GENERAL INFORMATION SECTION

FOREWORD

This service manual supplement has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicle.
Please study and then utilize this supplement together with LEGACY SERVICE MANUAL and SERVICE MANUAL SUPPLEMENTS published already.

When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

The star marks for referred title indexes represent:
- ☆1: Refer to 95MY Service Manual.
- ☆2: Refer to 96MY Service Manual Supplement.
- ☆3: Refer to 95MY Right Hand Drive Service Manual Supplement.
- ☆4: Refer to 96MY Right Hand Drive Service Manual Supplement.
- ☆5: Refer to 96MY Service Manual Supplement ABS 5.3 equipped model.
- ☆6: Refer to 96MY Service Manual Supplement enhanced evaporative emission control system equipped model.
- ☆7: Refer to 96MY Service Manual Supplement right hand drive vehicle enhanced evaporative emission control system equipped model.
- ☆8: Refer to 97MY Service Manual Supplement.
- ☆9: Refer to 97MY Service Manual Supplement for SUS model.
- ☆10: Refer to 97MY Service Manual Supplement for ABS 5.3i equipped model.
- ☆11: Refer to 97MY Service Manual Supplement for rear window defogger timer equippement model.
- ☆12: Refer to 98MY Service Manual Supplement.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

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SPECIFICATIONS 1-1

1. 4-door Sedan

A: DIMENSIONS

Model				2200			2500
				FWD	AWD		AWD
				L	L	LS	GT
Overall length			mm (in)	4,610 (181.5)			
Overall width			mm (in)	1,715 (67.5)			
Overall height (at CW)			mm (in)	1,405 (55.3)			
Compartment	Leg room	Front Max.	mm (in)	1,101 (43.3)			
		Rear Min.	mm (in)	880 (34.6)			
	Head room	Front Max.	mm (in)	987 (38.9), 944 (37.2)*1			
		Rear Min.	mm (in)	933 (36.7), 926 (36.5)*1			
	Shoulder room	Front Max.	mm (in)	1,373 (54.1)			
		Rear Min.	mm (in)	1,361 (53.6)			
Wheelbase			mm (in)	2,630 (103.5)			
Tread		Front	mm (in)	1,460 (57.5)			
		Rear	mm (in)	1,455 (57.3)			
Minimum road clearance		M.L.V.W.	mm (in)	115 (4.5)			MT: 110 (4.3) AT: 115 (4.5) AT LTD: 110 (4.3)
		C.W.	mm (in)	155 (6.1)			

*1: with sun roof

B: ENGINE

Model		2200	2500
Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
Valve arrangement		Overhead camshaft type	
Bore x Stroke	mm (in)	96.9 x 75.0 (3.815 x 2.953)	99.5 x 79.0 (3.917 x 3.110)
Displacement	cm^3 (cu in)	2,212 (135.0)	2,457 (149.9)
Compression ratio		9.7	9.7
Firing order		1 — 3 — 2 — 4	1 — 3 — 2 — 4
Idle speed at Park/Neutral position	rpm	700	700
Maximum output	kW (HP)/rpm	102 (137)/5,400	123 (165)/5,600
Maximum torque	N.m (kg-m, ft-lb)/rpm	196 (20.0, 145)/4,000	220 (22.4, 162)/4,000

C: ELECTRICAL

Model			2200	2500
Ignition timing at idling speed		BTDC/rpm	14°/700(MT), 20°/700 (AT)	15°/700
Spark plug	Type and manufacturer		CHAMPION: RC10YC4 (Standard) NGK: BKR6E-11 NIPPONDENSO: K20PR-U11	NGK: PFR5B-11
Generator			12V — 85A	
Battery	Reserve capacity	min	82 (MT), 100 (AT)	
	Cold cranking amperes	amp.	430 (MT), 490 (AT)	

D: TRANSMISSION

Model			2200			2500	
			FWD	AWD		AWD	
Transmission type			4AT*1	5MT*2	4AT*2	5MT*2	4AT*2
Clutch type			TCC	DSPD	TCC	DSPD	TCC
Gear ratio		1st	2.785	3.545	2.785	3.545	3.027
		2nd	1.545	2.111	1.545	2.111	1.619
		3rd	1.000	1.448	1.000	1.448	1.000
		4th	0.694	1.088	0.694	1.088	0.694
		5th	—	0.780	—	0.780	—
		Reverse	2.272	3.416	2.272	3.416	2.272
Reduction gear (Front drive)	1st reduction	Type of gear	Helical	—	Helical	—	Helical
		Gear ratio	1.000	—	1.000	—	1.000
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	3.900	3.900	4.111	4.111	4.444
Reduction gear (Rear drive)	Transfer reduction	Type of gear	—	Helical	—	Helical	—
		Gear ratio	—	1.000	—	1.000	—
	Final reduction	Type of gear	—	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	—	3.900	4.111	4.111	4.444

5MT*1: 5-forward speeds with synchromesh and 1-reverse
4AT*1: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse
5MT*2: 5-forward speeds with synchromesh and 1-reverse – with center differential and viscous coupling
4AT*2: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse – with hydraulically controlled transfer clutch
DSPD: Dry Single Plate Diaphragm
TCC: Torque Converter Clutch

E: STEERING

Type		Rack and Pinion
Turns, lock to lock		3.2
Minimum turning circle	m (ft)	Curb to curb: 10.6 (34.8), Wall to wall: 11.4 (37.4)

F: SUSPENSION

Front	Macpherson strut type, Independent, Coil spring
Rear	Dual link strut type, Independent, Coil spring

G: BRAKE

Model	without ABS	with ABS
Service brake system	Dual circuit hydraulic with vacuum suspended power unit	
Front	Ventilated disc brake	
Rear	Drum brake	Disc brake
Parking brake	Mechanical on rear brakes	

H: TIRE

Model	14 inch wheel	15 inch wheel	16 inch wheel
Size	P185/70R14 87S	P195/60R15 87H	P205/55R16 89H
Type	Steel belted radial, Tubeless		

I: CAPACITY

Model			2200			2500	
			FWD	AWD		AWD	
			4AT	5MT	4AT	5MT	4AT
Fuel tank		ℓ (US gal, Imp gal)	60 (15.9, 13.2)			60 (15.9, 13.2)	
Engine oil	Upper level	ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)			4.5 (4.7, 3.9)	
	Lower level	ℓ (US qt, Imp qt)	3.0 (3.2, 2.6)			3.5 (3.7, 3.1)	
Transmission gear oil		ℓ (US qt, Imp qt)	—	3.5 (3.7, 3.1)	—	3.5 (3.7, 3.1)	—
Automatic transmission fluid		ℓ (US qt, Imp qt)	7.9 (8.4, 7.0)	—	7.9 (8.4, 7.0)	—	9.5 (10, 8.4)
AT differential gear oil		ℓ (US qt, Imp qt)	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)
AWD rear differential gear oil		ℓ (US qt, Imp qt)	—	0.8 (0.8, 0.6)		0.8 (0.8, 0.6)	
Power steering fluid		ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)			0.7 (0.7, 0.6)	
Engine coolant		ℓ (US qt, Imp qt)	5.8 (6.1, 5.1)			6.0 (6.3, 5.3)	

J: WEIGHT

1. AMERICA SPEC. VEHICLE

Model			2200		
			FWD	AWD	
			L	L	
			4AT**1	5MT**4	4AT**4
Curb weight (C.W.)	Front	kg (lb)	744 (1,640)	730 (1,610)	764 (1,685)
	Rear	kg (lb)	510 (1,125)	578 (1,275)	580 (1,280)
	Total	kg (lb)	1,254 (2,765)	1,308 (2,885)	1,345 (2,965)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	937 (2,065)	950 (2,095)	
	Rear	kg (lb)	846 (1,865)	914 (2,015)	
	Total	kg (lb)	1,782 (3,930)	1,864 (4,110)	

Model			2500	
			AWD	
			GT	
			5MT**2	4AT**2
Curb weight (C.W.)	Front	kg (lb)	776 (1,710)	810 (1,785)
	Rear	kg (lb)	626 (1,380)	624 (1,375)
	Total	kg (lb)	1,401 (3,090)	1,433 (3,160)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	950 (2,095)	
	Rear	kg (lb)	927 (2,045)	
	Total	kg (lb)	1,878 (4,140)	

**1: Includes the weights of P/W, P/D, A/C and L+ pack.
**2: Includes the weights of P/W, P/D, A/C, C/C, ABS and S/R.
**3: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R and L/S.
**4: Includes the weights of P/W, P/D, A/C, C/C, ABS and L+ pack.
**5: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R, L/S and C/W.

NOTE:
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts	Power window (P/W)	Power door lock (P/D)	ABS (ABS)	Air conditioning (A/C)	Sun roof (S/R)	Cruise control (C/C)	L+ pack	Leather seat and security (L/S)	Cold weather pack (C/W)
Front kg (lb)	1.4 (3.1)	0.1 (0.2)	12.0 (26.4)	21.2 (46.6)	6.5 (14.3)	1.0 (2.2)	1.2 (2.6)	1.1 (2.4)	1.2 (2.7)
Rear kg (lb)	1.7 (3.7)	0.4 (0.9)	10.2 (22.4)	–2.0 (–4.4)	9.3 (20.5)	0.1 (0.2)	9.1 (20.1)	1.6 (3.6)	0.7 (1.5)
Total kg (lb)	3.1 (6.8)	0.5 (1.1)	22.2 (48.8)	19.2 (42.2)	15.8 (34.8)	1.1 (2.4)	10.3 (22.7)	2.7 (6.0)	1.9 (4.2)

2. CANADA SPEC. VEHICLE

Model			2200		2500	
			AWD		AWD	
			L		GT	
			5MT**4	4AT**4	5MT**2	4AT**2
Curb weight (C.W.)	Front	kg (lb)	730 (1,610)	764 (1,685)	776 (1,710)	810 (1,785)
	Rear	kg (lb)	578 (1,275)	581 (1,280)	625 (1,380)	623 (1,375)
	Total	kg (lb)	1,308 (2,885)	1,345 (2,965)	1,401 (3,090)	1,433 (3,160)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	950 (2,095)		950 (2,095)	
	Rear	kg (lb)	914 (2,015)		928 (2,045)	
	Total	kg (lb)	1,864 (4,110)		1,878 (4,140)	

**1: Includes the weights of P/W, P/D, A/C and L+ pack.
**2: Includes the weights of P/W, P/D, A/C, C/C, ABS and S/R.
**3: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R and L/S.
**4: Includes the weights of P/W, P/D, A/C, C/C, ABS and L+ pack.
**5: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R, L/S and C/W.

NOTE:
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts	Power window (P/W)	Power door lock (P/D)	ABS (ABS)	Air conditioning (A/C)	Sun roof (S/R)	Cruise control (C/C)	L+ pack	Leather seat and security (L/S)	Cold weather pack (C/W)
Front kg (lb)	1.4 (3.1)	0.1 (0.2)	12.0 (26.4)	21.2 (46.6)	6.5 (14.3)	1.0 (2.2)	1.2 (2.6)	1.1 (2.4)	1.2 (2.7)
Rear kg (lb)	1.7 (3.7)	0.4 (0.9)	10.2 (22.4)	–2.0 (–4.4)	9.3 (20.5)	0.1 (0.2)	9.1 (20.1)	1.6 (3.6)	0.7 (1.5)
Total kg (lb)	3.1 (6.8)	0.5 (1.1)	22.2 (48.8)	19.2 (42.2)	15.8 (34.8)	1.1 (2.4)	10.3 (22.7)	2.7 (6.0)	1.9 (4.2)

3. TAIWAN SPEC. VEHICLE

Model			2500		
			FWD	AWD	
			L	L	LS
			4AT**4	4AT**4	4AT**2
Curb weight (C.W.)	Front	kg (lb)	755 (1,665)	764 (1,685)	778 (1,715)
	Rear	kg (lb)	522 (1,150)	580 (1,280)	601 (1,325)
	Total	kg (lb)	1,277 (2,815)	1,345 (2,965)	1,379 (3,040)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	937 (2,065)	950 (2,095)	
	Rear	kg (lb)	846 (1,865)	914 (2,015)	
	Total	kg (lb)	1,782 (3,930)	1,864 (4,110)	

**1: Includes the weights of P/W, P/D, A/C and L+ pack.
**2: Includes the weights of P/W, P/D, A/C, C/C, ABS and S/R.
**3: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R and L/S.
**4: Includes the weights of P/W, P/D, A/C, C/C, ABS and L+ pack.
**5: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R, L/S and C/W.

NOTE:
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts	Power window (P/W)	Power door lock (P/D)	ABS (ABS)	Air conditioning (A/C)	Sun roof (S/R)	Cruise control (C/C)	L+ pack	Leather seat and security (L/S)	Cold weather pack (C/W)
Front kg (lb)	1.4 (3.1)	0.1 (0.2)	12.0 (26.4)	21.2 (46.6)	6.5 (14.3)	1.0 (2.2)	1.2 (2.6)	1.1 (2.4)	1.2 (2.7)
Rear kg (lb)	1.7 (3.7)	0.4 (0.9)	10.2 (22.4)	–2.0 (–4.4)	9.3 (20.5)	0.1 (0.2)	9.1 (20.1)	1.6 (3.6)	0.7 (1.5)
Total kg (lb)	3.1 (6.8)	0.5 (1.1)	22.2 (48.8)	19.2 (42.2)	15.8 (34.8)	1.1 (2.4)	10.3 (22.7)	2.7 (6.0)	1.9 (4.2)

2. Station Wagon

A: DIMENSIONS

Model				2200				
				FWD	AWD			
				L	POST	BRIGHTON	L	LS
Overall length			mm (in)	4,685 (184.4)				
Overall width			mm (in)	1,715 (67.5)				
Overall height			mm (in)	1,450 (57.1)				
Compartment	Leg room	Front Max.	mm (in)	1,101 (43.3)				
		Rear Min.	mm (in)	883 (34.8)				
	Head room	Front	mm (in)	1,004 (39.5), 968 (38.1)*1				
		Rear	mm (in)	985 (38.8), 957 (37.7)*1				
	Shoulder room	Front	mm (in)	1,373 (54.1)				
		Rear	mm (in)	1,361 (53.6)				
Wheelbase			mm (in)	2,630 (103.5)				
Tread		Front	mm (in)	1,460 (57.5)				
		Rear	mm (in)	1,450 (57.1)	1,455 (57.3)			
Minimum road clearance		M.L.V.W.	mm (in)	120 (4.7)				
		C.W.	mm (in)	155 (6.1)				

*1: with sun roof

Model				2500
				AWD
				GT
Overall length			mm (in)	4,685 (184.4)
Overall width			mm (in)	1,715 (67.5)
Overall height			mm (in)	1,450 (57.1)
Compartment	Leg room	Front Max.	mm (in)	1,101 (43.3)
		Rear Min.	mm (in)	883 (34.8)
	Head room	Front	mm (in)	1,004 (39.5), 968 (38.1)*1
		Rear	mm (in)	985 (38.8), 957 (37.7)*1
	Shoulder room	Front	mm (in)	1,373 (54.1)
		Rear	mm (in)	1,361 (53.6)
Wheelbase			mm (in)	2,630 (103.5)
Tread		Front	mm (in)	1,460 (57.5)
		Rear	mm (in)	1,455 (57.3)
Minimum road clearance		M.L.V.W.	mm (in)	MT: 115 (4.5) AT: 120 (4.7)
		C.W.	mm (in)	155 (6.1)

*1: with sun roof

B: ENGINE

Model		2200	2500
Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
Valve arrangement		Overhead camshaft type	
Bore x Stroke	mm (in)	96.9 x 75.0 (3.815 x 2.953)	99.5 x 79.0 (3.917 x 3.110)
Displacement	cm^3 (cu in)	2,212 (135.0)	2,457 (149.9)
Compression ratio		9.7	9.7
Firing order		1 — 3 — 2 — 4	1 — 3 — 2 — 4
Idle speed at Park/Neutral position	rpm	700	700
Maximum output	kW (HP)/rpm	102 (137)/5,400	123 (165)/5,600
Maximum torque	N.m (kg-m, ft-lb)/rpm	196 (20.0, 145)/4,000	220 (22.4, 162)/4,000

C: ELECTRICAL

Model		2200	2500
Ignition timing at idling speed BTDC/rpm		14°/700 (MT), 20°/700 (AT)	15°/700
Spark plug	Type and manufacturer	CHAMPION: RC10YC4 (Standard) NGK: BKR6E-11 NIPPONDENSO: K20PR-U11	NGK: PFR5B-11
Generator		12V — 85A	
Battery	Reserve capacity min	82 (MT), 100 (AT)	
	Cold cranking amperes amp.	430 (MT), 490 (AT)	

D: TRANSMISSION

Model			2200			2500	
			FWD	AWD		AWD	
Transmission type			4AT*1	5MT*2	4AT*2	5MT*2	4AT*2
Clutch type			TCC	DSPD	TCC	DSPD	TCC
Gear ratio		1st	2.785	3.545	2.785	3.545	3.027
		2nd	1.545	2.111	1.545	2.111	1.619
		3rd	1.000	1.448	1.000	1.448	1.000
		4th	0.694	1.088	0.694	1.088	0.694
		5th	—	0.780	—	0.780	—
		Reverse	2.272	3.416	2.272	3.416	2.272
Reduction gear (Front drive)	1st reduction	Type of gear	Helical	—	Helical	—	Helical
		Gear ratio	1.000	—	1.000	—	1.000
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	3.900	3.900	4.111	4.111	4.444
Reduction gear (Rear drive)	Transfer reduction	Type of gear	—	Helical	—	Helical	—
		Gear ratio	—	1.000	—	1.000	—
	Final reduction	Type of gear	—	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	—	3.900	4.111	4.111	4.444

4AT*1: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse
5MT*2: 5-forward speeds with synchromesh and 1-reverse – with center differential and viscous coupling
4AT*2: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse – with hydraulically controlled transfer clutch
DSPD: Dry Single Plate Diaphragm
TCC: Torque Converter Clutch

E: STEERING

Type	Rack and Pinion
Turns, lock to lock	3.2
Minimum turning circle m (ft)	Curb to curb: 10.6 (34.8), Wall to wall: 11.4 (37.4)

F: SUSPENSION

Front	Macpherson strut type, Independent, Coil spring
Rear	Dual link strut type, Independent, Coil spring

G: BRAKE

Model	without ABS	with ABS
Service brake system	Dual circuit hydraulic with vacuum suspended power unit	
Front	Ventilated disc brake	
Rear	Drum brake	Disc brake
Parking brake	Mechanical on rear brakes	

H: TIRE

Model	14 inch wheel	15 inch wheel	16 inch wheel
Size	P185/70R14 87S	P195/60R15 87H	P205/55R16 89H
Type	Steel belted radial, Tubeless		

I: CAPACITY

Model			2200			2500	
			FWD	AWD		AWD	
			4AT	5MT	4AT	5MT	4AT
Fuel tank		ℓ (US gal, Imp gal)	60 (15.9, 13.2)			60 (15.9, 13.2)	
Engine oil	Upper level	ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)			4.5 (4.7, 3.9)	
	Lower level	ℓ (US qt, Imp qt)	3.0 (3.2, 2.6)			3.5 (3.7, 3.1)	
Transmission gear oil		ℓ (US qt, Imp qt)	—	3.5 (3.7, 3.1)	—	3.5 (3.7, 3.1)	—
Automatic transmission fluid		ℓ (US qt, Imp qt)	7.9 (8.4, 7.0)	—	7.9 (8.4, 7.0)	—	9.5 (10, 8.4)
AT differential gear oil		ℓ (US qt, Imp qt)	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)
AWD rear differential gear oil		ℓ (US qt, Imp qt)	—	0.8 (0.8, 0.6)		0.8 (0.8, 0.6)	
Power steering fluid		ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)			0.7 (0.7, 0.6)	
Engine coolant		ℓ (US qt, Imp qt)	5.8 (6.1, 5.1)			6.0 (6.3, 5.3)	

J: WEIGHT

1. AMERICA SPEC. VEHICLE

Model			2200					
			FWD	AWD				
			L	POST	BRIGHTON		L	
			4AT**1	4AT**3	5MT**5	4AT**5	5MT**4	4AT**4
Curb weight (C.W.)	Front	kg (lb)	735 (1,620)	753 (1,660)	707 (1,560)	744 (1,640)	723 (1,595)	760 (1,675)
	Rear	kg (lb)	562 (1,240)	619 (1,365)	610 (1,345)	615 (1,355)	626 (1,380)	630 (1,390)
	Total	kg (lb)	1,297 (2,860)	1,372 (3,025)	1,317 (2,905)	1,358 (2,995)	1,349 (2,975)	1,390 (3,065)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	913 (2,015)	937 (2,065)				
	Rear	kg (lb)	959 (2,115)	989 (2,180)				
	Total	kg (lb)	1,873 (4,130)	1,925 (4,245)				

Model			2500	
			AWD	
			GT	
			5MT**2	4AT**2
Curb weight (C.W.)	Front	kg (lb)	771 (1,700)	805 (1,775)
	Rear	kg (lb)	671 (1,480)	669 (1,475)
	Total	kg (lb)	1,442 (3,180)	1,474 (3,250)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	937 (2,065)	
	Rear	kg (lb)	1,002 (2,210)	
	Total	kg (lb)	1,939 (4,275)	

**1: Includes the weights of P/W, P/D, A/C and L+ pack.
**2: Includes the weights of P/W, P/D, A/C, C/C, ABS and S/R.
**3: Includes the weights of P/W, P/D and A/C.
**4: Includes the weights of P/W, P/D, A/C, C/C, ABS and L+ pack.
**5: Includes the weight of A/C.
**6: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R and L/S.
**7: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R, L/S and C/W.

NOTE:
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts	Power window (P/W)	Power door lock (P/D)	ABS (ABS)	Air conditioning (A/C)	Sun roof (S/R)	Cruise control (C/C)	L+ pack	Leather seat and security (L/S)	Cold weather pack (C/W)
Front kg (lb)	1.4 (3.1)	0.1 (0.2)	12.0 (26.4)	21.2 (46.7)	6.5 (14.3)	1.0 (2.2)	0.6 (1.3)	1.1 (2.4)	1.2 (2.7)
Rear kg (lb)	1.7 (3.7)	0.4 (0.9)	10.2 (22.4)	–2.0 (–4.4)	9.3 (20.5)	0.1 (0.2)	0.9 (2.0)	1.6 (3.6)	0.7 (1.5)
Total kg (lb)	3.1 (6.8)	0.5 (1.1)	22.2 (48.8)	19.2 (42.3)	15.8 (34.8)	1.1 (2.4)	1.5 (3.3)	2.7 (6.0)	1.9 (4.2)

2. CANADA SPEC. VEHICLE

Model			2200			
			AWD			
			BRIGHTON		L	
			5MT	4AT	5MT**4	4AT**4
Curb weight (C.W.)	Front	kg (lb)	687 (1,515)	723 (1,595)	723 (1,595)	760 (1,675)
	Rear	kg (lb)	612 (1,350)	617 (1,360)	626 (1,380)	630 (1,390)
	Total	kg (lb)	1,299 (2,865)	1,340 (2,955)	1,349 (2,975)	1,390 (3,065)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	937 (2,065)			
	Rear	kg (lb)	990 (2,180)			
	Total	kg (lb)	1,927 (4,245)			

Model			2500	
			AWD	
			GT	
			5MT**2	4AT**2
Curb weight (C.W.)	Front	kg (lb)	771 (1,700)	805 (1,775)
	Rear	kg (lb)	671 (1,480)	669 (1,475)
	Total	kg (lb)	1,442 (3,180)	1,474 (3,250)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	937 (2,065)	
	Rear	kg (lb)	1,002 (2,210)	
	Total	kg (lb)	1,939 (4,275)	

**1: Includes the weights of P/W, P/D, A/C and L+ pack.
**2: Includes the weights of P/W, P/D, A/C, C/C, ABS and S/R.
**3: Includes the weights of P/W, P/D and A/C.
**4: Includes the weights of P/W, P/D, A/C, C/C, ABS and L+ pack.
**5: Includes the weight of A/C.
**6: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R and L/S.
**7: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R, L/S and C/W.

NOTE:
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts	Power window (P/W)	Power door lock (P/D)	ABS (ABS)	Air conditioning (A/C)	Sun roof (S/R)	Cruise control (C/C)	L+ pack	Leather seat and security (L/S)	Cold weather pack (C/W)
Front kg (lb)	1.4 (3.1)	0.1 (0.2)	12.0 (26.4)	21.2 (46.7)	6.5 (14.3)	1.0 (2.2)	0.6 (1.3)	1.1 (2.4)	1.2 (2.7)
Rear kg (lb)	1.7 (3.7)	0.4 (0.9)	10.2 (22.4)	–2.0 (–4.4)	9.3 (20.5)	0.1 (0.2)	0.9 (2.0)	1.6 (3.6)	0.7 (1.5)
Total kg (lb)	3.1 (6.8)	0.5 (1.1)	22.2 (48.8)	19.2 (42.3)	15.8 (34.8)	1.1 (2.4)	1.5 (3.3)	2.7 (6.0)	1.9 (4.2)

3. TAIWAN SPEC. VEHICLE

Model			2500		
			FWD	AWD	
			L	L	LS
			4AT**4	4AT**4	4AT**2
Curb weight (C.W.)	Front	kg (lb)	748 (1,650)	760 (1,675)	773 (1,705)
	Rear	kg (lb)	571 (1,260)	630 (1,390)	646 (1,425)
	Total	kg (lb)	1,320 (2,910)	1,390 (3,065)	1,420 (3,130)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	914 (2,015)	937 (2,065)	
	Rear	kg (lb)	959 (2,115)	989 (2,180)	
	Total	kg (lb)	1,873 (4,130)	1,925 (4,245)	

**1: Includes the weights of P/W, P/D, A/C and L+ pack.
**2: Includes the weights of P/W, P/D, A/C, C/C, ABS and S/R.
**3: Includes the weights of P/W, P/D and A/C.
**4: Includes the weights of P/W, P/D, A/C, C/C, ABS and L+ pack.
**5: Includes the weight of A/C.
**6: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R and L/S.
**7: Includes the weights of P/W, P/D, A/C, C/C, ABS, S/R, L/S and C/W.

NOTE:
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts	Power window (P/W)	Power door lock (P/D)	ABS (ABS)	Air conditioning (A/C)	Sun roof (S/R)	Cruise control (C/C)	L+ pack	Leather seat and security (L/S)	Cold weather pack (C/W)
Front kg (lb)	1.4 (3.1)	0.1 (0.2)	12.0 (26.4)	21.2 (46.7)	6.5 (14.3)	1.0 (2.2)	0.6 (1.3)	1.1 (2.4)	1.2 (2.7)
Rear kg (lb)	1.7 (3.7)	0.4 (0.9)	10.2 (22.4)	–2.0 (–4.4)	9.3 (20.5)	0.1 (0.2)	0.9 (2.0)	1.6 (3.6)	0.7 (1.5)
Total kg (lb)	3.1 (6.8)	0.5 (1.1)	22.2 (48.8)	19.2 (42.3)	15.8 (34.8)	1.1 (2.4)	1.5 (3.3)	2.1 (6.0)	1.9 (4.2)

3. OUTBACK

A: DIMENSIONS

Model				2500	
				AWD	
				5MT	4AT
Overall length			mm (in)	4,720 (185.8)	
Overall width			mm (in)	1,715 (67.5)	
Overall height			mm (in)	1,555 (61.2)	
Compartment	Leg room	Front Max.	mm (in)	1,101 (43.3)	
		Rear Min.	mm (in)	883 (34.8)	
	Head room	Front	mm (in)	1,021 (40.2), 977 (38.5)*1	
		Rear	mm (in)	995 (39.2), 939 (37.0)*1	
	Shoulder room	Front	mm (in)	1,373 (54.1)	
		Rear	mm (in)	1,361 (53.6)	
Wheelbase			mm (in)	2,630 (103.5)	
Tread		Front	mm (in)	1,455 (57.3)	
		Rear	mm (in)	1,450 (57.1)	
Minimum road clearance		M.L.V.W.	mm (in)	145 (5.7)	150 (5.9), 145 (5.7)*2
		C.W.	mm (in)	185 (7.3)	

*1: with sun roof
*2: LTD model

B: ENGINE

Model	2500
Engine type	Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
Valve arrangement	Overhead camshaft type
Bore x Stroke mm (in)	99.5 x 79.0 (3.917 x 3.110)
Displacement cm^3 (cu in)	2,457 (149.9)
Compression ratio	9.7
Firing order	1 — 3 — 2 — 4
Idle speed at Park/Neutral position rpm	700
Maximum output kW (HP)/rpm	123 (165)/5,600
Maximum torque N.m (kg-m, ft-lb)/rpm	220 (22.4, 162)/4,000

C: ELECTRICAL

Model		2500
Ignition timing at idling speed	BTDC/rpm	15°/700
Spark plug	Type and manufacturer	NGK: PFR5B-11
Generator		12V — 85A
Battery	Reserve capacity min	82 (MT), 100 (AT)
	Cold cranking amperes amp.	430 (MT), 490 (AT)

D: TRANSMISSION

Model			2500	
			AWD	
Transmission type			5MT	4AT
Clutch type			DSPD	TCC
Gear ratio		1st	3.545	3.027
		2nd	2.111	1.619
		3rd	1.448	1.000
		4th	1.088	0.694
		5th	0.871	—
		Reverse	3.416	2.272
Reduction gear (Front drive)	1st reduction	Type of gear	—	Helical
		Gear ratio	—	1.000
	Final reduction	Type of gear	Hypoid	Hypoid
		Gear ratio	4.111	4.444
Reduction gear (Rear drive)	Transfer reduction	Type of gear	Helical	—
		Gear ratio	1.000	—
	Final reduction	Type of gear	Hypoid	Hypoid
		Gear ratio	4.111	4.444

5MT: 5-forward speeds with synchromesh and 1-reverse – with center differential and viscous coupling
4AT: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse – with hydraulically controlled transfer clutch
DSPD: Dry Single Plate Diaphragm
TCC: Torque Converter Clutch

E: STEERING

Type	Rack and Pinion
Turns, lock to lock	3.4
Minimum turning circle m (ft)	Curb to curb: 11.2 (36.7), Wall to wall: 12.0 (39.4)

F: SUSPENSION

Front	Macpherson strut type, Independent, Coil spring
Rear	Dual link strut type, Independent, Coil spring

G: BRAKE

Model	with ABS
Service brake system	Dual circuit hydraulic with vacuum suspended power unit
Front	Ventilated disc brake
Rear	Disc brakes
Parking brake	Mechanical on rear brakes

H: TIRE

Model	15 inch wheel
Size	P205/70R15 95S
Type	Steel belted radial, Tubeless

I: CAPACITY

Model			2500	
			AWD	
			5MT	4AT
Fuel tank		ℓ (US gal, Imp gal)	60 (15.9, 13.2)	
Engine oil	Upper level	ℓ (US qt, Imp qt)	4.5 (4.7, 3.9)	
	Lower level	ℓ (US qt, Imp qt)	3.5 (3.7, 3.1)	
Transmission gear oil		ℓ (US qt, Imp qt)	3.5 (3.7, 3.1)	—
Automatic transmission fluid		ℓ (US qt, Imp qt)	—	9.5 (10, 8.4)
AT differential gear oil		ℓ (US qt, Imp qt)	—	1.2 (1.3, 1.1)
AWD rear differential gear oil		ℓ (US qt, Imp qt)	0.8 (0.8, 0.6)	
Power steering fluid		ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)	
Engine coolant		ℓ (US qt, Imp qt)	6.0 (6.3, 5.3)	

J: WEIGHT

1. AMERICA SPEC. VEHICLE

Model			2500	
			AWD	
			OUTBACK	
			5MT**1	4AT**1
Curb weight (C.W.)	Front	kg (lb)	766 (1,690)	798 (1,760)
	Rear	kg (lb)	664 (1,465)	662 (1,460)
	Total	kg (lb)	1,431 (3,155)	1,460 (3,220)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	937 (2,065)	
	Rear	kg (lb)	1,002 (2,210)	
	Total	kg (lb)	1,939 (4,275)	

**1: Includes the weights of P/W, P/D, A/C, C/C, and ABS.
**2: Includes the weights of P/W, P/D, A/C, C/C, ABS and C/W.

NOTE:
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts	Power window (P/W)	Power door lock (P/D)	ABS	Air conditioning (A/C)	Sun roof (S/R)	Cruise control (C/C)	Leather seat and security (L/S)	Cold weather pack (C/W)	Side air bag (S/A)
Front kg (lb)	1.4 (3.1)	0.1 (0.2)	12.0 (26.4)	21.2 (46.7)	10.9 (24.0)	1.0 (2.2)	1.1 (2.4)	1.2 (2.7)	3.0 (6.6)
Rear kg (lb)	1.7 (3.7)	0.4 (0.9)	10.2 (22.4)	–2.0 (–4.4)	18.0 (39.7)	0.1 (0.2)	1.6 (3.6)	0.7 (1.5)	2.4 (5.3)
Total kg (lb)	3.1 (6.8)	0.5 (1.1)	22.2 (48.8)	19.2 (42.3)	28.9 (63.7)	1.1 (2.4)	2.7 (6.0)	1.9 (4.2)	5.4 (11.9)

2. CANADA SPEC. VEHICLE

Model			2500	
			AWD	
			OUTBACK	
			5MT**2	4AT**2
Curb weight (C.W.)	Front	kg (lb)	769 (1,695)	801 (1,765)
	Rear	kg (lb)	664 (1,465)	662 (1,460)
	Total	kg (lb)	1,433 (3,160)	1,463 (3,225)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	937 (2,065)	
	Rear	kg (lb)	1,002 (2,210)	
	Total	kg (lb)	1,939 (4,275)	

**1: Includes the weights of P/W, P/D, A/C, C/C, and ABS.
**2: Includes the weights of P/W, P/D, A/C, C/C, ABS and C/W.

NOTE:
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts	Power window (P/W)	Power door lock (P/D)	ABS	Air conditioning (A/C)	Sun roof (S/R)	Cruise control (C/C)	Leather seat and security (L/S)	Cold weather pack (C/W)
Front kg (lb)	1.4 (3.1)	0.1 (0.2)	12.0 (26.4)	21.2 (46.7)	10.9 (24.0)	1.0 (2.2)	1.1 (2.4)	1.2 (2.7)
Rear kg (lb)	1.7 (3.7)	0.4 (0.9)	10.2 (22.4)	–2.0 (–4.4)	18.0 (39.7)	0.1 (0.2)	1.6 (3.6)	0.7 (1.5)
Total kg (lb)	3.1 (6.8)	0.5 (1.1)	22.2 (48.8)	19.2 (42.3)	28.9 (63.7)	1.1 (2.4)	2.7 (6.0)	1.9 (4.2)

4. SUS (Sports Utility Sedan)

A: DIMENSIONS

Model				2500
				AWD
				4AT
Overall length			mm (in)	4,635 (182.5)
Overall width			mm (in)	1,715 (67.5)
Overall height			mm (in)	1,470 (57.9)
Compartment	Leg room	Front Max.	mm (in)	1,101 (43.3)
		Rear Min.	mm (in)	880 (34.6)
	Head room	Front Max.	mm (in)	987 (38.9)
		Rear Min.	mm (in)	933 (36.7)
	Shoulder room	Front Max.	mm (in)	1,373 (54.1)
		Rear Min.	mm (in)	1,361 (53.6)
Wheelbase			mm (in)	2,630 (103.5)
Tread		Front	mm (in)	1,455 (57.3)
		Rear	mm (in)	1,450 (57.1)
Minimum road clearance		M.L.V.W.	mm (in)	150 (5.9)
		C.W.	mm (in)	185 (7.3)

B: ENGINE

Model		2500
Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
Valve arrangement		Overhead camshaft type
Bore x Stroke	mm (in)	99.5 x 79.0 (3.917 x 3.110)
Displacement	cm^3 (cu in)	2,457 (149.9)
Compression ratio		9.7
Firing order		1 — 3 — 2 — 4
Idle speed at Park/Neutral position	rpm	700
Maximum output	kW (HP)/rpm	123 (165)/5,600
Maximum torque	N.m (kg-m, ft-lb)/rpm	220 (22.4, 162)/4,000

C: ELECTRICAL

Model			2500
Ignition timing at idling speed		BTDC/rpm	15°/700
Spark plug	Type and manufacturer		NGK: PFR5B-11
Generator			12V — 85A
Battery	Reserve capacity	min	100
	Cold cranking amperes	amp.	490

D: TRANSMISSION

Model			2500
			AWD
Transmission type			4AT
Clutch type			TCC
Gear ratio		1st	3.027
		2nd	1.619
		3rd	1.000
		4th	0.694
		5th	—
		Reverse	2.272
Reduction gear (Front drive)	1st reduction	Type of gear	Helical
		Gear ratio	1.000
	Final reduction	Type of gear	Hypoid
		Gear ratio	4.444
Reduction gear (Rear drive)	Transfer reduction	Type of gear	—
		Gear ratio	—
	Final reduction	Type of gear	Hypoid
		Gear ratio	4.444

4AT: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse – with hydraulically controlled transfer clutch
TCC: Torque Converter Clutch

E: STEERING

Type	Rack and Pinion
Turns, lock to lock	3.4
Minimum turning circle m (ft)	Curb to curb: 11.2 (36.7), Wall to wall: 12.0 (39.4)

F: SUSPENSION

Front	Macpherson strut type, Independent, Coil spring
Rear	Dual link strut type, Independent, Coil spring

G: BRAKE

Model	with ABS
Service brake system	Dual circuit hydraulic with vacuum suspended power unit
Front	Ventilated disc brake
Rear	Disc brakes
Parking brake	Mechanical on rear brakes

H: TIRE

Model	15 inch wheel
Size	P205/70R15 95S
Type	Steel belted radial, Tubeless

I: CAPACITY

Model			2500
			AWD
			4AT
Fuel tank		ℓ (US gal, Imp gal)	60 (15.9, 13.2)
Engine oil	Upper level	ℓ (US qt, Imp qt)	4.5 (4.7, 3.9)
	Lower level	ℓ (US qt, Imp qt)	3.5 (3.7, 3.1)
Transmission gear oil		ℓ (US qt, Imp qt)	—
Automatic transmission fluid		ℓ (US qt, Imp qt)	9.5 (10, 8.4)
AT differential gear oil		ℓ (US qt, Imp qt)	1.2 (1.3, 1.1)
AWD rear differential gear oil		ℓ (US qt, Imp qt)	0.8 (0.8, 0.6)
Power steering fluid		ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)
Engine coolant		ℓ (US qt, Imp qt)	6.0 (6.3, 5.3)

J: WEIGHT

1. AMERICA SPEC. VEHICLE

Model			2500
			AWD
			SUS
			4AT**[1]
Curb weight (C.W.)	Front	kg (lb)	800 (1,770)
	Rear	kg (lb)	615 (1,355)
	Total	kg (lb)	1,415 (3,125)
Gross vehicle weight (G.V.W.)	Front	kg (lb)	950 (2,095)
	Rear	kg (lb)	925 (2,045)
	Total	kg (lb)	1,875 (4,140)

**[1]: Includes the weights of P/W, P/D, A/C, C/C, and ABS.

NOTE:
When any of the following optional parts are installed, add the weight to the curb weight.

Weight of optional parts		Power window (P/W)	Power door lock (P/D)	ABS	Air conditioning (A/C)	Cruise control (C/C)	Cold weather pack (C/W)
Front	kg (lb)	1.4 (3.1)	0.1 (0.2)	12.0 (26.4)	21.2 (46.6)	1.0 (2.2)	1.2 (2.7)
Rear	kg (lb)	1.7 (3.7)	0.4 (0.9)	10.2 (22.4)	–2.0 (–4.4)	0.1 (0.2)	0.7 (1.5)
Total	kg (lb)	3.1 (6.8)	0.5 (1.1)	22.2 (48.8)	19.2 (42.2)	1.1 (2.4)	1.9 (4.2)

GENERAL INFORMATION 1-3

Page

2. Precaution for Supplemental Restraint System (Airbag)

The Supplemental Restraint System (Airbag) has been implemented in some Subaru vehicles. For proper and safe maintenance of this system, please ensure that you carefully read the precautionary notes given in "5-5 SUPPLEMENTAL RESTRAINT SYSTEM" in the Service Manual before servicing.
It should also be noted that in the SM table of contents, an AIRBAG mark is added to each of the items which do not directly concern the airbag system but need to be considered in their relationship to it. So, during the service work for such items, make sure you refer to "5-5 SUPPLEMENTAL RESTRAINT SYSTEM".

- **Take utmost care to follow faithfully the service procedures specified for the airbag, since otherwise it might deploy unexpectedly.**
- **With the airbag system, failures such as faulty connection of harness connectors or neglect of tightening sensor mounting bolts can lead to failure of deployment in an accident. Recheck each check point after maintenance work and use the on-board self-diagnosis to ensure there is nothing wrong with the system.**
- **All wire harnesses of the airbag system are encased in a yellow cover to make them distinct from those of other systems.**

The following are the parts involved in the airbag installation:
1) Steering wheel
2) Steering column
3) Toe-board (center, left & right ends)
4) Front seat floor and side sill
5) Inside left and right front fenders (OUTBACK model only)
6) Front pillar (left, lower)
7) Combination meter
8) Instrument Panel

Care should be taken when servicing in areas where the above parts are installed since it can affect the airbag system.

- Examples of service work involving the airbag system:

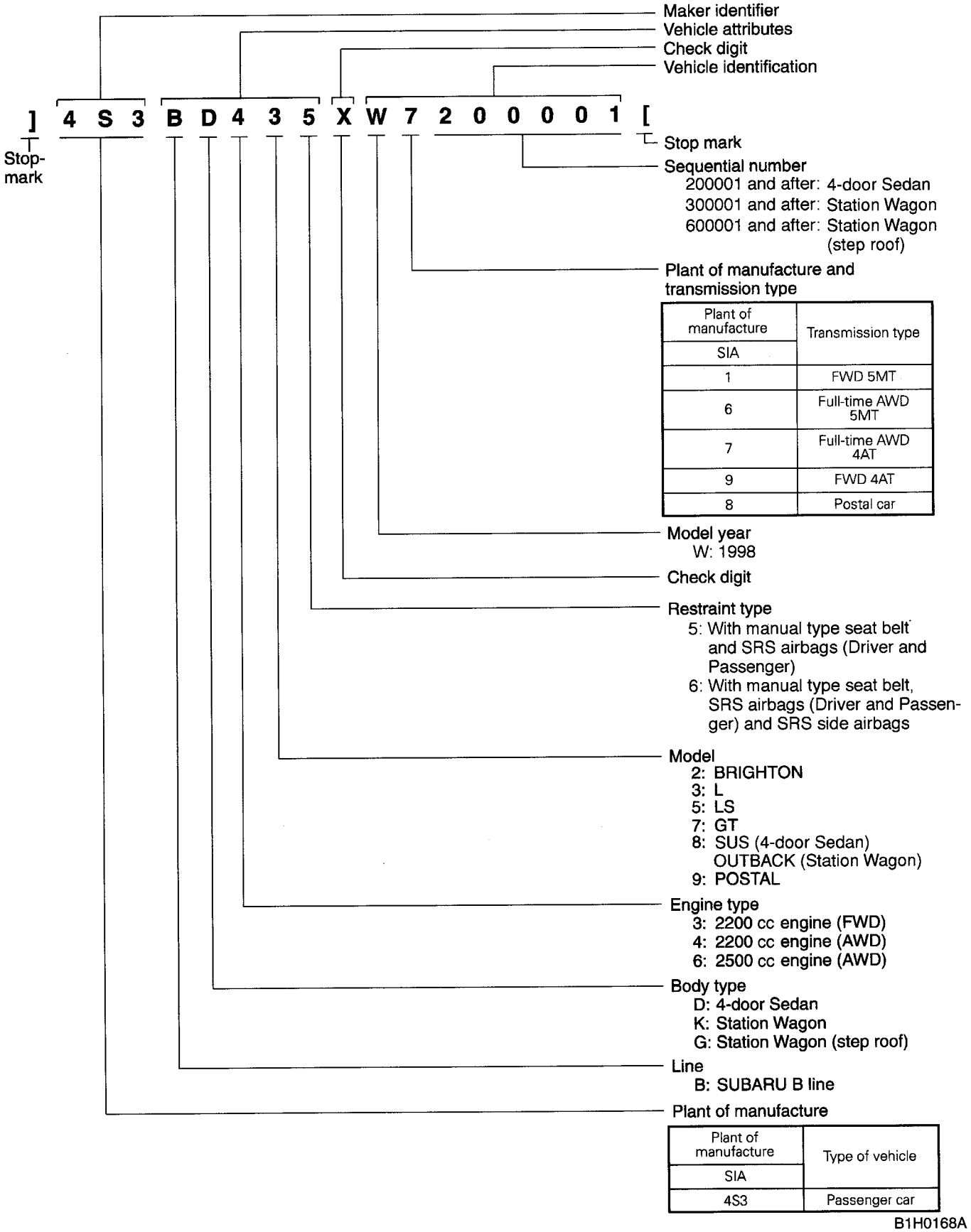
1) Replacement of steering gear
2) Steering maintenance and repair of the area adjoining toe-board
3) Removal and installation of combination meter
4) Installation of car stereo and other optional extras
5) Sheet metal repair paint work on the body front (OUTBACK model only)

3. Vehicle Identification Numbers (V.I.N)

A: APPLICABLE V.I.N. IN THIS MANUAL

4-door Sedan	2200 cc engine	L	4AT	4	S	3	B	D	3	3	5	X	W	9	2	0	0	0	0	1 and after
		AWD L	5MT	4	S	3	B	D	4	3	5	X	W	6	2	0	0	0	0	1 and after
			4AT	4	S	3	B	D	4	3	5	X	W	7	2	0	0	0	0	1 and after
		AWD LS	4AT	4	S	3	B	D	4	5	5	X	W	7	2	0	0	0	0	1 and after
	2500 cc engine	AWD GT	5MT	4	S	3	B	D	6	7	5	X	W	6	2	0	0	0	0	1 and after
			4AT	4	S	3	B	D	6	7	5	X	W	7	2	0	0	0	0	1 and after
		AWD SUS	4AT	4	S	3	B	D	6	8	5	X	W	7	2	0	0	0	0	1 and after
Station Wagon	2200 cc engine	L	4AT	4	S	3	B	K	3	3	5	X	W	9	3	0	0	0	0	1 and after
		AWD POST	4AT	4	S	3	B	K	4	9	5	X	W	8	3	0	0	0	0	1 and after
		AWD BRIGHTON	5MT	4	S	3	B	K	4	2	5	X	W	6	3	0	0	0	0	1 and after
			4AT	4	S	3	B	K	4	2	5	X	W	7	3	0	0	0	0	1 and after
		AWD L	5MT	4	S	3	B	K	4	3	5	X	W	6	3	0	0	0	0	1 and after
			4AT	4	S	3	B	K	4	3	5	X	W	7	3	0	0	0	0	1 and after
		AWD LS	4AT	4	S	3	B	K	4	5	5	X	W	7	3	0	0	0	0	1 and after
	2500 cc engine	AWD GT	5MT	4	S	3	B	K	6	7	5	X	W	6	3	0	0	0	0	1 and after
			4AT	4	S	3	B	K	6	7	5	X	W	7	3	0	0	0	0	1 and after
		AWD OUTBACK	5MT	4	S	3	B	G	6	8	5	X	W	6	6	0	0	0	0	1 and after
			4AT	4	S	3	B	G	6	8	5	X	W	7	6	0	0	0	0	1 and after
		AWD OUTBACK with SRS side airbags	5MT	4	S	3	B	G	6	8	6	X	W	6	6	0	0	0	0	1 and after
			4AT	4	S	3	B	G	6	8	6	X	W	7	6	0	0	0	0	1 and after

B: THE MEANING OF V.I.N



Plant of manufacture	Transmission type
SIA	
1	FWD 5MT
6	Full-time AWD 5MT
7	Full-time AWD 4AT
9	FWD 4AT
8	Postal car

Plant of manufacture	Type of vehicle
SIA	
4S3	Passenger car

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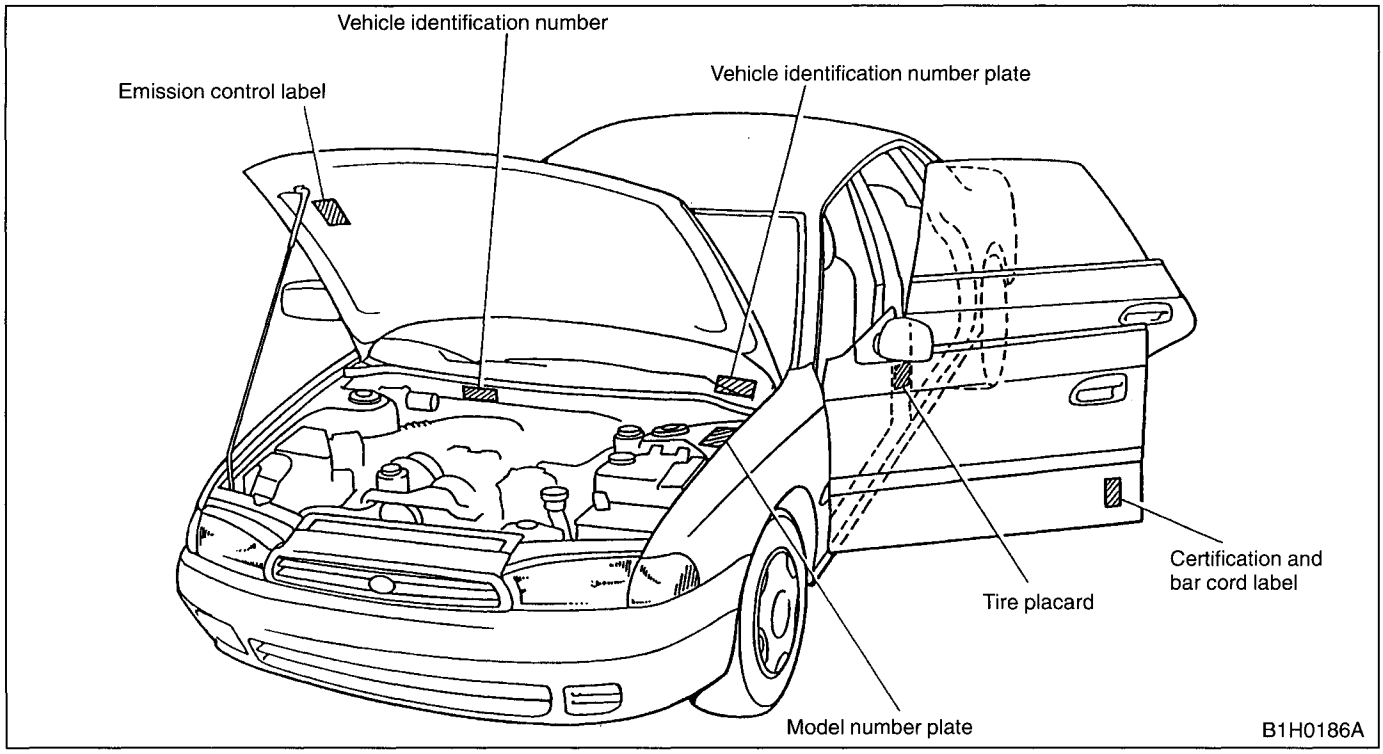
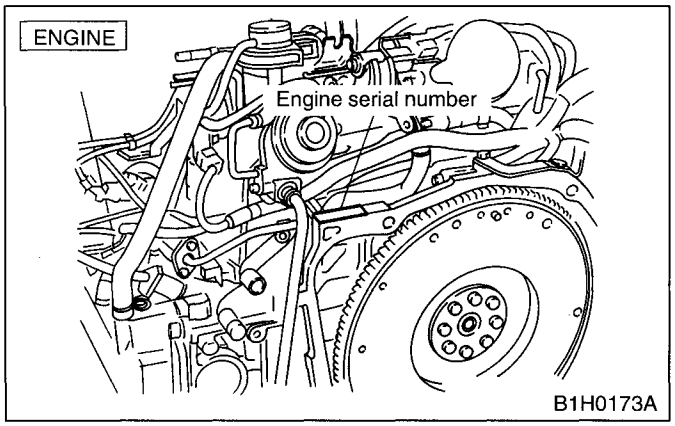
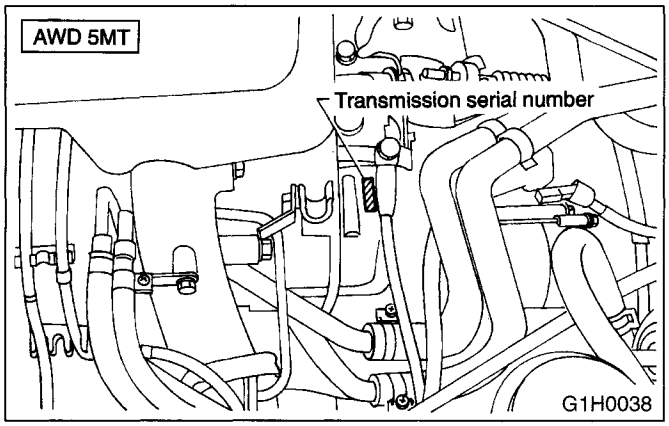
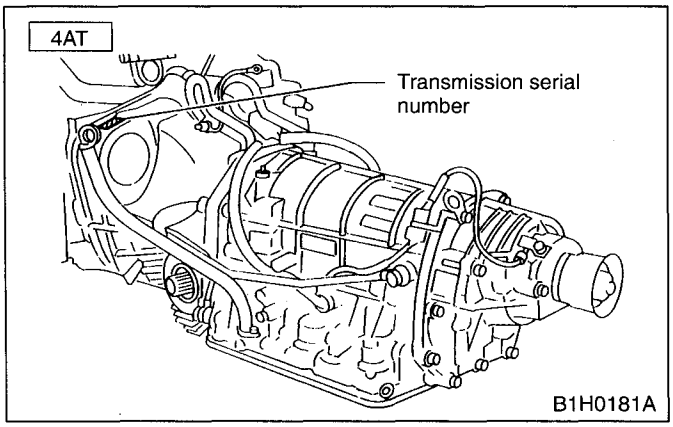
4. Identification Number and Label Locations

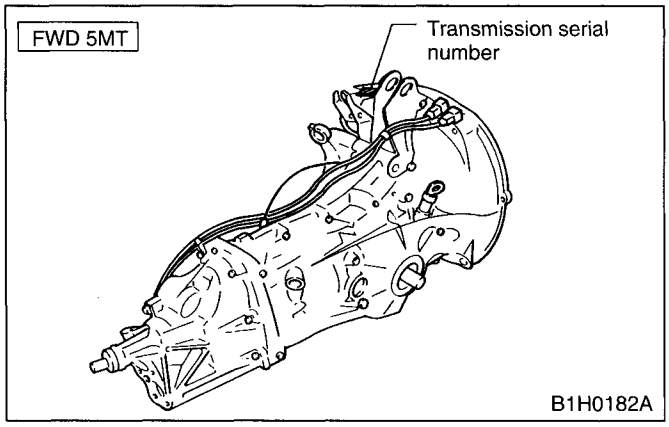
Engine, transmission and vehicle identification numbers are used for factory communications such as Technical Information, Service Bulletins and other information.











5. Recommended Fuel, Lubricants, Sealants and Adhesives

A: FUEL

1. FUEL OCTANE RATING

SUBARU engines are designed to use only unleaded gasoline with an octane rating of 87 AKI or higher. [This octane rating is the average of the Research Octane and Motor Octane numbers and is commonly referred to as the Anti-Knock Index (AKI).] Using a gasoline with a lower octane rating can cause persistent and heavy knocking, which can damage the engine. Do not be concerned if SUBARU vehicle sometimes knocks lightly when you drive up a hill or when you accelerate. See your dealer or a qualified service technician if you use a gasoline with the specified octane rating and SUBARU vehicle knocks heavily or persistently.

2. UNLEADED GASOLINE

The neck of the fuel filler pipe is designed to accept only an unleaded gasoline filler nozzle. Under no circumstances should leaded gasoline be used since it will damage the emission control system and may impair driveability and fuel economy.

3. GASOLINE FOR CALIFORNIA-CERTIFIED TLEV

If SUBARU vehicle is a California-certified Traditional Low Emission Vehicle (TLEV) as indicated on the underhood tune-up label, it is designed to optimize engine and emission control system performance with gasolines that meet California specifications. SUBARU vehicle will operate on gasoline meeting federal specifications.

B: FUELS CONTAINING ALCOHOL

Your use of gasoline with detergent additives will help prevent deposits from forming in your engine and fuel system. This helps keep your engine in tune and your emission control system working properly, and is a way of doing your part for cleaner air.
Many gasolines are now blended with materials called oxygenates. Use of these fuels can also help keep the air cleaner. SUBARU approves the use of oxygenated blend fuels, such as MTBE (Methyl Tertiary Butyl Ether) or ethanol (ethyl or grain alcohol). These blended fuels should contain no more than 15% MTBE or 10% ethanol for the proper operation of your SUBARU.
In addition, some gasoline suppliers are now producing reformulated gasolines, which are designed to reduce vehicle emissions. SUBARU approves the use of reformulated gasoline.
If you are not sure what the fuel contains, you should ask your service station operators if their gasolines contain detergents and oxygenates and if they have been reformulated to reduce vehicle emissions.
As additional guidance, only use fuels suited for your vehicle as explained below.

- Fuel should be unleaded and have an octane rating no lower than that specified in this manual.
- Methanol (methyl or wood alcohol) is sometimes mixed with unleaded gasoline. Methanol can be used in your vehicle **ONLY** if it does not exceed 5% of the fuel mixture **AND** if it is accompanied by sufficient quantities of the proper cosolvents and corrosion inhibitors required to prevent damage to the fuel system. Do not use fuel containing methanol **EXCEPT** under these conditions.
- If undesirable driveability problems are experienced and you suspect they may be fuel related, try a different brand of gasoline before seeking service at your SUBARU dealer.
- Fuel system damage or driveability problems which result from the use of improper fuel are not covered under the SUBARU Limited Warranty.

CAUTION:
Take care not to spill fuel during refueling. Fuels containing alcohol may cause paint damage.

C: LUBRICANTS

Lubricants	Specifications	Remarks
• Engine oil	• API Classification: SJ or SH with the word "Energy Conserving or Energy Conserving II" • New API Certified • CCMC Specification: G4 or G5 • ACEA Specification: A1 or A2 or A3	• For SAE viscosity number, refer to the following table. • If it is impossible to get SJ or SH grade, you may use SG grade.
• Transmission and differential gear oil • AWD rear differential gear oil	• API Classification: GL-5	• For SAE viscosity number, refer to the following table.
• Automatic transmission fluid	• DEXRON II or IIE or III	—
• Power steering fluid	• DEXRON II or IIE or III	—
• Coolant	• Genuine SUBARU Coolant (Part No. 000016218) (Anti-freeze, anti-corrosive ethylene glycol base)	• For further coolant specifications, refer to the following table.
• Brake fluid	• DOT3 or DOT4	• FMVSS NO. 116 • Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading. • When brake fluid is added, be careful not to allow any dust into the reservoir.
• Clutch fluid	• DOT3 or DOT4	• FMVSS NO. 116 • Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading. • When clutch fluid is added, be careful not to allow any dust into the reservoir.

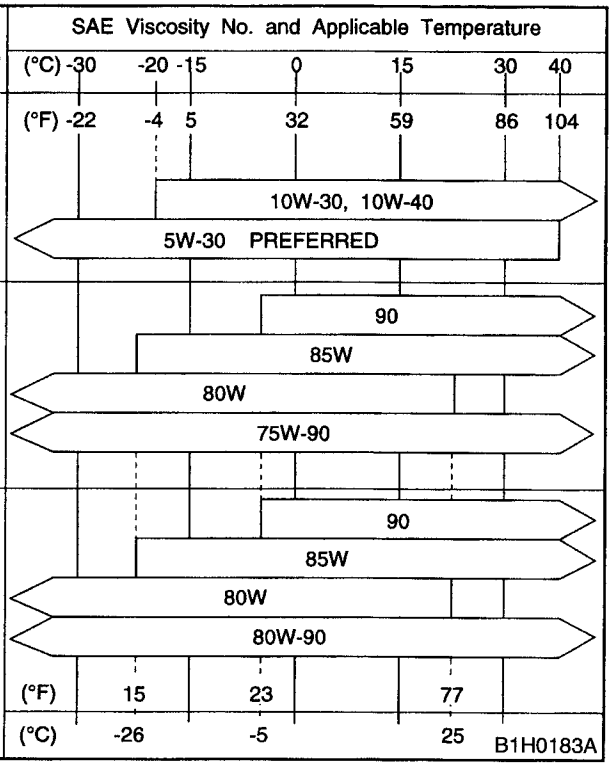
Lubricants	Recommended	Application	Equivalent
• Spray lubricants	SUBARU CRC (P/N 004301003)	O_2 sensor	—
• Grease	SUNLIGHT 2, Ni glube R (P/N 003602010)	Bushing for manual transmission gear shift system	—
	Valiant grease M-2 (P/N 003608001)	Steering gearbox	—
	Niglube RX-2 (P/N 003606000 or 725191040)	Piston boot of disc brake and sliding pin	—
	Molykote No. 7439 (P/N 725191460)	Contacting surfaces of drum brake shoes and shoe clearance adjuster	—
	Molylex No.2 (P/N 723223010)	BJ (for rear axle) and joints of axle shafts	—
	VU-3A702 (P/N 23223GA050)	DOJ joints of axle shafts	—
	NTG2218 (P/N 28093AA020)	BJ (for front axle) joints of axle shafts	—
	FX clutch grease (P/N 000040901)	Splines of transmission main shaft	—
	Slicolube G-30M (P/N 004404002)	Control cables and carburetor linkages subject to cold weather, door latch, striker, battery terminals, etc.	—
	NTG30B (P/N 28095AC000)	SFJ joints of axle shafts	—

D: FLUID

CAUTION:
• Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands (Except engine oil).
• When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.

NOTE:
If vehicle is used in desert areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used:
API classification: SJ
SAE Viscosity No: 30, 40, 10W-50, 20W-40, 20W-50

ITEM	API Classification	New API Certification Mark (Star burst mark)	CCMC Specification	ACEA Specification	SAE Viscosity No. and Applicable Temperature
Engine oil	SJ or SH with the words "Energy Conserving or Energy Conserving II"		G4 or G5	A1 or A2 or A3	
•Transmission gear oil	GL-5	—	—	—	
•AWD rear differential gear oil •Front differential gear oil for automatic transmission	GL-5	—	—	—	



E: COOLANT

CAUTION:
• Avoid using any coolant or only water other than this designated type to prevent corrosion.
• SUBARU's engine is aluminum alloy, and so special care is necessary.

Coolant Specifications							
Lowest anticipated atmospheric temperature	SUBARU coolant-to-*water ratio (Volume) %	Specification gravity					Freezing point
		at 10°C (50°F)	at 20°C (68°F)	at 30°C (86°F)	at 40°C (104°F)	at 50°C (122°F)	
Above –30°C (–22°F)	50 — 50	1.084	1.079	1.074	1.068	1.062	–36°C (–33°F)
Above –15°C (5°F)	30 — 70	1.053	1.049	1.044	1.039	1.034	–16°C (–3°F)

*: It is recommended that distilled water be used.

F: SEALANTS

	Recommended	Application	Equivalent
Sealant	Three Bond 1105 (P/N 004403010)	Rear differential oil drain plug, etc.	Dow Corning's No. 7038
	Three Bond 1215 (P/N 004403007)	Matching surface of oil pump, transmission case, etc.	Dow Corning's No. 7038
	Starcalking B-33A (P/N 000018901)	Sealing against water and dust entry through weatherstrips, grommets, etc.	Butyl Rubber Sealant
	Three Bond 1102 (P/N 004403006)	Steering gear box adjust screw	—

G: ADHESIVES

Adhesive	Cemedine 5430L	Weatherstrips and other rubber parts, plastics and textiles except soft vinyl parts.	3M's EC-1770 EC-1368
	Cemedine 540	Soft vinyl parts, and other parts subject to gasoline, grease or oil, e.g. trim leather, gear shift boot, door inner remote cover, etc.	3M's EC-776 EC-847 EC-1022 (Spray Type)
	Cemedine 3000	Bonding metals, glass, plastic and rubber parts. Repairing slightly torn weatherstrips, etc.	Armstrong's Eastman 910
	Essex Chemical Crop's Urethane E	Windshield to body panel.	Sunstar 580

PRE-DELIVERY INSPECTION 1-4

2. Pre-road Test Inspection

B: DOOR OPERATION, DOOR LOCK AND REGULATOR

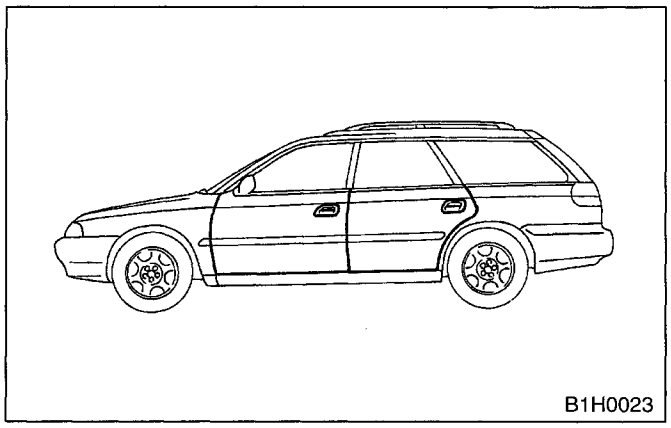
CHECK POINTS

1. **Door "Open-close" operation**
2. **Operation of door release and lock**
3. **Loose or damaged parts**
4. **Regulator handle operation**
5. **Position of door window glass**
6. **Operation of power window switches**
7. **Power door locking operation**
8. **Operation of child**

• Check the opening and closing of doors and rear gate.

1) First open the door completely and then close it fully by operating the inner handle from the driver's seat.
2) Repeat step 1) two or three times to see how the door opens and closes. Pay attention to the operating effort, any abnormal noise and positive operation.
3) Operate the outer handle from the outside and check how the door opens and closes. Also, check that there is a uniform clearance between the door and car body without any grade difference.

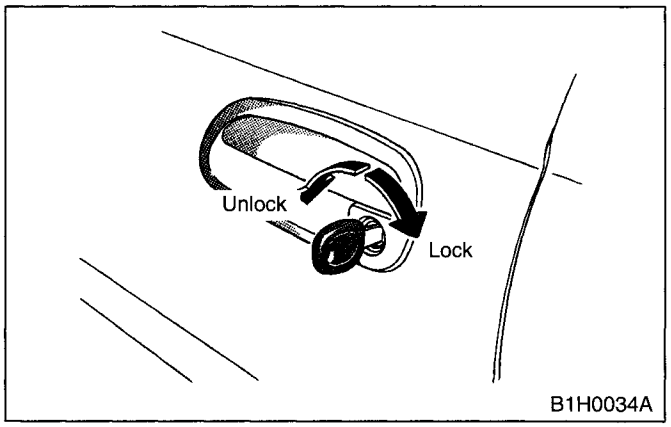
NOTE:
• To examine the closed state and sinking of the door, observe from the front right-hand door.
• If the striker drags during opening when the outer handle is pulled, adjust by relocating the striker.


B1H0023

• Check the operation of door locks.

1) Close the door completely, lock it with the key plate and pull the outside handle to ensure the door does not open.

NOTE:
• Do not pull the outside handle with greater force than necessary.
• While inspecting the door and lock, check the lock in the rear part of the door and the door striker attached to the pillar.



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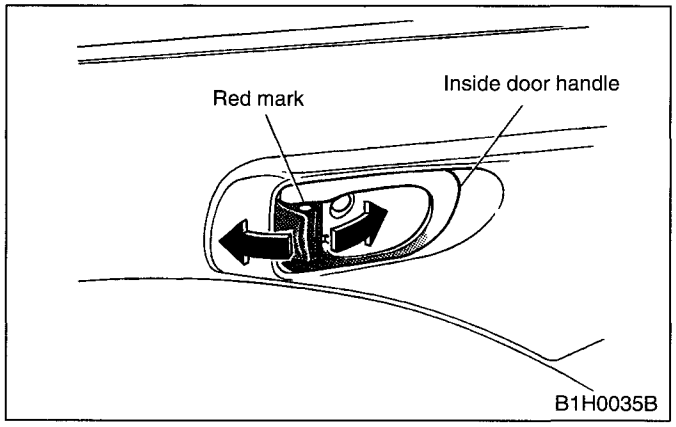
2) Again operate the key plate to ensure the door unlocks.

NOTE:
Replace the lock cylinder if it malfunctions. When the door lock seems to be operating slowly, lubricate the moving parts with grease or oil.

3) Vehicles with manual door locks:
Sit in the driver seat, close the door completely, and move the lock lever to the lock position. Then, pull the inside door handle to ensure the door will not open.

4) Vehicles with power door locks:
Sit in the driver seat, close the driver's door

completely, and place the door lock lever to the lock position. Then, pull the inside door handle to ensure the driver's door will open.
For other doors, place the lock levers to the lock positions and then pull the inside door handles to ensure that the doors will not open.



- **Check the looseness of doors.**

1) Open and close the door two or three times with a somewhat strong force.
2) Check the bolts or screws securing the door hinge, lock and striker for looseness. Re-tighten loose ones to the specified tightening torque.

- **Check the operation of regulator handle and position of door window glass.**

1) Operate the regulator handle to see if the window rises and lowers smoothly.
2) Make sure that the front of the glass stopper is simultaneously in contact with the glass when the glass is completely raised.
3) Also ensure the side windows and locks operate normally.

- **Check the operation of power window.**

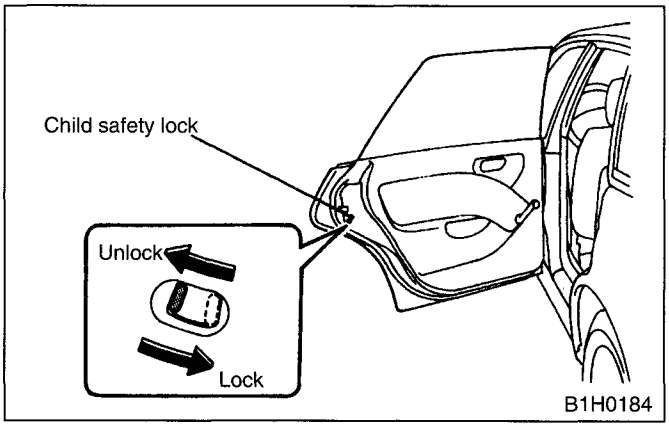
1) Depress the power window switches to fully open the windows.
2) Depress the power window switches to fully close the windows.
3) Repeat steps 1) and 2) two or three times to see how the windows open and close.

- **Check the operation of power door lock.**

1) Close the door completely.
2) Operate the door lock switches on the front both side doors to lock and check that all the doors are locked.
3) Operate the door lock switches on the front both side doors to unlock and check that all the doors are unlocked.
4) Repeat the above steps two or three times.

- **Check the operation of child safety locks.**

1) Set the child safety lock on both rear doors to the lock positions.
2) Close the rear doors completely.
3) Check that the lock levers of the rear doors are in the unlock positions. Then, pull the inside door handles of the rear doors to ensure that the doors will not open.
4) Next, pull the outside door handles of the rear doors to ensure that the doors will open.
5) Repeat the above steps two or three times.



2. Pre-road Test Inspection

D: BRAKE FLUID LEVEL AND BRAKE PIPING INSTALLATION

CHECK POINTS

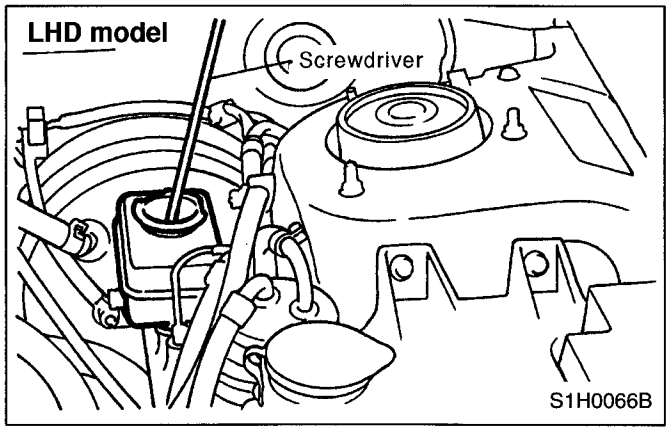
1. Fluid level in brake reserve tank
2. Wiring of fluid leveller and its operation
3. Brake booster, master cylinder, hill holder and pressure control valve for proper installation; brake pipe, brake hose and connectors for proper fitting
4. Leakage in any of the above

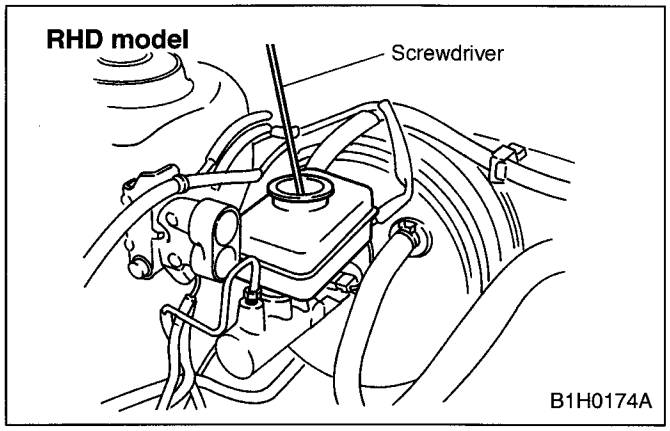
Recommended brake fluid
FMVSS No. 116, fresh DOT3 or DOT4 brake fluid

CAUTION:
• The fluid level must be kept at "MAX" level.
• Do not mix different brands of brake fluid.
• When adding brake fluid, be careful not to allow any dirt, water, or oil around the fluid tank to enter it.
• Use special care not to spill any brake fluid on the vehicle's painted surfaces, because it will quickly erode them. In case of an accident, wipe it off as quickly and as cleanly as possible.
• Never use engine oil, gear oil, or any mineral oil.
• Use extreme care not to allow any water to get into the fluid; water in the brake fluid will lower the fluid's boiling point and cause vapor-lock.
• If too much brake fluid is missing, check the brake line for possible leakage.
• After adding brake fluid, any excess must be stored in a tightly sealed container.
• When checking the operation of leveller, use clean screwdriver or the like and be careful not to allow dirt or dust to get into the tank.

1. CHECK FLUID LEVELLER OPERATION

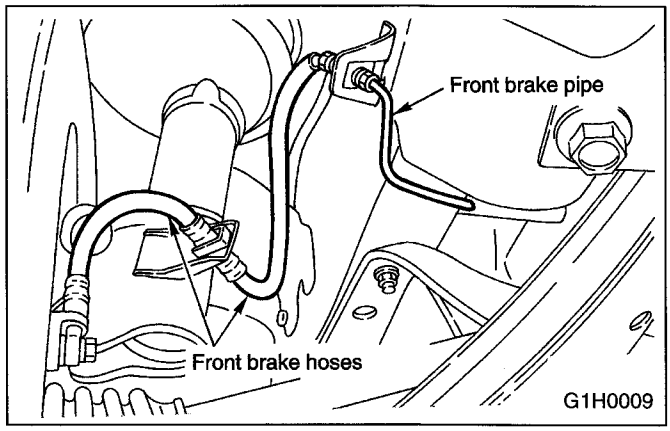
1) Remove filter from reservoir tank.
2) Check fluid leveller operation while pushing it down with a screwdriver.

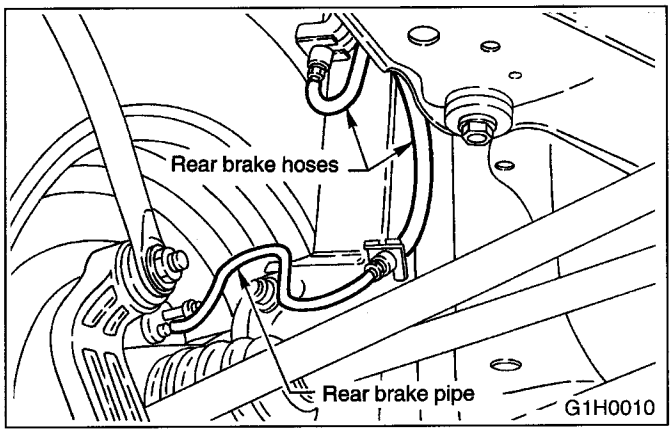




2. CHECK THAT THE BRAKE PIPES, HOSES AND CONNECTORS ARE IN GOOD CONDITION

1) Brake fluid is not oozing or leaking from the brake fluid lines.
2) The connectors and clamps are not loose.
3) There is no possibility of the pipes and hoses contacting the body or other mechanical parts due to vibration during running.





G: ENGINE OIL LEVEL

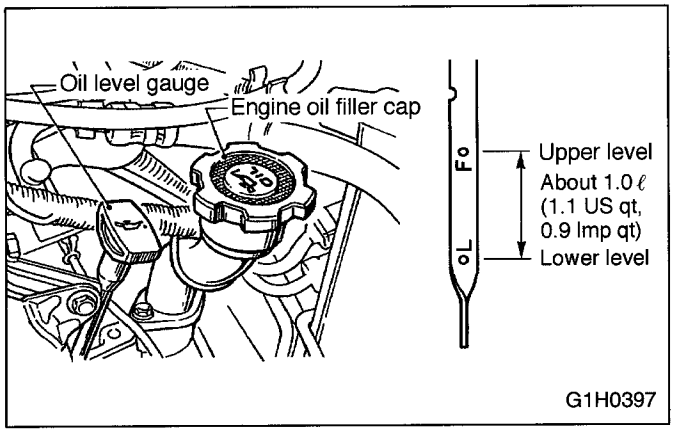
CHECK POINTS

1. Engine oil level

2. Engine oil leakage or contamination

1. CHECK THE ENGINE OIL LEVEL

The level should be within the specified range marked on the gauge.

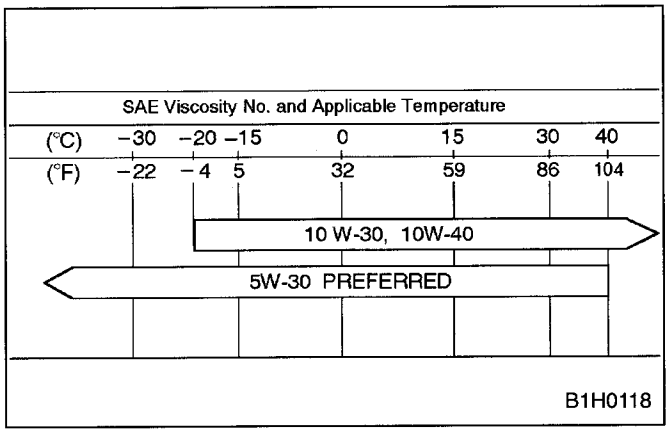


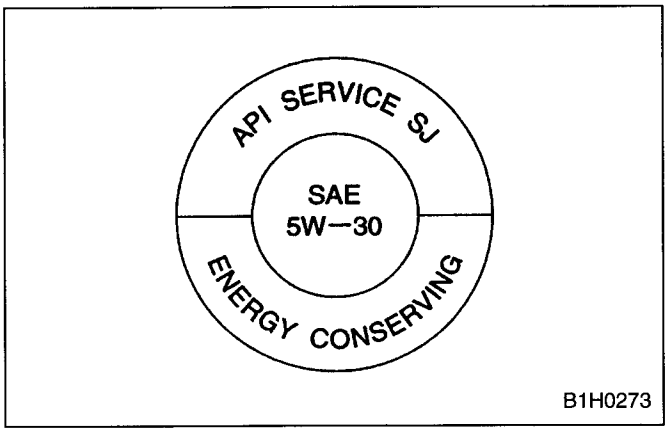
NOTE:

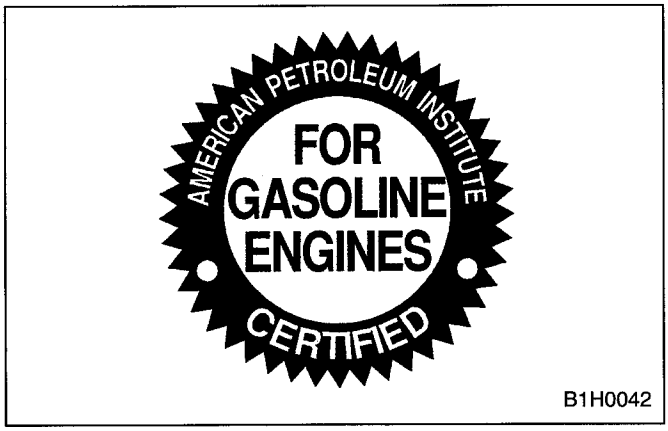
- Check engine oil level before starting the engine, when engine oil is cold, to obtain correct level reading. After stopping a hot engine, wait about 5 minutes until oil returns to oil pan before checking oil level. Oil level reading will be slightly higher than when engine is cold due to oil expansion. It is advisable to check oil level each time oil is replenished.
- Insert the oil level gauge into guide hole.

Recommended oil

API classification: SJ or SH with the words "Energy Conserving or Energy Conserving II", CCMC specification G4 or G5, or New API certification mark is displayed on the container







CAUTION:

When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.

NOTE:
If vehicle is used in desert areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used:
API classification: SJ
SAE Viscosity No.: 30, 40, 10 W – 50, 20W – 40, 20 W – 50

H: TRANSMISSION AND DIFFERENTIAL GEAR OIL LEVEL

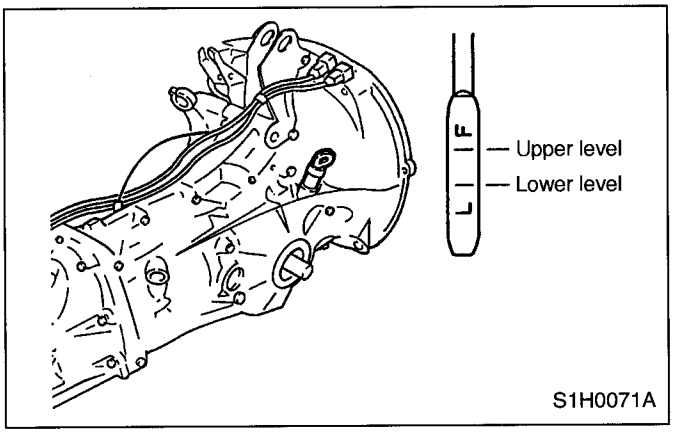
CHECK POINTS

1. Level of transmission gear oil for manual transmission
2. Level of rear differential gear oil for AWD model
3. Level of front differential gear oil for automatic transmission

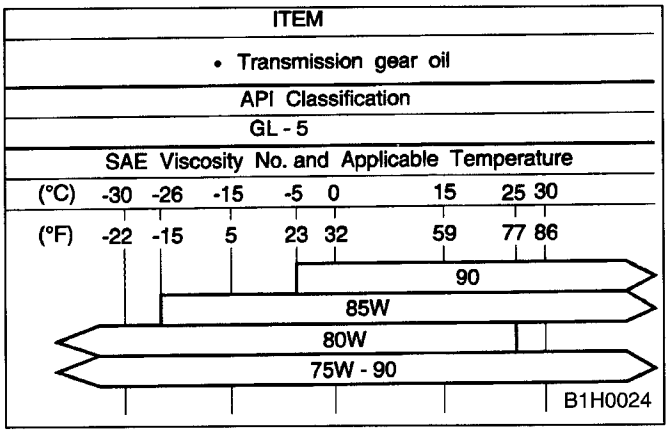
1. CHECK THE LEVEL OF TRANSMISSION GEAR OIL FOR MANUAL TRANSMISSION

CAUTION:
When inserting the level gauge into transmission gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.

NOTE:
The level should be within the specified range marked on the gauge.



Transmission gear oil
Recommended oil

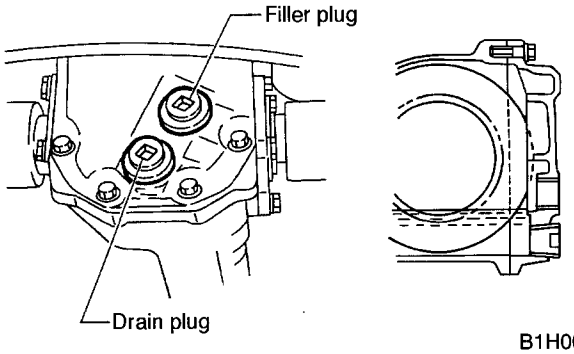


2. CHECK THE LEVEL OF REAR DIFFERENTIAL GEAR OIL FOR AWD MODEL

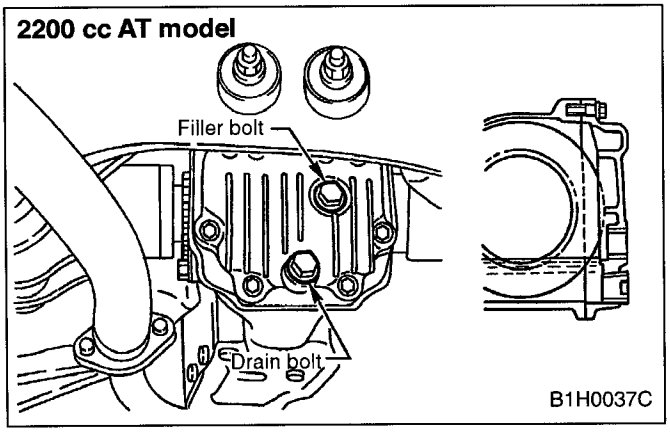
CAUTION:
Each manufacturer uses different base oils and additives. Thus, do not mix brands.

The oil level must be kept above the bottom of the filler bolt or plug. If below that level, add oil up to the bottom line.

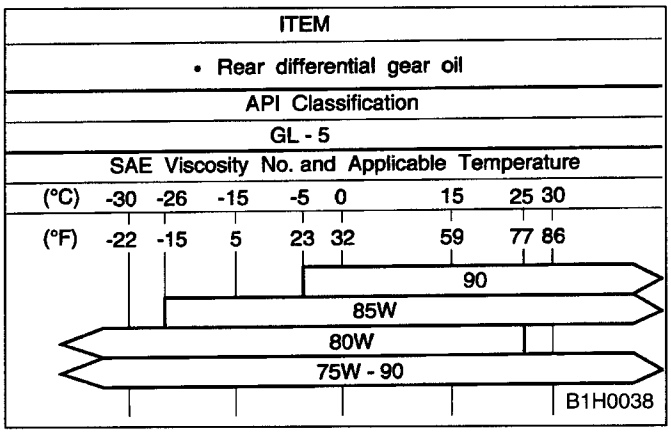
Except 2200 cc AT model



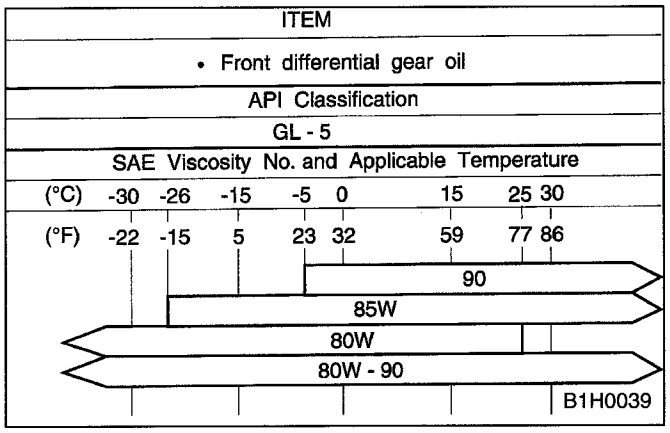
2200 cc AT model



Rear differential gear oil
Recommended oil



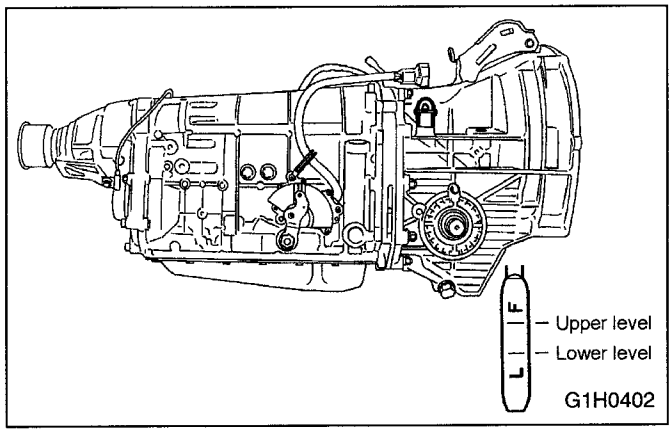
Front differential gear oil
Recommended oil



3. CHECK THE LEVEL OF FRONT DIFFERENTIAL GEAR OIL FOR AUTOMATIC TRANSMISSION

CAUTION:
When inserting the level gauge into differential gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.

NOTE:
The level should be within the specified range marked on the gauge.



3. Road Test Inspection

D: DRIVING TEST

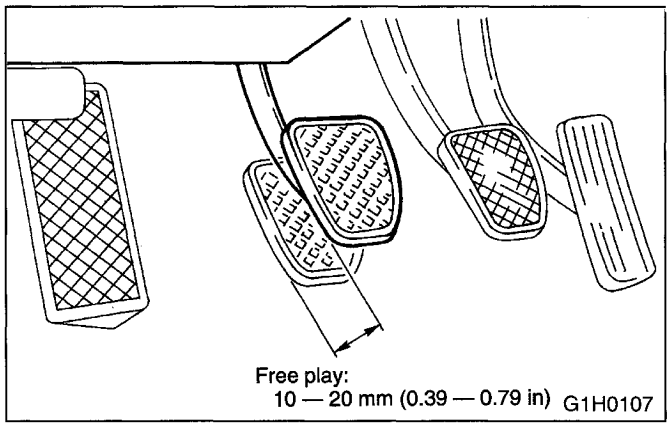
CHECK POINTS

1. **Operation of foot brake and parking brake**
2. **Inspect the clutch pedal free play**
3. **Operation of speedometer**
4. **Operation of clutch and gear shift**
5. **Operation of hill holder (Manual transmission)**
6. **Operation of selector lever (Automatic transmission)**
7. **Operation of steering and position of steering wheel**
8. **Operation of turn signal cancel cam**
9. **Operation of ventilation system and heater**
10. **Abnormal noises or vibration**
11. **Operation of air conditioning**
12. **Operation of cruise control**

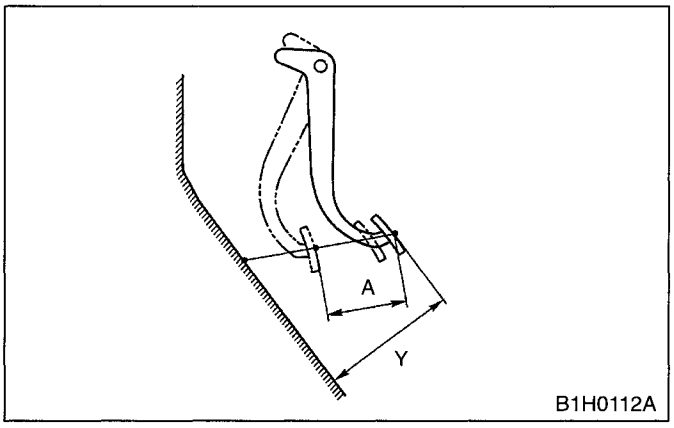
2. Inspect the clutch pedal free play

1) Mechanical clutch type
(1) Lightly press the clutch pedal down with a finger to check the free play.

Standard free play:
At clutch pedal
10 — 20 mm (0.39 — 0.79 in)

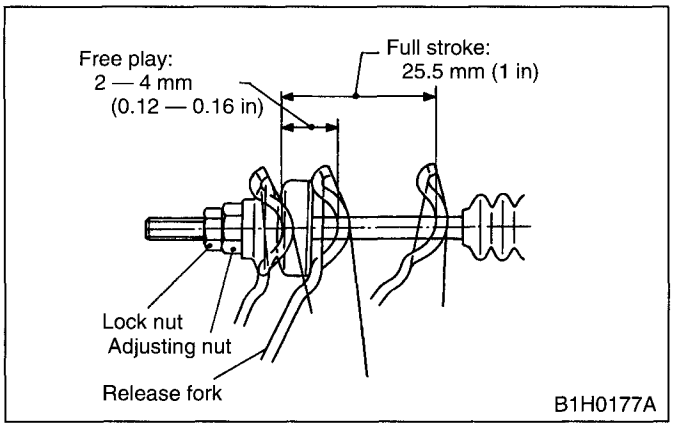


Fork lever free play allowance:
2 — 4 mm (0.12 — 0.16 in)



Pedal height: Y
143 mm (6.22 in)
Pedal stroke: A
140 — 145 mm (5.51 — 5.71 in)

(2) If it is out of specification, adjust it by turning adjusting nut on engine side end of clutch cable at release fork.



Tightening torque:
6 ± 1.5 N.m
(0.60 ± 0.15 kg-m, 4.4 ± 1.1 ft-lb)

2) Hydraulic clutch type
Inspection of the clutch free play is not required.

21°C (70°F)], read the fluid level at the "COLD" position of the level gauge.

CAUTION:
The available power steering fluid is DEXRON II, IIE or III type automatic transmission fluid.
Be sure to use the recommended fluid.
When power steering fluid is added, be careful not to allow any dust into the tank.

4. Post-road Test Inspection

B: POWER STEERING FLUID LEVEL

CHECK POINTS
1. Level of power steering fluid

The power steering fluid shoud be maintained at a proper level.
Check level as follows:
1) Drive the car several miles or kilometers to bring power steering system up to the normal operating temperature of about 60°C (140°F).
2) Park the car on a level surface and stop the engine.
3) Remove the level gauge and wipe it clean.
4) Reinstall the level gauge firmly.
5) Remove it again and read the level on the "HOT" side.
If the fluid level is at lower point or below, add fluid to keep the level in the specified range of the indicator. If at upper point or above, drain fluid by using a syringe or the like. When the fluid level is to be checked without warming up the power steering system [at approximately

PERIODIC MAINTENANCE SERVICES 1-5

Schedule of Inspection and Maintenance Services

• FEDERAL SPEC. VEHICLES

Continue periodic maintenance beyond 192,000 km (120,000 miles) or 120 months by returning to the first column of the maintenance schedule and adding 192,000 km (120,000 miles) or 120 months to the column headings.

MAINTENANCE ITEM			MAINTENANCE INTERVAL (Number of months or km (miles), whichever occurs first)																	REMARKS
		Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	
		× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	
		× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	
1	Drive belt(s) [Except camshaft]						I				R				I				R	
2	Camshaft drive belt	2200 cc					I				R				I				R	
		2500 cc					I*				I*				I*		R			
3	Engine oil		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	See NOTE 1)
4	Engine oil filter		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	See NOTE 1)
5	Replace engine coolant and inspect cooling system, hoses and connections						P				P				P				P	
6	Replace fuel filter and inspect fuel system, hoses and connections						(P)				P				(P)				P	See NOTE 2), 6) & 7)
7	Air cleaner element						R				R				R				R	See NOTE 8)
8	Spark plugs	2200 cc					R				R				R				R	
		2500 cc									R								R	
9	Transmission/Differential (Front & Rear) lubricants (Gear oil)						I				I				I				I	See NOTE 3)
10	Automatic transmission fluid						I				I				I				I	See NOTE 4)
11	Brake fluid						R				R				R				R	See NOTE 5)
12	Disc brake pads and discs, Front and rear axle boots and axle shaft joint portions				I		I		I		I		I		I		I		I	See NOTE 6)
13	Brake linings and drums						I				I				I				I	See NOTE 6)
14	Inspect brake line and check operation of parking and service brake system				P		P		P		P		P		P		P		P	See NOTE 6)
15	Clutch and hill-holder system				I		I		I		I		I		I		I		I	
16	Steering and suspension				I		I		I		I		I		I		I		I	See NOTE 6)
17	Front and rear wheel bearing lubricant										(I)								(I)	
18	Supplemental restraint system		Inspect every 10 years																	
19	Valve clearance																I			

R: Replace
I: Inspect, correct or replace if necessary.
P: Perform
(I) or (P): Recommended service for safe vehicle operation
*: This maintenance operation is required for federal spec. vehicles. However, we do recommend that this operation be performed on California spec. vehicles as well.

NOTE:
1) When the vehicle is used under severe driving conditions such as those mentioned below*, the engine oil and filter should be changed every 6,000 km (3,750 miles) or 3.5 months.
2) When the vehicle is used in extremely cold or hot weather areas, contamination of the filter may occur and filter replacement should be performed more often.
3) When the vehicle is frequently operated under severe conditions, replacement should be performed every 24,000 km (15,000 miles).
4) When the vehicle is frequently operated under severe conditions, replacement should be performed every 24,000 km (15,000 miles).
5) When the vehicle is used in high humidity areas or in mountainous areas, change the brake fluid every 24,000 km (15,000 miles) or 15 months, whichever occurs first.
6) When the vehicle is used under severe driving conditions such as those mentioned below*, inspection should be performed every 12,000 km (7,500 miles) or 7.5 months, whichever occurs first.
7) This inspection is not required to maintain emission warranty eligibility and it does not affect the manufacturer's obligations under EPA's in-use compliance program.
8) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.

- * Examples of severe driving conditions:
  - Repeated short distance driving. (Items 3, 12 and 13 only)
  - Driving on rough and/or muddy roads. (Items 12, 13 and 16 only)
  - Driving in dusty conditions.
  - Driving in extremely cold weather. (Items 3 and 16 only)
  - Driving in areas where roads salts or other corrosive materials are used. (Items 6, 12, 13, 14 and 16 only)
  - Living in coastal areas. (Items 6, 12, 13, 14 and 16 only)
  - Towing a trailer. (Items 3, 4, 9, 10, 12 and 13 only)

• CALIFORNIA SPEC. VEHICLES

Continue periodic maintenance beyond 192,000 km (120,000 miles) or 120 months by returning to the first column of the maintenance schedule and adding 192,000 km (120,000 miles) or 120 months to the column headings.

MAINTENANCE ITEM		MAINTENANCE INTERVAL (Number of months or km (miles), whichever occurs first)																	REMARKS
		Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	
		× 1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	
		× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120	
1	Drive belt(s) [Except camshaft]						I				I				I		R			
2	Camshaft drive belt						I*				I*				I*		R			
3	Engine oil		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	See NOTE 1)
4	Engine oil filter		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	See NOTE 1)
5	Replace engine coolant and inspect cooling system, hoses and connections						P				P				P				P	
6	Replace fuel filter and inspect fuel system, hoses and connections						(P)				(P)				(P)				P	See NOTE 2), 6) & 7)
7	Air cleaner element						R				R				R				R	See NOTE 8)
8	Spark plugs	2200 cc					R				R				R				R	
		2500 cc									R								R	
9	Transmission/Differential (Front & Rear) lubricants (Gear oil)						I				I				I				I	See NOTE 3)
10	Automatic transmission fluid						I				I				I				I	See NOTE 4)
11	Brake fluid						R				R				R				R	See NOTE 5)
12	Disc brake pads and discs, Front and rear axle boots and axle shaft joint portions				I		I		I		I		I		I		I		I	See NOTE 6)
13	Brake linings and drums						I				I				I				I	See NOTE 6)
14	Inspect brake line and check operation of parking and service brake system				P		P		P		P		P		P		P		P	See NOTE 6)
15	Clutch and hill-holder system				I		I		I		I		I		I		I		I	
16	Steering and suspension				I		I		I		I		I		I		I		I	See NOTE 6)
17	Front and rear wheel bearing lubricant										(I)								(I)	
18	Supplemental restraint system		Inspect every 10 years																	
19	Valve clearance																I			

R: Replace
I: Inspect, correct or replace if necessary.
P: Perform
(I) or (P): Recommended service for safe vehicle operation
*: This maintenance operation is required for federal spec. vehicles. However, we do recommend that this operation be performed on California spec. vehicles as well.

NOTE:
1) When the vehicle is used under severe driving conditions such as those mentioned below*, the engine oil and filter should be changed every 6,000 km (3,750 miles) or 3.5 months.
2) When the vehicle is used in extremely cold or hot weather areas, contamination of the filter may occur and filter replacement should be performed more often.
3) When the vehicle is frequently operated under severe driving conditions, replacement should be performed every 24,000 km (15,000 miles).
4) When the vehicle is frequently operated under severe driving conditions, such as mountain driving replacement should be performed every 24,000 km (15,000 miles).
5)V When the vehicle is used in high humidity areas or in mountainous areas, change the brake fluid every 24,000 km (15,000 miles) or 15 months, whichever occurs first.
6) When the vehicle is used under severe driving conditions such as those mentioned below*, inspection should be performed every 12,000 km (7,500 miles) or 7.5 months, whichever occurs first.
7) This inspection is not required to maintain emission warranty eligibility and it does not affect the manufacturer's obligations under EPA's in-use compliance program.
8) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.

- * Examples of severe driving conditions:
  - Repeated short distance driving. (Items 3, 12 and 13 only)
  - Driving on rough and/or muddy roads. (Items 12, 13 and 16 only)
  - Driving in dusty conditions.
  - Driving in extremely cold weather. (Items 3 and 16 only)
  - Driving in areas where roads salts or other corrosive materials are used. (Items 6, 12, 13, 14 and 16 only)
  - Living in coastal areas. (Items 6, 12, 13, 14 and 16 only)
  - Towing a trailer. (Items 3, 4, 9, 10, 12 and 13 only)

2. Camshaft Drive Belt (Timing Belt)

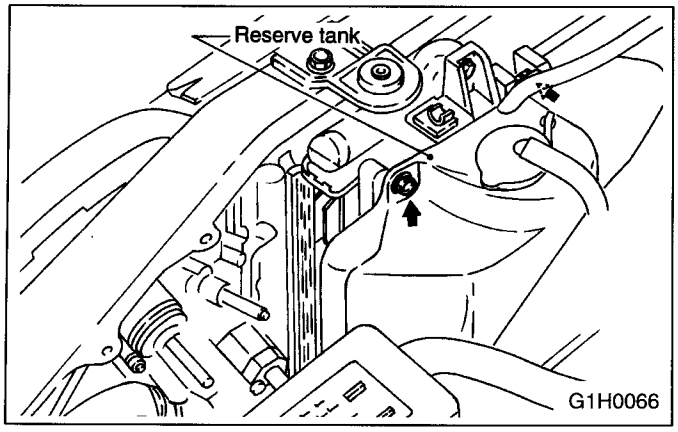
MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
×1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
×1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
California					I*				I*				I*		R		
All states except California and Canada (2200 cc)					I				R				I				R
All states except California and Canada (2500 cc)					I*				I*				I*		R		

*: This maintenance operation is required for all state except California. However, we do recommend that this operation be performed on California vehicles as well.

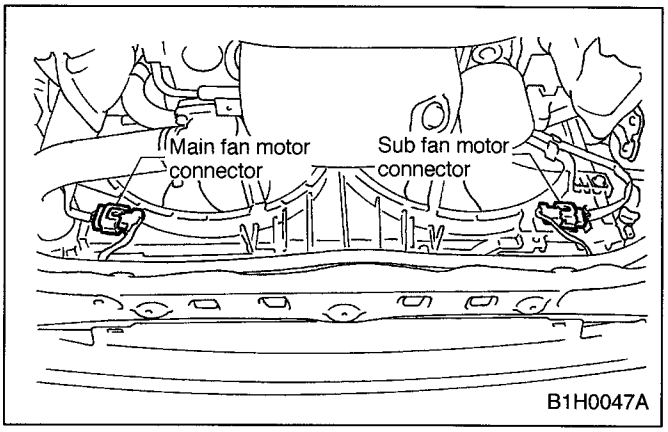
A: REPLACEMENT

1. SOHC MODEL

1) Disconnect ground cable (–) from battery.
2) Remove reserve tank.

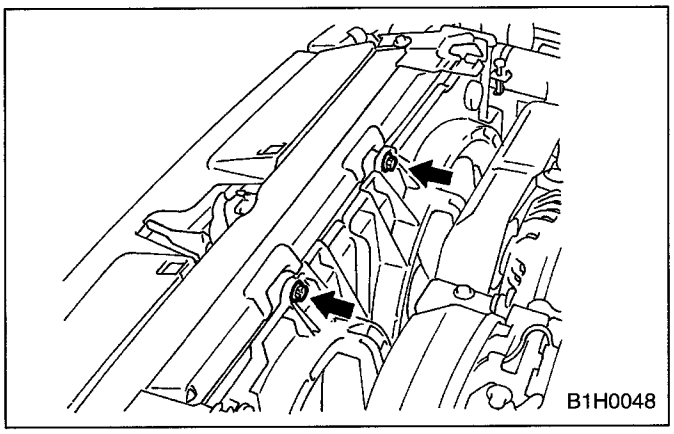


3) Remove radiator main fan motor connector and radiator sub fan motor connector.

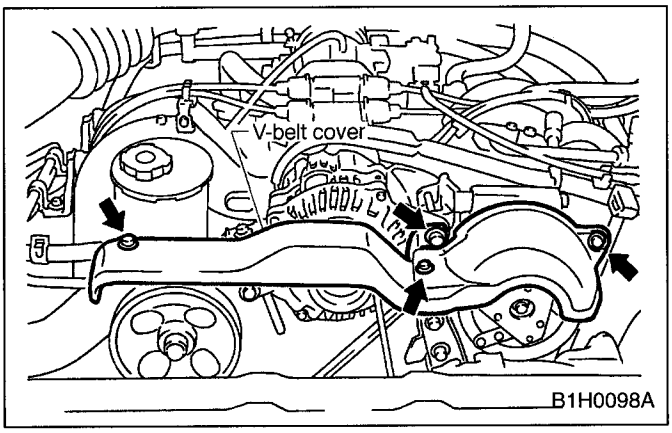


4) Remove radiator fan.
   (1) Remove the two bolts from the upper side of the shroud.
   (2) Remove radiator fan.

CAUTION:
Remove air conditioning fan in the same step described in the removal of radiator.

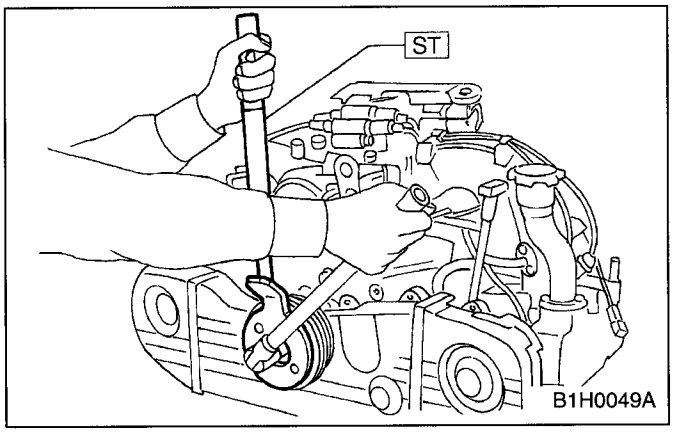

B1H0048

5) Remove V-belt cover.



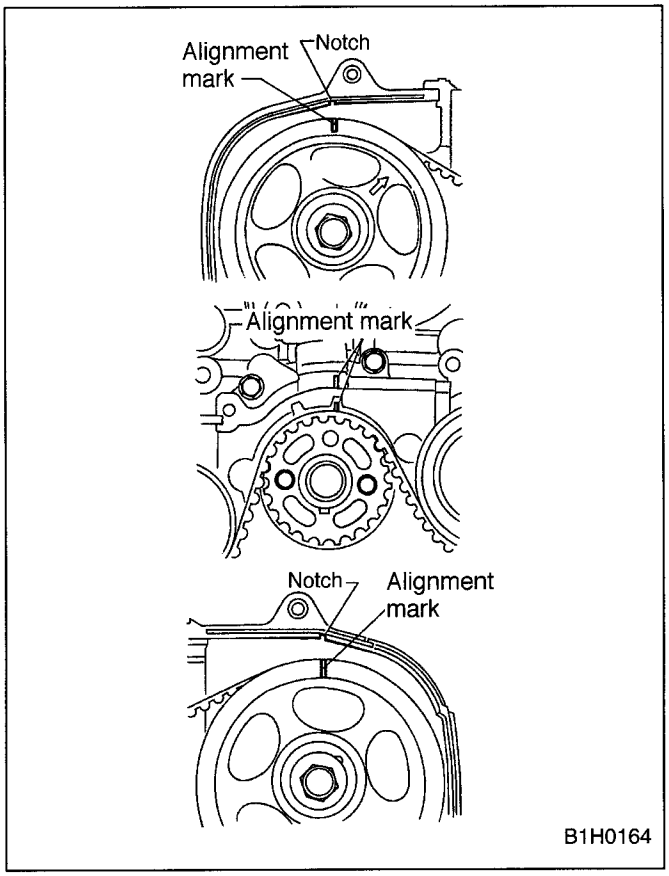
B1H0098A

6) Remove V-belts. <Ref. to 1-5 [01B1].☆1>
7) Remove air conditioning compressor drive belt tensioner.
8) Remove pulley bolt. To lock crankshaft use ST.
ST 499977300 CRANKSHAFT PULLEY WRENCH



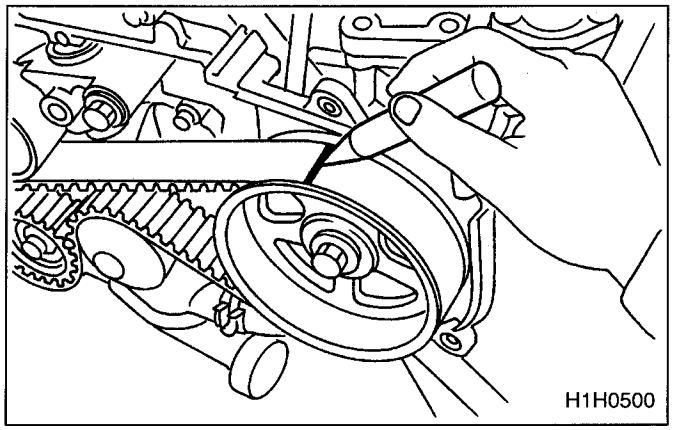
B1H0049A

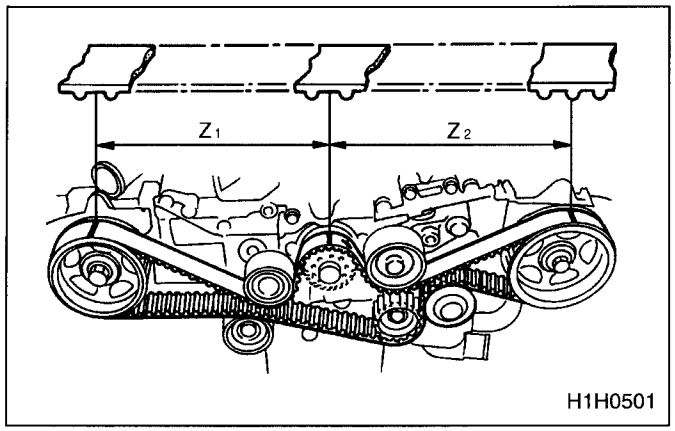
9) Remove crankshaft pulley.
10) Remove left side belt cover.
11) Remove right side belt cover.
12) Remove front belt cover.
13) If alignment mark and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as follows:
(1) Turn crankshaft and align alignment marks on crankshaft, and left and right camshaft sprockets with notches of belt cover and cylinder block.
ST 499987500 CRANKSHAFT SOCKET



B1H0164

(2) Using white paint, put alignment and/or arrow marks on timing belts in relation to the sprockets.

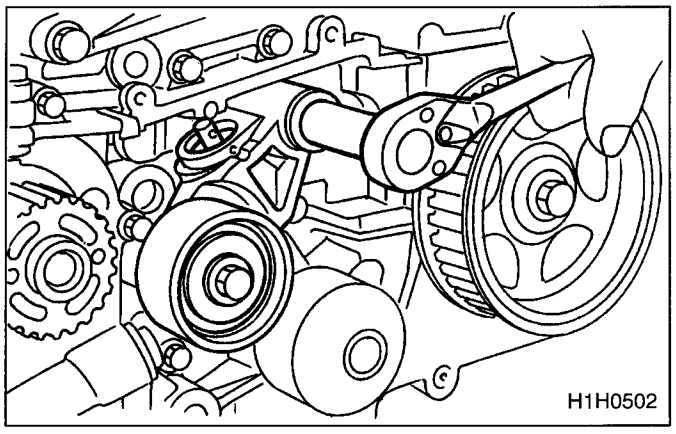

H1H0500



H1H0501

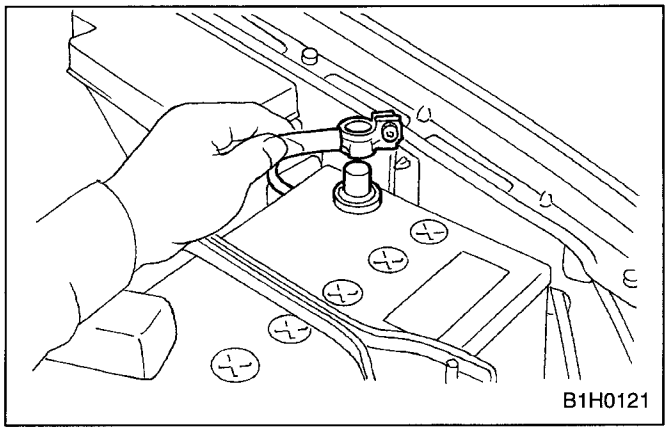
Z_1 44 teeth length
Z_2 40.5 teeth length

14)Remove belt idler No. 2.
15)Remove timing belt.
16)Remove automatic belt tension adjuster assembly.

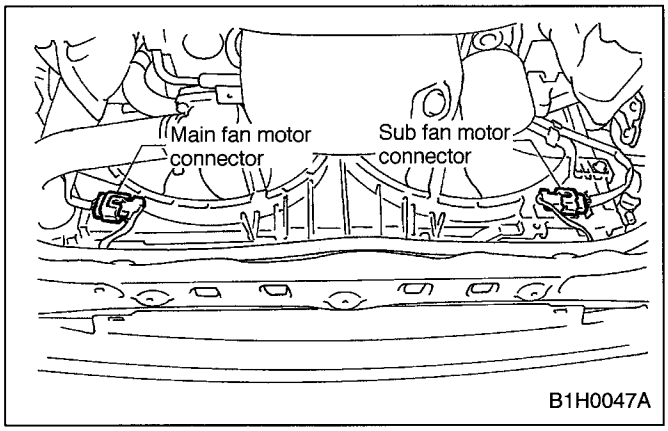

H1H0502

2. DOHC MODEL

1) Disconnect ground cable (–) from battery.

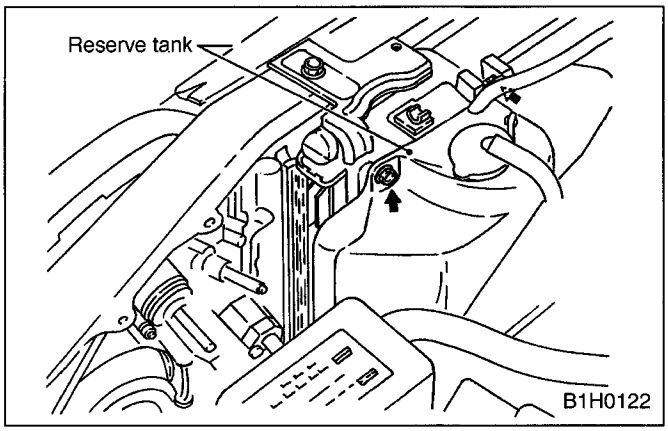

B1H0121

2) Disconnect radiator main fan motor connector and sub fan motor connector.



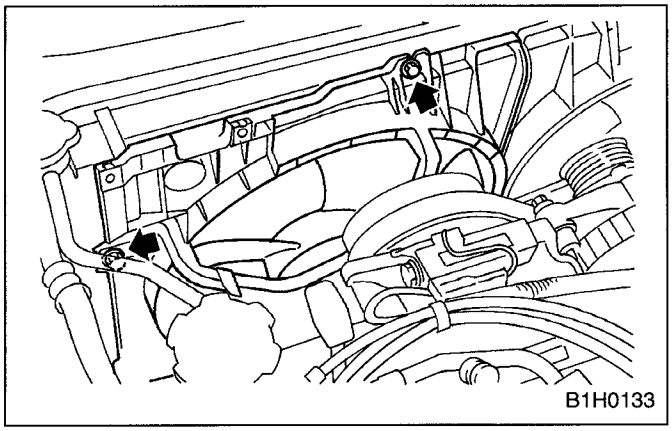
B1H0047A

3) Remove reservoir tank.



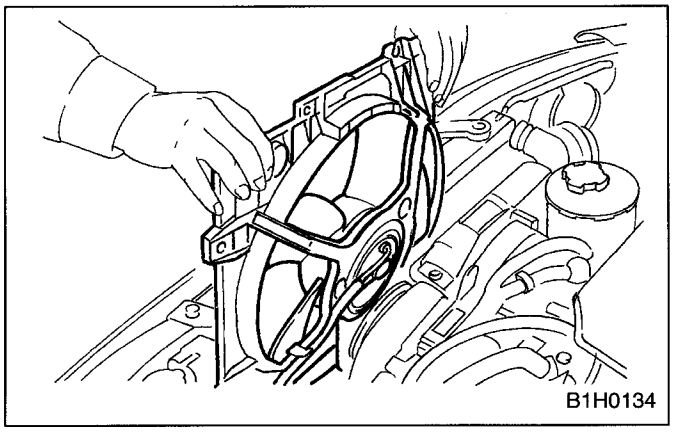
B1H0122

4) Remove four bolts holding shroud to radiator.

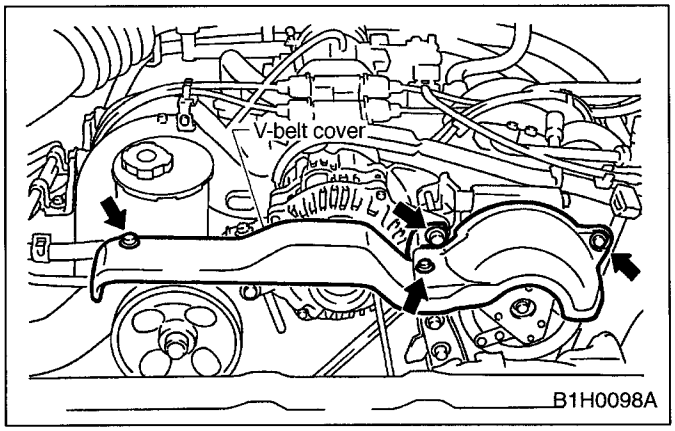


5) Remove radiator main fan motor assembly.

CAUTION:
Remove radiator sub fan motor assembly in the same step described in the removal of radiator main fan motor assembly.

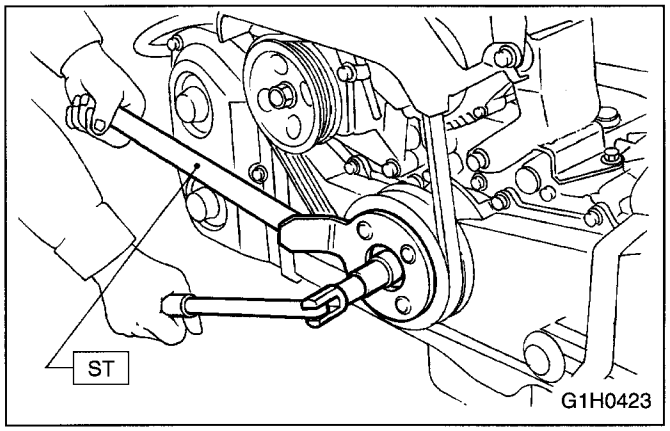


6) Remove V-belt cover.

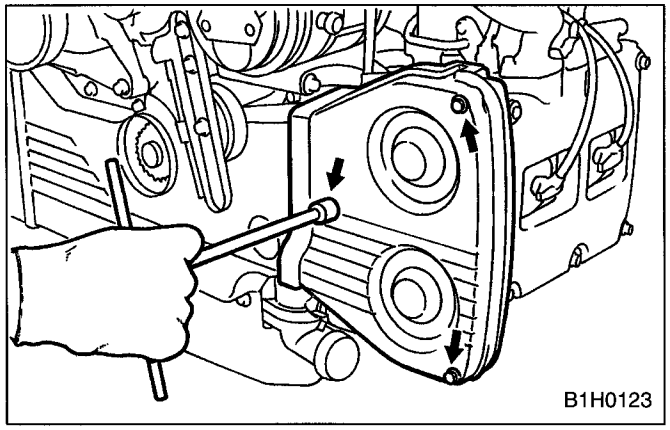


7) Remove V-belts. <Ref. to 1-5 [01B1].☆1>

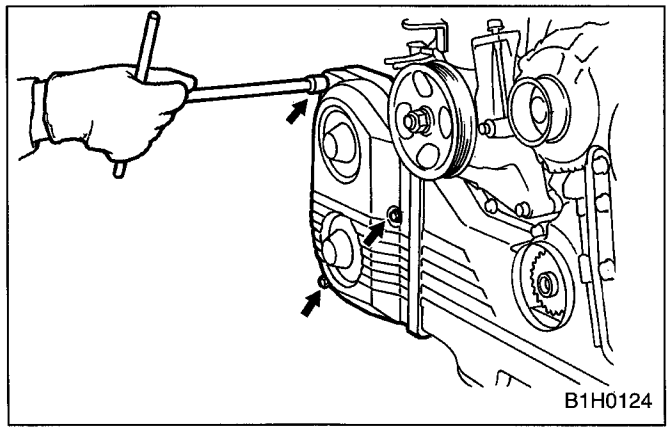
8) Remove pulley bolt. To lock crankshaft use ST.
ST 499977100 CRANKSHAFT PULLEY WRENCH



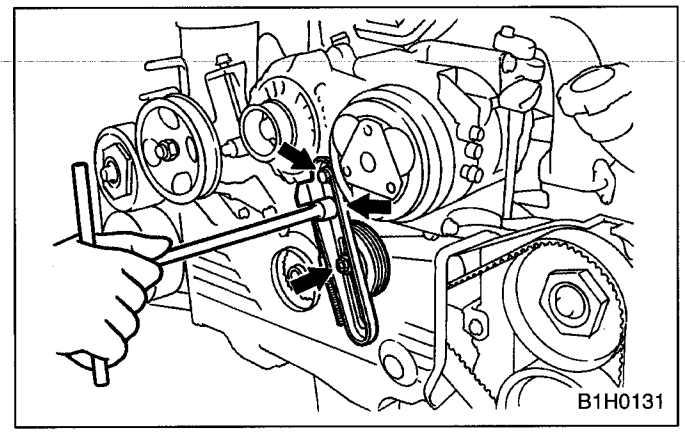
9) Remove crankshaft pulley.
10) Remove left side belt cover.



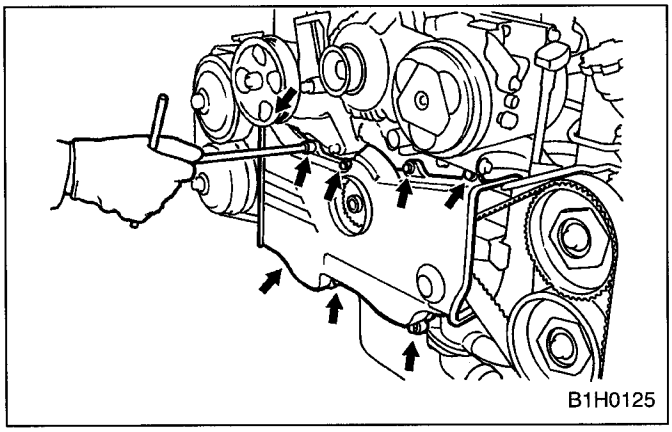
11) Remove right side belt cover.



12)Remove air conditioning compressor drive belt tensioner.



13)Remove front belt cover.

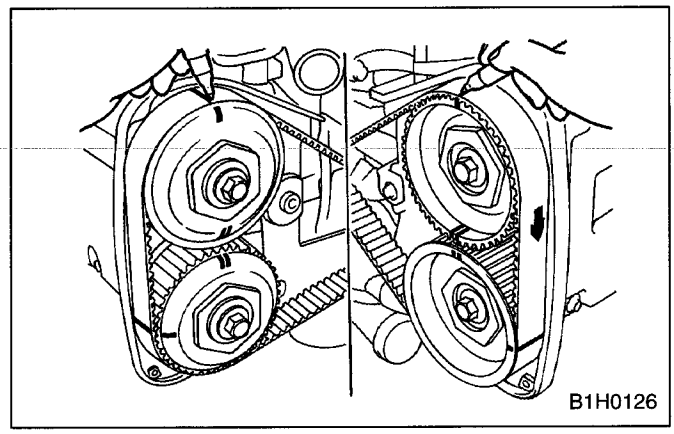


14)If alignment mark and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as follows:

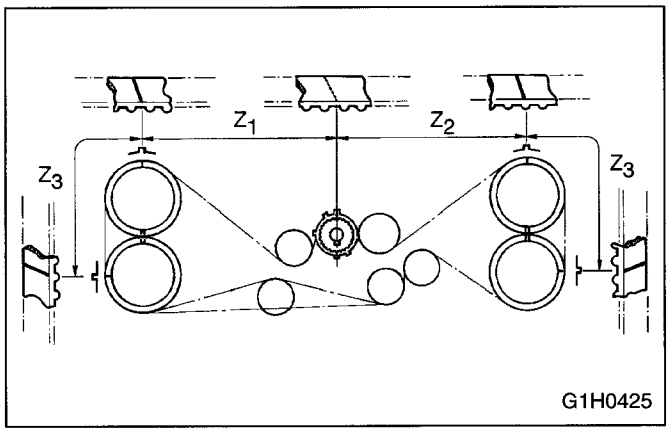
(1) Turn crankshaft and align alignment marks on crankshaft, and left and right camshaft sprockets with notches of belt cover and cylinder block. To turn crankshaft, use ST.

ST 499987500 CRANKSHAFT SOCKET

(2) Using white paint, put alignment and/or arrow marks on timing belts in relation to the sprockets.

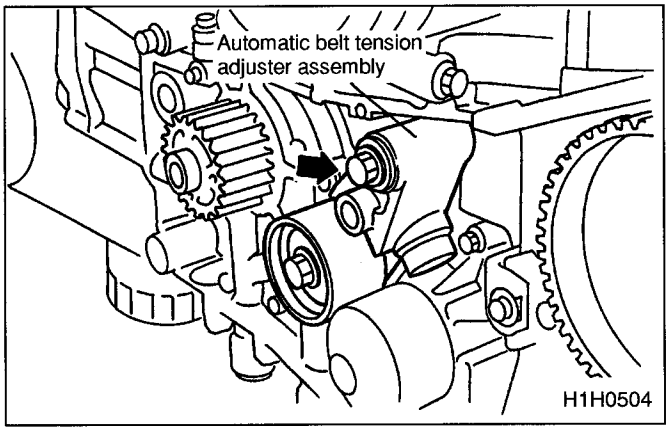


15)Remove belt idler.
16)Remove belt idler No. 2.
17)Remove timing belt.



Z_1 54.5 tooth length
Z_2 51 tooth length
Z_3 28 tooth length

18)Remove automatic belt tension adjuster assembly.



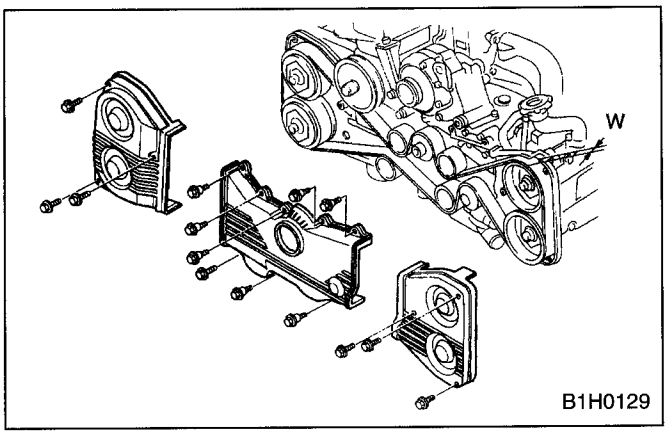
B: INSTALLATION

1. SOHC MODEL

To install, reverse order of removal procedures. <Ref. to 2-3 [W3C0].☆12>

2. DOHC MODEL

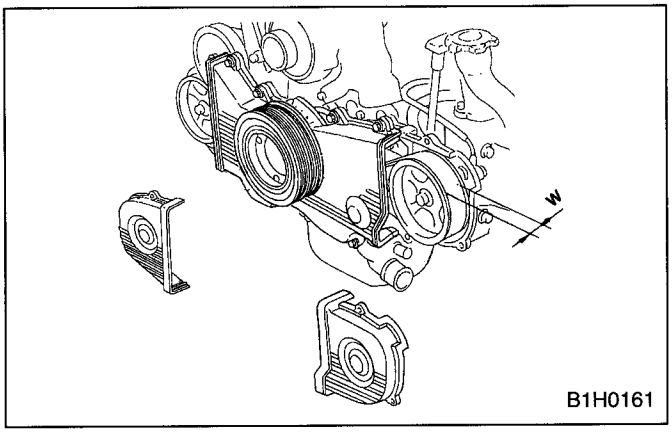
To install, reverse order of removal procedures. <Ref. to 2-3b [W2C0].☆12>



C: INSPECTION

1. SOHC MODEL

1) Remove left and right timing belt covers.
2) While cranking engine at least four rotations, check timing belt back surface for cracks or damage. Replace faulty timing belt as needed.
3) Measure timing belt width W. If it is less than 27 mm (1.06 in), check idlers, tensioner, water pump pulley and cam sprocket to determine idler alignment (squareness). Replace worn timing belt.
4) Install left and right timing belt covers.



2. DOHC MODEL

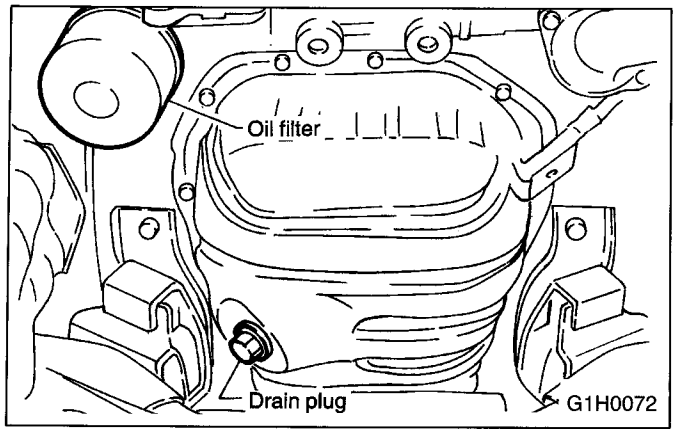
1) Remove left and right timing belt covers.
2) While cranking engine at least four rotations, check timing belt back surface for cracks or damage. Replace faulty timing belt as needed.
3) Measure timing belt width W. If it is less than 30 mm (1.18 in), check idlers, tensioner, water pump pulley and cam sprocket to determine idler alignment (squareness). Replace worn timing belt.
4) Install left and right timing belt covers.

3. Engine Oil

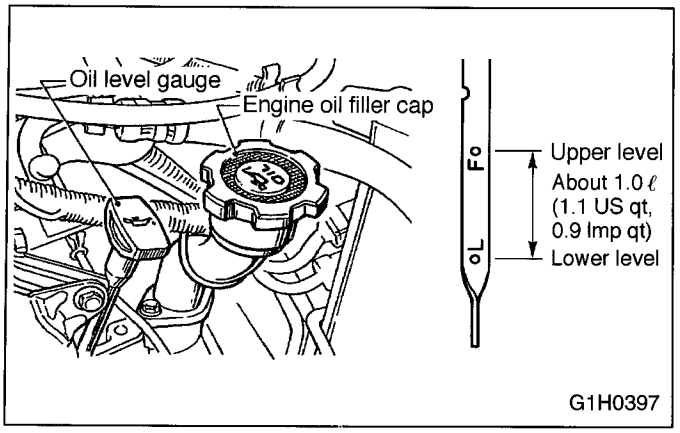
MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
×1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
×1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
California	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
All states except California	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

A: REPLACEMENT

1) Drain engine oil by loosening engine oil drain plug.



2) Open engine oil filler cap for quick draining of the engine oil.



3) Tighten engine oil drain plug after draining engine oil.

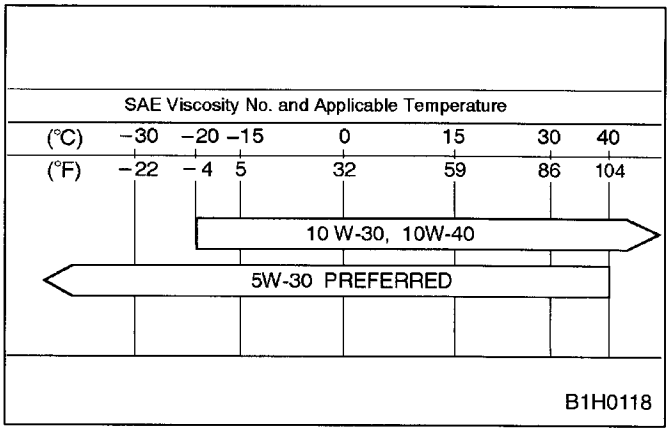
Tightening torque:
44 ± 4.8 N.m (4.5 ± 0.5 kg-m, 33 ± 3.6 ft-lb)

NOTE:
Replace drain plug gasket.

4) Fill engine oil through filler pipe up to upper point on level gauge. Make sure that vehicle is placed level when checking oil level. Use engine oil of proper quality and viscosity, selected in accordance with the table in figure.

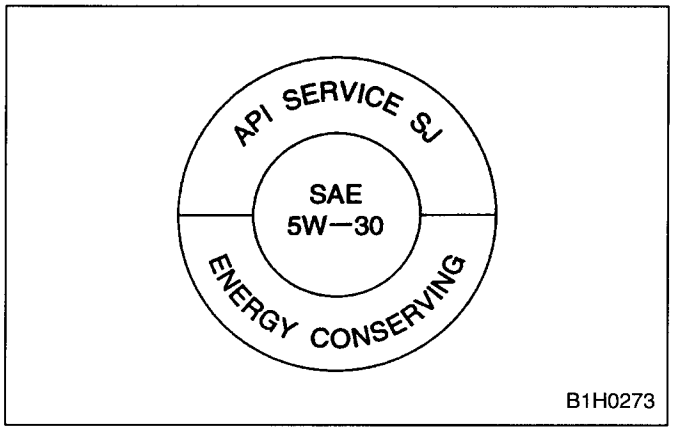
Recommended oil
API classification: SJ or SH with the words "Energy Conserving or Energy Conserving II", CCMC specifiction G4 or G5, or New API certification mark is displayed on the container

Engine oil capacity:
2200 cc:
Upper level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level
3.0 ℓ (3.2 US qt, 2.6 Imp qt)
2500 cc
Upper level
4.5 ℓ (4.8 US qt, 4.0 Imp qt)
Lower level
3.5 ℓ (3.7 US qt, 3.1 Imp qt)

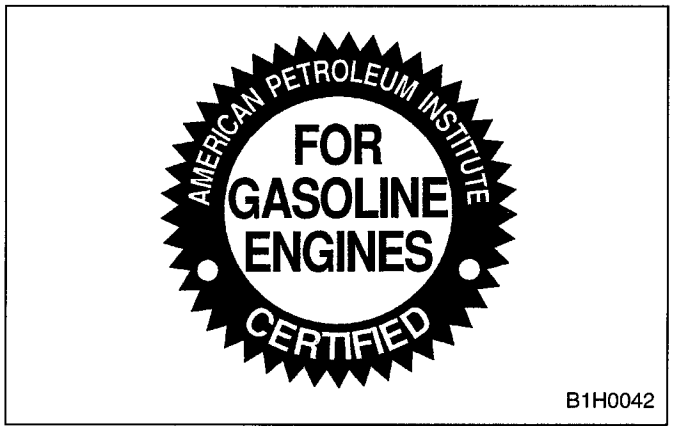


The proper viscosity helps car get good cold and hot starting by reducing viscous friction and thus increasing cranking speed.

CAUTION:
When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.



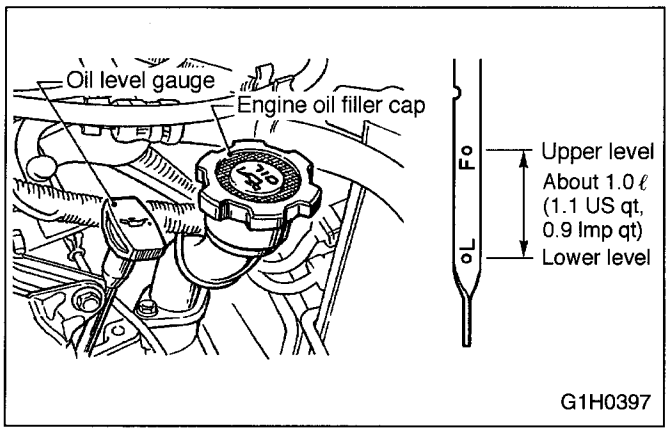
B1H0273



B1H0042

NOTE:
If vehicle is used in desert areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used:
API classification: SJ
SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20 W-50

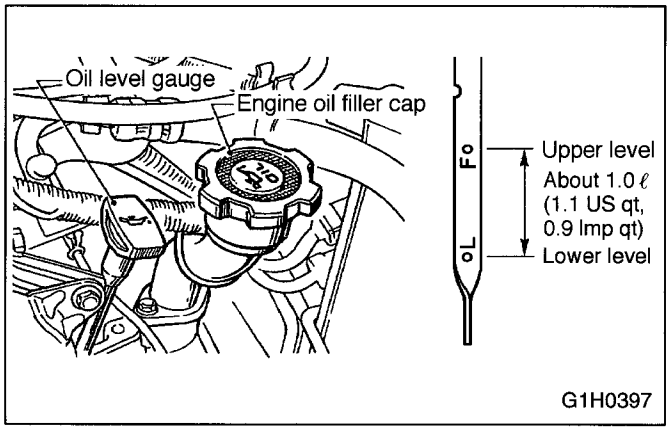
5) Close engine oil filler cap.
6) Start engine and warm it up for a time.
7) After engine stops, recheck the oil level.
If necessary, add engine oil up to upper level on level gauge.



G1H0397

B: INSPECTION

1) Park vehicle on a level surface.
2) Remove oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
4) Remove it again and note the reading. If the engine oil level is below the "L" line, add oil to bring the level up to the "F" line.
5) After turning off the engine, wait a few minutes for the oil to drain back into the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level may show in the range between the "F" line and the notch mark. This is caused by thermal expansion of the engine oil.
7) To prevent overfilling the engine oil, do not add oil above the "F" line when the engine is cold.



G1H0397

5. Replace Engine Coolant and Inspect Cooling System, Hoses and Connections

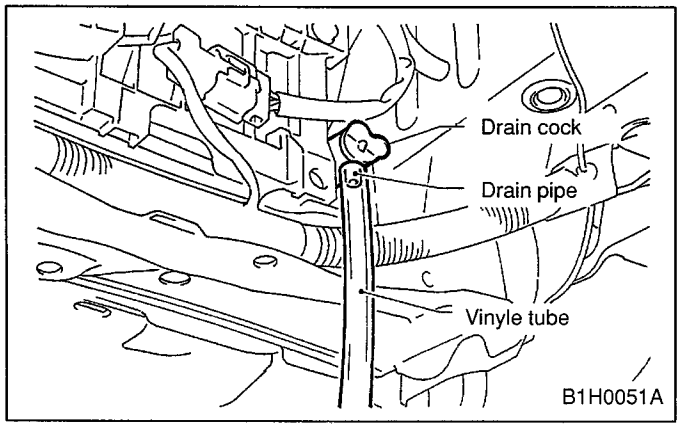
MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
x1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
x1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
California					P				P				P				P
All states except California and Canada					P				P				P				P

A: REPLACEMENT

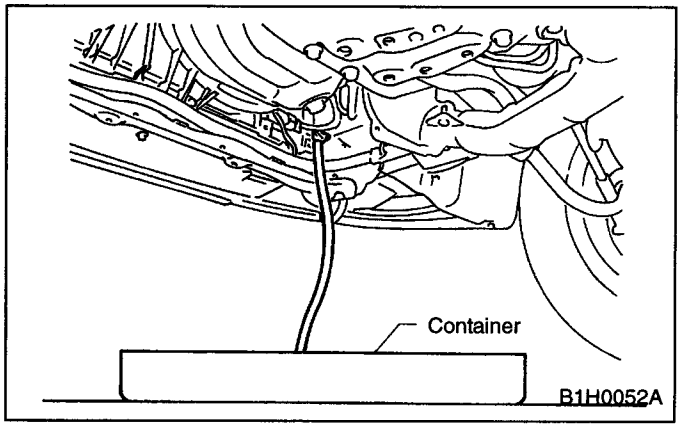
1. REPLACEMENT OF COOLANT

WARNING:
The radiator is of the pressurized type. Do not attempt to open the radiator cap immediately after the engine has been stopped.

1) Lift up the vehicle. <Ref. to 1-3 [0700].☆1>



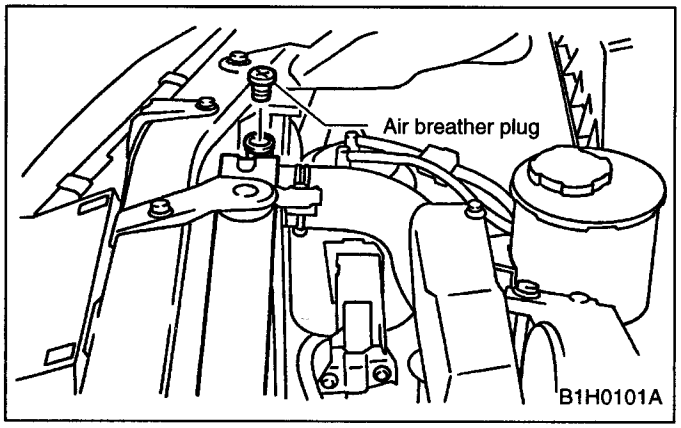
2) Fit vinyle tube to drain pipe.
3) Place a container under vinyle tube.



4) Loosen drain cock to drain engine coolant into container.
5) For quick draining, open radiator cap.

CAUTION:
Be careful not to spill coolant on the floor.

6) Drain coolant from reservoir tank.
7) Tighten radiator drain plug securely after draining coolant. (Drain tube may face downward.)



8) Remove air breather plug from radiator.
9) Fill engine coolant into radiator up to filler neck position.
10) Fill engine coolant into reservoir tank up to "FULL" level.

Coolant capacity (fill up to "FULL" level)
2200 cc: Approx. 5.8 ℓ (6.2 US qt, 5.1 Imp qt)
2500 cc: Approx. 6.0ℓ (6.3 US qt, 5.3 Imp qt)

CAUTION:
The SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crankcase. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

11) Securely install radiator cap and reservoir tank cap.
12) Run engine for more than five minutes at 2,000 to 3,000 rpm. (Run engine until radiator becomes hot in order to purge air trapped in cooling system.)
13) Stop engine and wait until coolant temperature lowers. Then open radiator cap to check coolant level and add coolant up to radiator filler neck. Next, add coolant into reservoir tank up to "FULL" level.
14) Securely install air breather plug.
15) Securely install radiator and reservoir tank caps.

8. Spark Plugs

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
x1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
x1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
California (2200 cc)					R				R				R				R
California (2500 cc)									R								R
All states except California and Canada (2200 cc)					R				R				R				R
All states except California and Canada (2500 cc)									R								R

A: REPLACEMENT

2. DOHC MODEL

For the replacement procedures of the spark plugs on DOHC models, refer to 6-1 [W3D0]☆2.

9. Transmission/Differential (Front and rear) Lubricants (Gear oil)

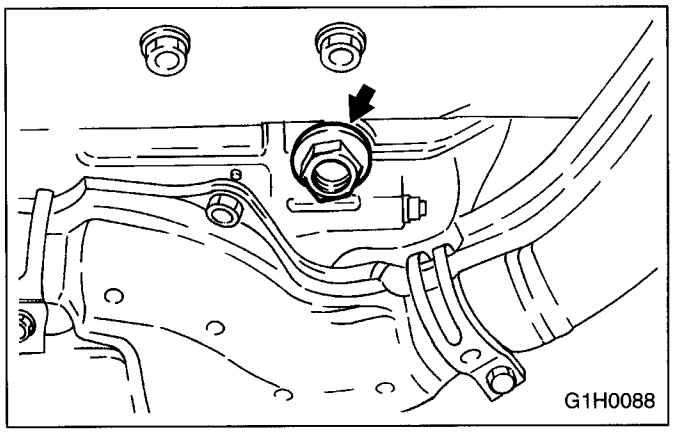
MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
×1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
×1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
California					I								I				
All states except California					I								I				

A: REPLACEMENT

1. MANUAL TRANSMISSION

1) Drain gear oil by removing drain plug after allowing the engine to cool for 3 to 4 hours.

CAUTION:
Before starting work, cool off the engine well.



2) Reinstall drain plug after draining gear oil and tighten it to the specified torque.

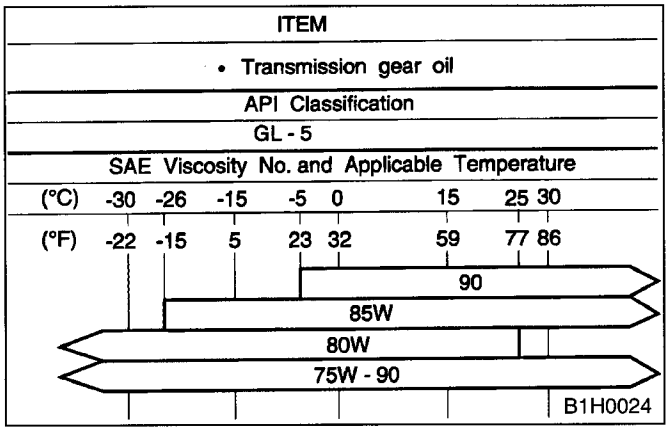
Tightening torque:
44 ± 3 N.m (4.5 ± 0.3 kg-m, 32.5 ± 2.2 ft-lb)

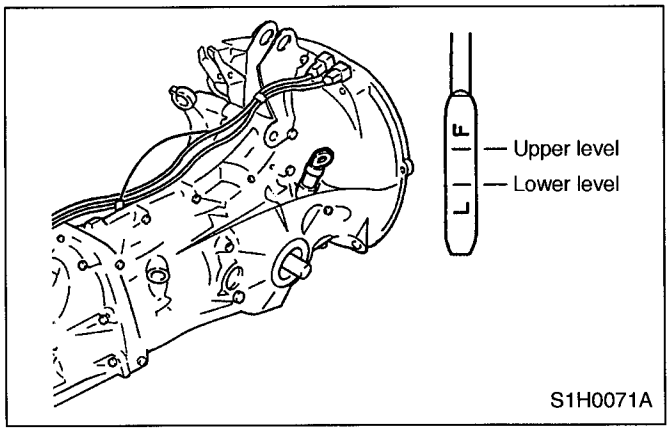
CAUTION:
- **Be sure to place a gasket between the transmission case and drain plug.**
- **Replace the gasket with a new one.**

3) Fill transmission gear oil through the oil level gauge hole up to the upper point of level gauge.

Gear oil capacity:
AWD model: 3.5 ℓ (3.7 US qt, 3.1 Imp qt)

Transmission gear oil
Recommended oil

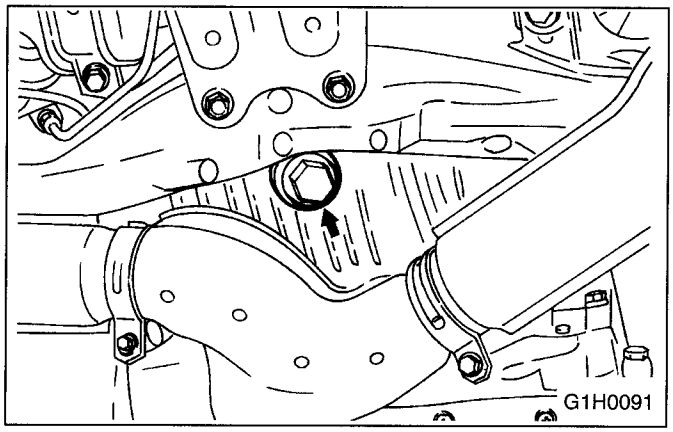




2. FRONT DIFFERENTIAL (AUTOMATIC TRANSMISSION)

1) Drain differential gear oil by removing drain plug after allowing the engine to cool for 3 to 4 hours.

CAUTION:
Before starting work, cool off the engine well.



2) Reinstall drain plug after draining differential gear oil and tighten it to the specified torque.

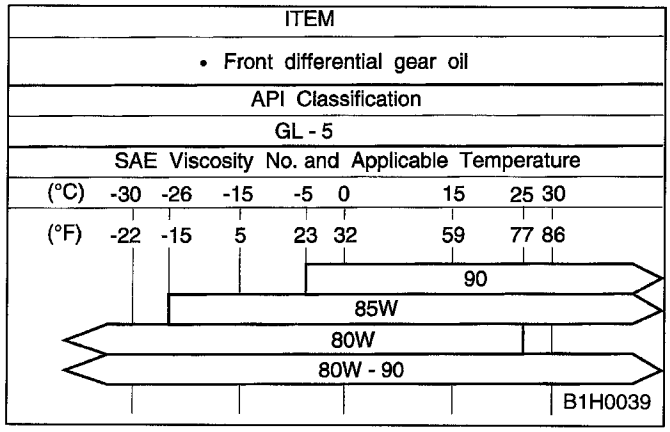
Tightening torque:
44 ± 3 N.m (4.5 ± 0.3 kg-m, 33 ± 2.2 ft-lb)

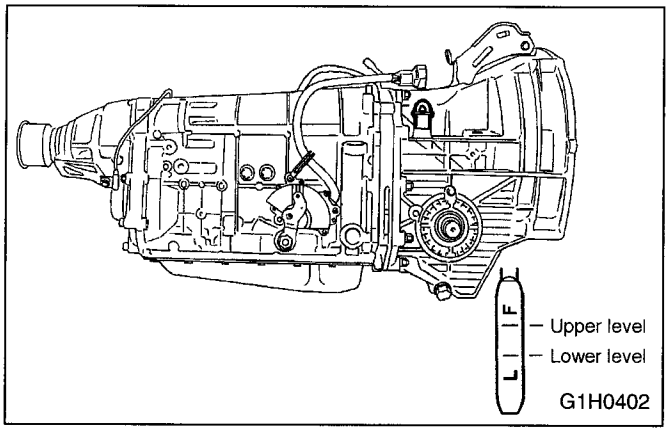
CAUTION:
- **Be sure to place a gasket between the transmission case and drain plug.**
- **Replace the gasket with a new one.**

3) Fill differential gear oil through the oil level gauge hole up to the upper point of level gauge.

Differential gear oil capacity:
1.1 — 1.3 ℓ
(1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

Front differential gear oil
Recommended oil





3. REAR DIFFERENTIAL (AWD MODEL)

1) Drain oil by removing drain plug or bolt.
2) Remove filler plug or bolt for quick draining oil.
3) Tighten drain plug or bolt after draining oil.

CAUTION:
Apply fluid packing to plug.

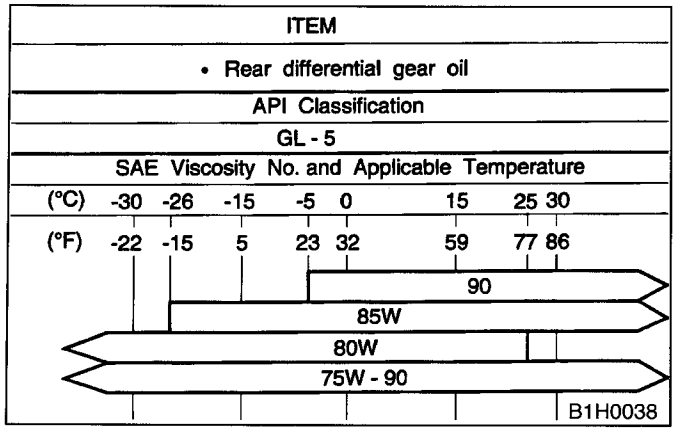
Fluid packing:
THREE BOND 1205 or equivalent
Tightening torque:
44 ± 4 N.m (4.5 ± 0.4 kg-m, 33 ± 2.9 ft-lb)

4) After installing drain plug or bolt onto rear differential gear case firmly, fill oil up fully to the mouth of filler plug or bolt.

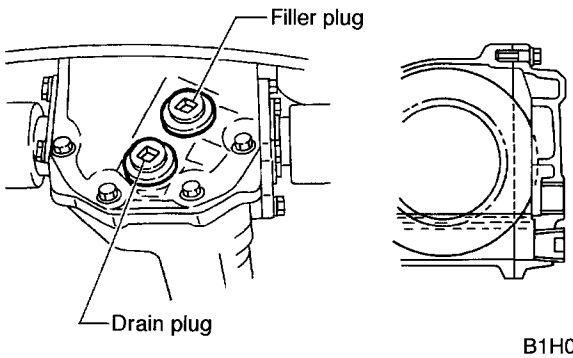
Oil capacity:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)

Rear differential gear oil
Recommended oil

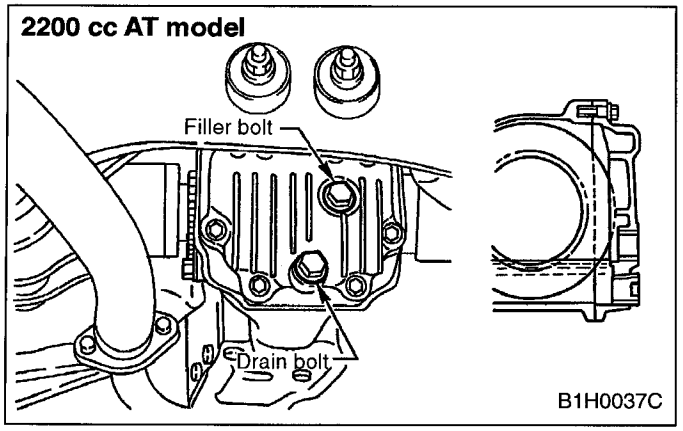
CAUTION:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.



Except 2200 cc AT model



2200 cc AT model



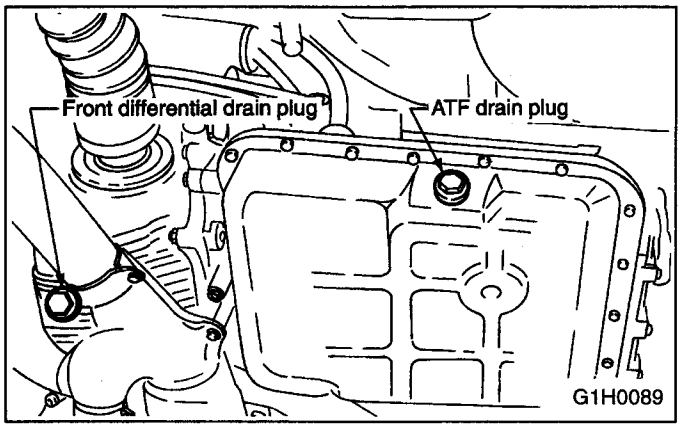
5) Instal filler plug or bolt onto rear differential gear case firmly.

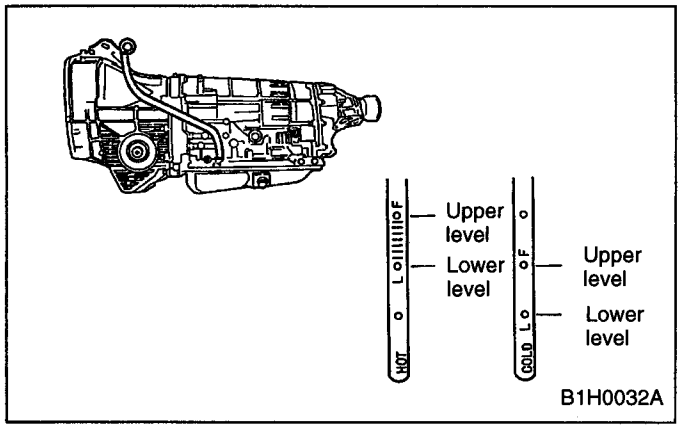
CAUTION:
Apply fluid packing to plug. (Except 2200 cc AT model)

Fluid packing:
THREE BOND 1205 or equivalent
Tightening torque:
44 ± 4 N.m (4.5 ± 0.4 kg-m, 33 ± 2.9 ft-lb)

10. Automatic Transmission Fluid

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]									
Months	3	7.5	15	22.5	30	37.5	45	52.5	60
x1,000 km	4.8	12	24	36	48	60	72	84	96
x1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60
					I				





A: REPLACEMENT

1) Drain ATF (Automatic Transmission Fluid) by removing drain plug after allowing the engine to cool for 3 to 4 hours.
2) Reinstall drain plug after draining ATF, and tighten it to the specified torque.

Tightening torque:
25 ± 2 N.m (2.5 ± 0.2 kg-m, 18.1 ± 1.4 ft-lb)

CAUTION:
Before starting work, cool off the engine well.

3) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole.

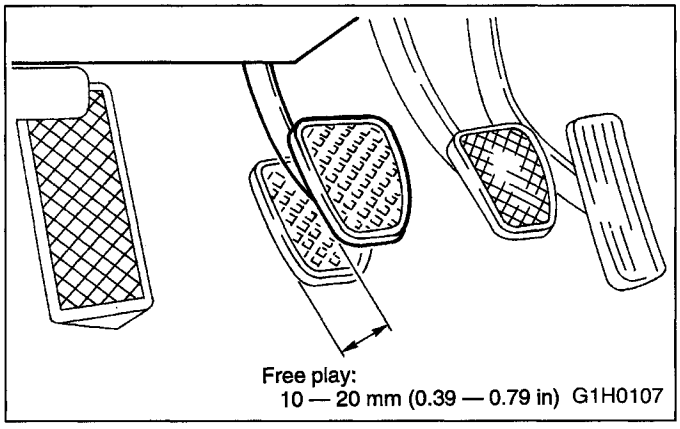
Fluid capacity
2200 cc: 7.9 — 8.2 ℓ
(8.4 — 8.7 US qt, 7.0 — 7.2 Imp qt)
2500 cc: 9.5 — 9.8 ℓ
(10 — 10.4 US qt, 8.4 — 8.6 Imp qt)

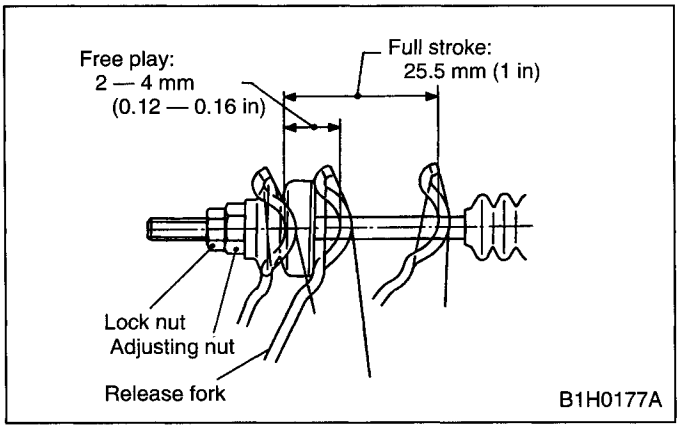
4) Run the vehicle until the ATF temperature rises to 60 to 80°C (140 to 176°F) and check the ATF level.

Recommended fluid:
Dexron II or Dexron III type automatic transmission fluid

15. Clutch and Hill-holder System

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
x1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
x1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
California			I		I		I		I		I		I		I		I
All states except California and Canada			I		I		I		I		I		I		I		I





A: INSPECTION AND ADJUSTMENT

1. MECHANICAL CLUTCH TYPE

1) Inspect free play of clutch pedal by operating pedal by hand.
If it is out of the specified value, adjust it by turning adjusting nut on engine side of clutch cable at release fork.

Tightening torque
(Adjusting nut on release fork):
6 ± 1.5 N.m
(0.60 ± 0.15 kg-m, 4.4 ± 1.1 ft-lb)

Standard free play:
At clutch pedal
10 — 20 mm (0.39 — 0.79 in)

Fork lever free play allowance:
2 — 4 mm (0.12 — 0.16 in)

NOTE:
When replacing clutch cable with new one and/or marking free play adjustment of clutch pedal, make adjustment of hill-holder system without fail as follows.
After replacing clutch cable [and/or pressure hold valve (PHV) cable] with a new one, de-

press clutch pedal about thirty (30) times as a running-in operation prior to this adjustment.

2) Pedal-to-floor plate gap in disengaged position

(1) With the engine idling, pull parking brake lever completely.

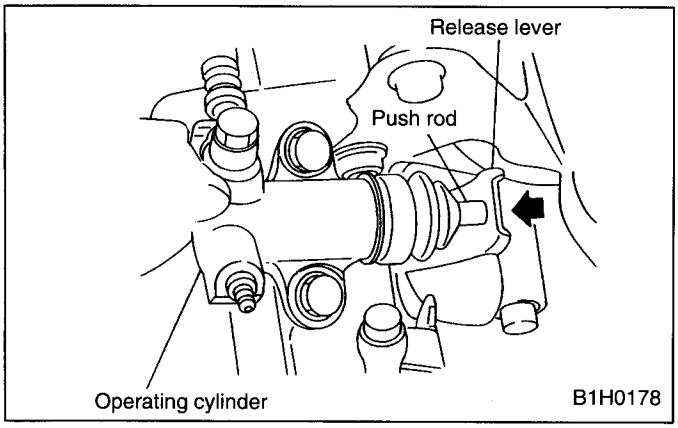
(2) Slowly depress clutch pedal while moving shift lever into reverse.

(3) Stop depressing clutch pedal when gearshifting is complete. With clutch pedal in this position, measure the distance between the upper side of pedal pad and the lower end of front panel (intersection of front panel with floor). Check that the measured value is within the specified standard.

Standard:
80 mm (3.15 in) or more

3) Pedal height

Check that the clutch pedal pad surface is level with or higher than brake pedal pad surface.



3. HYDRAULIC CLUTCH TYPE

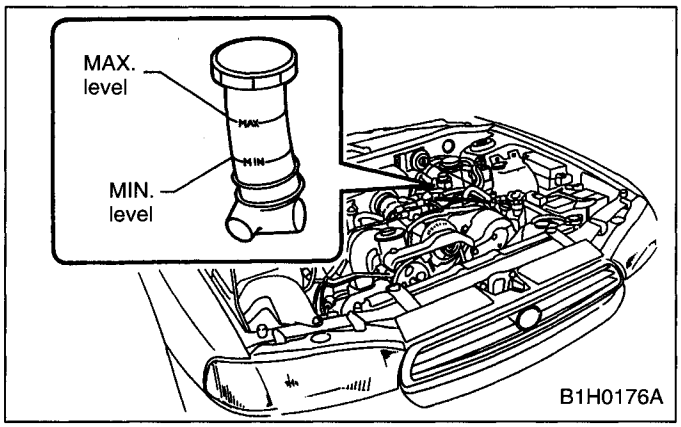
1) Push the release fork to retract the push rod of the operating cylinder and check if the fluid level in the clutch reservoir tank rises or not.

2) If the fluid level rises, pedal free play is correct.

3) If the fluid level does not rise, or the push rod cannot be retracted, adjust the clutch pedal. <Ref. to 4-5 [W1F1]☆8>

4) Inspect the underside of master cylinder, clutch damper and operating cylinder for clutch system, hoses, piping and their couplings for fluid leaks.

If fluid leaks are found, correct them by retightening their fitting bolt and/or replacing their parts.



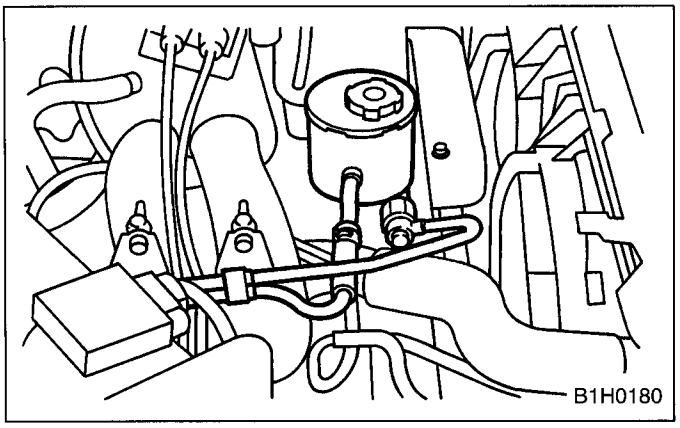
5) Check the fluid level using the scale on the outside of the clutch master cylinder tank. If the level is below "MIN", add clutch fluid to bring it up to "MAX".

Recommended clutch fluid:
FMVSS No. 116, fresh DOT3 or DOT4 brake fluid

CAUTION
• Avoid mixing different brakes of brake fluid to prevent degradation of the fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.
• Use fresh DOT3 or DOT4 brake fluid when refilling fluid.

16. Steering and Suspension System

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
x1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
x1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
California			I		I		I		I		I		I		I		I
All states except California and Canada			I		I		I		I		I		I		I		I



A: INSPECTION

7. HOSES OF OIL PUMP FOR DAMAGES

Check pressure hose and return hose of oil pump for crack, swell or damage. Replace hose with new one if necessary.

NOTE:
Prevent hoses from revolving and/or turning when installing hoses.

8. POWER STEERING PIPES FOR DAMAGE

Check power steering pipes for corrosion and damage.
Replace pipes with new one if necessary.

19. Valve Clearance

MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]																	
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
x1,000 km	4.8	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
x1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120
California															I		
All states except California and Canada															I		

A: INSPECTION

1. SOHC MODEL

For the inspection procedures of the valve clearace on SOHC models, refer to "ON-CAR SERVICE". <Ref, to 2-2 [07A1]☆8>

2. DOHC MODEL

For the inspection procedures of the valve clearace on DOHC models, refer to "ON-CAR SERVICE". <Ref, to 2-2 [07A2]☆8>

SPECIAL TOOLS 1-6

1. Engine Tools

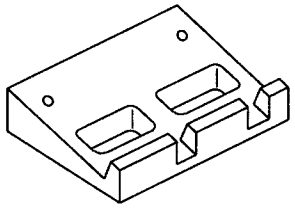
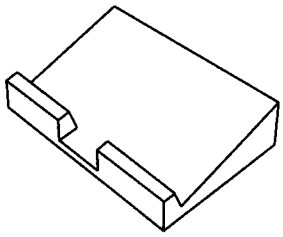
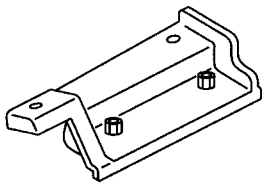
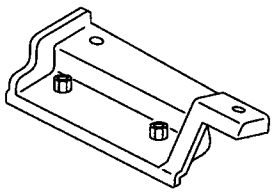
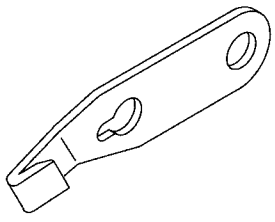
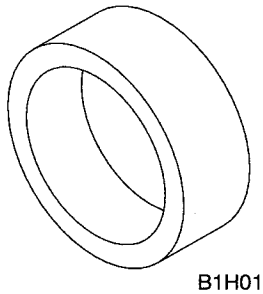
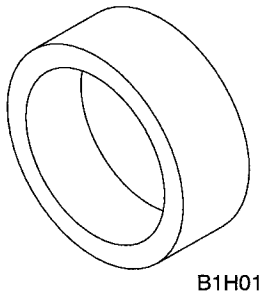
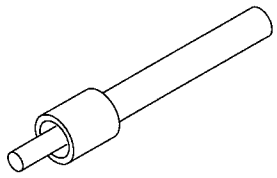
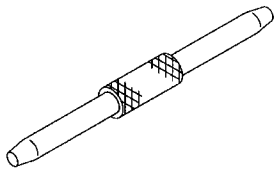
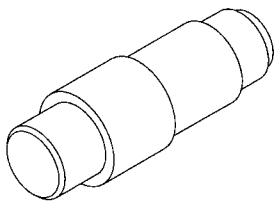
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0126	498267200	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve springs.
 G1H0371	498267600	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve springs. • For DOHC engine.
 G1H0128	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).
 G1H0129	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 B1H0194	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0195	498747100	PISTON GUIDE	• Used for installing piston in cylinder. • For 2200 cc engine.
 B1H0195	498747300	PISTON GUIDE	• Used for installing piston in cylinder. • For 2500 cc engine.
 B1H0197	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 B1H0198	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 B1H0199	499037100	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.

SPECIAL TOOLS

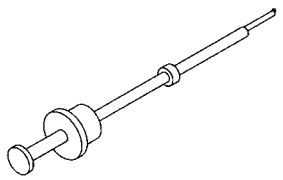
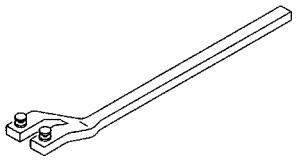
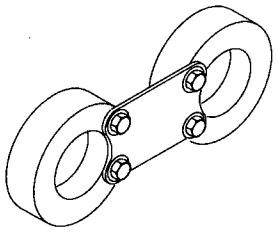
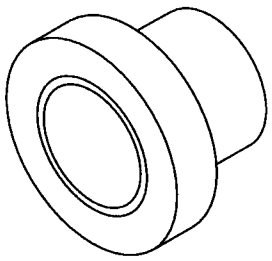
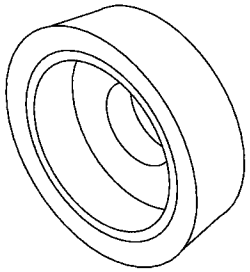
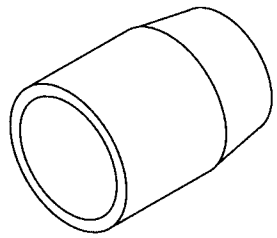
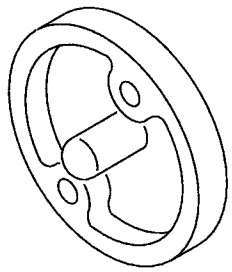
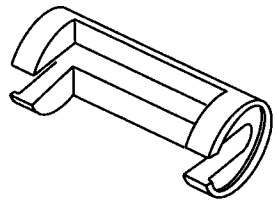
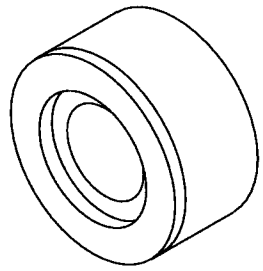
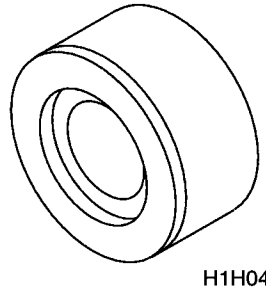
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0200	499097500	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 B1H0201	499207100	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket.
 B1H0202	499207300	CAMSHAFT SPROCKET WRENCH	• Used for removing and installing plastic camshaft sprocket. • For DOHC engine.
 B1H0203	499587100	CAMSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CAMSHAFT OIL SEAL GUIDE (499597000).
 B1H0204	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H1H0494	499597000	CAMSHAFT OIL SEAL GUIDE	• Used for installing camshaft oil seal. • Used with CAMSHAFT OIL SEAL INSTALLER (499587100).
 H1H0495	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
 G1H0142	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 H1H0496	499767000	VALVE GUIDE ADJUSTER	Used for installing intake and exhaust valve guides.
 H1H0496	498267700	VALVE GUIDE ADJUSTER	• Used for installing intake and exhaust valve guides. • For DOHC engine.

SPECIAL TOOLS

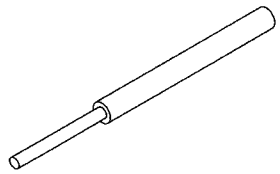
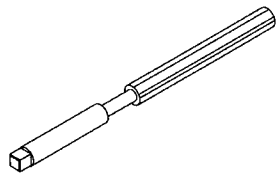
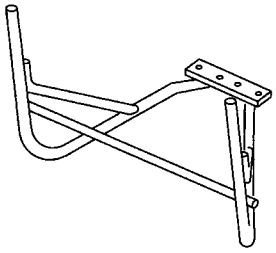
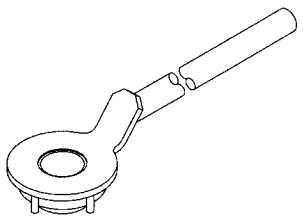
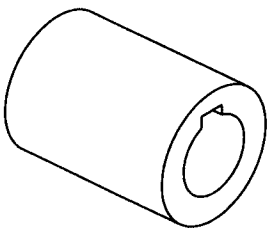
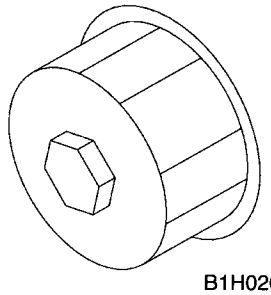
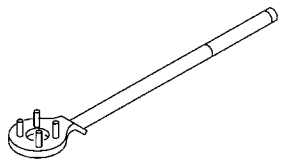
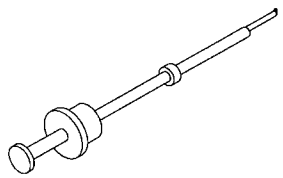
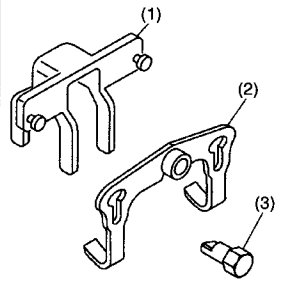
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0205	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 B1H0206	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.
 G1H0146	499817000	ENGINE STAND	• Stand used for engine disassembly and assembly. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).
 B1H0274	499977300 (Newly adopted tool)	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 G1H0148	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0208	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.
 B1H0207	499977100	CRANK PULLEY WRENCH	• Used for stopping rotation of crankshaft pulley when losening and tightening crankshaft pulley bolts. • For 2500 cc engine.
 B1H0200	499097600	PISTON PIN REMOVER ASSY	• Used for removing piston pin. • For DOHC engine.
 H1H0491A	498187100 (Newly adopted tool)	SHIM REPLACER KIT	• Used for removing piston pin. • For DOHC engine. (1) Replacer 1 (49818720) (2) Replacer 2 (49818710) (3) Replacer 3 (49818730)

4. Rear Differential Tools (AWD Models)

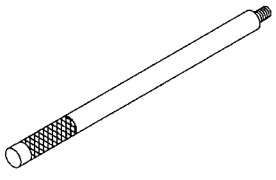
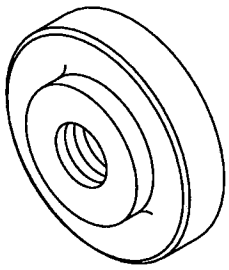
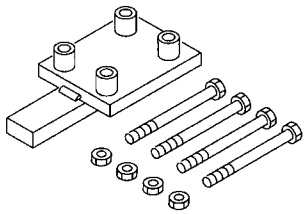
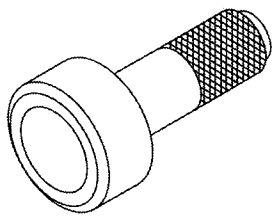
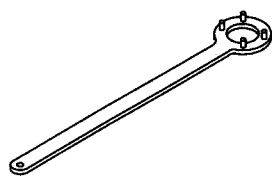
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0230	398477701	HANDLE	Used for installing front and rear bearing cone.
 B1H0235	398477702	DRIFT	Used for press-fitting the bearing cone of differential carrier (front).
 B1H0143	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.
 B1H0236	498447120	DRIFT	Used for installing front oil seal.
 G1H0222	498427200	FLANGE WRENCH	Used for stopping rotation of companion flange when loosening and tightening self-lock nut.

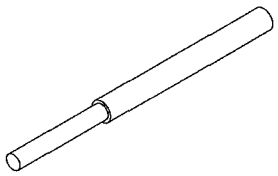
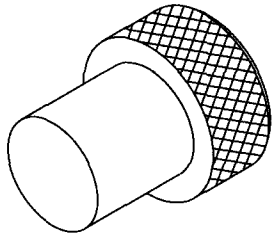
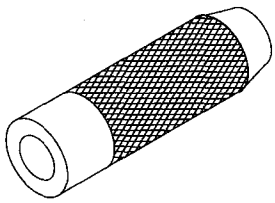
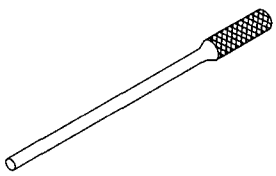
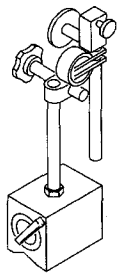
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0237	398467700	DRIFT	Used for removing drive pinion, pilot bearing and front bearing cone.
 B1H0211	399780104	WEIGHT	Used for installing front bearing cone, pilot bearing, companion flange.
 B1H0238	899580100	INSTALLER	Used for press-fitting the front bearing cone, pilot bearing.
 B1H0220	899904100	STRAIGHT PIN REMOVER	Used for driving out differential pinion shaft lock pin.
 B1H0137	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).

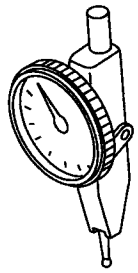
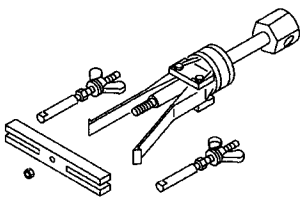
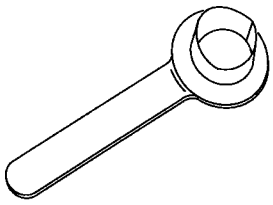
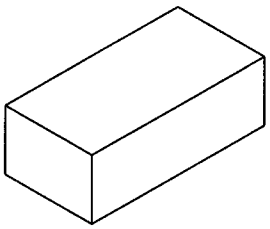
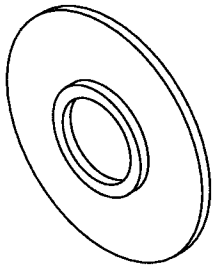
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0160	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).
 B1H0138	398527700	PULLEY ASSY	Used for removing oil seal and side bearing cup.
 G1H0303	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft into rear differential. • For protecting oil seal.
 B1H0242	398507704	BLOCK	Used for adjusting pinion height and preload.
 B1H0223	398177700	INSTALLER	• Used for installing rear bearing cone. • For T-type.

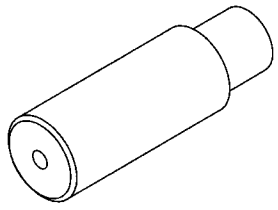
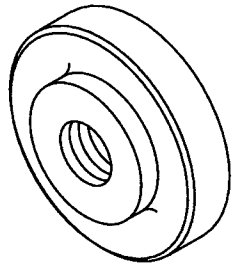
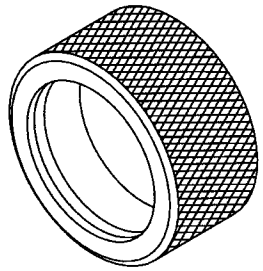
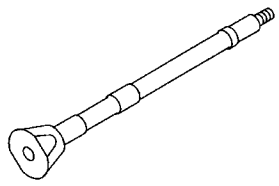
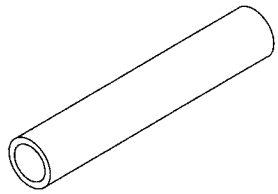
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0239	398457700	ATTACHMENT	• Used for removing side bearing retainer. • For T-type.
 B1H0235	398477703	DRIFT 2	• Used for press-fitting the bearing race (rear) of differential carrier. • For T-type.
 G1H0200	398437700	DRIFT	• Used for installing said oil seal. • For T-type.
 B1H0240	398507702	DUMMY SHAFT	• Used for adjusting pinion height and preload. • For T-type.
 B1H0241	398507703	DUMMY COLLAR	• Used for adjusting pinion height and preload. • For T-type.

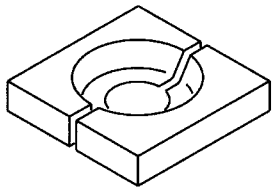
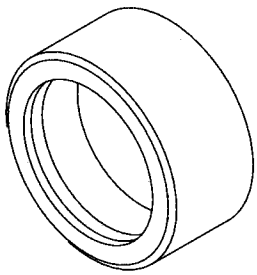
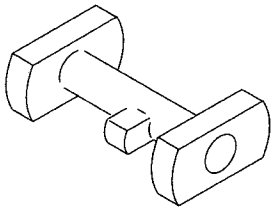
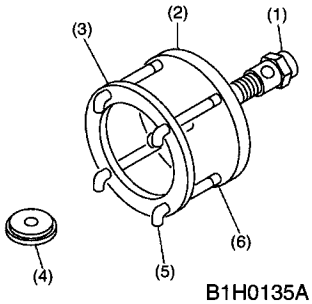
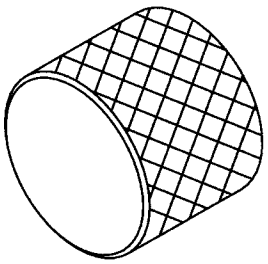
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0379	398517700	REPLACER	• Used for removing rear bearing cone. • For T-type.
 B1H0224	398487700	DRIFT	• Used for press-fitting the side bearing cone. • For T-type.
 B1H0156	398507701	GAUGE	• Used for adjusting pinion height. • For T-type.
 B1H0135A	399527700	PULLER SET	• Used for extracking side bearing cone. (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000) • For T-type.
 B1H0243	398227700	WEIGHT	• Used for installing side bearing. • Used with GAUGE (398237700). • For T-type.

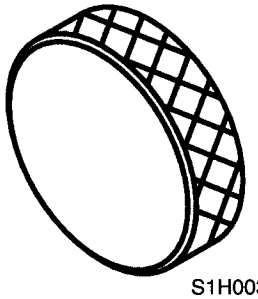
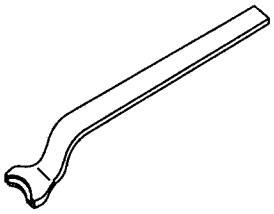
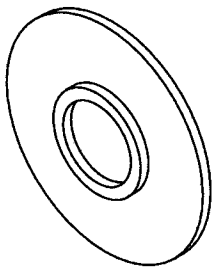
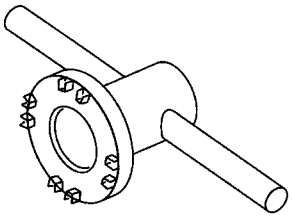
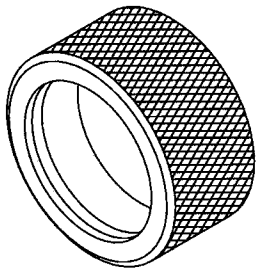
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 S1H0033	398237700	GAUGE	• Used for installing side bearing. • Used with WEIGHT (398227700). • For T-type.
 G1H0338	28099PA100	DRIVE SHAFT REMOVER	• Used for removing rear drive shaft from rear differential. • For T-type.
 B1H0223	498175500	INSTALLER	• Used for installing rear bearing cone. • For VA-type.
 G1H0169	399780111	WRENCH ASSY	• Used for removing and installing side oil seal holder. • For VA-type.
 G1H0200	498447100	OIL SEAL INSTALLER	• Used for installing oil seal. • For VA-type.

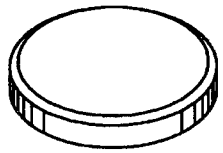
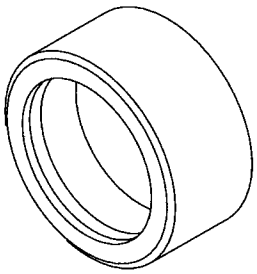
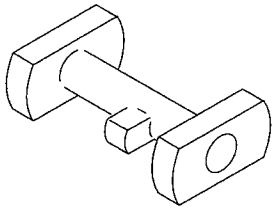
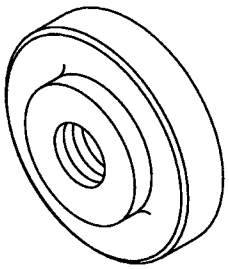
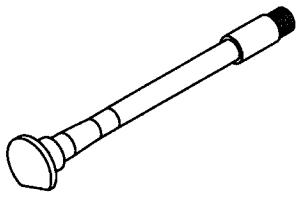
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H1H0499	399520105	SEAT	• Used for removing side bearing cone. • Used with PULLER SET (899524100). • For VA-type.
 B1H0224	498485400	DRIFT	• Used for installing side bearing cone. • For VA-type.
 B1H0156	498505501	GAUGE	• Used for adjusting pinion height. • For VA-type.
 B1H0235	498447110	BEARING OUTER RACE DRIFT	• Used for press-fitting the bearing race (front) of differential carrier. • For VA-type.
 B1H0193	498447150	DUMMY SHAFT	• Used for adjusting pinion height and preload. • For VA-type.

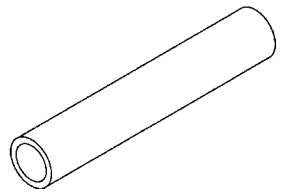
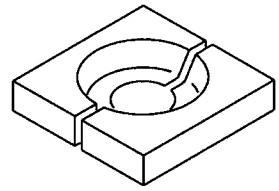
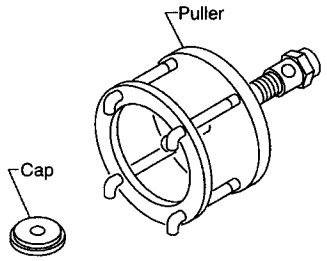
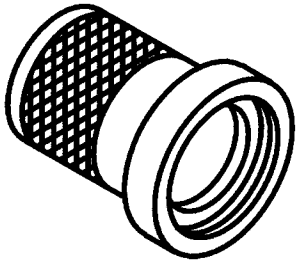
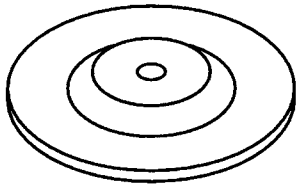
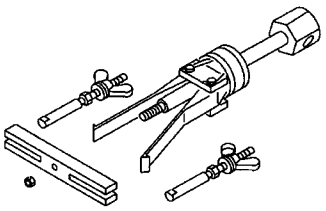
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0241	32285AA000	DUMMY COLLAR	• Used for adjusting pinion height and preload. • For VA-type.
 G1H0379	498515500	REPLACER	• Used for removing rear bearing cone. • For VA-type.
 B1H0135B	899524100	PULLER SET	• Used for removing side bearing cone. • For VA-type.
 H1H0497	899874100	INSTALLER	• Used for installing companion flange. • For VA-type.
 H1H0498	499705404	SEAT	• Used for removing side bearing race. • Used with PULLEY ASSY (499705401). • For VA-type.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B1H0138	499705401	PULLEY ASSY	• Used for removing side bearing race. • Used with SEAT (499705404). • For VA-type.

10. Supplemental Restraint System Tools

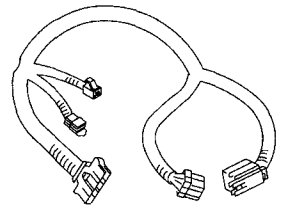
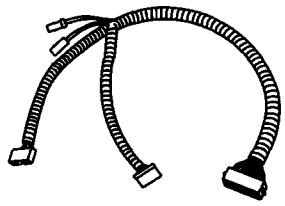
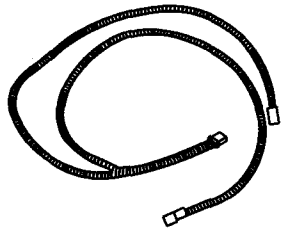
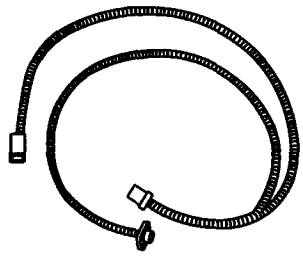
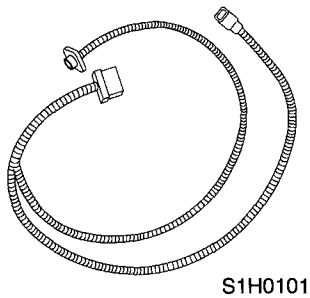
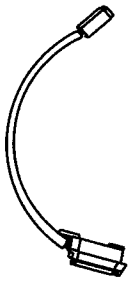
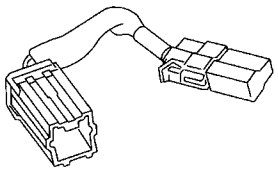
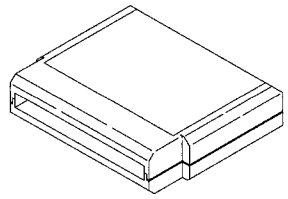
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 G1H0284	98299PA000	HARNESS A	Used for checking the supplemental restraint system.
 S1H0001	98299FC000 (Newly adopted tool)	HARNESS E	Used for checking the supplemental restraint system.
 S1H0002	98299FC010 (Newly adopted tool)	HARNESS F	Used for checking the supplemental restraint system.
 S1H0003	98299FC020 (Newly adopted tool)	HARNESS G	Used for checking the supplemental restraint system.
 S1H0101	98299FA020 (Newly adopted tool)	HARNESS H	Used for checking the supplemental restraint system.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 S1H0028	98299FC030 (Newly adopted tool)	ADAPTER A (DEPLOYMENT)	• Used for deploying the air bag module. • Used with DEPLOYMENT TOOL (98299PA030).
 G1H0287	98299PA030	DEPLOYMENT TOOL	Used for operating the supplemental restraint system when scraping the vehicle.
 G1H0389	98299PA040	AIR BAG RESISTOR	Used for checking the steering column harness.

11. Select Monitor and Cartridge

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 S1H0070	24082AA010 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 S1H0027	22771AA020 (Newly adopted tool)	SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA020 (With printer) 22771AA030 (Without printer) • German: 22771AA040 (With printer) • French: 22771AA050 (With printer) • Spanish: 22771AA060 (With printer)

REPAIR SECTION

FOREWORD

This portion of the service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of both the fully qualified and the less-experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

Important safety notice

- Providing appropriate service and repair is a matter of great importance in the serviceman's safety maintenance and safe operation, function and performance which the SUBARU vehicle possesses.
- In case the replacement of parts or replenishment of consumables is required, genuine SUBARU parts whose parts numbers are designated or their equivalents must be utilized.
- It must be made well known that the safety of the serviceman and the safe operation of the vehicle would be jeopardized if the used any service parts, consumables, special tools and work procedure manuals which are not approved or designated by SUBARU.

How to use this manual

- This Service Manual is divided into four volumes by section so that it can be used with ease at work. Refer to the Table of Contents, select and use the necessary section.

  - GENERAL INFORMATION SECTION
  - REPAIR SECTION
  - DIAGNOSTICS SECTION
  - WIRING DIAGRAM SECTION

- Each chapter in the manual is basically made of the following four types of areas.

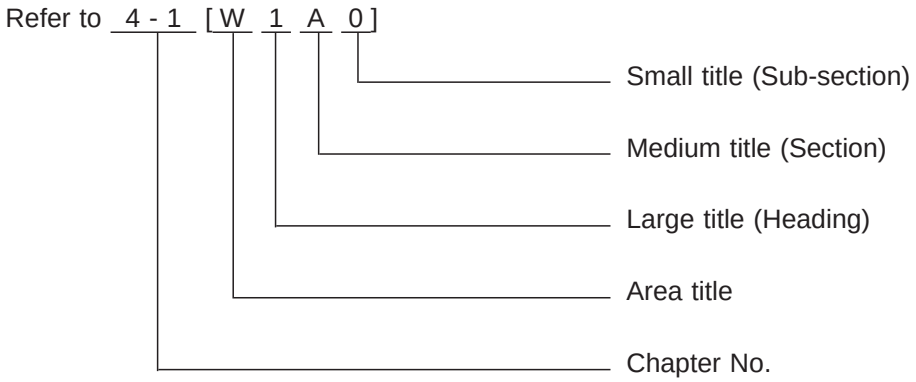
  S SPECIFICATIONS AND SERVICE DATA
  C COMPONENT PARTS
  W SERVICE PROCEDURE
  (X SERVICE PROCEDURE)
  (Y SERVICE PROCEDURE)
  K DIAGNOSTICS

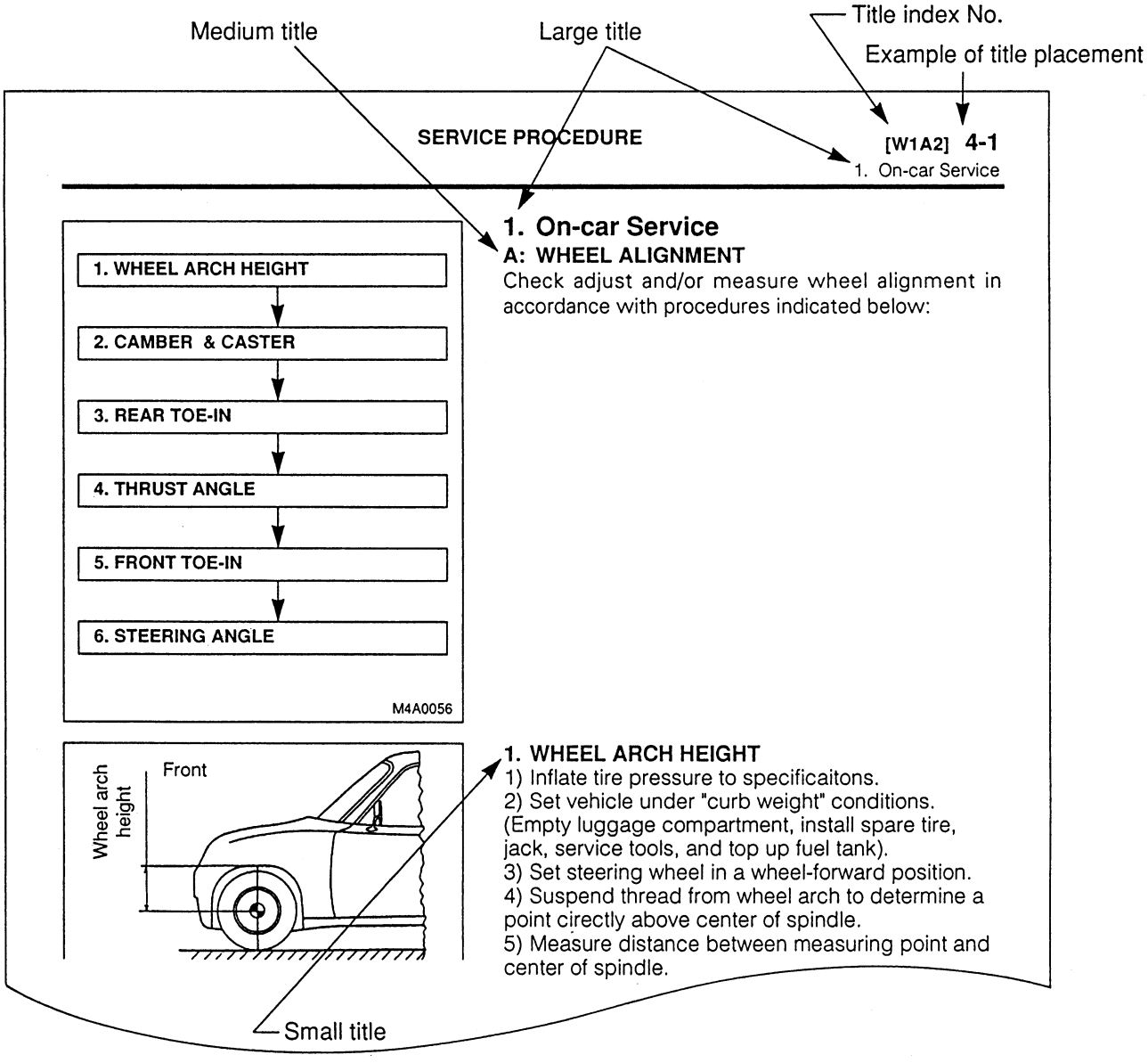
- The description of each area is provided with four types of titles different in size as shown below. The Title No. or Symbol prefixes each title in order that the construction of the article and the flow of explanation can be easily understood.

  [Example of each title]
  - Area title: W SERVICE PROCEDURE (one of the four types of areas)
  - Large title (Heading): 1. Oil Pump (to denote the main item of explanation)
  - Medium title (Section): A: REMOVAL (to denote the type of work in principle)
  - Small title (Sub-section): 1. INNER ROTATOR (to denote a derivative item of explanation)

- The Title Index No. is indicated on the top left (or right) side of the page as the book is opened. This is useful for retrieving the necessary portion.

(Example of usage)





- In this manual, the following symbols are used.

  ✻ : Selective part

  ★ : Replacement part

  : Should be lubricated with oil.

  : Should be lubricated with grease.

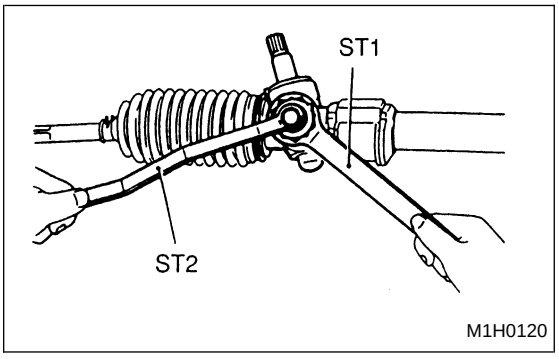
  : Sealing point

  T : Tightening torque

- WARNING, CAUTION, NOTE

  - WARNING: Indicates the item which must be observed precisely during performance of maintenance services in order to avoid injury to the mechanics and other persons.
  - CAUTION: Indicates the item which must be followed precisely during performance of maintenance services so as to avoid damage and breakage to the vehicle and its parts and components.
  - NOTE: Indicates the hints, knacks, etc. which make the maintenance job easier.

- SPECIAL TOOLS
  When any special tool is required to perform the job, it is identified by “ST” in the applicable illustration and its part number is shown in the manual.



1. Procedures for adjusting backlash

1) Set steering wheel to the straight-ahead position.
2) Remove the exhaust pipe
3) Loosen the lock nut with ST.

ST1	921650000	STEERING GEARBOX WRENCH
ST2	921550000	STEERING GEARBOX WRENCH

Description (of job method)

Shows the part name

Shows the part number

Tells that two kinds of special tools are required.
When two or more kinds of special tools are required to do a job, they are identified by ST1, ST2,.....respectively.

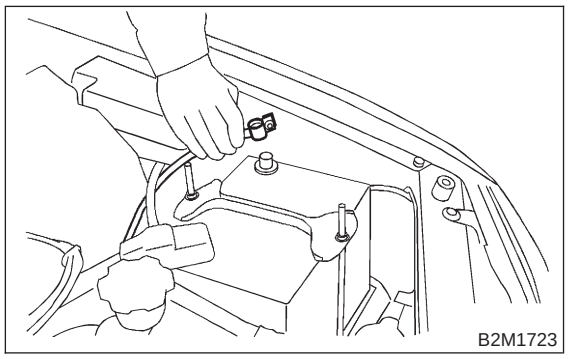
TABLE OF CONTENTS

EMISSION CONTROL SYSTEM AND VACUUM FITTING 2-1

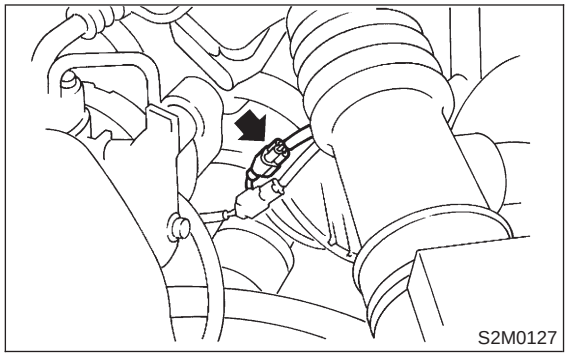
1. Front Catalytic Converter

A: REMOVAL

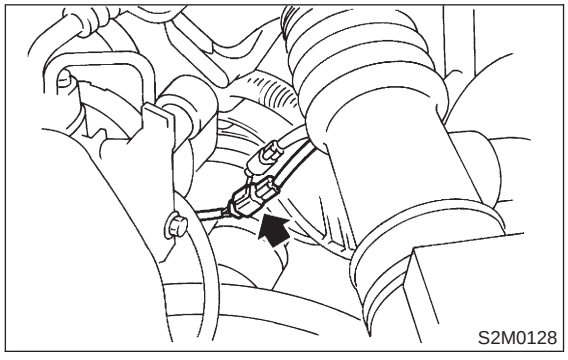
1) Disconnect battery ground cable.



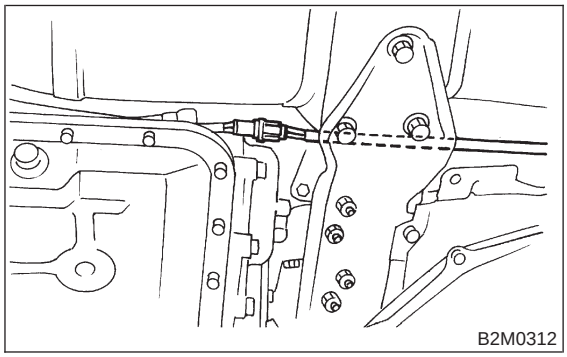
2) Disconnect front oxygen sensor connector.



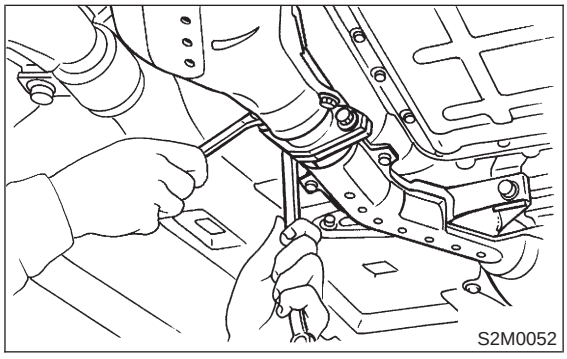
3) Disconnect rear oxygen sensor connector. (California spec. vehicles)



4) Lift-up the vehicle.
5) Disconnect rear oxygen sensor connector. (Except California spec. vehicles)

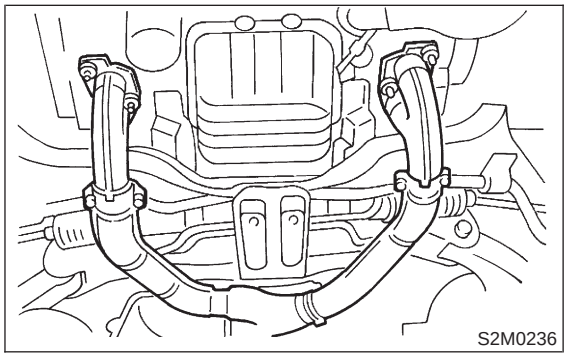


6) Separate center exhaust pipe from front catalytic converter.

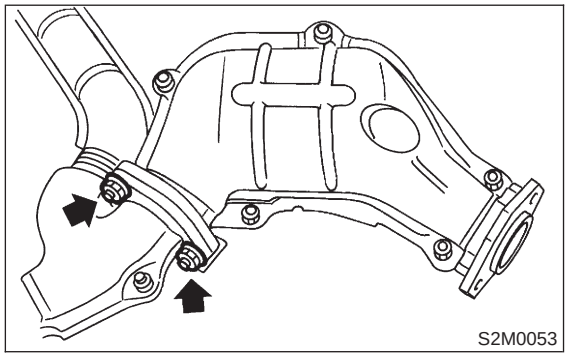


7) Remove bolts which hold front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down front exhaust pipe and center exhaust pipe.



8) Separate front catalytic converter from front exhaust pipe.

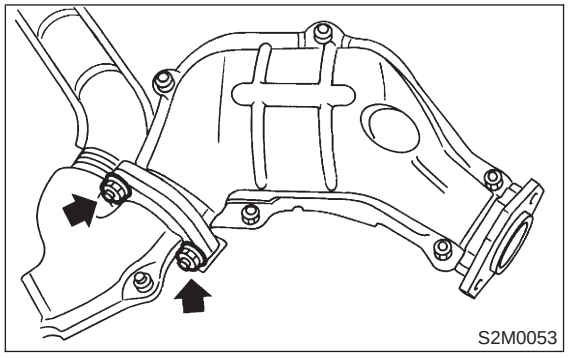


B: INSTALLATION

CAUTION:
Replace gaskets with new ones.

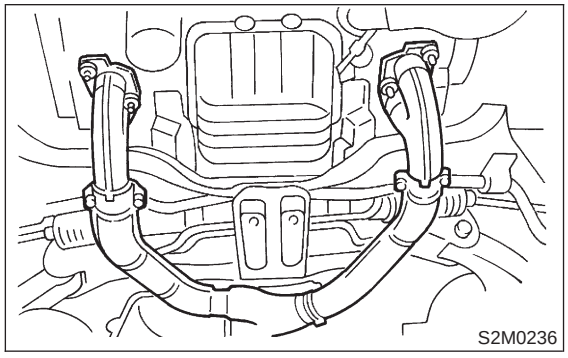
1) Install front catalytic converter to front exhaust pipe and center exhaust pipe.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)



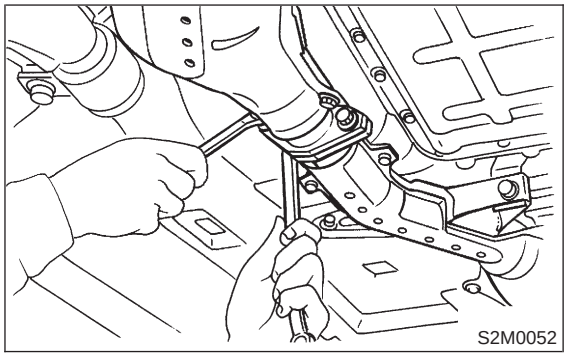
2) Tighten bolts which hold front exhaust pipe onto cylinder heads.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)

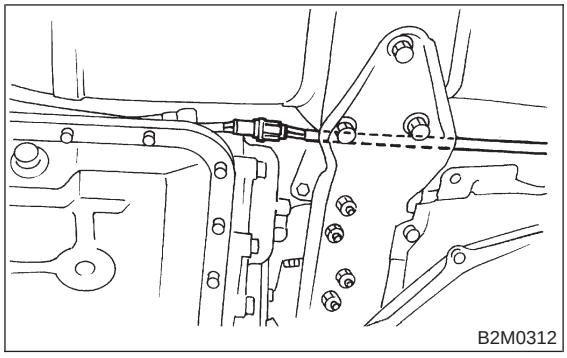


3) Install center exhaust pipe to front catalytic converter.

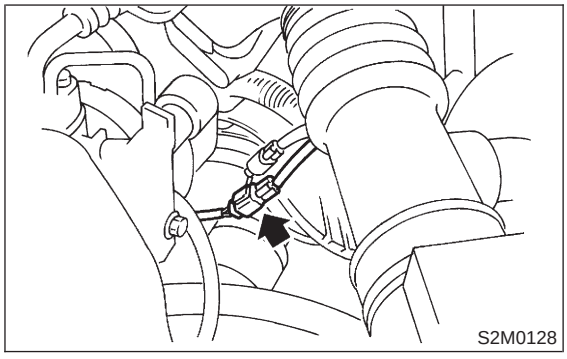
Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)



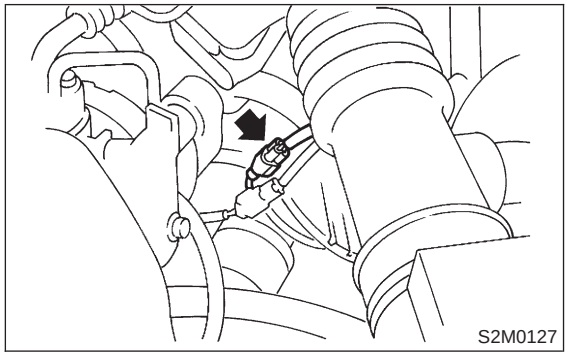
4) Connect rear oxygen sensor connector. (Except California spec. vehicles)



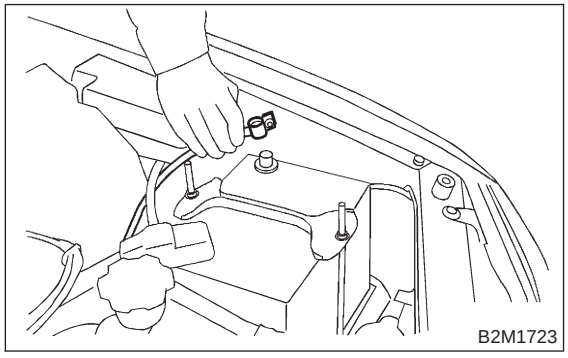
5) Lower the vehicle.
6) Connect rear oxygen sensor connector. (California spec. vehicles)



7) Connect front oxygen sensor connector.



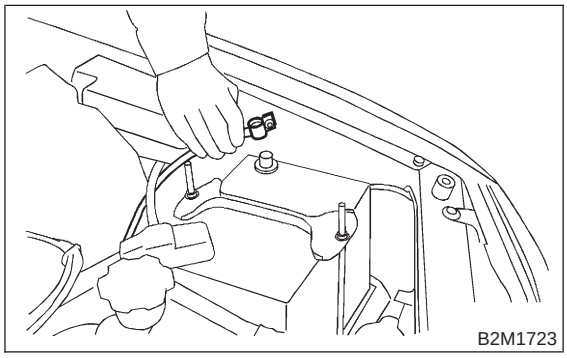
8) Connect battery ground cable.



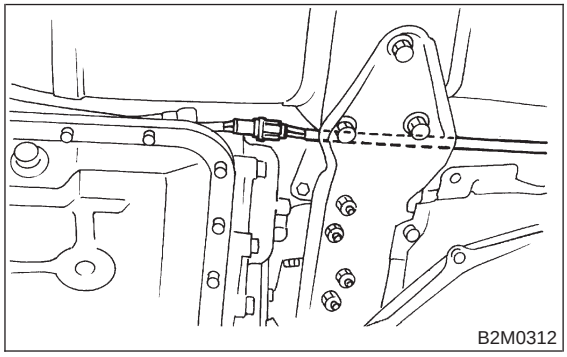
2. Rear Catalytic Converter

A: REMOVAL

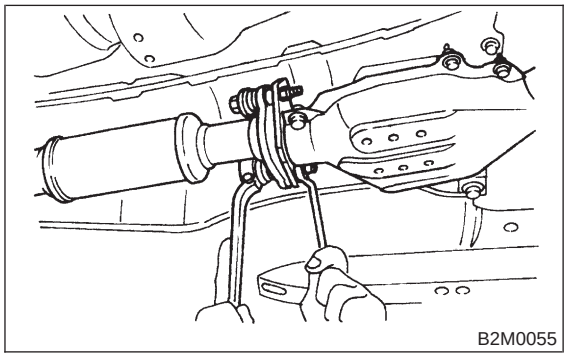
1) Disconnect battery ground cable.



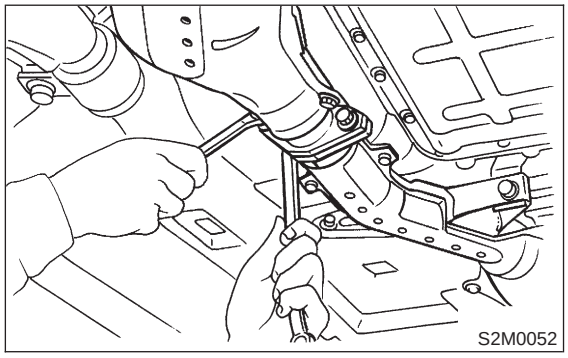
2) Lift-up the vehicle.
3) Disconnect rear oxygen sensor connector. (Except California spec. vehicles)



4) Separate center exhaust pipe and rear catalytic converter assembly from rear exhaust pipe.

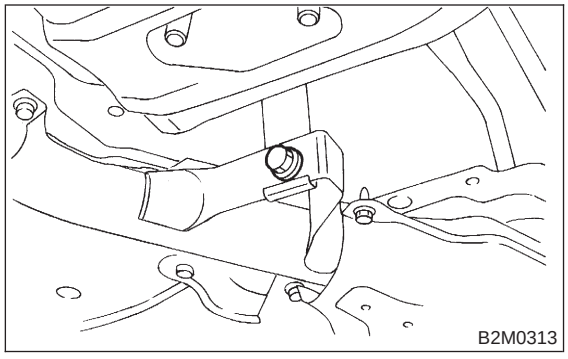


5) Separate center exhaust pipe and rear catalytic converter assembly from front catalytic converter.


S2M0052

6) Remove center exhaust pipe and rear catalytic converter assembly from hanger bracket.

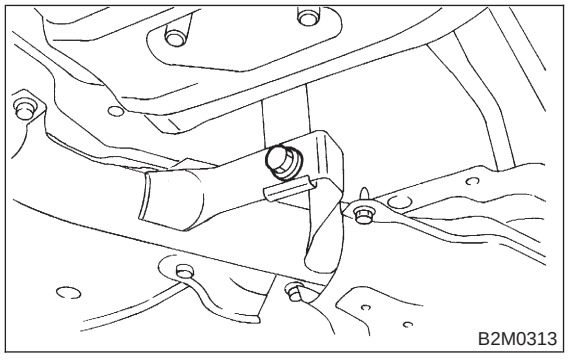
CAUTION:
● Be careful not to pull down center exhaust pipe.
● After removing center exhaust pipe, do not apply excessive pulling force on front catalytic converter and front exhaust pipe.


B2M0313

B: INSTALLATION

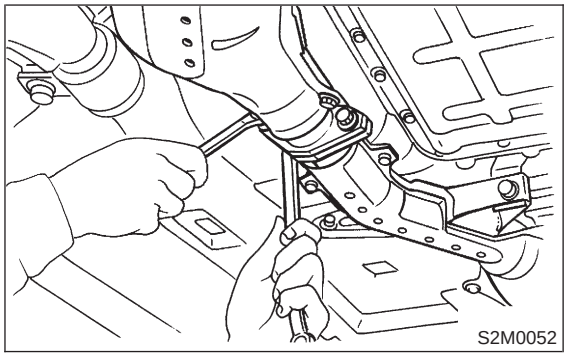
CAUTION:
Replace gaskets with new ones.

1) Install center exhaust pipe and rear catalytic converter assembly.
Temporarily tighten bolt which installs center exhaust pipe to hanger bracket.


B2M0313

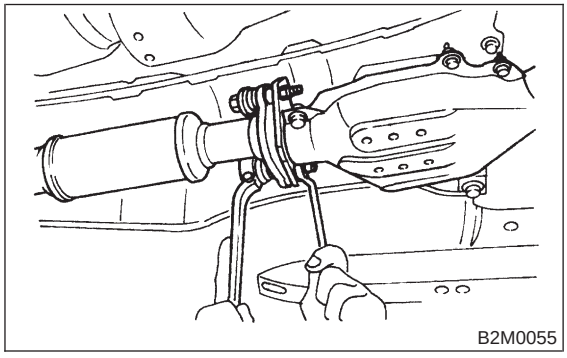
2) Install center exhaust pipe to front catalytic converter.

Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)


S2M0052

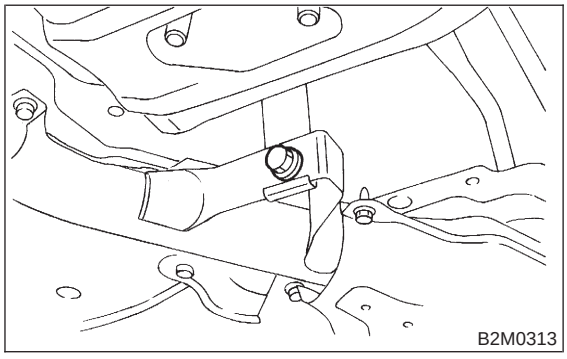
3) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

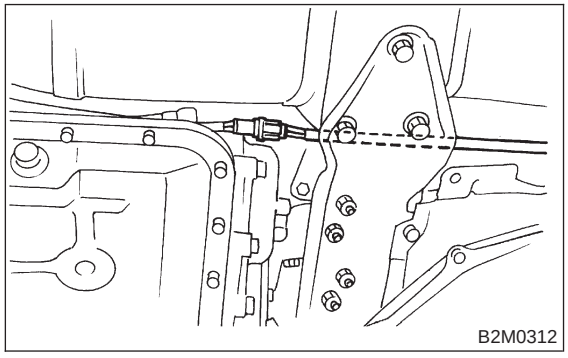

B2M0055

4) Tighten bolt which holds center exhaust pipe to hanger bracket.

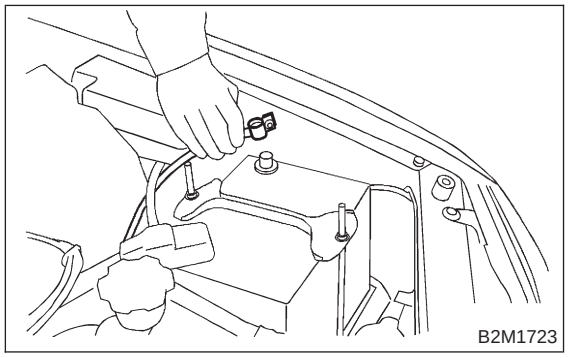
Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)


B2M0313

5) Connect rear oxygen sensor connector. (Except California spec. vehicles)


B2M0312

6) Lower the vehicle.
7) Connect battery ground cable.

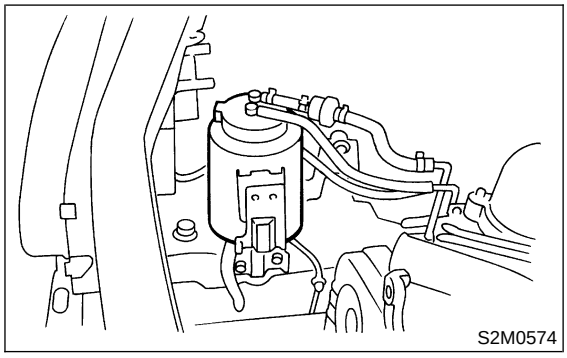

B2M1723

3. Canister

A: REMOVAL AND INSTALLATION

1. 2200 cc FWD AND TAIWAN SPEC. VEHICLES

1) Disconnect canister hoses from evaporation pipes.
2) Remove canister with bracket.

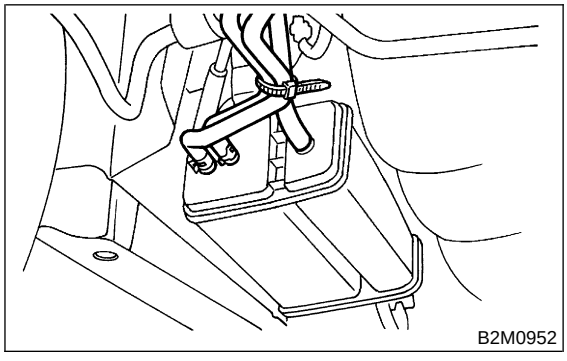

S2M0574

3) Installation is in the reverse order of removal.

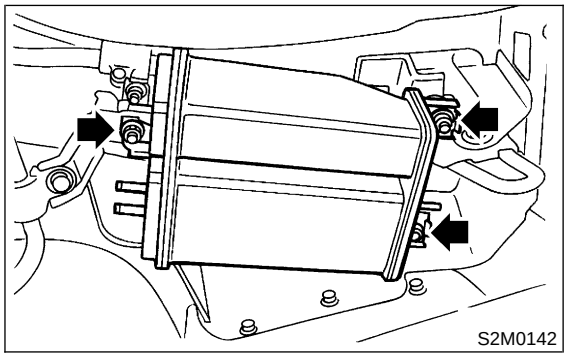
CAUTION:
Insert air vent hose of canister into the hole on body.

2. 2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES AND 2500 cc MODEL

1) Lift-up the vehicle.
2) Disconnect evaporation hoses from canister.

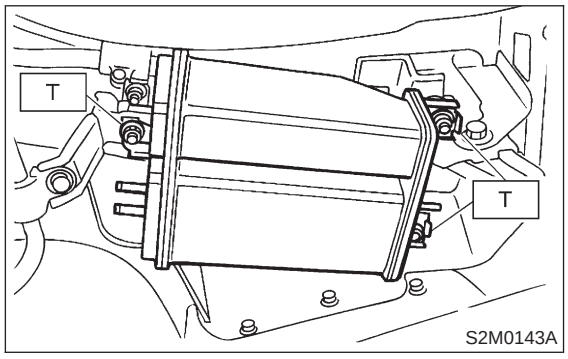

B2M0952

3) Remove canister from body.


S2M0142

4) Installation is in the reverse order of removal.

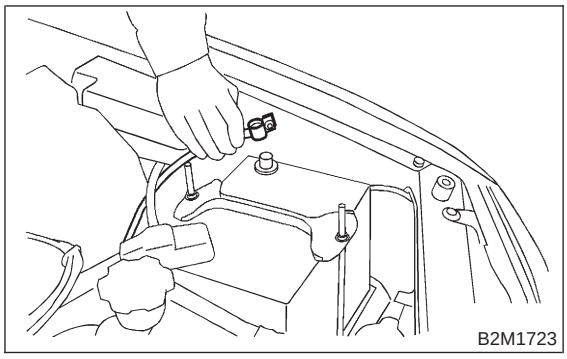
Tightening torque:
22.5±7 N·m (2.3±0.7 kg-m, 16.6±5.1 ft-lb)



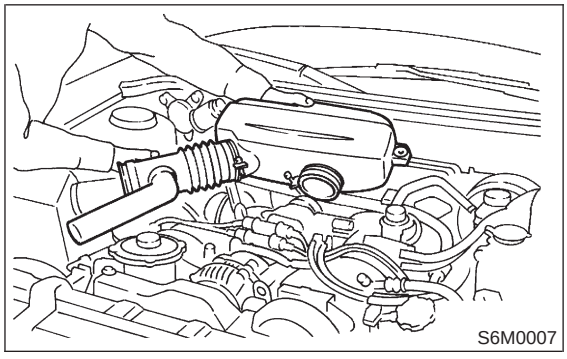
4. Purge Control Solenoid Valve

A: REMOVAL AND INSTALLATION

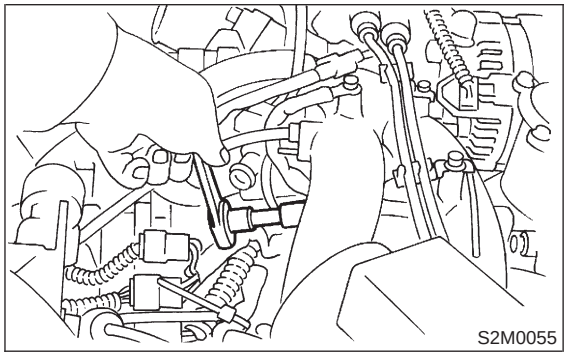
1) Disconnect battery ground cable.



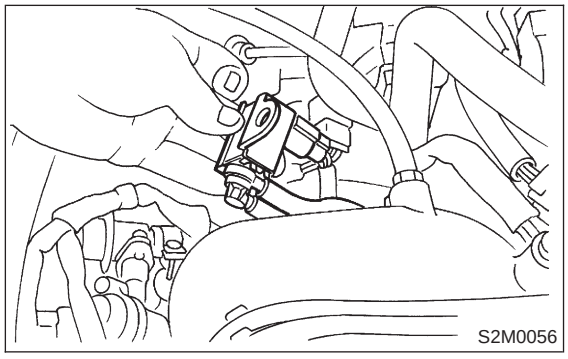
2) Remove air intake chamber and air intake duct as a unit. <Ref. to 2-7 [W18A0].>



3) Remove bolt which installs purge control solenoid valve to intake manifold.

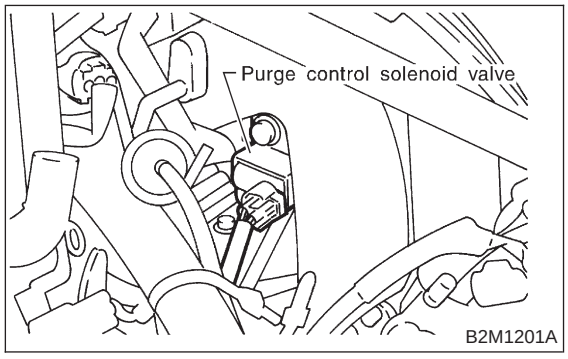


4) Take out purge control solenoid valve.
5) Disconnect connector from purge control solenoid valve.
6) Disconnect vacuum hoses from purge control solenoid valve.

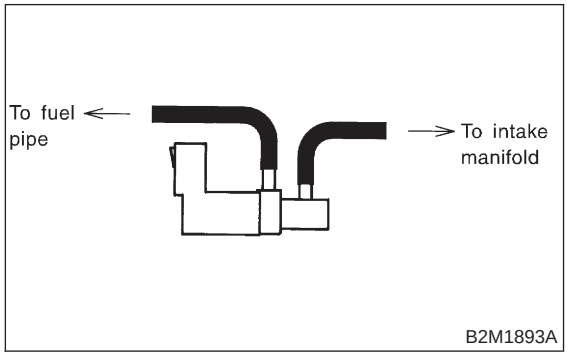


7) Installation is in the reverse order of removal.

Tightening torque:
15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)



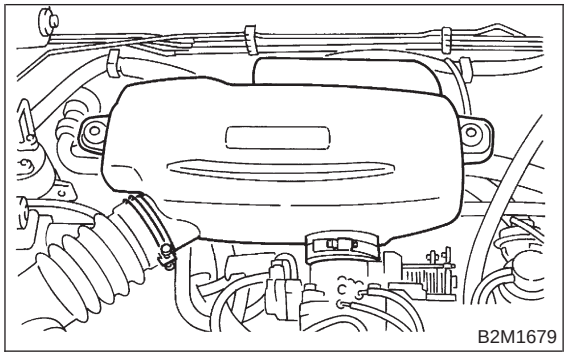
CAUTION:
Carefully connect the evaporation hoses.



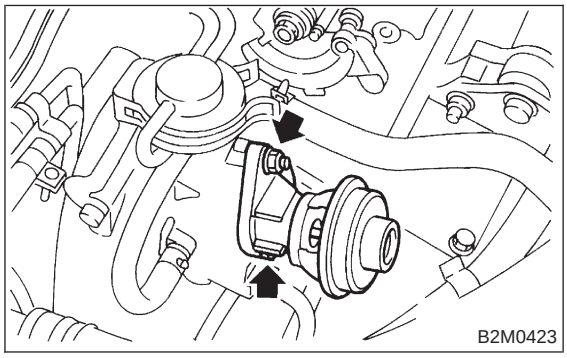
5. EGR Valve (Except 2200 cc MT Vehicles)

A: REMOVAL AND INSTALLATION

1) Remove air intake chamber.



2) Disconnect vacuum hose from EGR valve.
3) Remove bolts which install EGR valve onto intake manifold.



4) Installation is in the reverse order of removal.

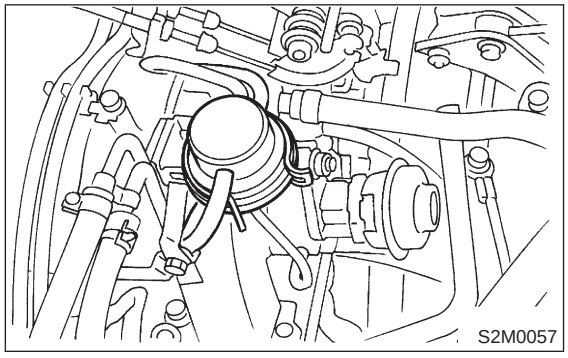
CAUTION:
Replace gasket with a new one.

Tightening torque:
18.6±1.5 N·m (1.9±1.5 kg-m, 13.7±1.1 ft-lb)

6. Back-Pressure Transducer (BPT) (Except 2200 cc MT Vehicles)

A: REMOVAL AND INSTALLATION

1) Disconnect vacuum hoses from BPT.
2) Remove BPT from bracket.



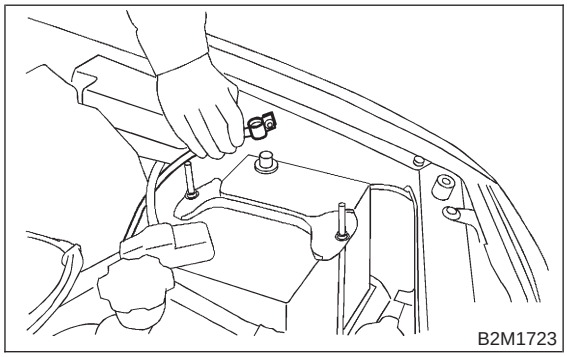
3) Installation is in the reverse order of removal.

7. EGR Solenoid Valve (Except 2200 cc MT Vehicles)

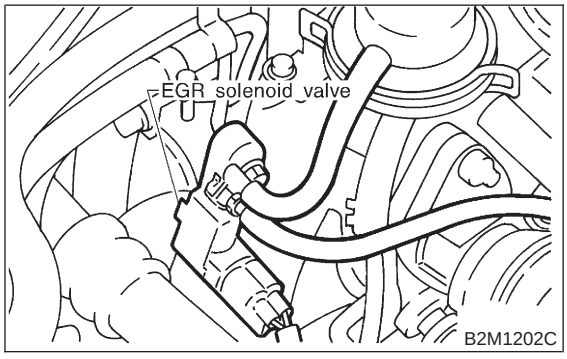
A: REMOVAL AND INSTALLATION

1. 2200 cc AT VEHICLES

1) Disconnect battery ground cable.



2) Disconnect connector from EGR solenoid valve.
3) Disconnect vacuum hoses from EGR solenoid valve.
4) Remove bolt which installs EGR solenoid valve onto intake manifold.

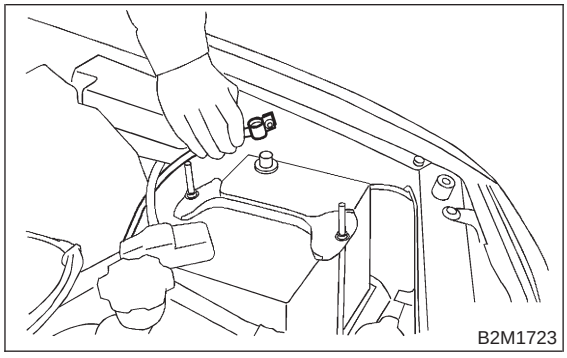


5) Installation is in the reverse order of removal.

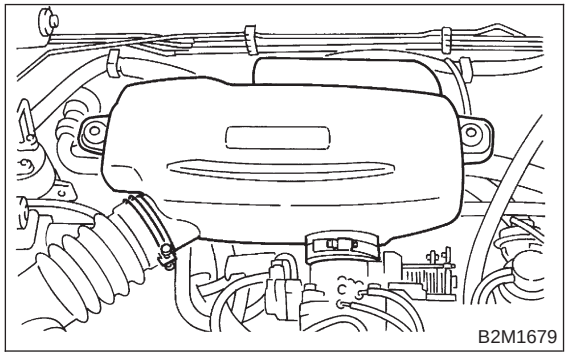
Tightening torque:
15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)

2. 2500 cc MODEL

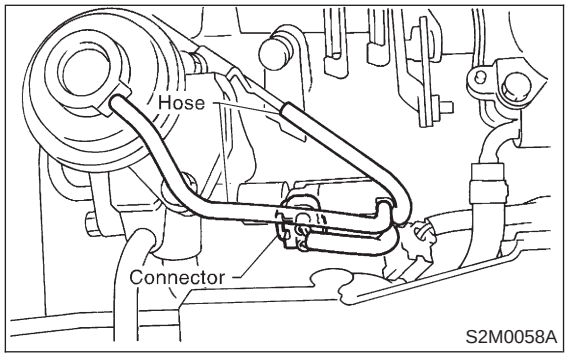
1) Disconnect battery ground cable.



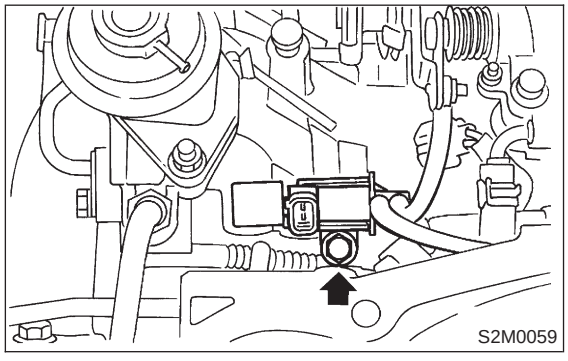
2) Remove air intake chamber. <Ref. to 2-7 [W18A0].>



3) Disconnect vacuum hoses from EGR solenoid valve.
4) Disconnect connector from EGR solenoid valve.



5) Remove bolt which installs EGR solenoid valve onto intake manifold.



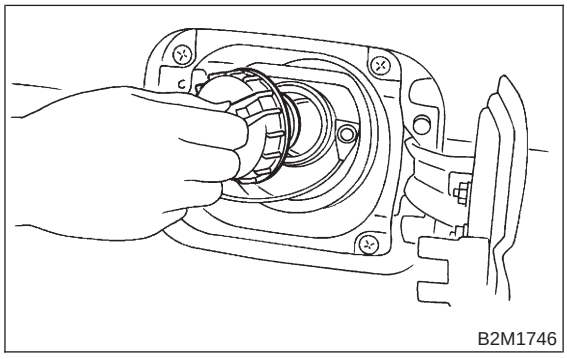
6) Installation is in the reverse order of removal.

Tightening torque:
15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)

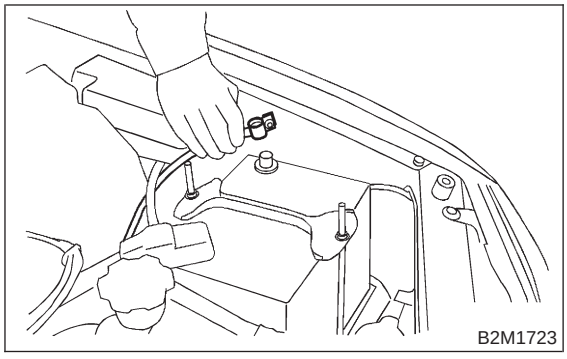
8. Fuel Temperature Sensor (2200 cc AWD except Taiwan Spec. Vehicles and 2500 cc Model)

A: REMOVAL

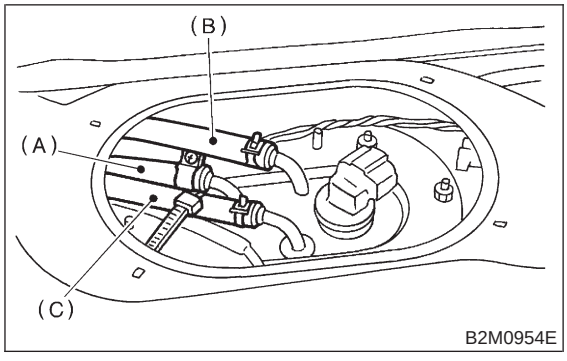
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Remove fuel filler cap.



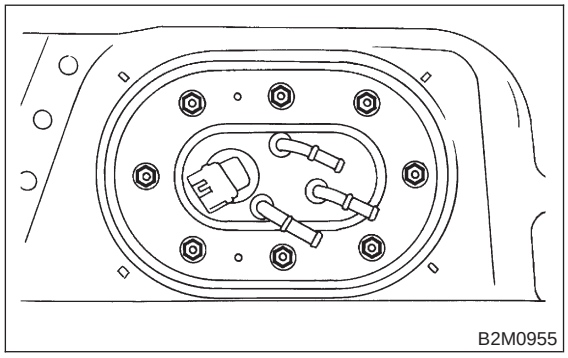
3) Disconnect battery ground cable.



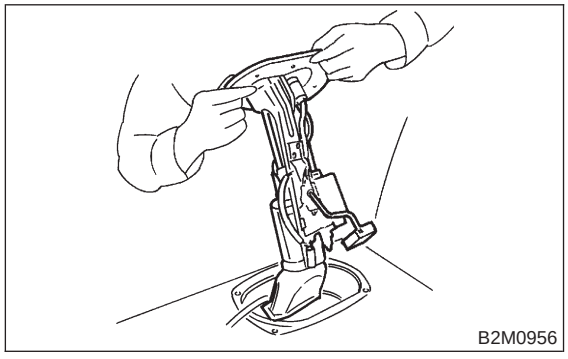
4) Disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C).



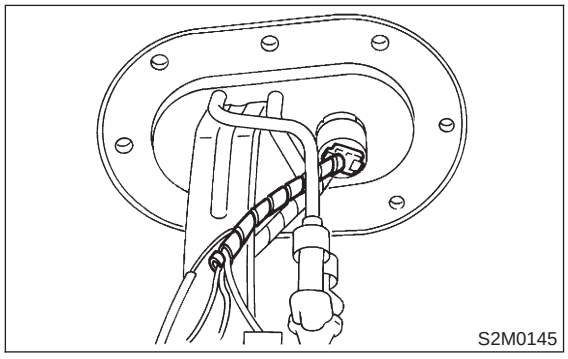
5) Remove nuts which install fuel pump assembly onto fuel tank.


B2M0955

6) Take off fuel pump assembly from fuel tank.

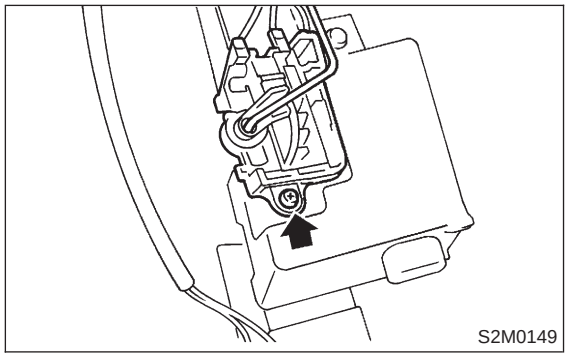

B2M0956

7) Disconnect connector from fuel pump bracket.


S2M0145

8) Remove main fuel level sensor from fuel pump assembly. <Ref. to 2-1 [W12A0].>

NOTE:
Fuel temperature sensor is a unit with fuel pump. If replacing it, replace as a fuel pump.

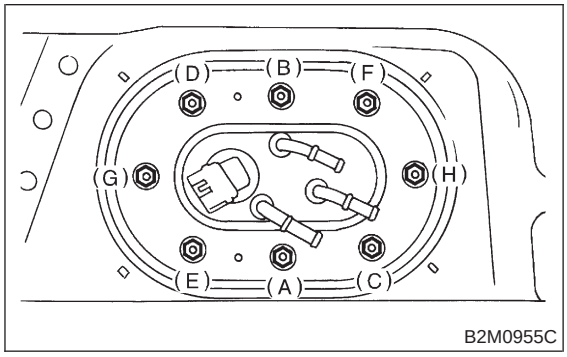

S2M0149

B: INSTALLATION

CAUTION:
Leave fuel filler cap open when tightening nuts, to prevent fuel from flowing out through fuel delivery and return pipes. Close fuel filler cap after tightening nuts.

Installation is in the reverse order of removal. Do the following:
(1) Always use new gaskets.
(2) Ensure sealing portion is free from fuel or foreign particles before installation.
(3) Tighten nuts in alphabetical sequence shown in figure to specified torque.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)



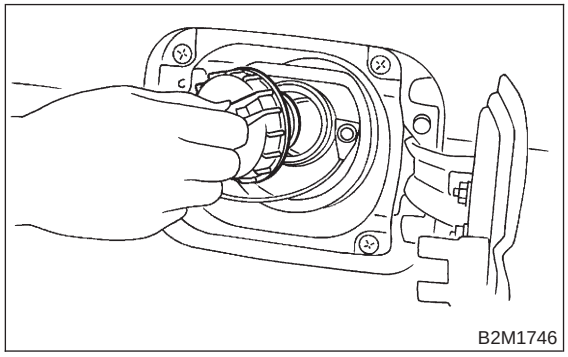
B2M0955C

9. Fuel Tank Pressure Sensor (2200 cc AWD except Taiwan Spec. Vehicles and 2500 cc Model)

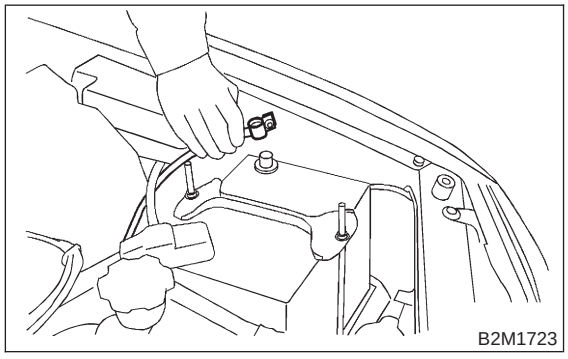
A: REMOVAL AND INSTALLATION

1. 2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES

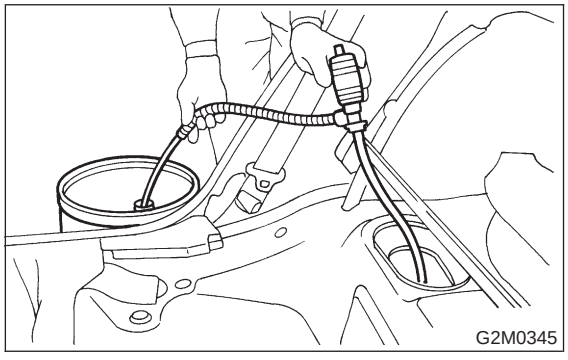
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


B2M1746

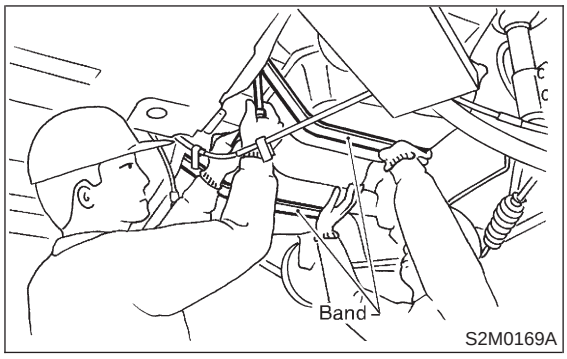
3) Disconnect battery ground cable.


B2M1723

4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>

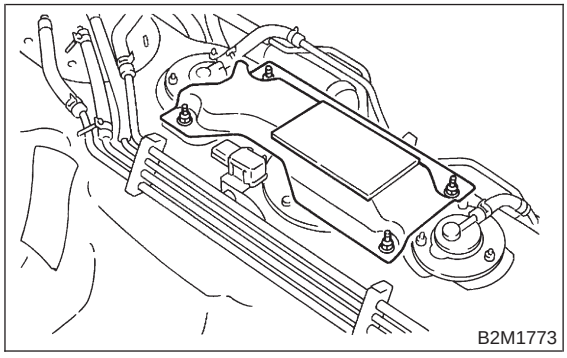

G2M0345

5) Remove fuel tank. <Ref. to 2-8 [W2A0].>

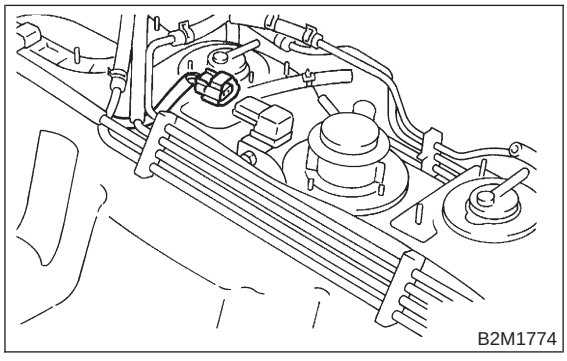


S2M0169A

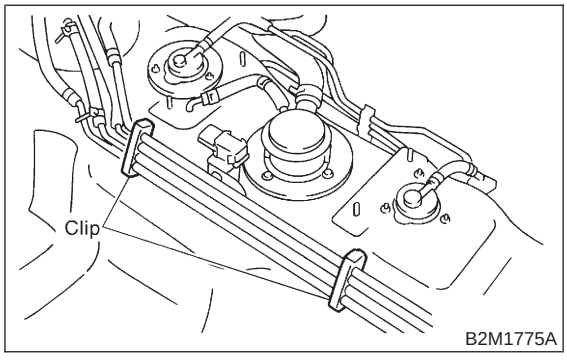
6) Remove protector cover.


B2M1773

7) Disconnect connector from fuel tank pressure sensor.

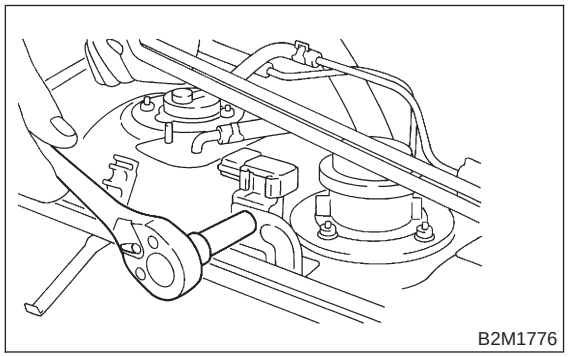

B2M1774

8) Release clips which hold fuel pipes onto fuel tank.

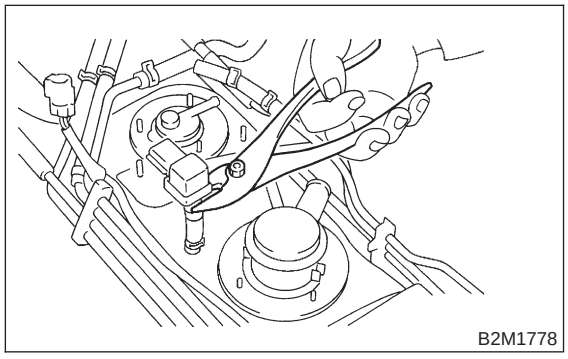


B2M1775A

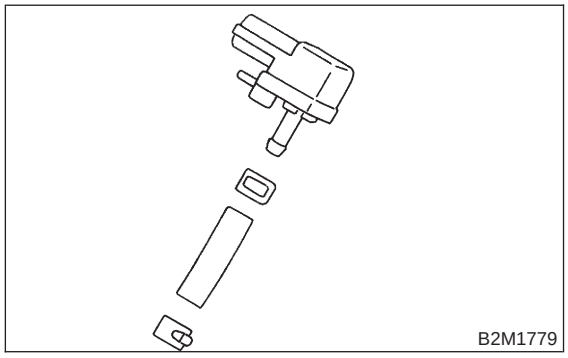
9) Move two fuel pipes to upper side, and remove bolt which install fuel tank pressure sensor to bracket.


B2M1776

10) Move clip, and disconnect pressure hose from fuel tank.

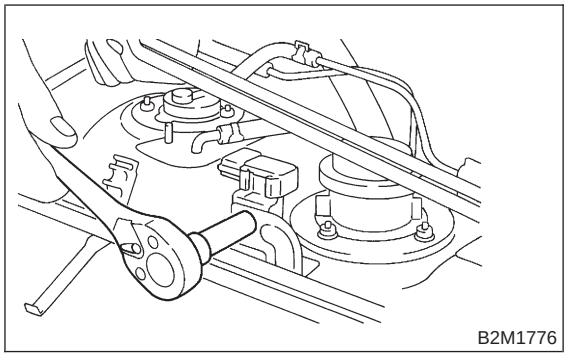

B2M1778

11) Disconnect pressure hose from fuel tank pressure sensor.


B2M1779

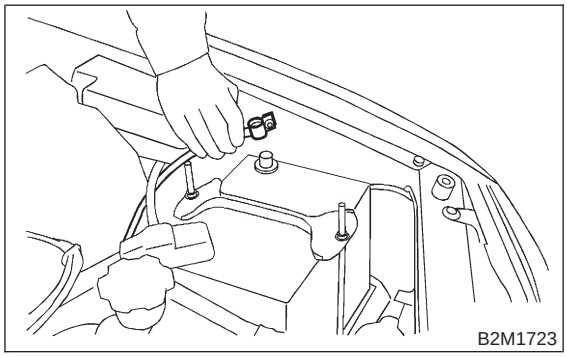
12) Installation is in the reverse order of removal.

Tightening torque:
7.35±1.96 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)

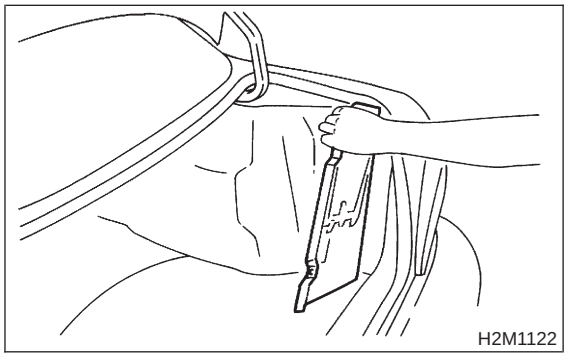

B2M1776

2. 2500 cc MODEL

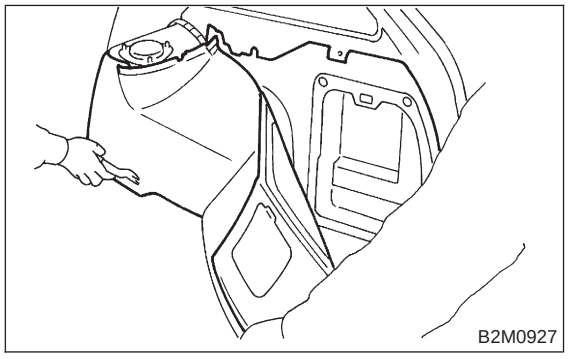
1) Disconnect battery ground cable.


B2M1723

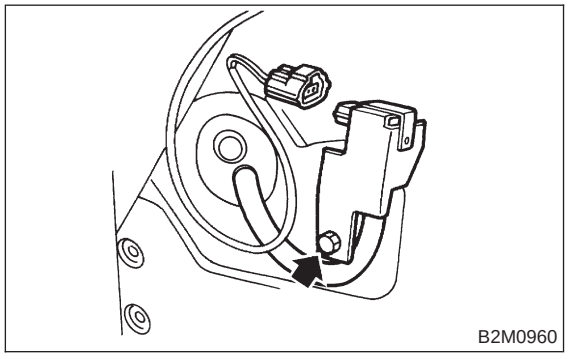
2) Remove trims.
● 4 door model:
Remove right trunk side trim.


H2M1122

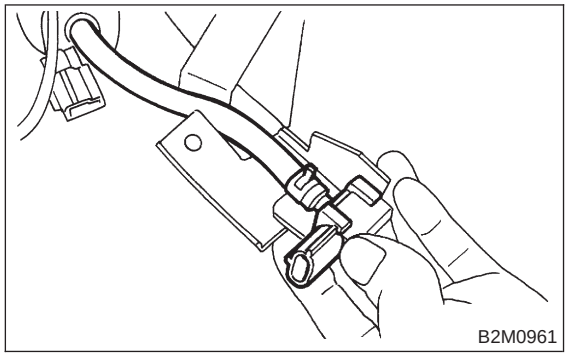
- Wagon model:
  (1) Remove right rear quarter upper rear trim.
  (2) Remove right strut cap.
  (3) Remove right rear quarter pillar lower trim.


B2M0927

3) Disconnect connector from fuel tank pressure sensor.
4) Remove bolts which install fuel tank pressure sensor bracket on body.


B2M0960

5) Disconnect hose from fuel tank pressure sensor.
6) Remove fuel tank pressure sensor from bracket.


B2M0961

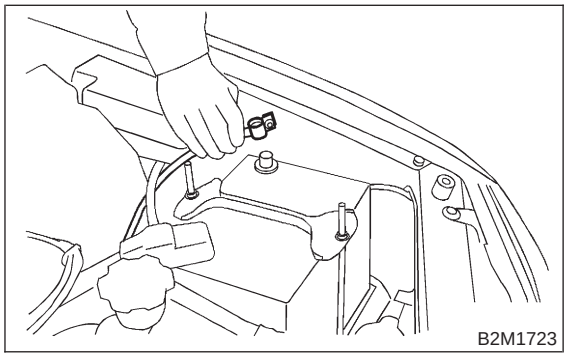
7) Installation is in the reverse order of removal.

10. Pressure Control Solenoid Valve (2200 cc AWD except Taiwan Spec. Vehicles and 2500 cc Model)

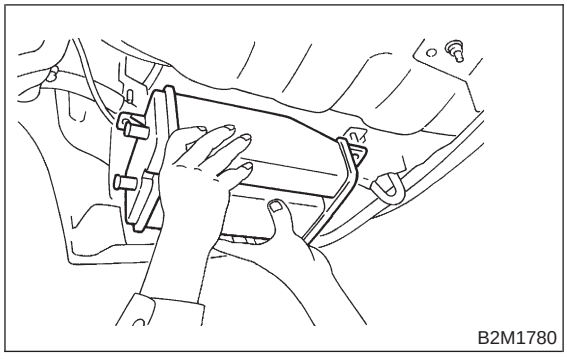
A: REMOVAL AND INSTALLATION

1. 2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES

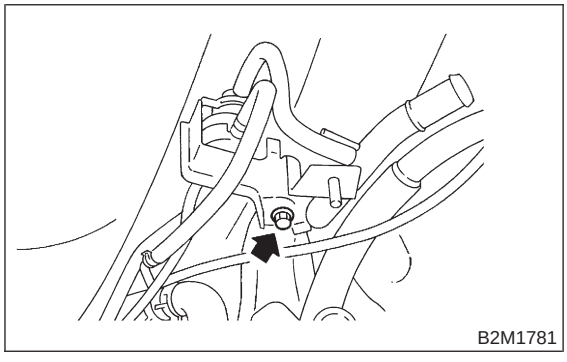
1) Disconnect battery ground cable.


B2M1723

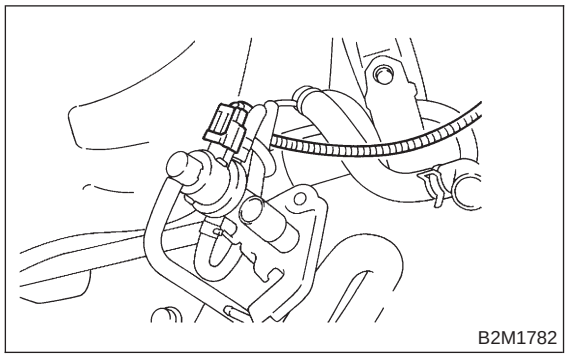
2) Remove canister. <Ref. to 2-1 [W3A2].>


B2M1780

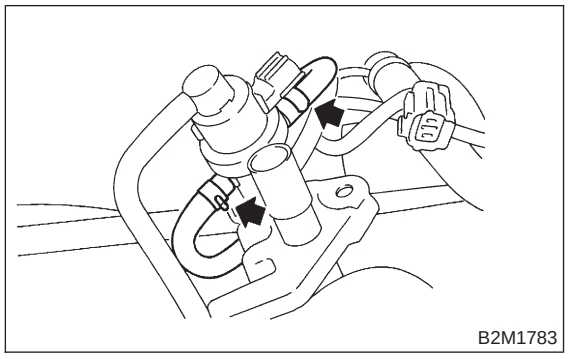
3) Remove bolt which installs pressure control solenoid valve holding bracket on body.


B2M1781

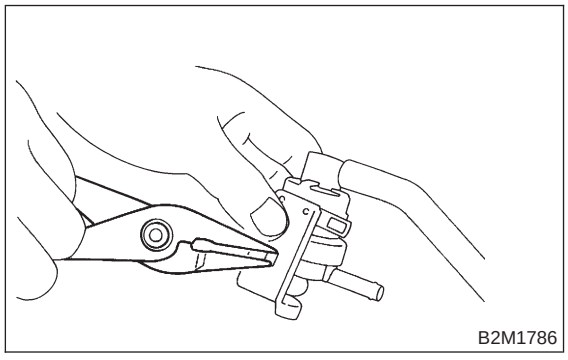
4) Disconnect connector from pressure control solenoid valve.


B2M1782

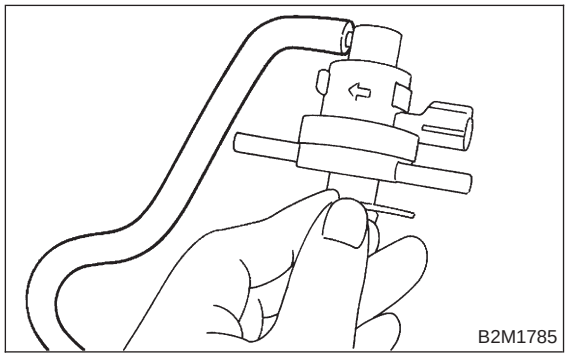
5) Disconnect two evaporation hoses from pressure control solenoid valve.
6) Remove pressure control solenoid valve with bracket.


B2M1783

7) Remove pressure control solenoid valve from bracket.

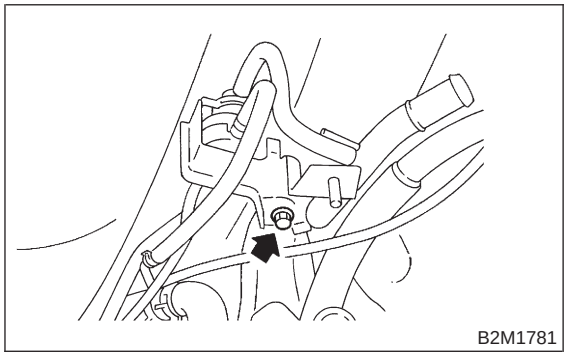

B2M1786

8) Disconnect vacuum hose from pressure control solenoid valve.


B2M1785

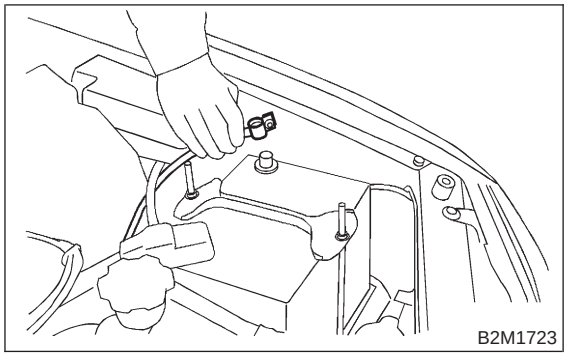
9) Installation is in the reverse order of removal.

Tightening torque:
17.6±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

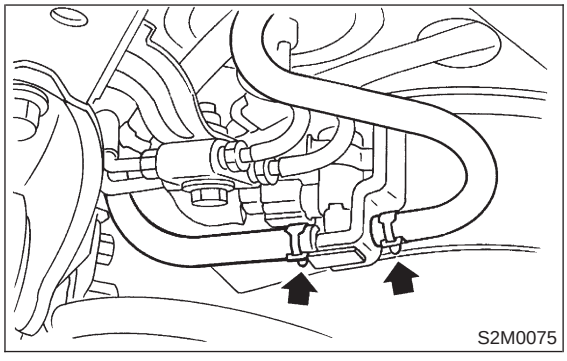

B2M1781

2. 2500 cc MODEL

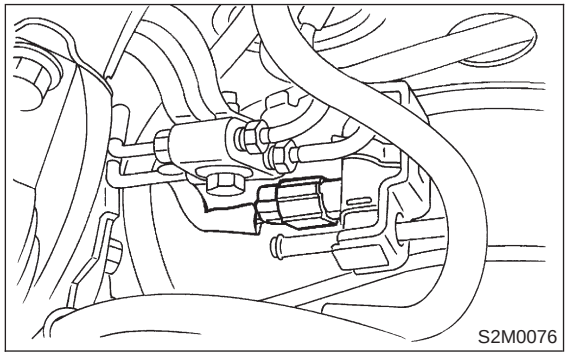
1) Disconnect battery ground cable.


B2M1723

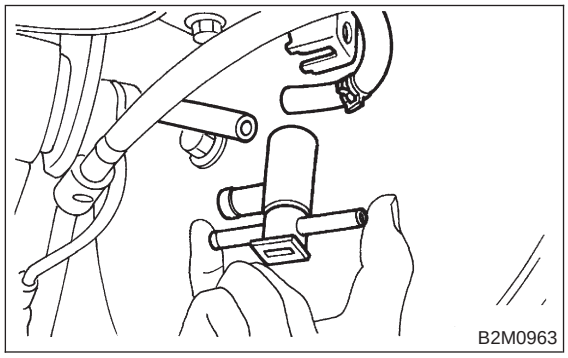
2) Lift-up the vehicle.
3) Disconnect evaporation hoses from pressure control valve.


S2M0075

4) Disconnect connector from pressure control valve.



5) Remove pressure control valve from bracket.

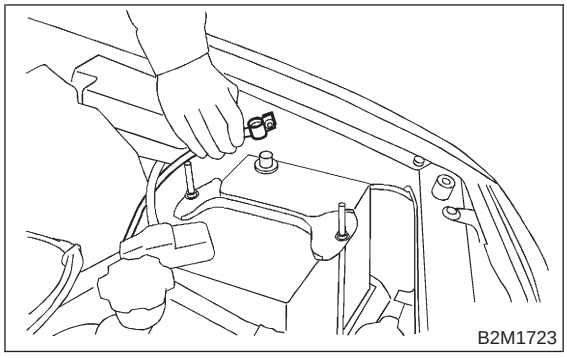


6) Installation is in the reverse order of removal.

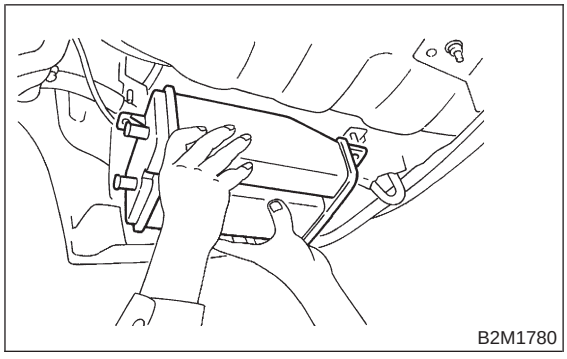
11. Vent Control Solenoid Valve (2500 cc Model)

A: REMOVAL

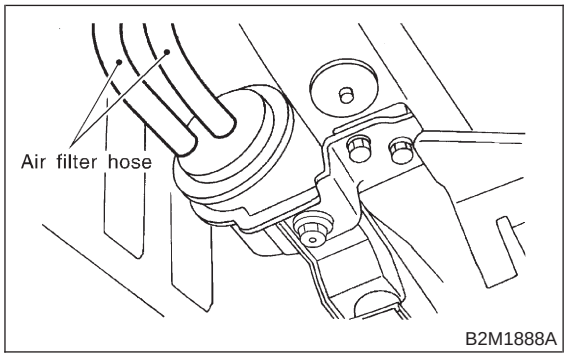
1) Disconnect battery ground cable.



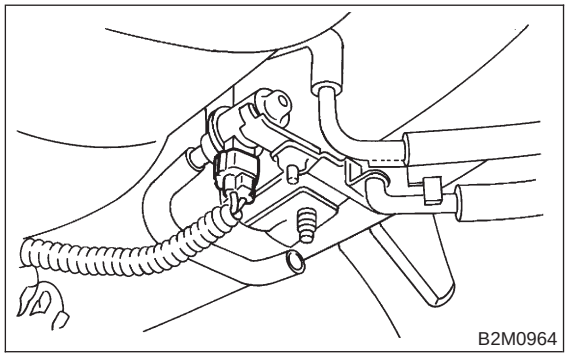
2) Lift-up the vehicle.
3) Remove canister. <Ref. to 2-1 [W3A2].>



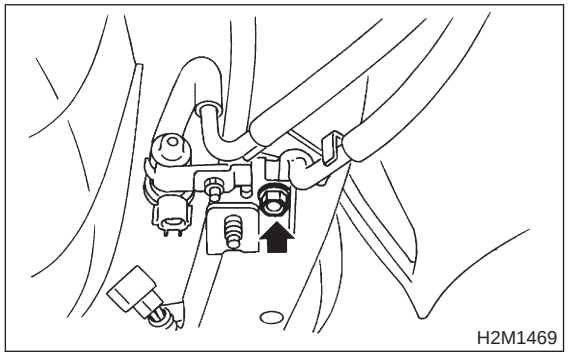
4) Disconnect two hoses from air filter.



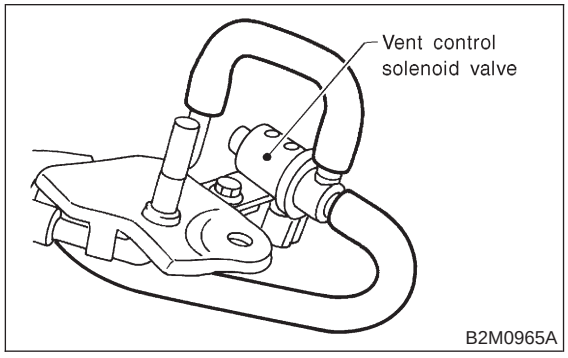
5) Disconnect connector from vent control solenoid valve.



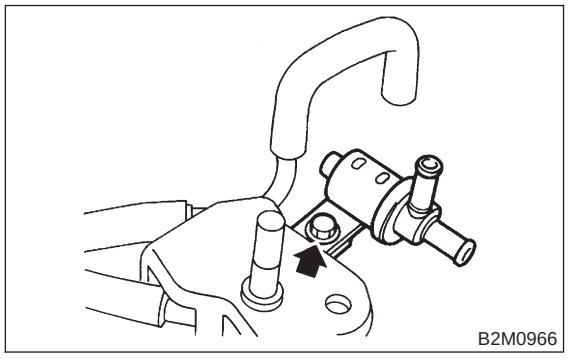
6) Remove one bolt fixing bracket on the body.



7) Remove two vacuum hoses from vent control solenoid valve.



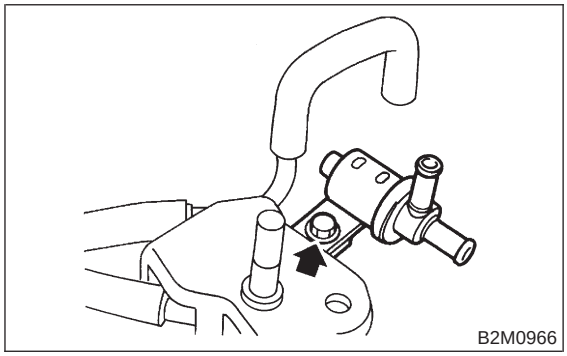
8) Remove one bolt fixing vent control solenoid valve on bracket.



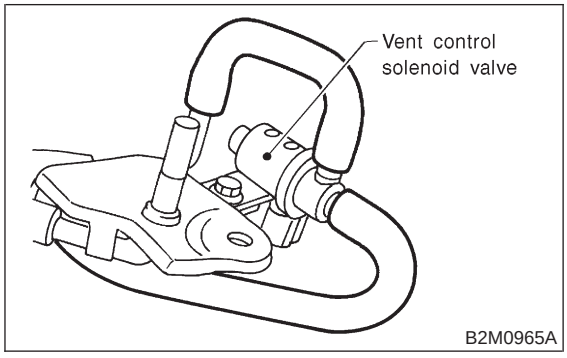
9) Remove vent control solenoid valve.

B: INSTALLATION

1) Install the bolt fixing vent control solenoid valve on bracket.

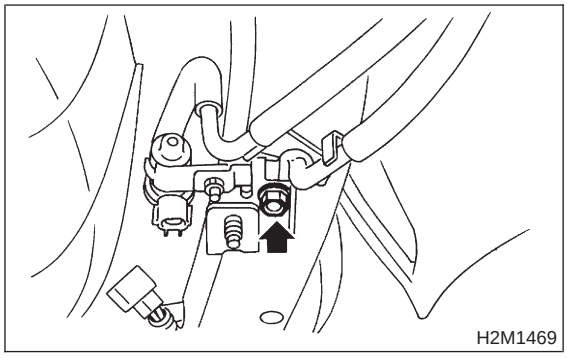


2) Install two vacuum hoses to vent control solenoid valve.

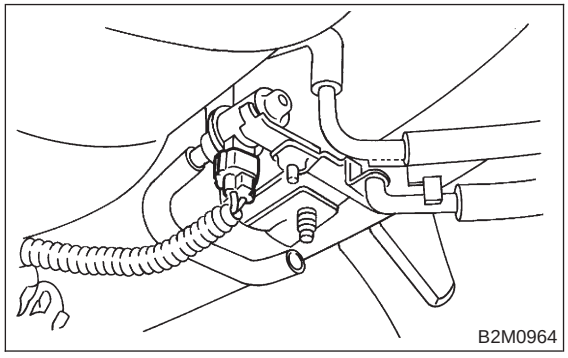


3) Install the bolt fixing bracket on the body.

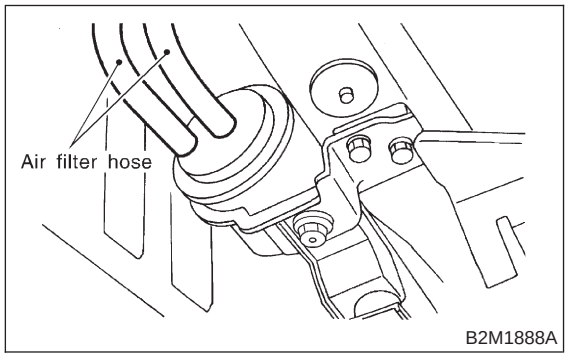
Tightening torque:
25±7 N·m (2.5±0.7 kg-m, 18.1±5.1 ft-lb)



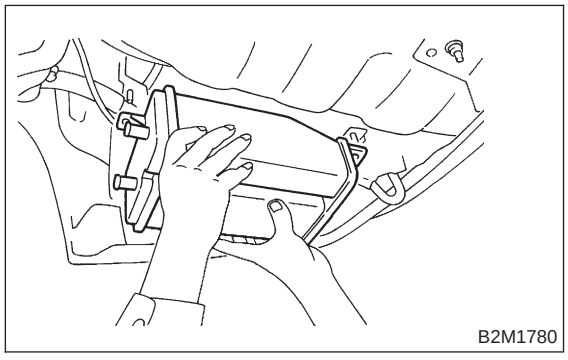
4) Connect connector to vent control solenoid valve.



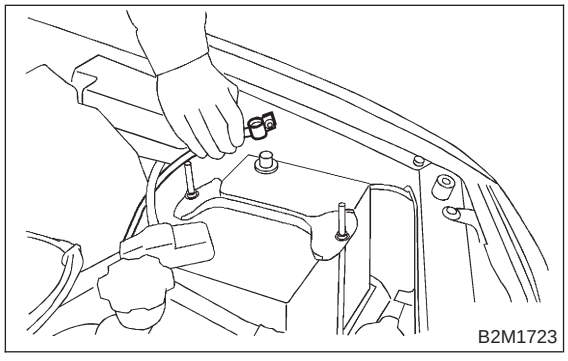
5) Connect two hoses to air filter.



6) Install canister. <Ref. to 2-1 [W3A2].>



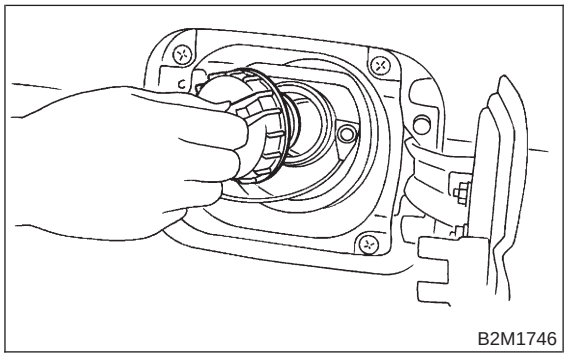
7) Lower the vehicle.
8) Connect battery ground cable.



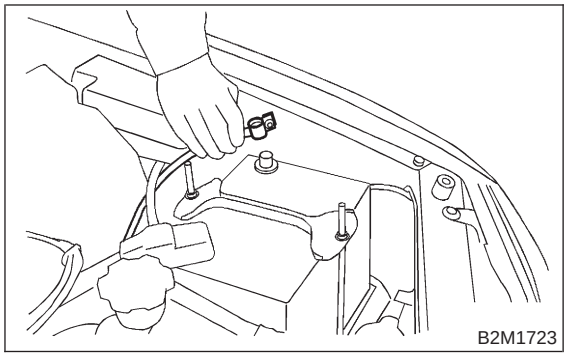
12. Main Fuel Level Sensor (2200 cc AWD except Taiwan Spec. Vehicles and 2500 cc Model)

A: REMOVAL

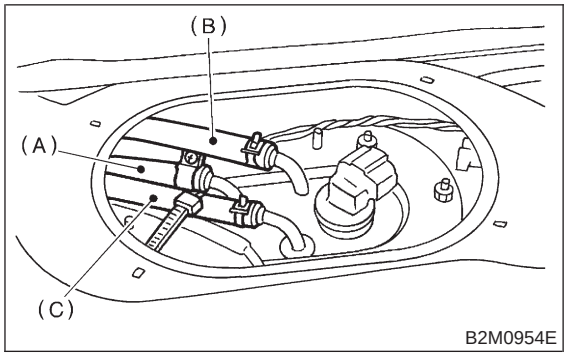
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



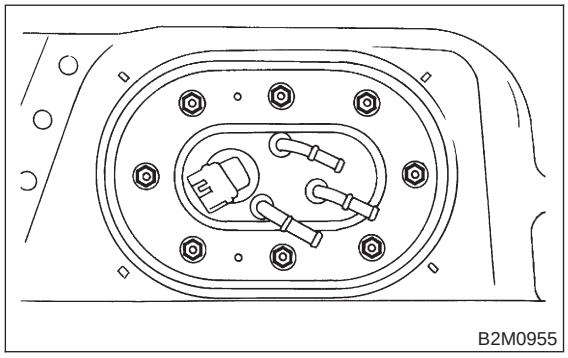
3) Disconnect battery ground cable.



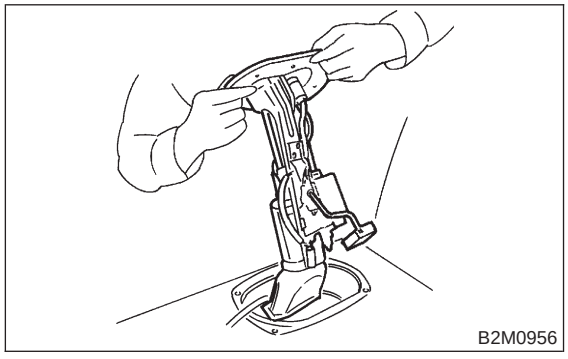
4) Disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C).



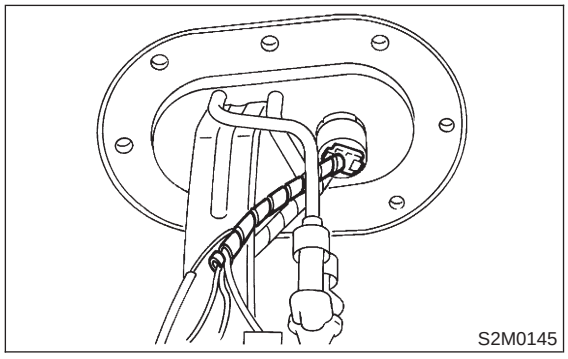
5) Remove nuts which install fuel pump assembly onto fuel tank.



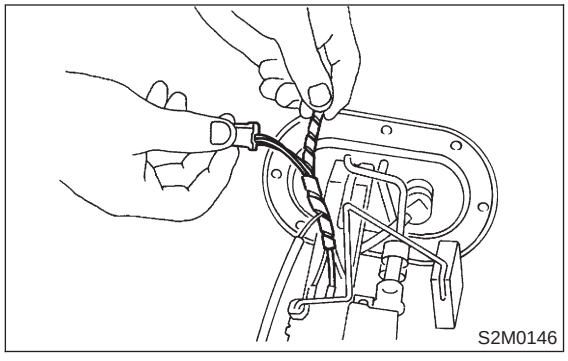
6) Take off fuel pump assembly from fuel tank.



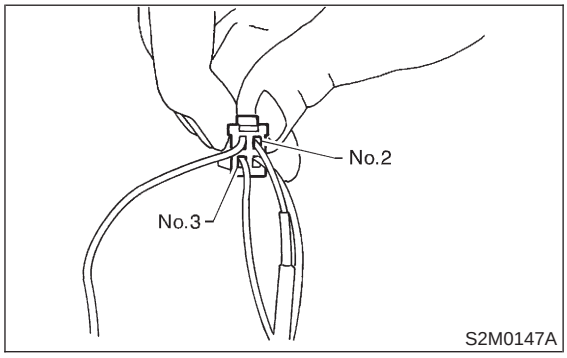
7) Disconnect connector from fuel pump bracket.



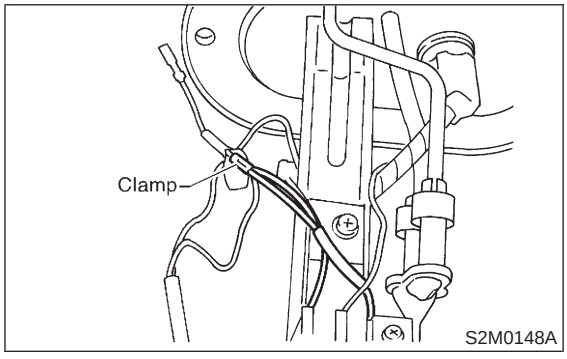
8) Remove spiral cable from wire harness.



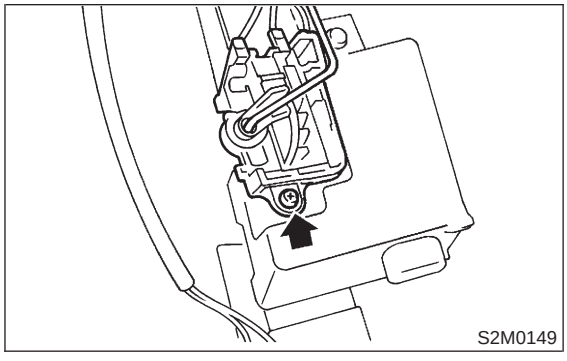
9) Remove No. 2 and No. 3 terminals from sensor connector.



10) Separate harness.



11) Remove screw which installs fuel level sensor on mounting bracket.

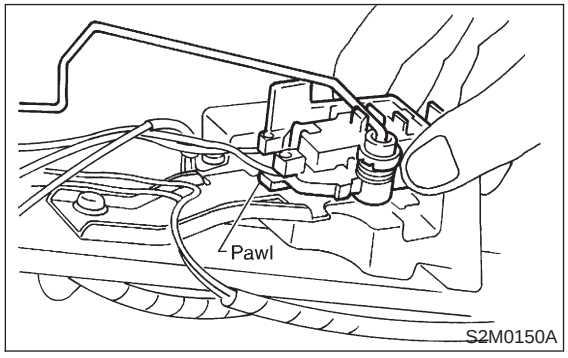


B: INSTALLATION

CAUTION:
Leave fuel filler cap open when tightening nuts, to prevent fuel from flowing out through fuel delivery and return pipes. Close fuel filler cap after tightening nuts.

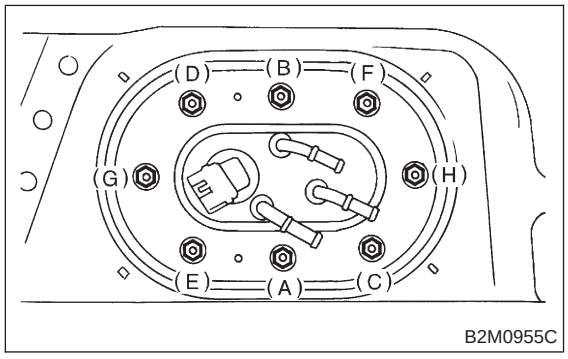
Installation is in the reverse order of removal. Do the following:

(1) Install the fuel level sensor by inserting its pawl into the cutout area of the mounting bracket.



(2) Always use new gaskets.
(3) Ensure sealing portion is free from fuel or foreign particles before installation.
(4) Tighten nuts in alphabetical sequence shown in figure to specified torque.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)

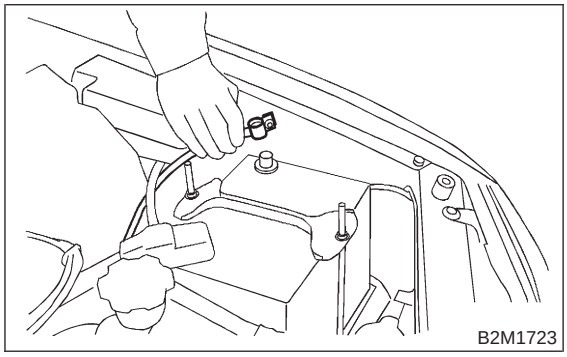


13. Air Filter (2200 cc AWD except Taiwan Spec. Vehicles and 2500 cc Model)

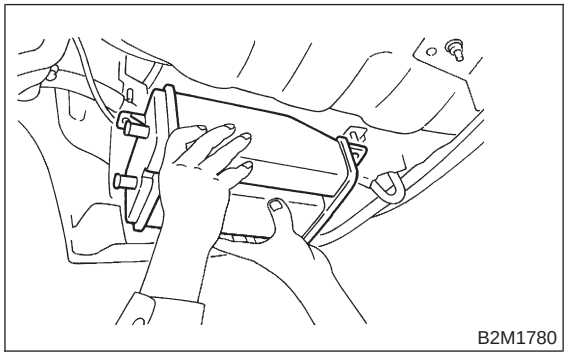
A: REMOVAL AND INSTALLATION

1. 2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES

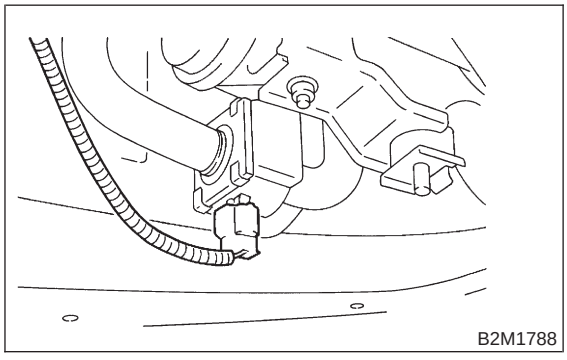
1) Disconnect battery ground cable.



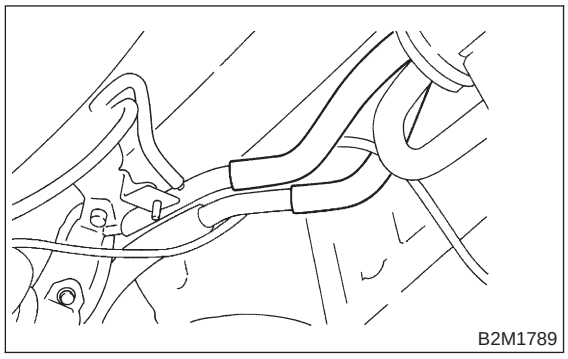
2) Lift-up the vehicle.
3) Remove canister. <Ref. to 2-1 [W3A2].>



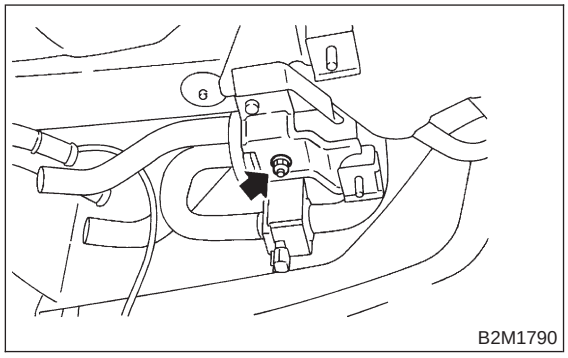
4) Disconnect connector from drain valve.



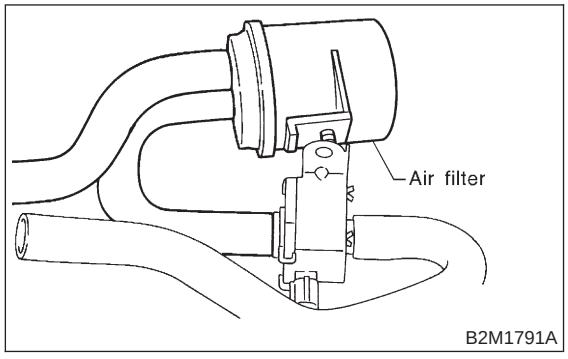
5) Disconnect evaporation hoses from joint pipes.


B2M1789

6) Remove nut which installs air filter and drain valve brackets on body, and remove them as a unit.


B2M1790

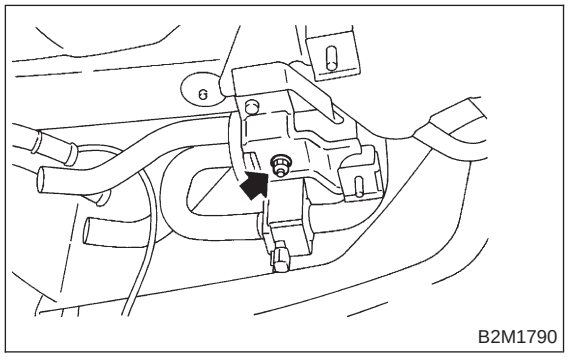
7) Disconnect evaporation hoses, and remove air filter.



B2M1791A

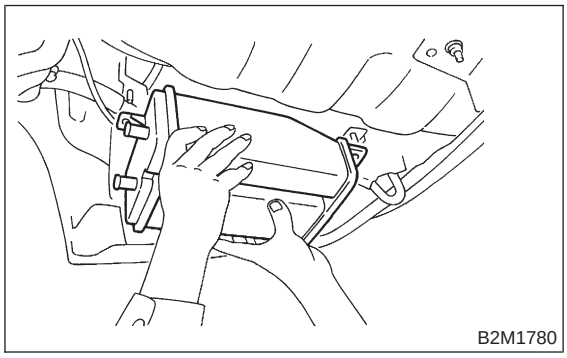
8) Installation is in the reverse order of removal.

Tightening torque:
22.5±7 N·m (2.3±0.7 kg-m, 16.6±5.1 ft-lb)

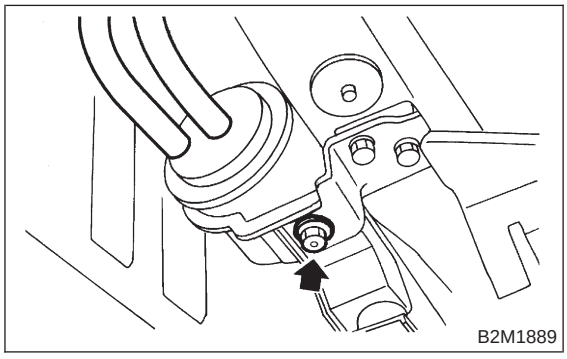

B2M1790

2. 2500 cc MODEL

1) Remove canister. <Ref. to 2-1 [W3A2].>


B2M1780

2) Disconnect two hoses from air filter.
3) Remove flange nut from bracket.


B2M1889

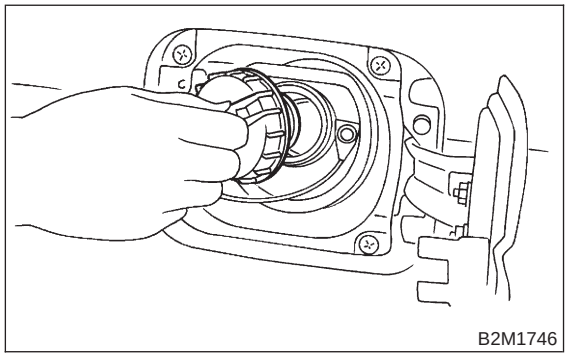
4) Installation is in the reverse order of removal.

Tightening torque:
22.5±7 N·m (2.3±0.7 kg-m, 16.6±5.1 ft-lb)

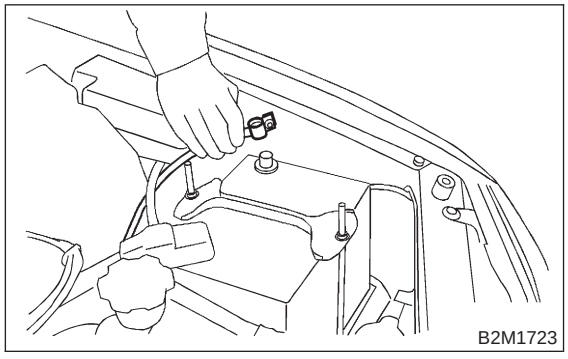
14. Sub Fuel Level Sensor (AWD Model)

A: REMOVAL AND INSTALLATION

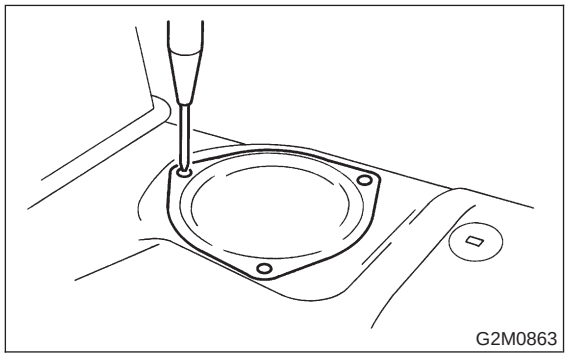
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


B2M1746

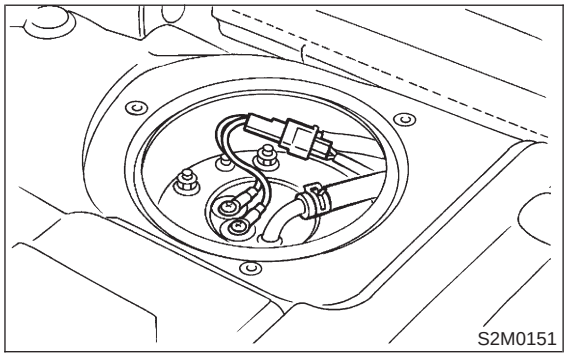
3) Disconnect battery ground cable.


B2M1723

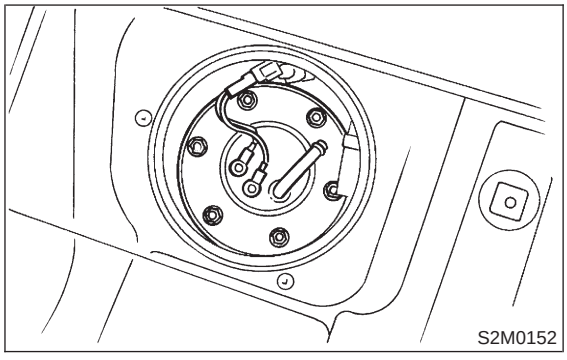
4) Remove service hole cover.


G2M0863

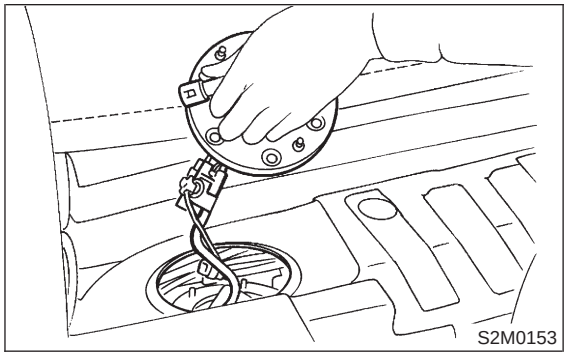
5) Disconnect connector from fuel sub meter, and disconnect jet pump hose.


S2M0151

6) Remove bolts which install sub fuel level sensor on fuel tank.

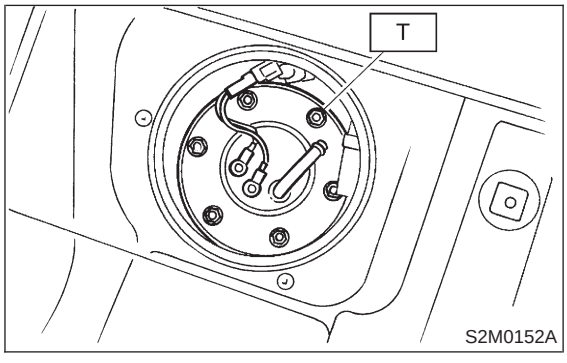

S2M0152

7) Remove sub fuel level sensor.


S2M0153

8) Installation is in the reverse order of removal.

Tightening torque:
T: 4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)

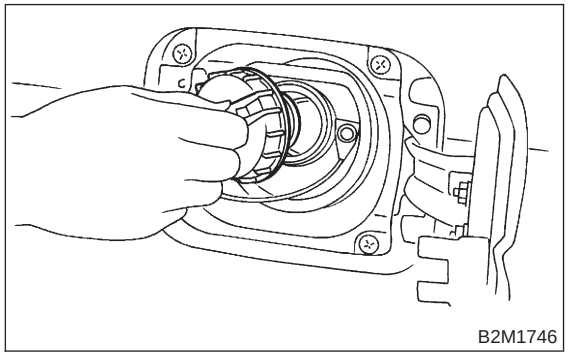


S2M0152A

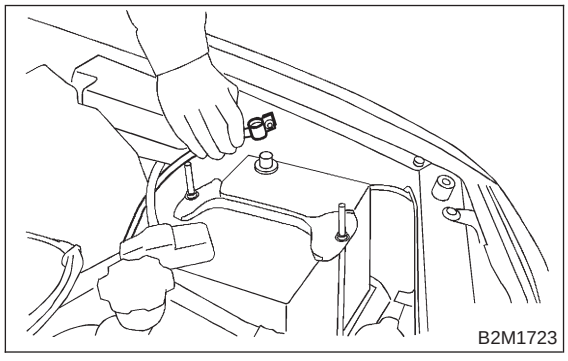
15. Vent Valve (2200 cc AWD except Taiwan Spec. Vehicles)

A: REMOVAL AND INSTALLATION

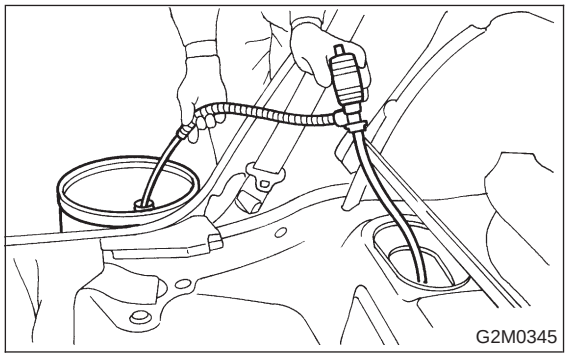
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filer cap.


B2M1746

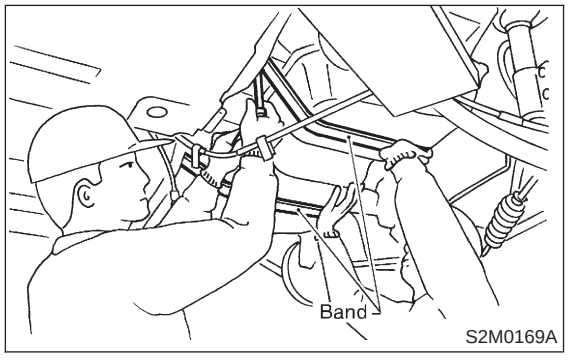
3) Disconnect battery ground cable.


B2M1723

4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>

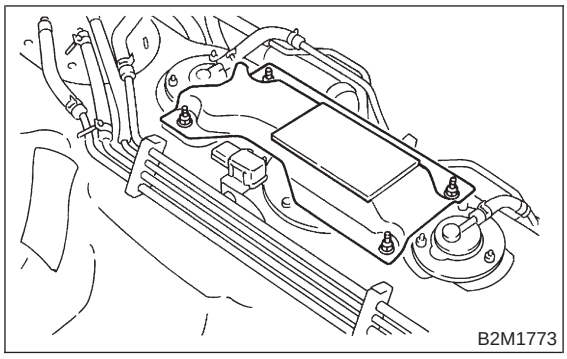

G2M0345

5) Remove fuel tank. <Ref. to 2-8 [W2A0].>

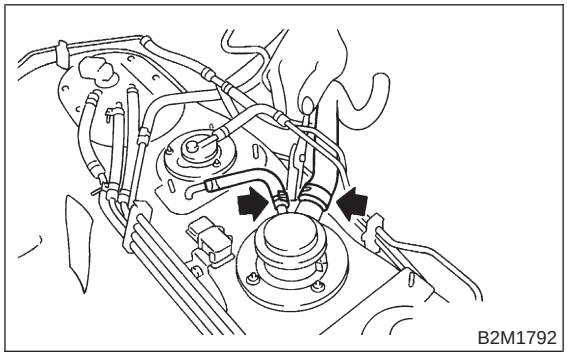


S2M0169A

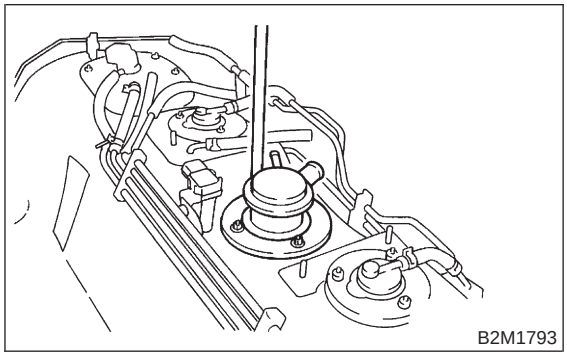
6) Remove protector cover.


B2M1773

7) Move clips, and disconnect hoses from vent valve.


B2M1792

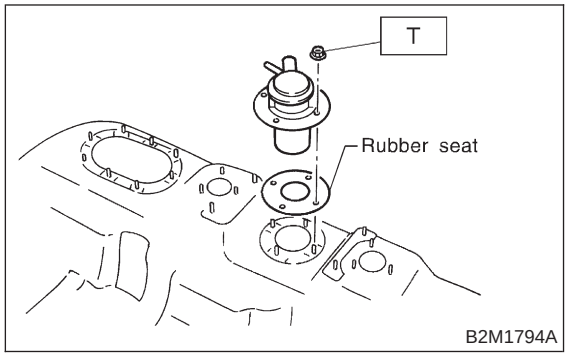
8) Remove nuts which install vent valve on fuel tank.


B2M1793

9) Installation is in the reverse order of removal.

CAUTION:
Replace rubber seat with a new one.

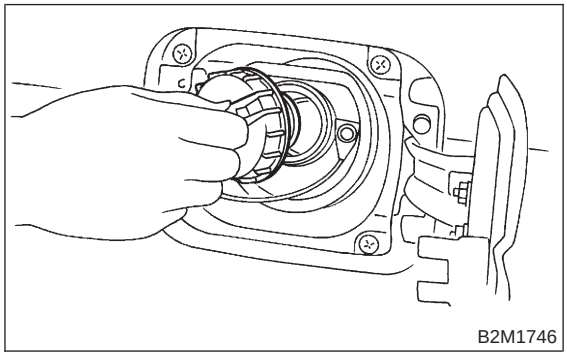
Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)



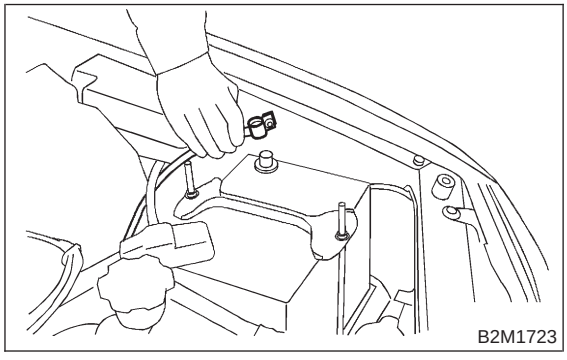
16. Shut Valve (2200 cc AWD except Taiwan Spec. Vehicles)

A: REMOVAL AND INSTALLATION

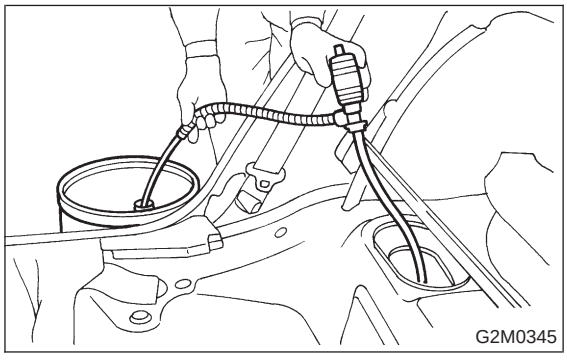
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filer cap.



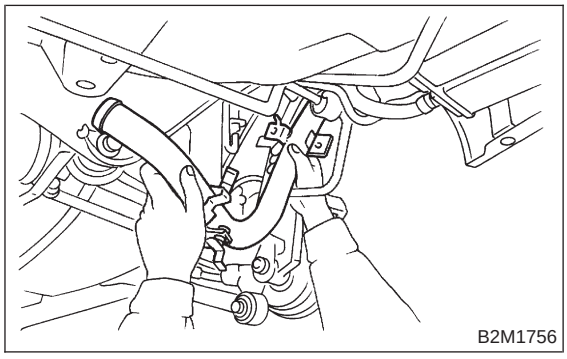
3) Disconnect battery ground cable.



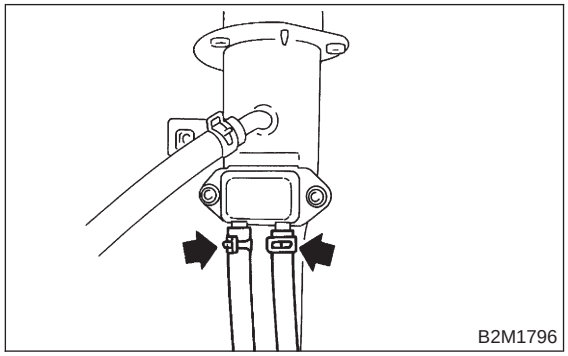
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



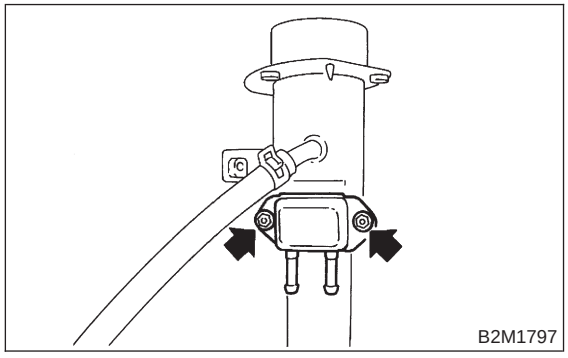
5) Remove fuel filler pipe. <Ref. to 2-8 [W3A2].>



6) Disconnect evaporation hoses from shut valve.

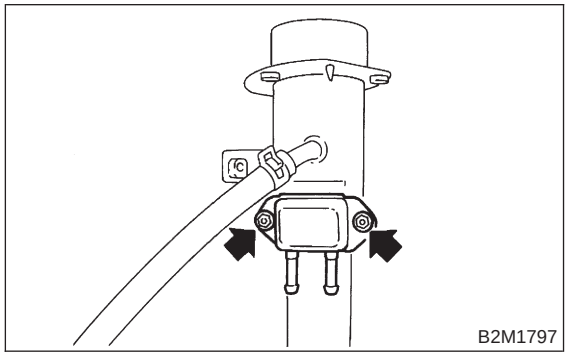


7) Remove shut valve from fuel filler pipe.



8) Installation is in the reverse order of removal.

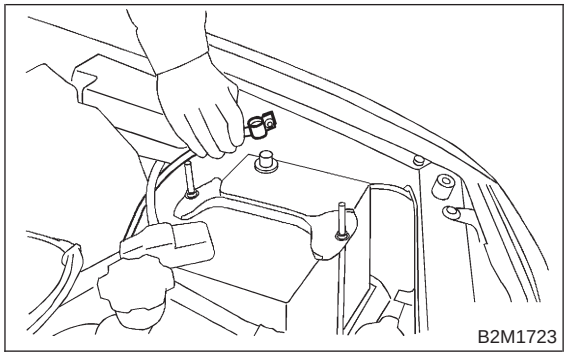
Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)



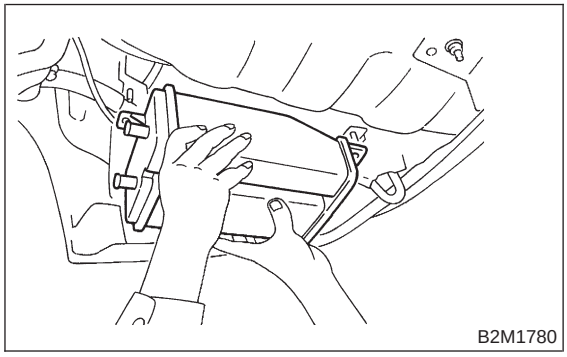
17. Drain Valve (2200 cc AWD except Taiwan Spec. Vehicles)

A: REMOVAL AND INSTALLATION

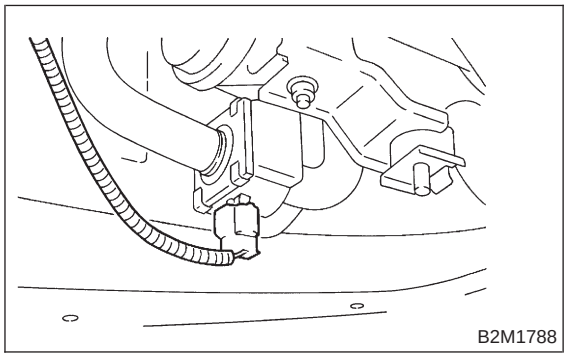
1) Disconnect battery ground cable.



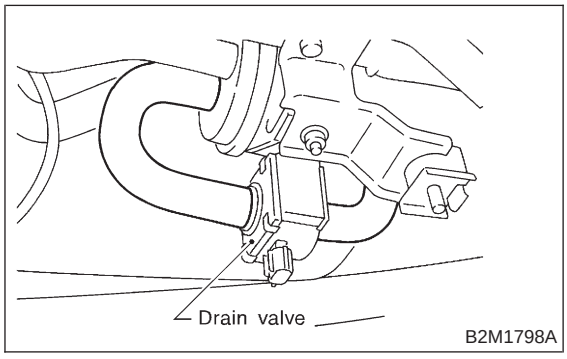
2) Lift-up the vehicle.
3) Remove canister. <Ref. to 2-1 [W3A2].>



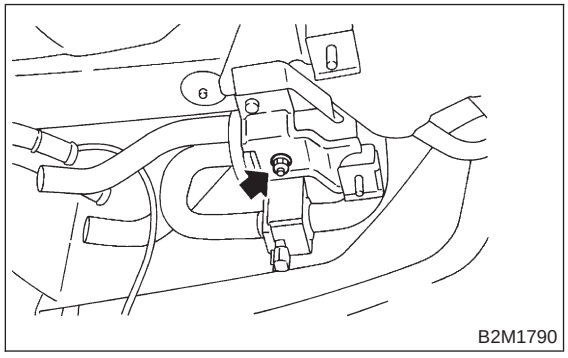
4) Disconnect connector from drain valve.



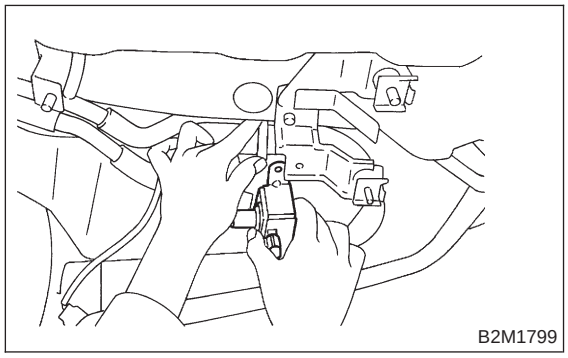
5) Disconnect evaporation hoses from drain valve.



6) Remove bolt which installs air filter and drain valve brackets on body.

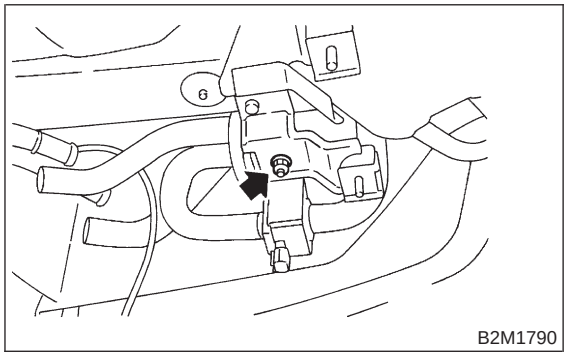


7) Move air filter to upper side, and remove drain valve with bracket.



8) Installation is in the reverse order of removal.

Tightening torque:
22.5±7 N·m (2.3±0.7 kg-m, 16.6±5.1 ft-lb)



ON-CAR SERVICES 2-2

1. Foreword

A: GENERAL

This chapter describes major inspection and service procedures for the engine mounted on the body. For procedures not found in this chapter, refer to the service procedure section in the applicable chapter.

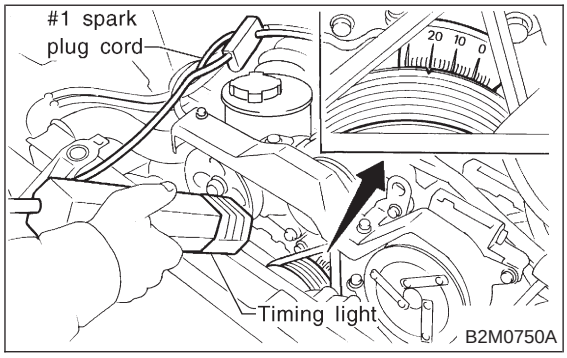
2. Ignition Timing

A: MEASUREMENT

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) Warm-up the engine.
2) To check the ignition timing, connect a timing light to #1 cylinder spark plug cord, and illuminate the timing mark with the timing light.
3) Start the engine at idle speed and check the ignition timing.

Ignition timing [BTDC/rpm]:
14°±8°/700 (2200 cc MT model)
20°±8°/700 (2200 cc AT model)
15°±8°/700 (2500 cc model)

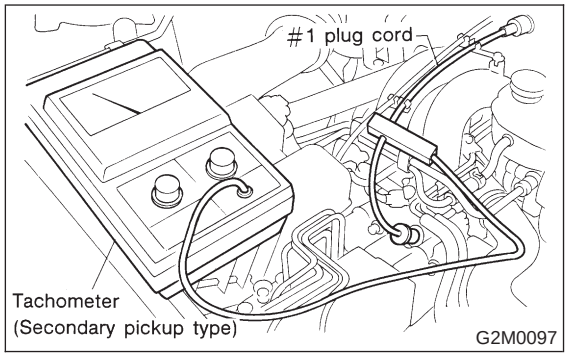


If the timing is not correct, check the ignition control system.
<Ref. to 2-7 On-Board Diagnostics II System.>

3. Engine Idle Speed

A: MEASUREMENT

1) Before checking idle speed, check the following:
   (1) Ensure that air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and that hoses are connected properly.
   (2) Ensure that malfunction indicator light (CHECK ENGINE light) does not illuminate.
2) Warm-up the engine.
3) Stop the engine, and turn igintion switch to OFF.
4) When using SUBARU SELECT MONITOR;
   (1) Insert the cartridge to SUBARU SELECT MONITOR.
   (2) Connect SUBARU SELECT MONITOR to the data link connector.
   (3) Turn igintion switch to ON, and SUBARU SELECT MONITOR switch to ON.
   (4) Select {2. Each System Check} in Main Menu.
   (5) Select {EGI/EMPI} in Selection Menu.
   (6) Select {1. Current Data Display & Save} in EGI/EMPI Diagnosis.
   (7) Select {1.12 Data Display} in Data Display Menu.
   (8) Start the engine, and read engine idle speed.
5) When using tachometer (Secondary pick-up type).
   (1) Attach the pick-up clip to No. 1 cylinder spark plug cord.
   (2) Start the engine, and read engine idle speed.



NOTE:
- When using the OBD-II general scan tool, carefully read its operation manual.
- This ignition system provides simultaneous ignition for #1 and #2 plugs. It must be noted that some tachometers may register twice that of actual engine speed.

6) Check idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, air conditioning, etc. OFF)

Idle speed (No load and gears in neutral (MT), or N or P (AT) position):
700±100 rpm

7) Check idle speed when loaded. (Turn air conditioning switch to “ON” and operate compressor for at least one minute before measurement.)

Idle speed [A/C “ON”, no load and gears in neutral (MT) or N or P (AT) position]:
850±50 rpm

CAUTION:
Never rotate idle adjusting screw. If idle speed is out of specifications, refer to General On-board Diagnosis Table under “2-7 On-Board Diagnostics II System”.

4. Engine Compression

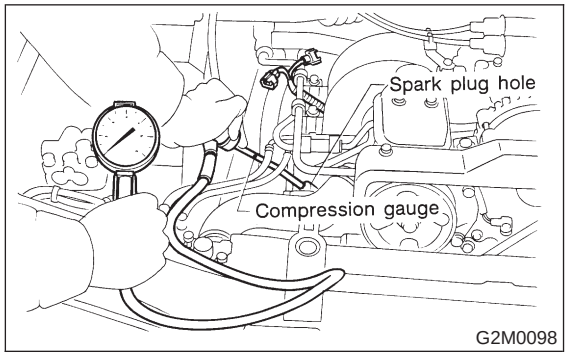
A: MEASUREMENT

1. 2200 cc MODEL

1) After warming-up the engine, turn ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Remove all the spark plugs.
4) Disconnect connectors from fuel injectors.
5) Fully open throttle valve.
6) Check the starter motor for satisfactory performance and operation.
7) Hold the compression gauge tight against the spark plug hole.

CAUTION:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

8) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (200 — 300 rpm and fully open throttle):
Standard;
1,079 — 1,275 kPa (11.0 — 13.0 kg/cm², 156 — 185 psi)
Limit;
883 kPa (9.0 kg/cm², 128 psi)
Difference between cylinders;
196 kPa (2.0 kg/cm², 28 psi)

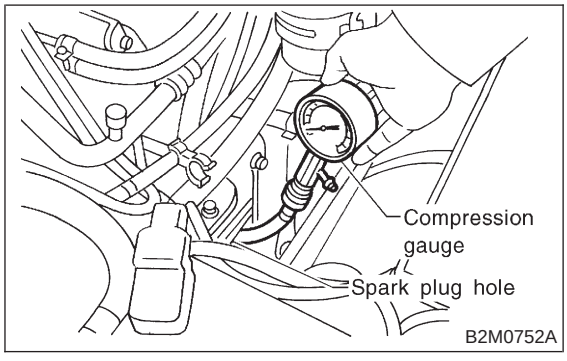
2. 2500 cc MODEL

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) After warming-up the engine, turn ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Remove all the spark plugs. <Ref. to 6-1 [W3B0].> and <Ref. to 6-1 [W3C0].>
4) Disconnect connectors from fuel injectors.
5) Fully open throttle valve.
6) Check the starter motor for satisfactory performance and operation.
7) Hold the compression gauge tight against the spark plug hole.

CAUTION:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

8) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



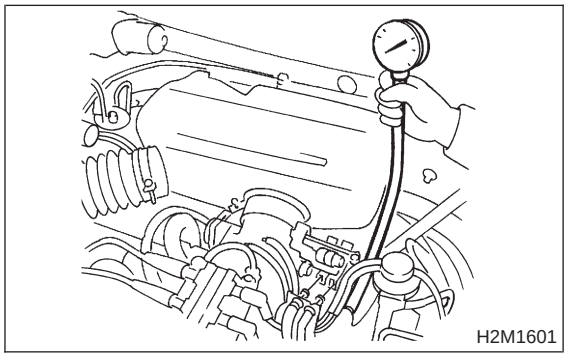
9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully open throttle):
Standard;
1,216 kPa (12.4 kg/cm², 176 psi)
Limit;
941 kPa (9.6 kg/cm², 137 psi)
Difference between cylinders;
49 kPa (0.5 kg/cm², 7 psi), or less

5. Intake Manifold Vacuum

A: MEASUREMENT

1) Warm-up the engine.
2) Disconnect the brake vacuum hose and install the vacuum gauge to the hose fitting on the manifold.
3) Keep the engine at the idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described below.



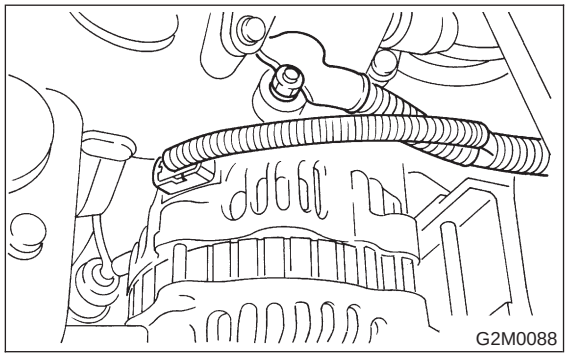
Vacuum pressure (at idling, A/C "OFF"):
Less than −60.0 kPa (−450 mmHg, −17.72 inHg)

Diagnosis of engine condition by measurement of manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket or disconnection or damaged vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Back pressure too high, or exhaust system clogged
3. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Sticky valves
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

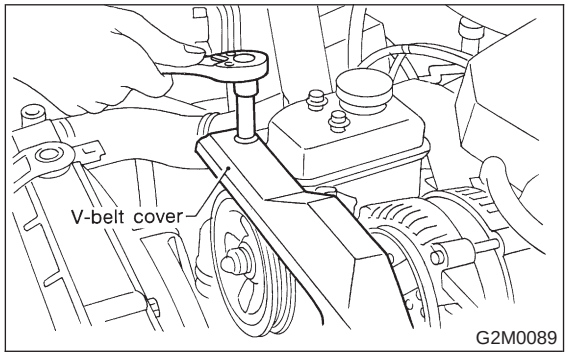
6. Engine Oil Pressure

A: MEASUREMENT

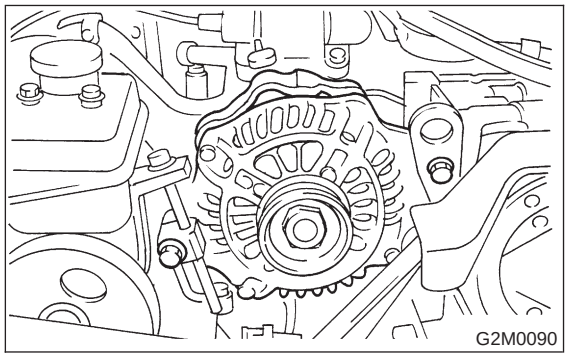
1) Disconnect battery ground cable.
2) Remove generator from bracket.
(1) Disconnect connector and terminal from generator.



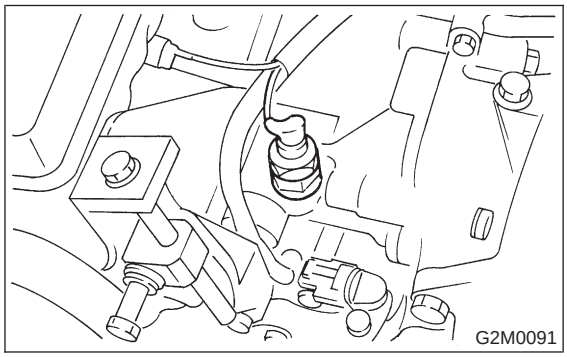
(2) Remove V-belt cover



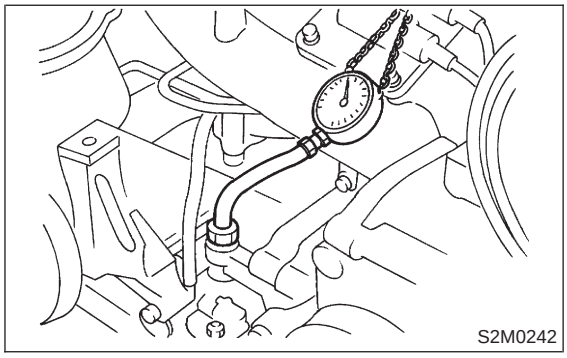
(3) Loosen lock bolt and slider bolt, and remove V-belt for generator.
(4) Remove generator lock bolt.
(5) Remove bolt which install generator on bracket.



3) Disconnect connector from oil pressure switch.
4) Remove oil pressure switch from engine cylinder block.



5) Connect oil pressure gauge hose to cylinder block.
6) Connect battery ground cable.
7) Start the engine, and measure oil pressure.



Oil pressure:
98 kPa (1.0 kg/cm^2,14 psi) or more at 800 rpm
294 kPa (3.0 kg/cm^2, 43 psi) or more at 5,000 rpm

CAUTION:
● If oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to 2-4 ENGINE LUBRICATION SYSTEM.>
● If oil pressure warning light is turned ON and oil pressure is in specification, replace oil pressure switch. <Ref. to 2-4 ENGINE LUBRICATION SYSTEM.>

NOTE:
The specified data is based on an engine oil temperature of 80°C (176°F).

8) After measuring oil pressure, install oil pressure switch.

Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)

9) Install generator and V-belt in the reverse order of removal, and adjust the V-belt deflection.

7. Valve Clearance

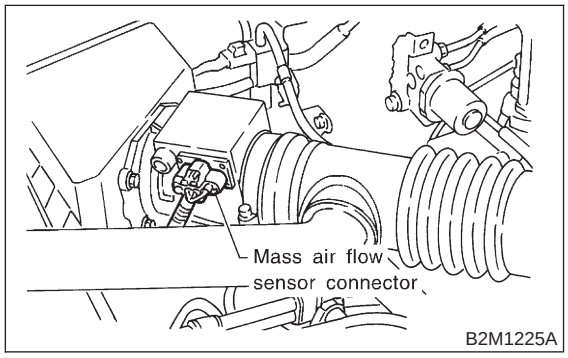
A: INSPECTION

1. 2200 cc MODEL

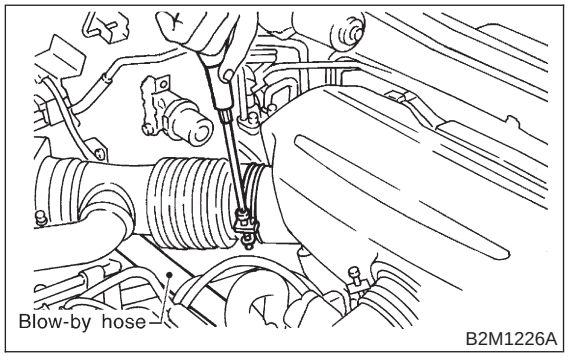
CAUTION:
Inspection and adjustment of valve clearance should be performed while engine is cold.

1) Set the vehicle onto the lift.
2) Disconnect battery ground cable.
3) Remove timing belt cover (RH).
4) Remove rocker cover.

- When inspecting #1 and #3 cylinders;
  (1) Disconnect connector from mass air flow sensor.



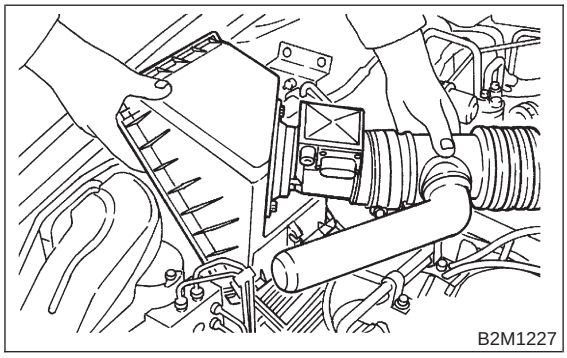
  (2) Loosen clamp which connects air intake duct to air intake chamber.



  (3) Remove the two clips from air cleaner upper cover.

CAUTION:
Before installing air cleaner upper cover, align hole(s) with protruding portions of air cleaner lower case, then secure upper cover.

  (4) Disconnect blow-by hose from air intake duct.
  (5) Remove air intake duct and air cleaner upper cover as a unit.

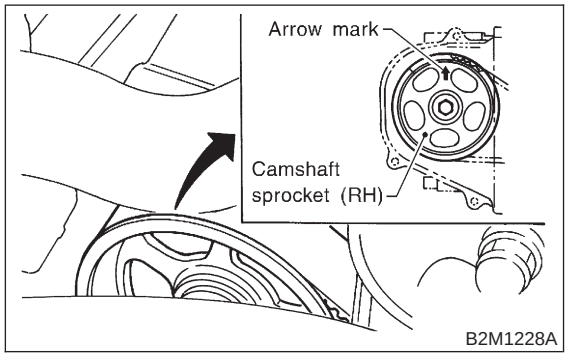


  (6) Remove air cleaner element.
  (7) Disconnect spark plug cords from spark plugs (#1 and #3 cylinders).
  (8) Remove under cover (RH).
  (9) Place suitable container under the vehicle.
  (10) Disconnect PCV hose from rocker cover (RH).
  (11) Remove bolts, then remove rocker cover (RH).

- When inspecting #2 and #4 cylinders;
  (1) Disconnect battery cables, and then remove battery and battery carrier.
  (2) Disconnect washer motor connectors.
  (3) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.
  (4) Remove the two bolts which holds washer tank, then secure the tank away from working area.
  (5) Disconnect spark plug cords from spark plugs (#2 and #4 cylinders).
  (6) Remove under cover (LH).
  (7) Place suitable container under the vehicle.
  (8) Disconnect PCV hose from rocker cover (LH).
  (9) Remove bolts, then remove rocker cover (LH).

5) Set #1 cylinder piston to top dead center of compression stroke by rotating crankshaft pulley clockwise.

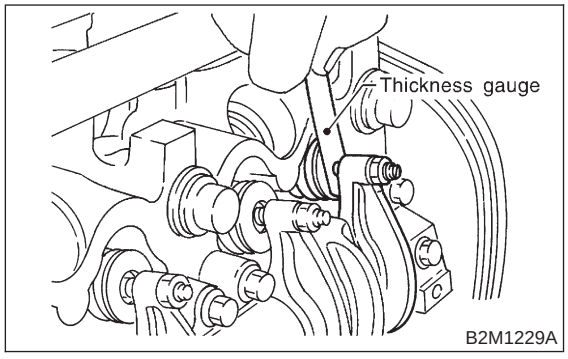
NOTE:
When arrow mark on camshaft sprocket (RH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.



6) Measure #1 cylinder valve clearance by using thickness gauge.

CAUTION:
● Insert the thickness gauge in as horizontal a direction as possible with respect to the valve stem end face.
● Measure exhaust valve clearances while lifting-up the vehicle.

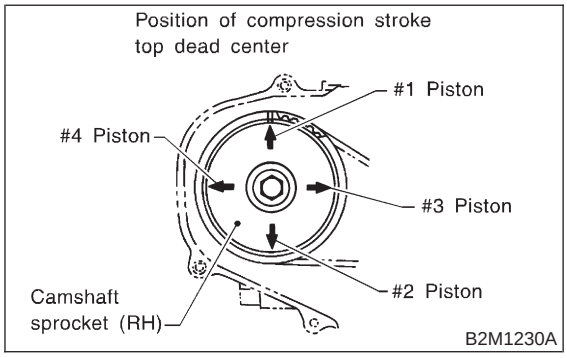
Valve clearance:
Intake: 0.20±0.02 mm (0.0079±0.0008 in)
Exhaust: 0.25±0.02 mm (0.0098±0.0008 in)



7) If necessary, adjust the valve clearance. <Ref. to 2-2 [W7B1].>

8) Similar to measurement procedures used for #1 cylinder, measure #2, #3 and #4 cylinder valve clearances.

NOTE:
● Be sure to set cylinder pistons to their respective top dead centers on compression stroke before measuring valve clearances.
● To set #3, #2 and #4 cylinder pistons to their top dead centers on compression stroke, turn crankshaft pulley clockwise 90° at a time starting with arrow mark on right- hand camshaft sprocket facing up.



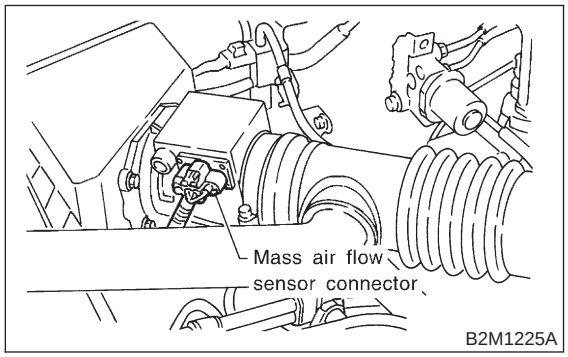
9) After inspection, install the related parts in the reverse order of removal.

2. 2500 cc MODEL

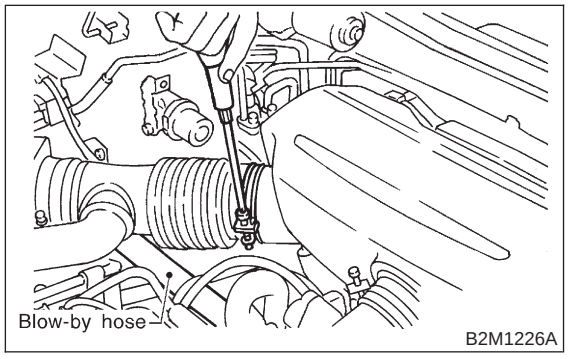
CAUTION:
Inspection and adjustment of valve clearance should be performed while engine is cold.

1) Set the vehicle onto the lift.
2) Disconnect battery ground cable.
3) Remove canister (Taiwan spec. vehicles only).
4) Remove two bolts on the upper side which secure timing belt cover (RH).
5) Lift-up the vehicle.
6) Remove under cover (RH).
7) Remove canister bracket (Taiwan spec. vehicles only).
8) Loosen remaining bolt on under side which secures timing belt cover (RH), then remove belt cover.
9) Lower the vehicle.
10) Remove rocker cover.

● When inspecting #1 and #3 cylinders;
(1) Disconnect connector from mass air flow sensor.



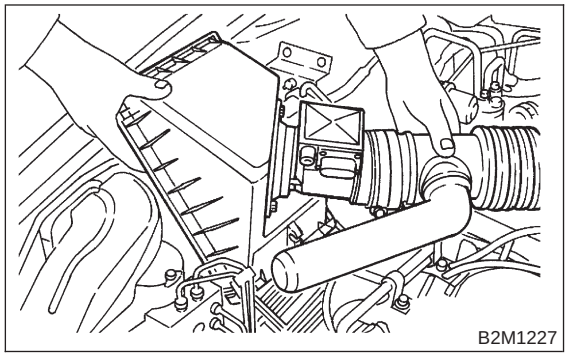
(2) Loosen clamp which connects air intake duct to air intake chamber.



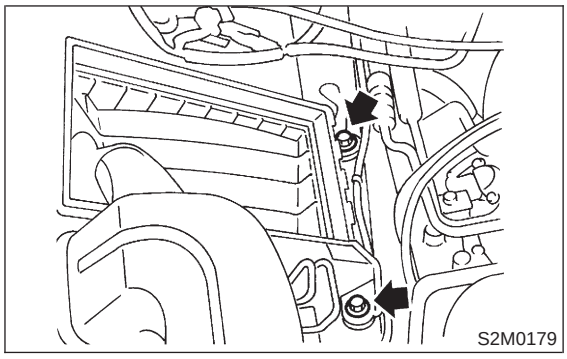
(3) Remove the two clips from air cleaner upper cover.

CAUTION:
Before installing air cleaner upper cover, align hole(s) with protruding portions of air cleaner lower case, then secure upper cover.

(4) Disconnect blow-by hose from air intake duct.
(5) Remove air intake duct and air cleaner upper cover as a unit.



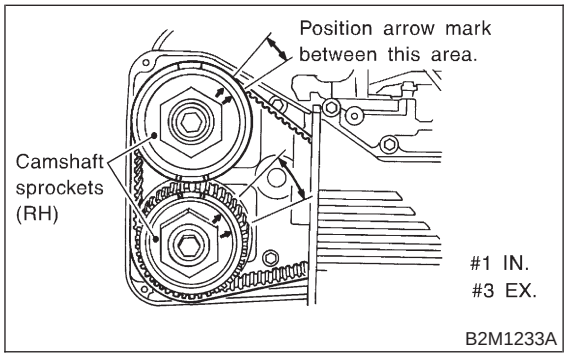
(6) Remove air cleaner element.
(7) Remove air cleaner lower case.



(8) Disconnect spark plug cords from spark plugs (#1 and #3 cylinders).
(9) Place suitable container under the vehicle.
(10) Disconnect PCV hose from rocker cover (RH).
(11) Remove bolts, then remove rocker cover (RH).

● When inspecting # 2 and #4 cylinders;
(1) Disconnect battery cables, and then remove battery and battery carrier.
(2) Disconnect washer motor connectors.
(3) Disconnect washer hoses from washer motors, then plug connections with suitable caps.
(4) Remove washer tank.
(5) Disconnect spark plug cords from spark plugs (#2 and #4 cylinders).
(6) Remove under cover (LH).
(7) Place suitable container under the vehicle.
(8) Disconnect PCV hose from rocker cover (LH).
(9) Remove bolts, then remove rocker cover (LH).

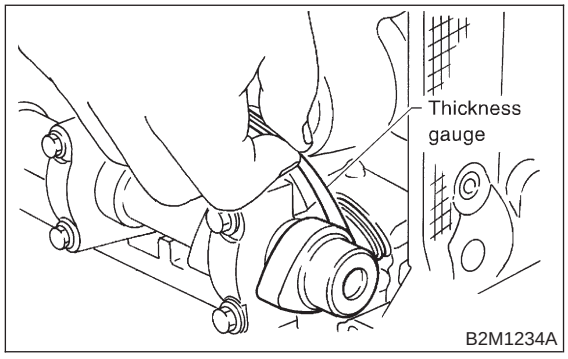
11) Turn crankshaft pulley clockwise until arrow mark on camshaft sprocket is set to position shown in figure.



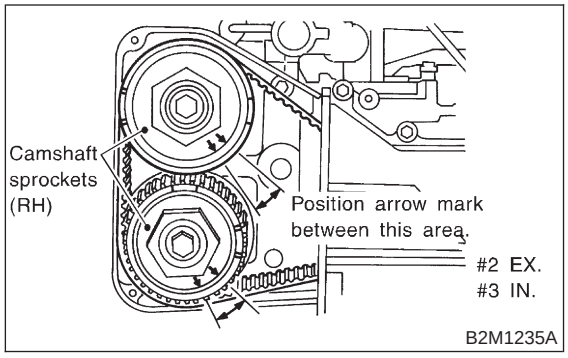
12) Measure #1 cylinder intake valve and #3 cylinder exhaust valve clearances by using thickness gauge.

CAUTION:
● Insert the thickness gauge in as horizontal a direction as possible with respect to the shim.
● Measure exhaust valve clearances while lifting-up the vehicle.

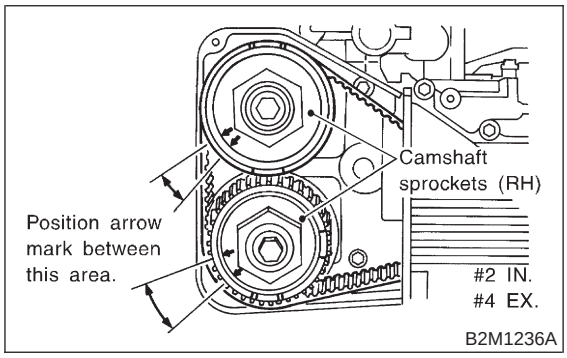
Valve clearance:
Intake: 0.20±0.02 mm (0.0079±0.0008 in)
Exhaust: 0.25±0.02 mm (0.0098±0.0008 in)



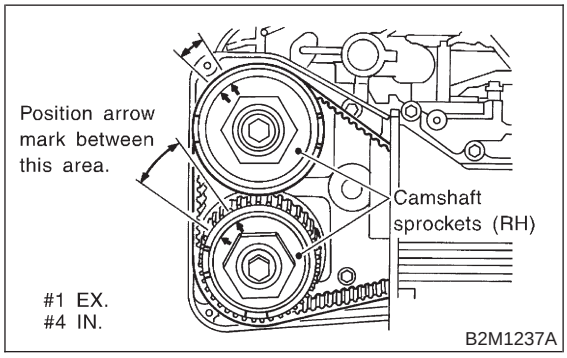
13) If necessary, adjust the valve clearance. <Ref. to 2-2 [W7B2].>
14) Further turn crankshaft pulley clockwise. Using the same procedures as in step 12) above, measure valve clearances.
(1) Set arrow mark on camshaft sprocket to position shown in figure, and measure #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



(2) Set arrow mark on camshaft sprocket to position shown in figure, and measure #2 cylinder intake valve and #4 cylinder exhaust valve clearances.



(3) Set arrow mark on camshaft sprocket to position shown in figure, and measure #1 cylinder exhaust valve and #4 cylinder intake valve clearances.



15) After inspection, install the related parts in the reverse order of removal.

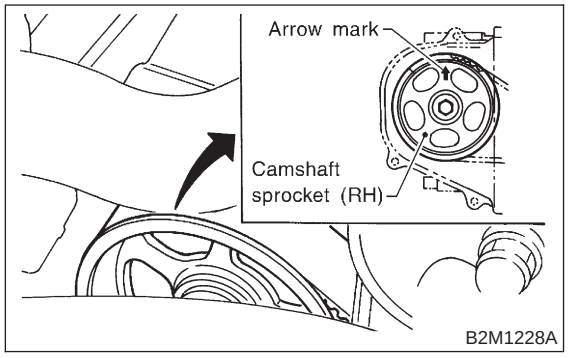
B: ADJUSTMENT

1. 2200 cc MODEL

CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Set #1 cylinder piston to top dead center of compression stroke by rotating crankshaft pulley clockwise.

NOTE:
When arrow mark on camshaft sprocket (RH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.

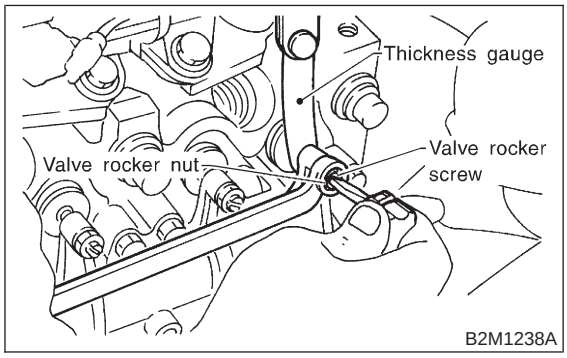


2) Adjust the #1 cylinder valve clearance.
(1) Loosen the valve rocker nut and screw.
(2) Place suitable thickness gauge.
(3) While noting valve clearance, tighten valve rocker adjust screw.
(4) When specified valve clearance is obtained, tighten valve rocker nut.

Tightening torque:
10±1 N·m (1.0±0.1 kg-m, 7.2±0.7 ft-lb)

CAUTION:
● Insert the thickness gauge in as horizontal a direction as possible with respect to the valve stem end face.
● Adjust exhaust valve clearances while lifting-up the vehicle.

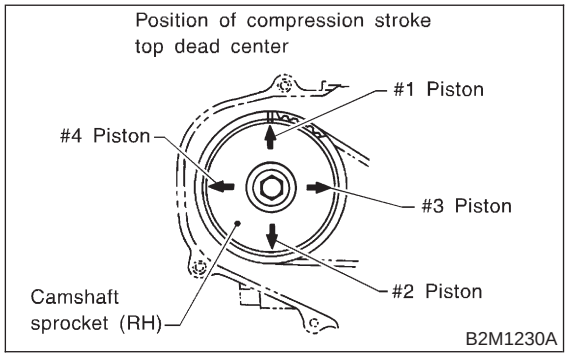
Valve clearance:
Intake: 0.20±0.02 mm (0.0079±0.0008 in)
Exhaust: 0.25±0.02 mm (0.0098±0.0008 in)



3) Ensure that valve clearances are within specifications.
4) Turn crankshaft two complete rotations until #1 cylinder piston is again set to top dead center on compression stroke.
5) Ensure that valve clearances are within specifications. If necessary, re-adjust valve clearances.

6) Similar to adjustment procedures used for #1 cylinder, adjust #2, #3 and #4 cylinder valve clearances.

NOTE:
● Be sure to set cylinder pistons to their respective top dead centers on compression stroke before adjusting valve clearances.
● To set #3, #2 and #4 cylinder pistons to their top dead centers on compression stroke, turn crankshaft pulley clockwise 90° at a time starting with arrow mark on right-hand camshaft sprocket facing up.

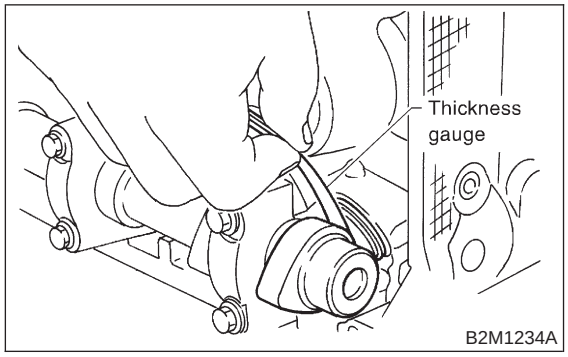


2. 2500 cc MODEL

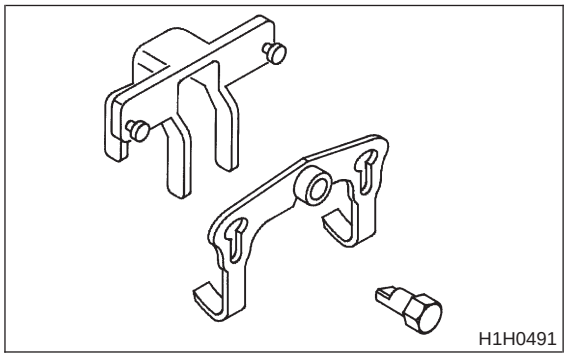
CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Measure all valve clearances. <Ref. to 2-2 [W7A2].>

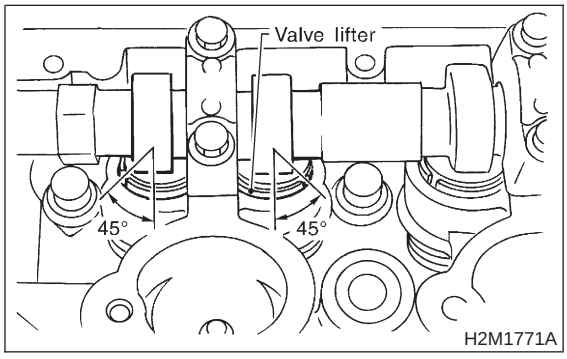
NOTE:
Record each valve clearance after it has been measured.



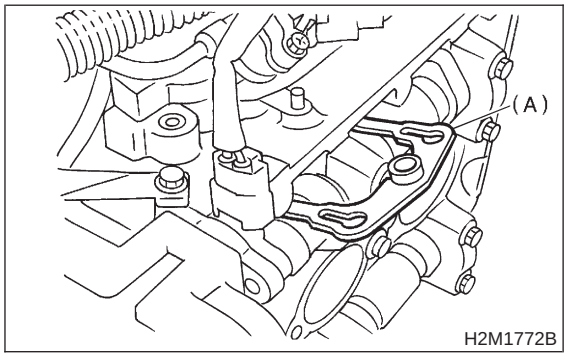
2) Remove shim of intake side.
(1) Prepare the ST.
ST 498187100 SHIM REPLACER KIT



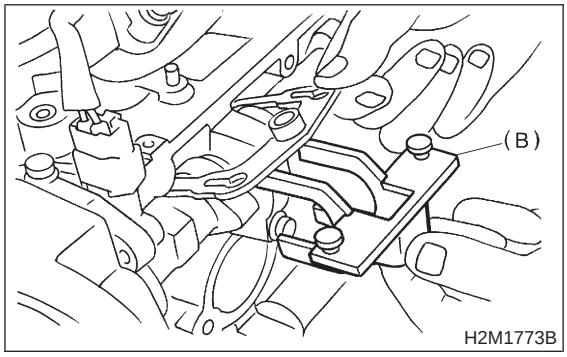
(2) Rotate the notch of the valve lifter outward by 45°.



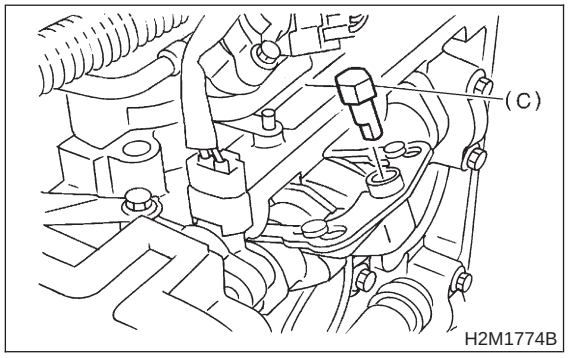
(3) Set REPLACER No. 1 (A) to intake camshaft.



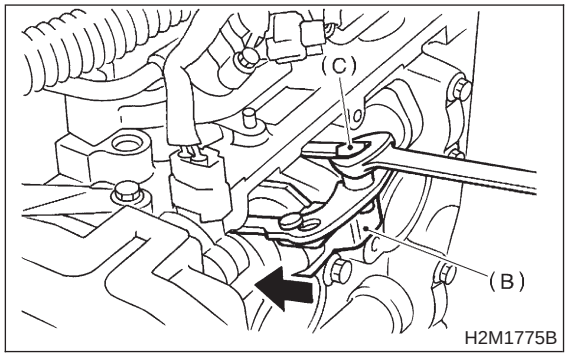
(4) Set REPLACER No. 2 (B).



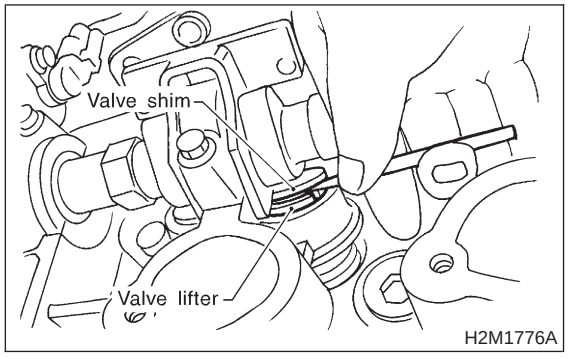
(5) Set REPLACER No. 3 (C) to hole of REPLACER No. 1.



(6) Rotate REPLACER No. 3 (C) until REPLACER No. 2 (B) pushes away valve lifter.

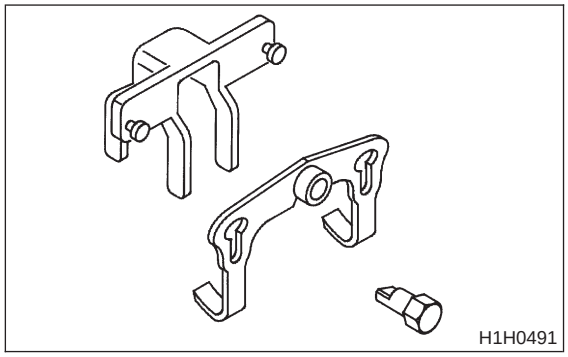


(7) Insert tweezers into the notch of the valve lifter, and take the shim out.

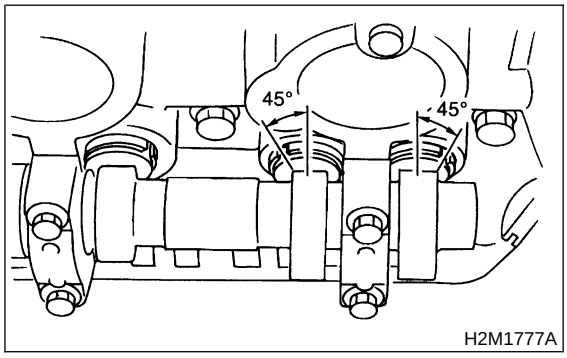


3) Remove shim of exhaust side.
(1) Prepare the ST.

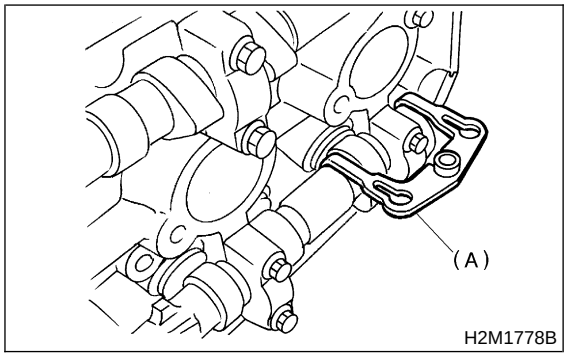
ST 498187100 SHIM REPLACER KIT



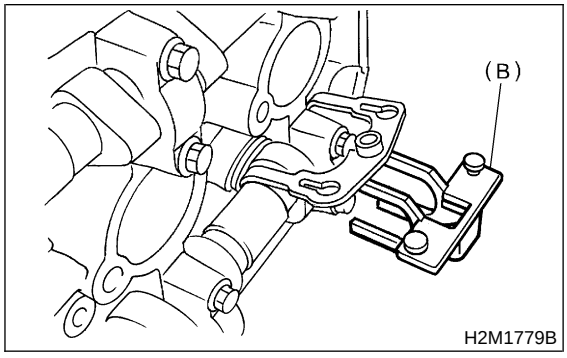
(2) Rotate the notch of the valve lifter outward by 45°.



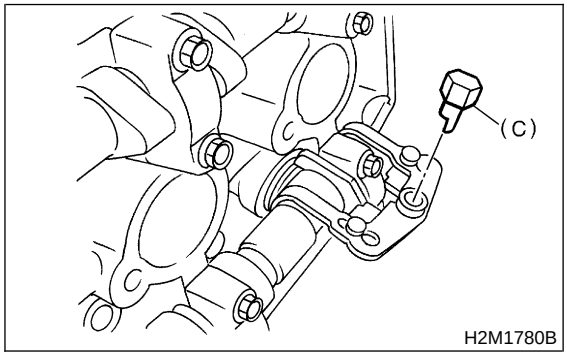
(3) Set REPLACER No. 1 (A) to exhaust camshaft.



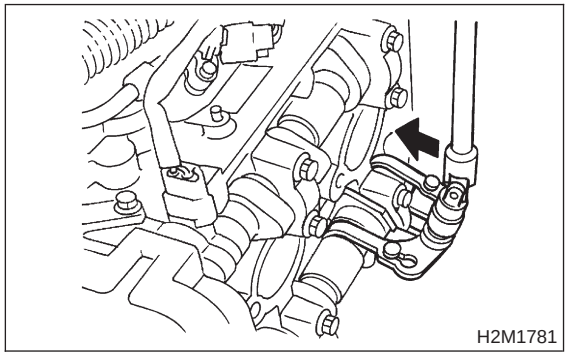
(4) Set REPLACER No. 2 (B).



(5) Set REPLACER No. 3 (C) to hole of REPLACER No. 1.

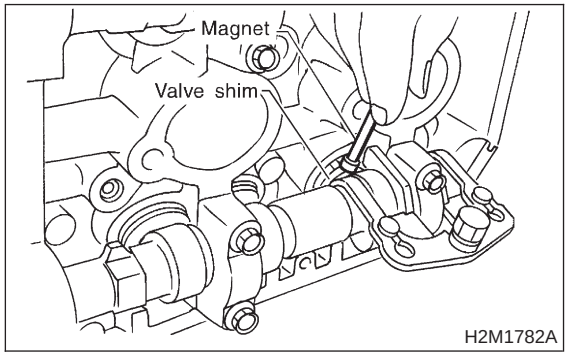


(6) Rotate REPLACER No. 3 until REPLACER No. 2 pushes away valve lifter.

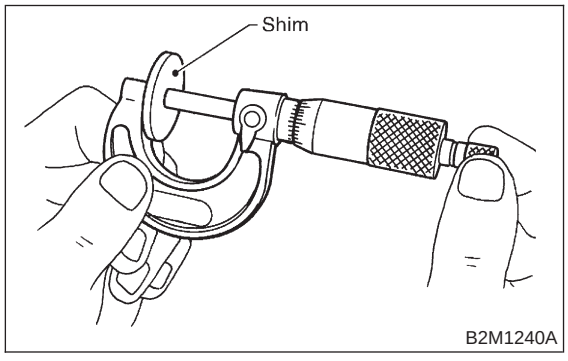


(7) Insert tweezers into the notch of the valve lifter, and take the shim out.

NOTE:
By using a magnet, the shim can be taken out without dropping it.



4) Measure thickness of shim with micrometer.



5) Select a shim of suitable thickness using measured valve clearance and shim thickness, using the following table.

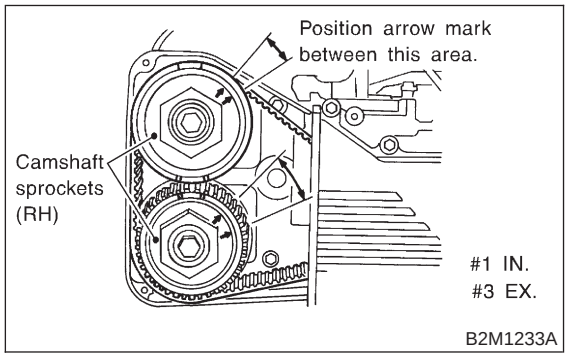
Intake valve (mm): S = (V + T) − 0.20
Exhaust valve (mm): S = (V + T) − 0.25

S: Shim thickness to be used
V: Measured valve clearance
T: Shim thickness required

Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
13218AC230	2.22 (0.0874)	13218AC480	2.52 (0.0992)
13218AE000	2.23 (0.0878)	13218AC490	2.53 (0.0996)
13218AC240	2.24 (0.0882)	13218AC500	2.54 (0.1000)
13218AE010	2.25 (0.0886)	13218AC510	2.55 (0.1004)
13218AC250	2.26 (0.0890)	13218AC520	2.56 (0.1008)
13218AE020	2.27 (0.0894)	13218AC530	2.57 (0.1012)
13218AC260	2.28 (0.0898)	13218AC540	2.58 (0.1016)
13218AE030	2.29 (0.0902)	13218AC550	2.59 (0.1020)
13218AC270	2.30 (0.0906)	13218AC560	2.60 (0.1024)
13218AE040	2.31 (0.0909)	13218AC570	2.61 (0.1028)
13218AC280	2.32 (0.0913)	13218AC580	2.62 (0.1031)
13218AC290	2.33 (0.0917)	13218AC590	2.63 (0.1035)
13218AC300	2.34 (0.0921)	13218AC600	2.64 (0.1039)
13218AC310	2.35 (0.0925)	13218AC610	2.65 (0.1043)
13218AC320	2.36 (0.0929)	13218AC620	2.66 (0.1047)
13218AC330	2.37 (0.0933)	13218AC630	2.67 (0.1051)
13218AC340	2.38 (0.0937)	13218AC640	2.68 (0.1055)
13218AC350	2.39 (0.0941)	13218AC650	2.69 (0.1059)
13218AC360	2.40 (0.0945)	13218AC660	2.70 (0.1063)
13218AC370	2.41 (0.0949)	13218AE050	2.71 (0.1067)
13218AC380	2.42 (0.0953)	13218AC670	2.72 (0.1071)
13218AC390	2.43 (0.0957)	13218AE060	2.73 (0.1075)
13218AC400	2.44 (0.0961)	13218AC680	2.74 (0.1079)
13218AC410	2.45 (0.0965)	13218AE070	2.75 (0.1083)
13218AC420	2.46 (0.0969)	13218AC690	2.76 (0.1087)
13218AC430	2.47 (0.0972)	13218AE080	2.77 (0.1091)
13218AC440	2.48 (0.0976)	13218AC700	2.78 (0.1094)
13218AC450	2.49 (0.0980)	13218AE090	2.79 (0.1098)
13218AC460	2.50 (0.0984)	13218AC710	2.80 (0.1102)
13218AC470	2.51 (0.0988)	13218AE100	2.81 (0.1106)

6) Set suitable shim selected in one step before, to valve lifter.

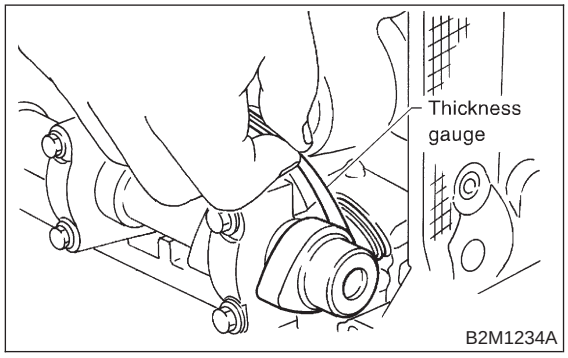
7) Turn crankshaft pulley clockwise until arrow mark on camshaft sprocket is set to position shown in figure.



8) Ensure that #1 cylinder intake valve and #3 cylinder exhaust valve are adjusted to specifications.

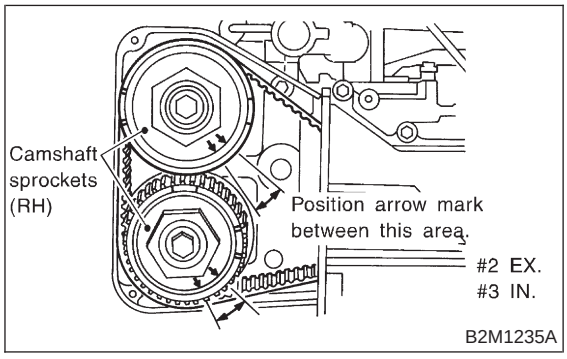
CAUTION:
● Insert the thickness gauge in as horizontal a direction as possible with respect to the shim.
● Adjust exhaust valve clearances while lifting-up the vehicle.

Valve clearance:
Intake: 0.20±0.02 mm (0.0079±0.0008 in)
Exhaust: 0.25±0.02 mm (0.0098±0.0008 in)

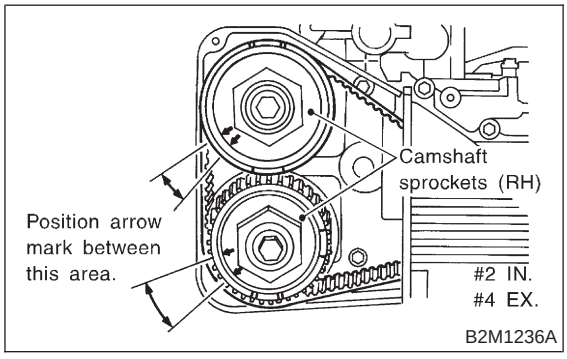


9) Turn crankshaft two complete rotations. Check again to ensure that #1 cylinder intake valve and #3 cylinder exhaust valve clearances are within specifications. If necessary, re-adjust valve clearances.
10) Further turn crankshaft pulley clockwise. Using the same procedures as in two steps before, measure valve clearances.

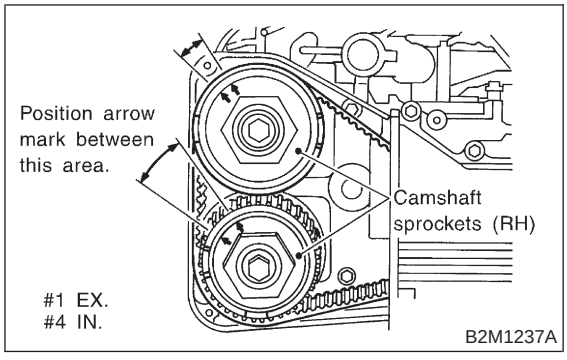
(1) Set arrow mark on camshaft sprocket to position shown in figure, and check #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



(2) Set arrow mark on camshaft sprocket to position shown in figure, and check #2 cylinder intake valve and #4 cylinder exhaust valve clearances.



(3) Set arrow mark on camshaft sprocket to position shown in figure, and check #1 cylinder exhaust valve and #4 cylinder intake valve clearances.



ENGINE (SOHC) 2-3a

1. Engine

A: SPECIFICATIONS

Engine	Model			2200 cc
	Type			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement			Belt driven, single over-head camshaft, 4-valve/cylinder
	Bore × Stroke		mm (in)	96.9 × 75.0 (3.815 × 2.953)
	Displacement		cm^3 (cu in)	2,212 (135.0)
	Compression ratio			9.7
	Compression pressure (at 200 — 300 rpm)		kPa (kg/cm^2, psi)	1,079 — 1,275 (11.0 — 13.0, 156 — 185)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening		4° BTDC
		Closing		52° ABDC
	Exhaust valve timing	Opening		48° BBDC
		Closing		12° ATDC
	Valve clearance	Intake	mm (in)	0.20±0.02 (0.0079±0.0008)
		Exhaust	mm (in)	0.25±0.02 (0.0098±0.0008)
	Idling speed [At neutral position on MT, or “P” or “N” position on AT]		rpm	700±100 (No load) 850±50 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4
	Ignition timing		BTDC/rpm	14°±8°/700 (MT), 20°±8°/700 (AT)

B: SERVICE DATA

NOTE:
STD: Standard, I.D.: Inner Diameter, O.D.: Outer Diameter, OS: Oversize, US: Undersize

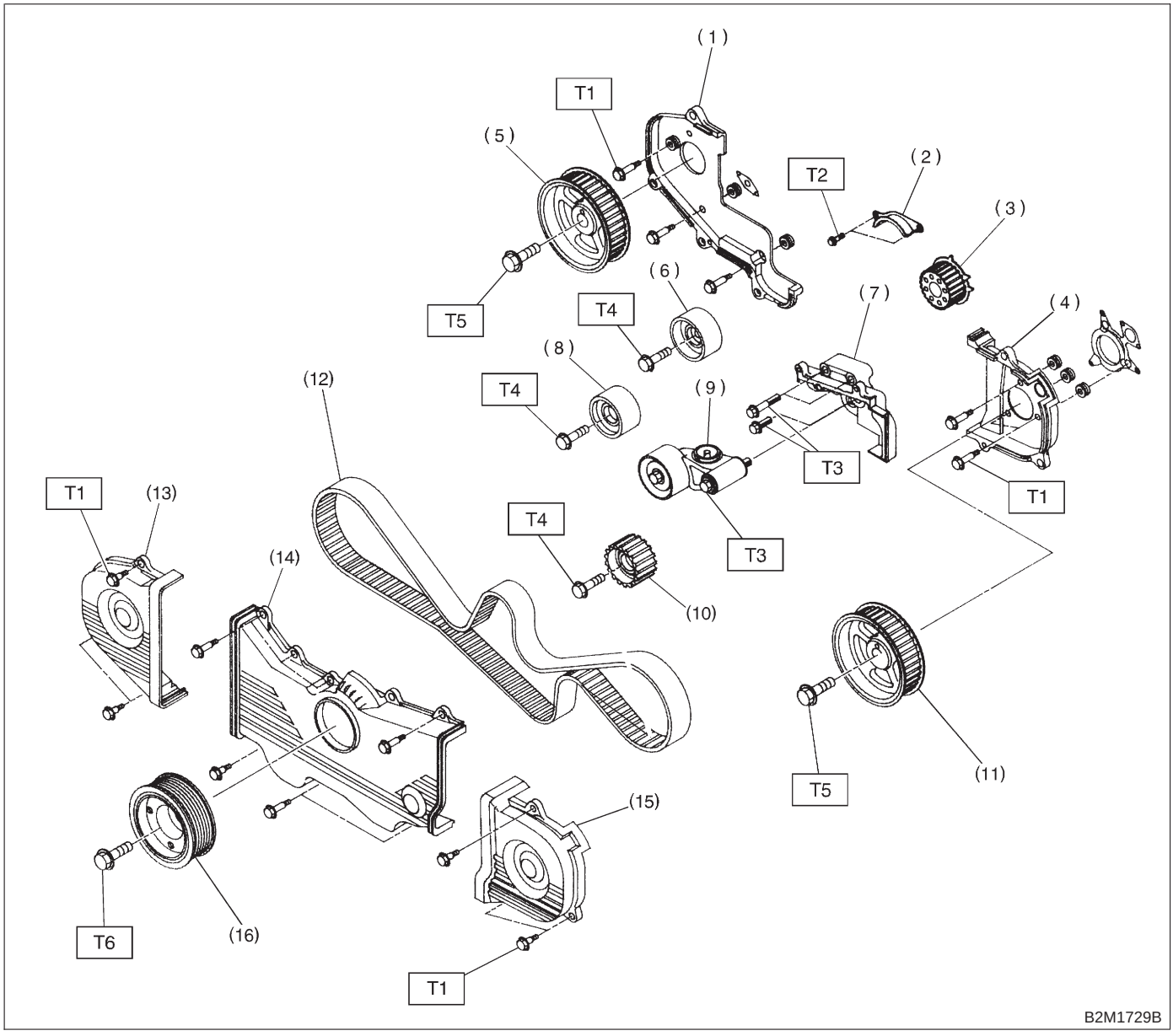
Belt tensioner adjuster	Protrusion of adjuster rod		15.4 — 16.4 mm	(0.606 — 0.646 in)
Belt tensioner	Spacer O.D.		16 mm	(0.63 in)
	Tensioner bush I.D.		16.16 mm	(0.6362 in)
	Clearance between spacer and bush	STD	0.117 — 0.180 mm	(0.0046 — 0.0071 in)
		Limit	0.230 mm	(0.0091 in)
	Side clearance of spacer	STD	0.37 — 0.54 mm	(0.0146 — 0.0213 in)
		Limit	0.8 mm	(0.031 in)
Valve rocker arm	Clearance between shaft and arm	STD	0.020 — 0.054 mm	(0.0008 — 0.0021 in)
		Limit	0.10 mm	(0.0039 in)

Cam-shaft	Bend limit					0.025 mm	(0.0010 in)
	Thrust clearance				STD	0.030 — 0.260 mm	(0.0012 — 0.0102 in)
					Limit	0.35 mm	(0.0138 in)
	Cam lobe height			Intake	STD	32.244 — 32.344 mm	(1.2694 — 1.2734 in)
					Limit	32.094 mm	(1.2635 in)
				Exhaust	STD	31.964 — 32.064 mm	(1.2584 — 1.2624 in)
					Limit	31.814 mm	(1.2525 in)
	Camshaft journal O.D.	RH	Front	LH	Rear	31.935 — 31.950 mm	(1.2573 — 1.2579 in)
			Cen-ter		Center	37.435 — 37.450 mm	(1.4738 — 1.4744 in)
			Rear		Front	37.935 — 37.950 mm	(1.4935 — 1.4941 in)
	Camshaft journal hole I.D.	RH	Front	LH	Rear	32.005 — 32.025 mm	(1.2600— 1.2608 in)
			Cen-ter		Center	37.505 — 37.525 mm	(1.4766 — 1.4774 in)
			Rear		Front	38.005 — 38.025 mm	(1.4963 — 1.4970 in)
	Oil clearance				STD	0.055 — 0.090 mm	(0.0022 — 0.0035 in)
					Limit	0.10 mm	(0.0039 in)
Cylinder head	Surface warpage limit					0.05 mm	(0.0020 in)
	Surface grinding limit					0.1 mm	(0.004 in)
	Standard height					98.3 mm	(3.870 in)
Valve set	Refacing angle					90°	
	Contacting width			Intake	STD	0.7 mm	(0.028 in)
					Limit	1.4 mm	(0.055 in)
				Exhaust	STD	1.4 mm	(0.055 in)
					Limit	1.8 mm	(0.071 in)
Valve guide	Inner diameter					6.000 — 6.012 mm	(0.2362 — 0.2367 in)
	Protrusion above head					17.5 — 18.0 mm	(0.689 — 0.709 in)
Valve	Head edge thickness			Intake	STD	1.0 mm	(0.039 in)
					Limit	0.8 mm	(0.031 in)
				Exhaust	STD	1.2 mm	(0.047 in)
					Limit	0.8 mm	(0.031 in)
	Stem diameter				Intake	5.950 — 5.965 mm	(0.2343 — 0.2348 in)
					Exhaust	5.945 — 5.960 mm	(0.2341 — 0.2346 in)
	Stem oil clearance			STD	Intake	0.035 — 0.062 mm	(0.0014 — 0.0024 in)
					Exhaust	0.040 — 0.067 mm	(0.0016 — 0.0026 in)
				Limit	—	0.15 mm	(0.0059 in)
	Overall length				Intake	101.0 mm	(3.976 in)
					Exhaust	101.2 mm	(3.984 in)
Valve spring	Free length					44.05 mm	(1.7342 in)
	Squareness					2.5°, 1.9 mm	(0.075 in)
	Tension/spring height					174.6 — 200.1 N (17.8 — 20.4 kg, 39.2 — 45.0 lb)/36.0 mm (1.417 in) 405.0 — 458.0 N (41.3 — 46.7 kg, 91.1 — 103.0 lb)/28.2 mm (1.110 in)	

Cylinder block	Surface warpage limit (mating with cylinder head)			0.05 mm	(0.0020 in)
	Surface grinding limit			0.1 mm	(0.004 in)
	Cylinder bore	STD	A	96.905 — 96.915 mm	(3.8151 — 3.8155 in)
			B	96.895 — 96.905 mm	(3.8148 — 3.8151 in)
	Taper		STD	0.015 mm	(0.0006 in)
			Limit	0.050 mm	(0.0020 in)
	Out-of-roundness		STD	0.010 mm	(0.0004 in)
			Limit	0.050 mm	(0.0020 in)
	Piston clearance		STD	0.010 — 0.030 mm	(0.0004 — 0.0012 in)
			Limit	0.050 mm	(0.0020 in)
	Enlarging (boring) limit			0.5 mm	(0.020 in)
Piston	Outer diameter	STD	A	96.885 — 96.895 mm	(3.8144 — 3.8148 in)
			B	96.875 — 96.885 mm	(3.8140 — 3.8144 in)
		0.25 mm (0.0098 in) OS		97.115 — 97.145 mm	(3.8234 — 3.8246 in)
		0.50 mm (0.0197 in) OS		97.365 — 97.395 mm	(3.8333 — 3.8344 in)
Piston pin	Standard clearance between piston pin and hole in piston	STD		0.004 — 0.010 mm	(0.0002 — 0.0004 in)
		Limit		0.020 mm	(0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).	
Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.35 mm	(0.0079 — 0.0138 in)
			Limit	1.0 mm	(0.039 in)
		Second ring	STD	0.20 — 0.50 mm	(0.0079 — 0.0197 in)
			Limit	1.0 mm	(0.039 in)
		Oil ring	STD	0.20 — 0.70 mm	(0.0079 — 0.0276 in)
			Limit	1.5 mm	(0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm	(0.0016 — 0.0031 in)
			Limit	0.15 mm	(0.0059 in)
		Second ring	STD	0.030 — 0.070 mm	(0.0012 — 0.0028 in)
			Limit	0.15 mm	(0.0059 in)
Connecting rod	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm	(0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm	(0.0028 — 0.0130 in)
			Limit	0.4 mm	(0.016 in)
Connecting rod bearing	Oil clearance		STD	0.015 — 0.045 mm	(0.0006 — 0.0018 in)
			Limit	0.05 mm	(0.0020 in)
	Thickness at center portion		STD	1.492 — 1.501 mm	(0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US	1.510 — 1.513 mm	(0.0594 — 0.0596 in)
			0.05 mm (0.0020 in) US	1.520 — 1.523 mm	(0.0598 — 0.0600 in)
			0.25 mm (0.0098 in) US	1.620 — 1.623 mm	(0.0638 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm	(0 — 0.0009 in)
			Limit	0.030 mm	(0.0012 in)

Crank-shaft	Bend limit			0.035 mm	(0.0014 in)
	Crankpin and crank journal		Out-of-roundness	0.030 mm (0.0012 in) or less	
			Grinding limit	0.250 mm	(0.0098 in)
	Crankpin outer diameter		STD	51.984 — 52.000 mm	(2.0466 — 2.0472 in)
			0.03 mm (0.0012 in) US	51.954 — 51.970 mm	(2.0454 — 2.0461 in)
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm	(2.0446 — 2.0453 in)
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm	(2.0368 — 2.0374 in)
	Crank journal outer diameter	#1, #5	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm	(2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.934 — 59.950 mm	(2.3596 — 2.3602 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm	(2.3520 — 2.3527 in)
		#2, #3, #4	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.954 — 59.970 mm	(2.3604 — 2.3610 in)
			0.05 mm (0.0020 in) US	59.934 — 59.950 mm	(2.3596 — 2.3602 in)
			0.25 mm (0.0098 in) US	59.734 — 59.750 mm	(2.3517 — 2.3524 in)
	Thrust clearance		STD	0.030 — 0.115 mm	(0.0012 — 0.0045 in)
			Limit	0.25 mm	(0.0098 in)
	Oil clearance	#1, #5	STD	0.003 — 0.030 mm	(0.0001 — 0.0012 in)
		#2, #3, #4	STD	0.010 — 0.033 mm	(0.0004 — 0.0013 in)
		#1, #3, #5	Limit	0.040 mm	(0.0016 in)
		#2, #4	Limit	0.035 mm	(0.0014 in)
Crank-shaft bearing	Crankshaft bearing thickness	#1, #5	STD	1.998 — 2.011 mm	(0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm	(0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm	(0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm	(0.0837 — 0.0839 in)
		#2, #3, #4	STD	2.000 — 2.013 mm	(0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm	(0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm	(0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm	(0.0838 — 0.0839 in)

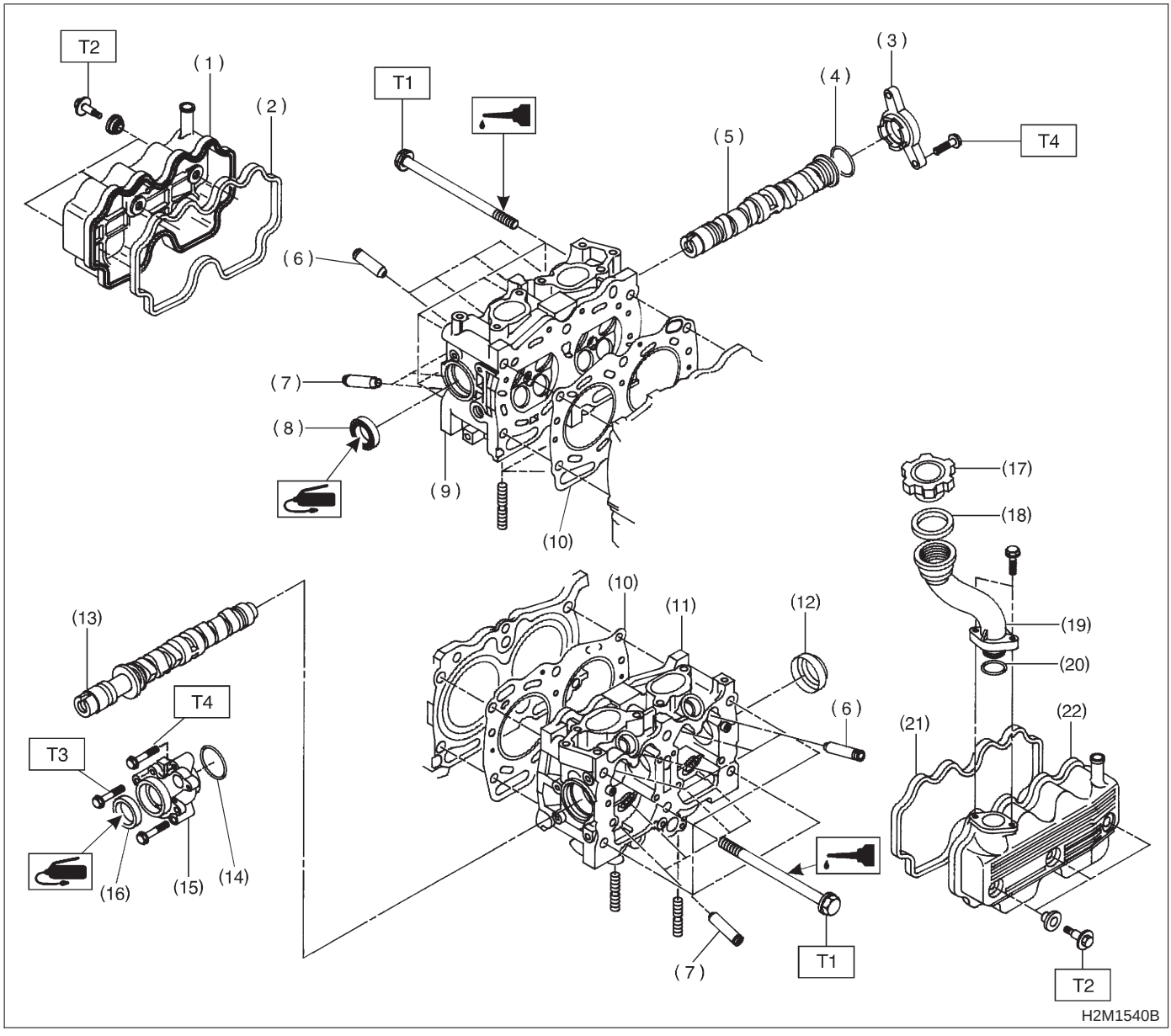
1. Timing Belt



(1) Belt cover No. 2 (RH)
(2) Timing belt guide (MT vehicles only)
(3) Crankshaft sprocket
(4) Belt cover No. 2 (LH)
(5) Camshaft sprocket No. 1
(6) Belt idler (No. 1)
(7) Tensioner bracket
(8) Belt idler (No. 2)
(9) Automatic belt tension adjuster ASSY
(10) Belt idler No. 2
(11) Camshaft sprocket No. 2
(12) Timing belt
(13) Belt cover (RH)
(14) Front belt cover
(15) Belt cover (LH)
(16) Crankshaft pulley

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 9.8±1.0 (1.0±0.1, 7.2±0.7)
T3: 25±3 (2.5±0.3, 18.1±2.2)
T4: 39±4 (4.0±0.4, 28.9±2.9)
T5: 78±5 (8.0±0.5, 57.9±3.6)
T6: 127^{+10}_{-5} ($13.0^{+1.0}_{-0.5}$, $94^{+7.2}_{-3.6}$)

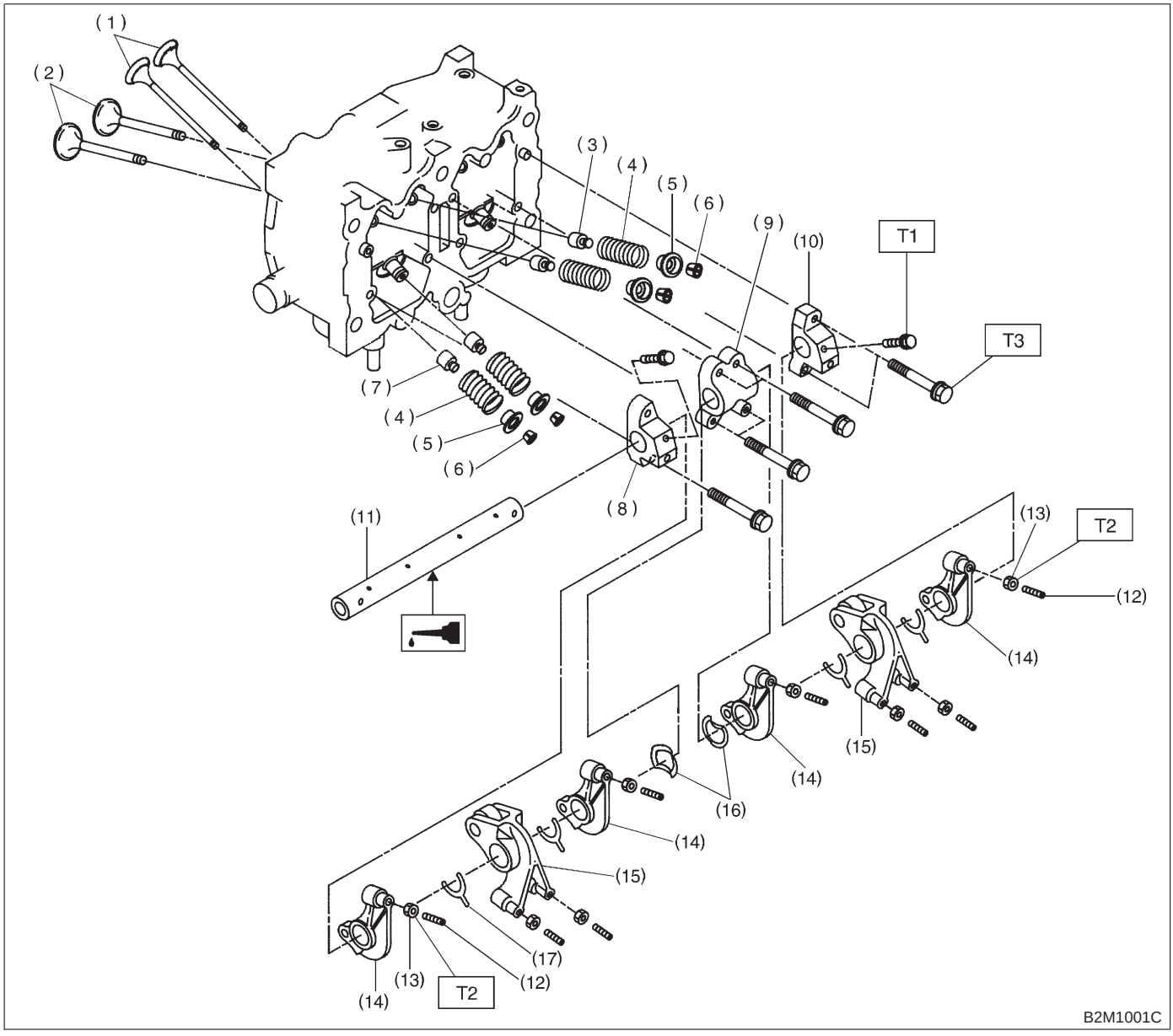
2. Cylinder Head and Camshaft



(1) Rocker cover (RH)
(2) Rocker cover gasket
(3) Camshaft support (RH)
(4) O-ring
(5) Camshaft (RH)
(6) Intake valve guide
(7) Exhaust valve guide
(8) Oil seal
(9) Cylinder head (RH)
(10) Cylinder head gasket
(11) Cylinder head (LH)
(12) Plug
(13) Camshaft (LH)
(14) O-ring
(15) Camshaft support (LH)
(16) Oil seal
(17) Oil filler cap
(18) Gasket
(19) Oil filler pipe
(20) O-ring
(21) Rocker cover gasket
(22) Rocker cover (LH)

Tightening torque: N·m (kg-m, ft-lb)
T1: Refer to 2–3a [W5E1].
T2: 5±1 (0.5±0.1, 3.6±0.7)
T3: 10 (1.0, 7)
T4: 16 (1.6, 12)

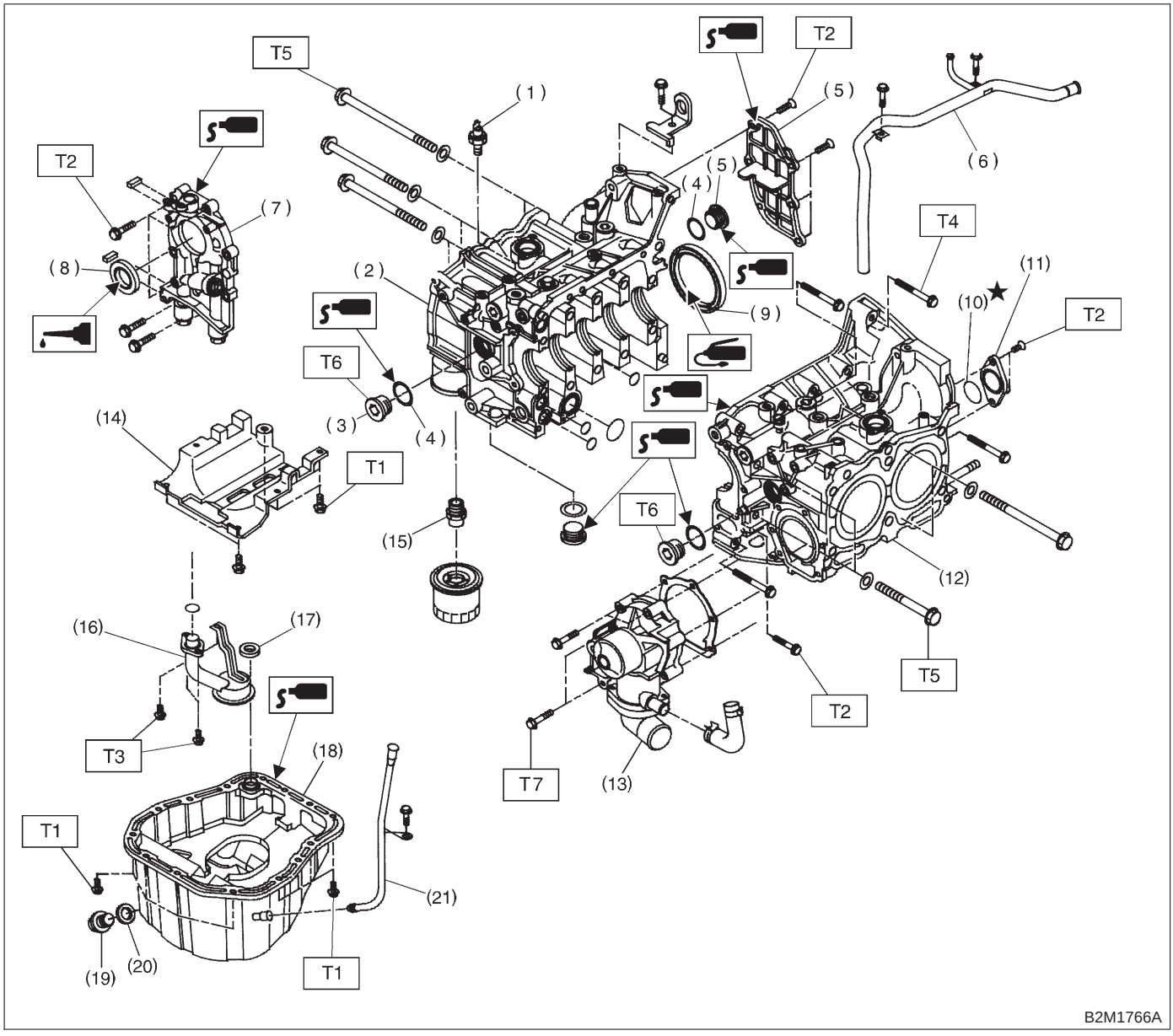
3. Cylinder Head and Valve Assembly



(1) Exhaust valve
(2) Intake valve
(3) Intake valve oil seal
(4) Valve spring
(5) Retainer
(6) Retainer key
(7) Exhaust valve oil seal
(8) Rocker shaft support
(9) Rocker shaft support
(10) Rocker shaft support
(11) Rocker shaft
(12) Valve rocker adjust screw
(13) Valve rocker nut
(14) Intake valve rocker arm
(15) Exhaust valve rocker arm
(16) Spring
(17) Plate

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 10±1 (1.0±0.1, 7.2±0.7)
T3: 12±1 (1.2±0.1, 8.7±0.7)

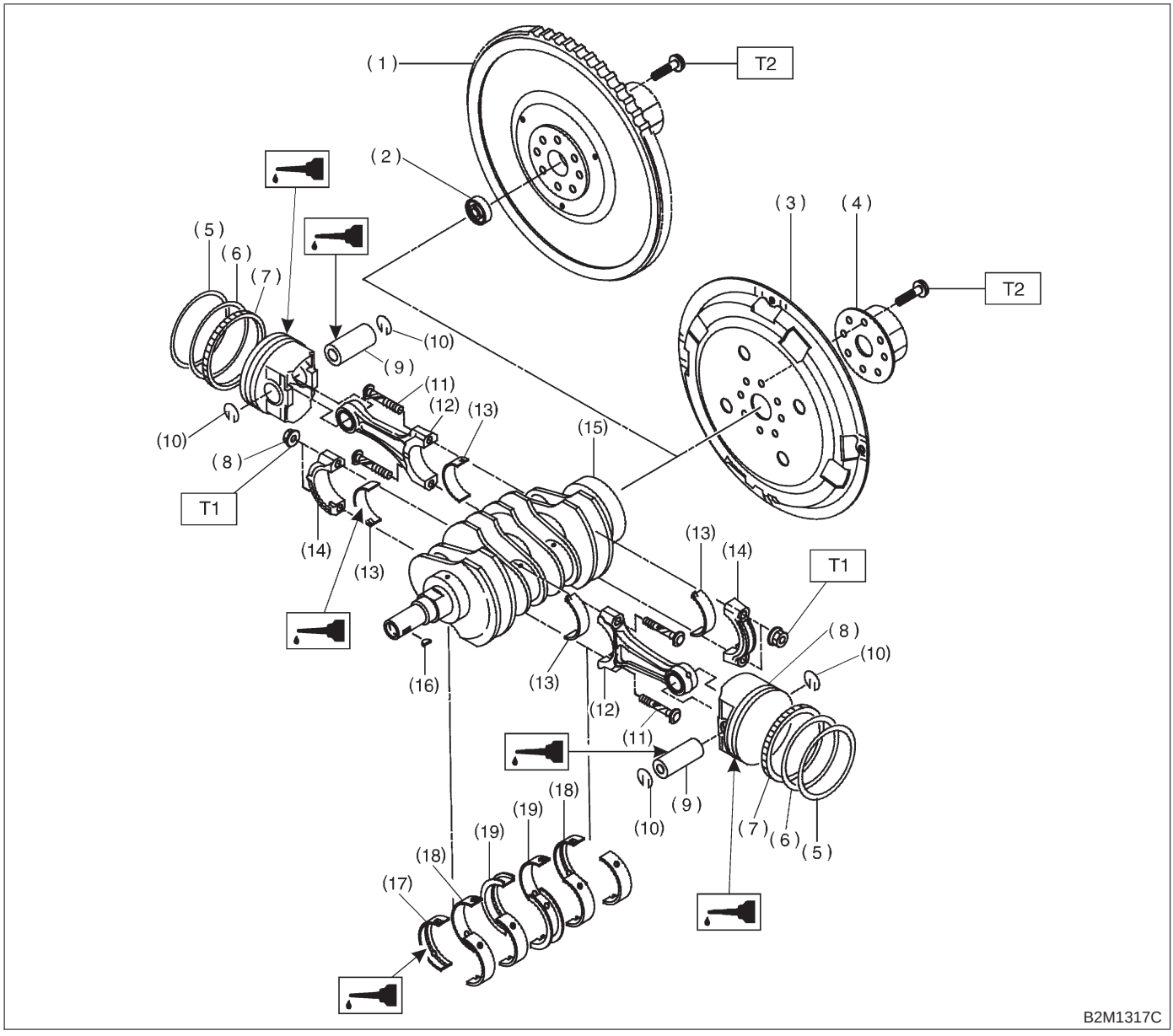
4. Cylinder Block



(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil sea
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil filter connector
(16) Oil strainer
(17) Gasket
(18) Oil pan
(19) Drain plug
(20) Metal gasket
(21) Oil level gauge guide

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 25±2 (2.5±0.2, 18.1±1.4)
T5: 47±3 (4.8±0.3, 34.7±2.2)
T6: 69±7 (7.0±0.7, 50.6±5.1)
T7: First 12±2 (1.2±0.2, 8.7±1.4)
Second 12±2 (1.2±0.2, 8.7±1.4)

5. Crankshaft and Piston



(1) Drive plate (AT)
(2) Reinforcement (AT)
(3) Flywheel (MT)
(4) Bell bearing (MT)
(5) Top ring
(6) Second ring
(7) Oil ring
(8) Piston
(9) Piston pin
(10) Circlip
(11) Connecting rod bolt
(12) Connecting rod
(13) Connecting rod bearing
(14) Connecting rod cap
(15) Crankshaft
(16) Woodruff key
(17) Crankshaft bearing #1, #5
(18) Crankshaft bearing #2, #4
(19) Crankshaft bearing #3

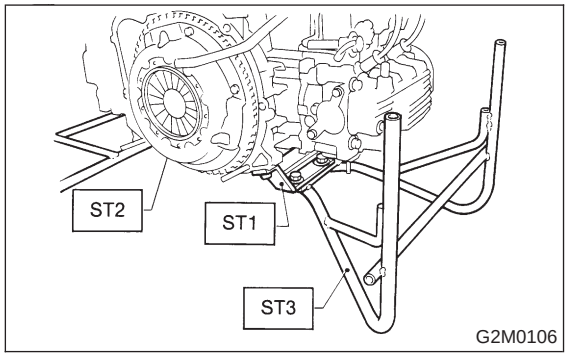
Tightening torque: N·m (kg-m, ft-lb)
T1: 44±2 (4.5±0.2, 32.5±1.4)
T2: 72±3 (7.3±0.3, 52.8±2.2)

1. Precautions

A: GENERAL PRECAUTIONS

1) Before disassembling engine, place it on ST3.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817000	ENGINE STAND

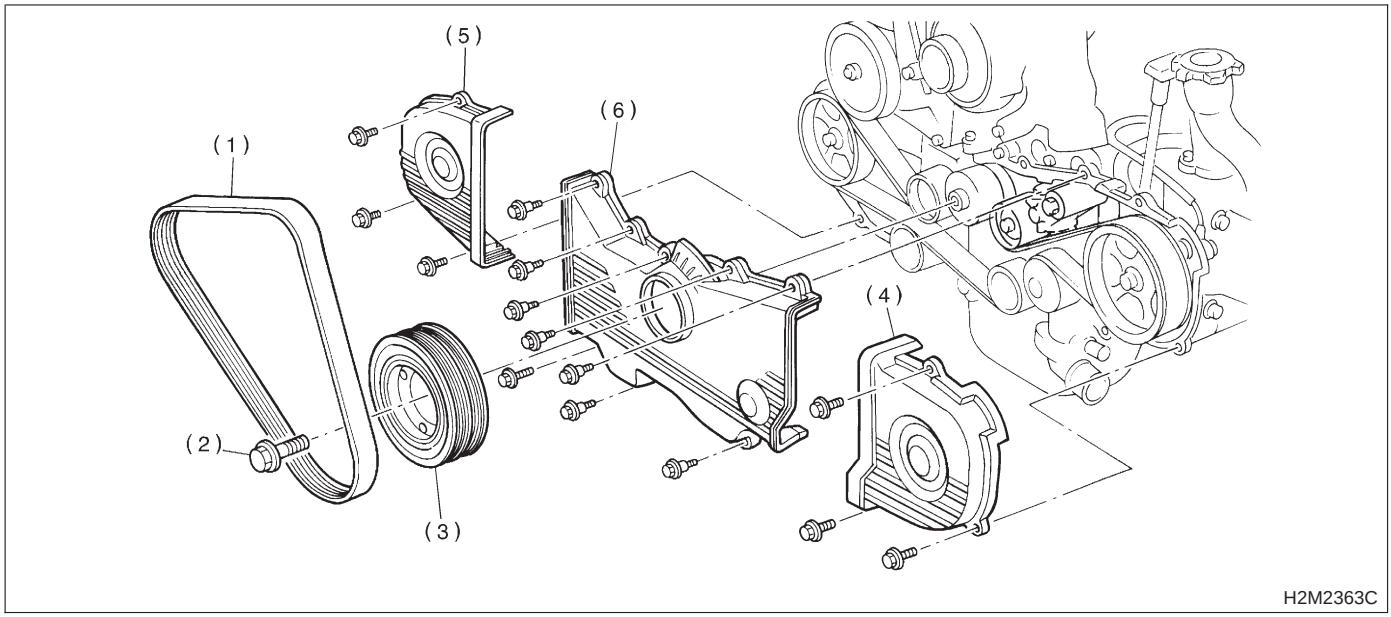


2) All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
3) Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
4) Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
5) All removed parts, if to be reused, should be reinstalled in the original positions and directions.
6) All removed parts, if to be reused, should be reinstalled in the original positions and directions.
7) Bolts, nuts and washers should be replaced with new ones as required.
8) Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.

2. Timing Belt

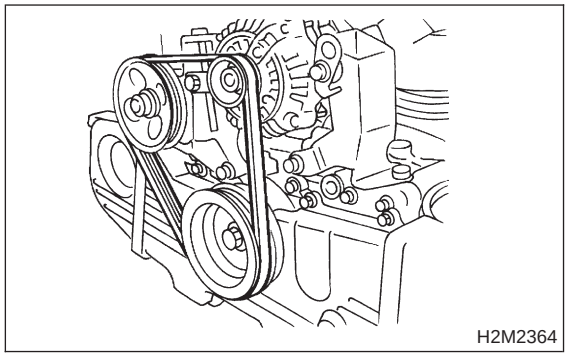
A: REMOVAL

1. CRANKSHAFT PULLEY AND BELT COVER



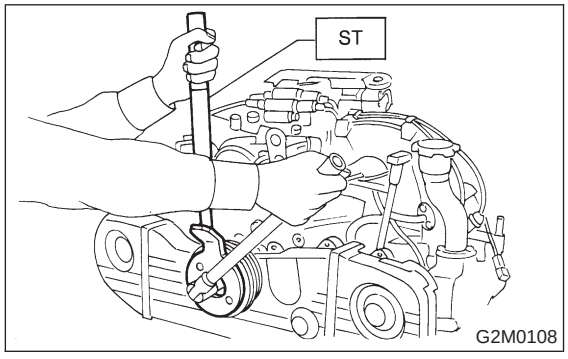
(1) V-belt
(2) Crankshaft pulley bolt
(3) Crankshaft Pulley
(4) Belt cover (LH)
(5) Belt cover (RH)
(6) Front belt cover

1) Remove V-belt and A/C belt tensioner.

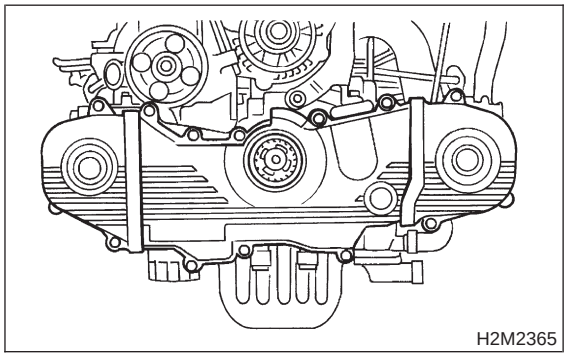


2) Remove crankshaft pulley bolt. To lock crankshaft use ST.

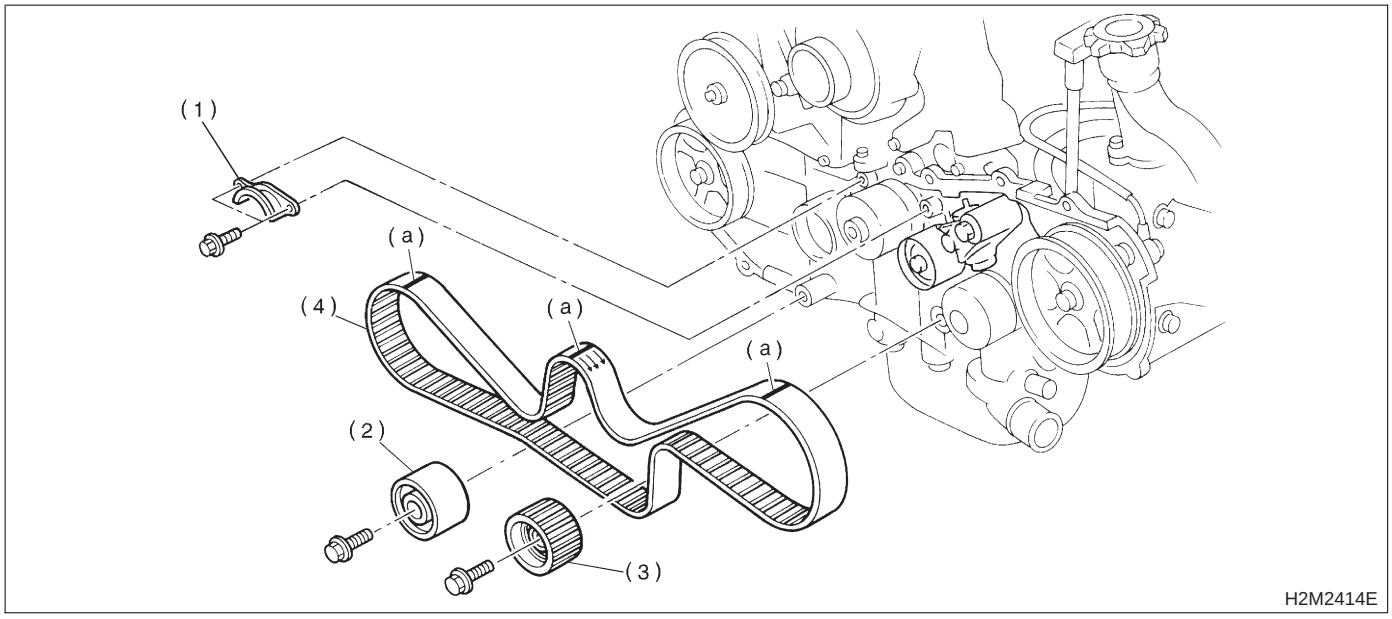
ST 499977000 CRANKSHAFT PULLEY WRENCH



3) Remove crankshaft pulley.
4) Remove belt cover (LH).
5) Remove belt cover (RH).
6) Remove front belt cover.

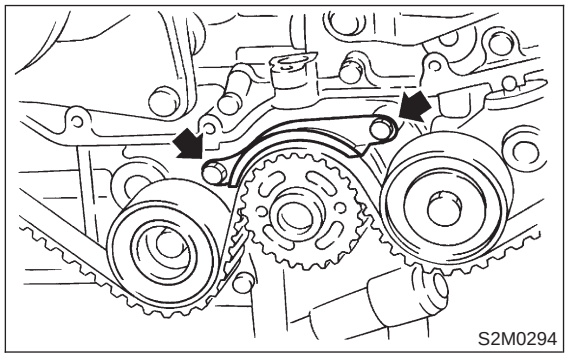


2. TIMING BELT

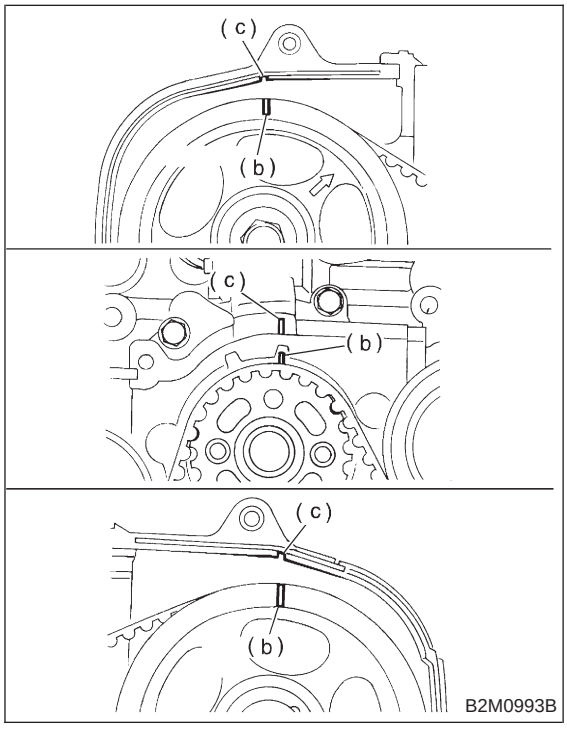


(a) Alignment mark
(1) Timing belt guide (MT vehicles only)
(2) Belt idler (No. 2)
(3) Belt idler No. 2
(4) Timing belt

1) Remove timing belt guide. (MT vehicles only)

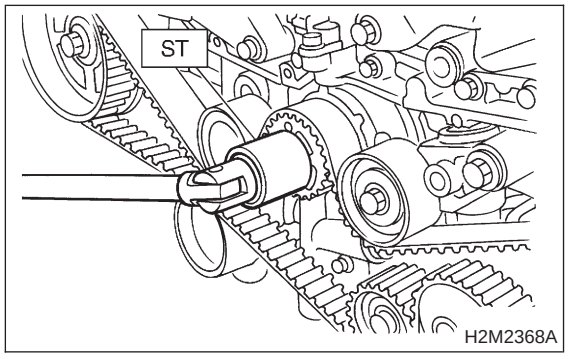


2) If alignment mark (a) and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as shown in Figure:

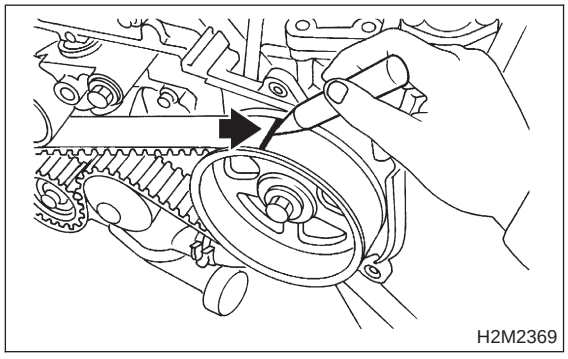


(1) Turn crankshaft using ST, and align alignment marks (c) on crankshaft sprocket, and left and right camshaft sprockets with notches (c) of belt cover and cylinder block.

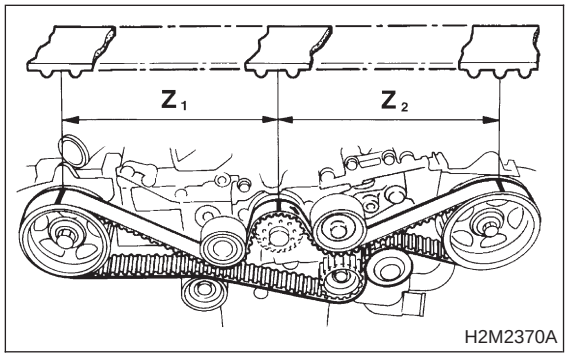
ST 499987500 CRANKSHAFT SOCKET



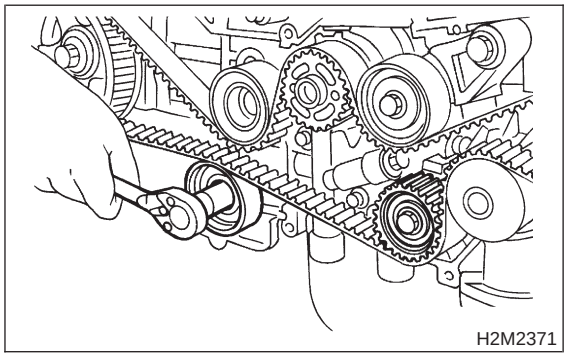
(2) Using white paint, put alignment and/or arrow marks on timing belts in relation to the sprockets.



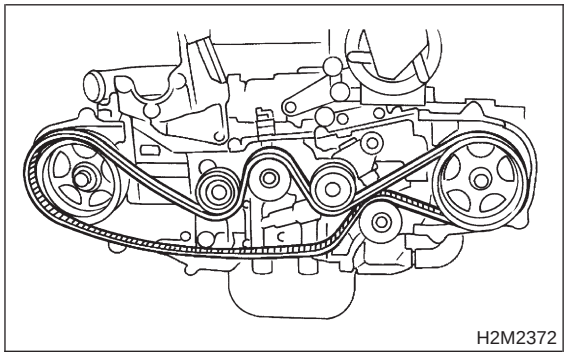
Specified data:
Z_1: 44 tooth length
Z_2: 40.5 tooth



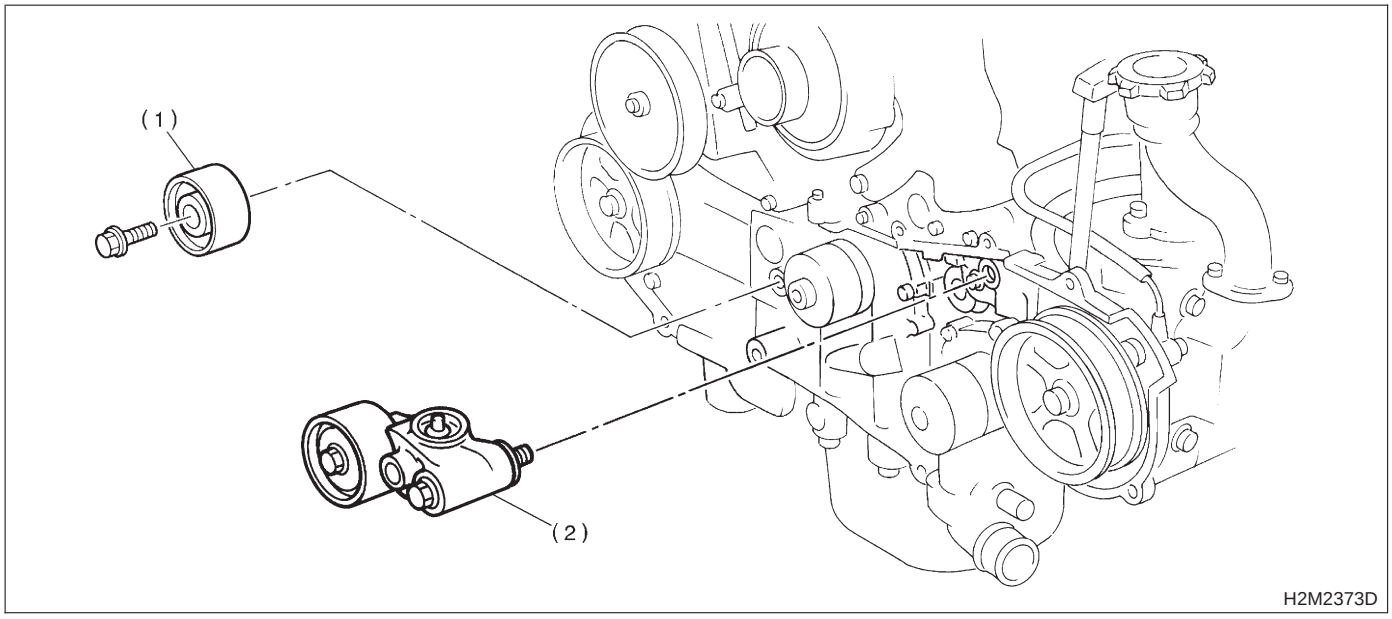
3) Remove belt idler (No. 2).
4) Remove belt idler No. 2.



5) Remove timing belt.

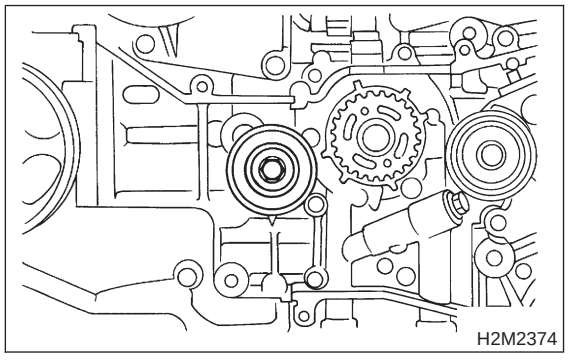


3. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY

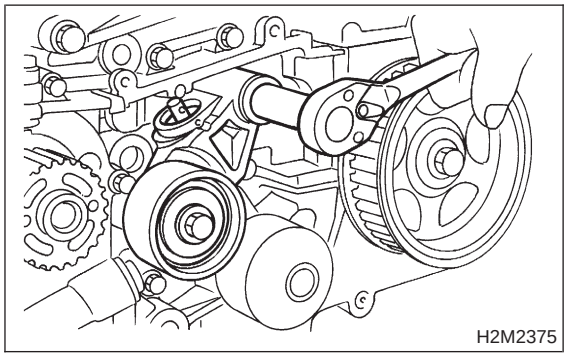


(1) Belt idler (No. 1)
(2) Automatic belt tension adjuster ASSY

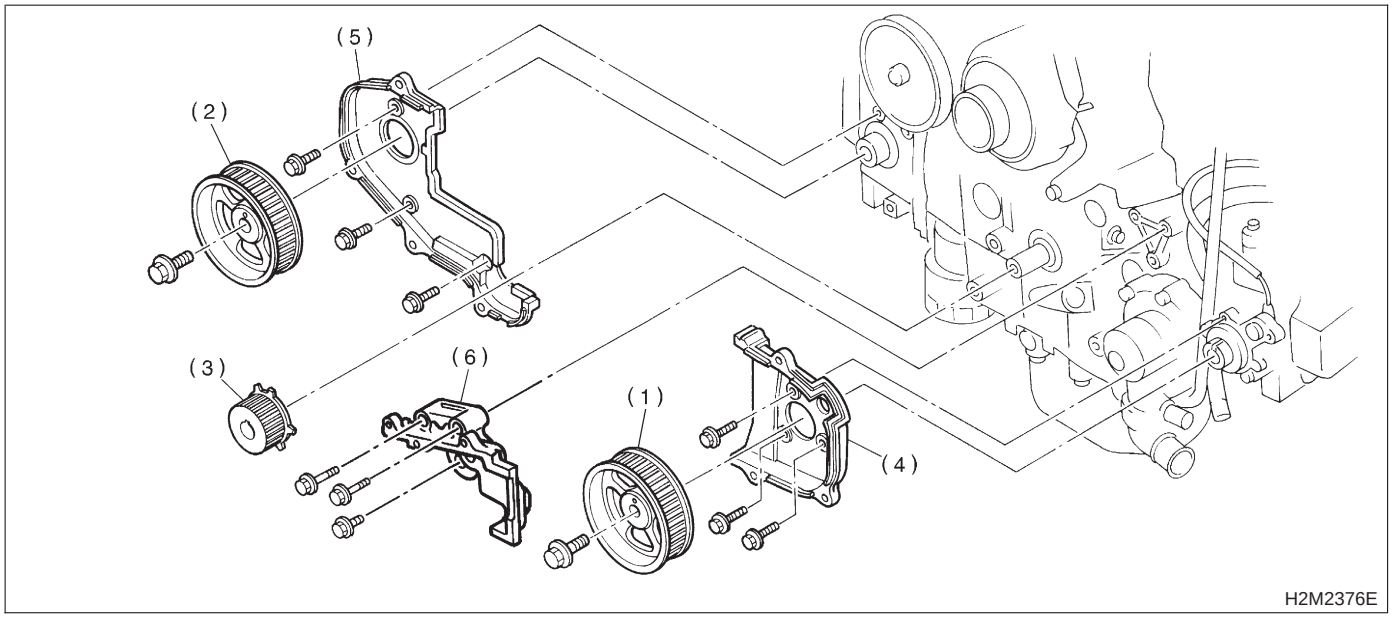
1) Remove belt idler (No. 1).



2) Remove automatic belt tension adjuster assembly.

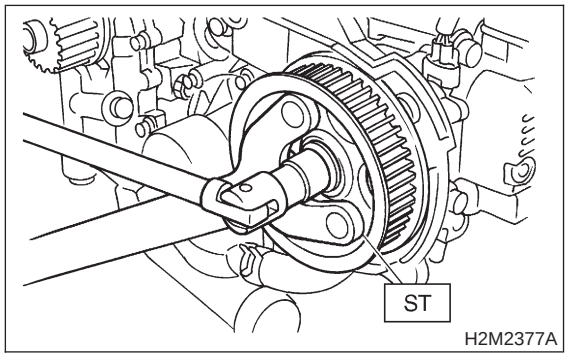


4. CAMSHAFT AND CRANKSHAFT SPROCKET

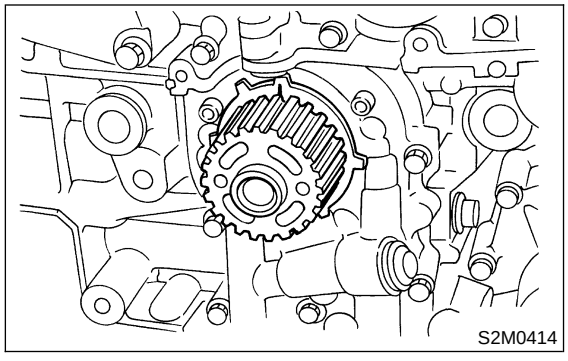


(1) Camshaft sprocket No. 2
(2) Camshaft sprocket No. 1
(3) Crankshaft sprocket
(4) Belt cover No. 2 (LH)
(5) Belt cover No. 2 (RH)
(6) Tensioner bracket

1) Remove camshaft sprocket No. 1 and No. 2. To lock camshaft use ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH

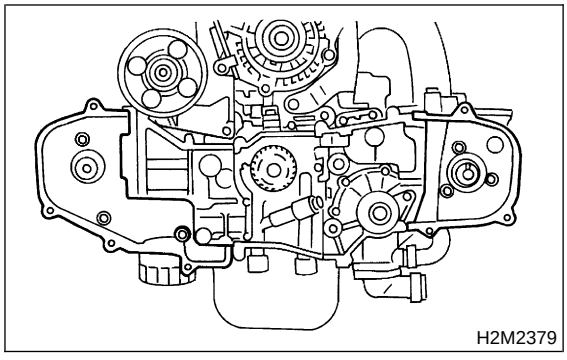


2) Remove crankshaft sprocket.

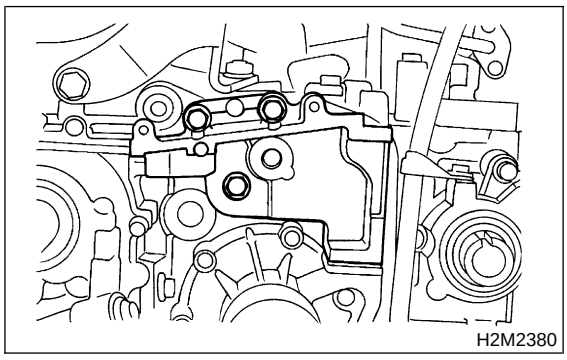


3) Remove belt cover No. 2 (LH).
4) Remove belt cover No. 2 (RH).

CAUTION:
Do not damage or lose the seal rubber when removing belt covers.



5) Remove tensioner bracket.



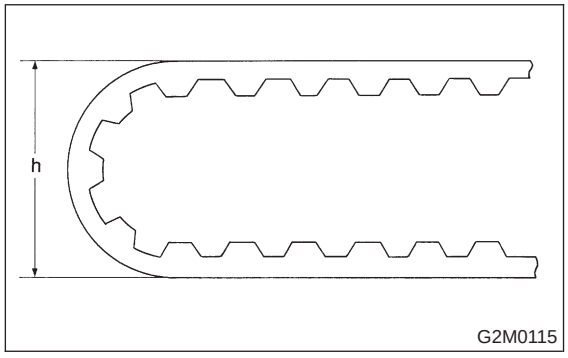
B: INSPECTION

1. TIMING BELT

1) Check timing belt teeth for breaks, cracks, and wear. If any fault is found, replace belt.
2) Check the condition of back side of belt; if any crack is found, replace belt.

CAUTION:
● Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
● Do not bend the belt sharply.

Bending radius: h
60 mm (2.36 in) or more



2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace faulty parts.

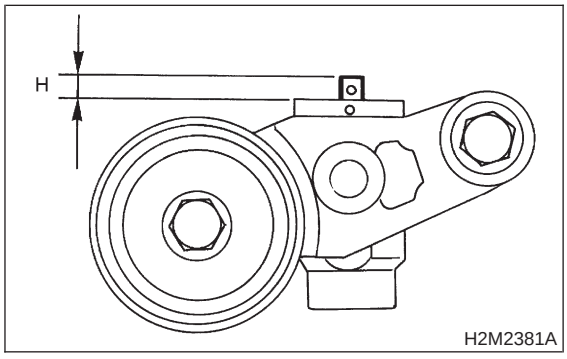
CAUTION:
Slight traces of oil at rod's oil seal does not indicate a problem.

2) Check that the adjuster rod does not move when a pressure of 294 N (30 kg, 66 lb) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kg, 66 lb), check it using the following procedures:
(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this motion 2 or 3 times.
(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kg, 66 lb) to it. Check adjuster rod stiffness.
(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
● Always use a vertical type pressing tool to move the adjuster rod down.
● Do not use a lateral type vise.
● Push adjuster rod vertically.
● Press-in the push adjuster rod gradually taking more than three minutes.
● Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).
● Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.

4) Measure the extension of rod beyond the body. If it is not within specifications, replace with a new one.

Rod extension: H
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace automatic belt tension adjuster assembly if faulty.
2) Check tension pulley for smooth rotation. Replace if noise or excessive play is noted.
3) Check tension pulley for grease leakage.

4. BELT IDLER

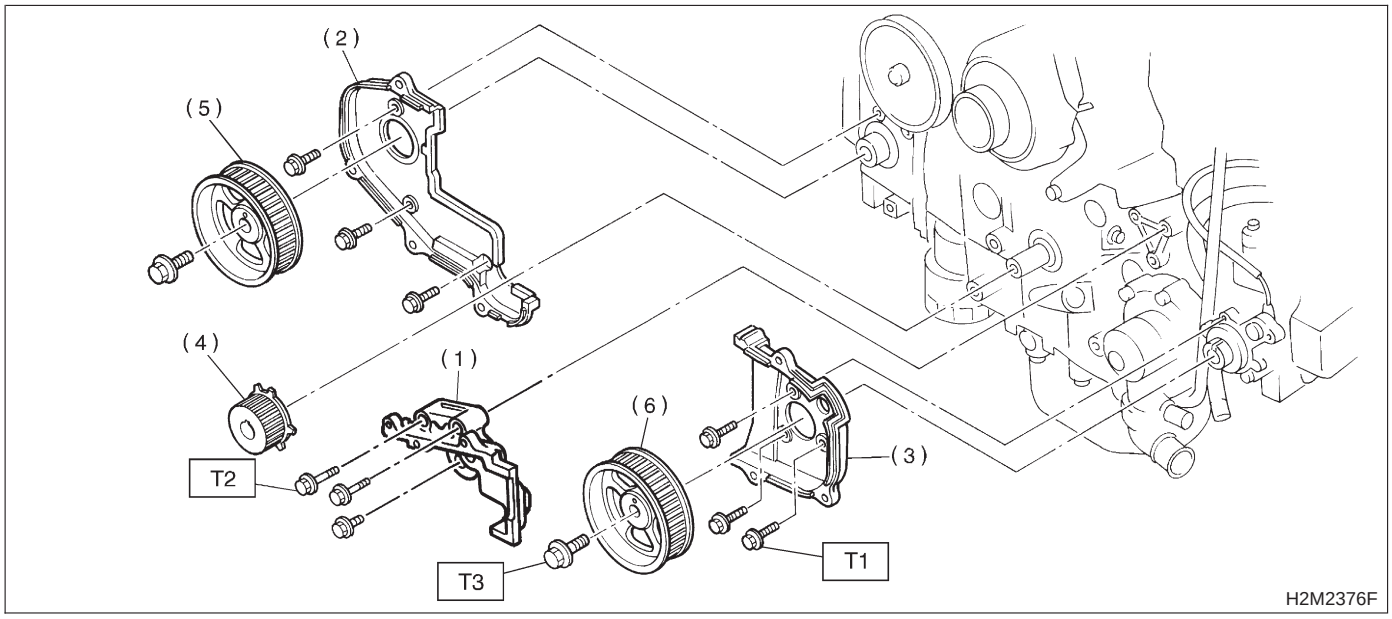
1) Check belt idler for smooth rotation. Replace if noise or excessive play is noted.
2) Check belt outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check belt idler for grease leakage.

5. CAMSHAFT AND CRANKSHAFT SPROCKET

1) Check sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

C: INSTALLATION

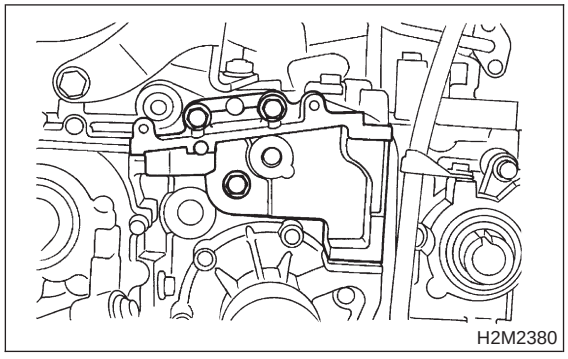
1. CAMSHAFT AND CRANKSHAFT SPROCKET



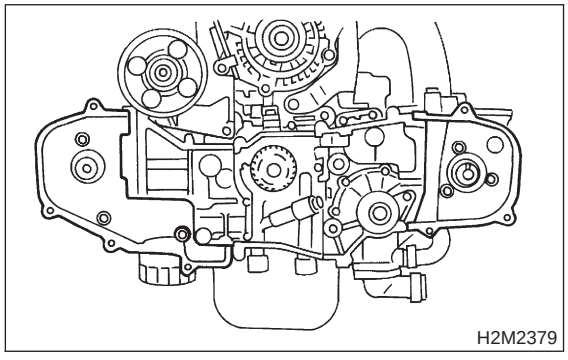
(1) Tensioner bracket
(2) Belt cover No. 2 (RH)
(3) Belt cover No. 2 (LH)
(4) Crankshaft sprocket
(5) Camshaft sprocket No. 1
(6) Camshaft sprocket No. 2

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 25±3 (2.5±0.3, 18.1±2.2)
T3: 78±5 (8.0±0.5, 57.9±3.6)

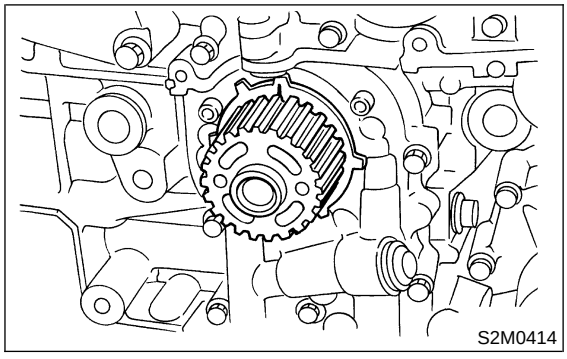
1) Install tensioner bracket.



2) Install belt cover No. 2 (RH).
3) Install belt cover No. 2 (LH).

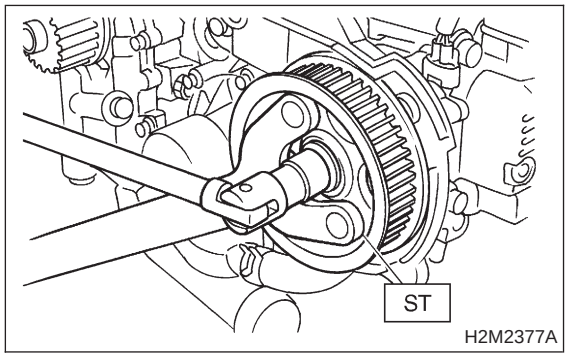


4) Install crankshaft sprocket.

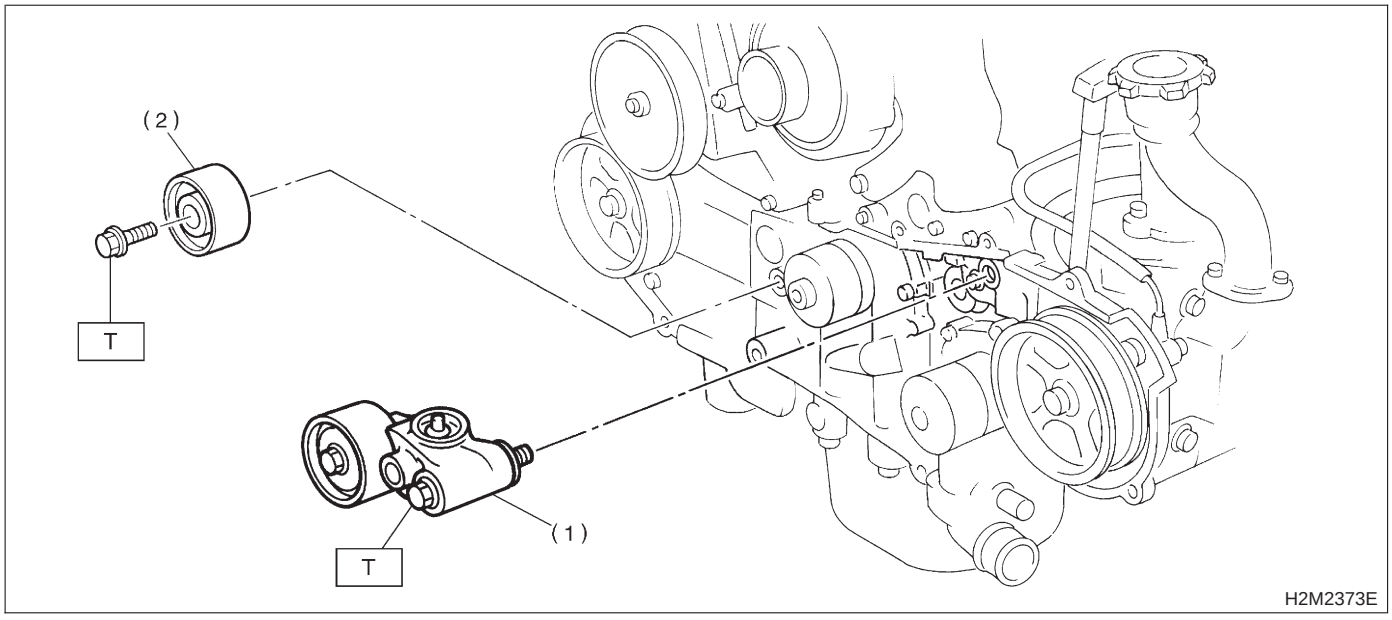


5) Install camshaft sprocket No. 1 and camshaft sprocket No. 2. To lock camshaft use ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH

CAUTION:
Do not confuse left and right side camshaft sprockets during installation. The camshaft sprocket No. 2 is identified by a projection used to monitor camshaft position sensor.



2. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER



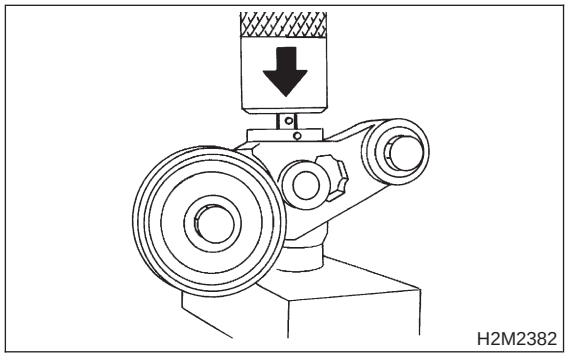
(1) Automatic belt tension adjuster ASSY
(2) Belt idler (No. 1)

Tightening torque: N·m (kg-m, ft-lb)
T: 39±4 (4.0±0.4, 28.9±2.9)

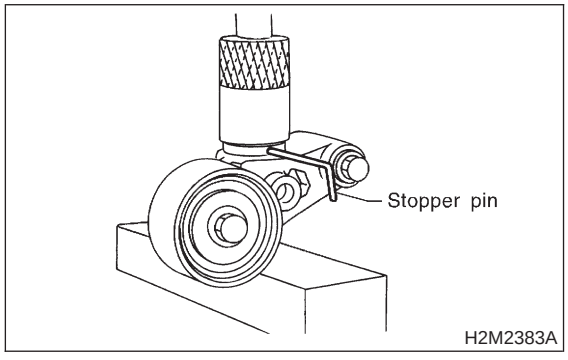
1) Preparation for installation of automatic belt tension adjuster assembly;

CAUTION:
- **Always use a vertical type pressing tool to move the adjuster rod down.**
- **Do not use a lateral type vise.**
- **Push adjuster rod vertically.**
- **Be sure to slowly move the adjuster rod down applying a pressure of 294 N (30 kg, 66 lb).**
- **Press-in the push adjuster rod gradually taking more than three minutes.**
- **Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).**
- **Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.**
- **Do not release press pressure until stopper pin is completely inserted.**

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.
(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kg, 66 lb) until the adjuster rod is aligned with the stopper pin hole in the cylinder.

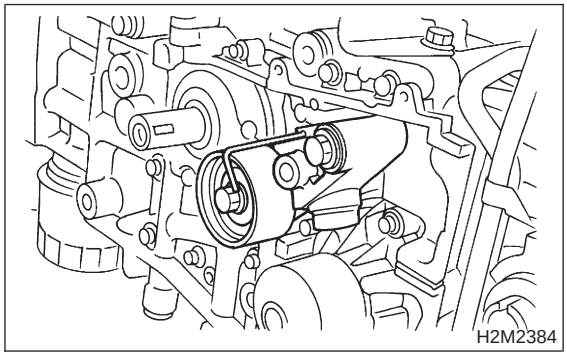

H2M2382

(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.

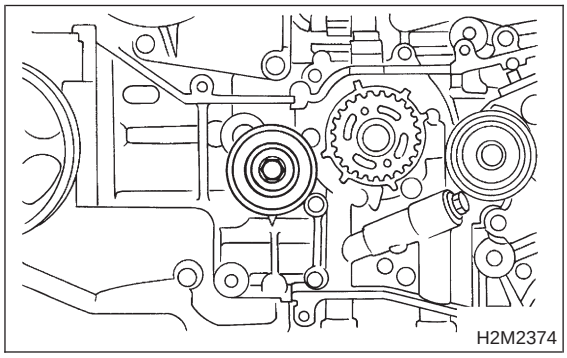


H2M2383A

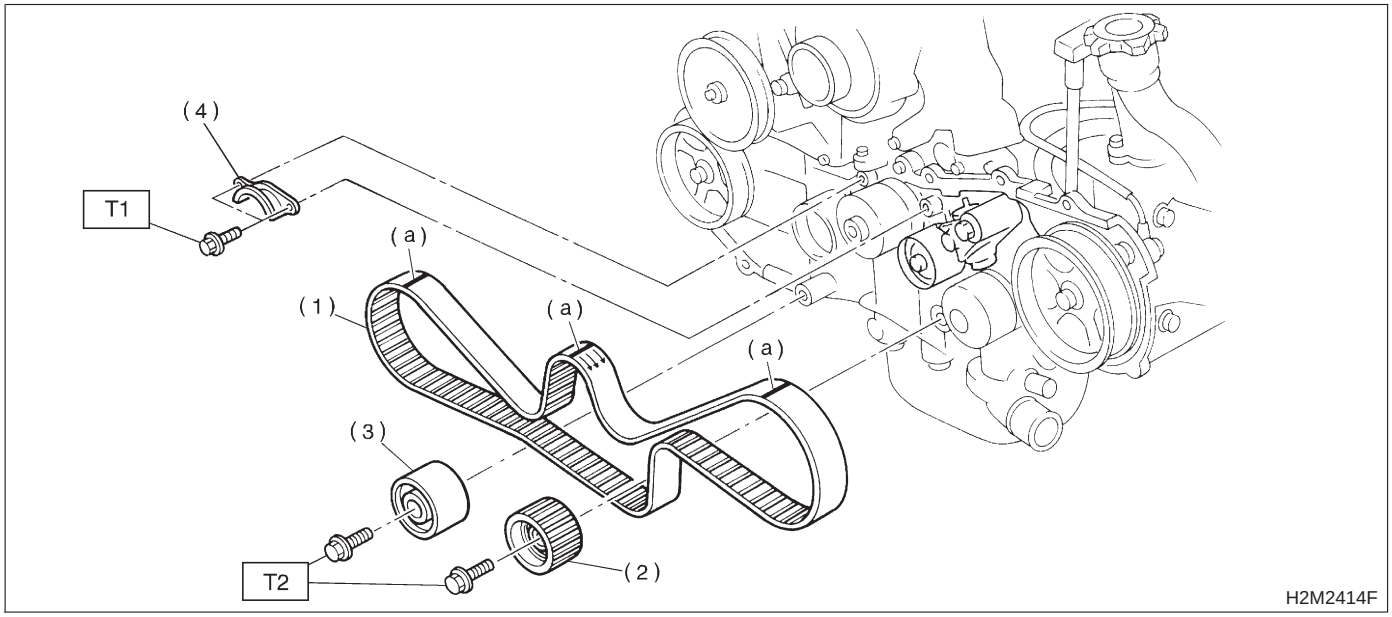
2) Install automatic belt tension adjuster assembly.


H2M2384

3) Install belt idler (No. 1).


H2M2374

3. TIMING BELT

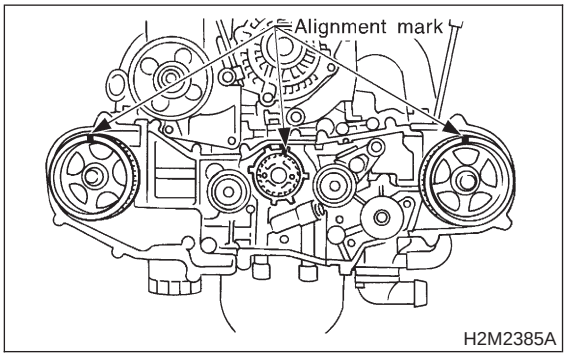


(a) Alignment mark
(1) Timing belt
(2) Belt idler No. 2
(3) Belt idler (No. 2)
(4) Timing belt guide (MT vehicles only)

Tightening torque: N·m (kg-m, ft-lb)
T1: 9.8±1.0 (1.0±0.1, 7.2±0.7)
T2: 39±4 (4.0±0.4, 28.9±2.9)

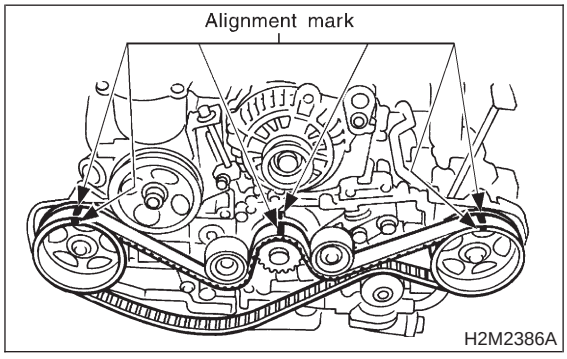
1) Installation of timing belt
(1) Using ST, turn left and right camshaft sprockets so that their alignment marks come to top positions.

ST 499207100 CAMSHAFT SPROCKET WRENCH

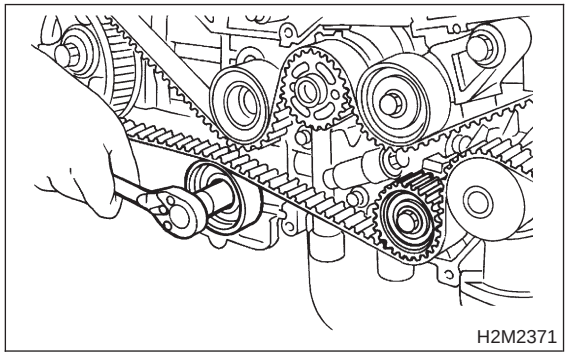


(2) While aligning alignment mark on timing belt with marks on sprockets, position timing belt properly.

CAUTION:
Ensure belt's rotating direction is correct.

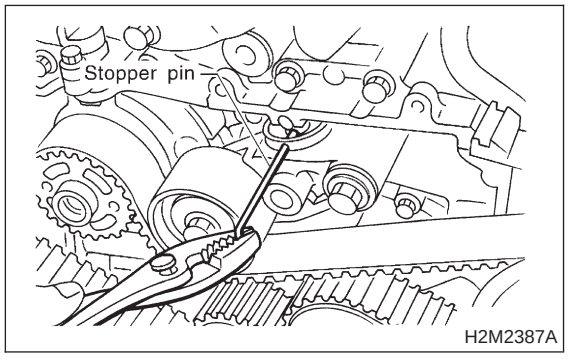


2) Install belt idler No. 2.
3) Install belt idler (No. 2).

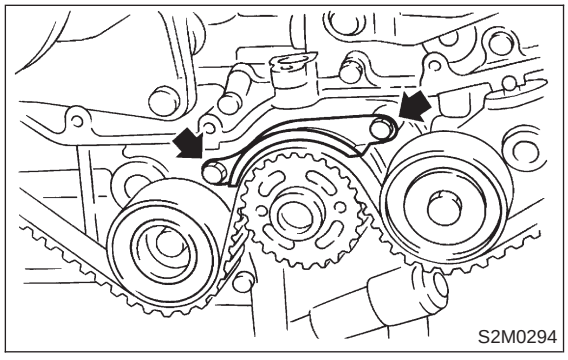


4) After ensuring that the marks on timing belt and camshaft sprockets are aligned, remove stopper pin from belt tensioner adjuster.

CAUTION:
After properly installing timing belt, remove rocker cover and ensure that the valve lash adjuster contains no air.

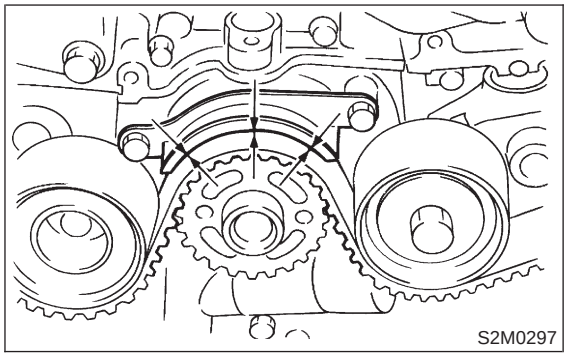


5) Install timing belt guide. (MT vehicles only)
(1) Temporarily tighten remaining bolts.

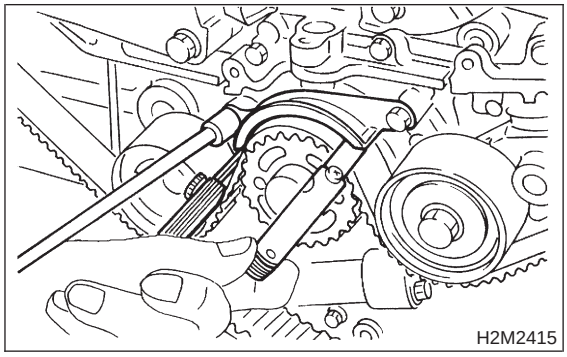


(2) Check and adjust clearance between timing belt and timing belt guide.

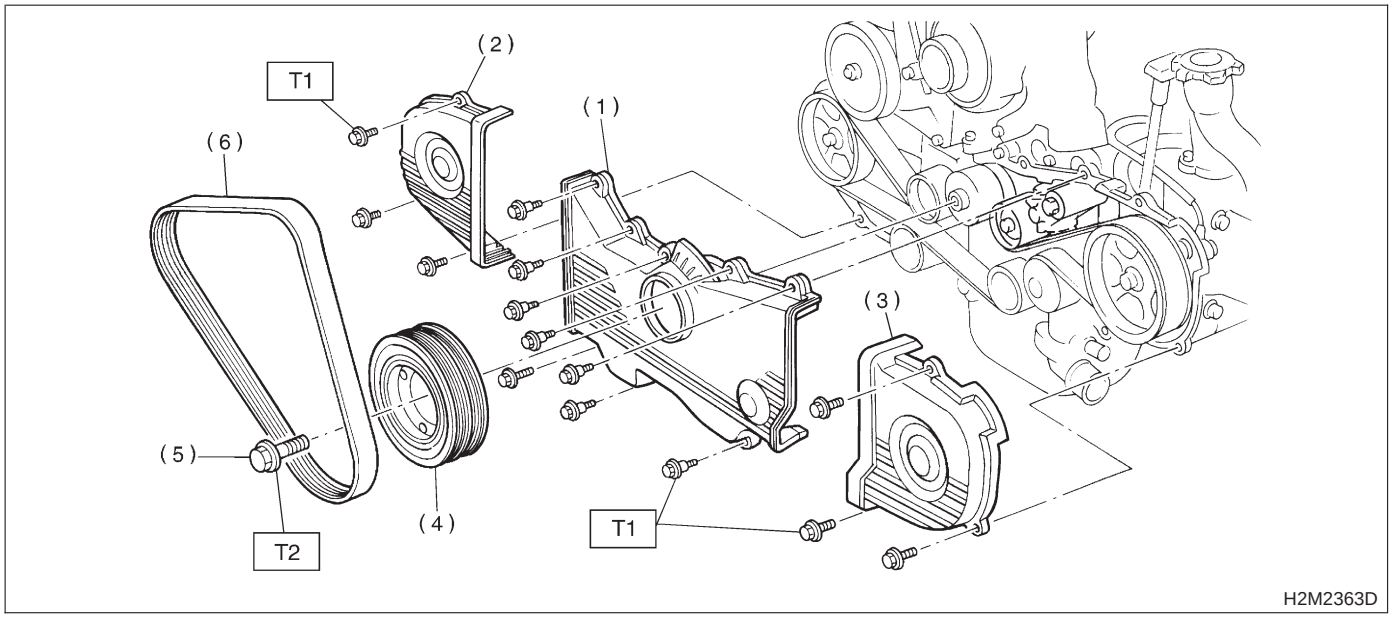
Clearance:
1.0±0.5 mm (0.039±0.020 in)



(3) Tighten remaining bolts.



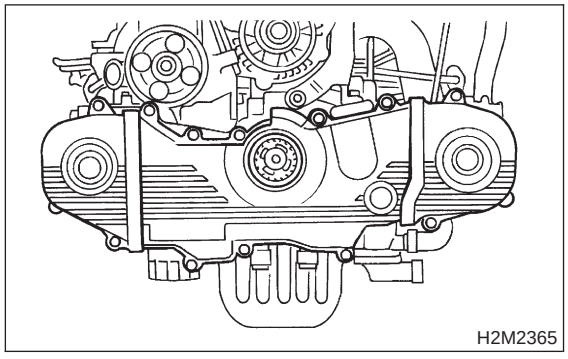
4. CRANKSHAFT PULLEY AND BELT COVER



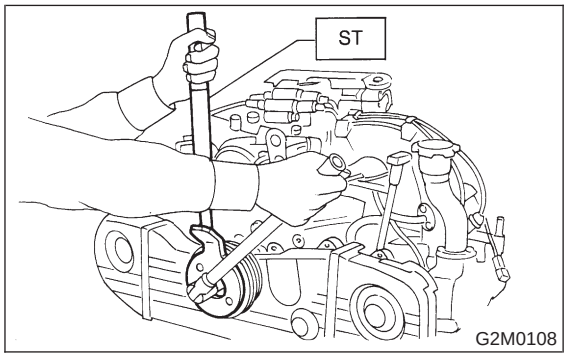
(1) Front belt cover
(2) Belt cover (RH)
(3) Belt cover (LH)
(4) Crankshaft pulley
(5) Crankshaft pulley bolt
(6) V-belt

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 127^{+10}_{-5} ($13.0^{+1.0}_{-0.5}$, $94^{+7.2}_{-3.6}$)

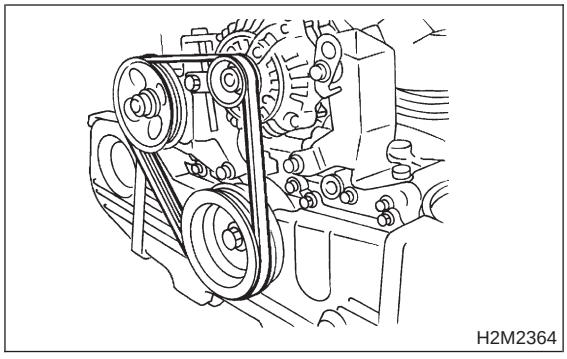
1) Install front belt cover.
2) Install belt cover (RH).
3) Install belt cover (LH).



4) Install crankshaft pulley.
5) Install pulley bolt.
To lock crankshaft, use ST.
ST 499977000 CRANKSHAFT PULLEY WRENCH

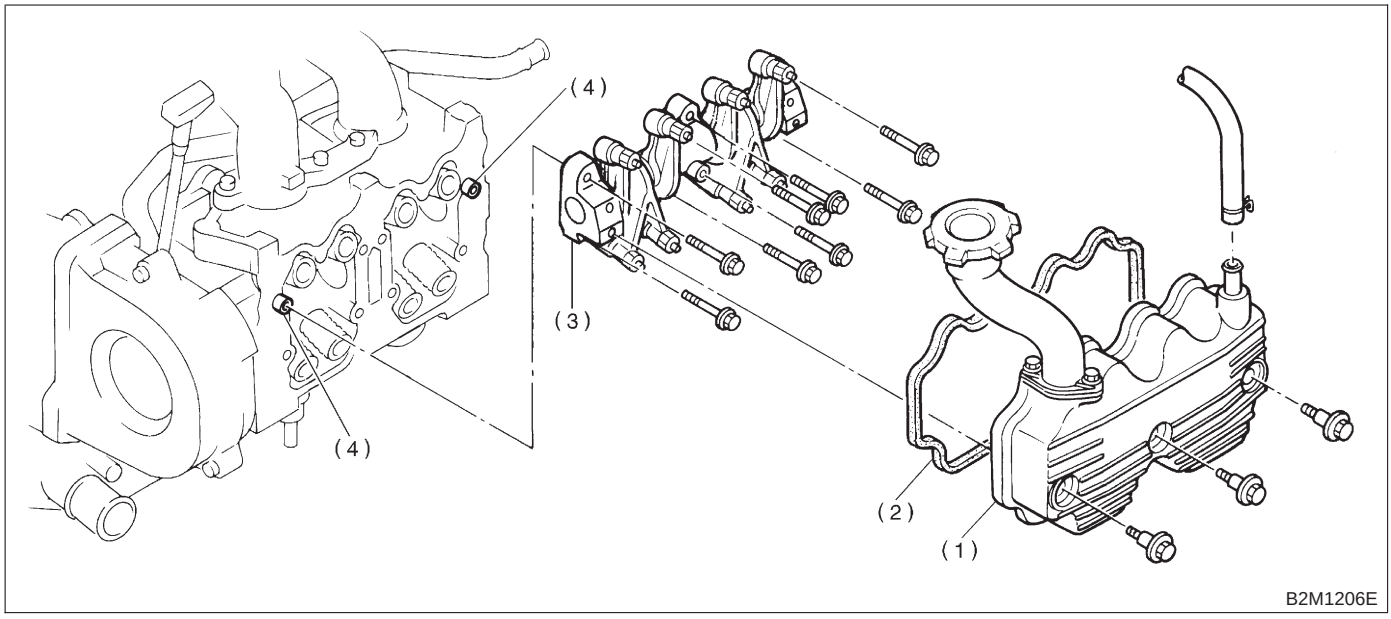


6) Install V-belt.



3. Valve Rocker Assembly

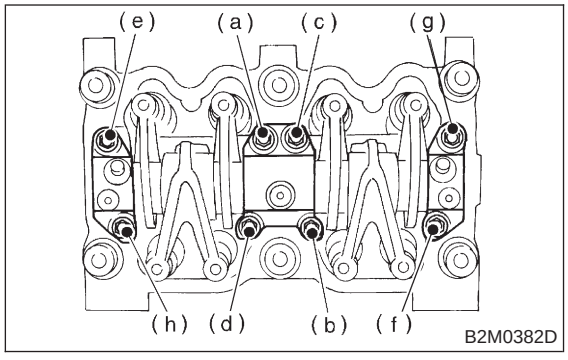
A: REMOVAL



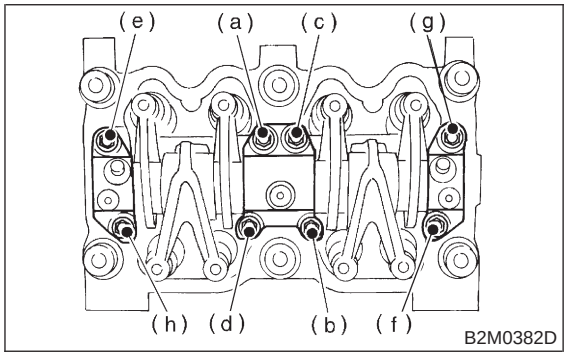
(1) Rocker cover
(2) Rocker cover gasket
(3) Valve rocker ASSY
(4) Knock pin

1) Disconnect PCV hose and remove rocker cover.
2) Removal of valve rocker assembly
(1) Remove bolts (a) through (b) in alpfabetical sequence.

CAUTION:
Leave two or three threads of bolt (a) engaged to retain valve rocker assembly.

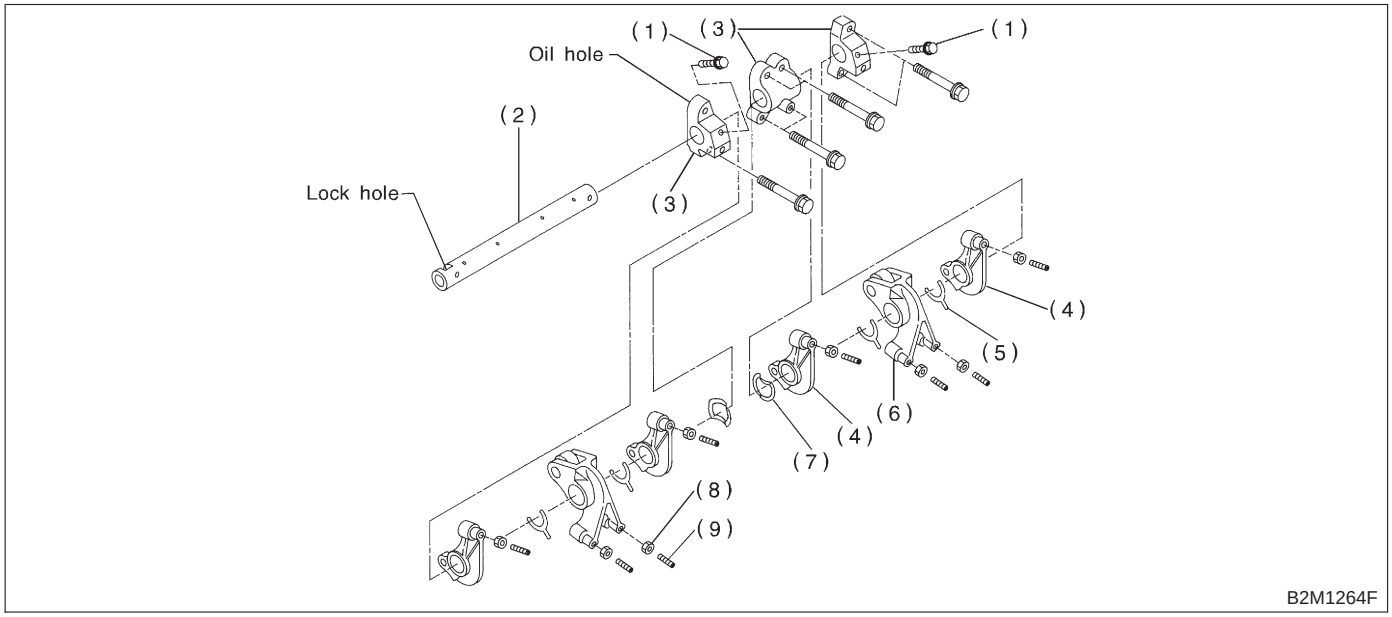


(2) Equally loosen bolts (e) through (h) all the way, being careful that knock pin is not gouged.



(3) Remove valve rocker assembly.

B: DISASSEMBLY



(1) Bolt
(2) Rocker shaft
(3) Rocker shaft support
(4) Intake valve rocker arm
(5) Plate
(6) Exhaust valve rocker arm
(7) Spring
(8) Valve rocker nut
(9) Valve rocker adjust screw

1) Remove bolts which secure rocker shaft.
2) Extract rocker shaft. Remove valve rocker arms, springs, plates and shaft supports from rocker shaft.

CAUTION:
Arrange all removed parts in order so that they can be installed in their original positions.

3) Remove nut and adjuster screw from valve rocker.

C: INSPECTION

1. VALVE ROCKER ARM

1) Measure inside diameter of valve rocker arm and outside diameter of valve rocker shaft, and determine the difference between the two (= oil clearance).

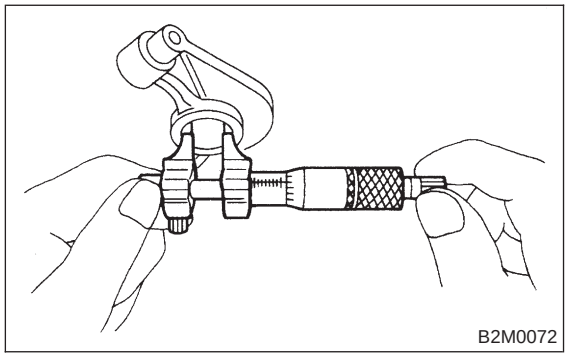
Clearance between arm and shaft:
Standard
0.020 — 0.054 mm (0.0008 — 0.0021 in)
Limit
0.10 mm (0.0039 in)

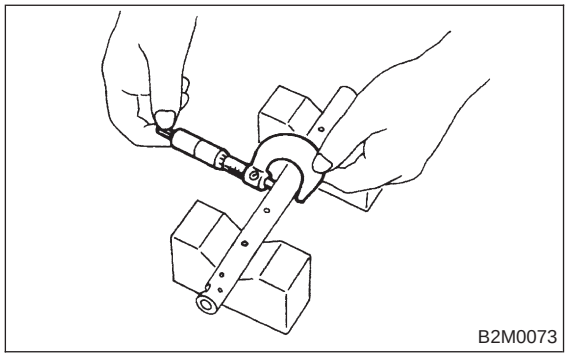
● If oil clearance exceeds specifications, replace valve rocker arm or shaft.

NOTE:
Replace valve rocker arm or shaft, whichever shows greater amount of wear.

Rocker arm inside diameter:
22.020 — 22.041 mm (0.8669 — 0.8678 in)

Rocker shaft diameter:
21.987 — 22.000 mm (0.8656 — 0.8661 in)


B2M0072


B2M0073

2) Measure inside diameter of rocker shaft support and outside diameter of valve rocker shaft, and determine the difference between the two (= oil clearance).

Clearance between support and shaft:
Standard
0.005 — 0.039 mm (0.0002 — 0.0015 in)
Limit
0.05 mm (0.0020 in)

● If oil clearance exceeds specifications, replace rocker shaft support or shaft.

NOTE:
Replace rocker shaft support or shaft, whichever shows greater amount of wear.

Rocker shaft support inside diameter:
22.005 — 22.026 mm (0.8663 — 0.8672 in)

Rocker shaft diameter:
21.987 — 22.000 mm (0.8656 — 0.8661 in)

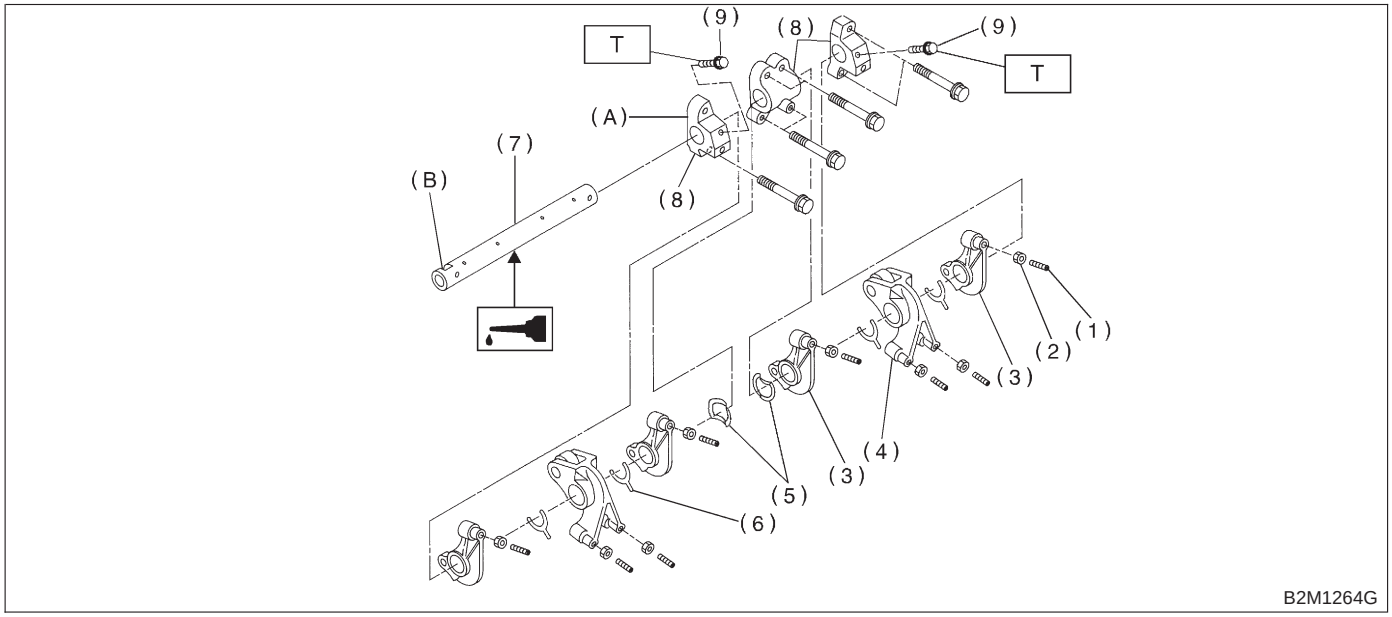
3) If cam or valve contact surface of valve rocker arm is worn or dented excessively, replace valve rocker arm.
4) Check that valve rocker arm roller rotates smoothly. If not, replace valve rocker arm.

2. VALVE ROCKER SHAFT

Visually check oil relief valve of shaft end for any of the following abnormalities.
● Breaks in check ball body
● Foreign particles caught in valve spring
● Oil leakage at check ball

CAUTION:
Repair or replace valve rocker shaft as necessary.

D: ASSEMBLY



(1) Valve rocker adjust screw
(2) Valve rocker nut
(3) Intake valve rocker arm
(4) Exhaust valve roker arm
(5) Spring
(6) Plate
(7) Rocker shaft
(8) Rocker shaft support
(9) Bolt
(A) Oil hole
(B) Lock hole

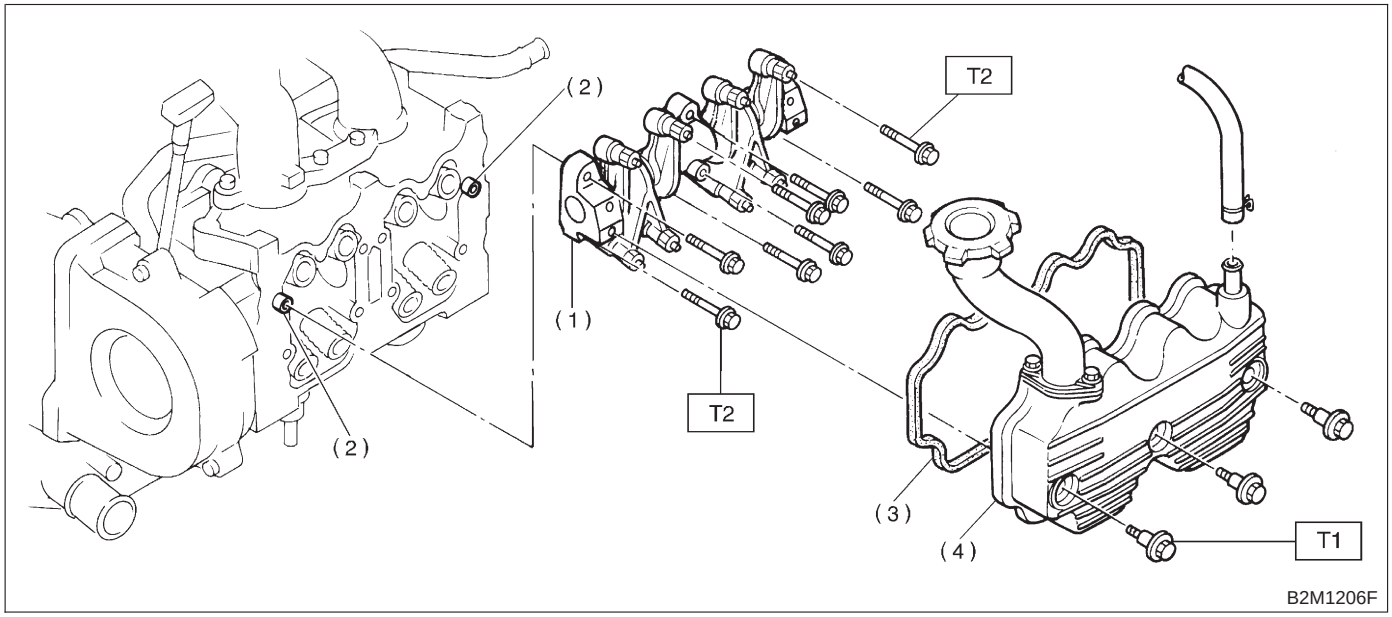
Tightening torque: N·m (kg-m, ft-lb)
T: 5±1 (0.5±0.1, 3.6±0.7)

1) Install adjuster screw and nut to valve rocker.
2) Arrange valve rocker arms, springs and shaft supports in assembly order and insert valve rocker shaft. Ensure that cutout portion of rocker shaft faces oil holes (A) in shaft supports.

CAUTION:
Valve rocker arms, rocker shaft and shaft supports have identification marks. Ensure parts with same markings are properly assembled.

3) Install valve rocker shaft securing bolts while aligning shaft “lock” holes (B) with bolts.

E: INSTALLATION



(1) Valve rocker ASSY
(2) Knock pin
(3) Rocker cover gasket
(4) Rocker cover

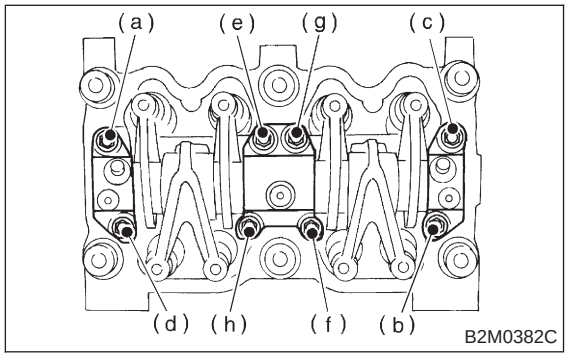
Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 12±1 (1.2±0.1, 8.7±0.7)

1) Installation of valve rocker assembly
(1) Temporarily tighten bolts (a) through (d) equally as shown in Figure.

CAUTION:
Do not allow valve rocker assembly to gouge knock pins.

(2) Tighten bolts (e) through (h) to specified torque.
(3) Tighten bolts (a) through (d) to specified torque.

Tightening torque:
12±1N·m (1.2±0.1kg-m, 8.7±0.7ft-lb)



2) Adjust the valve clearances. <Ref. to 2-2 [W7B1].>
3) Install rocker cover and connect PCV hose.

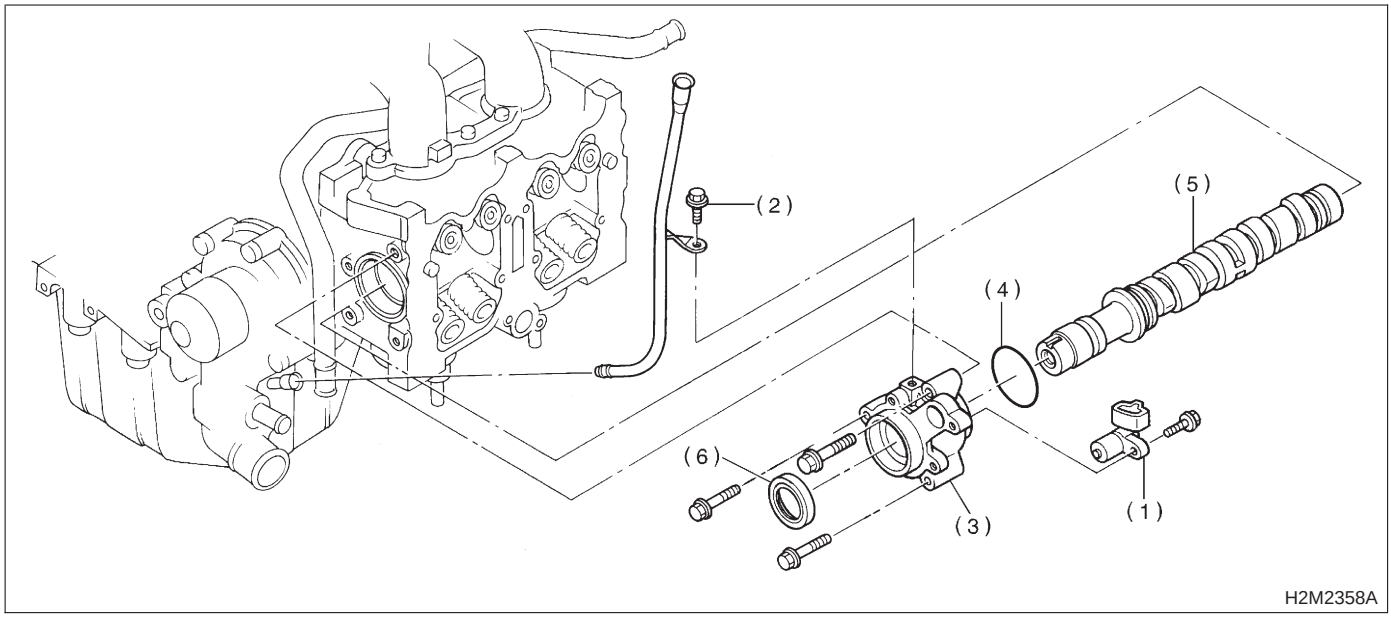
4. Camshaft

A: REMOVAL

1. RELATED PARTS

1) Remove timing belt, camshaft sprockets and related parts. <Ref. to 2-3a [W2A0].>

2. CAMSHAFT (LH)



(1) Camshaft position sensor
(2) Bolt
(3) Camshaft support (LH)
(4) O-ring
(5) Camshaft (LH)
(6) Oil seal

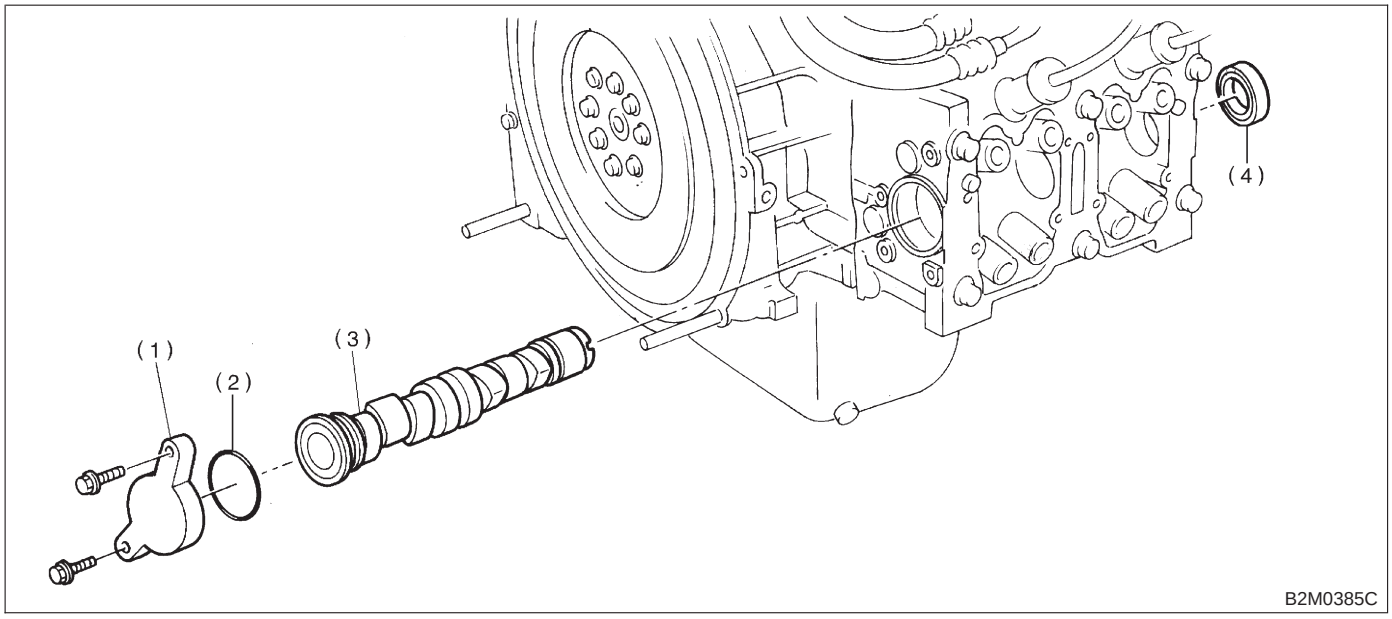
1) Remove camshaft position sensor.

CAUTION:
Do not damage the camshaft position sensor.

2) Remove oil level gauge guide attaching bolt.
3) Remove camshaft support (LH).
4) Remove camshaft support LH.Remove O-ring.
2) Remove valve rocker assembly. <Ref. to 2-3a [W3A0].>
5) Remove camshaft (LH).
6) Remove oil seal.

CAUTION:
- **Do not remove oil seal unless necessary.**
- **Do not scratch journal surface when removing oil seal.**

3. CAMSHAFT (RH)



(1) Camshaft support (RH)
(2) O-ring
(3) Camshaft (RH)
(4) Oil seal

1) Remove camshaft support (RH).
2) Remove O-ring.
3) Remove camshaft (RH).
4) Remove oil seal.

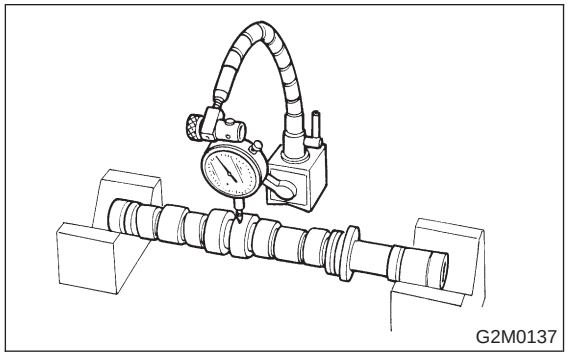
CAUTION:
- **Do not remove oil seal unless necessary.**
- **Do not scratch journal surface when removing oil seal.**

B: INSPECTION

1. CAMSHAFT

1) Measure the bend, and repair or replace if necessary.

Limit:
0.025 mm (0.0010 in)



2) Check journal for damage and wear. Replace if faulty.
3) Measure outside diameter of camshaft journal and inside diameter of cylinder head journal, and determine the difference between the two (= oil clearance). If oil clearance exceeds specifications, replace camshaft or cylinder head as necessary.

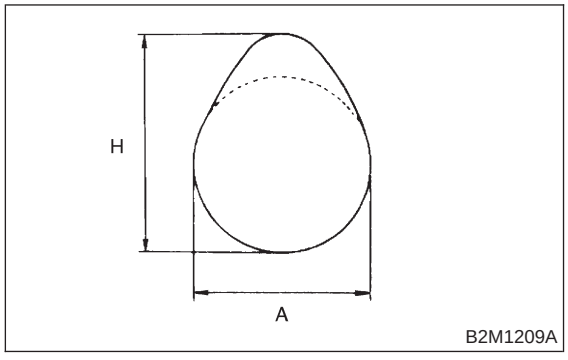
Unit: mm (in)

Item				
	Right-hand camshaft	Front	Center	Rear
	Left-hand camshaft	Rear	Center	Front
Clearance at journal	Standard	0.055 — 0.090 (0.0022 — 0.0035)		
	Limit	0.10 (0.0039)		
Camshaft journal O.D.		31.935 — 31.950 (1.2573 — 1.2579)	37.435 — 37.450 (1.4738 — 1.4744)	37.935 — 37.950 (1.4935 — 1.4941)
Journal hole I.D.		32.005 — 32.025 (1.2600 — 1.2608)	37.505 — 37.525 (1.4766 — 1.4774)	38.005 — 38.025 (1.4963 — 1.4970)

4) Check cam face condition; remove minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

Cam height: H
Standard
IN: 32.244 — 32.344 mm (1.2694 — 1.2734 in)
EX: 31.964 — 32.064 mm (1.2584 — 1.2624 in)
Limit
IN: 32.094 mm (1.2635 in)
EX: 31.814 mm (1.2525 in)

Cam base circle diameter A:
IN: 27.5 mm (1.083 in)
EX: 27.0 mm (1.063 in)

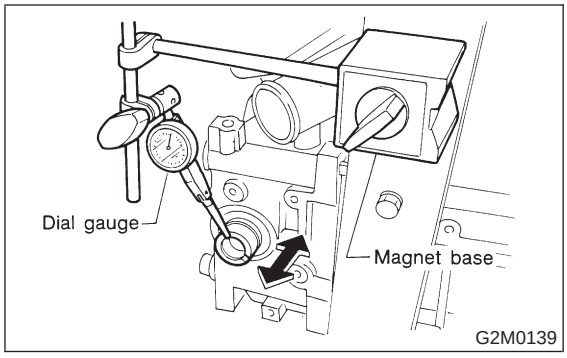


2. CAMSHAFT SUPPORT

Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace camshaft support.

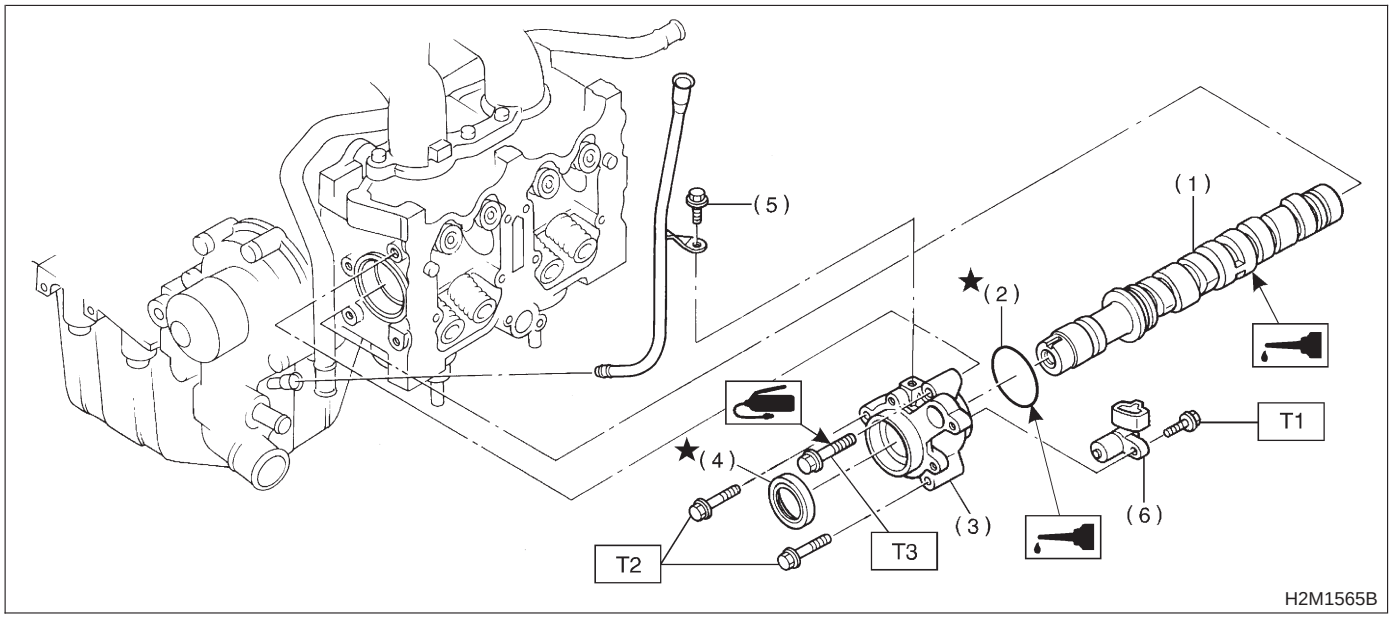
Standard:
0.030— 0.260 mm (0.0012 — 0.0102 in)

Limit:
0.35 mm (0.0138 in)



C: INSTALLATION

1. CAMSHAFT (LH)



(1) Camshaft (LH)
(2) O-ring
(3) Camshaft support (LH)
(4) Oil seal
(5) Bolt
(6) Camshaft position sensor

Tightening torque: N·m (kg-m, ft-lb)
T1: 10 (1.0, 7)
T2: 16 (1.6, 12)

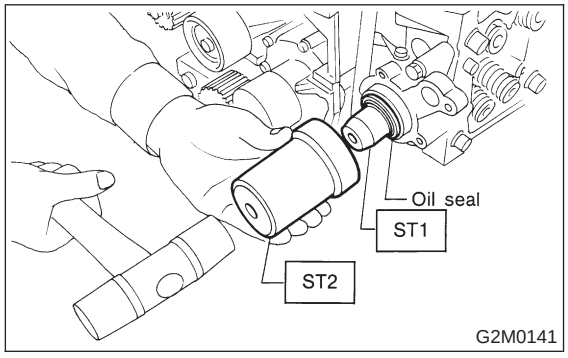
1) Apply a coat of engine oil to camshaft journals and install camshaft (LH).
2) Apply a coat of engine oil or grease to O-ring.
3) Install O-ring to camshaft support.

CAUTION:
Use a new O-ring.

4) Install camshaft support.
5) Apply a coat of grease to oil seal lips and install oil seal on camshaft support by using ST1 and ST2.

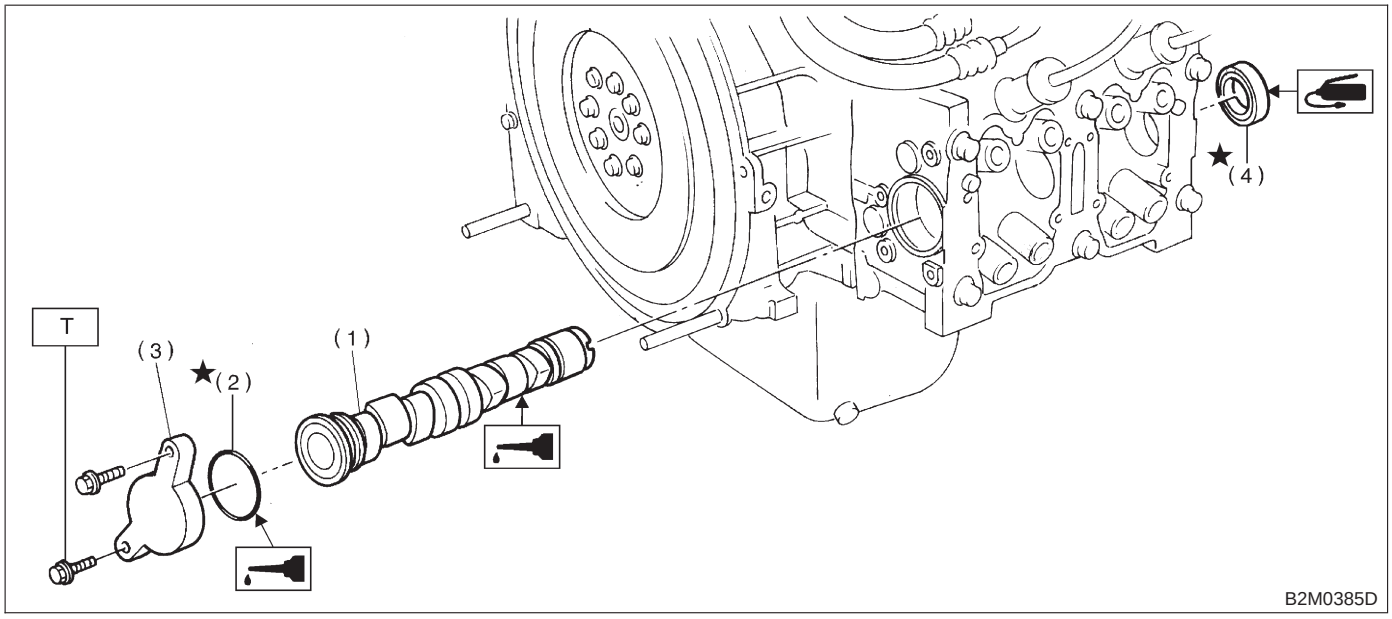
CAUTION:
Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE
ST2 499587100 OIL SEAL INSTALLER



6) Install oil level gauge guide bolt.
7) Install camshaft position sensor.

2. CAMSHAFT (RH)



(1) Camshaft (RH)
(2) O-ring
(3) Camshaft support (RH)
(4) Oil seal

Tightening torque: N·m (kg-m, ft-lb)
T: 16 (1.6, 12)

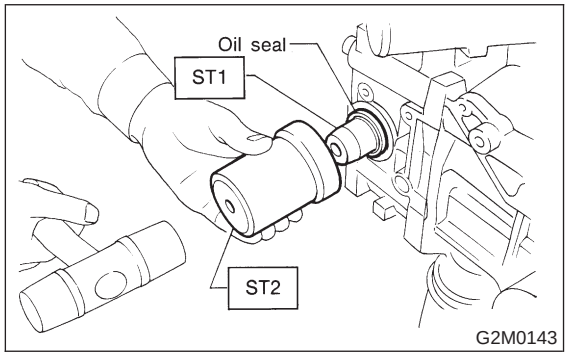
1) Apply a coat of engine oil to camshaft journals and install camshaft (RH).
2) Apply a coat of engine oil or grease to O-ring.
3) Install O-ring to camshaft support.

CAUTION:
Use a new O-ring.

4) Install camshaft support.
5) Install oil seal by using ST1 and ST2.

CAUTION:
Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE
ST2 499587100 OIL SEAL INSTALLER



3. RELATED PARTS

1) Install valve rocker assembly.
<Ref. to 2-3a [W3E0].>
2) Install timing belt, camshaft sprockets and related parts.
<Ref. to 2-3a [W2C0].>

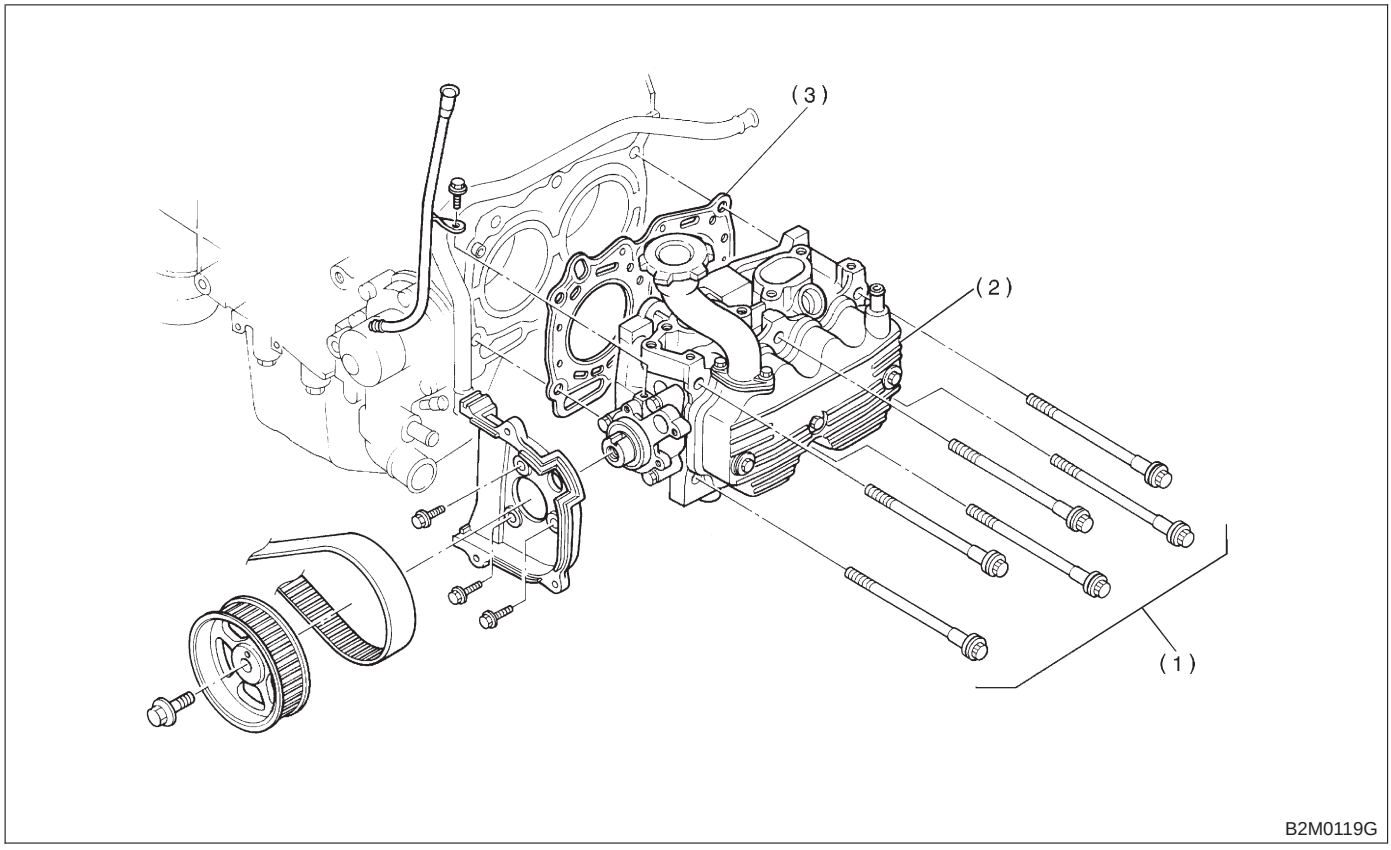
5. Cylinder Head

A: REMOVAL

1. RELATED PARTS

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Drain engine coolant. <Ref. to 2-5 [W1A0].>
3) Remove V-belt.
4) Remove alternator and bracket.
5) Disconnect spark plug cords.
6) Remove connector bracket attaching bolt.
7) Remove crankshaft position sensor and camshaft position sensor.
8) Disconnect oil pressure switch connector.
9) Disconnect blow-by hose.
10) Remove EGR pipe. (AT vehicles only)
11) Remove intake manifold. <Ref. to 2-7 [W4A0].>
12) Remove engine coolant pipe.

2. CYLINDER HEAD

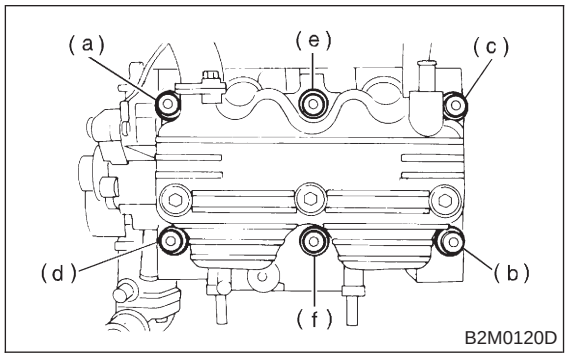


(1) Cylinder head bolt
(2) Cylinder head
(3) Cylinder head gasket

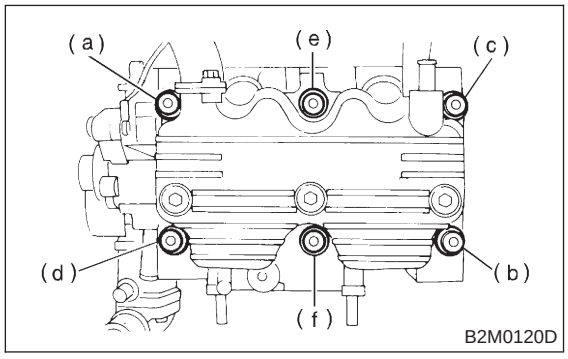
1) Remove timing belt, camshaft sprocket and related parts.
<Ref. to 2-3a [W2A0].>
2) Remove oil level gauge guide attaching bolt (left hand only) and oil level gauge guide.

3) Remove cylinder head bolts in alphabetical sequence shown in Figure.

CAUTION:
Leave bolts (a) and (c) engaged by three or four threads to prevent cylinder head from falling.



4) While tapping cylinder head with a plastic hammer, separate it from cylinder block.
5) Remove bolts (a) and (b) to remove cylinder head.

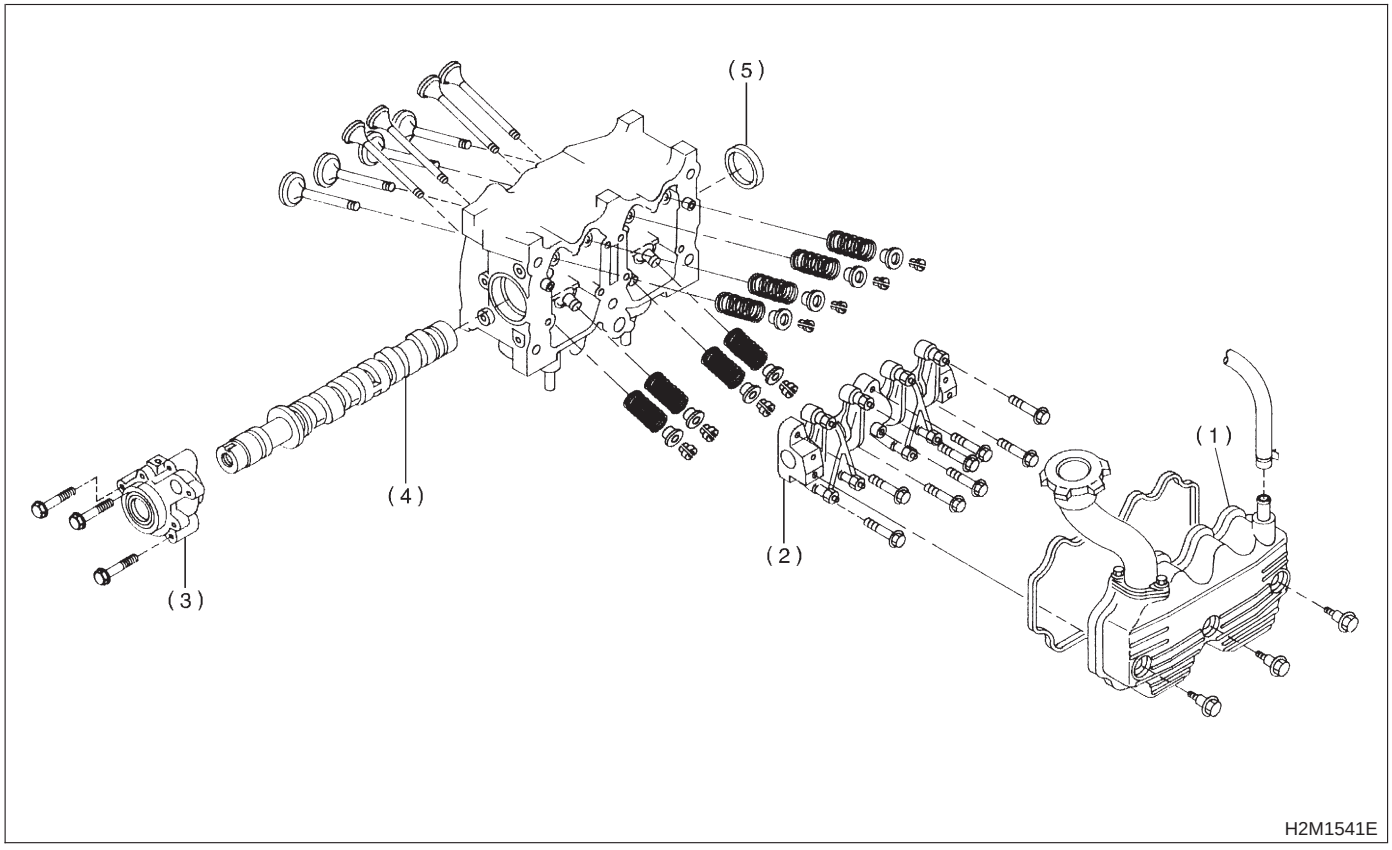


6) Remove cylinder head gasket.

CAUTION:
Do not scratch the mating surface of cylinder head and cylinder block.

7) Similarly, remove right side cylinder head.

B: DISASSEMBLY

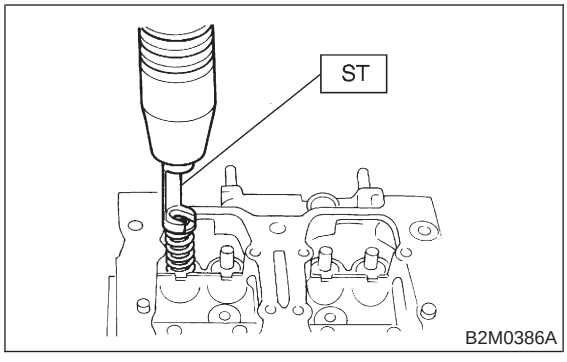


(1) Rocker cover
(2) Valve rocker ASSY
(3) Camshaft support
(4) Camshaft
(5) Oil seal

1) Remove rocker cover.
2) Remove valve rocker assembly. <Ref. to 2-3a [W3A0].>
3) Remove camshaft and support. <Ref. to 2-3a [W4A0].>
4) Place cylinder head on ST.
ST 498267200 CYLINDER HEAD TABLE

5) Set ST on valve spring. Compress valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST 499718000 VALVE SPRING REMOVER

CAUTION:
- **Mark each valve to prevent confusion.**
- **Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.**



6) Removal of plug (cylinder head LH)

CAUTION:
Do not remove plug unless necessary.

C: INSPECTION

1. CYLINDER HEAD

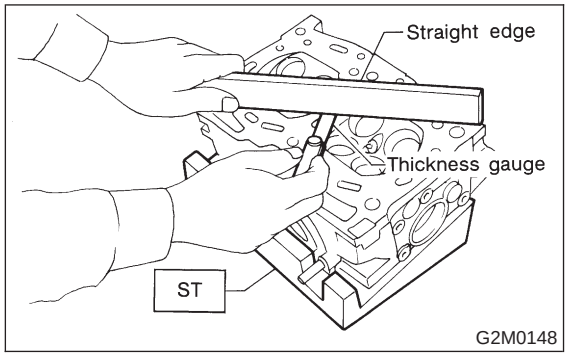
1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of red lead check.
Also make sure that gasket installing surface shows no trace of gas and water leaks.
2) Place cylinder head on ST.
ST 498267200 CYLINDER HEAD TABLE
3) Measure the warping of the cylinder head surface that mates with crankcase by using a straight edge and thickness gauge.
If the warping exceeds 0.05 mm (0.0020 in), regrind the surface with a surface grinder.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder head:
98.3 mm (3.870 in)

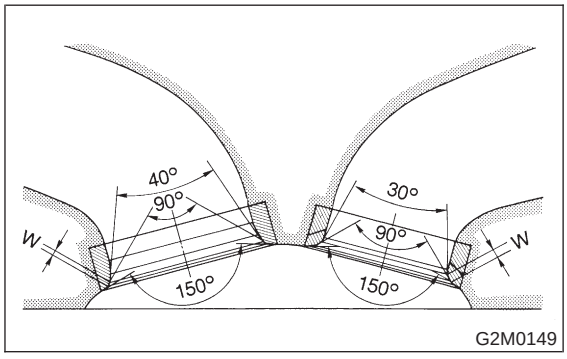
CAUTION:
Uneven torque for the cylinder head bolts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.

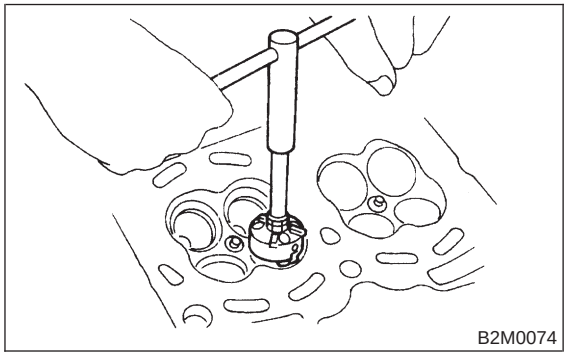


2. VALVE SEAT

Inspect intake and exhaust valve seats, and correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width: W
Intake
Standard 0.7 mm (0.028 in)
Limit 1.4 mm (0.055 in)
Exhaust
Standard 1.4 mm (0.055 in)
Limit 1.8 mm (0.071 in)





3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outside diameter of valve stem and the inside diameter of valve guide with outside and inside micrometers respectively.

Clearance between the valve guide and valve stem:

Standard

Intake 0.035 — 0.062 mm (0.0014 — 0.0024 in)

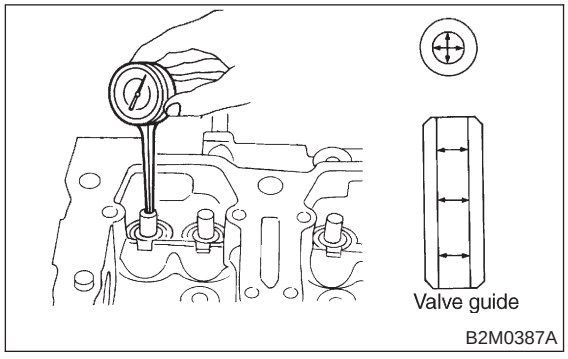
Exhaust 0.040 — 0.067 mm (0.0016 — 0.0026 in)

Limit

0.15 mm (0.0059 in)

Valve guide inner diameter:

6.000 — 6.012 mm (0.2362 — 0.2367 in)



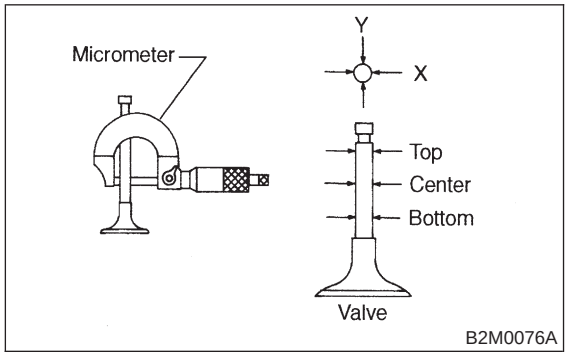
Valve stem outer diameters:

Intake

5.950 — 5.965 mm (0.2343 — 0.2348 in)

Exhaust

5.945 — 5.960 mm (0.2341 — 0.2346 in)

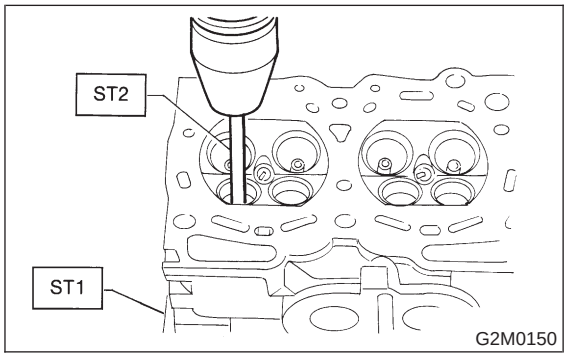


2) If the clearance between valve guide and stem exceeds the specification, replace guide as follows:

(1) Place cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.

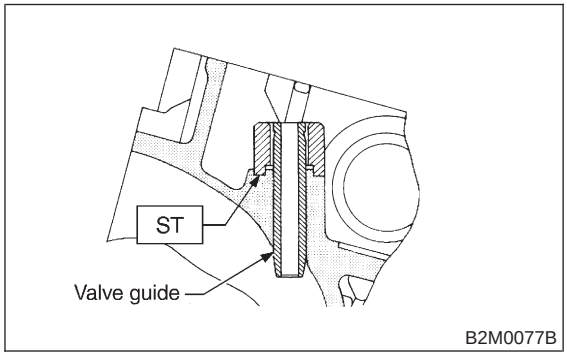
(2) Insert ST2 into valve guide and press it down to remove valve guide.

ST1 498267200 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



(3) Turn cylinder head upside down and place ST as shown in the Figure.

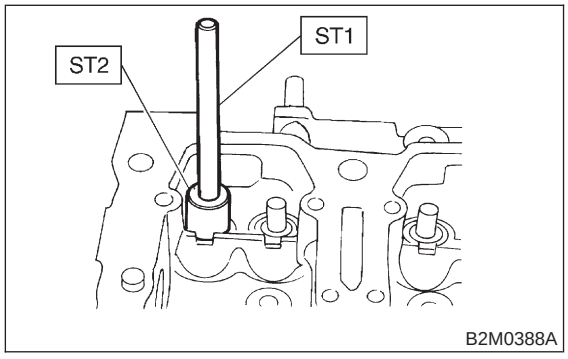
ST 499767000 VALVE GUIDE ADJUSTER



(4) Before installing new oversize valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.

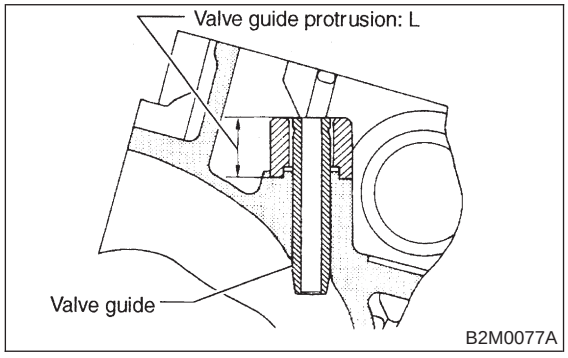
(5) Put new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
ST2 499767000 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

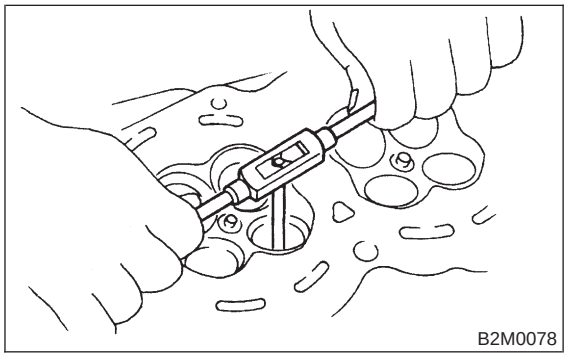
Valve guide protrusion: L
17.5 — 18.0 mm (0.689 — 0.709 in)



(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into valve guide, and return it also rotating clockwise. After reaming, clean valve guide to remove chips.

CAUTION:
● Apply engine oil to the reamer when reaming.
● If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
● If the inner surface of the valve guide becomes lustrous and the reamer does not chips, use a new reamer or remedy the reamer.

ST 499767400 VALVE GUIDE REAMER



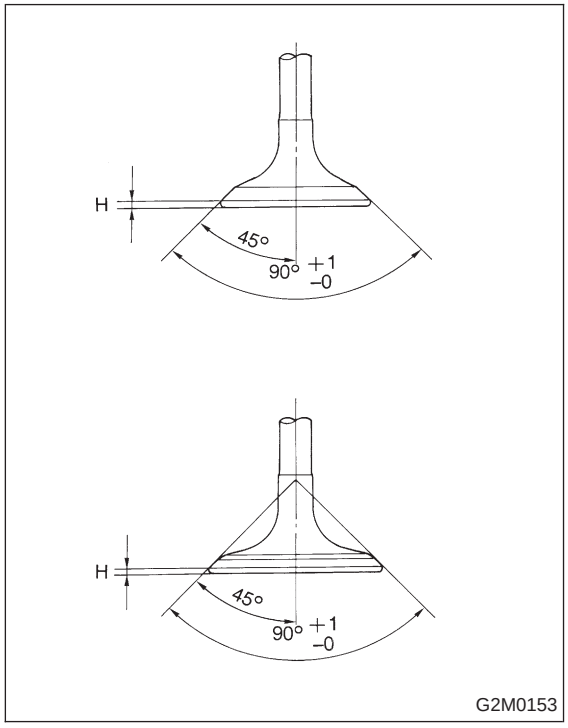
(8) Recheck the contact condition between valve and valve seat after replacing valve guide.

4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if “H” is less than the specified limit.

H:
Intake
Standard 1.0 mm (0.039 in)
Limit 0.8 mm (0.031 in)
Exhaust
Standard 1.2 mm (0.047 in)
Limit 0.8 mm (0.031 in)

Valve overall length:
Intake
101.0 mm (3.976 in)
Exhaust
101.2 mm (3.984 in)

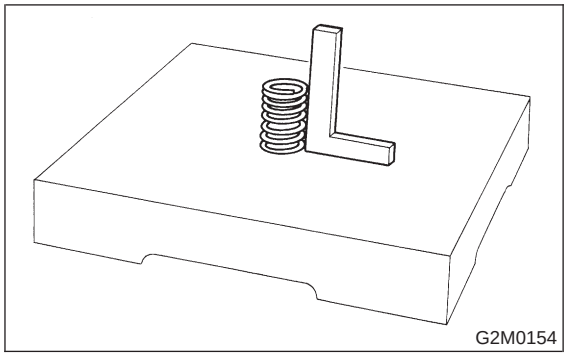


2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. <Ref. to 2-3a [W5C2].> Install a new intake valve oil seal after lapping.

5. VALVE SPRING

1) Check valve springs for damage, free length, and tension. Replace valve spring if it is not to the specifications presented below.
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

Free length	44.05 mm (1.7342 in)
Squareness	2.5°, 1.9 mm (0.075 in)
Tension/spring height	174.6 — 200.1 N (17.8 — 20.4 kg, 39.2 — 45.0 lb) / 36.0 mm (1.417 in)
	405.0 — 458.0 N (41.3 — 46.7 kg, 91.1 — 103.0 lb) / 28.2 mm (1.110 in)



6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace oil seal with new one, if lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.

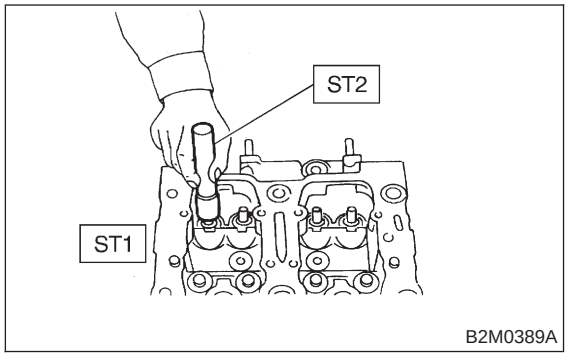
1) Place cylinder head on ST1.
2) Press-fit oil seal to the specified dimension indicated in the Figure by using ST2.

CAUTION:
● Apply engine oil to oil seal before press-fitting.
● When press-fitting oil seal, do not use hammer or strike in.
● Differentiate between intake valve oil seal and exhaust valve oil seal by noting their difference in color.

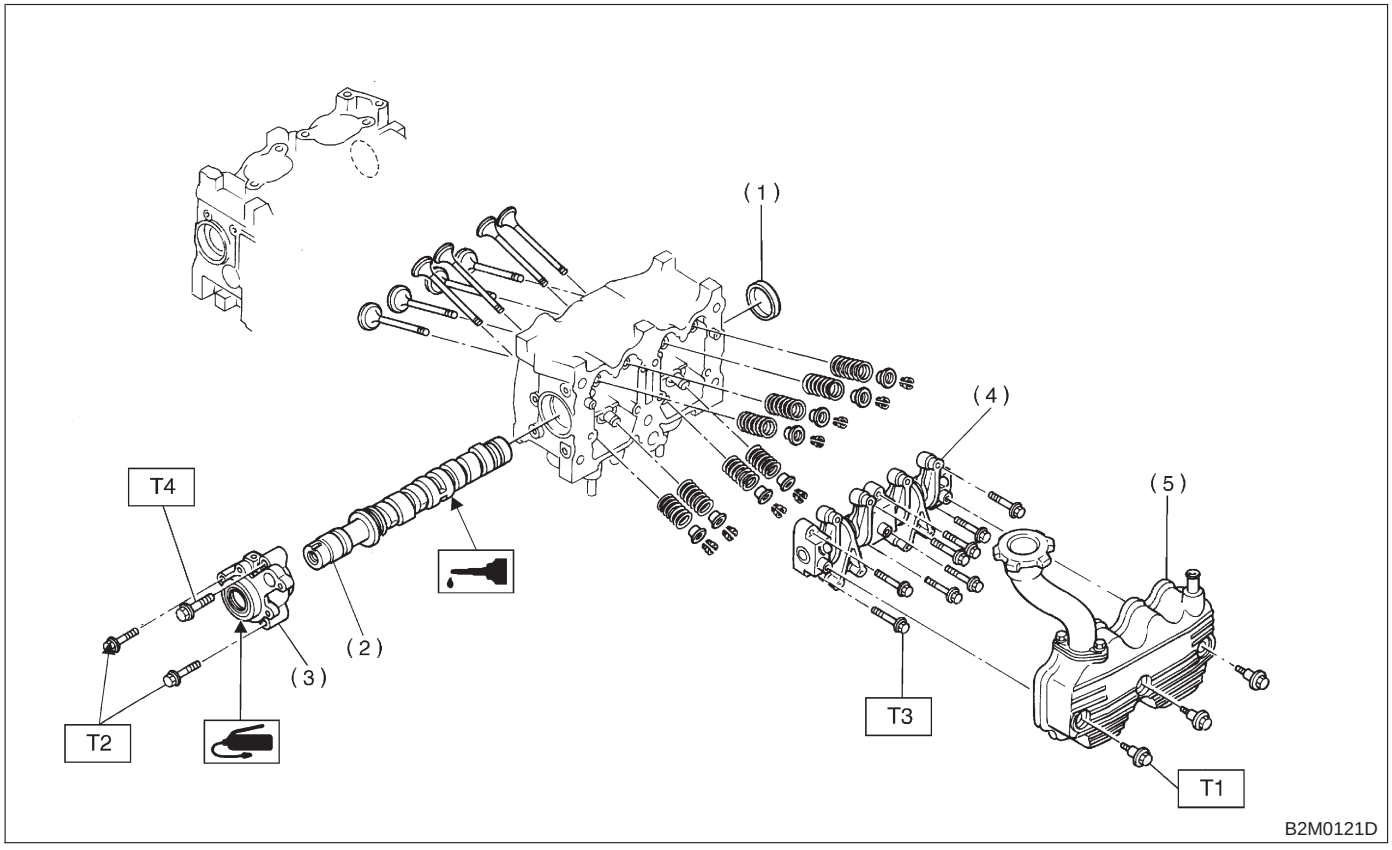
ST1 498267200 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

Color of rubber part:
Intake [Black]
Exhaust [Brown]

Color of spring part:
Intake [Silver]
Exhaust [Silver]



D: ASSEMBLY



(1) Oil seal
(2) Camshaft
(3) Camshaft support
(4) Valve rocker ASSY
(5) Rocker cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 10 (1.0, 7)
T3: 12±1 (1.2±0.1, 8.7±0.7)
T4: 16 (1.6, 12)

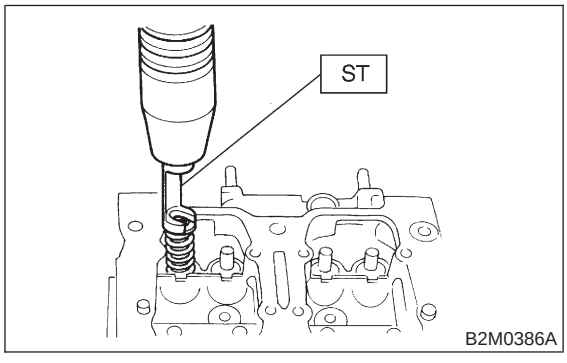
1) Install plug (cylinder head LH) by using ST.
ST 499587100 OIL SEAL INSTALLER
2) Installation of valve spring and valve
(1) Place cylinder head on ST.
ST 498267200 CYLINDER HEAD TABLE
(2) Coat stem of each valve with engine oil and insert valve into valve guide.

CAUTION:
When inserting valve into valve guide, use special care not to damage the oil seal lip.

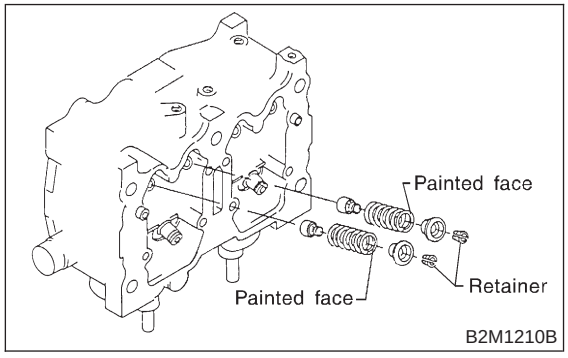
(3) Install valve spring and retainer.

CAUTION:
Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.

(4) Set ST on valve spring.
ST 499718000 VALVE SPRING REMOVER



(5) Compress valve spring and fit valve spring retainer key.

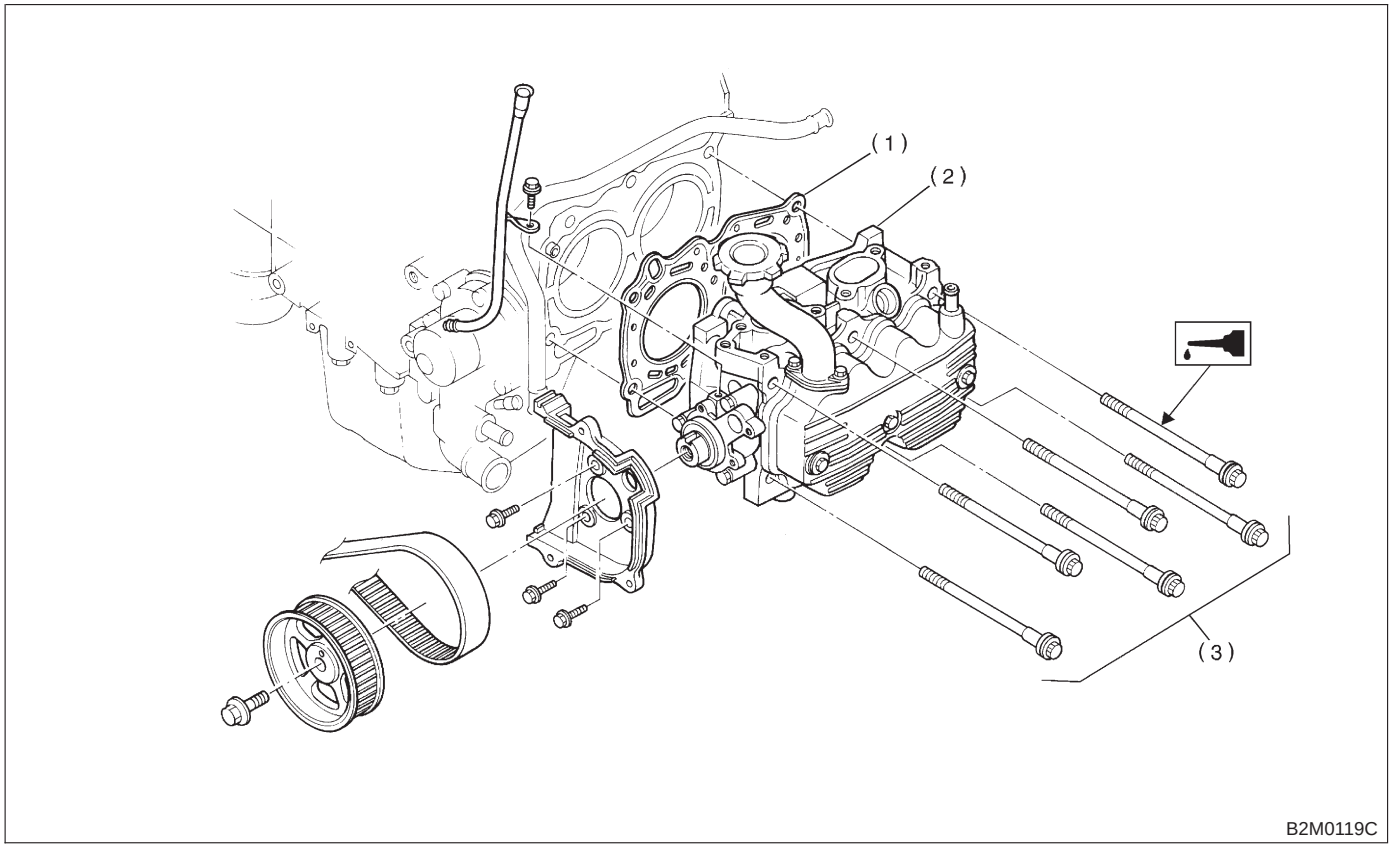


(6) After installing, tap valve spring retainers lightly with wooden hammer for better seating.

3) Install camshaft and support.
<Ref. to 2-3a [W4C0].>
4) Install valve rocker assembly.
<Ref. to 2-3a [W3E0].>
5) Install rocker cover.

E: INSTALLATION

1. CYLINDER HEAD



(1) Cylinder head gasket (2) Cylinder head (3) Cylinder head bolt

1) Install cylinder head and gaskets on cylinder block.

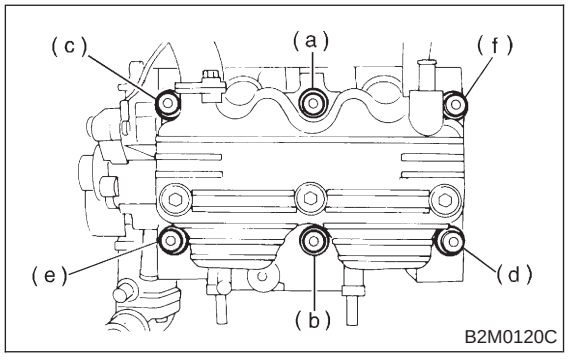
CAUTION:
Use new cylinder head gaskets.

2) Tighten cylinder head bolts.
(1) Apply a coat of engine oil to washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb) in alphabetical sequence.
Then tighten all bolts to 69 N·m (7.0 kg-m, 51 ft-lb) in alphabetical sequence.
(3) Back off all bolts by 180° first; back them off by 180° again.
(4) Tighten bolts (a) and (b) to 34 N·m (3.5 kg-m, 25 ft-lb).
(5) Tighten bolts (c), (d), (e) and (f) to 15 N·m (1.5 kg-m, 11 ft-lb).
(6) Tighten all bolts by 80 to 90° in alphabetical sequence.

CAUTION:
Do not tighten bolts more than 90°.

(7) Further tighten all bolts by 80 to 90° in alphabetical sequence.

CAUTION:
Ensure that the total "re-tightening angle" [in the former two steps], do not exceed 180°.



3) Install oil level gauge guide attaching bolt (left side only).
4) Install timing belt, camshaft sprocket and related parts.
<Ref. to 2-3a [W2C0].>

2. RELATED PARTS

CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.

1) Install engine coolant pipe.
2) Install intake manifold. <Ref. to 2-7 [W4D0].>
3) Connect blow-by hose.
4) Install EGR pipe. (AT vehicles only)
5) Connect oil pressure switch connector.
6) Install crankshaft position sensor and camshaft position sensor.
7) Install connector bracket attaching bolt.
8) Connect spark plug cords.
9) Install alternator and bracket.
10) Install V-belt.
11) Remove ENGINE STAND (ST).

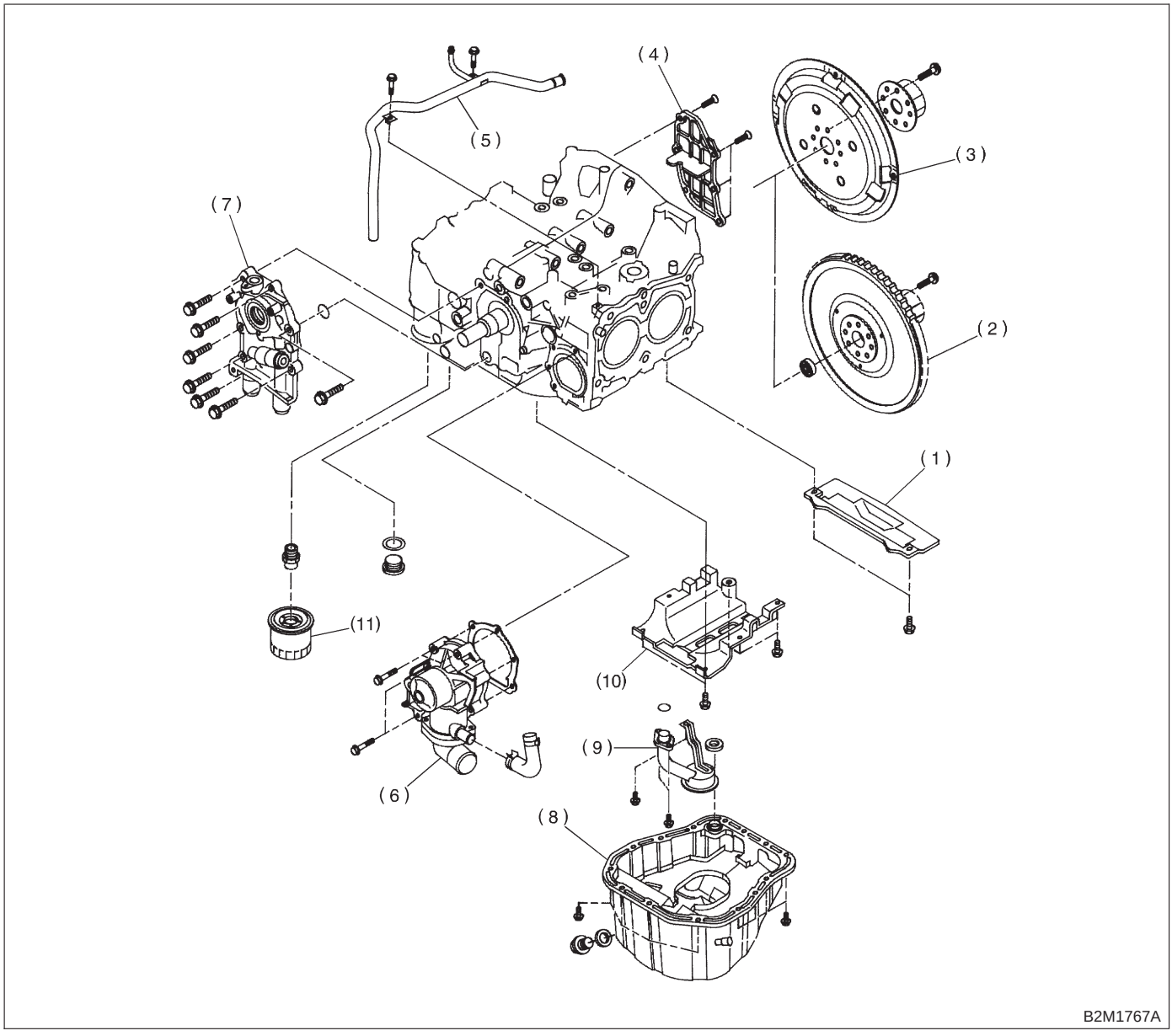
6. Cylinder Block

A: REMOVAL

1. RELATED PARTS

1) Remove timing belt, camshaft sprocket and related parts.
<Ref. to 2-3a [W2A0].>
2) Remove intake manifold and cylinder head.
<Ref. to 2-3a [W5A0].>

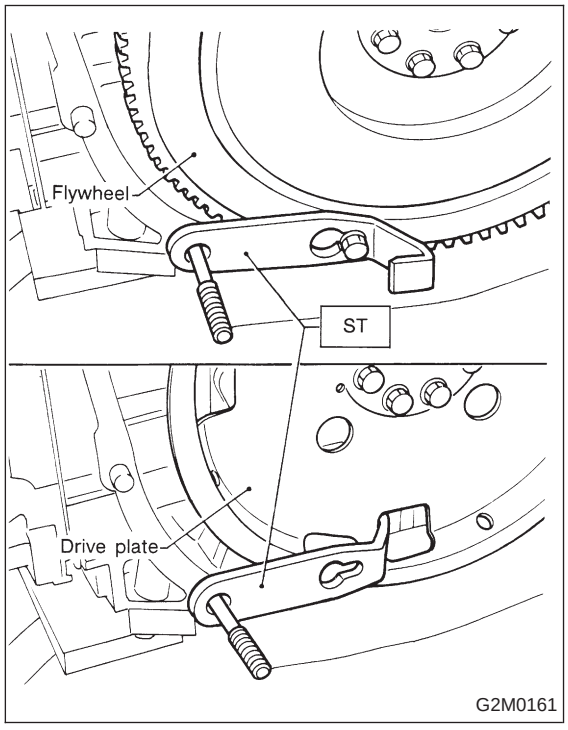
2. OIL PUMP AND WATER PUMP



(1) Clutch housing cover (MT vehicles only)
(2) Flywheel (MT vehicles only)
(3) Drive plate (AT vehicles only)
(4) Oil separator cover
(5) Water by-pass pipe
(6) Water pump
(7) Oil pump
(8) Oil pan
(9) Oil strainer
(10) Baffle plate
(11) Oil filter

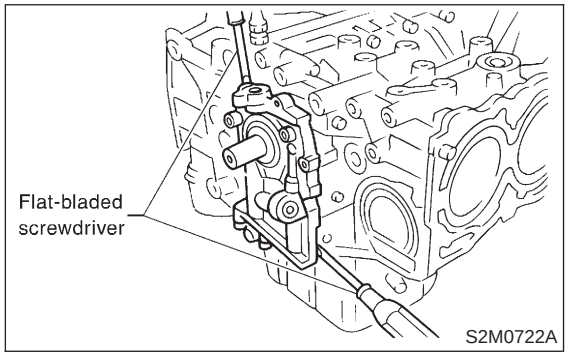
1) Remove clutch housing cover. (MT vehicles only)

2) Remove flywheel or drive plate.
To lock crankshaft use ST.
ST 498497100 CRANKSHAFT STOPPER



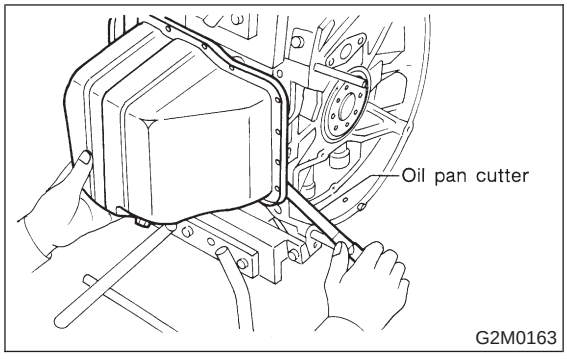
3) Remove oil separator cover.
4) Remove water by-pass pipe.
5) Remove water pump.
6) Remove oil pump from cylinder block.
Use a flat-bladed screwdriver as shown in Figure when removing oil pump.

CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.



7) Removal of oil pan
(1) Turn cylinder block with #2 and #4 piston sides facing upward.
(2) Remove bolts which secure oil pan to cylinder block.
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove oil pan.

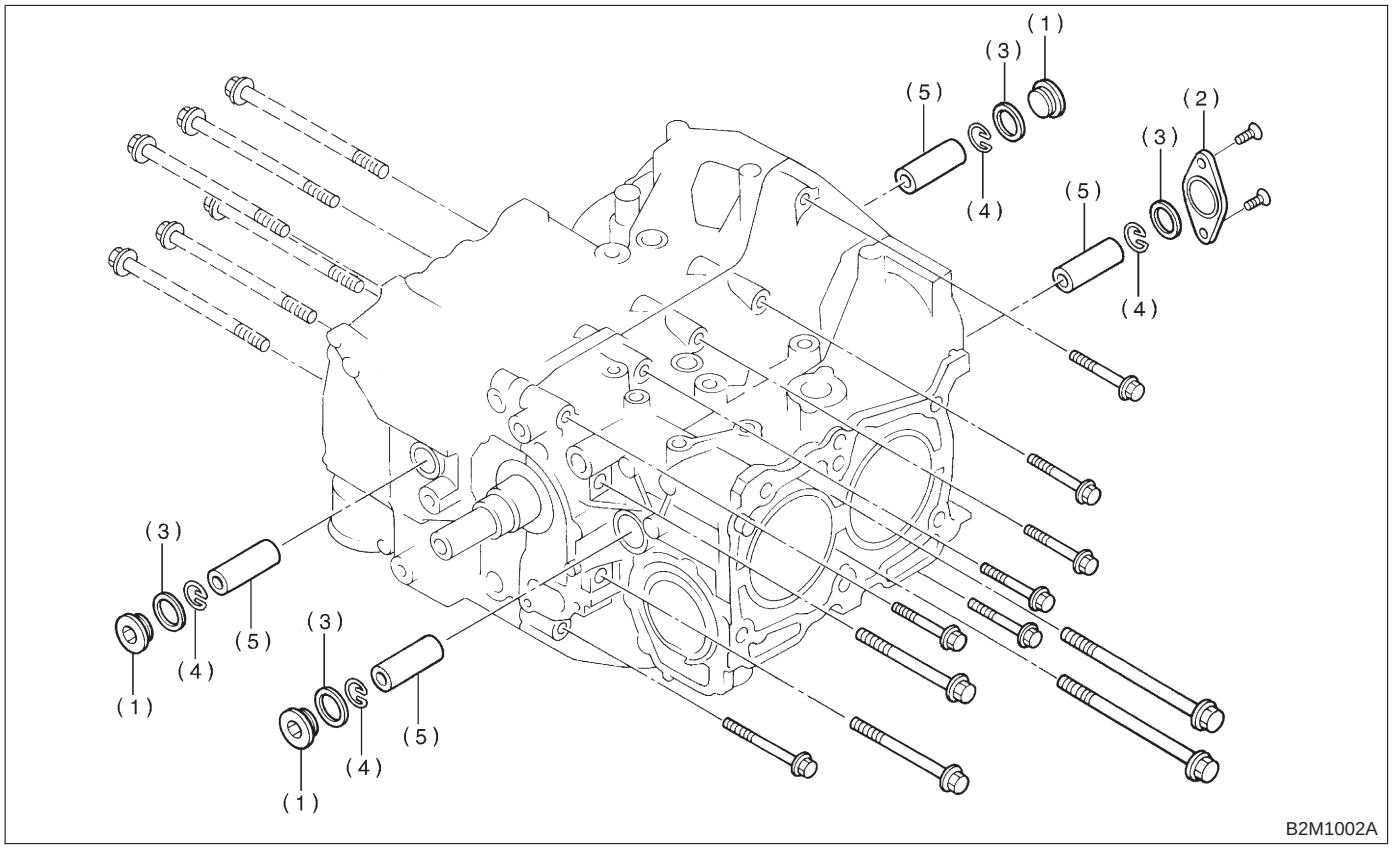
CAUTION:
Do not use a screwdriver or similar tool in place of oil- pan cutter.



8) Remove oil strainer stay.
9) Remove oil strainer.
10) Remove baffle plate.
11) Remove oil filter.

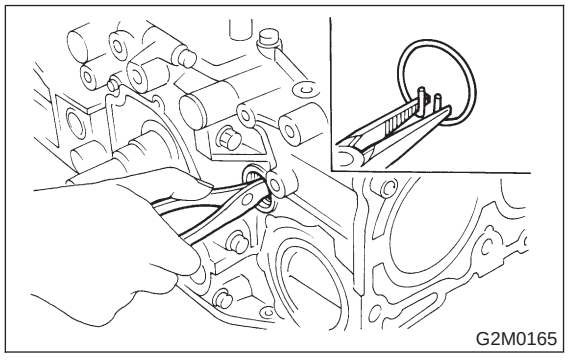
B: DISASSEMBLY

1. PISTON PIN AND CYLINDER BLOCK CONNECTING BOLT



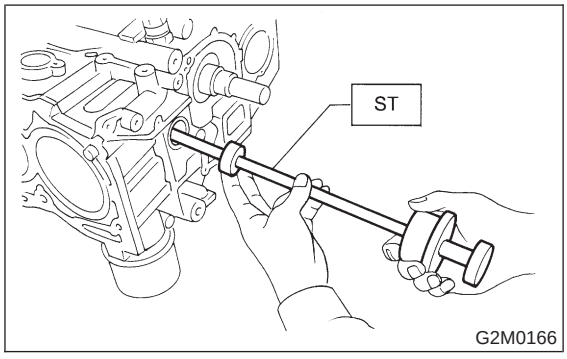
(1) Service hole plug
(2) Service hole cover
(3) Gasket
(4) Circlip
(5) Piston pin

1) Remove service hole cover and service hole plugs using hexagon wrench (14 mm).
2) Rotate crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove piston circlip through service hole of #1 and #2 cylinders.

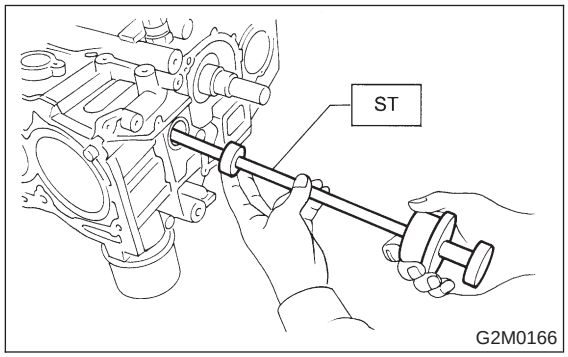


3) Draw out piston pin from #1 and #2 pistons by using ST.
ST 499097500 PISTON PIN REMOVER

CAUTION:
Be careful not to confuse original combination of piston, piston pin and cylinder.

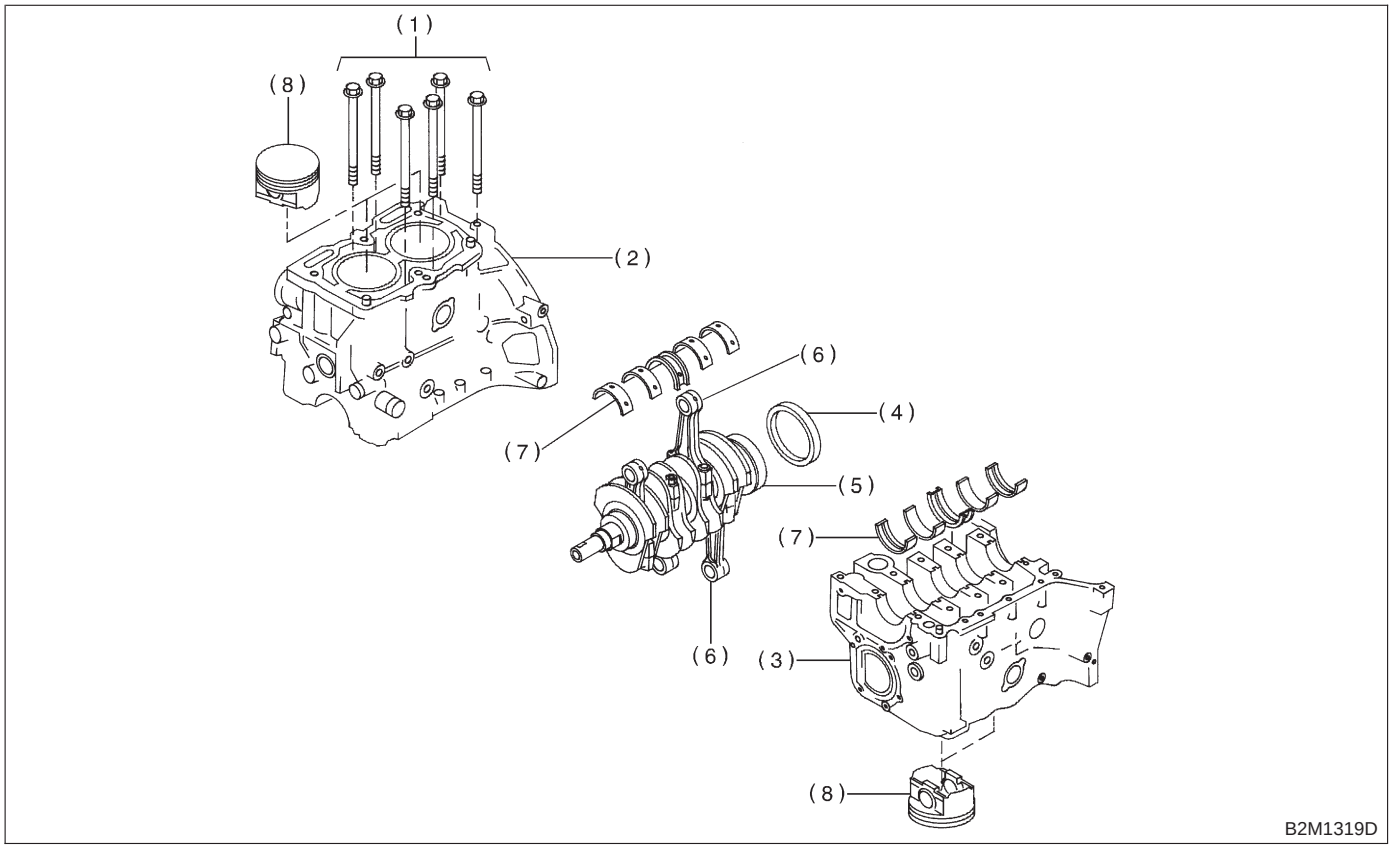


4) Similarly remove piston pins from #3 and #4 pistons by using ST.
ST 499097500 PISTON PIN REMOVER



5) Remove bolts which connect cylinder block on the side of #2 and #4 cylinders.
6) Back off bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.

2. CYLINDER BLOCK



(1) Bolt
(2) Cylinder block (RH)
(3) Cylinder block (LH)
(4) Rear oil seal
(5) Crankshaft
(6) Connecting rod
(7) Crankshaft bearing
(8) Piston

1) Set up cylinder block so that #1 and #3 cylinders are on the upper side, then remove cylinder block connecting bolts.
2) Separate left-hand and right-hand cylinder blocks.

CAUTION:
When separating cylinder block, do not allow the connecting rod to fall and damage the cylinder block.

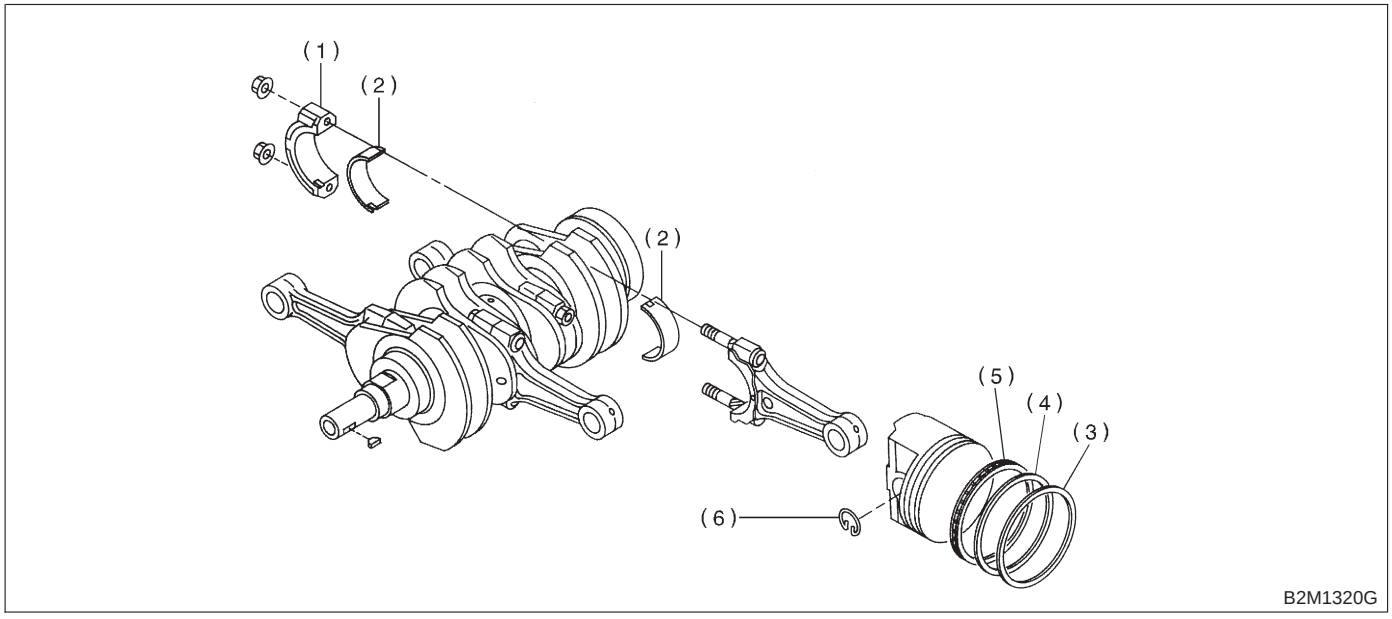
3) Remove rear oil seal.
4) Remove crankshaft together with connecting rod.
5) Remove crankshaft bearings from cylinder block using hammer handle.

CAUTION:
Do not confuse combination of crankshaft bearings. Press bearing at the end opposite to locking lip.

6) Draw out each piston from cylinder block using wooden bar or hammer handle.

CAUTION:
Do not confuse combination of piston and cylinder.

3. CRANKSHAFT AND PISTON



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Circlip

1) Remove connecting rod cap.
2) Remove connecting rod bearing.

CAUTION:
Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

3) Remove piston top and second rings using the piston ring expander.
4) Remove the oil ring by hand.

CAUTION:
Arrange the removed piston rings in good order to prevent confusion.

5) Remove circlip.

C: INSPECTION

1. CYLINDER BLOCK

1) Check for cracks and damage visually. Especially, inspect important parts by means of red lead check.
2) Check the oil passages for clogging.
3) Inspect crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder block:
201.0 mm (7.91 in)

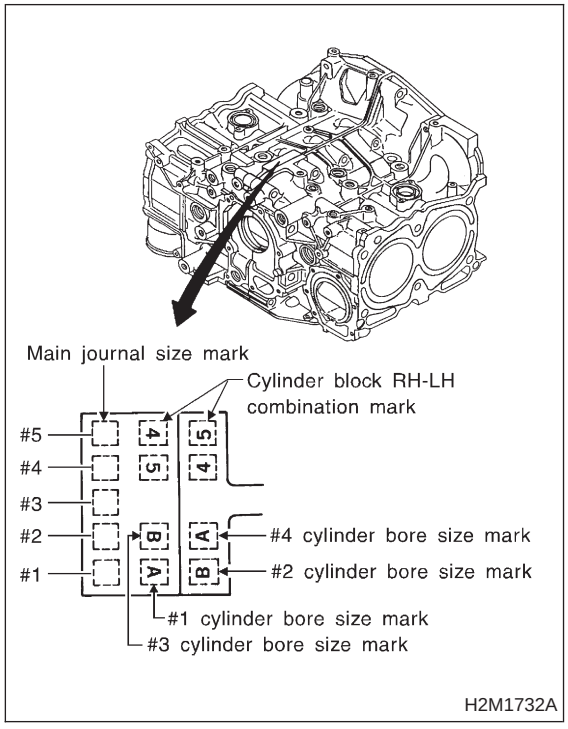
2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

CAUTION:
Measurement should be performed at a temperature 20°C (68°F).

NOTE:
Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as a guide line in selecting a standard piston.

Standard diameter:
A: 96.905 — 96.915 mm (3.8151 — 3.8155 in)
B: 96.895 — 96.905 mm (3.8148 — 3.8151 in)

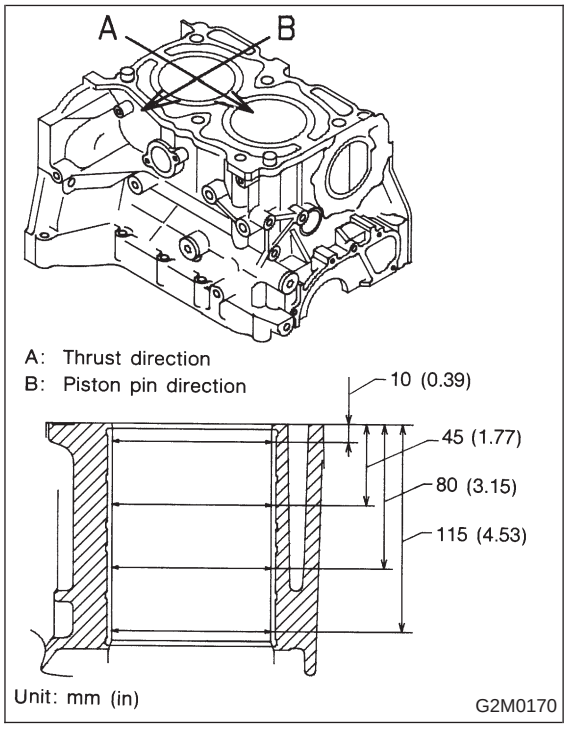


2) How to measure the inner diameter of each cylinder Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in the Figure, using a cylinder bore gauge.

CAUTION:
Measurement should be performed at a temperature 20°C (68°F).

Taper:
Standard
0.015 mm (0.0006 in)
Limit
0.050 mm (0.0020 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)
Limit
0.050 mm (0.0020 in)



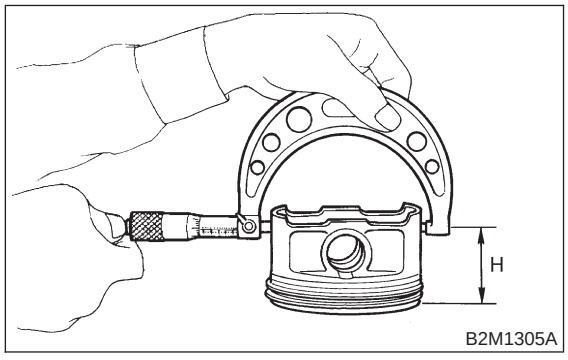
3) When piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

4) How to measure the outer diameter of each piston Measure the outer diameter of each piston at the height shown in the Figure. (Thrust direction)

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
40.0 mm (1.575 in)

Piston outer diameter:
Standard
A: 96.885 — 96.895 mm (3.8144 — 3.8148 in)
B: 96.875 — 96.885 mm (3.8140 — 3.8144 in)
0.25 mm (0.0098 in) oversize
97.115 — 97.145 mm (3.8234 — 3.8246 in)
0.50 mm (0.0197 in) oversize
97.365 — 97.395 mm (3.8333 — 3.8344 in)



5) Calculate the clearance between cylinder and piston.

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)
Limit
0.050 mm (0.0020 in)

6) Boring and honing
(1) If the value of taper, out-of-roundness, or cylinder- to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

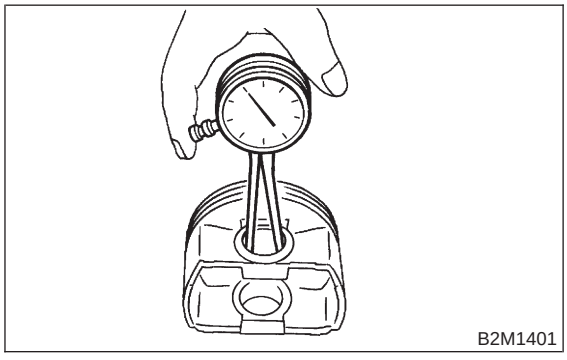
CAUTION:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

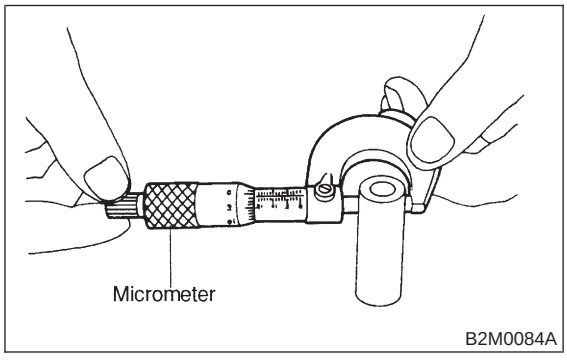
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN

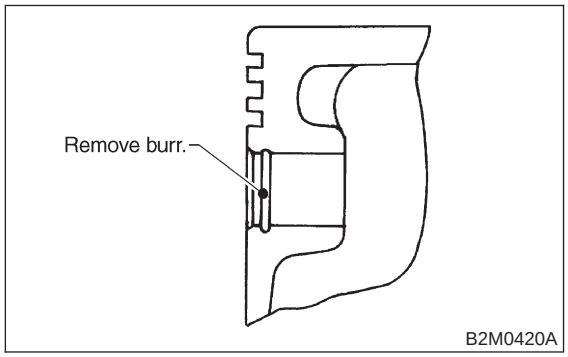
1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to 2-3a [W6C2].> If any of the clearances is not to specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make sure that piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Standard clearance between piston pin and hole in piston:
Standard
0.004 — 0.010 mm (0.0002 — 0.0004 in)
Limit
0.020 mm (0.0008 in)





4) Check circlip installation groove on the piston for burr. If necessary, remove burr from the groove so that piston pin can lightly move.

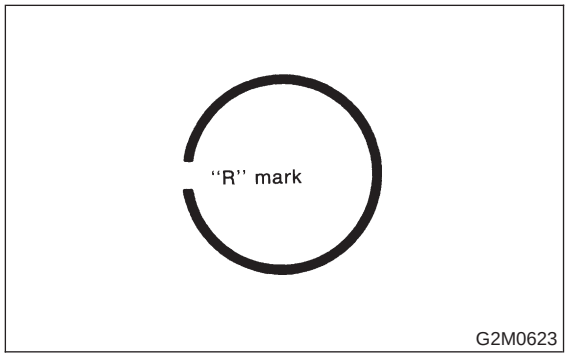


5) Check piston pin circlip for distortion, cracks and wear.

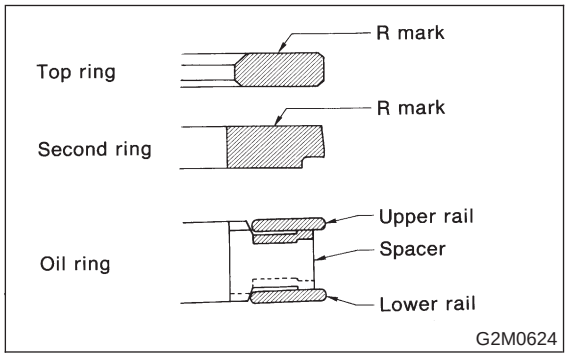
4. PISTON RING

1) If piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace piston ring with a new one of the same size as the piston.

CAUTION:
● "R" is marked on the end of the top and second rings. When installing the rings to the piston, face this mark upward.

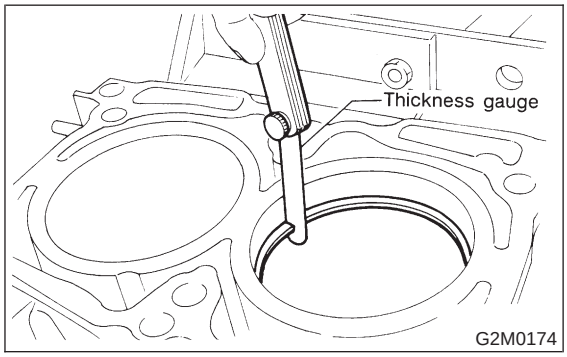


● The oil ring is a combined ring consisting of two rails and a spacer in between. When installing, be careful to assemble correctly.



2) Squarely place piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

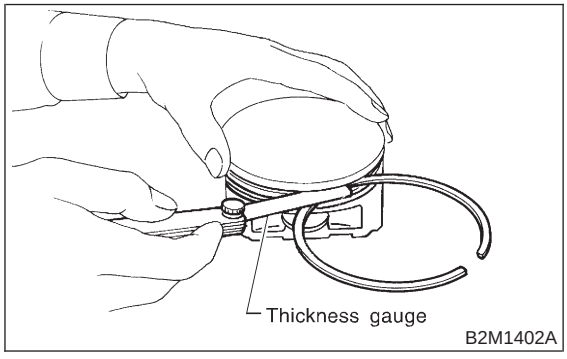
		Unit: mm (in)	
		Standard	Limit
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)	1.0 (0.039)
	Second ring	0.20 — 0.50 (0.0079 — 0.0197)	1.0 (0.039)
	Oil ring rail	0.20 — 0.70 (0.0079 — 0.0276)	1.5 (0.059)



3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

CAUTION:
Before measuring the clearance, clean the piston ring groove and piston ring.

		Unit: mm (in)	
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 0.0012 — 0.0028)	0.15 (0.0059)

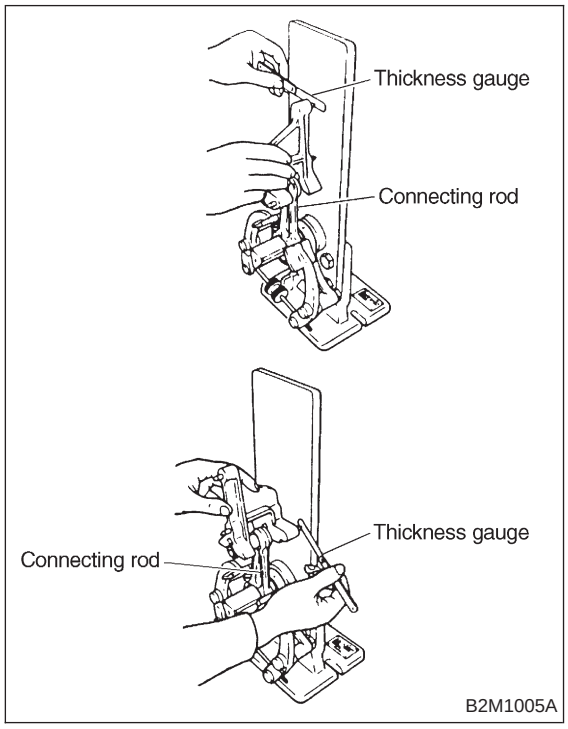


5. CONNECTING ROD

1) Replace connecting rod, if the large or small end thrust surface is damaged.

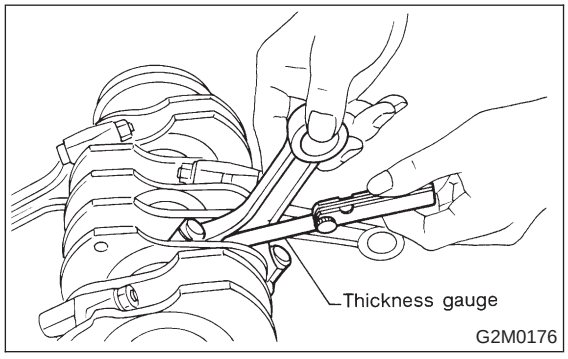
2) Check for bend or twist using a connecting rod aligner. Replace connecting rod if the bend or twist exceeds the limit.

Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



3) Install connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). Replace connecting rod if the side clearance exceeds the specified limit.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)
Limit
0.4 mm (0.016 in)



4) Inspect connecting rod bearing for scar, peeling, seizure, melting, wear, etc.
5))Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

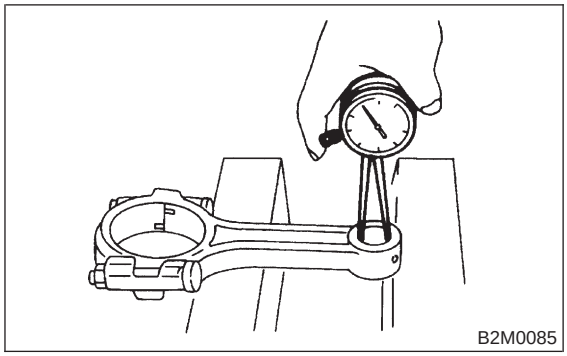
Connecting rod oil clearance:
Standard
0.015 — 0.045 mm (0.0006 — 0.0018 in)
Limit
0.05 mm (0.0020 in)

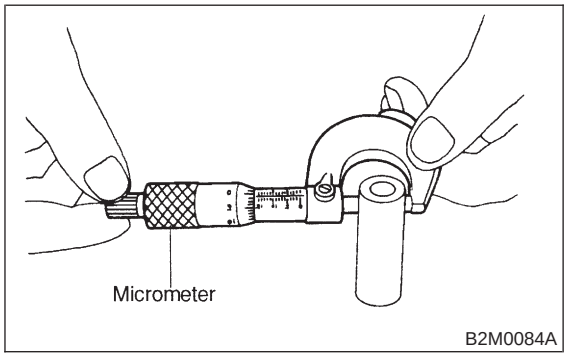
Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

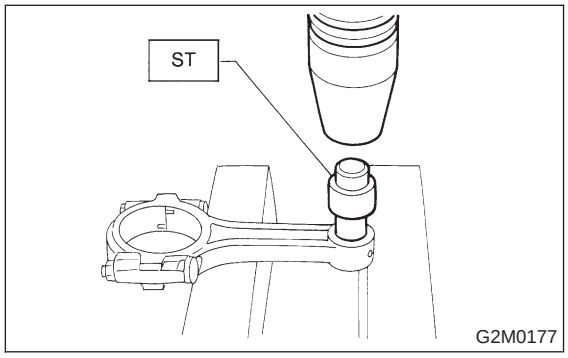
Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)
Limit
0.030 mm (0.0012 in)





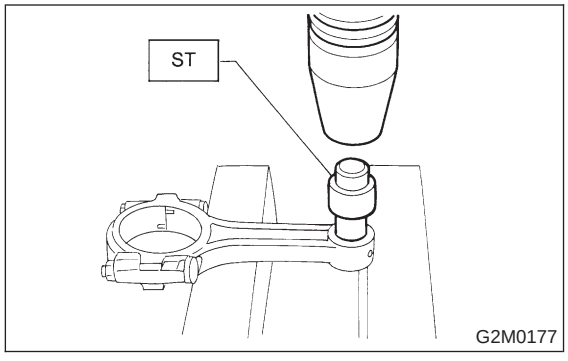
7) Replacement procedure is as follows.
(1) Remove bushing from connecting rod with ST and press.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



(2) Press bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



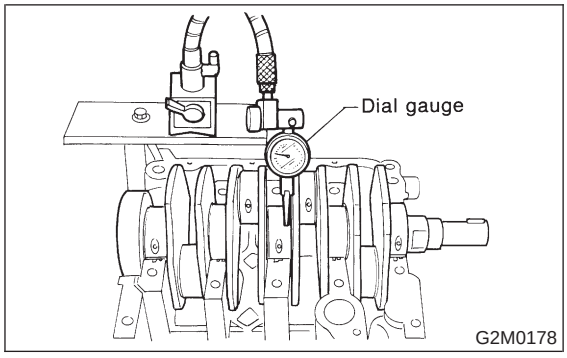
(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean crankshaft completely and check for cracks by means of red lead check etc., and replace if defective.
2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

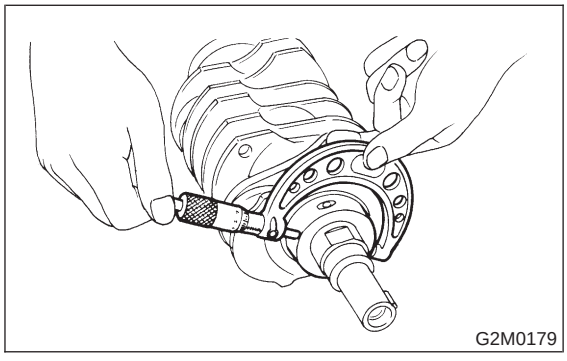
CAUTION:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position crankshaft on these bearings and measure crankshaft bend using a dial gauge.

Crankshaft bend limit:
0.035 mm (0.0014 in)



3) Inspect the crank journal and crank pin for wear. If not to specifications, replace bearing with an undersize one, and replace or recondition crankshaft as necessary. When grinding crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:
Out-of-roundness
0.030 mm (0.0012 in) or less
Taper limit
0.07 mm (0.0028 in)
Grinding limit
0.25 mm (0.0098 in)

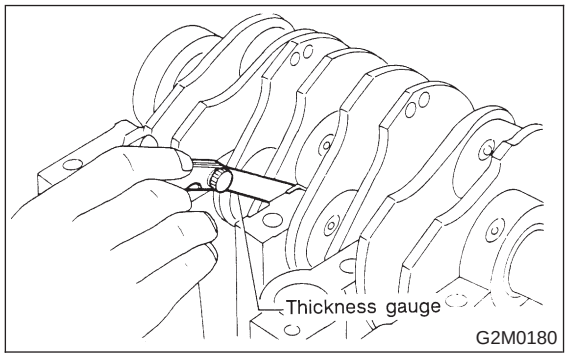


		Unit: mm (in)		
		Crank journal diameter		Crank pin diameter
		#1, #5	#2, #3, #4	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.501 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.954 — 59.970 (2.3604 — 2.3610)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	59.934 — 59.950 (2.3596 — 2.3602)	59.934 — 59.950 (2.3596 — 2.3602)	51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.734 — 59.750 (2.3517 — 2.3524)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)

O.D. ... Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace bearing.

Crankshaft thrust clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)
Limit
0.25 mm (0.0098 in)

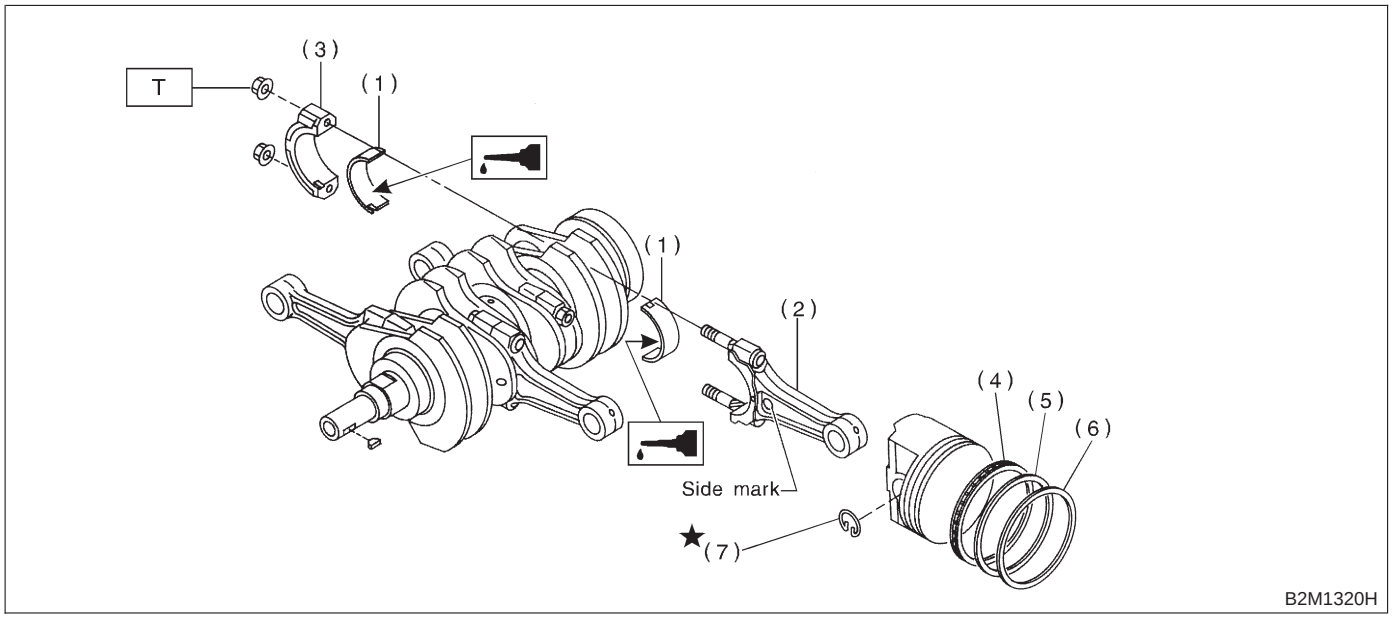


5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.
6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace defective bearing with an undersize one, and replace or recondition crankshaft as necessary.

Unit: mm (in)		
Crankshaft oil clearance		
Standard	#1, #5	0.003 — 0.030 (0.0001 — 0.0012)
	#2, #3, #4	0.010 — 0.033 (0.0004 — 0.0013)
Limit	#1, #3, #5	0.040 (0.0016)
	#2, #4	0.035 (0.0014)

D: ASSEMBLY

1. CRANKSHAFT AND PINION



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Circlip

Tightening torque: N·m (kg-m, ft-lb)
T: 44±2 (4.5±0.2, 32.5±1.4)

1) Install connecting rod bearings on connecting rods and connecting rod caps.

CAUTION:
Apply oil to the surfaces of the connecting rod bearings.

2) Install connecting rod on crankshaft.

CAUTION:
Position each connecting rod with the side marked facing forward.

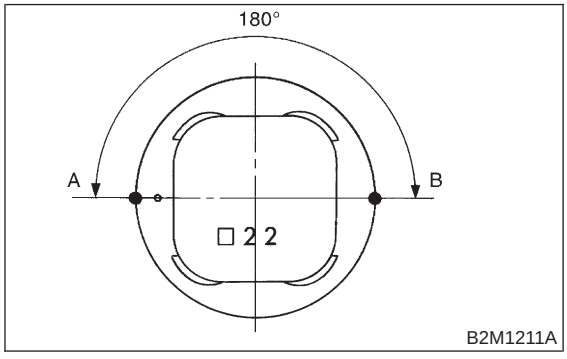
3) Install connecting rod cap with connecting rod nut. Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:
● Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
● When tightening the connecting rod nuts, apply oil on the threads.

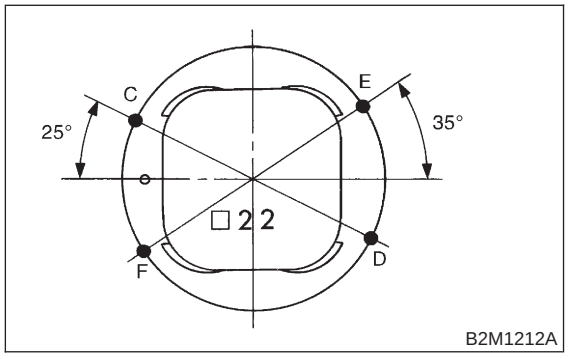
4) Installation of piston rings and oil ring

CAUTION:
● Ensure ring gaps do not face the same direction.
● Ensure ring gaps are not within the piston skirt area.

(1) Install oil ring spacer, upper rail and lower rail in this order by hand. Then install second ring and top ring with a piston ring expander.
(2) Position the top ring gap at A or B in the Figure.
(3) Position the second ring gap at 180° on the reverse side for the top ring gap.

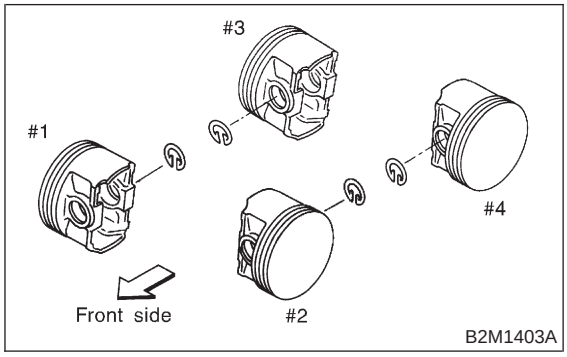


(4) Position the upper rail gap at C or D in the Figure.
(5) Position the expander gap the at 180° of the reverse side for the upper rail gap.
(6) Position the lower rail gap at E or F in the Figure.

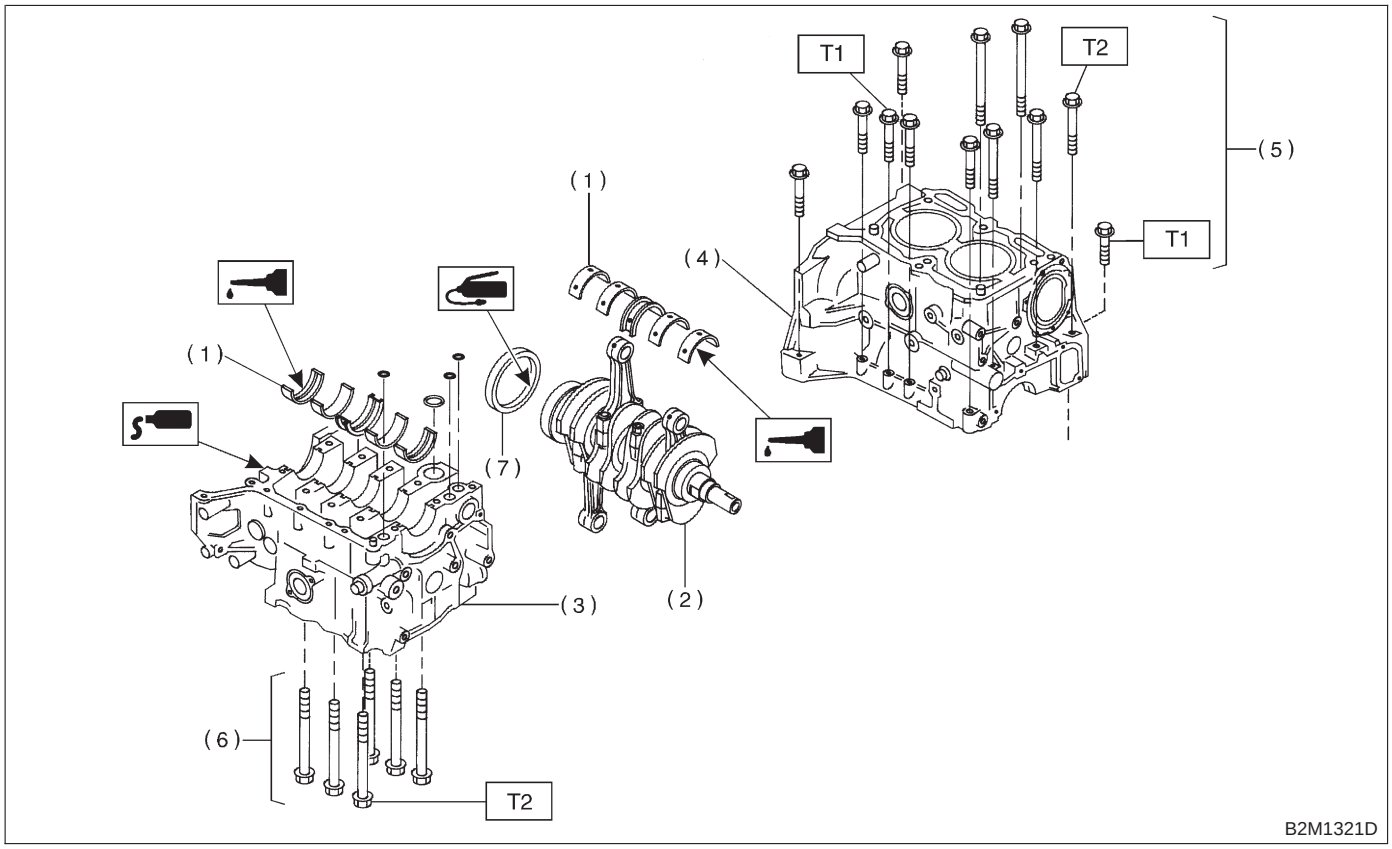


5) Install circlip.
Install circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

CAUTION:
Use new circlips.



2. CYLINDER BLOCK



(1) Crankshaft bearing
(2) Crankshaft ASSY
(3) Cylinder block (LH)
(4) Cylinder block (RH)
(5) Bolt
(6) Bolt
(7) Rear oil seal

Tightening torque: N·m (kg-m, ft-lb)
T1: 25±2 (2.5±0.2, 18.1±1.4)
T2: 47±3 (4.8±0.3, 34.7±2.2)

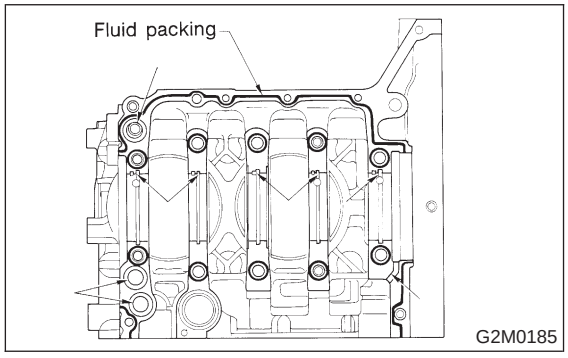
1) Install ST to cylinder block, then install crankshaft bearings.
ST 499817000 ENGINE STAND

CAUTION:
Remove oil the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

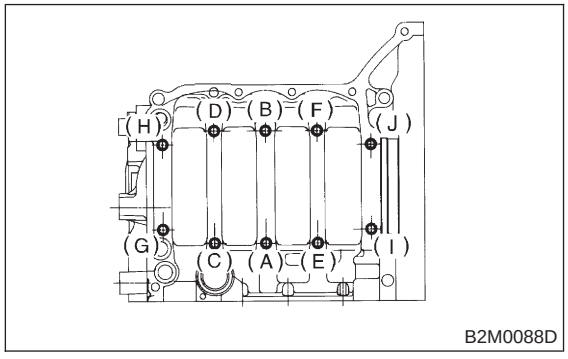
2) Position crankshaft on the cylinder block (LH).
3) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

CAUTION:
Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.

Fluid packing:
THREE BOND 1215 or equivalent

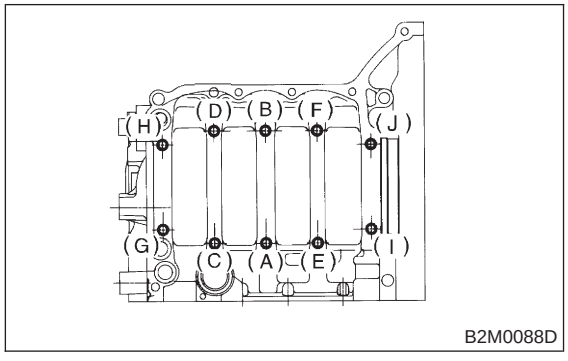


4) Temporarily tighten 10 mm cylinder block connecting bolts in alphabetical order or shown in Figure.



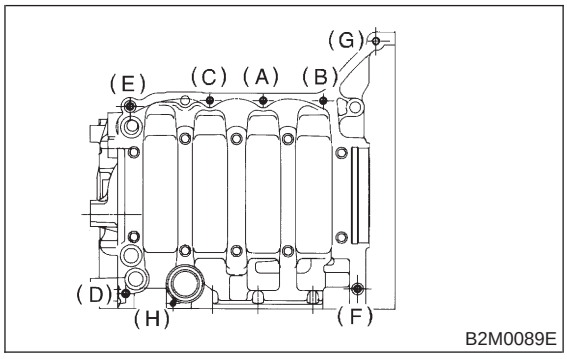
5) Tighten 10 mm cylinder block connecting bolts in alphabetical order.

Tightening torque:
47±3 N·m (4.8±0.3 kg-m, 34.7±2.2 ft-lb)

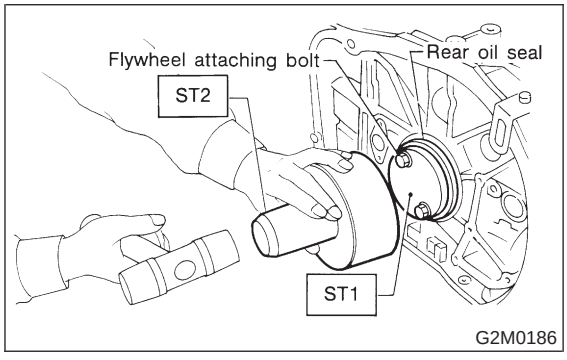


6) Tighten 8 mm and 6 mm cylinder block connecting bolts in alphabetical order or shown in Figure.

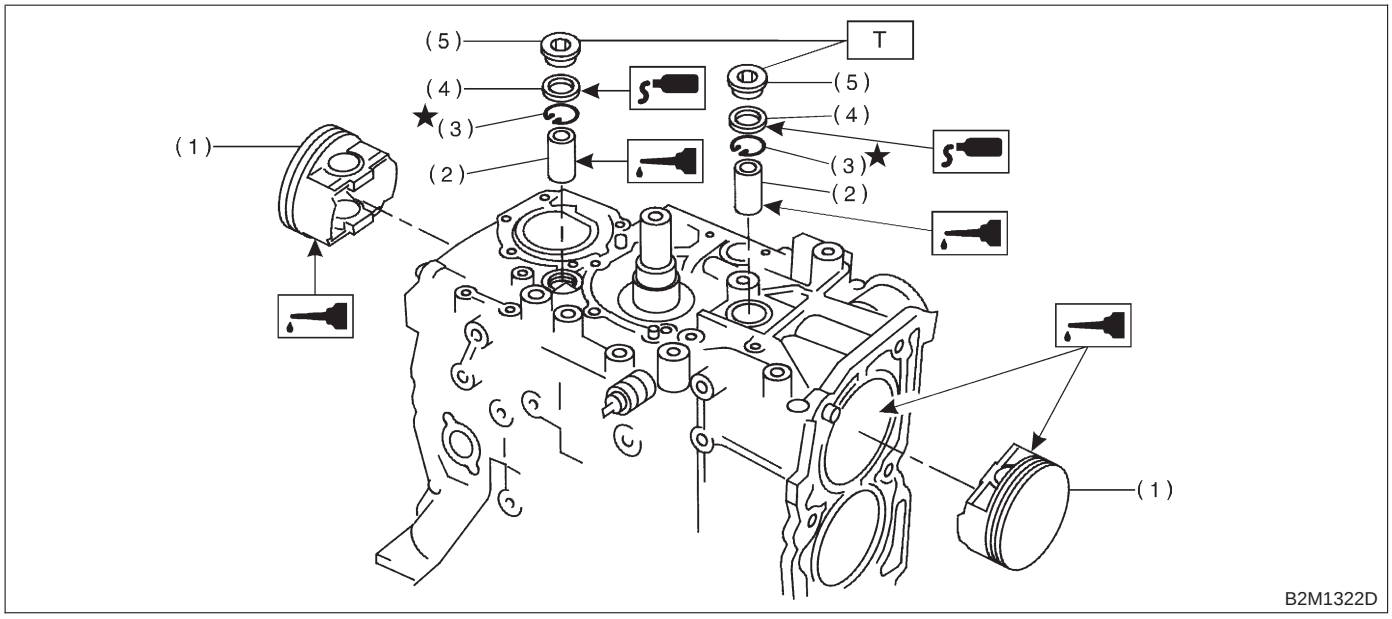
Tightening torque:
(A) — (G): 25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
(H): 6.4 N·m (0.65 kg-m, 4.7 ft-lb)



7) Install rear oil seal by using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER



3. PISTON AND PISTON PIN (#1 AND #2)



(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug

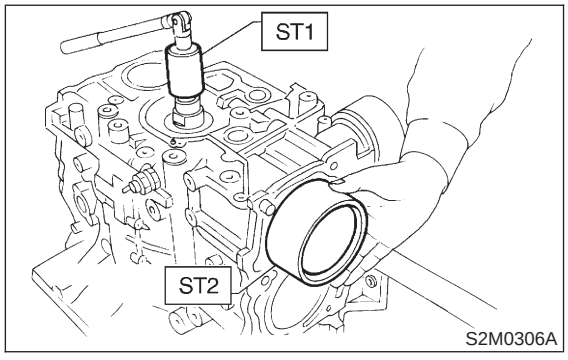
Tightening torque: N·m (kg-m, ft-lb)
T: 69±7 (7.0±0.7, 50.6±5.1)

1) Installing piston
(1) Turn cylinder block so that #1 and #2 cylinders face upward.
(2) Using ST1, turn crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

(3) Apply a coat of engine oil to pistons and cylinders and insert pistons in their cylinders by using ST2.

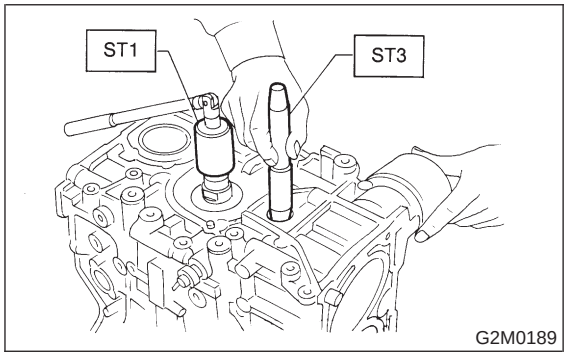
ST2 498747100 PISTON GUIDE



2) Installing piston pin
(1) Insert ST3 into service hole to align piston pin hole with connecting rod small end.

CAUTION:
Apply a coat of engine oil to ST3 before insertion.

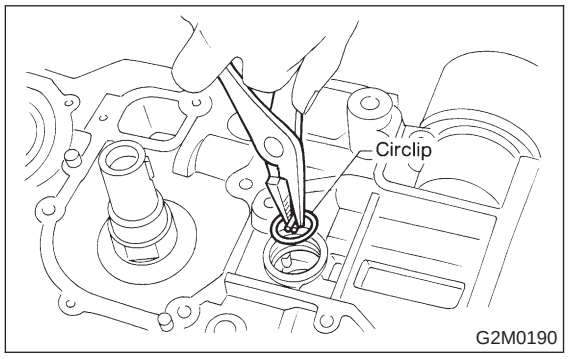
ST3 499017100 PISTON PIN GUIDE



(2) Apply a coat of engine oil to piston pin and insert piston pin into piston and connecting rod through service hole.

(3) Install circlip.

CAUTION:
Use new circlips.

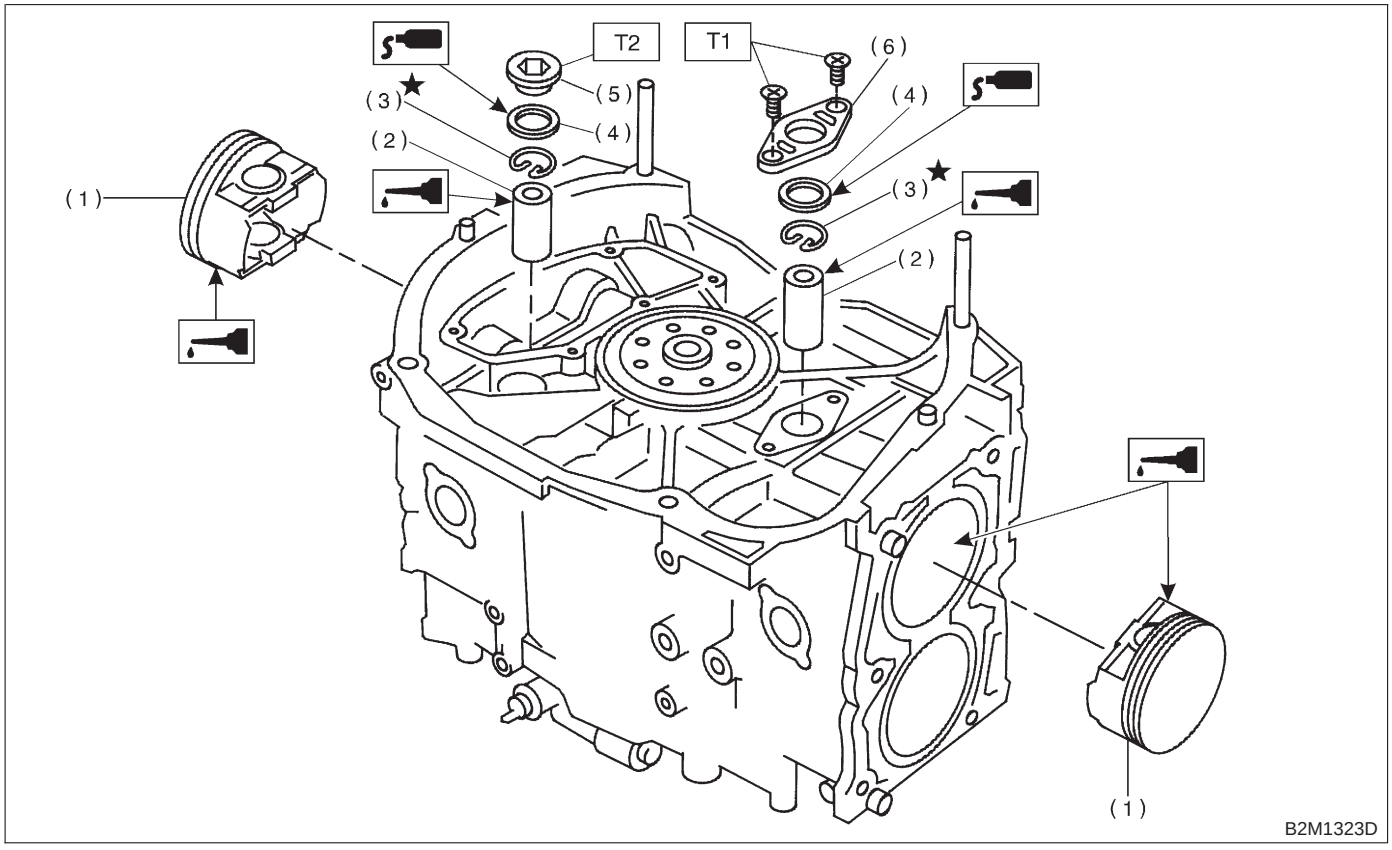


(4) Install service hole plug and gasket.

CAUTION:
Use a new gasket and apply a coat of fluid packing to it before installation.

Fluid packing:
THREE BOND 1215 or equivalent

4. PISTON AND PISTON PIN (#3 AND #4)



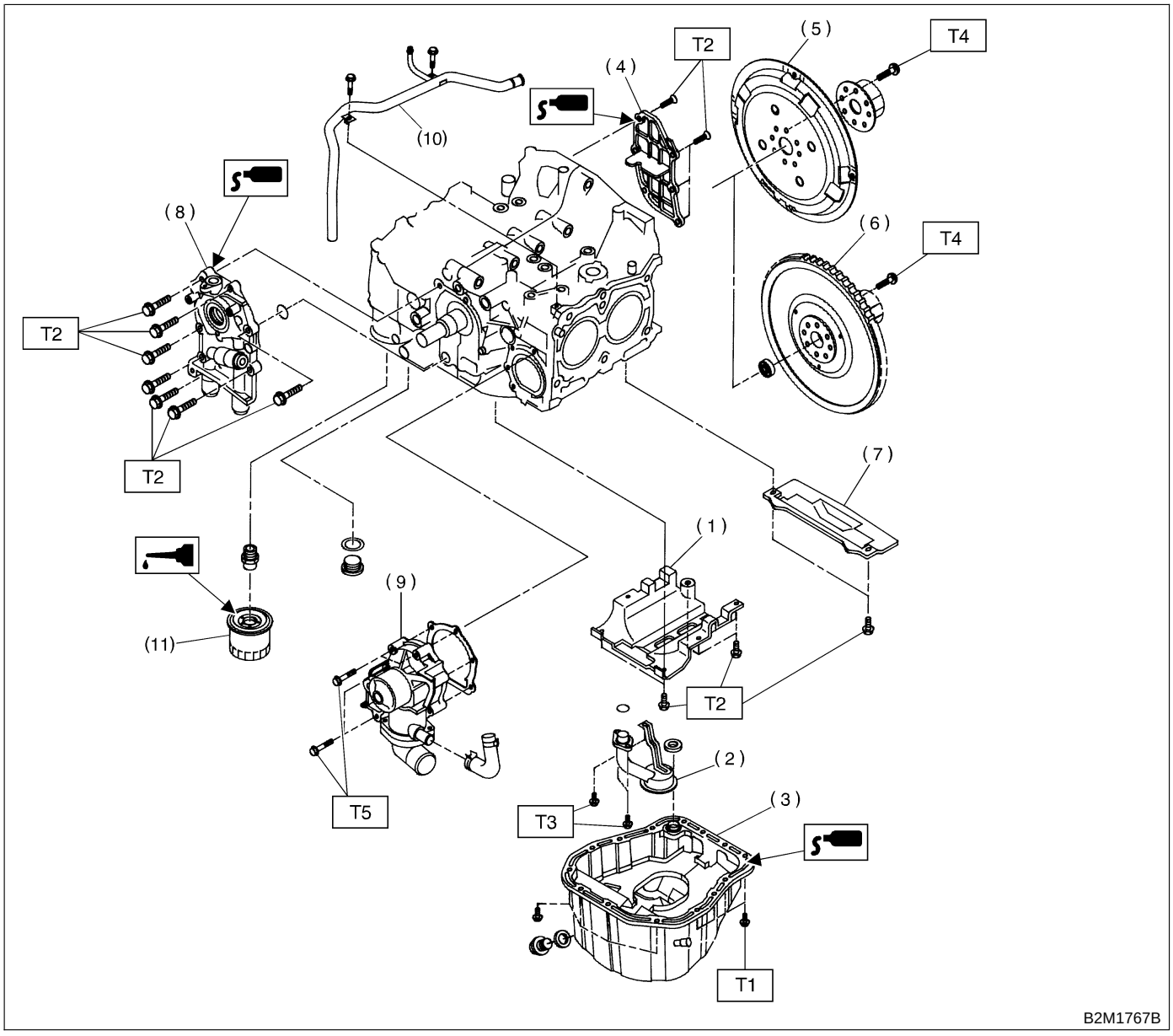
(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
(6) Service hole cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 69±7 (7.0±0.7, 50.6±5.1)

Turn cylinder block so that #3 and #4 cylinders face upward. Using the same procedures as used for #1 and #2 cylinders, install pistons and piston pins.

E: INSTALLATION

1. OIL PUMP AND WATER PUMP

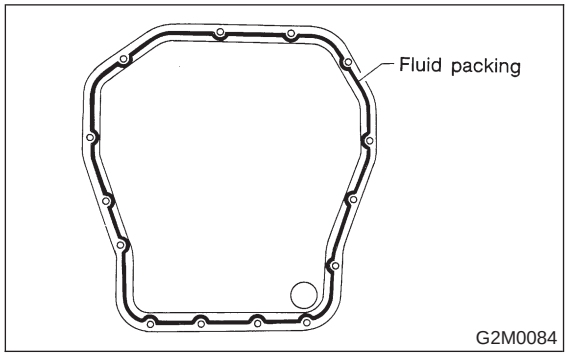


(1) Baffle plate
(2) Oil strainer
(3) Oil pan
(4) Oil separater cover
(5) Drive plate (AT vehicles only)
(6) Flywheel (MT vehicles only)
(7) Clutch housing cover (MT vehicles only)
(8) Oil pump
(9) Water pump
(10) Water by-pass pipe
(11) Oil filter

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 72±3 (7.3±0.3, 52.8±2.2)
T5: First 12±2 (1.2±0.2, 8.7±1.4)
Second 12±2 (1.2±0.2, 8.7±1.4)

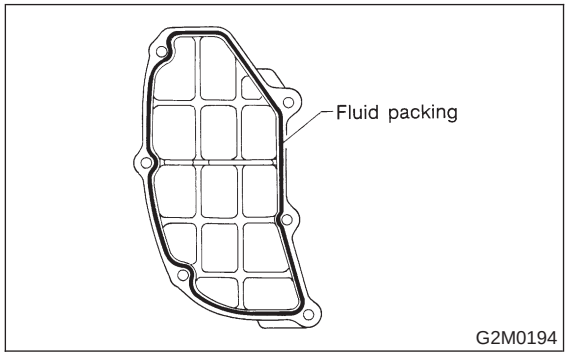
1) Install baffle plate.
2) Install oil strainer and O-ring
3) Install oil strainer stay.
4) Apply fluid packing to matching surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent

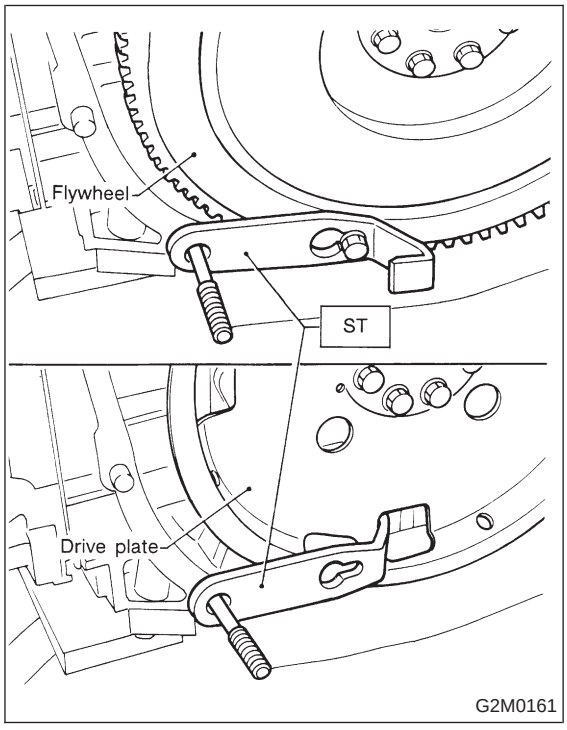


5) Apply fluid packing to matching surfaces and install oil separator cover.

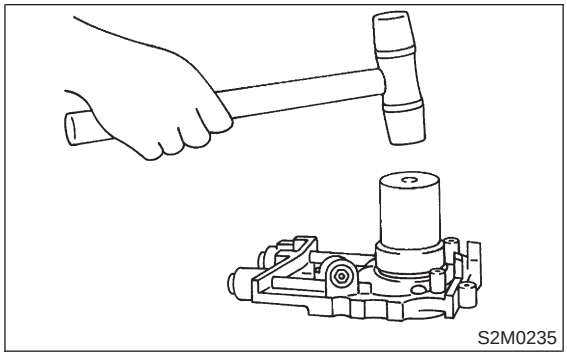
Fluid packing:
THREE BOND 1215 or equivalent



6) Install flywheel or drive plate.
To lock crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

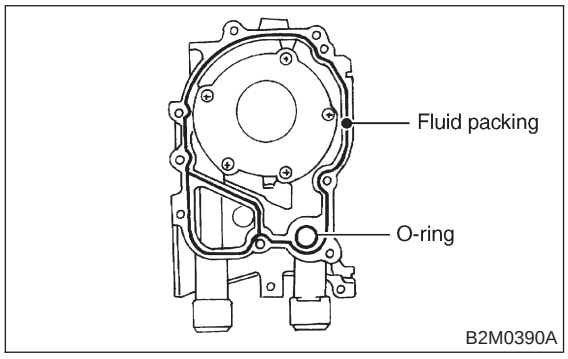


7) Install housing cover.
8) Installation of oil pump
(1) Discard front oil seal after removal. Replace with a new one by using ST.
ST 499587100 OIL SEAL INSTALLER



(2) Apply fluid packing to matching surface of oil pump.

Fluid packing:
THREE BOND 1215 or equivalent

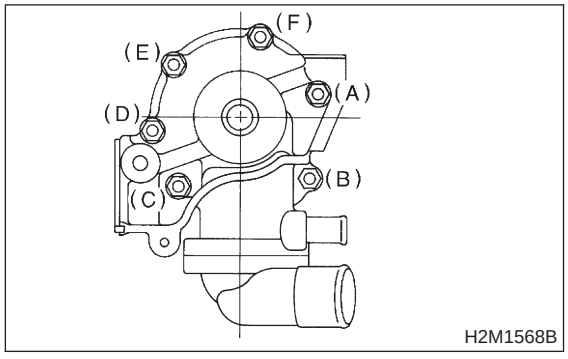


(3) Install oil pump on cylinder block. Be careful not to damage oil seal during installation.

CAUTION:
● Do not forget to install O-ring and seal when installing oil pump.
● Align flat surface of oil pump's inner rotor with crankshaft before installation.

9) Install water pump and gasket.

CAUTION:
● Be sure to use a new gasket.
● When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in Figure.



10) Install water pipe.
11) Install oil filter.

2. RELATED PARTS

1) Install cylinder head and intake manifold.
<Ref. to 2-3a [W5E0].>
2) Install timing belt, camshaft sprocket and related parts.
<Ref. to 2-3a [W2C0].>

1. Engine Trouble in General

NOTE:
"RANK" shown in the chart refer to the possibility of reason for the trouble in order ("Very often" to "Rarely")
A — Very often
B — Sometimes
C — Rarely

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
1.Engine will not start			
1) Starter does not turn.	● Starter	● Defective battery-to-starter harness	B
		● Defective starter switch	C
		● Defective inhibitor switch or neutral switch	C
		● Defective starter	B
	● Battery	● Poor terminal connecton	A
		● Run-down battrey	A
		● Defective charging system	B
	● Friction	● Seizure of crankshaft and connecting rod bearing	C
		● Seized camshaft	C
		● Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	● Starter	● Defective starter	C
	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Fuel line	● Defective fuel pump and relay	A
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B
3) Initial combustion occur.	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Intake system	● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
4) Engine stalls after initial combustion.	Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Intake system	● Loosened or cracked intake uct	B
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	C
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Dirty air cleaner element	C
	● Fuel line	● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B
2. Rough idle and engine stall.	Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	C
		● Loosened oil filter cap	B
		● Dirty air cleaner element	C
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective timing	C
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
		● Defective rocker cover gasket	C
	● Cooling system	● Overheating	C
	● Others	● Malfunction of evaporative emission control system	A
		● Stuck or damaged throttle valve	B
		● Accelerator cable out of adjustment	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration.	● Fuel injection system (Ref. to 2-7 On-Bard Diagnostics II System.)		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	B
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filter cap	B
		● Dirty air cleaner element	A
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
	● Cooling system	● Overheating	C
		● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	A
4. Surging.	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filter cap	B
		● Dirty air cleaner element	B
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Cooling system	● Overheating	B
	● Others	● Malfunction of evaporative emission control system	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
5. Engine does not return to idle.	Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Intake system	● Loosened or cracked vacuum hose	A
	● Others	● Stuck or damaged throttle valve	A
		● Accelerator cable out of adjustment	B
6. Dieseling (Run-on)	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Cooling system	● Overheating	B
	● Others	● Malfunction of evaporative emission control system	B
7. After burning in exhaust system.	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Intake system	● Loosened or cracked intake duct	C
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	B
		● Defective PCV valve	B
		● Loosened oil filter cap	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	C
8. Knocking.	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Intake system	● Loosened oil filter cap	B
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Incorrect valve timing	B
	● Cooling system	● Overheating	A
9. Excessive engine oil consumption.	● Intake system	● Loosened or cracked PCV hose	A
		● Defective PCV valve	B
		● Loosened oil filter cap	C
	● Compression	● Defective valve stem	A
		● Worn or stuck piston rings, cylinder and piston	A
	● Lubrication system	● Loosened oil pump attaching bolts and defective gasket	B
		● Defective oil filter seal	B
		● Defective crankshaft oil seal	B
		● Defective rocker cover gasket	B
		● Loosened oil drain plug or defective gasket	B
		● Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption.	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System.)		A
	● Intake system	● Dirty air cleaner element	A
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	B
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Accelerator cable out of adjustment	B

2. Engine Noise

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	● Valve mechanism is defective. ● Incorrect valve clearance ● Worn valve rocker ● Worn camshaft ●Broken valve spring
Heavy and dull clank	Oil pressure is low.	● Worn crankshaft main bearing ● Worn connecting rod bearing (big end)
	Oil pressure is normal.	● Loose flywheel mounting bolts ● Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	● Ignition timing advanced ● Accumulation of carbon inside combustion chamber ● Wrong spark plug ● Improper gasoline
Clank when engine speed is medium (1,000 to 2,000 rpm).	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	● Worn crankshaft main bearing ● Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm.	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	● Worn cylinder liner and piston ring ● Broken or stuck piston ring ● Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	● Unusually worn valve lifter ● Worn cam gear ● Worn camshaft journal bore in crankcase
Squeaky sound	—	● Insufficient generator lubrication
Rubbing sound	—	● Defective generator brush and rotor contact
Gear scream when starting engine	—	● Defective ignition starter switch ● Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	● Loose drive belt ● Defective engine coolant pump shaft
Hissing sound	—	● Loss of compression ● Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	● Loose timing belt ● Belt contacting case/adjacent part
Valve tappet noise	—	● Incorrect valve clearance

NOTE*:
When disconnecting fuel injector connector, Malfunction Indicator Light (CHECK ENGINE light) illuminates and trouble code is stored in ECM memory.
Therefore, carry out the CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].> after connecting fuel injector connector.

MEMO:

ENGINE (DOHC) 2-3b

1. Engine

A: SPECIFICATIONS

Engine	Type			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement			Belt driven, double over-head camshaft, 4-valve/cylinder
	Bore × Stroke		mm (in)	99.5 × 79.0 (3.917 × 3.110)
	Displacement		cm^3 (cu in)	2,457 (149.93)
	Compression ratio			9.5
	Compression pressure (at 200 — 300 rpm)	Standard	kPa (kg/cm^2, psi) − rpm	1,216 (12.4, 176) − 350
		Limit	kPa (kg/cm^2, psi) − rpm	941 (9.6, 137) − 350
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening		6° BTDC
		Closing		50° ABDC
	Exhaust valve timing	Opening		Front: 54° BBDC, Rear: 30° BBDC (Position in degrees)
		Closing		Front: 10° ATDC, Rear: 10° ATDC (Position in degrees)
	Valve clearance	Intake	mm (in)	0.20±0.02 (0.0079±0.0008)
		Exhaust	mm (in)	0.25±0.02 (0.0098±0.0008)
	Idling speed [At neutral position on MT, or “P” or “N” position on AT]		rpm	700±100 (No load) 850±50 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4
Ignition timing			BTDC/rpm	15°±8°/700 rpm

B: SERVICE DATA

NOTE:
STD: Standard, I.D.: Inner Diameter, O.D.: Outer Diameter, OS: Oversize, US: Undersize

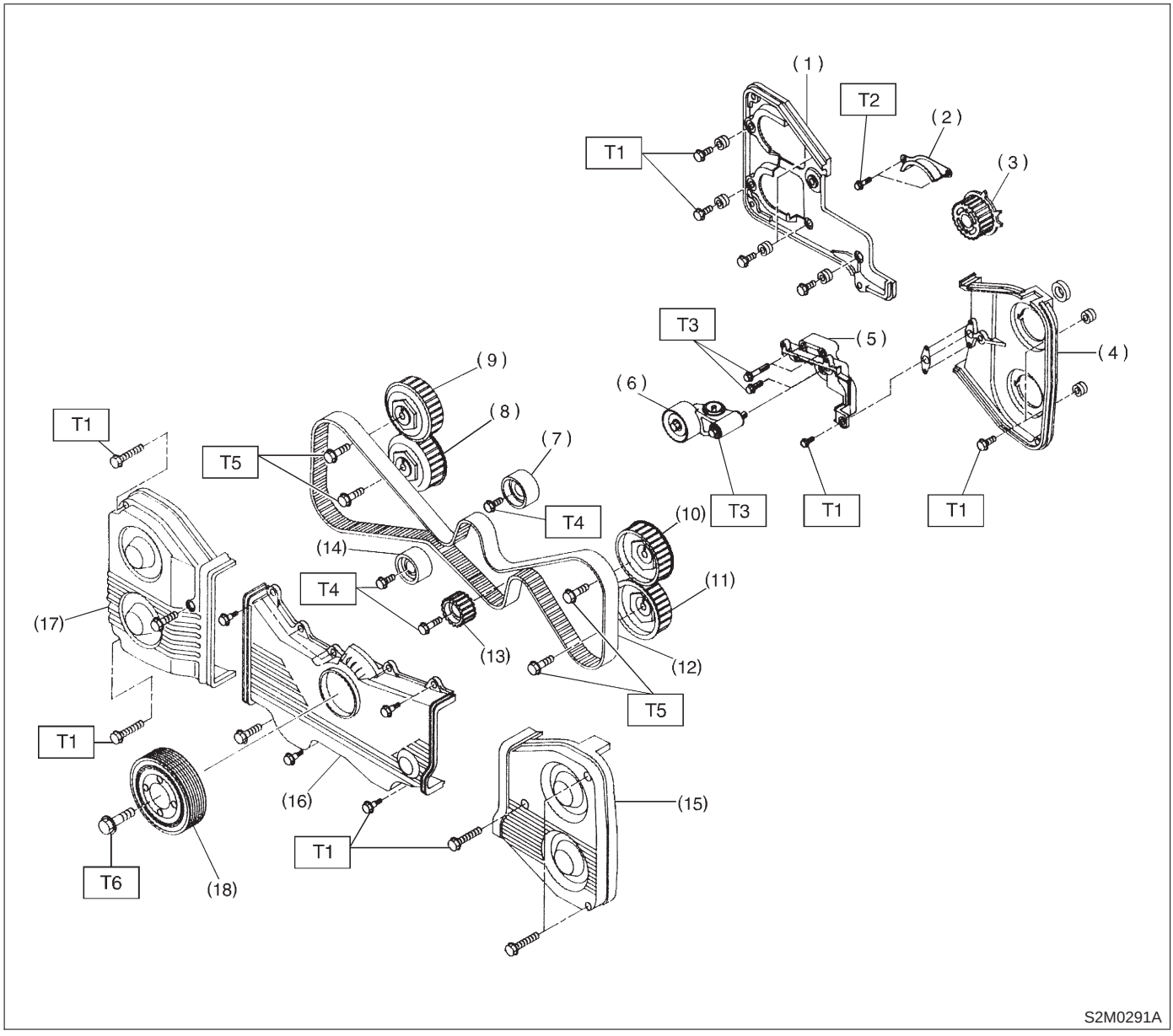
Belt tension adjuster	Protrusion of adjuster rod			15.4 — 16.4 mm	(0.606 — 0.646 in)
Belt tensioner	Spacer O.D.			16 mm	(0.63 in)
	Tensioner bush I.D.			16.16 mm	(0.6362 in)
	Clearance between spacer and bush		STD	0.117 — 0.180 mm	(0.0046 — 0.0071 in)
			Limit	0.230 mm	(0.0091 in)
	Side clearance of spacer		STD	0.37 — 0.54 mm	(0.0146 — 0.0213 in)
			Limit	0.8 mm	(0.031 in)
Camshaft	Bend limit			0.020 mm	(0.0008 in)
	Thrust clearance		STD	0.040 — 0.080 mm	(0.0016 — 0.0031 in)
			Limit	0.10 mm	(0.0039 in)
	Cam lobe height	Intake	STD	42.20 — 42.30 mm	(1.6614 — 1.6654 in)
			Limit	42.04 mm	(1.6551 in)
		Exhaust	STD	Front: 42.50 — 42.60 mm Rear: 41.40 — 41.50 mm	(1.6732 — 1.6772 in) (1.6299 — 1.6339 in)
			Limit	Front: 42.34 mm Rear: 41.24 mm	(1.6669 in) (1.6236 in)
	Camshaft journal O.D.		Front	31.946 — 31.963 mm	(1.2577 — 1.2584 in)
			Center	27.946 — 27.963 mm	(1.1002 — 1.1009 in)
			Rear	27.946 — 27.963 mm	(1.1002 — 1.1009 in)
	Camshaft journal hole I.D.		Front	32.000 — 32.018 mm	(1.2598 — 1.2605 in)
			Center	28.000 — 28.018 mm	(1.1024 — 1.1031 in)
			Rear	28.000 — 28.018 mm	(1.1024 — 1.1031 in)
	Oil clearance		STD	0.037 — 0.072 mm	(0.0015 — 0.0028 in)
			Limit	0.10 mm	(0.0039 in)
Cylinder head	Surface warpage limit			0.05 mm	(0.0020 in)
	Surface grinding limit			0.3 mm	(0.012 in)
	Standard height			127.5 mm	(5.02 in)
Valve seat	Refacing angle			90°	
	Contacting width	Intake	STD	1.0 mm	(0.039 in)
			Limit	1.7 mm	(0.067 in)
		Exhaust	STD	1.5 mm	(0.059 in)
			Limit	2.2 mm	(0.087 in)
Valve guide	Inner diameter			6.000 — 6.015 mm	(0.2362 — 0.2368 in)
	Protrusion above head			12.0 — 12.4 mm	(0.472 — 0.488 in)
Valve	Head edge thickness	Intake	STD	1.2 mm	(0.047 in)
			Limit	0.8 mm	(0.031 in)
		Exhaust	STD	1.5 mm	(0.059 in)
			Limit	0.8 mm	(0.031 in)
	Stem diameter		Intake	5.950 — 5.965 mm	(0.2343 — 0.2348 in)
			Exhaust	5.950 — 5.965 mm	(0.2343 — 0.2348 in)
	Stem oil clearance	STD	Intake	0.035 — 0.062 mm	(0.0014 — 0.0024 in)
			Exhaust	0.040 — 0.067 mm	(0.0016 — 0.0026 in)
		Limit	—	0.15 mm	(0.0059 in)
	Overall length		Intake	105.9 mm	(4.169 in)
			Exhaust	106.2 mm	(4.181 in)

Valve spring	Free length			48.04 mm	(1.8913 in)
	Squareness			2.5°, 2.1 mm	(0.083 in)
	Tension/spring height			146.1 — 167.7 N (14.9 — 17.1 kg, 32.9 — 37.7 lb)/42.0 mm (1.654 in) 455.0 — 523.7 N (46.4 — 53.4 kg, 102.3 — 117.7 lb)/33.4 mm (1.315 in)	
Cylinder block	Surface warpage limit (mating with cylinder head)			0.05 mm	(0.0020 in)
	Surface grinding limit			0.1 mm	(0.004 in)
	Cylinder bore	STD	A	99.505 — 99.515 mm	(3.9175 — 3.9179 in)
			B	99.495 — 99.505 mm	(3.9171 — 3.9175 in)
	Taper		STD	0.015 mm	(0.0006 in)
			Limit	0.050 mm	(0.0020 in)
	Out-of-roundness		STD	0.010 mm	(0.0004 in)
			Limit	0.050 mm	(0.0020 in)
	Piston clearance		STD	0.010 — 0.030 mm	(0.0004 — 0.0012 in)
			Limit	0.050 mm	(0.0020 in)
	Enlarging (boring) limit			0.5 mm	(0.020 in)
Piston	Outer diameter	STD	A	99.485 — 99.495 mm	(3.9167 — 3.9171 in)
			B	99.475 — 99.485 mm	(3.9163 — 3.9167 in)
		0.25 mm (0.0098 in) OS		99.725 — 99.735 mm	(3.9262 — 3.9266 in)
		0.50 mm (0.0197 in) OS		99.975 — 99.985 mm	(3.9360 — 3.9364 in)
Piston pin	Standard clearance between piston pin and hole in piston		STD	0.004 — 0.010 mm	(0.0002 — 0.0004 in)
			Limit	0.020 mm	(0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).	
Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.35 mm	(0.0079 — 0.0138 in)
			Limit	1.0 mm	(0.039 in)
		Second ring	STD	0.37 — 0.52 mm	(0.0146 — 0.0205 in)
			Limit	1.0 mm	(0.039 in)
		Oil ring	STD	0.20 — 0.60 mm	(0.0079 — 0.0236 in)
			Limit	1.5 mm	(0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm	(0.0016 — 0.0031 in)
			Limit	0.15 mm	(0.0059 in)
		Second ring	STD	0.030 — 0.070 mm	(0.0012 — 0.0028 in)
			Limit	0.15 mm	(0.0059 in)
Connecting rod	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm	(0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm	(0.0028 — 0.0130 in)
			Limit	0.4 mm	(0.016 in)
Connecting rod bearing	Oil clearance		STD	0.010 — 0.038 mm	(0.0004 — 0.0015 in)
			Limit	0.05 mm	(0.0020 in)
	Thickness at center portion		STD	1.492 — 1.501 mm	(0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US	1.510 — 1.513 mm	(0.0594 — 0.0596 in)
			0.05 mm (0.0020 in) US	1.520 — 1.523 mm	(0.0598 — 0.0600 in)
			0.25 mm (0.0098 in) US	1.620 — 1.623 mm	(0.0638 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm	(0 — 0.0009 in)
			Limit	0.030 mm	(0.0012 in)

Crankshaft	Bend limit			0.035 mm	(0.0014 in)
	Crank pin and crank journal	Out-of-roundness		0.020 mm (0.0008 in) or less	
		Grinding limit		0.25 mm	(0.0098 in)
	Crank pin outer diameter		STD	47.984 — 48.000 mm	(1.8891 — 1.8898 in)
			0.03 mm (0.0012 in) US	47.954 — 47.970 mm	(1.8879 — 1.8886 in)
			0.05 mm (0.0020 in) US	47.934 — 47.950 mm	(1.8872 — 1.8878 in)
			0.25 mm (0.0098 in) US	47.734 — 47.750 mm	(1.8793 — 1.8799 in)
	Crank journal outer diameter	#1, #5	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm	(2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm	(2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm	(2.3520 — 2.3527 in)
		#2, #3, #4	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm	(2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm	(2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm	(2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm	(0.0012 — 0.0045 in)
			Limit	0.25 mm	(0.0098 in)
	Oil clearance	#1, #5	STD	0.003 — 0.030 mm	(0.0001 — 0.0012 in)
		#2, #3, #4	STD	0.010 — 0.033 mm	(0.0004 — 0.0013 in)
		#1, #3, #5	Limit	0.040 mm	(0.0016 in)
		#2, #4	Limit	0.045 mm	(0.0018 in)

Crankshaft bearing	Crankshaft bearing thickness	#1, #5	STD	1.998 — 2.011 mm	(0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm	(0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm	(0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm	(0.0837 — 0.0839 in)
		#2, #3, #4	STD	2.000 — 2.013 mm	(0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm	(0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm	(0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm	(0.0838 — 0.0839 in)

1. Timing Belt

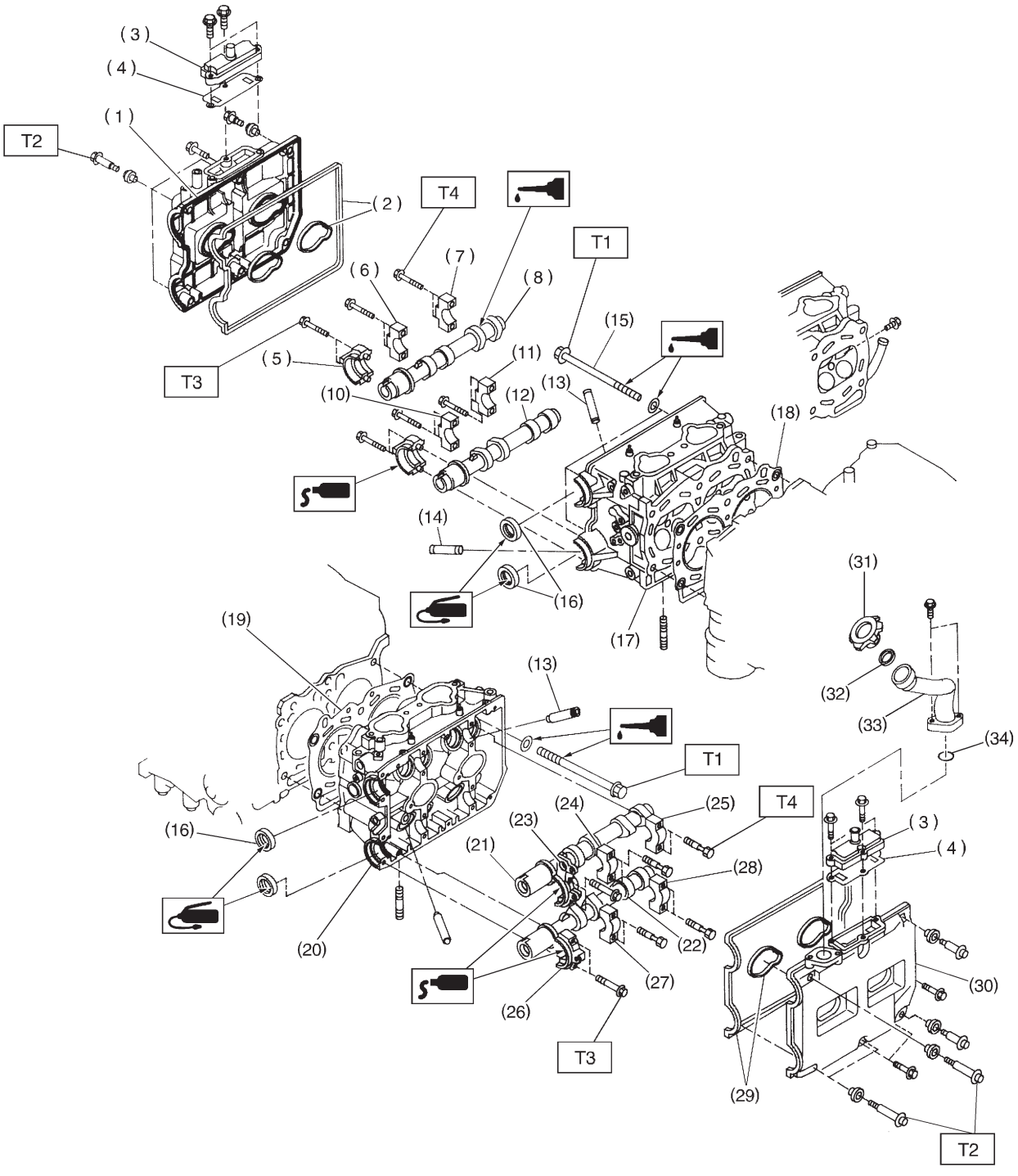


S2M0291A

(1) Right-hand belt cover No. 2
(2) Timing belt guide (MT vehicles only)
(3) Crankshaft sprocket
(4) Left-hand belt cover No. 2
(5) Tensioner bracket
(6) Automatic belt tension adjuster ASSY
(7) Belt idler
(8) Right-hand exhaust camshaft sprocket
(9) Right-hand intake camshaft sprocket
(10) Left-hand intake camshaft sprocket
(11) Left-hand exhaust camshaft sprocket
(12) Timing belt
(13) Belt idler No. 2
(14) Belt idler
(15) Left-hand belt cover
(16) Front belt cover
(17) Right-hand belt cover
(18) Crankshaft pulley

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.9±0.5 (0.5±0.05, 3.6±0.4)
T2: 9.8±1.0 (1.0±0.1, 7.2±0.7)
T3: 25±3 (2.5±0.3, 18.1±2.2)
T4: 39±4 (4.0±0.4, 28.9±2.9)
T5: 78±5 (8.0±0.5, 57.9±3.6)
T6: 177±10 (18.0±1.0, 130±7)

2. Cylinder Head and Camshaft

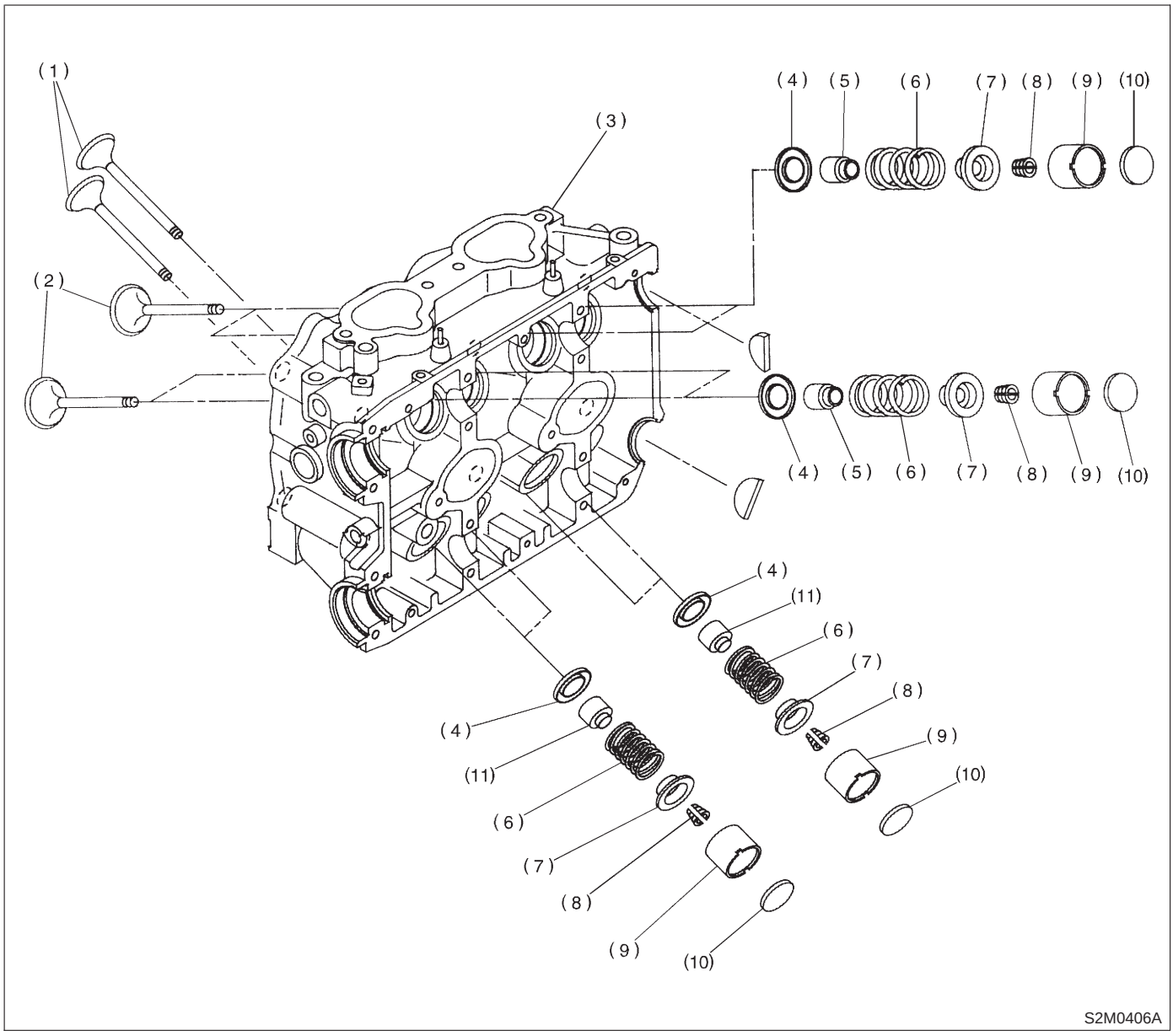


S2M0292C

(1) Rocker cover (RH)
(2) Rocker cover gasket (RH)
(3) Oil separator cover
(4) Gasket
(5) Intake camshaft cap (Front RH)
(6) Intake camshaft cap (Center RH)
(7) Intake camshaft cap (Rear RH)
(8) Intake camshaft (RH)
(9) Exhaust camshaft cap (Front RH)
(10) Exhaust camshaft cap (Center RH)
(11) Exhaust camshaft cap (Rear RH)
(12) Exhaust camshaft (RH)
(13) Intake valve guide
(14) Exhaust valve guide
(15) Cylinder head bolt
(16) Oil seal
(17) Cylinder head (RH)
(18) Cylinder head gasket (RH)
(19) Cylinder head gasket (LH)
(20) Cylinder head (LH)
(21) Intake camshaft (LH)
(22) Exhaust camshaft (LH)
(23) Intake camshaft cap (Front LH)
(24) Intake camshaft cap (Center LH)
(25) Intake camshaft cap (Rear LH)
(26) Exhaust camshaft (Front LH)
(27) Exhaust camshaft cap (Center LH)
(28) Exhaust camshaft cap (Rear LH)
(29) Rocker cover gasket (LH)
(30) Rocker cover (LH)
(31) Oil filler cap
(32) Gasket
(33) Oil filler duct
(34) O-ring

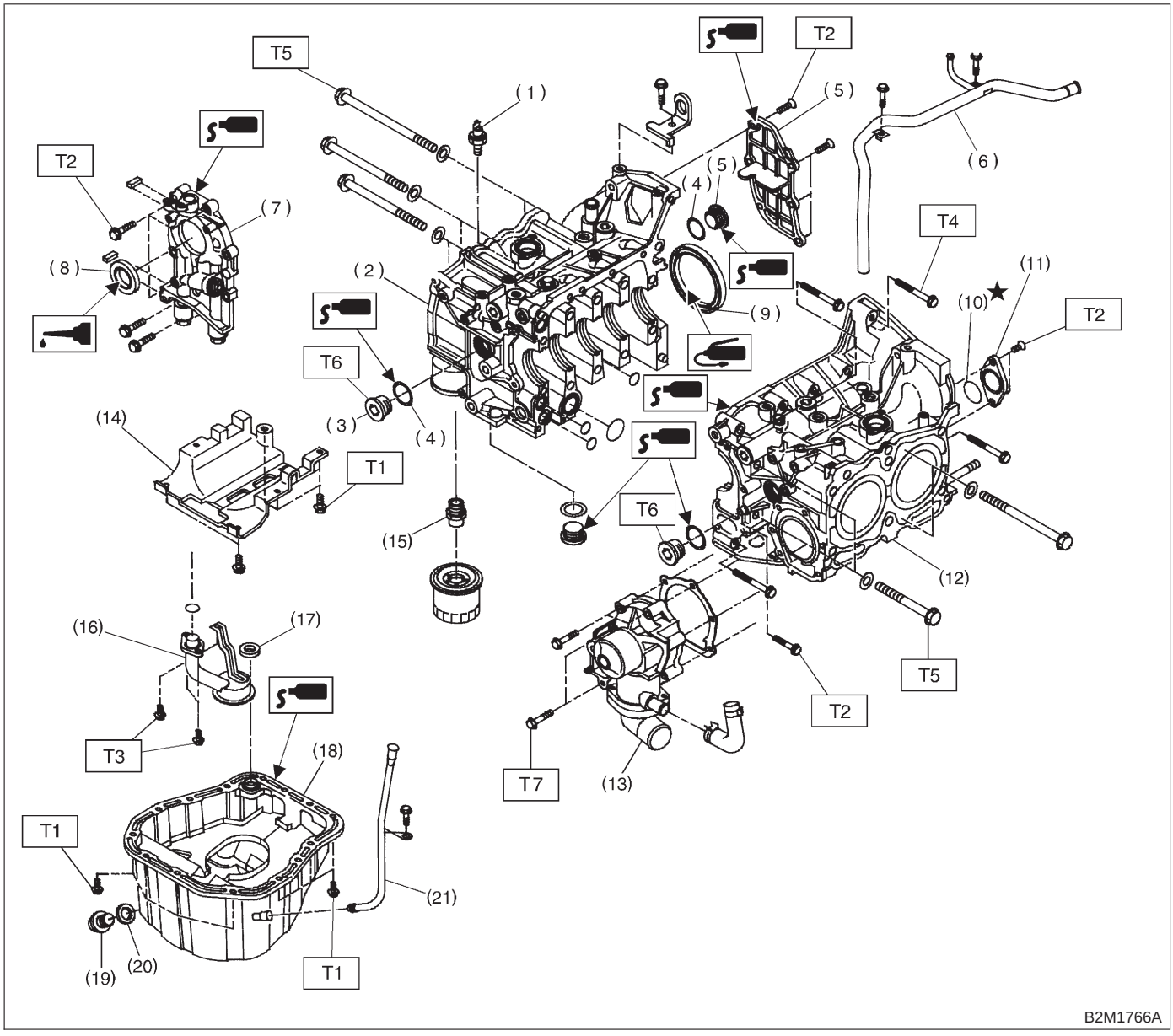
Tightening torque: N·m (kg-m, ft-lb)
T1: Refer to 2-3b [W4E1].
T2: 5 (0.5, 3.6)
T3: 10±0.7 (1.0±0.07, 7.2±0.5)
T4: 20±2 (2.0±0.2, 14.0±1.4)

3. Cylinder Head and Valve Assembly



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Shim
(11) Exhaust valve oil seal

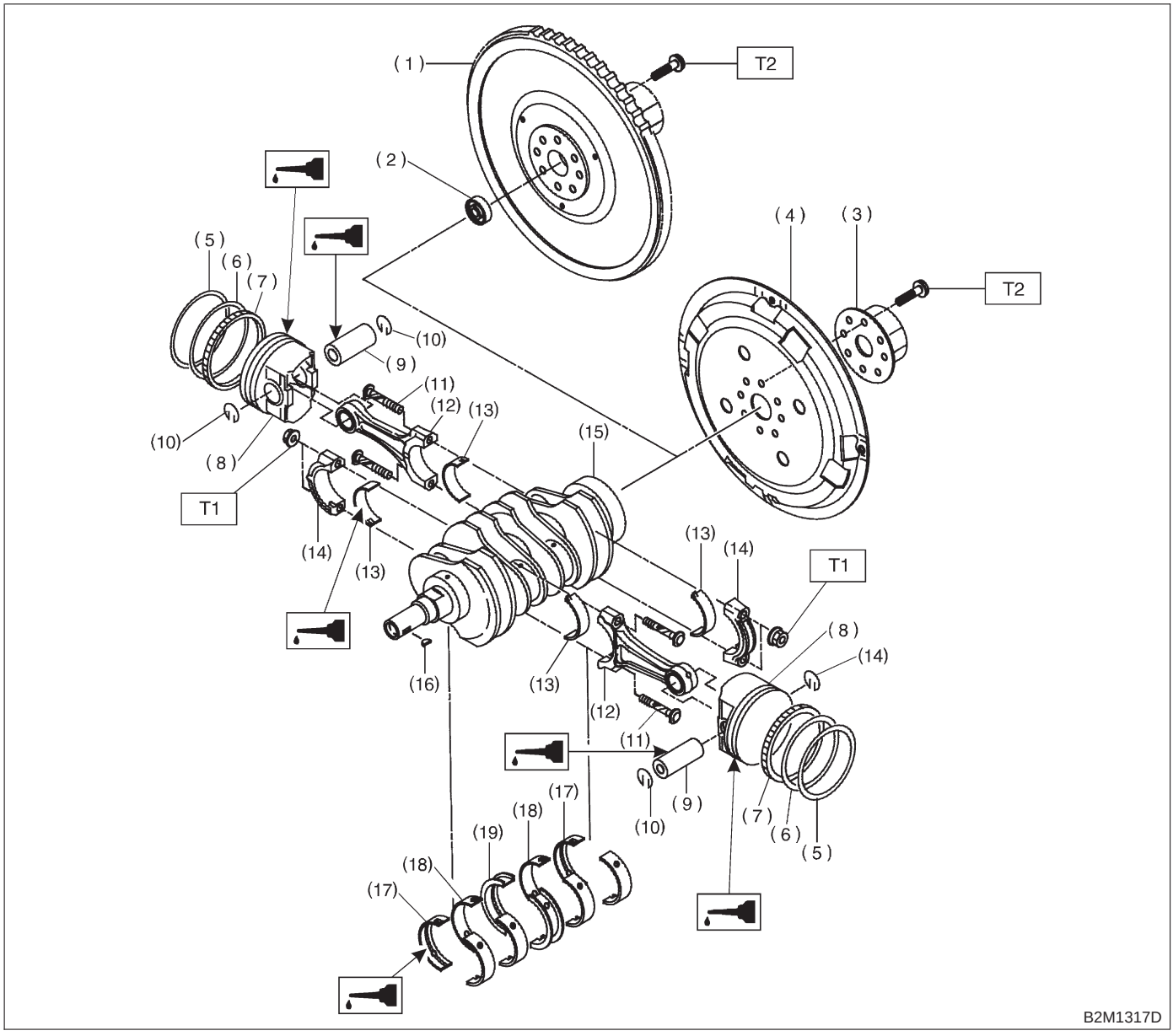
4. Cylinder Block



(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil filter connector
(16) Oil strainer
(17) Gasket
(18) Oil pan
(19) Drain plug
(20) Metal gasket
(21) Oil level gauge guide

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 25±2 (2.5±0.2, 18.1±1.4)
T5: 47±3 (4.8±0.3, 34.7±2.2)
T6: 69±7 (7.0±0.7, 50.6±5.1)
T7: First 12±2 (1.2±0.2, 8.7±1.4)
Second 12±2 (1.2±0.2, 8.7±1.4)

5. Crankshaft and Piston



(1) Flywheel (MT vehicles only)
(2) Bell bearing (MT vehicles only)
(3) Reinforcement (AT vehicles only)
(4) Drive plate (AT vehicles only)
(5) Top ring
(6) Second ring
(7) Oil ring
(8) Piston
(9) Piston pin
(10) Circlip
(11) Connecting rod bolt
(12) Connecting rod
(13) Connecting rod bearing
(14) Connecting rod cap
(15) Crankshaft
(16) Woodruff key
(17) Crankshaft bearing #1, #5
(18) Crankshaft bearing #2, #4
(19) Crankshaft bearing #3

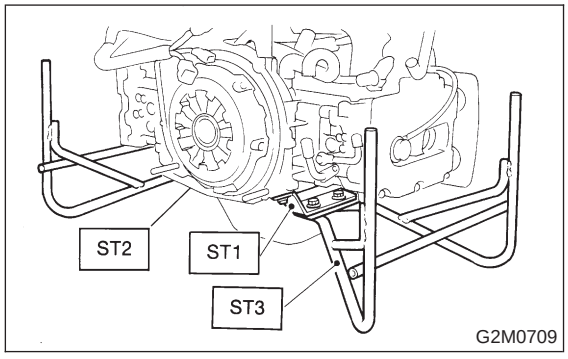
Tightening torque: N·m (kg-m, ft-lb)
T1: 44±2 (4.5±0.2, 32.5±1.4)
T2: 72±3 (7.3±0.3, 52.8±2.2)

1. Precautions

A: GENERAL PRECAUTIONS

(1) Before disassembling engine, place it on ST3.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817000	ENGINE STAND

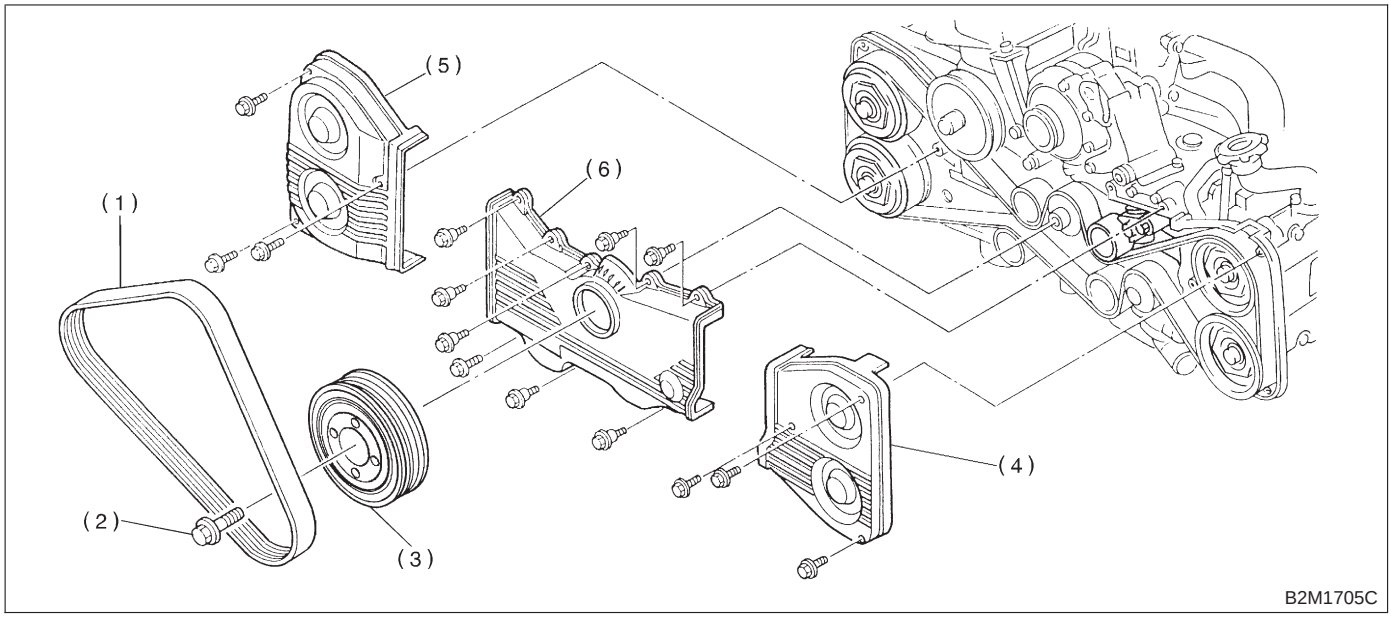


(2) All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
(3) Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
(4) Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
(5) All removed parts, if to be reused, should be reinstalled in the original positions and directions.
(6) Gaskets and lock washers must be replaced with new ones. Liquid gasket should be used where specified to prevent leakage.
(7) Bolts, nuts and washers should be replaced with new ones as required.
(8) Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.

2. Timing Belt

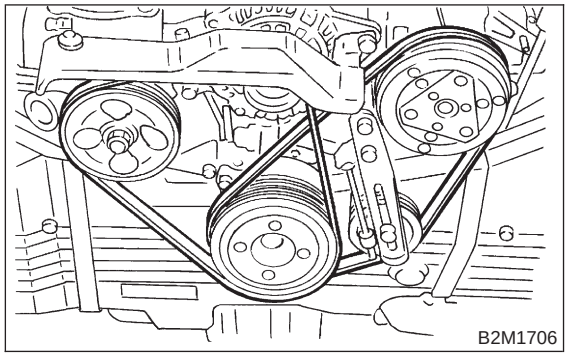
A: REMOVAL

1. CRANKSHAFT PULLEY AND BELT COVER

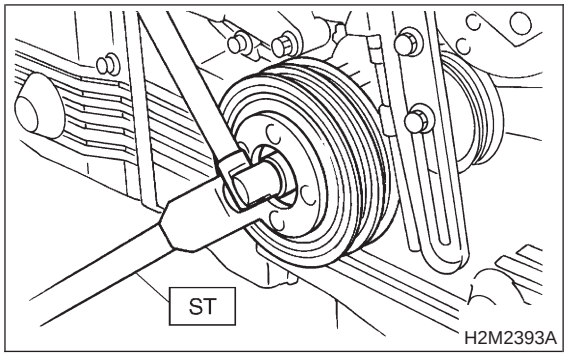


(1) V-belt
(2) Crankshaft pulley bolt
(3) Crankshaft pulley
(4) Left-hand belt cover No. 1
(5) Right-hand belt cover No. 1
(6) Front belt cover

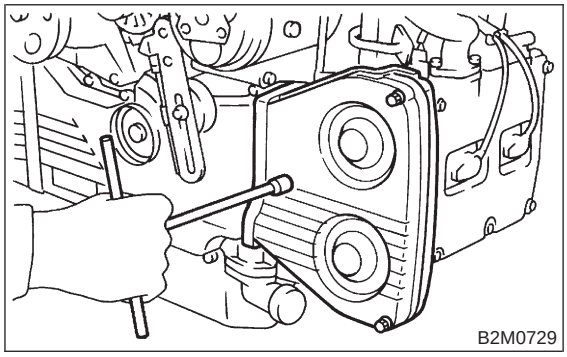
1) Remove V-belt cover, V-belt and air conditioning compressor drive belt tensioner. <Ref. to 1-5 [G2B0].>



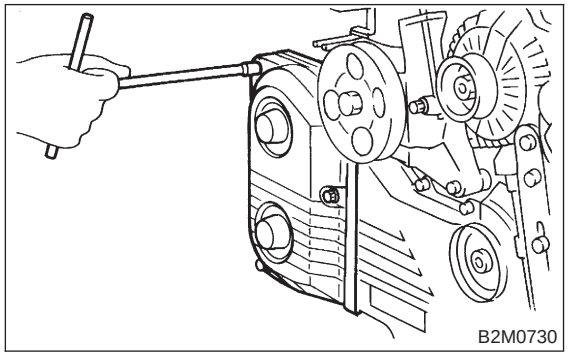
2) Remove pulley bolt. To lock crankshaft, use ST.
ST 499977100 CRANKSHAFT PULLEY WRENCH



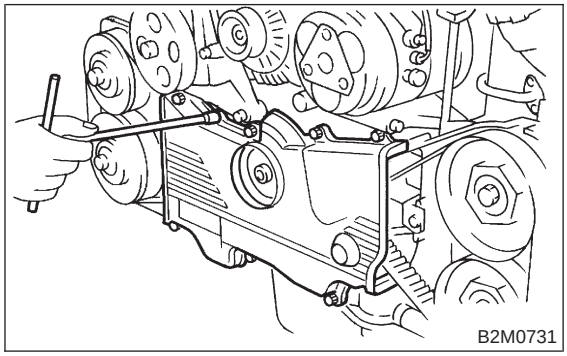
3) Remove crankshaft pulley.
4) Remove left-hand belt cover.



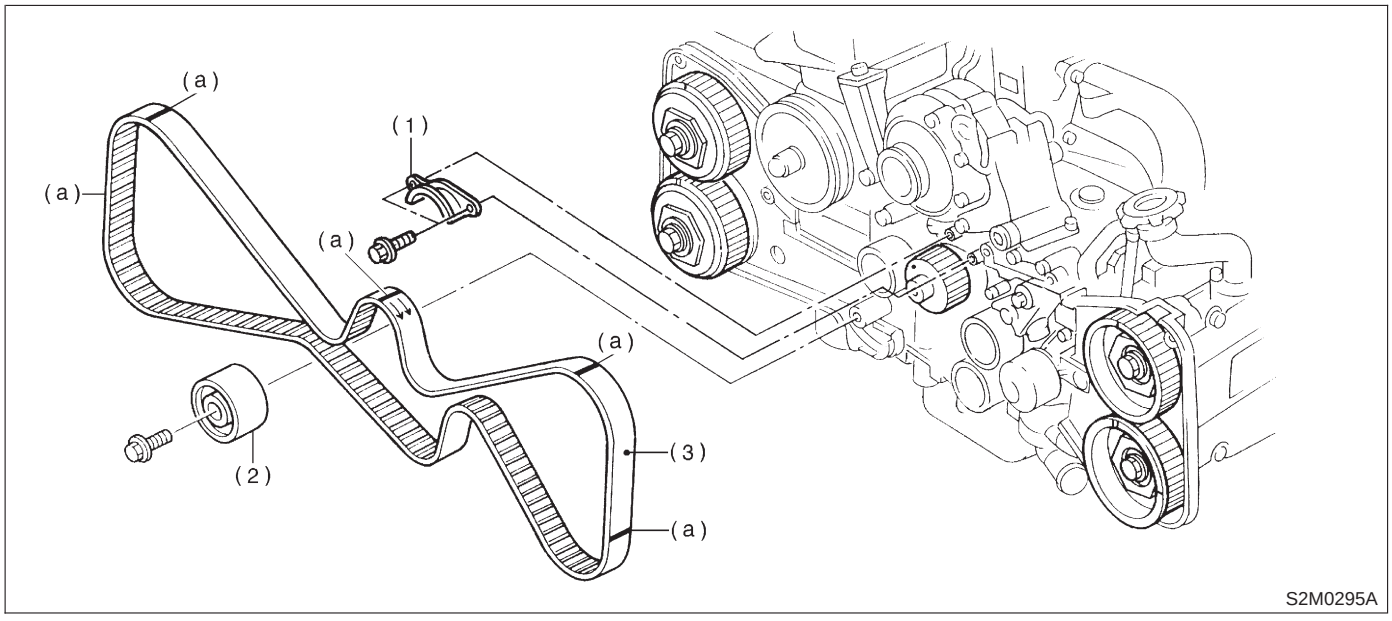
5) Remove right-hand belt cover.



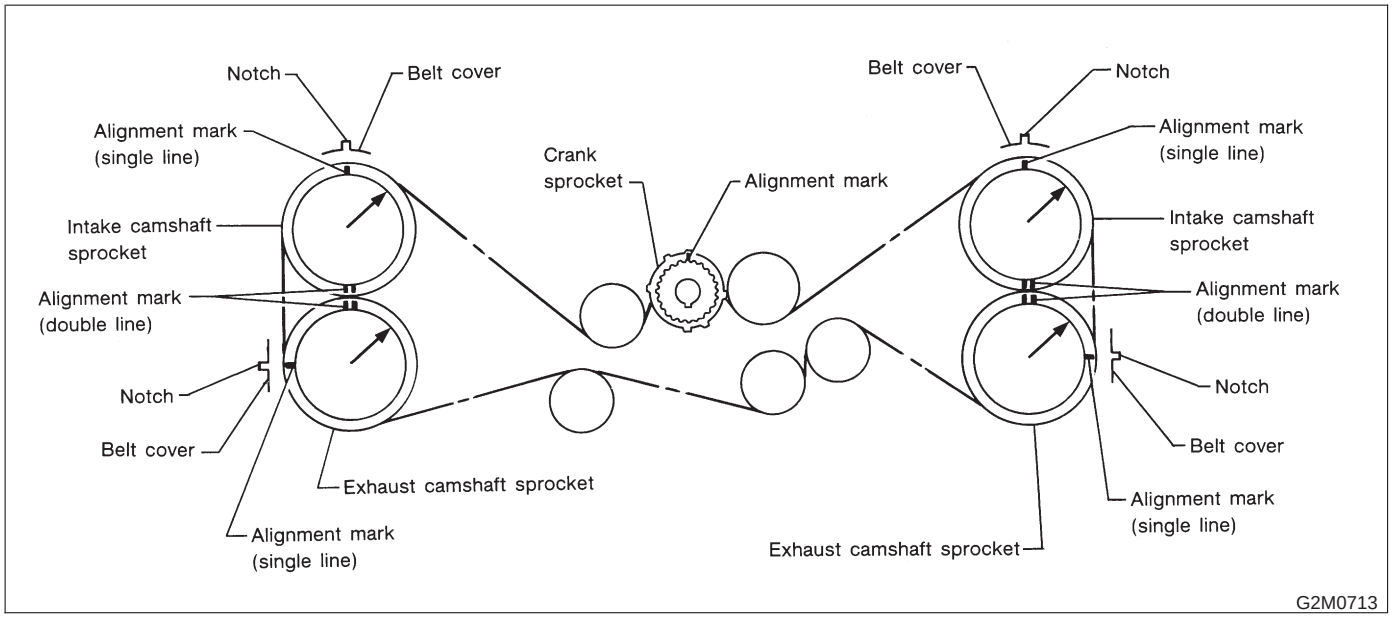
6) Remove front belt cover.



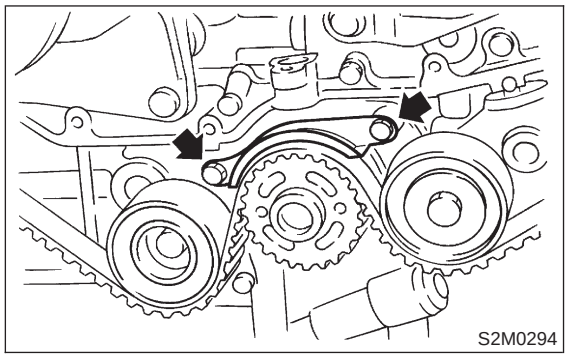
2. TIMING BELT



(1) Timing belt guide (MT vehicles only)
(2) Belt idler
(3) Timing belt
(a) Alignment marks



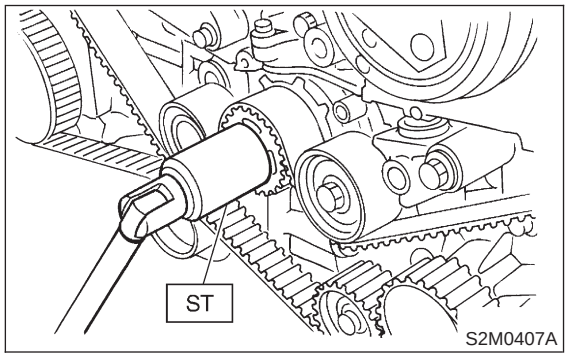
1) Remove timing belt guide. (MT vehicles only)


S2M0294

2) If alignment mark and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as follows:

(1) Turn crankshaft using ST, and align alignment marks on crankshaft sprocket, left-hand intake camshaft sprocket, left-hand exhaust camshaft sprocket, right-hand intake camshaft sprocket and right hand exhaust camshaft sprocket with notches of belt cover and cylinder block.

ST 499987500 CRANKSHAFT SOCKET



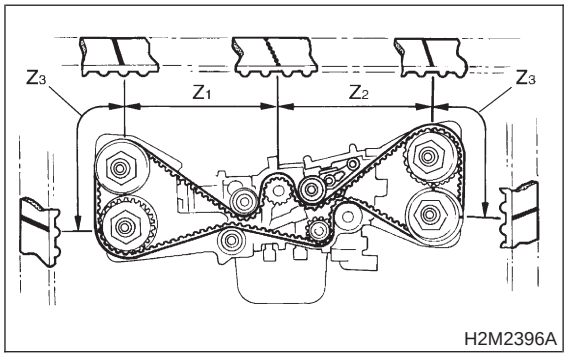
S2M0407A

(2) Using white paint, put alignment and/or arrow marks on timing belts in relation to the sprockets.

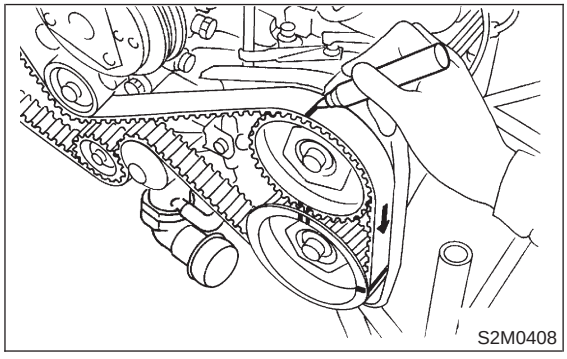
Z_1: 54.5 tooth length

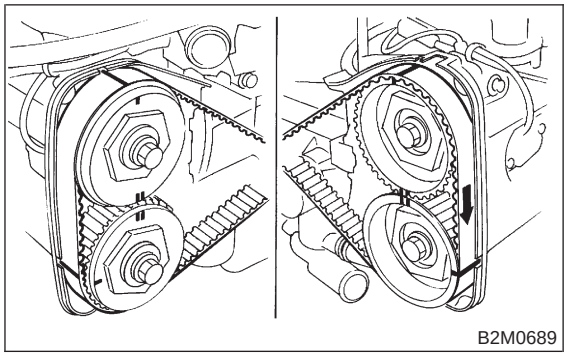
Z_2: 51 tooth length

Z_3: 28 tooth length

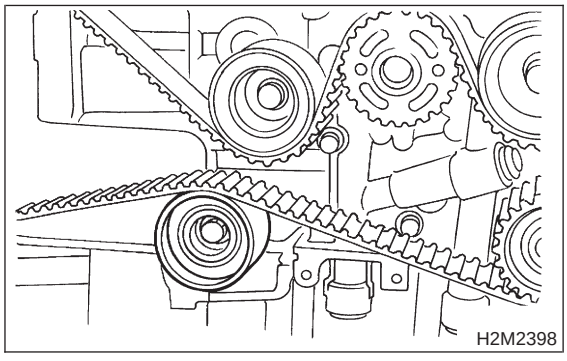


H2M2396A


S2M0408

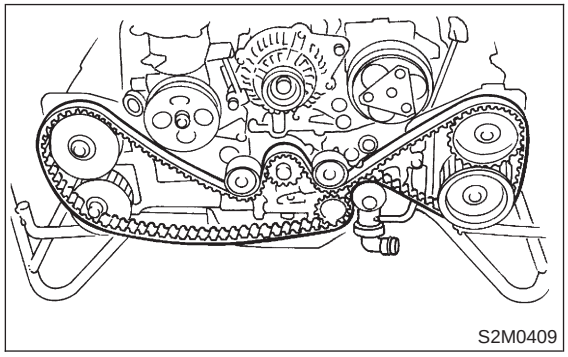

B2M0689

3) Remove belt idler.

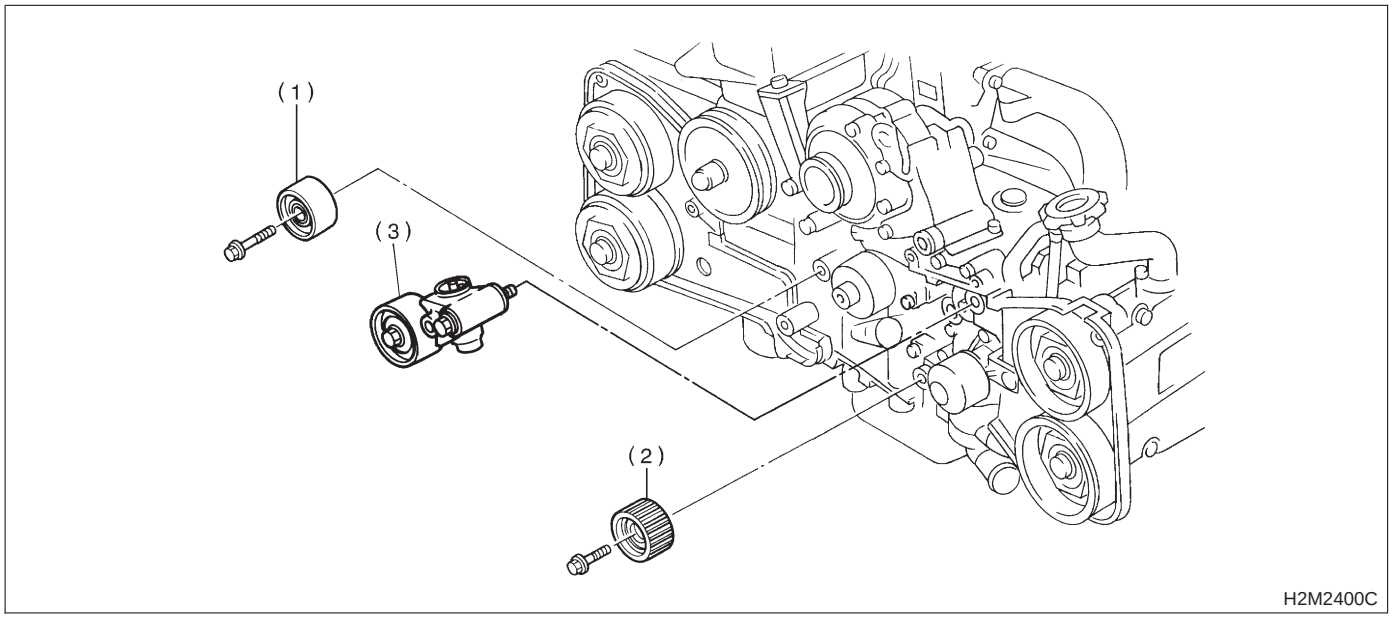

H2M2398

4) Remove timing belt.

CAUTION:
After timing belt has been removed, never rotate intake and exhaust, camshaft sprocket. If camshaft sprocket is rotated, the intake and exhaust valve heads strike together and valve stems are bent.


S2M0409

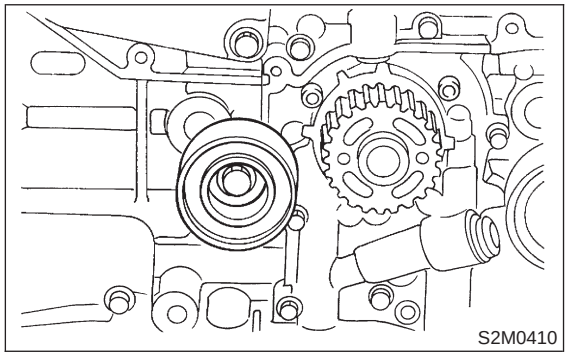
3. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY



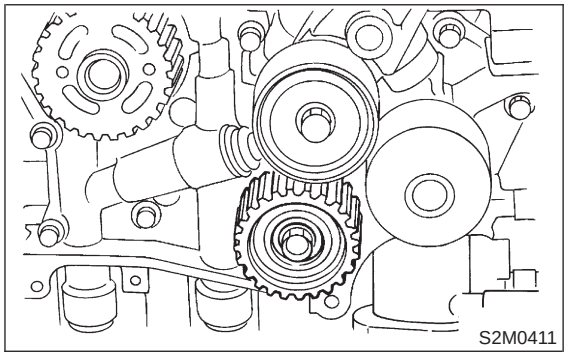
H2M2400C

(1) Belt idler
(2) Belt idler No. 2
(3) Automatic belt tension adjuster ASSY

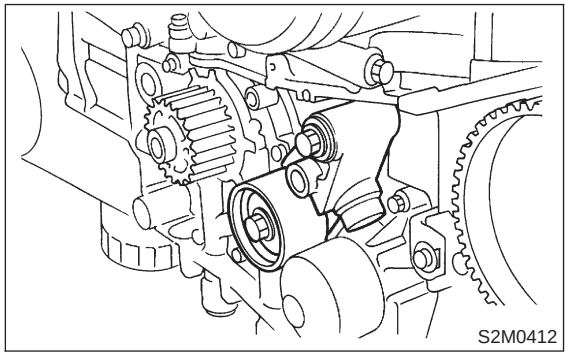
1) Remove belt idler.


S2M0410

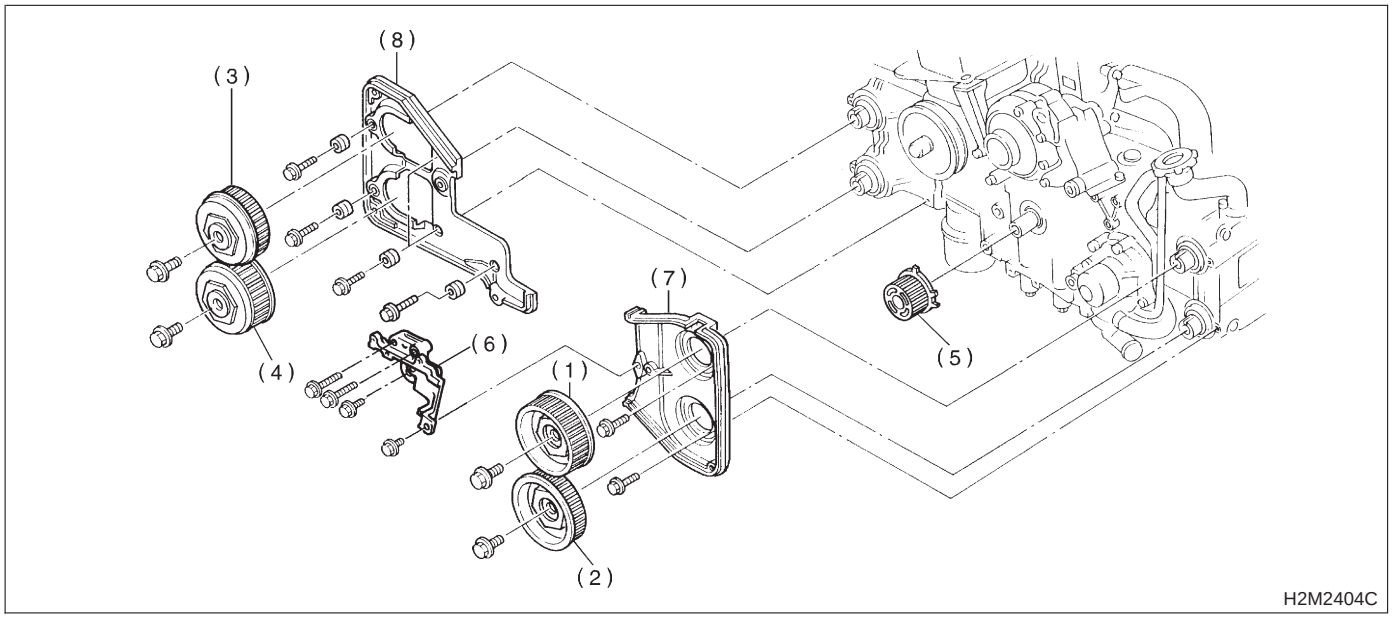
2) Remove belt idler No. 2.


S2M0411

3) Remove automatic belt tension adjuster assembly.



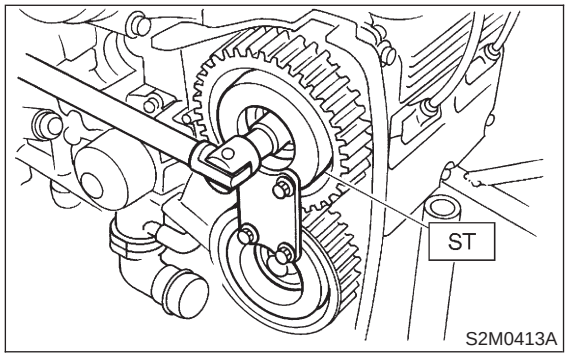
4. SPROCKET



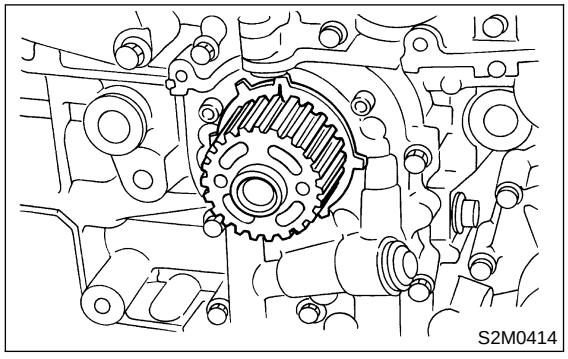
(1) Left-hand intake camshaft sprocket
(2) Left-hand exhaust camshaft sprocket
(3) Right-hand intake camshaft sprocket
(4) Right-hand exhaust camshaft sprocket
(5) Crankshaft sprocket
(6) Tensioner bracket
(7) Left-hand belt cover No. 2
(8) Right-hand belt cover No. 2

1) Remove left-hand intake camshaft sprocket.
2) Remove left-hand exhaust camshaft sprocket.
3) Remove right-hand intake camshaft sprocket.
4) Remove right-hand exhaust camshaft sprocket.

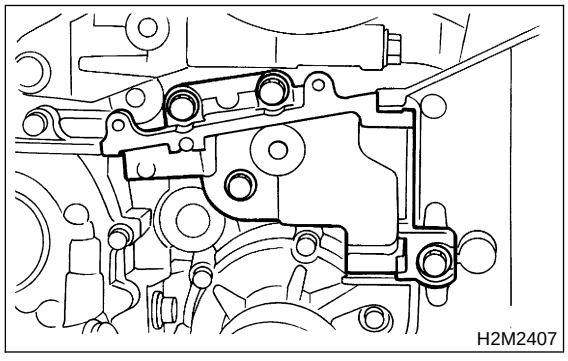
ST 499207300 CAMSHAFT SPROCKET WRENCH



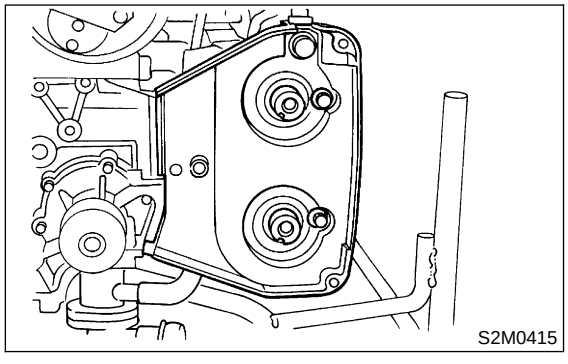
5) Remove crankshaft sprocket.



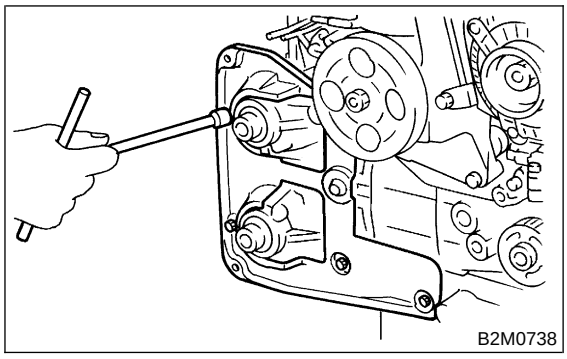
6) Remove tensioner bracket.



7) Remove left-hand belt cover No. 2.



8) Remove right-hand belt cover No. 2.



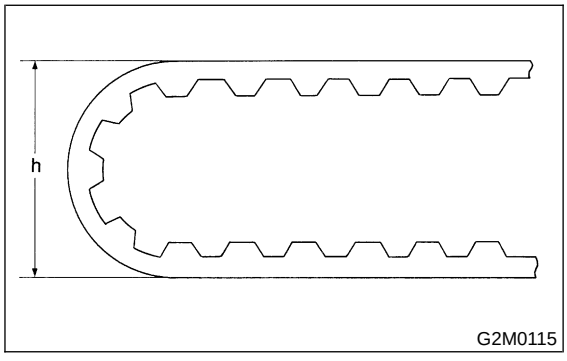
B: INSPECTION

1. TIMING BELT

1) Check timing belt teeth for breaks, cracks and wear. If any fault is found, replace belt.
2) Check the condition of back side of belt; if any crack is found, replace belt.

CAUTION:
● Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
● Do not bend the belt sharply.

Bending radius: h
60 mm (2.36 in) or more



2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace automatic belt tension adjuster assembly.

CAUTION:
Slight traces of oil at rod's oil seal does not indicate a problem.

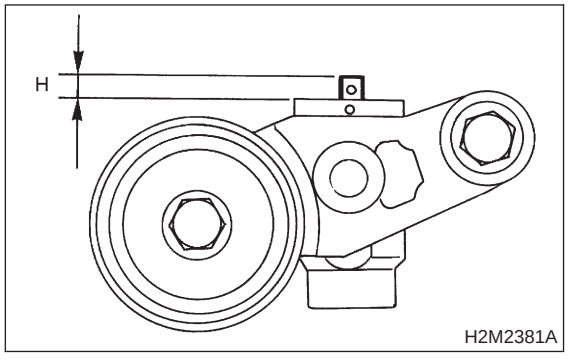
2) Check that the adjuster rod does not move when a pressure of 294 N (30 kg, 66 lb) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kg, 66 lb), check it using the following procedures:

(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this motion 2 or 3 times.
(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kg, 66 lb) to it. Check adjuster rod stiffness.
(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
● Always use a vertical type pressing tool to move the adjuster rod down.
● Do not use a lateral type vise.
● Push adjuster rod vertically.
● Press-in the push adjuster rod gradually taking more than three minutes.
● Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).
● Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.

4) Measure the extension of rod beyond the body. If it is not within specifications, replace with a new one.

Rod extension: H
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace belt tension pulley if faulty.
2) Check belt tension pulley for smooth rotation. Replace if noise or excessive play is noted.
3) Check belt tension pulley for grease leakage.

4. BELT IDLER

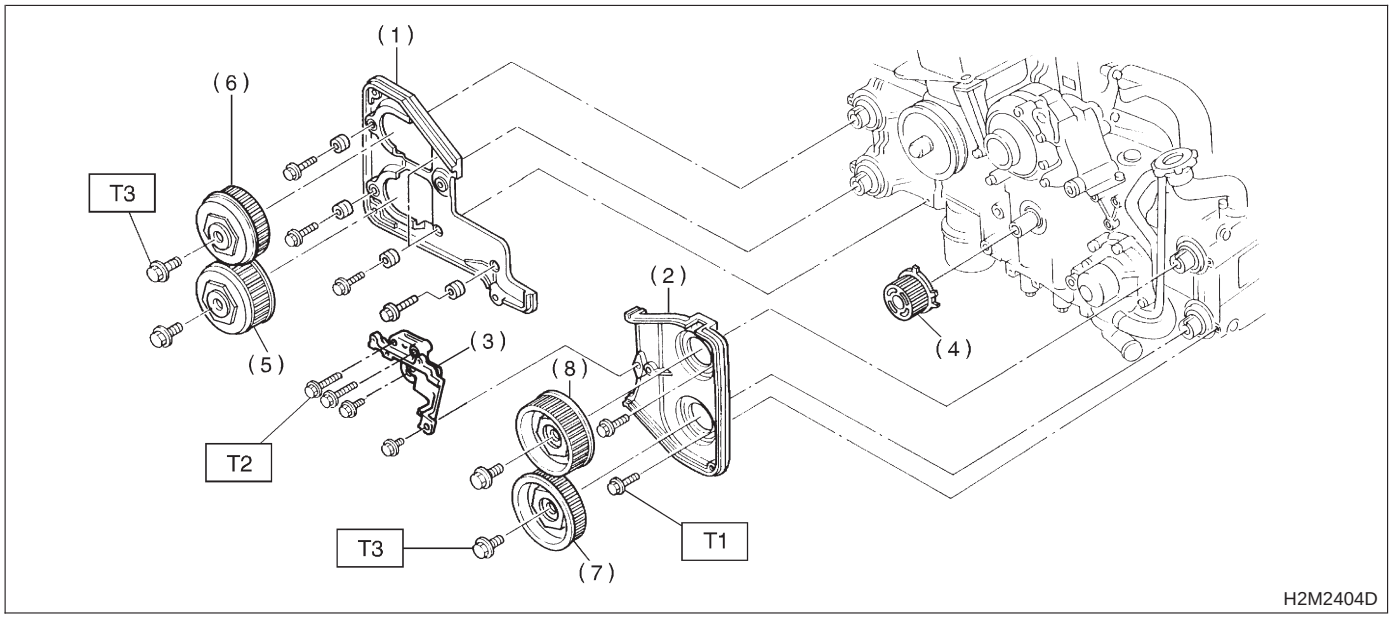
1) Check idler for smooth rotation. Replace if noise or excessive play is noted.
2) Check outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check idler for grease leakage.

5. SPROCKET

1) Check sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

C: INSTALLATION

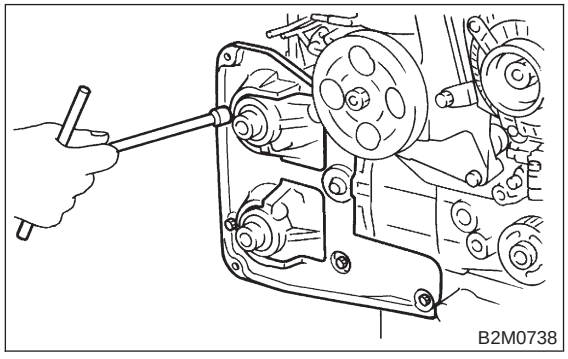
1. SPROCKET



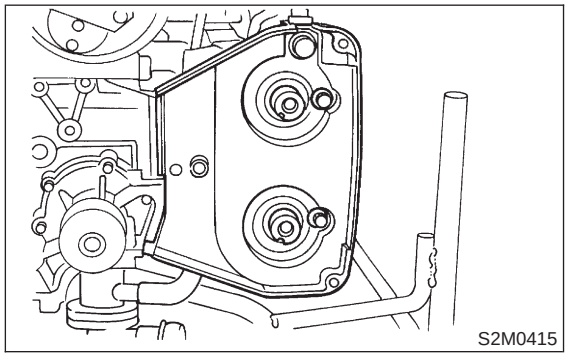
(1) Right-hand belt cover No. 2
(2) Left-hand belt cover No. 2
(3) Tensioner bracket
(4) Crankshaft sprocket
(5) Right-hand exhaust camshaft sprocket
(6) Right-hand intake camshaft sprocket
(7) Left-hand exhaust camshaft sprocket
(8) Left-hand intake camshaft sprocket

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.9±0.5 (0.5±0.05, 3.6±0.4)
T2: 25±3 (2.5±0.2, 18.1±2.2)
T3: 78±5 (8.0±0.5, 57.9±3.6)

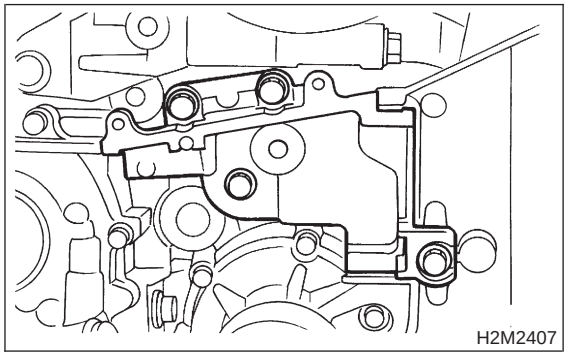
1) Install right-hand belt cover No. 2.



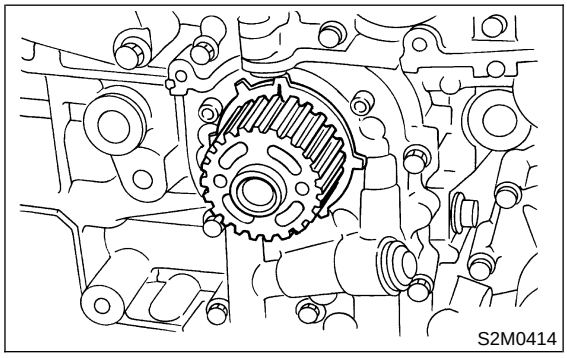
2) Install left-hand belt cover No. 2.



3) Install tensioner bracket.

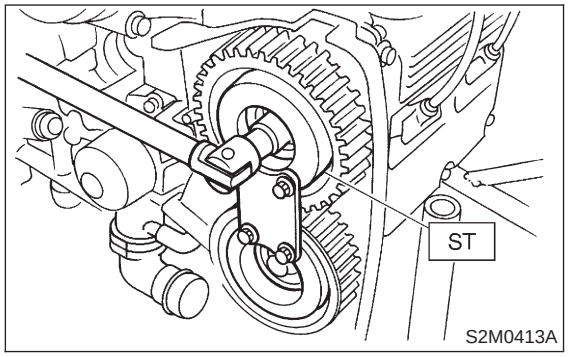


4) Install crankshaft sprocket.

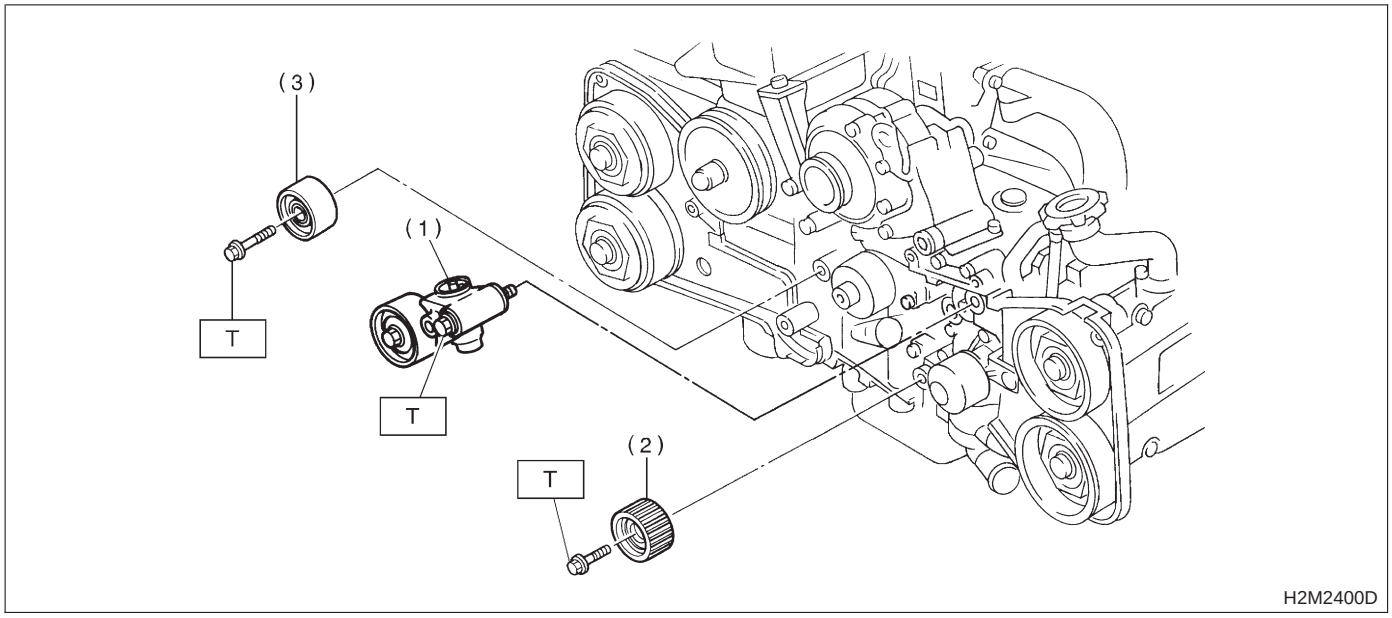


5) Install right-hand exhaust camshaft sprocket. To lock camshaft, use ST.
6) Install right-hand intake camshaft sprocket using ST.
7) Install left-hand exhaust camshaft sprocket using ST.
8) Install left-hand intake camshaft sprocket using ST.

ST 499207300 CAMSHAFT SPROCKET WRENCH



2. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER



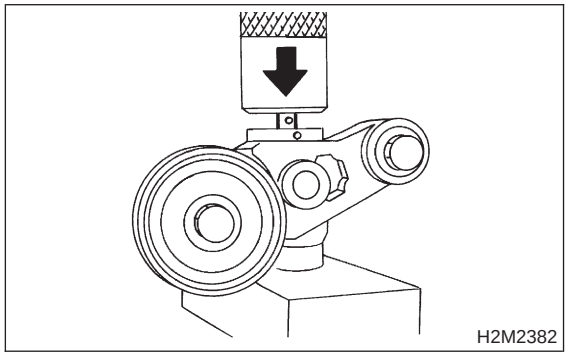
(1) Automatic belt tension adjuster ASSY
(2) Belt idler No. 2
(3) Belt idler

Tightening torque: N·m (kg-m, ft-lb)
T1: 39±4 (4.0±0.4, 28.9±2.9)

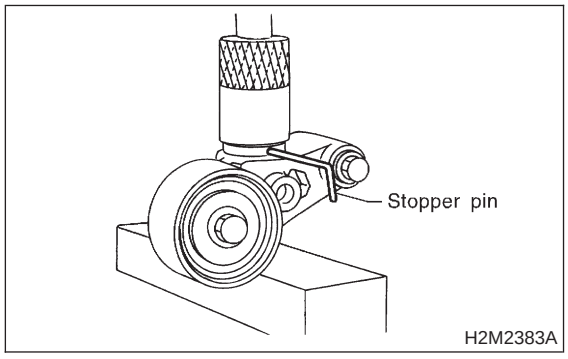
1) Preparation for installation of automatic belt tension adjuster assembly:

CAUTION:
- **Always use a vertical type pressing tool to move the adjuster rod down.**
- **Do not use a lateral type vise.**
- **Push adjuster rod vertically.**
- **Be sure to slowly move the adjuster rod down applying a pressure of 294 N (30 kg, 66 lb).**
- **Press-in the push adjuster rod gradually taking more than three minutes.**
- **Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).**
- **Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.**
- **Do not release press pressure until stopper pin is completely inserted.**

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.
(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kg, 66 lb) until the adjuster rod is aligned with the stopper pin hole in the cylinder.

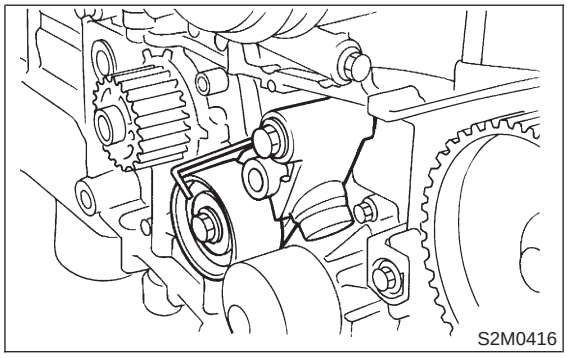

H2M2382

(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.

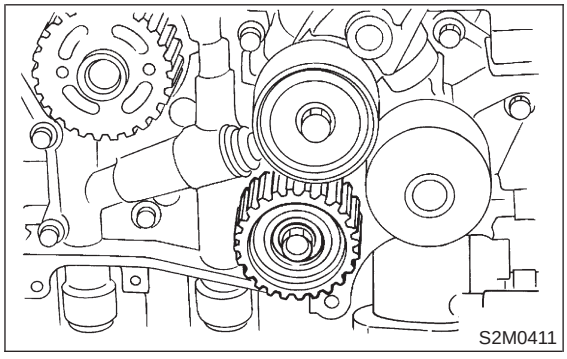


H2M2383A

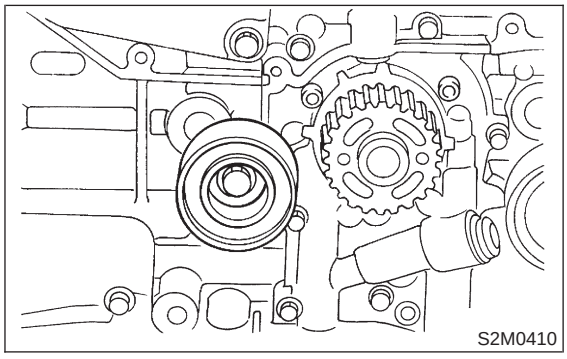
2) Install Automatic belt tension adjuster assembly.


S2M0416

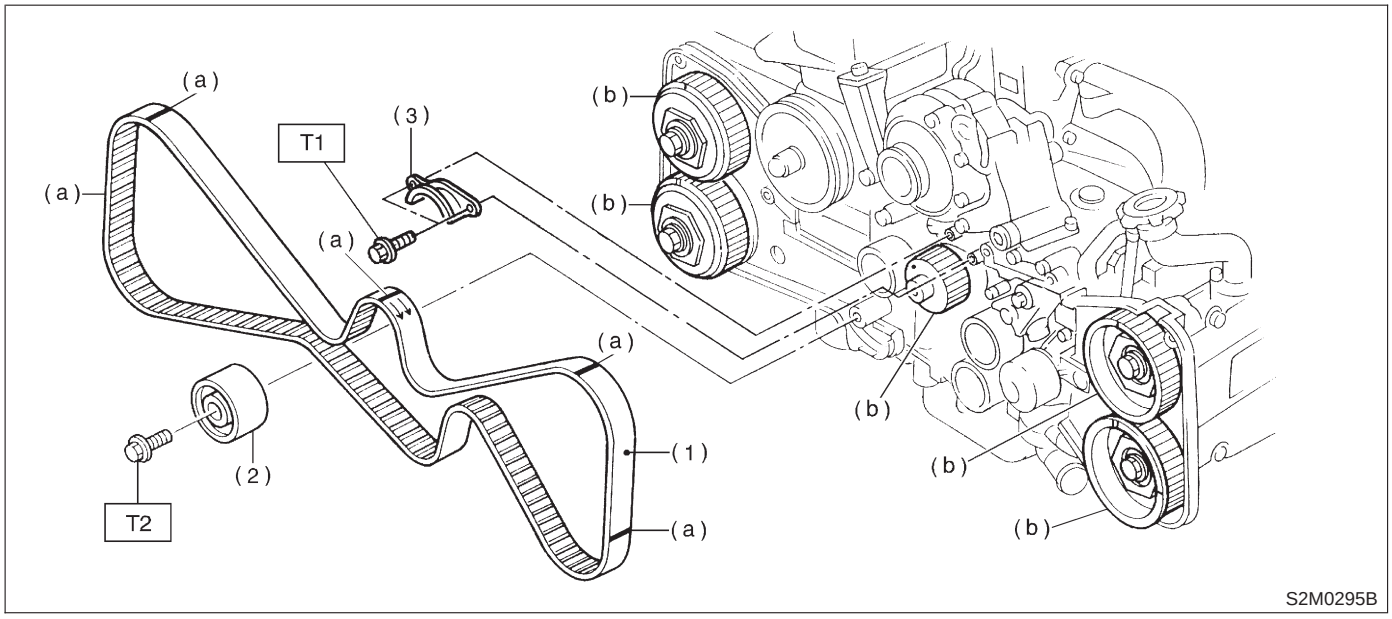
3) Install belt idler No. 2.


S2M0411

4) Install belt idler.


S2M0410

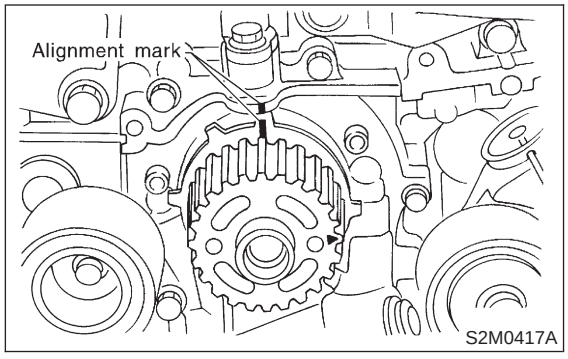
3. TIMING BELT



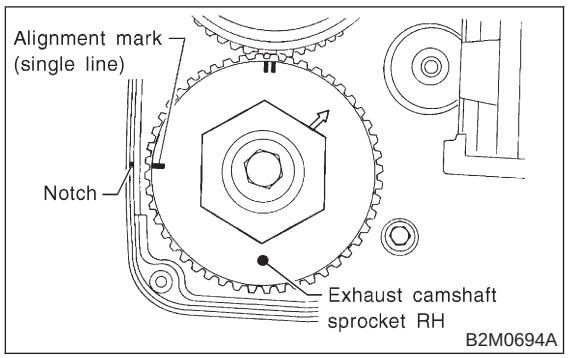
(1) Timing belt
(2) Belt idler
(3) Timing belt guide (MT vehicles only)
(a) Alignment mark (Timing belt side)
(b) Alignment mark (Sprocket side)

Tightening torque: N·m (kg-m, ft-lb)
T1: 9.8±1.0 (1.0±0.1, 7.2±0.7)
T2: 39±4 (4.0±0.4, 28.9±2.9)

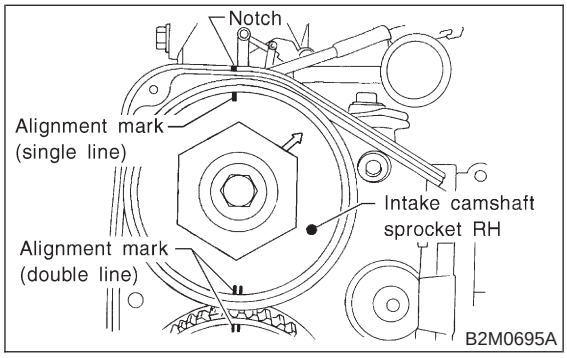
1) Crankshaft and camshaft sprocket alignment.
(1) Align mark on crankshaft sprocket with mark on the oil pump cover at cylinder block.



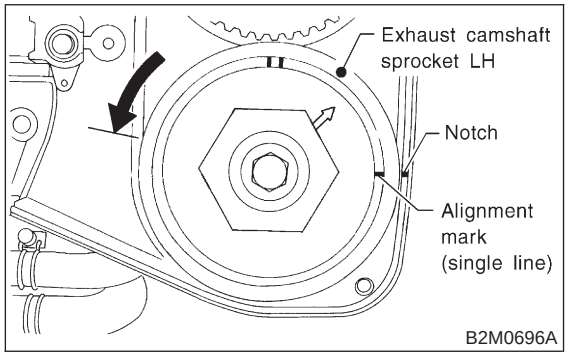
(2) Align single line mark on right-hand exhaust camshaft sprocket with notch on belt cover.



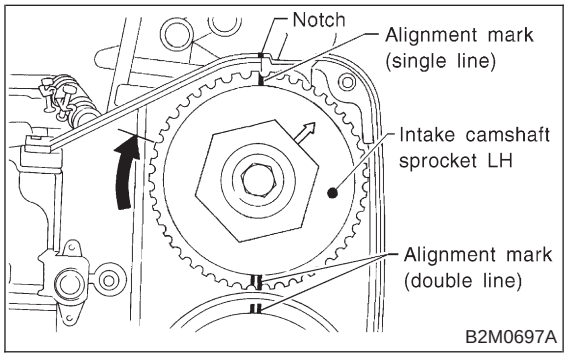
(3) Align single line mark on right-hand exhaust camshaft sprocket with notch on belt cover. (Make sure double lines on intake camshaft and exhaust camshaft sprockets are aligned.)



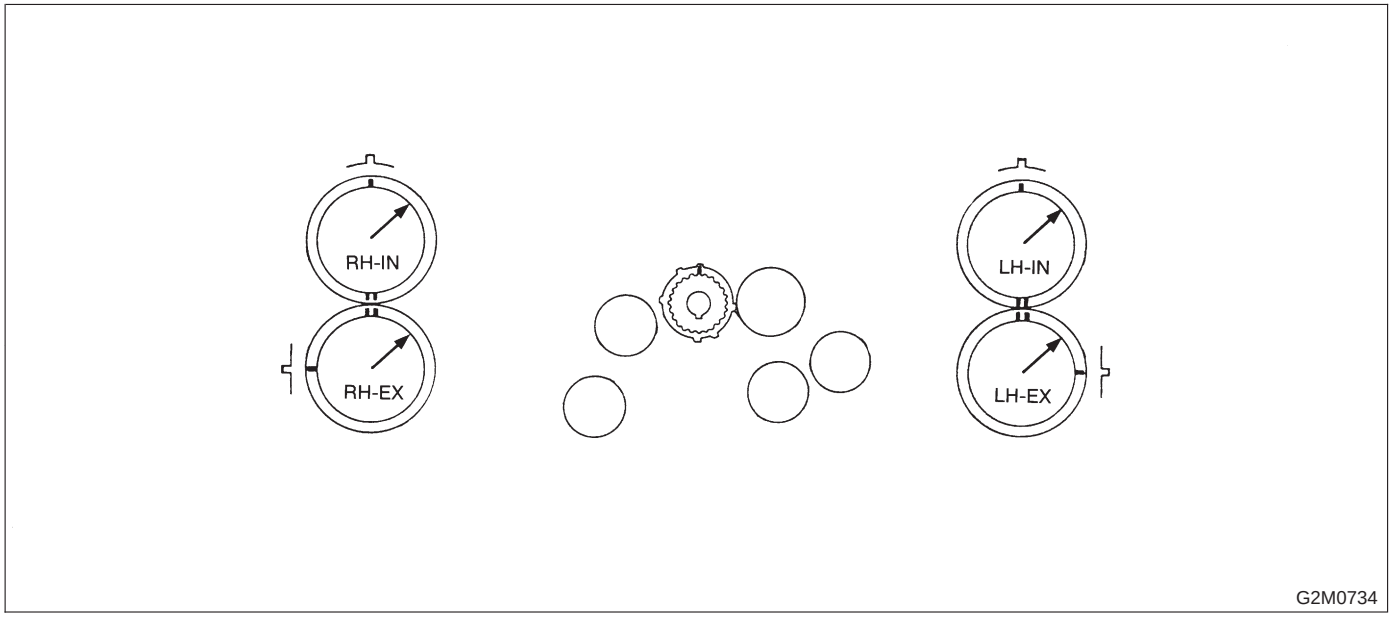
(4) Align single line mark on left-hand exhaust camshaft sprocket with notch on belt cover by turning sprocket counter-clockwise (as viewed from front of engine).



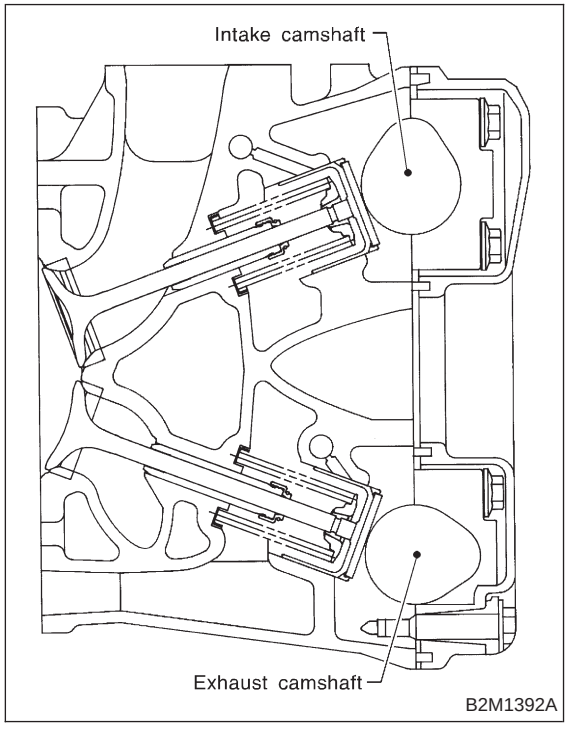
(5) Align single line mark on left-hand intake camshaft sprocket with notch on belt cover by turning sprocket clockwise (as viewed from front of engine).
Ensure double lines on intake and exhaust camshaft sprockets are aligned.



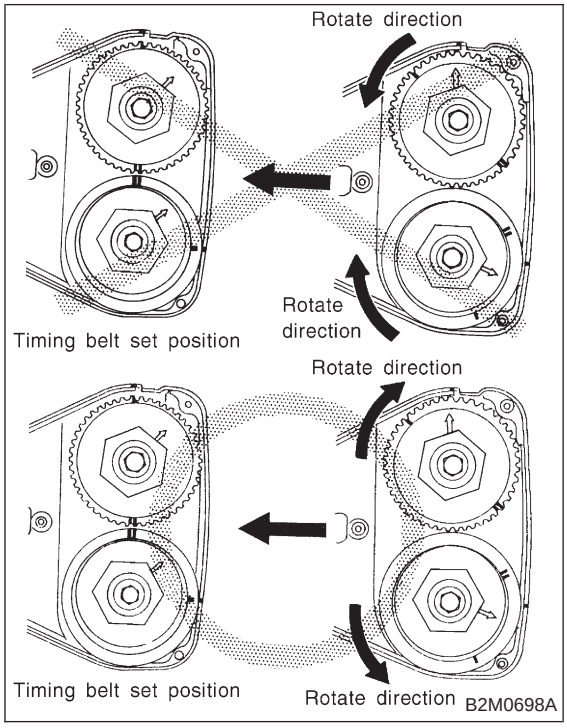
(6) Ensure camshaft and crankshaft sprockets are positioned as shown.



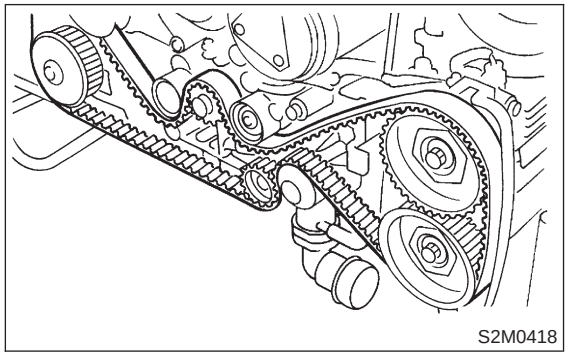
CAUTION:
● Intake and exhaust camshafts for this DOHC engine can be independently rotated with timing belts removed. As can be seen from the figure, if intake and exhaust valves are lifted simultaneously, their heads will interfere with each other, resulting in bent valves.



● When timing belts are not installed, four camshafts are held at the "zero-lift" position, where all cams on camshafts do not push intake and exhaust valves down. (Under this condition, all valves remain unlifted.)
● When camshafts are rotated to install timing belts, #2 intake and #4 exhaust cam of left-hand camshafts are held to push their corresponding valves down. (Under this condition, these valves are held lifted.) Right-side camshafts are held so that their cams do not push valves down.
● Left-hand camshafts must be rotated from the "zero-lift" position to the position where timing belt is to be installed at as small an angle as possible, in order to prevent mutual interference of intake and exhaust valve heads.
● Do not allow camshafts to rotate in the direction shown in the figure as this causes both intake and exhaust valves to lift simultaneously, resulting in interference with their heads.

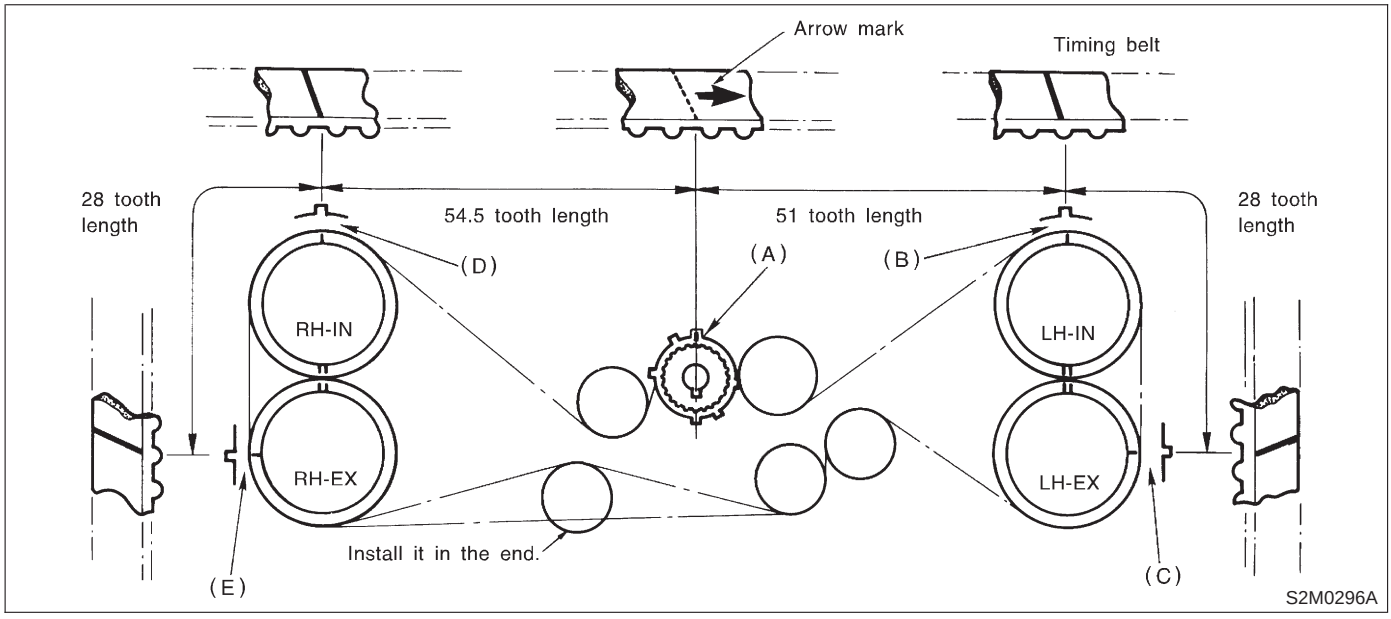


2) Installation of timing belt



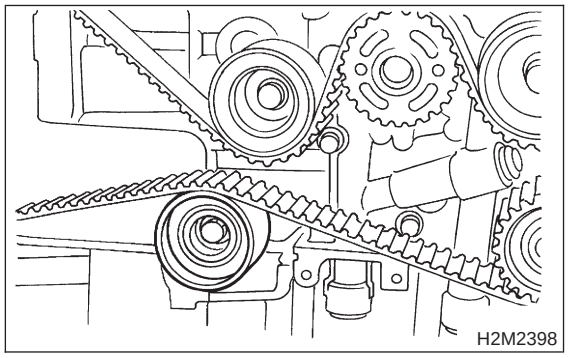
Align alignment mark on timing belt with marks on sprockets in the alphabetical order shown in figure. While aligning marks, position timing belt properly.

CAUTION:
- **Disengagement of more than three timing belt teeth may result in interference between the valve and piston.**
- **Ensure belt's rotating direction is correct.**

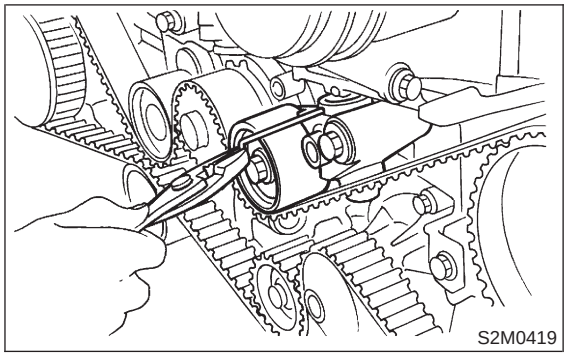


3) Install belt idler.

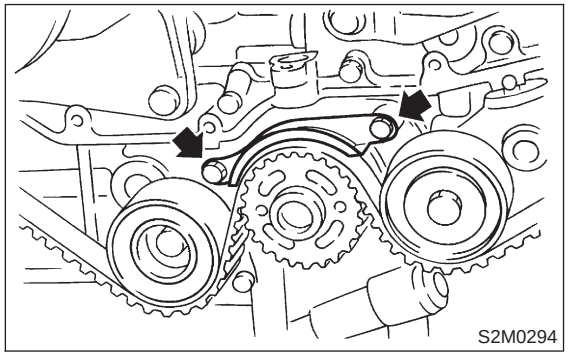
CAUTION:
Make sure that the marks on timing belt and sprockets are aligned.



4) After ensuring that the marks on timing belt and sprockets are aligned, remove stopper pin from tensioner adjuster.

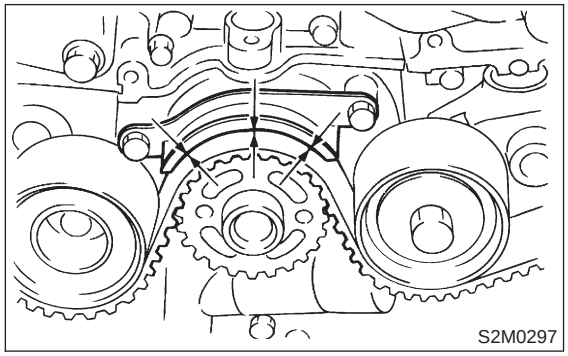


5) Install timing belt guide. (MT vehicles only)
(1) Temporarily tighten remaining bolts.

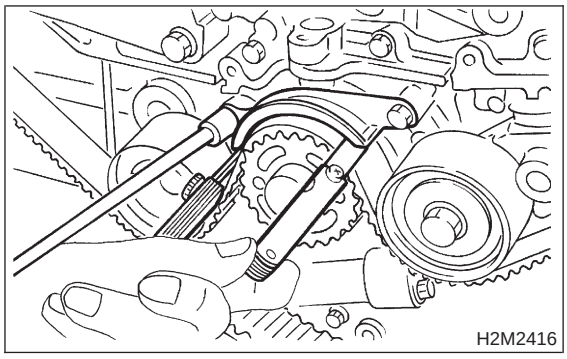


(2) Check and adjust clearance between timing belt and timing belt guide.

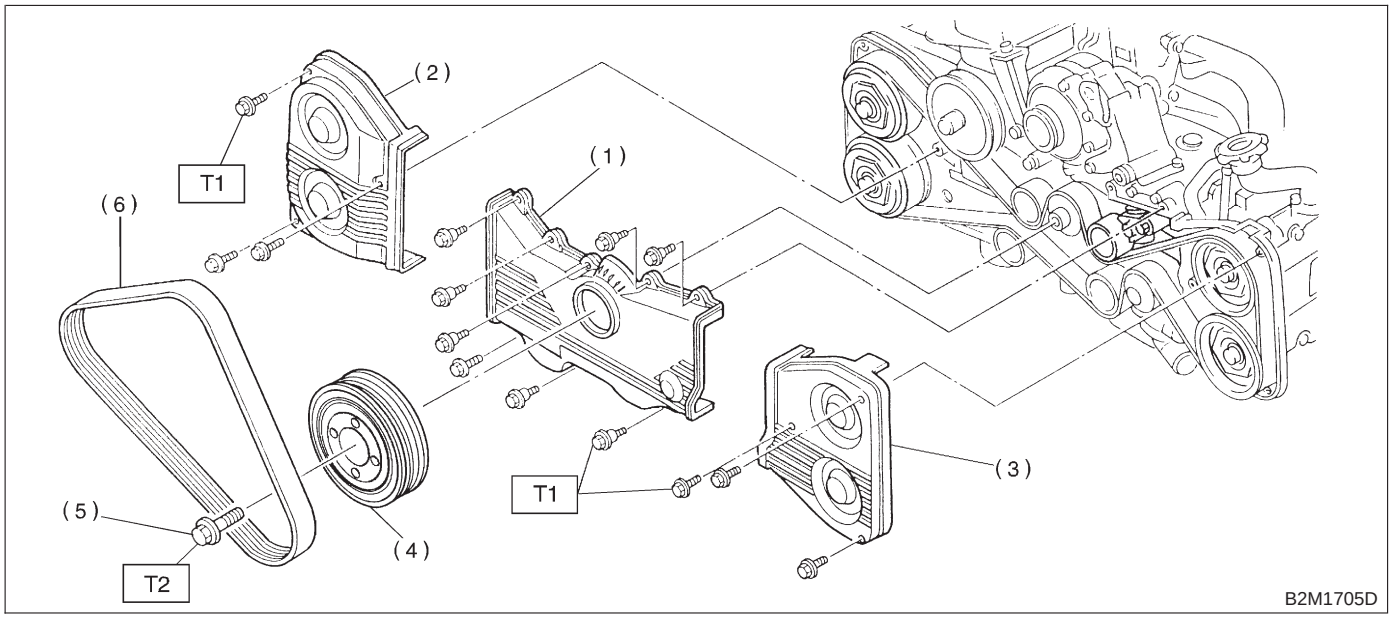
Clearance:
1.0±0.5 mm (0.039±0.020 in)



(3) Tighten remaining bolts.



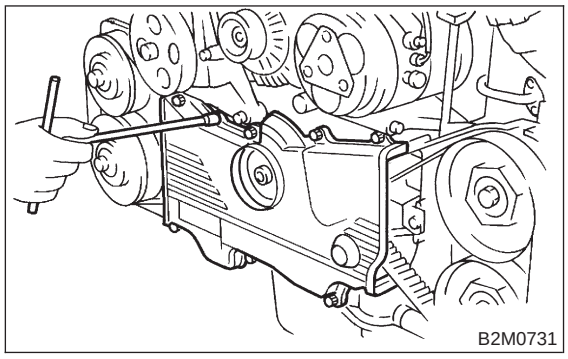
4. CRANKSHAFT PULLEY AND BELT COVER



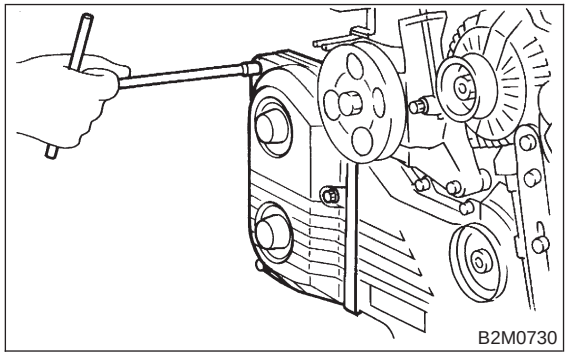
(1) Front belt cover
(2) Right-hand belt cover No. 1
(3) Left-hand belt cover No. 1
(4) Crankshft pulley
(5) Crankshaft pulley bolt

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±0.5 (0.5±0.05, 3.6±0.4)
T2: 177±10 (18.0±1.0, 130±7)

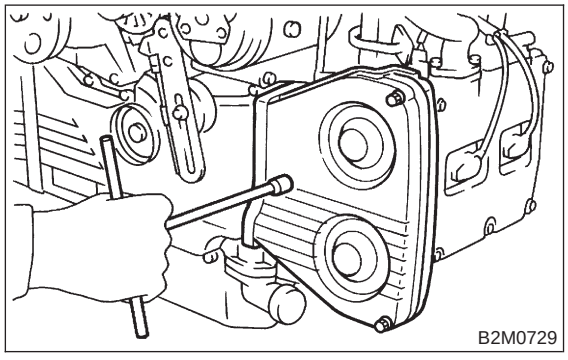
1) Install front belt cover.



2) Install right-hand belt cover.

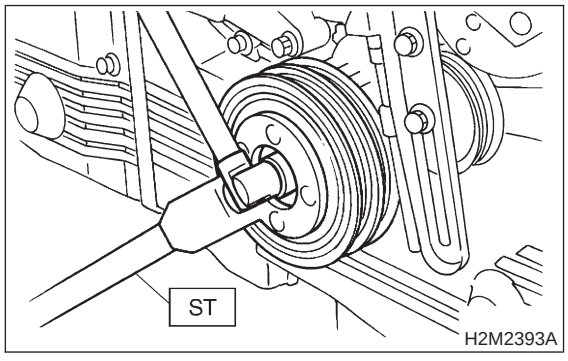


3) Install left-hand belt cover.



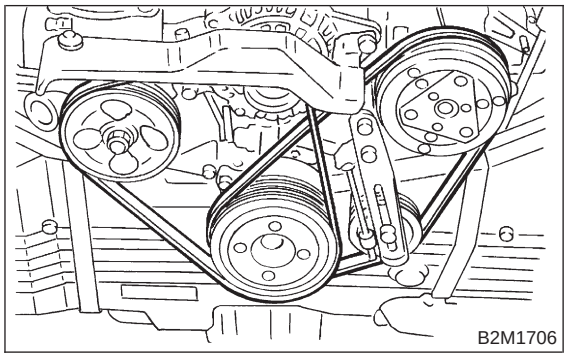
4) Install crankshaft pulley.
5) Tighten pulley bolt by using ST.

ST 499977100 CRANKSHAFT PULLEY WRENCH



6) Install V-belt, air conditioning compressor drive belt tensioner and V-belt cover. <Ref. to 1-5 [G2B0].>

CAUTION:
After installing V-belt, check and adjust V-belt tension.



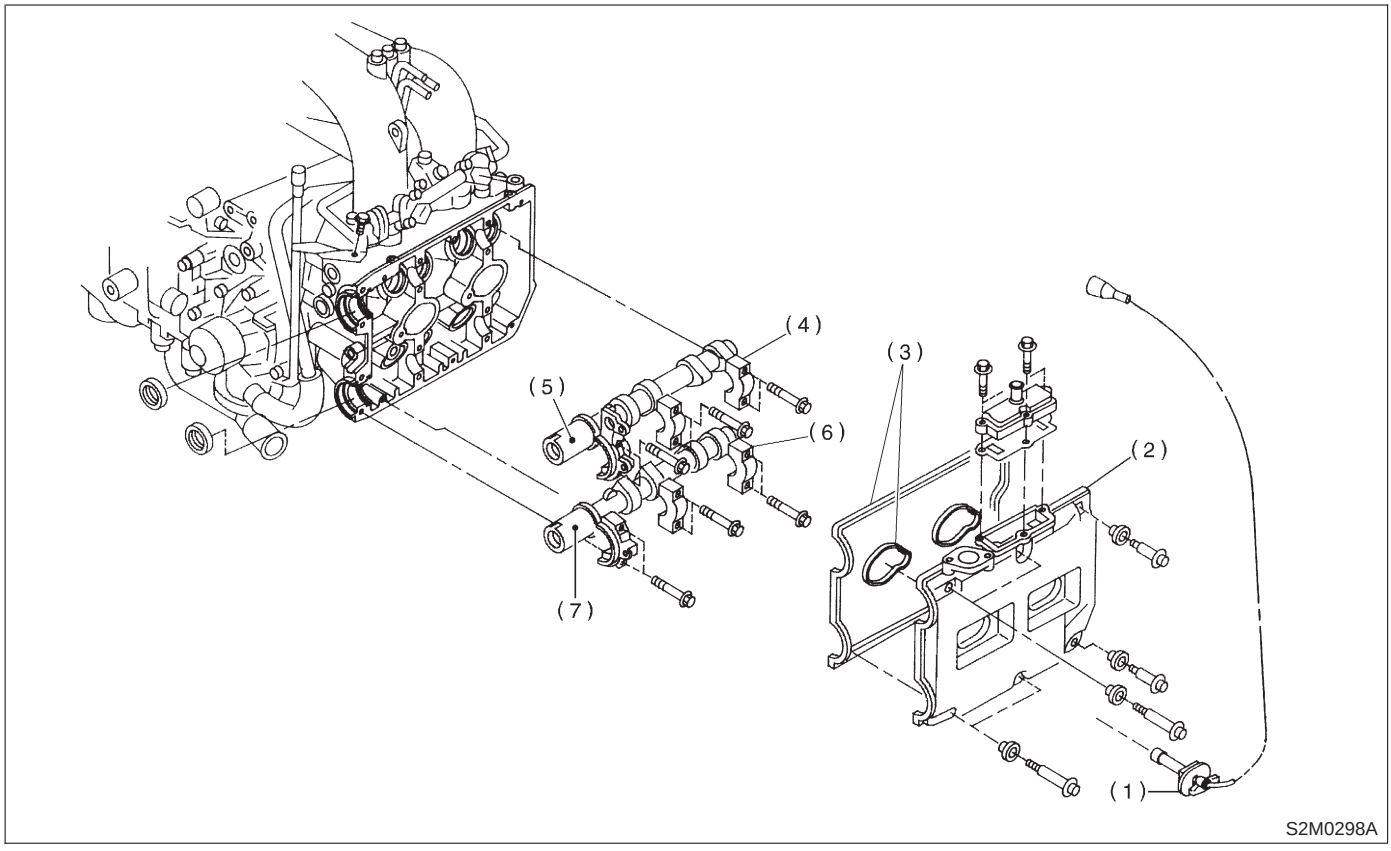
3. Camshaft

A: REMOVAL

1. RELATED PARTS

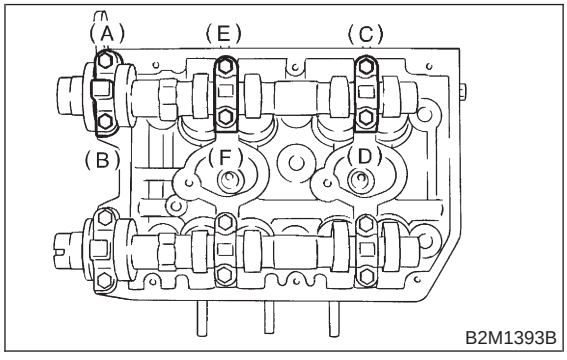
Remove timing belt, camshaft sprockets and related parts.
<Ref. to 2-3b [W2A0].>

2. CAMSHAFT



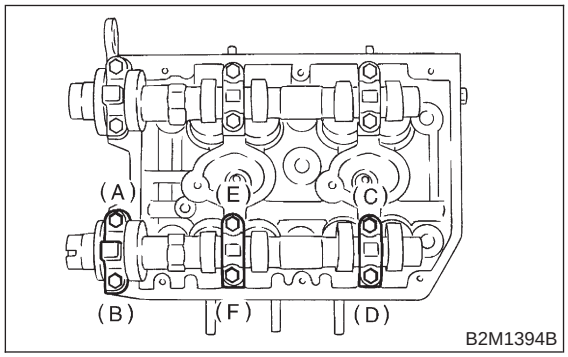
(1) Spark plug cord
(2) Rocker cover (LH)
(3) Rocker cover gasket (LH)
(4) Intake camshaft cap (LH)
(5) Intake camshaft (LH)
(6) Exhaust camshaft cap (LH)
(7) Exhaust camshaft (LH)

1) Remove camshaft position sensor (LH side only).
2) Remove spark plug cord.
3) Remove rocker cover and gasket.
4) Loosen intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in figure.



5) Remove camshaft caps and intake camshaft.

6) Loosen exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence shown in figure.



7) Remove camshaft caps and exhaust camshaft.

CAUTION:
Arrange camshaft caps in order so that they can be installed in their original positions.

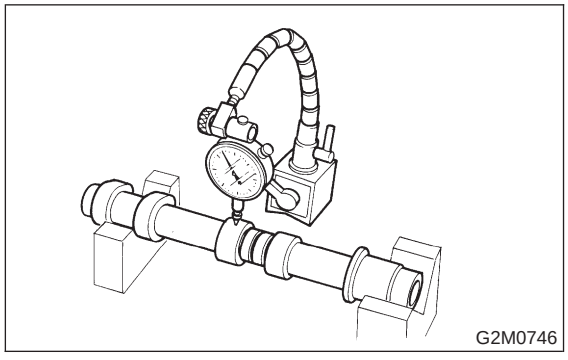
8) Similarly, remove right-hand camshafts and related parts.

B: INSPECTION

1. CAMSHAFT

1) Measure the bend, and repair or replace if necessary.

Limit:
0.020 mm (0.0008 in)



2) Check journal for damage and wear. Replace if faulty.
3) Measure outside diameter of camshaft journal. If the journal diameter is not as specified, check the oil clearance.

	Camshaft journal	
	Front	Center, rear
Standard	31.946 — 31.963 mm (1.2577 — 1.2584 in)	27.946 — 27.963 mm (1.1002 — 1.1009 in)

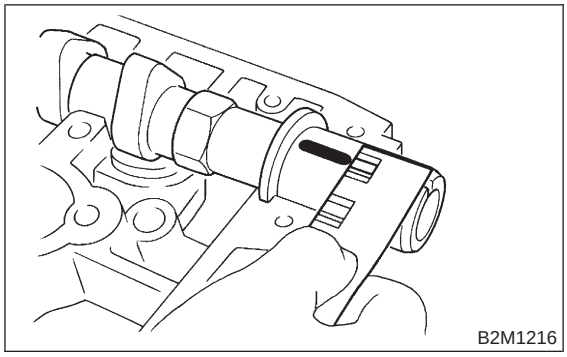
4) Measurement of the camshaft journal oil clearance
(1) Clean the bearing caps and camshaft journals.
(2) Place the camshafts on the cylinder head. (Without installing valve rocker.)
(3) Place plastigauge across each of the camshaft journals.
(4) Install the bearing caps.
<Ref. to 2-3b [W3C1].>

CAUTION:
Do not turn the camshaft.

(5) Remove the bearing caps.
(6) Measure the widest point of the plastigauge on each journal.
If the oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

Standard oil clearance:
0.037 — 0.072 mm (0.0015 — 0.0028 in)

Limit:
0.10 mm (0.0039 in)



(7) Completely remove the plastigauge.

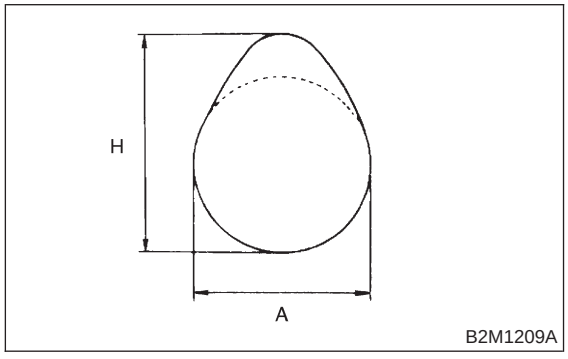
5) Check cam face condition; remove minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

Cam height: H

Standard:
Intake:
42.20 — 42.30 mm (1.6614 — 1.6654 in)
Exhaust:
Front: 42.50 — 42.60 mm (1.6732 — 1.6772 in)
Rear: 41.40 — 41.50 mm (1.6299 — 1.6339 in)

Limit:
Intake:
42.04 mm (1.6551 in)
Exhaust:
Front: 42.34 mm (1.6669 in)
Rear: 41.24 mm (1.6236 in)

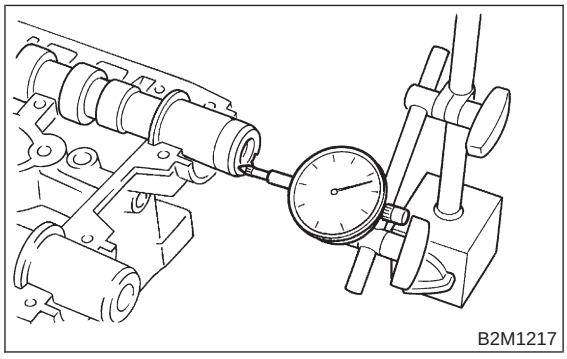
Cam base circle diameter A:
28.0 mm (1.102 in)



6) Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace caps and cylinder head as a set. If necessary replace camshaft.

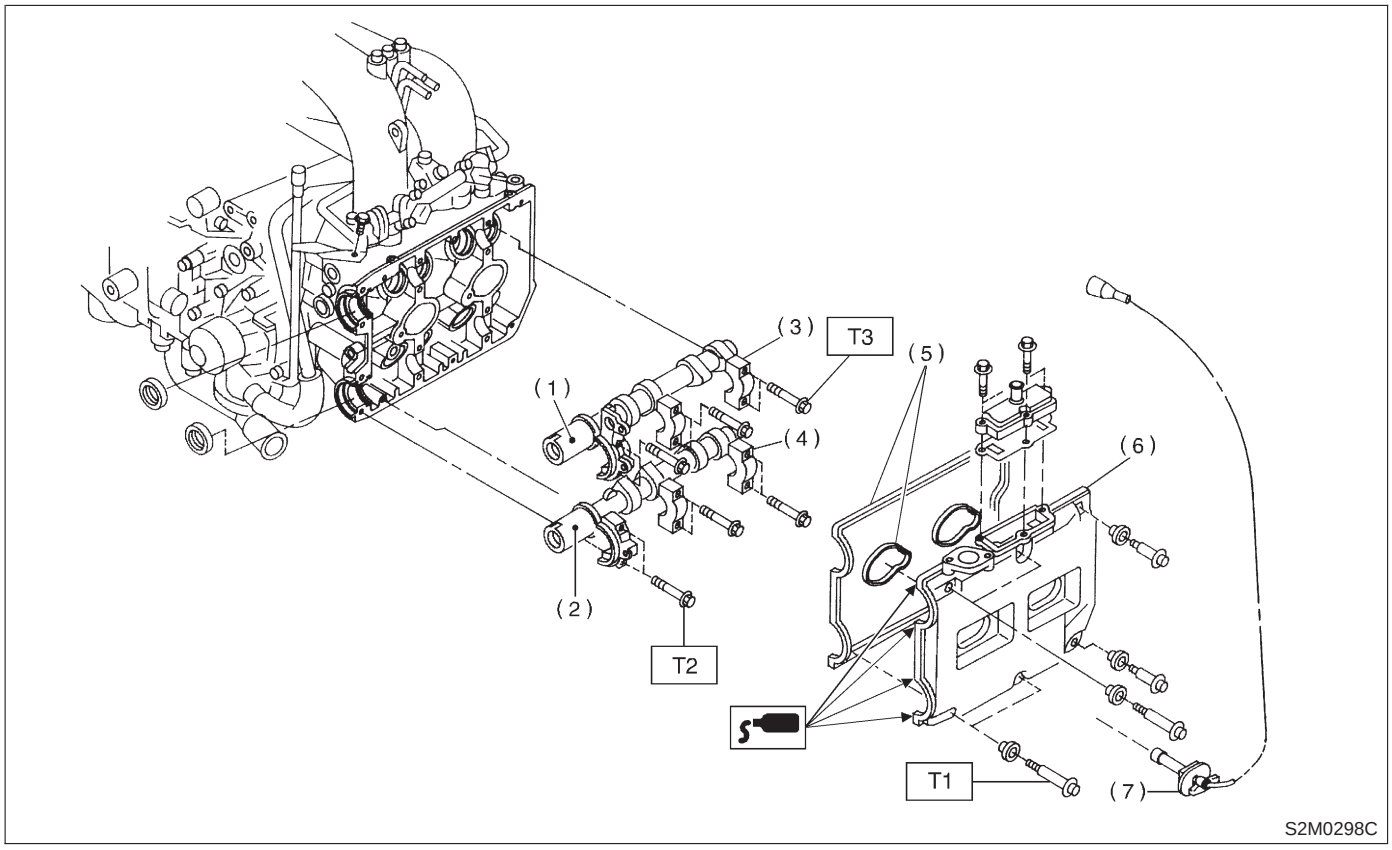
Standard:
0.040 — 0.080 mm (0.0016 — 0.0031 in)

Limit:
0.1 mm (0.004 in)



C: INSTALLATION

1. CAMSHAFT

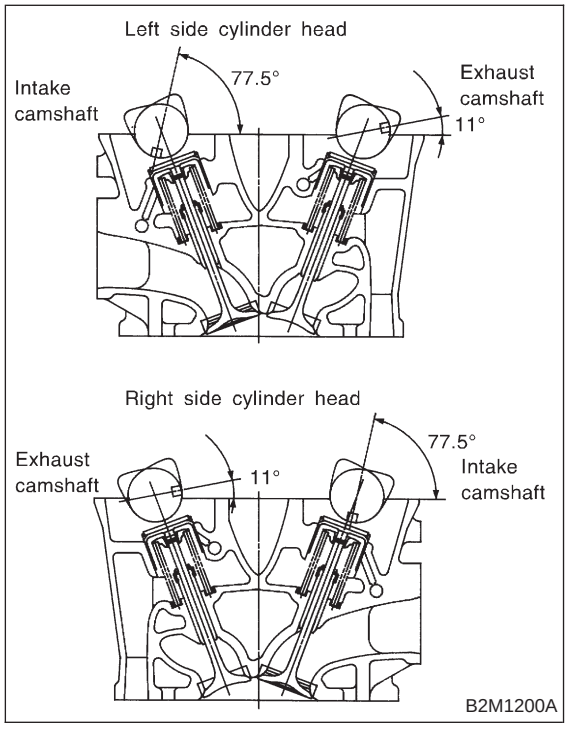


(1) Intake camshaft (LH)
(2) Exhaust camshaft (LH)
(3) Intake camshaft cap (LH)
(4) Exhaust camshaft cap (LH)
(5) Rocker cover gasket (LH)
(6) Rocker cover (LH)
(7) Spark plug cord

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±0.5 (0.5±0.05, 3.6±0.4)
T2: 10±0.7 (1.0±0.07, 7.2±0.5)
T3: 20±2 (2.0±0.2, 14.5±1.4)

1) Camshaft installation
Apply engine oil to cylinder head at camshaft bearing location before installing camshaft. Install camshaft so that rocker arm is close to or in contact with “base circle” of cam lobe.

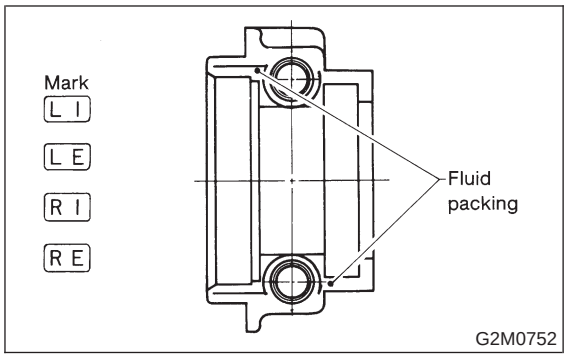
CAUTION:
● When camshafts are positioned as shown in figure, camshafts need to be rotated at a minimum to align with timing belt during installation.
● Right-hand camshaft need not be rotated when set at position shown in figure.
Left-hand intake camshaft: Rotate 80° clockwise.
Left-hand exhaust camshaft: Rotate 45° counter-clockwise.



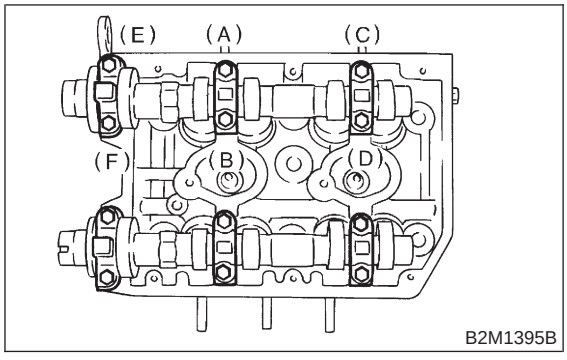
2) Camshaft cap installation
(1) Apply fluid packing sparingly to cap mating surface.

CAUTION:
Do not apply fluid packing excessively. Failure to do so may cause excess packing to come out and flow toward oil seal, resulting in oil leaks.

Fluid packing:
THREE BOND 1215 or equivalent



(2) Apply engine oil to cap bearing surface and install cap on camshaft as shown by identification mark.
(3) Gradually tighten cap in at least two stages in alphabetical sequence shown in figure, and then tighten to specified torque.

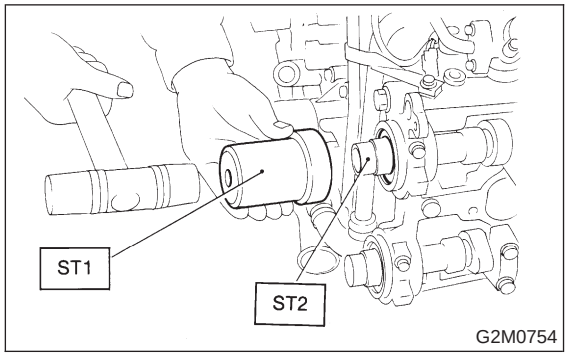


(4) Similarly, tighten cap on exhaust side.
After tightening cap, ensure camshaft rotates only slightly while holding it at “base” circle.

3) Camshaft oil seal installation
Apply grease to new oil seal lips and press onto front end of camshaft by using ST1 and ST2.

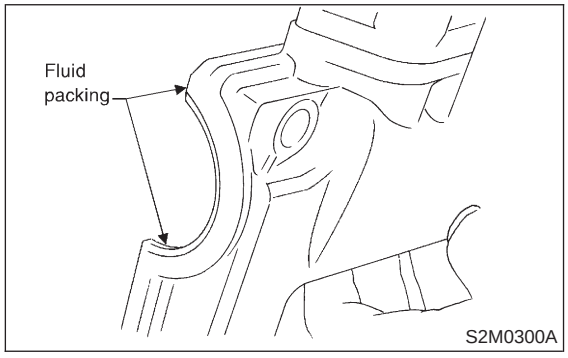
CAUTION:
Use a new oil seal.

ST1 499587100 OIL SEAL INSTALLER
ST2 499597000 OIL SEAL GUIDE



4) Rocker cover installation
(1) Install gasket on rocker cover.
Install peripheral gasket and ignition coil gasket.
(2) Apply fluid packing to four front open edges of peripheral gasket.

Fluid packing:
THREE BOND 1215 or equivalent



(3) Install rocker cover on cylinder head. Ensure gasket is properly positioned during installation.
5) Install ignition coil.
6) Install cam angle sensor.
7) Similarly, install parts on right-hand side.

2. RELATED PARTS

Install timing belt, camshaft sprockets and related parts.
<Ref. to 2-3b [W2C0].>

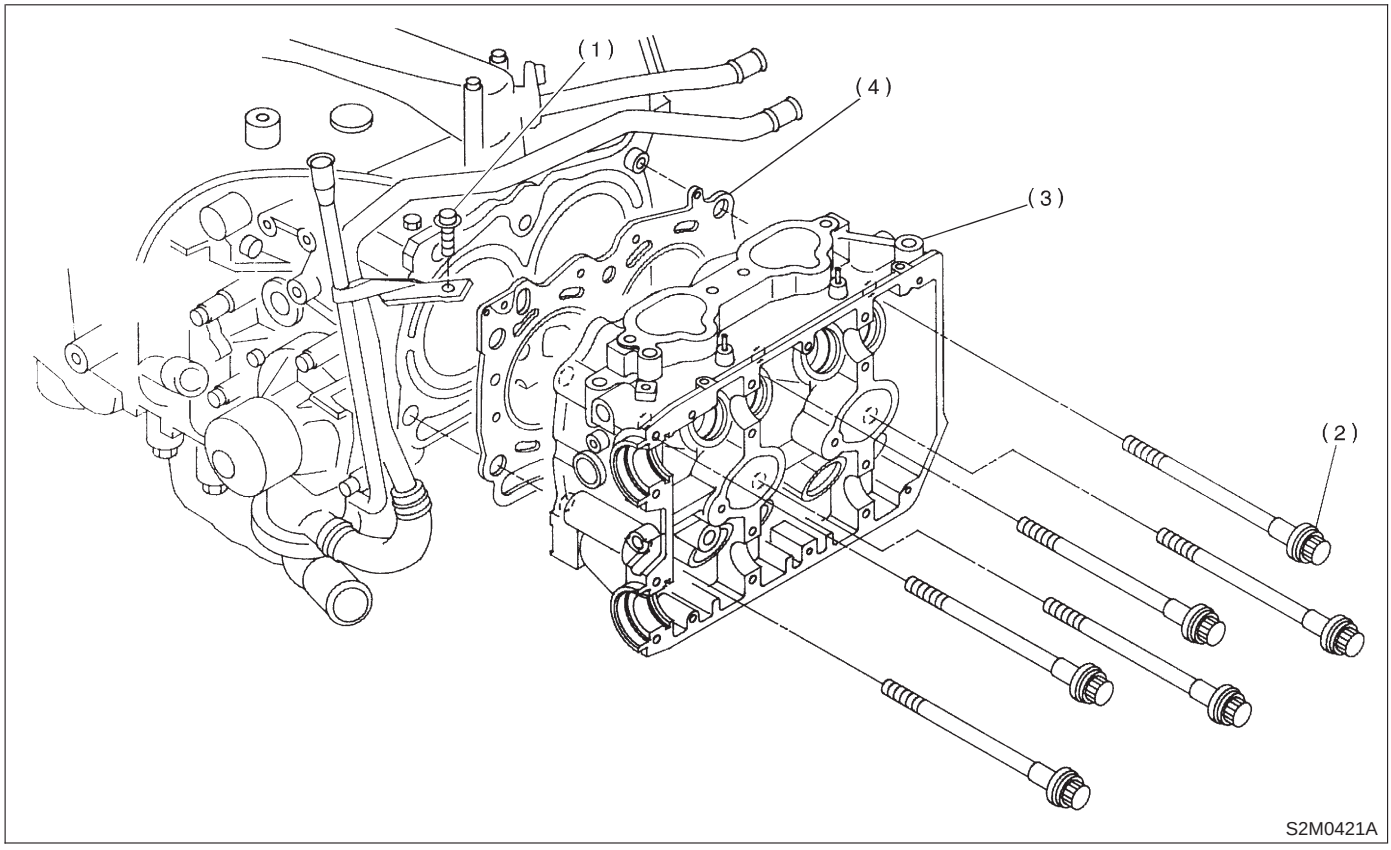
4. Cylinder Head

A: REMOVAL

1. RELATED PARTS

1) Remove V-belt.
2) Remove generator, air conditioner compressor and brackets.
3) Remove hoses and tubes from cylinder block.
4) Disconnect each connector and/or remove connector bracket.
5) Remove intake manifold assembly and gasket.
6) Remove camshaft position sensor.
7) Remove timing belt, camshaft sprockets and related parts.
<Ref. to 2-3b [W2A0].>
8) Remove rocker cover, camshafts and related parts.
<Ref. to 2-3b [W3A0].>

2. CYLINDER HEAD

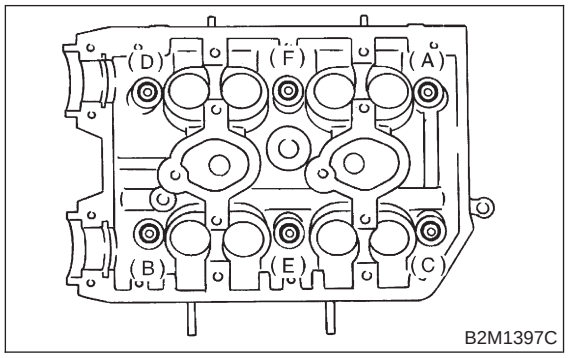


(1) Bolt
(2) Cylinder head bolt
(3) Cylinder head
(4) Cylinder head gasket

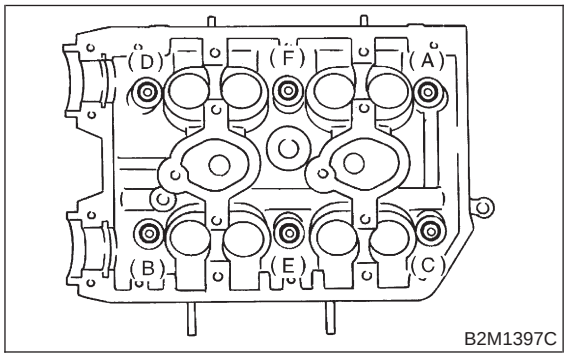
1) Remove oil level gauge guide attaching bolt (LH side only).

2) Remove cylinder head bolts in alphabetical sequence shown in figure.

CAUTION:
Leave bolts (A) and (D) engaged by three or four threads to prevent cylinder head from falling.

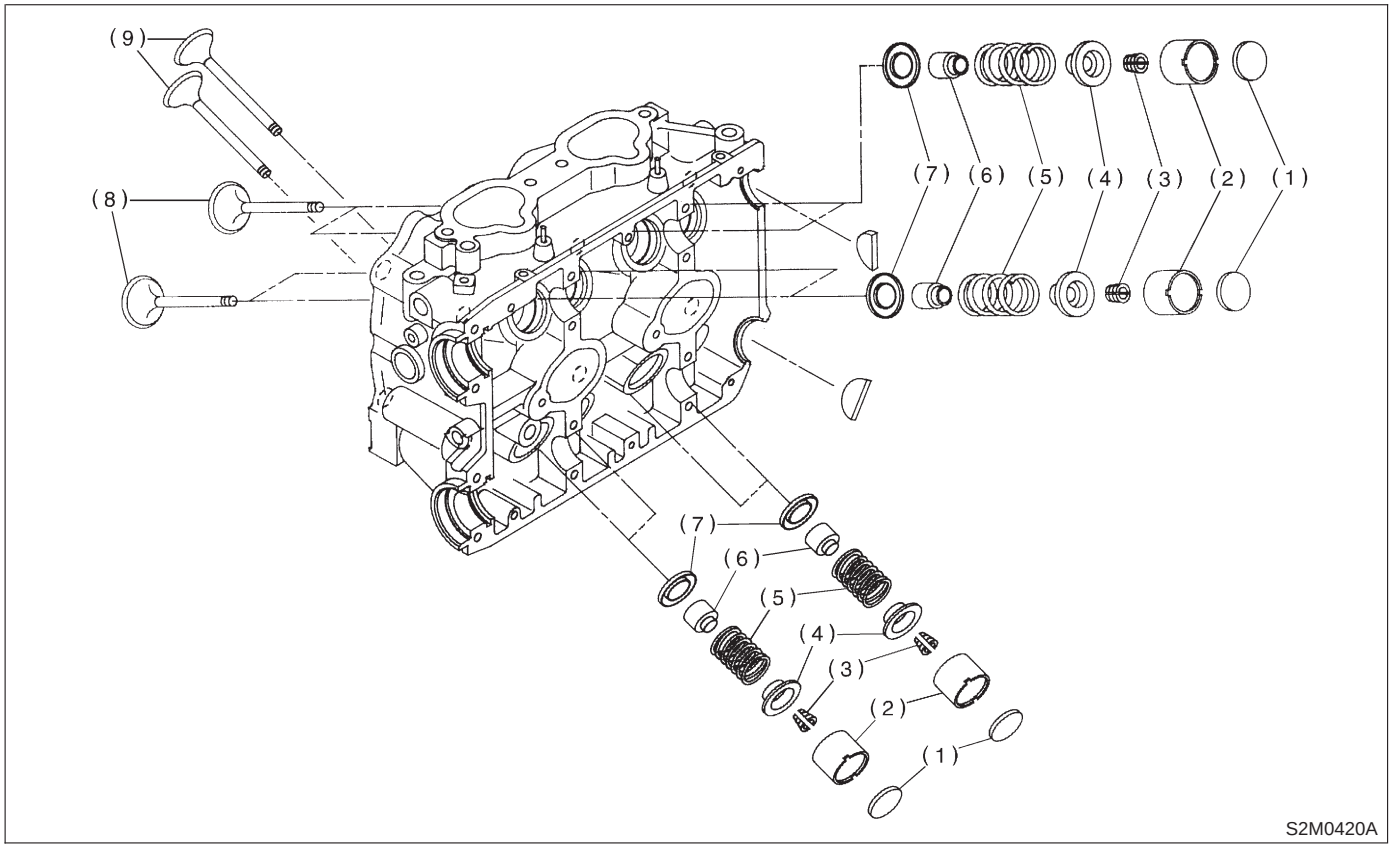


3) While tapping cylinder head with a plastic hammer, separate it from cylinder block.
Remove bolts (A) and (D) to remove cylinder head.



4) Remove cylinder head gasket.
5) Similarly, remove right-hand cylinder head.

B: DISASSEMBLY

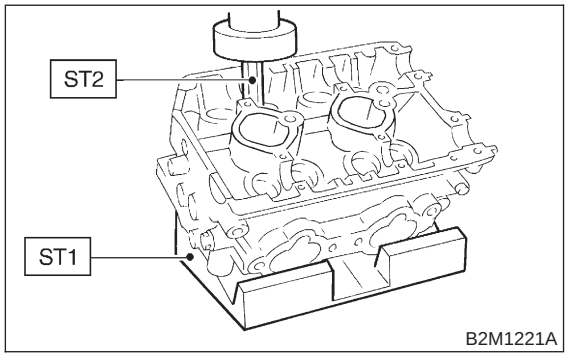


(1) Valve shim
(2) Valve lifter
(3) Valve retainer key
(4) Valve retainer
(5) Valve spring
(6) Valve oil seal
(7) Valve spring seat
(8) Intake valve
(9) Exhaust valve

1) Remove valve shims and valve lifters.

2) Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

CAUTION:
● Keep removed parts in order for re-installing in their original positions.
● Mark each valve to prevent confusion.
● Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.



C: INSPECTION

1. CYLINDER HEAD

1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of red check.

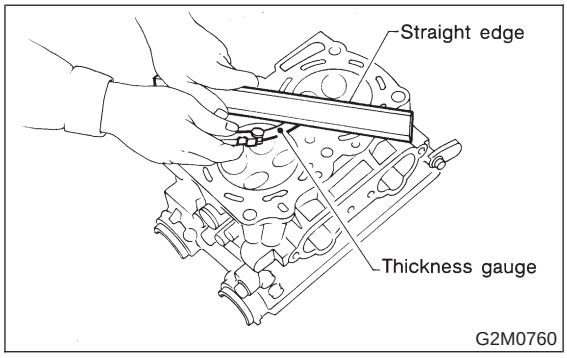
2) Measure the warping of the cylinder head surface that mates with crankcase by using a straight edge and thickness gauge.
If the warping exceeds 0.05 mm (0.0020 in), regrind the surface with a surface grinder.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.3 mm (0.012 in)

Standard height of cylinder head:
127.5 mm (5.02 in)

CAUTION:
Uneven torque for the cylinder head nuts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.



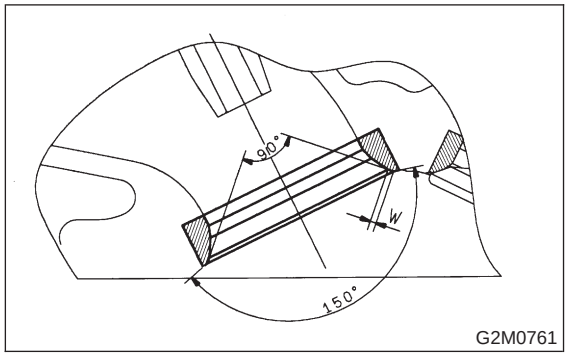
2. VALVE SEAT

Inspect intake and exhaust valve seats, and correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width: W

Intake
Standard
1.0 mm (0.039 in)
Limit
1.7 mm (0.067 in)

Exhaust
Standard
1.5 mm (0.059 in)
Limit
2.2 mm (0.087 in)



3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outside diameter of valve stem and the inside diameter of valve guide with outside and inside micrometers respectively.

Clearance between the valve guide and valve stem:

Standard
Intake
0.035 — 0.062 mm (0.0014 — 0.0024 in)
Exhaust
0.040 — 0.067 mm (0.0016 — 0.0026 in)

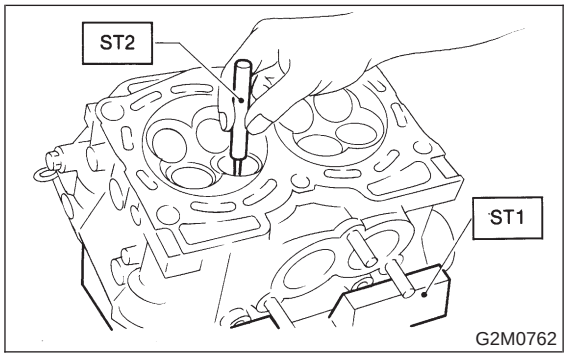
Limit
0.15 mm (0.0059 in)

Valve guide inner diameter:
6.000 — 6.015 mm (0.2362 — 0.2368 in)

Valve stem outer diameter:
Intake
5.950 — 5.965 mm (0.2343 — 0.2348 in)
Exhaust
5.950 — 5.965 mm (0.2343 — 0.2348 in)

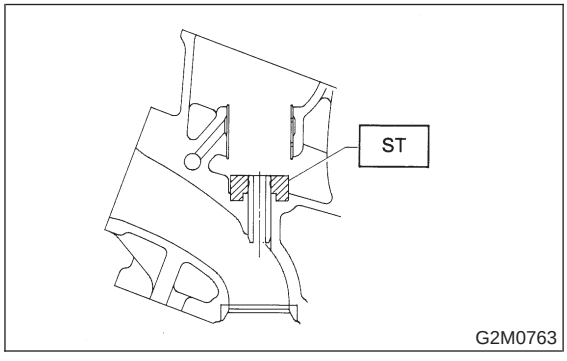
2) If the clearance between valve guide and stem exceeds the specification, replace guide as follows:
(1) Place cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.
(2) Insert ST2 into valve guide and press it down to remove valve guide.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



(3) Turn cylinder head upside down and place ST as shown in the figure.

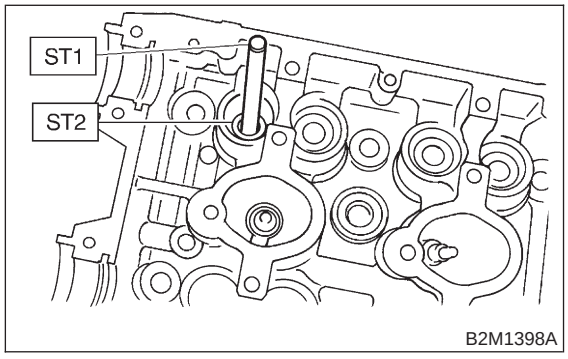
ST 498267700 VALVE GUIDE ADJUSTER



(4) Before installing new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.

(5) Put new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
ST2 498267700 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion: L
12.0 — 12.4 mm (0.472 — 0.488 in)

(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into valve guide, and return it also rotating clockwise. After reaming, clean valve guide to remove chips.

ST 499767400 VALVE GUIDE REAMER

CAUTION:
● Apply engine oil to the reamer when reaming.
● If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
● If the inner surface of the valve guide becomes lustrous and the reamer does not chips, use a new reamer or remedy the reamer.

(8) Recheck the contact condition between valve and valve seat after replacing valve guide.

4. INTAKE AND EXHAUST VALVE

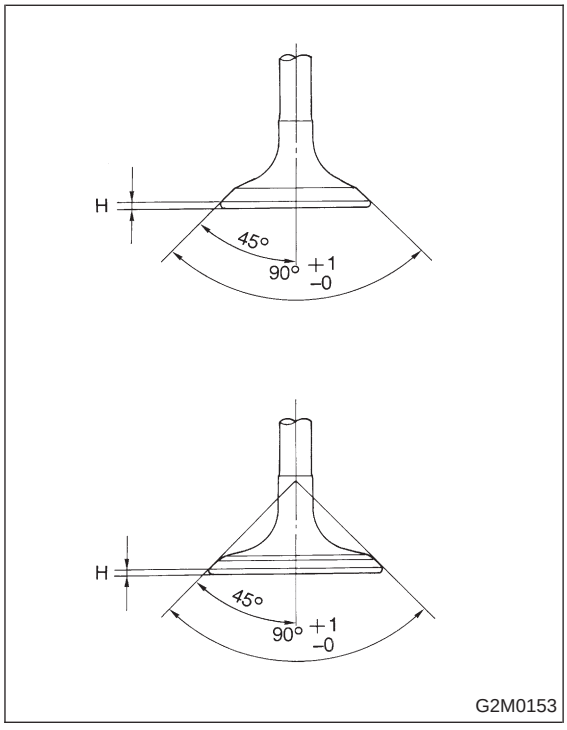
1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if “H” is less than the specified limit.

H:

Intake
Standard
1.2 mm (0.047 in)
Limit
0.8 mm (0.031 in)

Exhaust
Standard
1.5 mm (0.059 in)
Limit
0.8 mm (0.031 in))

Valve overall length:
Intake
105.9 mm (4.169 in)
Exhaust
106.2 mm (4.181 in)

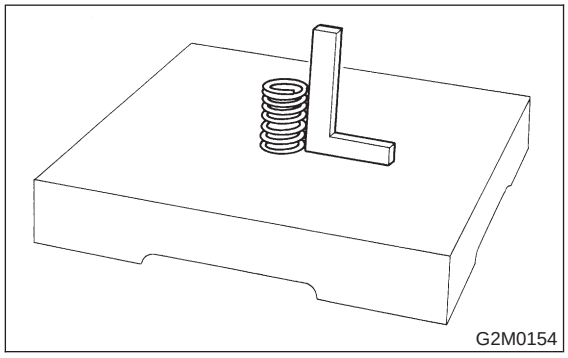


2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

5. VALVE SPRINGS

1) Check valve springs for damage, free length, and tension. Replace valve spring if it is not to the specifications presented in the table.
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

	Valve spring
Free length	39.8 mm (1.567 in)
Tension/spring height	228.5 — 261.8 N (23.3 — 26.7 kg, 51.4 — 58.9 lb)/31.0 mm (1.220 in)
	462.9 — 531.5 N (47.2 — 54.2 kg, 104.1 — 119.5 lb)/23.2 mm (0.913 in)
Squareness	2.5°, 1.7 mm (0.067 in)


G2M0154

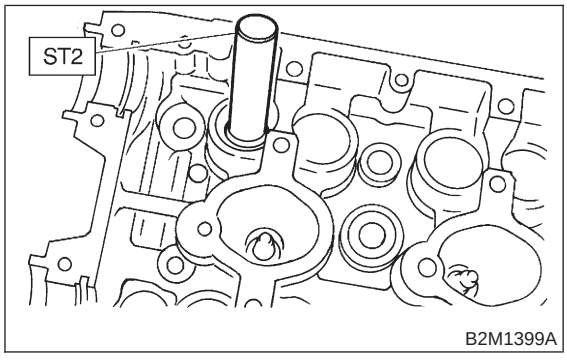
6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace oil seal with new one, if lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.
1) Place cylinder head on ST1.
2) Press in oil seal to the specified dimension indicated in the figure by using ST2.
ST1 498267600 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

CAUTION:
● Apply engine oil to oil seal before force-fitting.
● Differentiate between intake valve oil seal and exhaust valve oil seal by noting their difference in color.

Color of rubber part:
Intake [Black]
Exhaust [Brown]

Color of spring part:
Intake [Silver]
Exhaust [Silver]

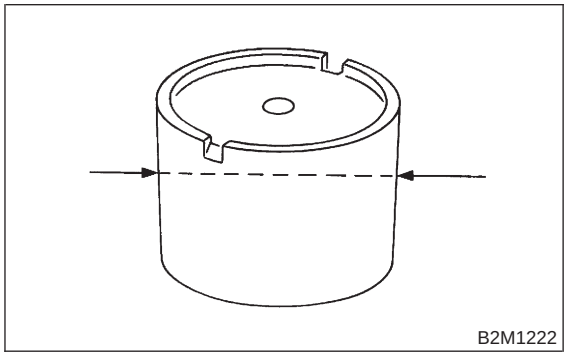


B2M1399A

7. VALVE LIFTER

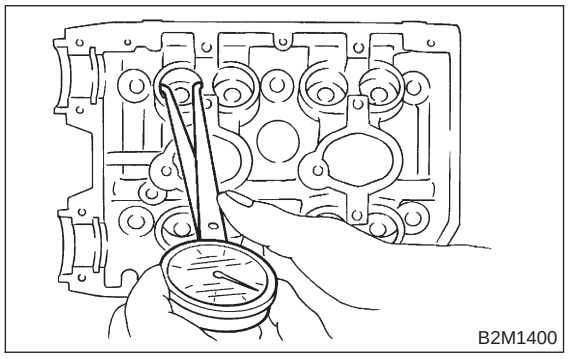
1) Check valve lifter visually.
2) Measure outer diameter of valve lifter.

Outer diameter:
32.959 — 32.975 mm (1.2976 — 1.2982 in)


B2M1222

3) Measure inner diameter of valve lifter mating part on cylinder head.

Inner diameter:
32.994 — 33.016 mm (1.2990 — 1.2998 in)

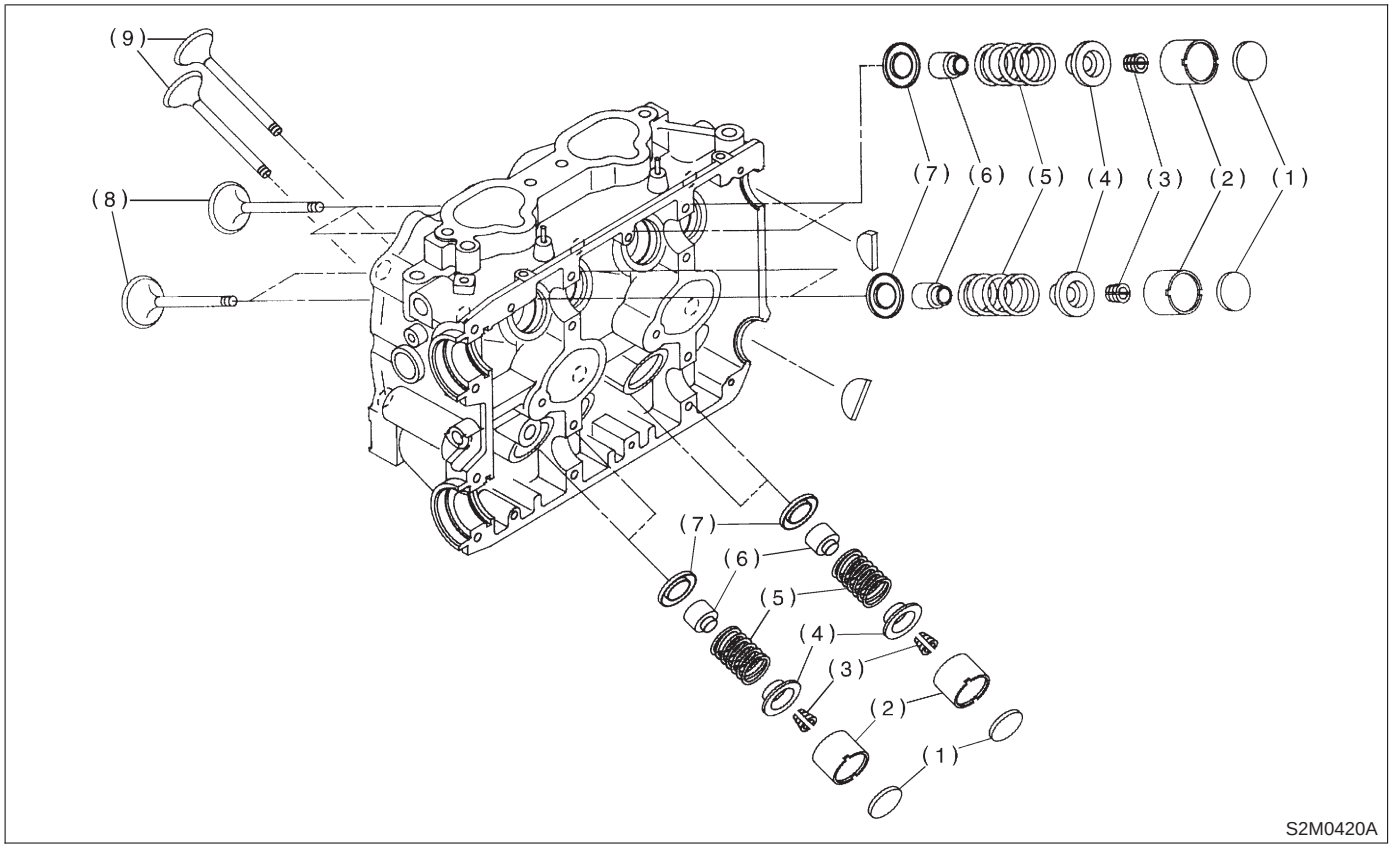


CAUTION:
If difference between outer diameter of valve lifter and inner diameter of valve lifter mating part is over the limit, replace cylinder head.

Standard:
0.019 — 0.057 mm (0.0007 — 0.0022 in)

Limit:
0.100 mm (0.0039 in)

D: ASSEMBLY



(1) Valve shim
(2) Valve lifter
(3) Valve retainer key
(4) Valve retainer
(5) Valve spring
(6) Valve oil seal
(7) Valve spring seat
(8) Intake valve
(9) Exhaust valve

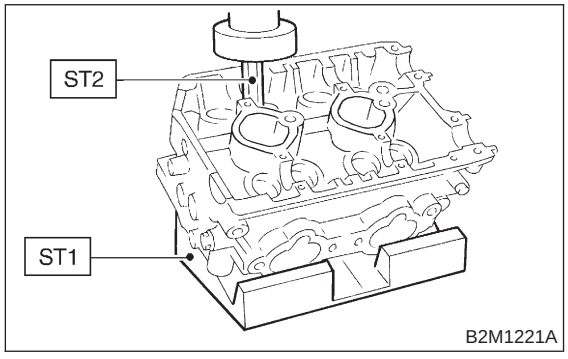
1) Installation of valve spring and valve
   (1) Coat stem of each valve with engine oil and insert valve into valve guide.

CAUTION:
When inserting valve into valve guide, use special care not to damage the oil seal lip.

   (2) Set cylinder head on ST1.
   (3) Install valve spring and retainer using ST2.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

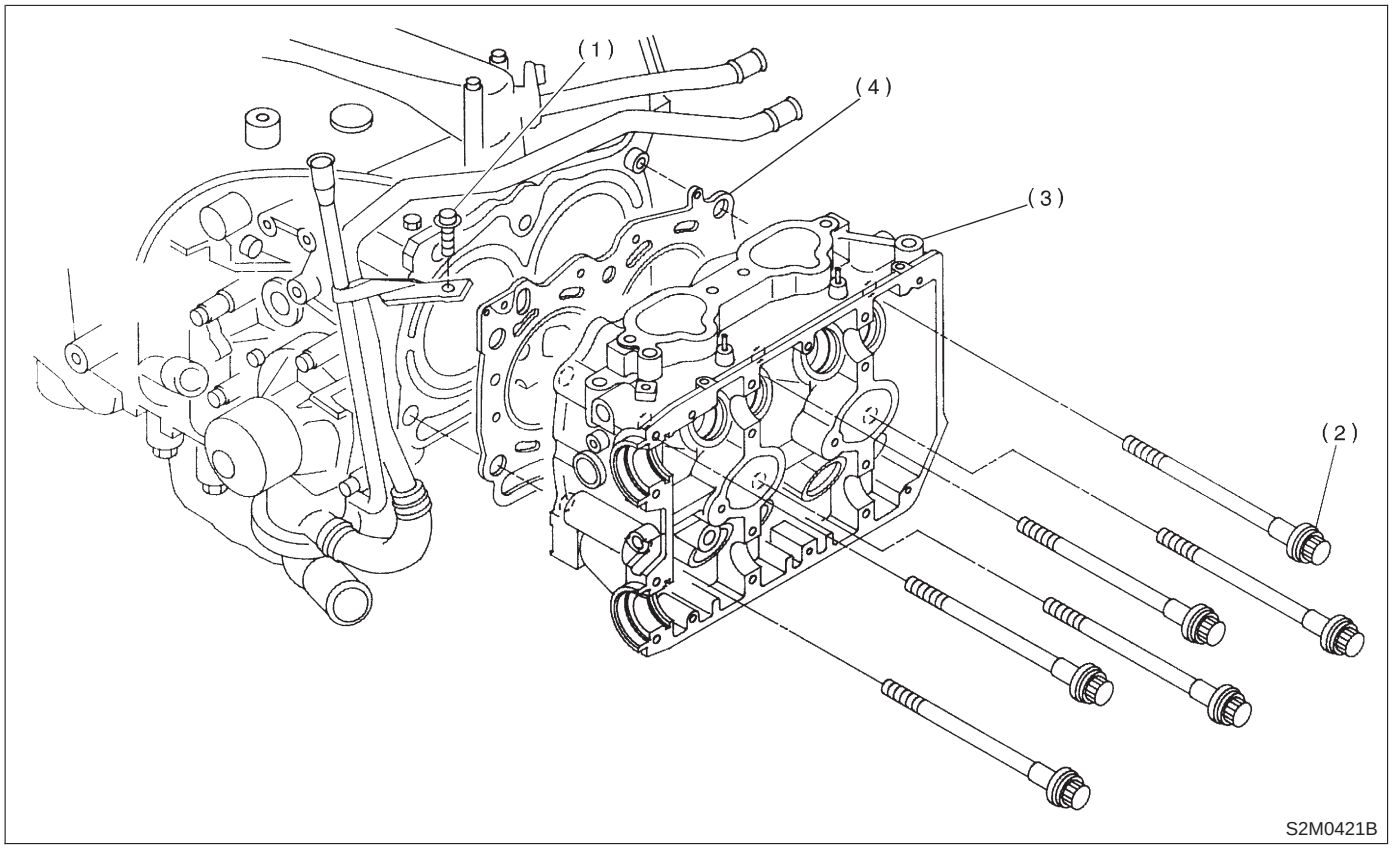
CAUTION:
Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.



   (4) Compress valve spring and fit valve spring retainer key.
   (5) After installing, tap valve spring retainers lightly with wooden hammer for better seating.
2) Install valve lifter and valve shim.

E: INSTALLATION

1. CYLINDER HEAD

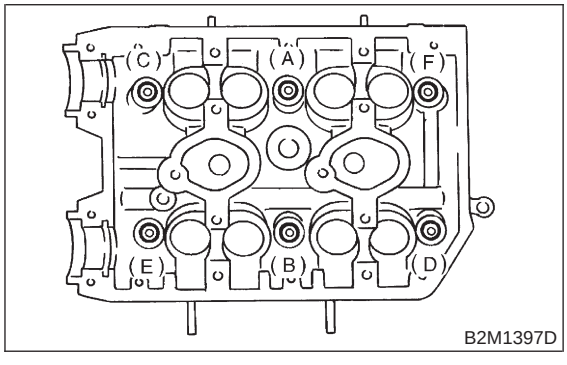


(1) Bolt
(2) Cylinder head bolt
(3) Cylinder head
(4) Cylinder head gasket

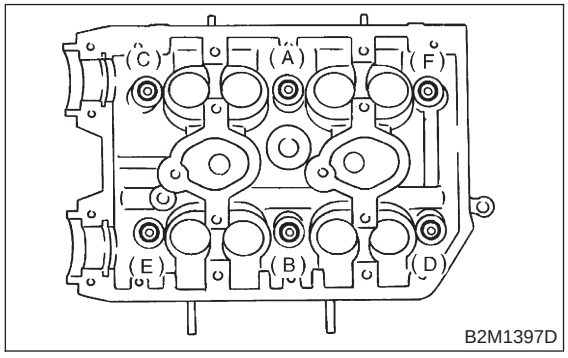
1) Install cylinder head and gaskets on cylinder block.

CAUTION:
Use new cylinder head gaskets.

2) Tighten cylinder head bolts.
(1) Apply a coat of engine oil to washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb) in alphabetical sequence.
Then tighten all bolts to 69 N·m (7.0 kg-m, 51 ft-lb) in alphabetical sequence.
(3) Back off all bolts by 180° first; back them off by 180° again.
(4) Tighten bolts (A) and (B) to 34 N·m (3.5 kg-m, 25 ft-lb).



(5) Tighten bolts (C), (D), (E) and (F) to 15 N·m (1.5 kg-m, 11 ft-lb).



(6) Tighten all bolts by 80 to 90° in alphabetical sequence.

CAUTION:
Do not tighten bolts more than 90°.

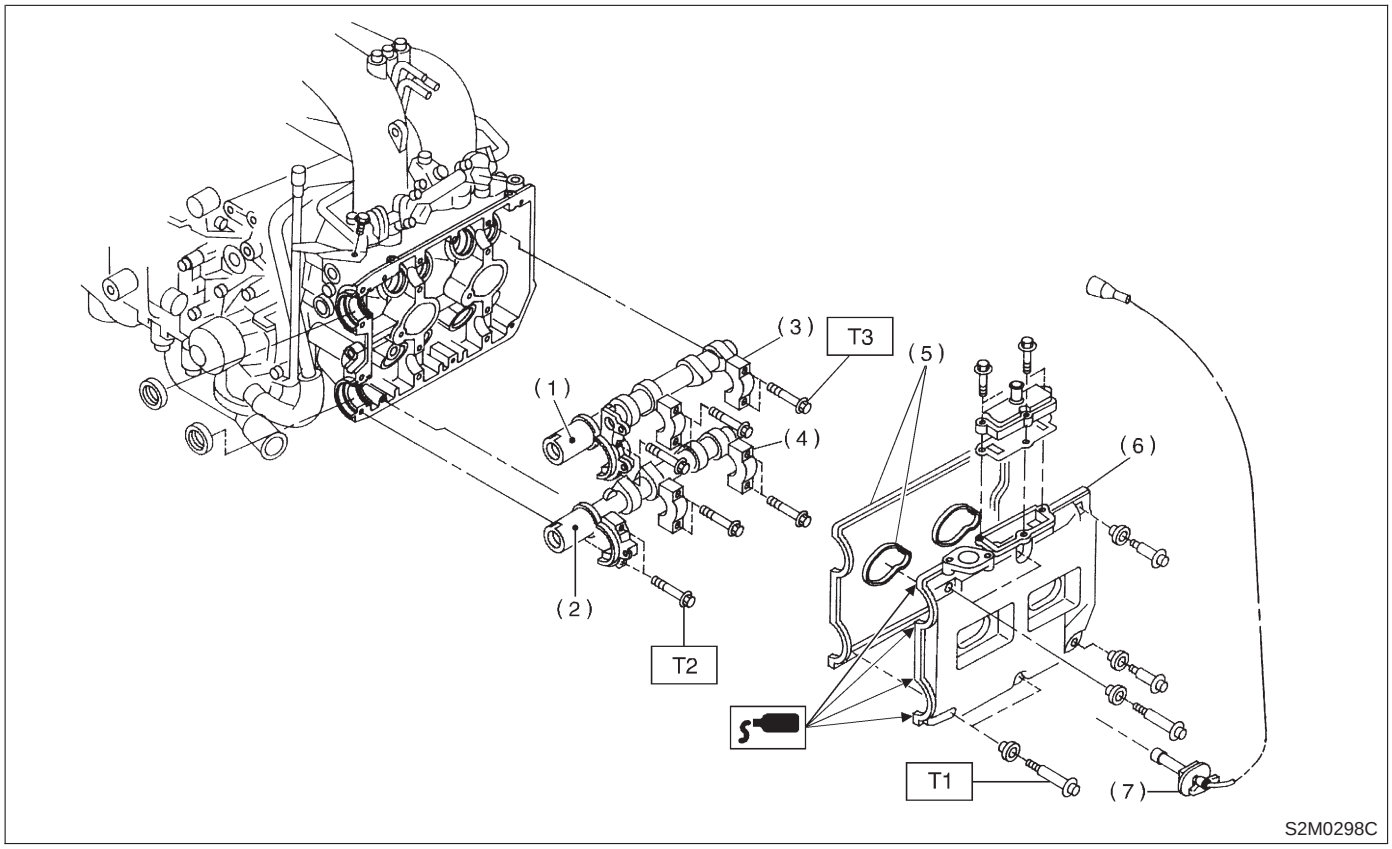
(7) Further tighten all bolts by 80 to 90° in alphabetical sequence.

CAUTION:
Ensure that the total "re-tightening angle" [in the two previous steps] do not exceed 180°.

3) Install oil level gauge guide attaching bolt (LH side only).

2. RELATED PARTS

1) Install camshafts, rocker cover and related parts.
<Ref. to 2-3b [W3C0].>

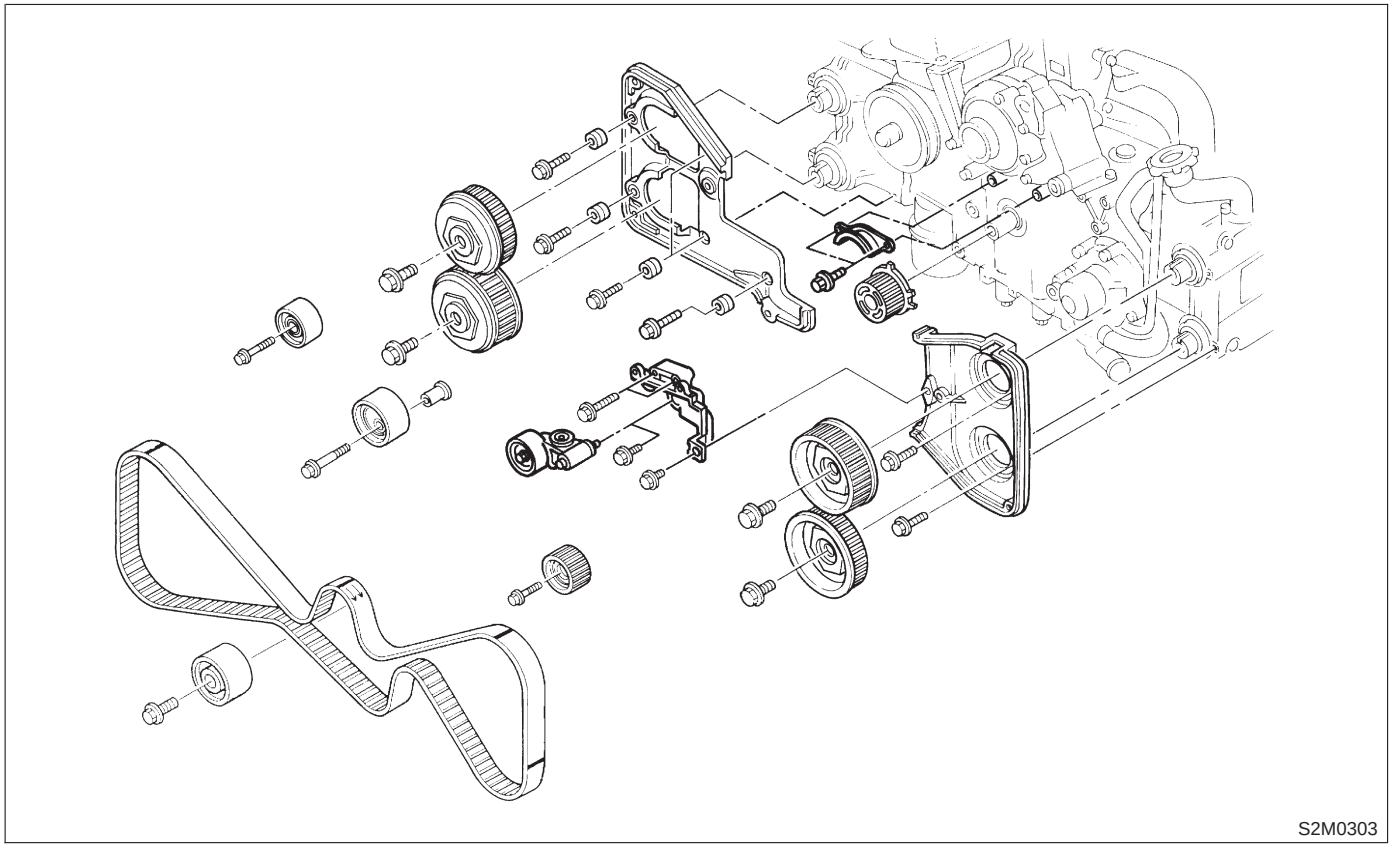


(1) Intake camshaft (LH)
(2) Exhaust camshaft (LH)
(3) Intake camshaft cap (LH)
(4) Exhasut camshaft cap (LH)
(5) Rocker cover gasket (LH)
(6) Rocker cover (LH)
(7) Spark plug cord

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±0.5 (0.5±0.05, 3.6±0.4)
T2: 10±0.7 (1.0±0.07, 7.2±0.5)
T3: 20±2 (2.0±0.2, 14.5±1.4)

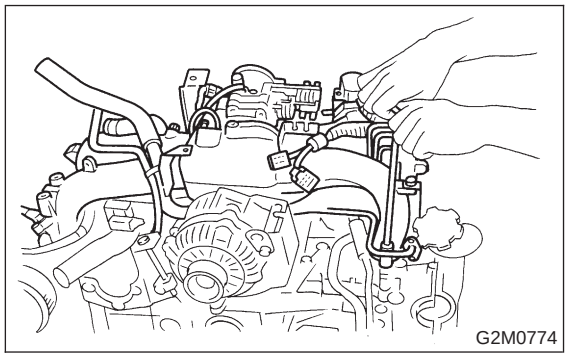
2) Similarly, install parts on right-hand side.

3) Install camshaft sprockets, timing belt and related parts.
<Ref. to 2-3b [W2C0].>


S2M0303

4) Install intake manifold.

CAUTION:
Use new gaskets.


G2M0774

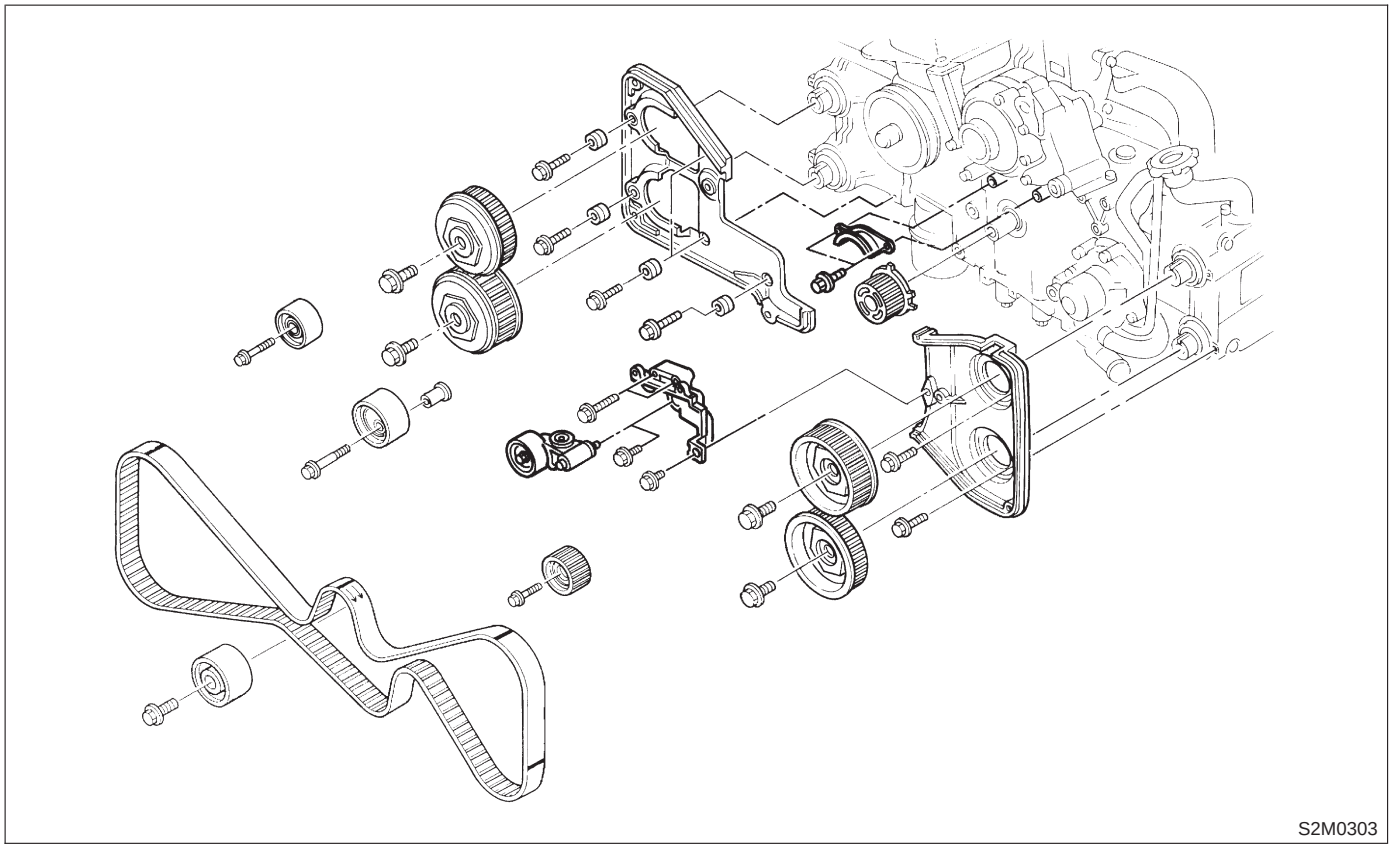
5) Install camshaft position sensor. Use dry compressed air to remove foreign particles before installing sensor.
6) Connect each connector and/or install connector bracket.
7) Connect hoses and tubes to cylinder block.
8) Install brackets, generator and air conditioner compressor.
9) Install V-belt.

5. Cylinder Block

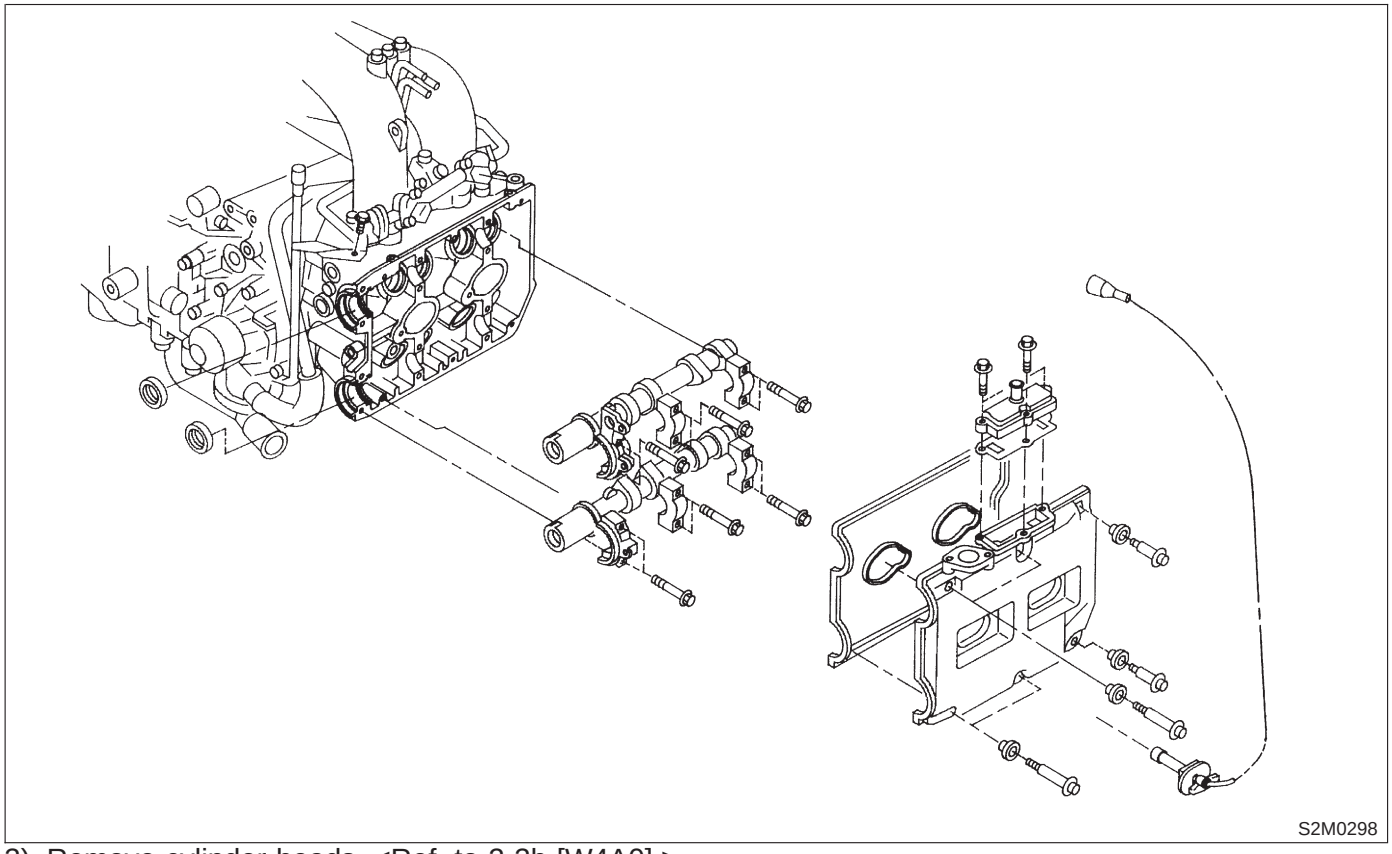
A: REMOVAL

1. RELATED PARTS

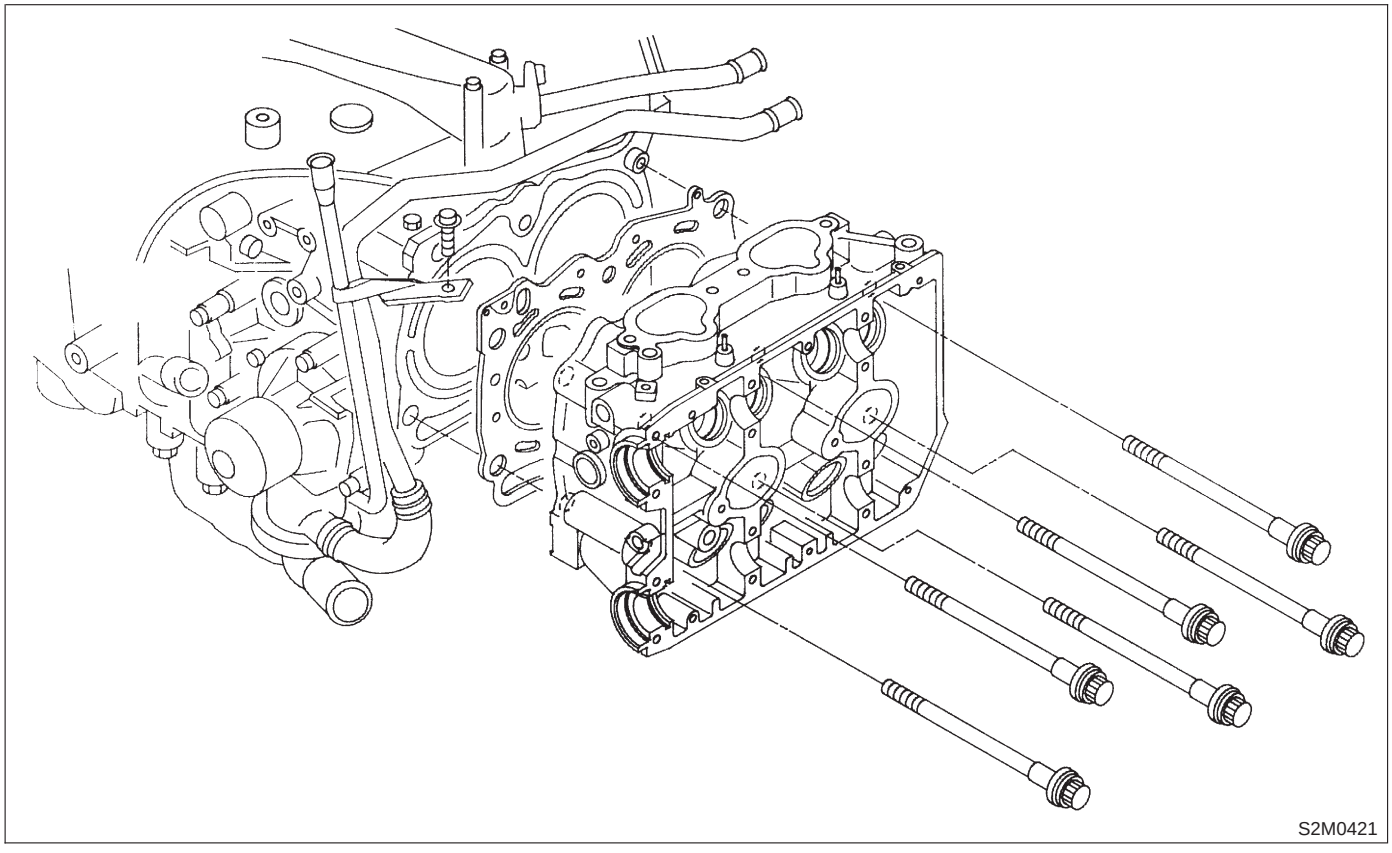
1) Remove timing belt, camshaft sprockets and related parts.
<Ref. to 2-3b [W2A0].>



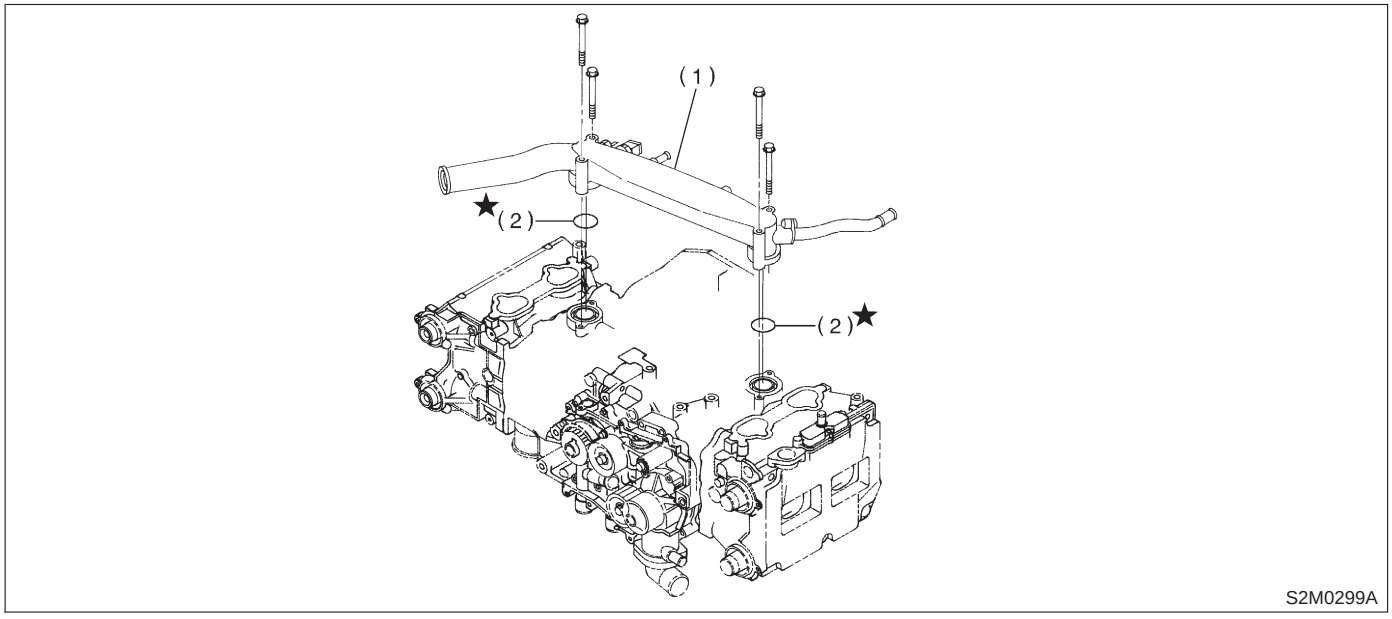
2) Remove rocker cover, camshafts and related parts. <Ref. to 2-3b [W3A0].>



3) Remove cylinder heads. <Ref. to 2-3b [W4A0].>

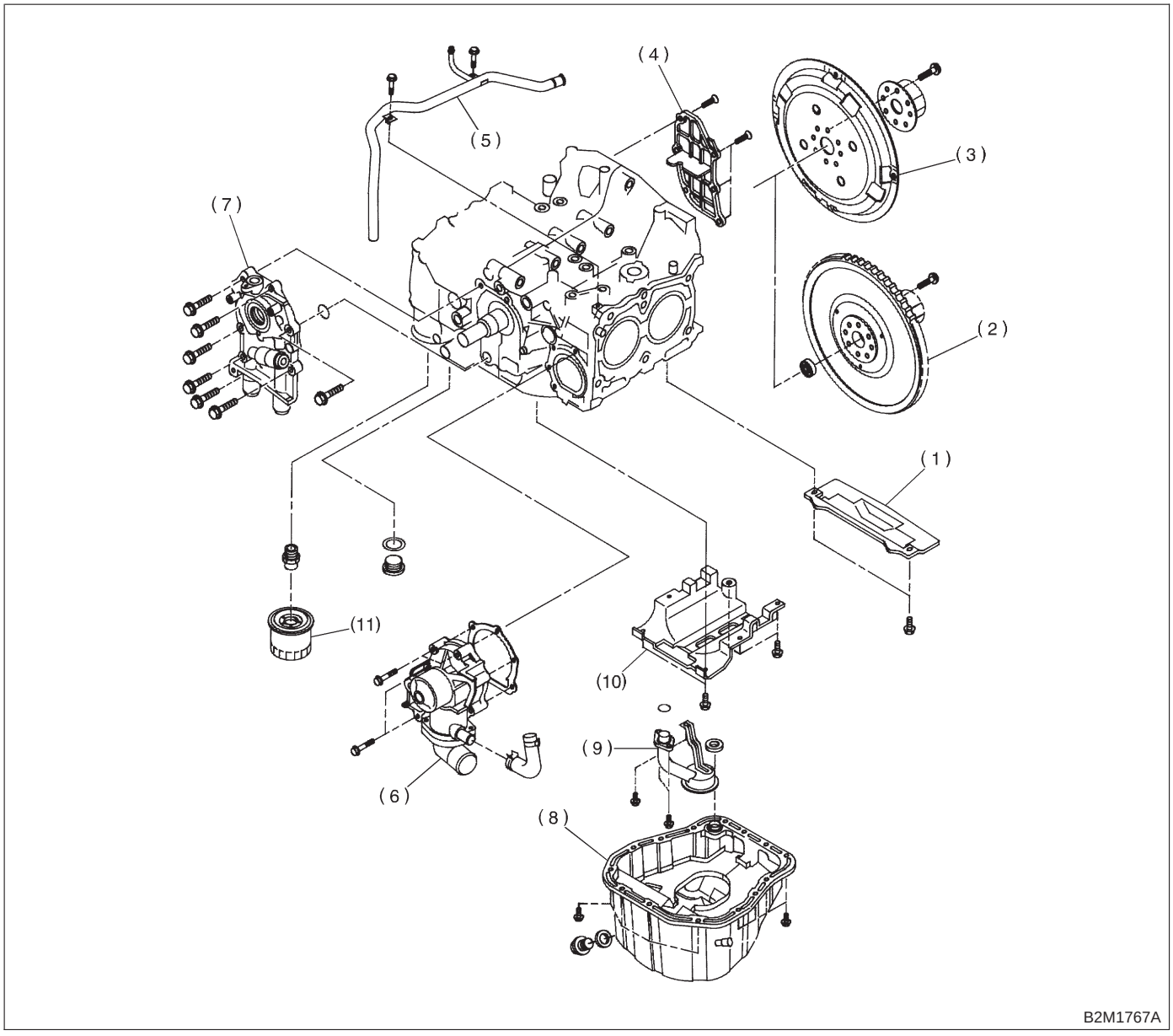


4) Remove water pipe. <Ref. to 2-5 [W8A0].>



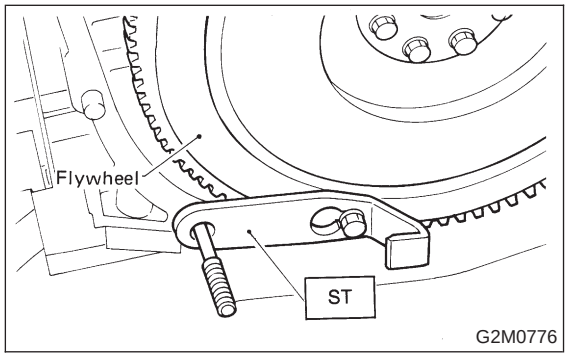
(1) Water pipe
(2) O-ring

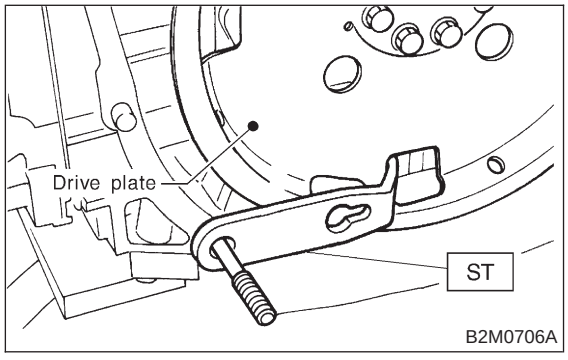
2. OIL PUMP AND WATER PUMP



(1) Clutch housing cover (MT vehicles only)
(2) Flywheel (MT vehicles only)
(3) Drive plate (AT vehicles only)
(4) Oil separator cover
(5) Water by-pass pipe
(6) Water pump
(7) Oil pump
(8) Oil pan
(9) Oil strainer
(10) Baffle plate
(11) Oil filter

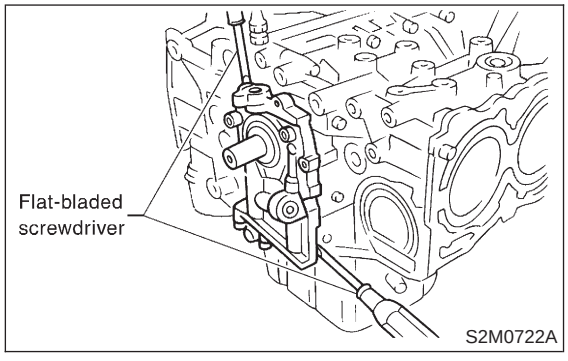
1) Remove clutch housing cover (MT vehicles only).
2) Remove flywheel (MT vehicles only) or drive plate (AT vehicles only).
Using ST, lock crankshaft.
ST 498497100 CRANKSHAFT STOPPER





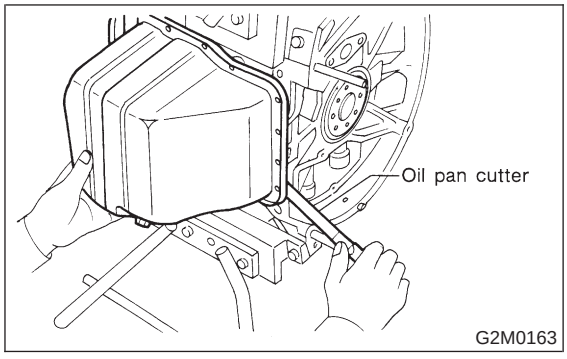
3) Remove oil separator cover.
4) Remove water by-pass pipe for heater.
5) Remove water pump.
6) Remove oil pump from cylinder block.
Use a flat-bladed screwdriver as shown in figure when removing oil pump.

CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.



7) Removal of oil pan
(1) Turn cylinder block with #2 and #4 piston sides facing upward.
(2) Remove bolts which secure oil pan to cylinder block.
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove oil pan.

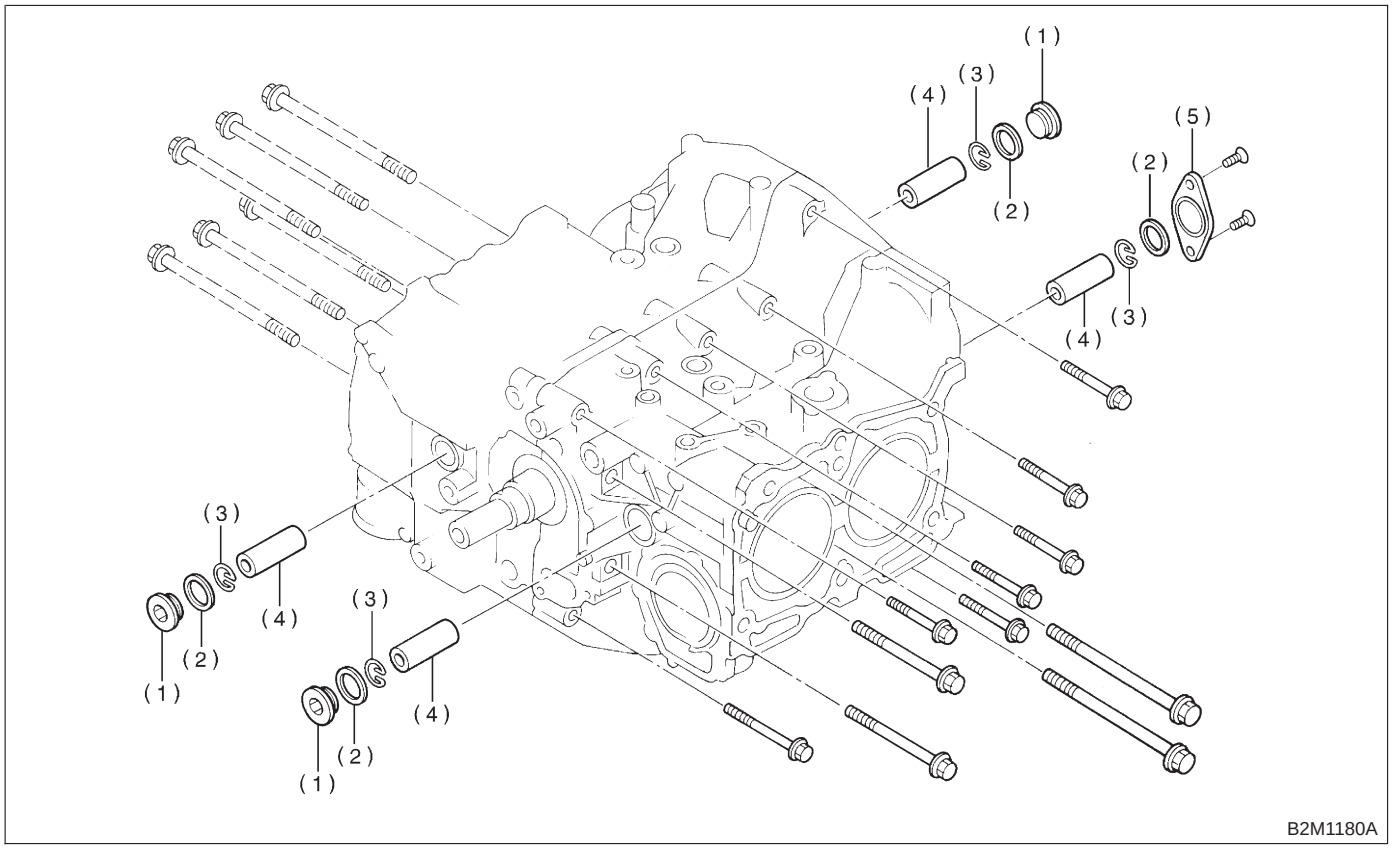
CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.



8) Remove oil strainer stay.
9) Remove oil strainer.
10) Remove baffle plate.
11) Remove oil filter.

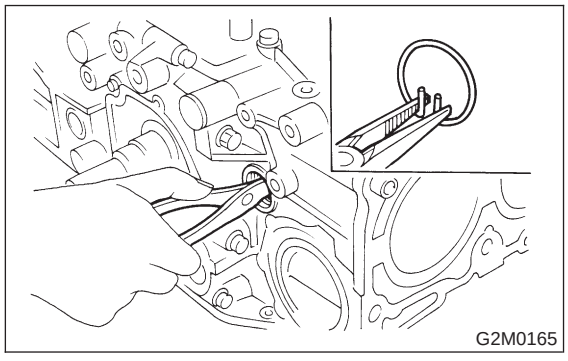
B: DISASSEMBLY

1. PISTON PIN AND CYLINDER BLOCK CONNECTING BOLT



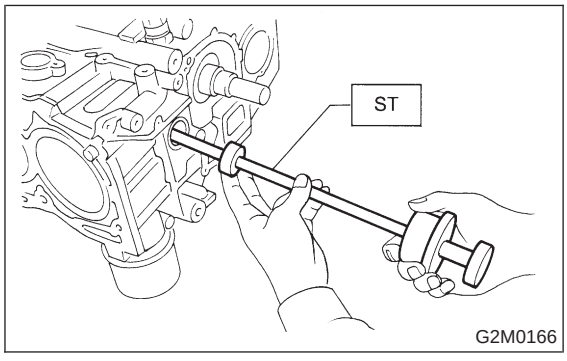
(1) Service hole plug
(2) Gasket
(3) Circlip
(4) Piston pin
(5) Service hole cover

1) Remove service hole cover and service hole plugs using hexagon wrench (14 mm).
2) Rotate crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove piston circlip through service hole of #1 and #2 cylinders.



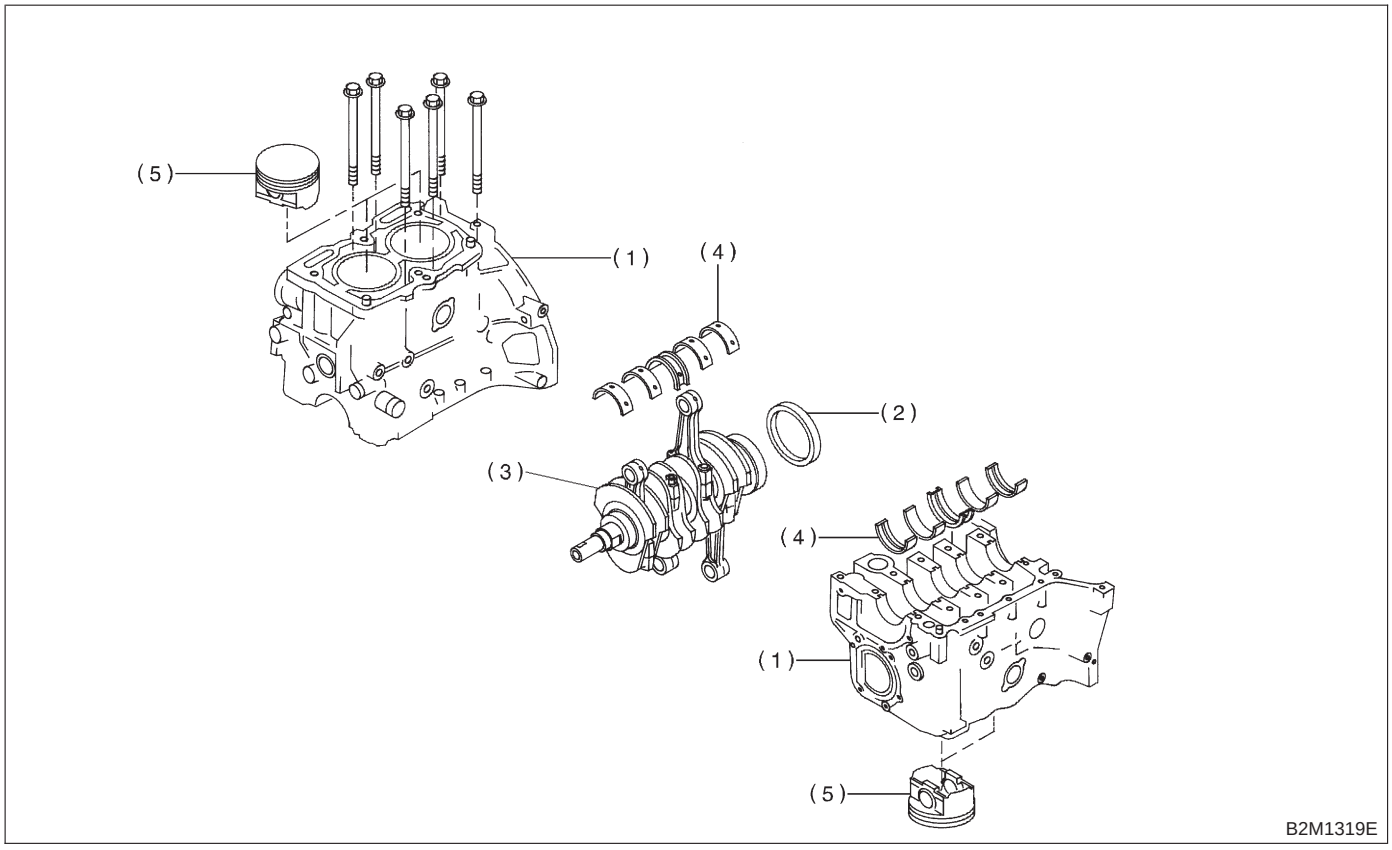
3) Draw out piston pin from #1 and #2 pistons by using ST.
ST 499097700 PISTON PIN REMOVER

CAUTION:
Be careful not to confuse original combination of piston, piston pin and cylinder.



4) Similarly remove piston pins from #3 and #4 pistons.
5) Remove bolts which connect cylinder block on the side of #2 and #4 cylinders.
6) Back off bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.

2. CYLINDER BLOCK



(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

1) Set up cylinder block so that #1 and #3 cylinders are on the upper side, then remove cylinder block connecting bolts.
2) Separate left-hand and right-hand cylinder blocks.

CAUTION:
When separating cylinder block, do not allow the connecting rod to fall and damage the cylinder block.

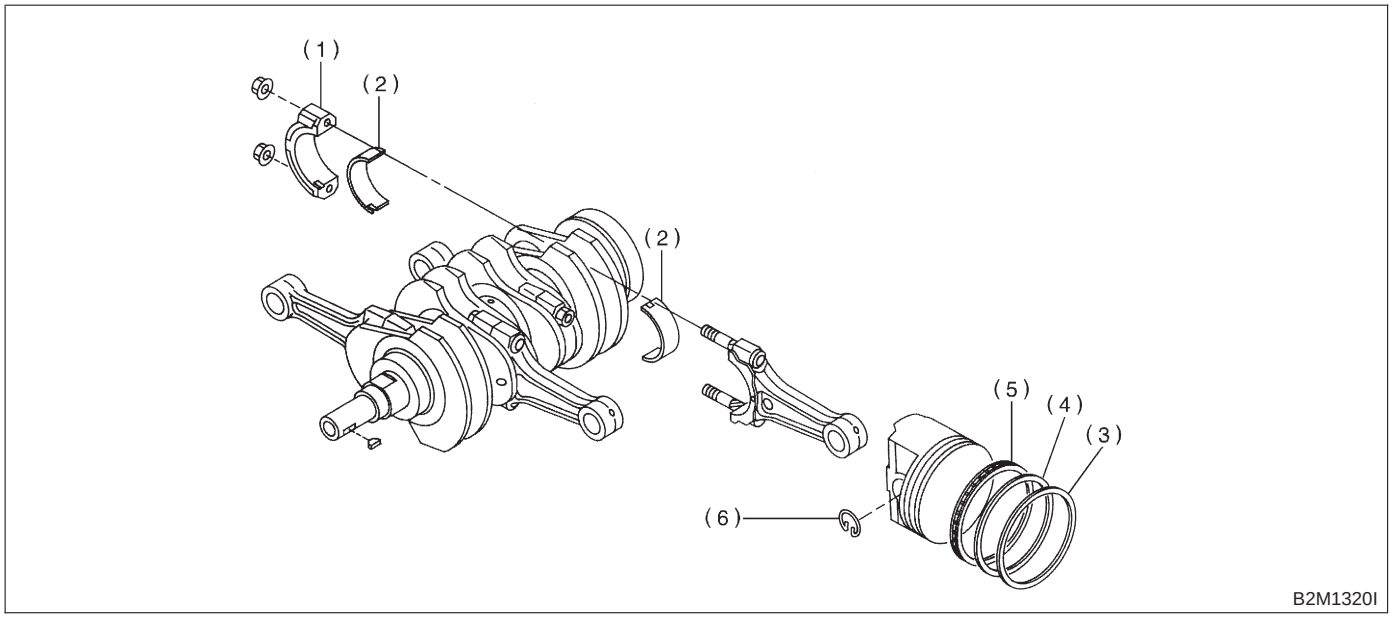
3) Remove rear oil seal.
4) Remove crankshaft together with connecting rod.
5) Remove crankshaft bearings from cylinder block using hammer handle.

CAUTION:
Do not confuse combination of crankshaft bearings. Press bearing at the end opposite to locking lip.

6) Draw out each piston from cylinder block using wooden bar or hammer handle.

CAUTION:
Do not confuse combination of piston and cylinder.

3. CRANKSHAFT AND PISTON



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Circlip

1) Remove connecting rod cap.
2) Remove connecting rod bearing.

CAUTION:
Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

3) Remove piston rings using the piston ring expander.
4) Remove the oil ring by hand.

CAUTION:
Arrange the removed piston rings in good order to prevent confusion.

5) Remove circlip.

C: INSPECTION

1. CYLINDER BLOCK

1) Check for cracks and damage visually. Especially, inspect important parts by means of red lead check.
2) Check the oil passages for clogging.
3) Inspect crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.1 mm (0.004 in)

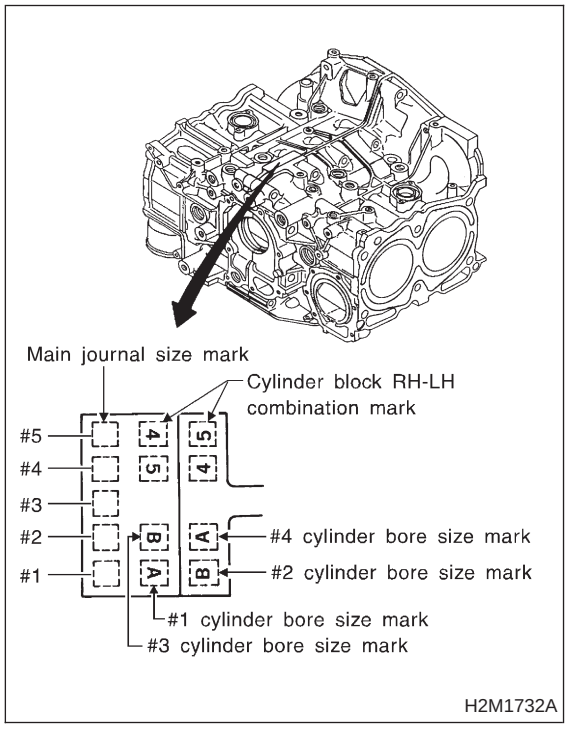
Standard height of cylinder block:
201.0 mm (7.91 in)

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

NOTE:
Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as a guide line in selecting a standard piston.

Standard diameter:
A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)
B: 99.495 — 99.505 mm (3.9171 — 3.9175 in)

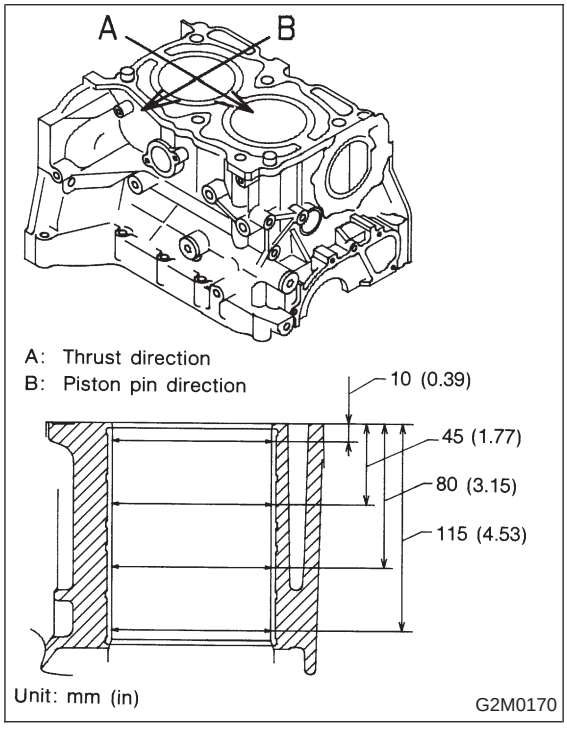


2) How to measure the inner diameter of each cylinder
Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in figure, using a cylinder bore gauge.

CAUTION:
Measurement should be performed at a temperature 20°C (68°F).

Taper:
Standard
0.015 mm (0.0006 in)
Limit
0.050 mm (0.0020 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)
Limit
0.050 mm (0.0020 in)



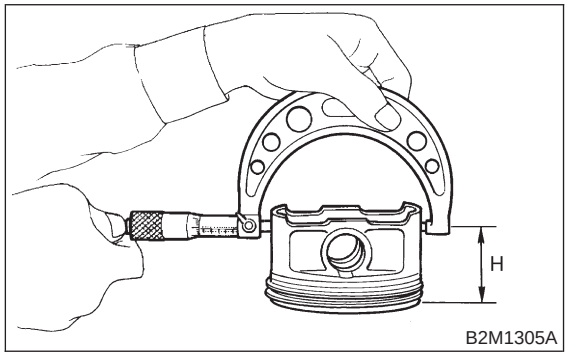
3) When piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

4) How to measure the outer diameter of each piston
Measure the outer diameter of each piston at the height shown in figure. (Thrust direction)

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
37.0 mm (1.457 in)

Piston outer diameter:
Standard
A: 99.485 — 99.495 mm (3.9167 — 3.9171 in)
B: 99.475 — 99.485 mm (3.9163 — 3.9167 in)
0.25 mm (0.0098 in) oversize
99.725 — 99.735 mm (3.9262 — 3.9266 in)
0.50 mm (0.0197 in) oversize
99.975 — 99.985 mm (3.9360 — 3.9364 in)



5) Calculate the clearance between cylinder and piston.

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)
Limit
0.050 mm (0.0020 in)

6) Boring and honing
(1) If the value of taper, out-of-roundness, or cylinder-to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

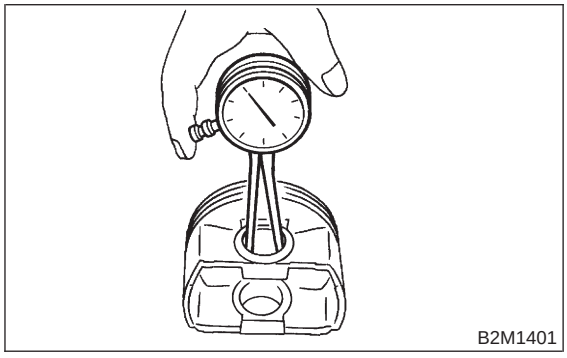
CAUTION:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

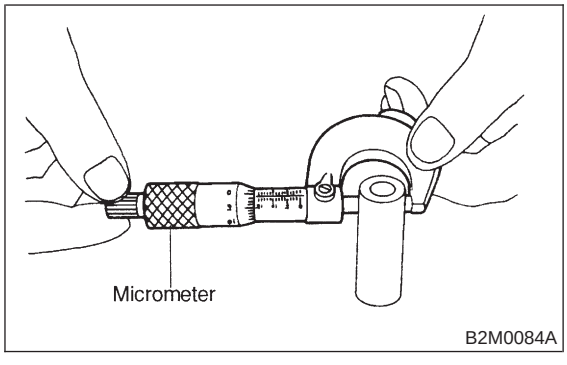
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN

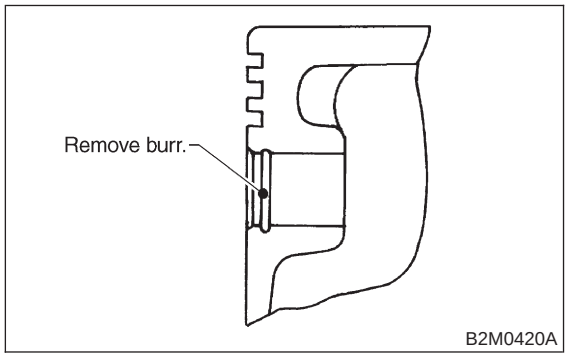
1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder.
<Ref. to 2-3b [W5C2].>
If any of the clearances is not to specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make sure that piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Standard clearance between piston pin and hole in piston:
Standard
0.004 — 0.010 mm (0.0002 — 0.0004 in)
Limit
0.020 mm (0.0008 in)





4) Check circlip installation groove on the piston for burr. If necessary, remove burr from the groove so that piston pin can lightly move.

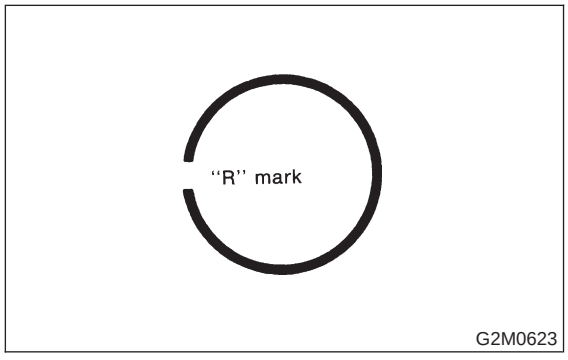


5) Check piston pin circlip for distortion, cracks and wear.

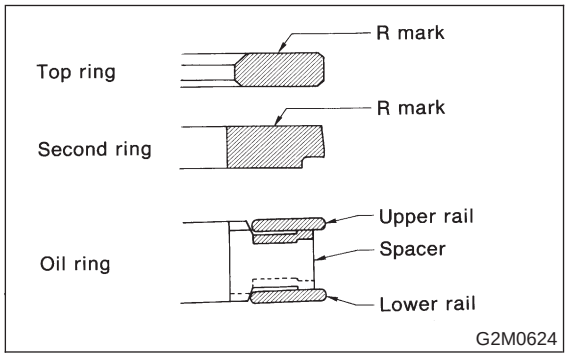
4. PISTON RING

1) If piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace piston ring with a new one of the same size as the piston.

CAUTION:
● "R" is marked on the end of the top and second rings. When installing the rings to the piston, face this mark upward.

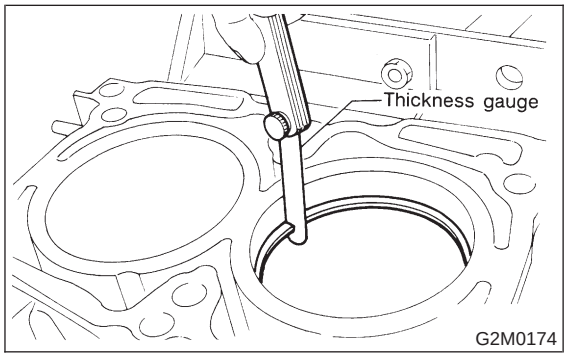


● The oil ring is a combined ring consisting of two rails and a spacer in between. When installing, be careful to assemble correctly.



2) Squarely place piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

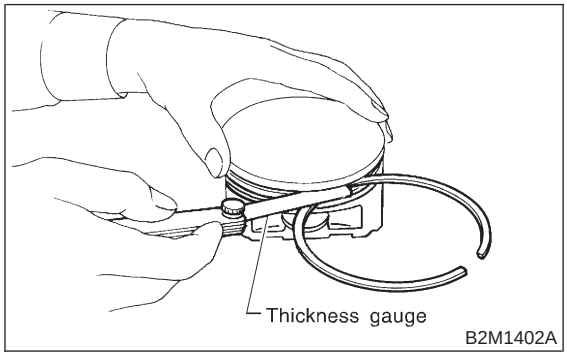
		Unit: mm (in)	
		Standard	Limit
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)	1.0 (0.039)
	Second ring	0.37 — 0.52 (0.0146 — 0.0205)	1.0 (0.039)
	Oil ring rail	0.20 — 0.60 (0.0079 — 0.0236)	1.5 (0.059)



3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

CAUTION:
Before measuring the clearance, clean the piston ring groove and piston ring.

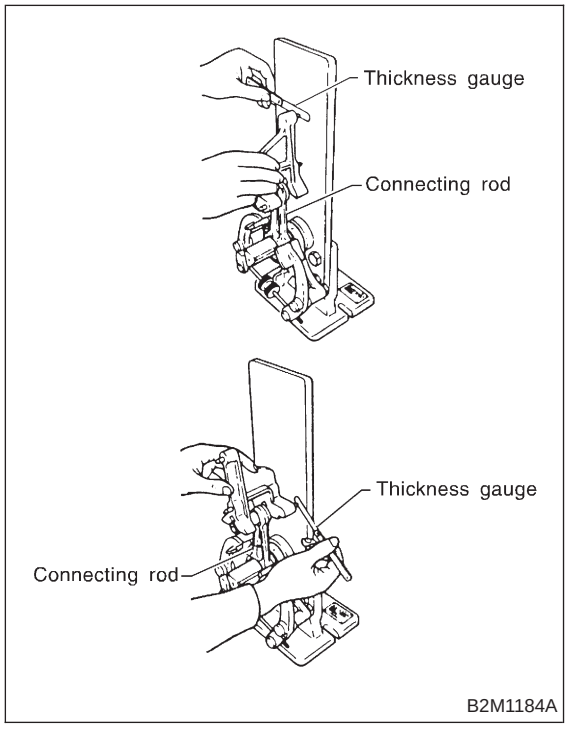
		Unit: mm (in)	
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 —0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 —0.0028)	0.15 (0.0059)



5. CONNECTING ROD

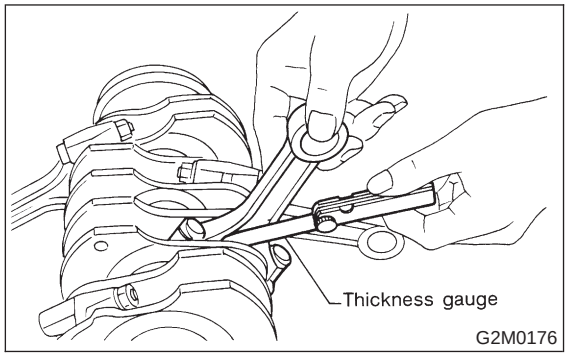
1) Replace connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace connecting rod if the bend or twist exceeds the limit.

Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



3) Install connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). Replace connecting rod if the side clearance exceeds the specified limit.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)
Limit
0.4 mm (0.016 in)



4) Inspect connecting rod bearing for scar, peeling, seizure, melting, wear, etc.

5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table.)

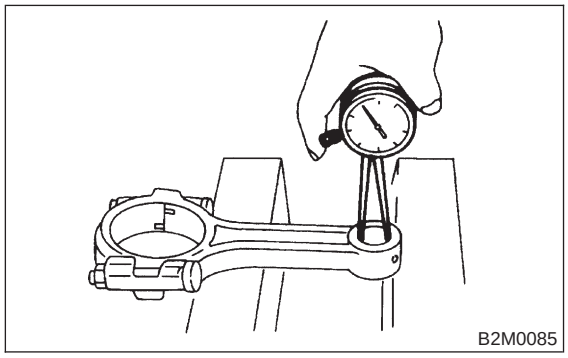
Connecting rod oil clearance:
Standard
0.010 — 0.038 mm (0.0004 — 0.0015 in)
Limit
0.05 mm (0.0020 in)

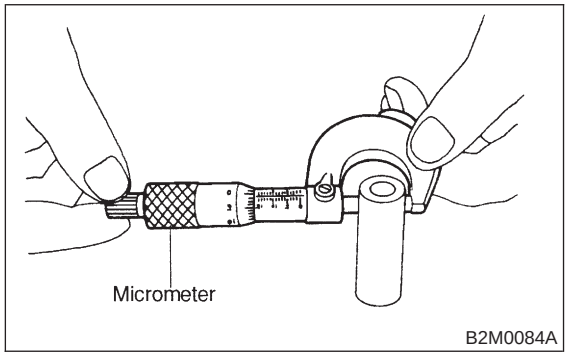
Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	47.984 — 48.000 (1.8891 — 1.8898)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	47.954 — 47.970 (1.8879 — 1.8886)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	47.934 — 47.950 (1.8872 — 1.8878)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	47.734 — 47.750 (1.8793 — 1.8799)

6) Inspect bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)
Limit
0.030 mm (0.0012 in)

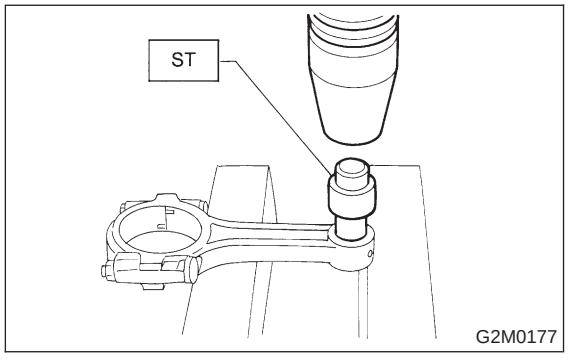

B2M0085



B2M0084A

7) Replacement procedure is as follows.
(1) Remove bushing from connecting rod with ST and press.
(2) Press bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



G2M0177

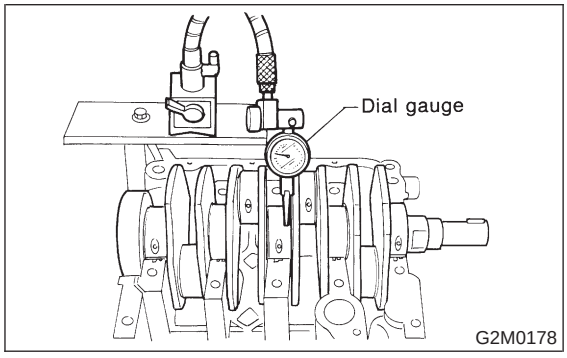
(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean crankshaft completely and check for cracks by means of red lead check etc., and replace if defective.
2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

CAUTION:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position crankshaft on these bearings and measure crankshaft bend using a dial gauge.

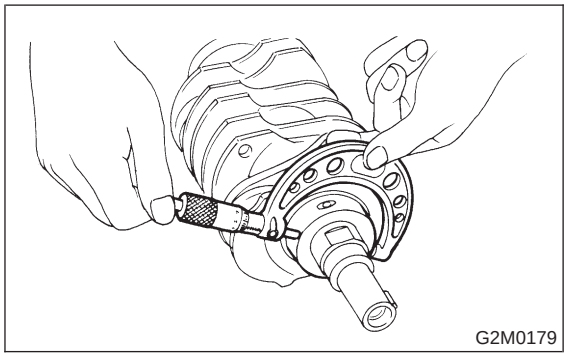
Crankshaft bend limit:
0.035 mm (0.0014 in)



G2M0178

3) Inspect the crank journal and crank pin for wear. If not to specifications, replace bearing with an undersize one, and replace or recondition crankshaft as necessary. When grinding crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:
Out-of-roundness
0.020 mm (0.0008 in) or less
Taper limit
0.07 mm (0.0028 in)
Grinding limit
0.25 mm (0.0098 in)


G2M0179

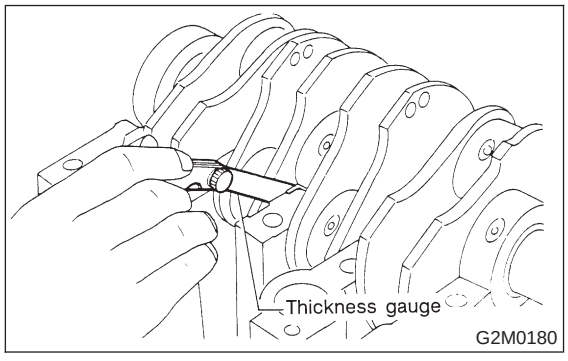
Unit: mm (in)

		Crank journal diameter		Crank pin diameter
		#1, #5	#2, #3, #4	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	47.984 — 48.000 (1.8891 — 1.8898)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.501 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	47.954 — 47.970 (1.8879 — 1.8886)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	59.942— 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	47.934 — 47.950 (1.8872 — 1.8878)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	47.734 — 47.750 (1.8793 — 1.8799)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)

O.D. ... Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace bearing.

Crankshaft thrust clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)
Limit
0.25 mm (0.0098 in)



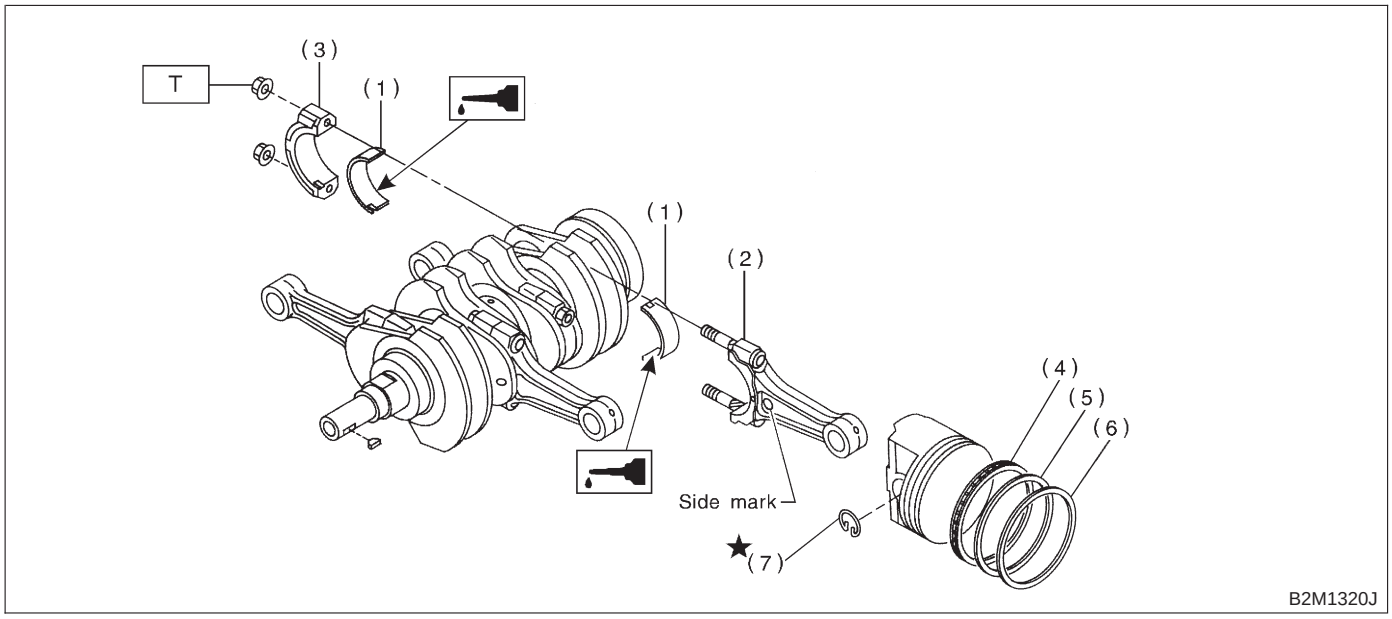
5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.
6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace defective bearing with an undersize one, and replace or recondition crankshaft as necessary.

Unit: mm (in)

Crankshaft oil clearance		
Standard	#1, #5	0.003 — 0.030 (0.0001 — 0.0012)
	#2, #3, #4	0.010 — 0.033 (0.0004 — 0.0013)
Limit	#1, #3, #5	0.040 (0.0016)
	#2, #4	0.045 (0.0018)

D: ASSEMBLY

1. CRANKSHAFT AND PISTON



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Circlip

Tightening torque: N·m (kg-m, ft-lb)
T: 44±2 (4.5±0.2, 32.5±1.4)

1) Install connecting rod bearings on connecting rods and connecting rod caps.

CAUTION:
Apply oil to the surfaces of the connecting rod bearings.

2) Install connecting rod on crankshaft.

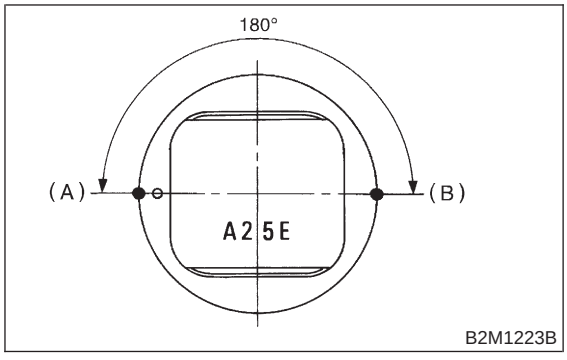
CAUTION:
Position each connecting rod with the side marked facing forward.

3) Install connecting rod cap with connecting rod nut.
Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:
● Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
● When tightening the connecting rod nuts, apply oil on the threads.

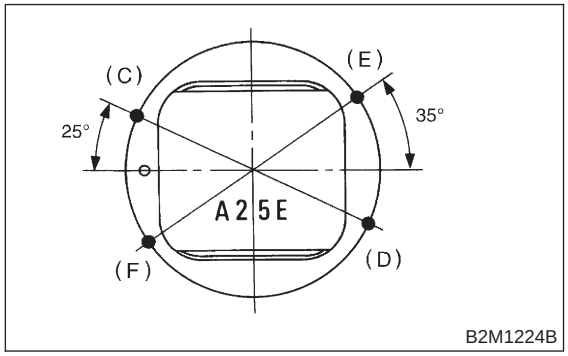
4) Installation of piston rings and oil ring
(1) Install oil ring spacer, upper rail and lower rail in this order by hand. Then install second ring and top ring with a piston ring expander.

(2) Position the top ring gap at (A) or (B) in the figure.



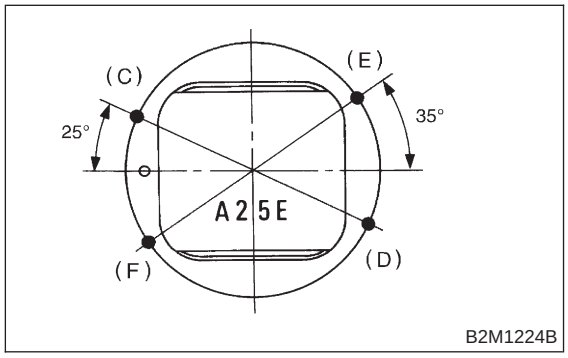
(3) Position the second ring gap at 180° on the reverse side for the top ring gap.

(4) Position the upper rail gap at (C) or (D) in the figure.



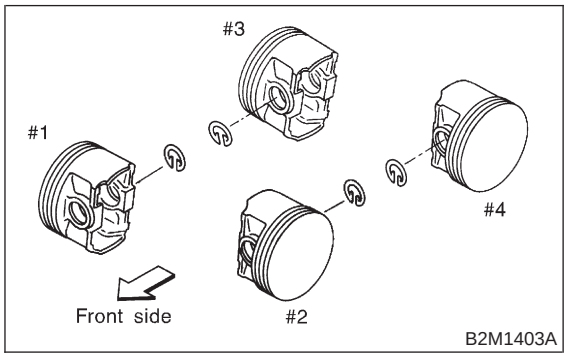
(5) Position the expander gap at 180° of the reverse side for the upper rail gap.
(6) Position the lower rail gap at (E) or (F) in the figure.

CAUTION:
● Ensure ring gaps do not face the same direction.
● Ensure ring gaps are not within the piston skirt area.

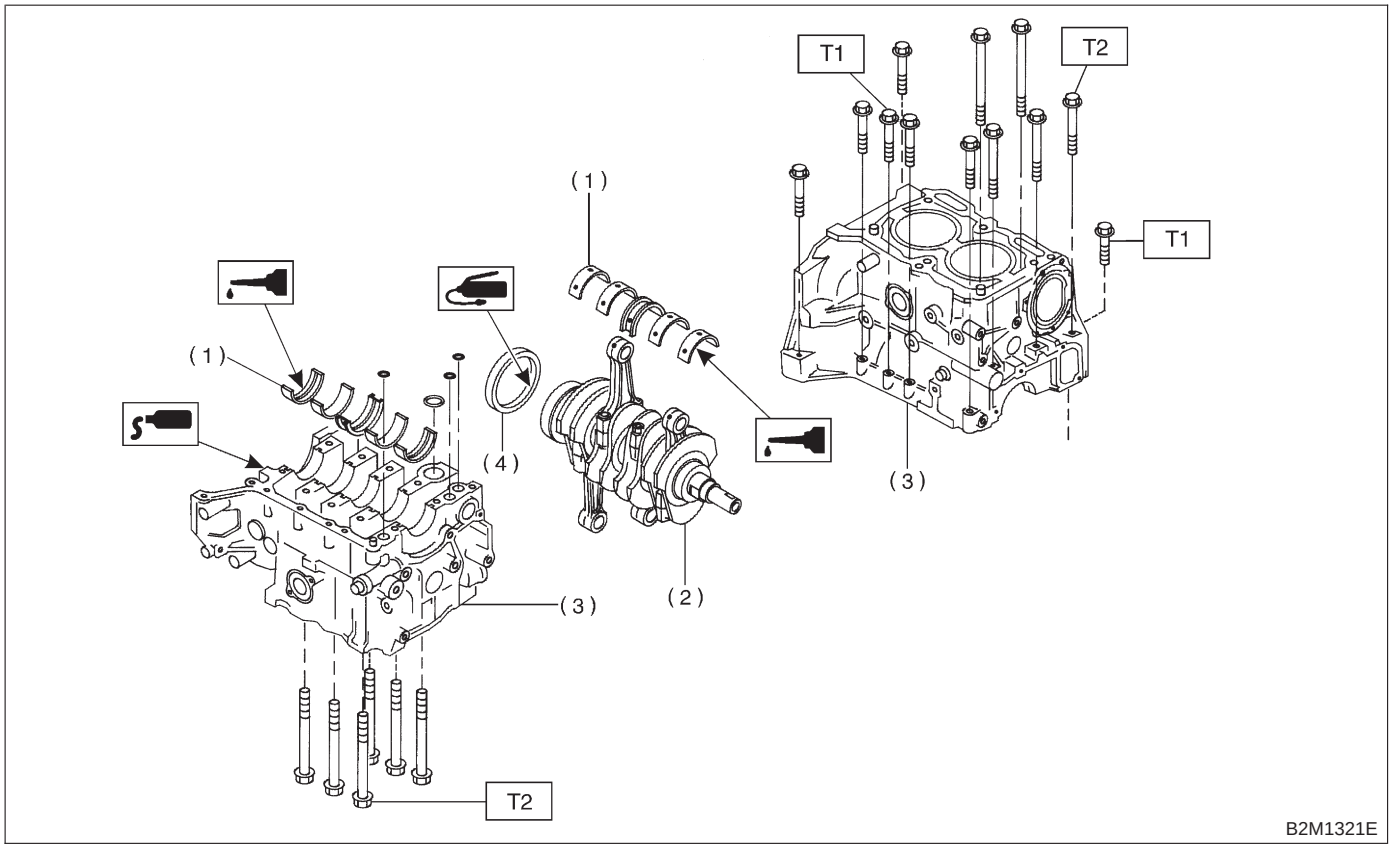


5) Install circlip.
Install circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

CAUTION:
Use new circlips.



2. CYLINDER BLOCK



(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal

Tightening torque: N·m (kg-m, ft-lb)
T1: 25±2 (2.5±0.2, 18.1±1.4)
T2: 47±3 (4.8±0.3, 34.7±2.2)

1) Install ST to cylinder block, then install crankshaft bearings.
ST 499817000 ENGINE STAND

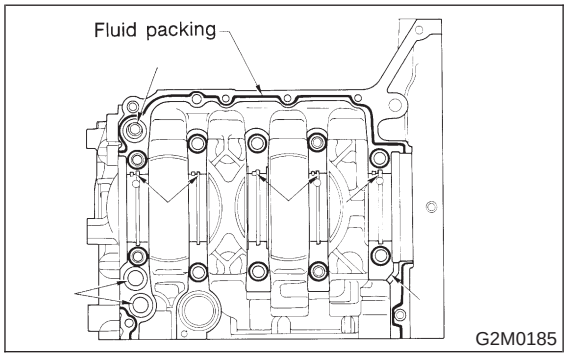
CAUTION:
Remove oil the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

2) Position crankshaft on the #2 and #4 cylinder block.

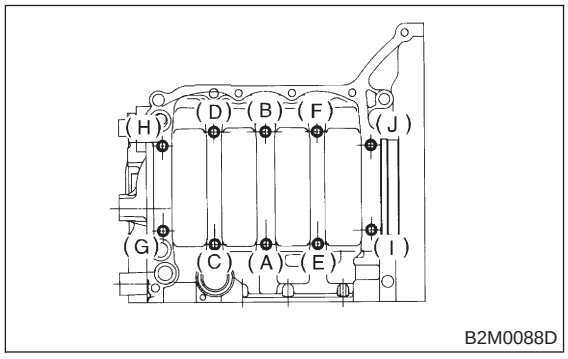
3) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

Fluid packing:
THREE BOND 1215 or equivalent

CAUTION:
Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.

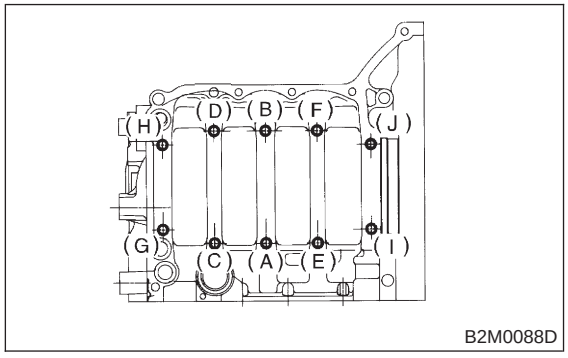


4) Temporarily tighten 10 mm cylinder block connecting bolts in alphabetical sequence shown in figure.



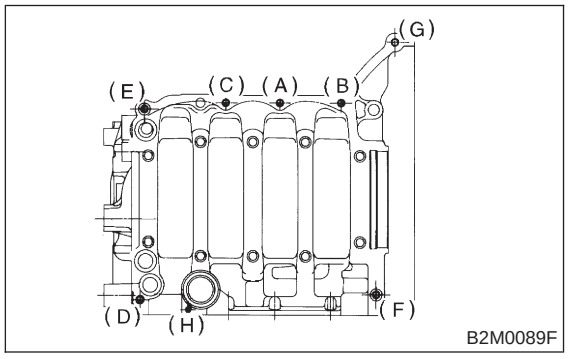
5) Tighten 10 mm cylinder block connecting bolts in alphabetical sequence.

Tightening torque:
47±3 N·m (4.8±0.3 kg-m, 34.7±2.2 ft-lb)

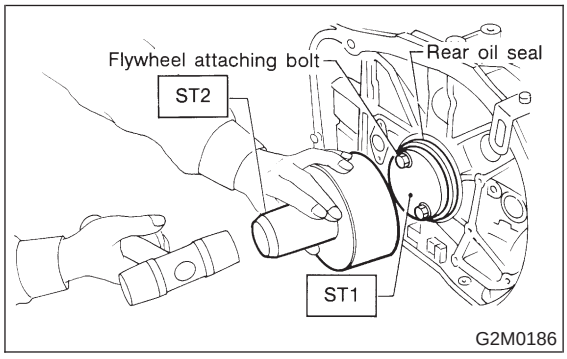


6) Tighten 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in figure.

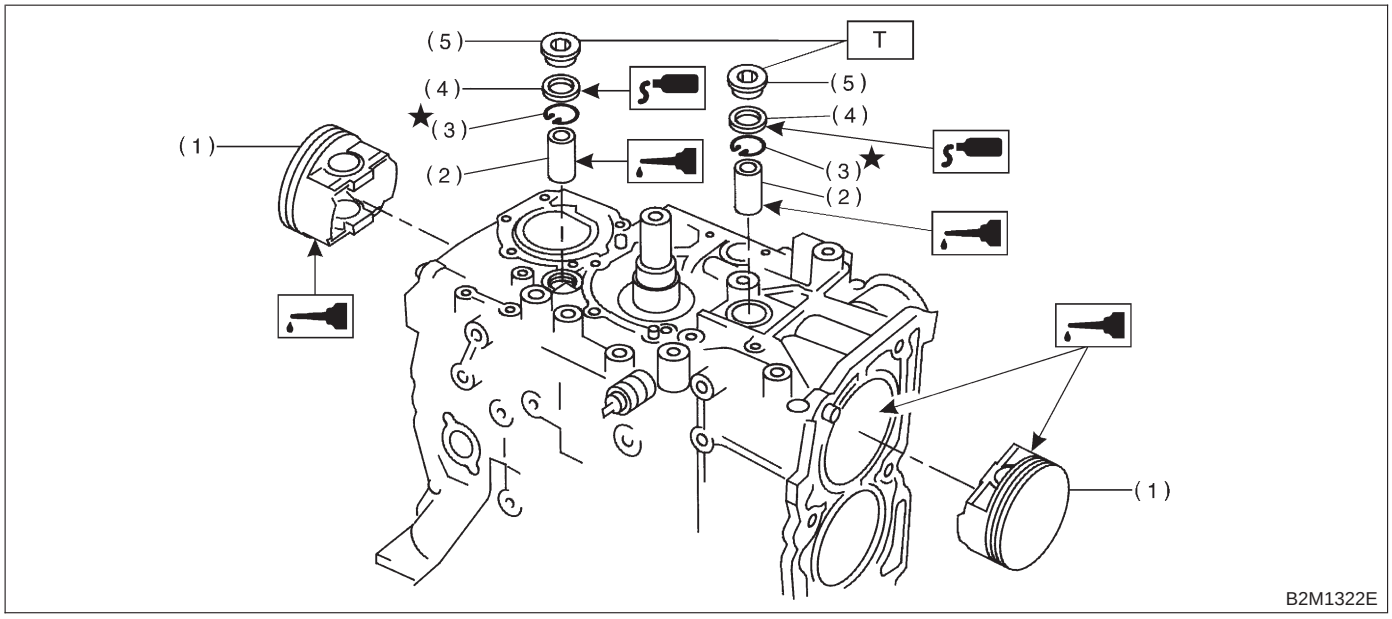
Tightening torque:
(A) — (G): 25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
(H): 6.4 N·m (0.65 kg-m, 4.7 ft-lb)



7) Install rear oil seal by using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER



3. PISTON AND PISTON PIN (#1 AND #2)



(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug

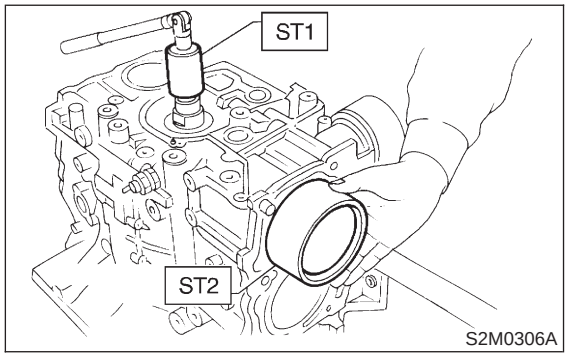
Tightening torque: N·m (kg-m, ft-lb)
T: 69±7 (7.0±0.7, 50.6±5.1)

1) Installing piston
(1) Turn cylinder block so that #1 and #2 cylinders face upward.
(2) Using ST1, turn crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

(3) Apply a coat of engine oil to pistons and cylinders and insert pistons in their cylinders by using ST2.

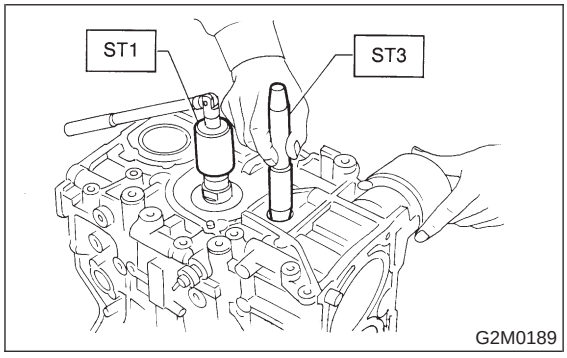
ST2 498747300 PISTON GUIDE



2) Installing piston pin
(1) Insert ST3 into service hole to align piston pin hole with connecting rod small end.

CAUTION:
Apply a coat of engine oil to ST3 before insertion.

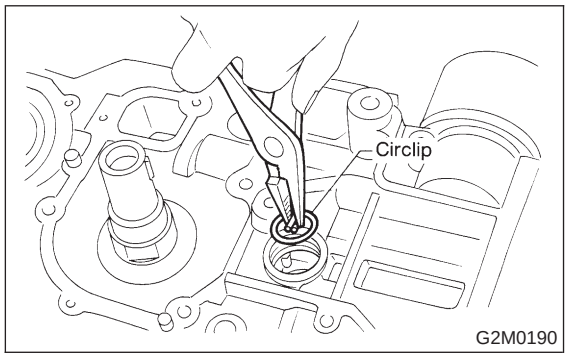
ST3 499017100 PISTON PIN GUIDE



(2) Apply a coat of engine oil to piston pin and insert piston pin into piston and connecting rod through service hole.

(3) Install circlip.

CAUTION:
Use new circlips.

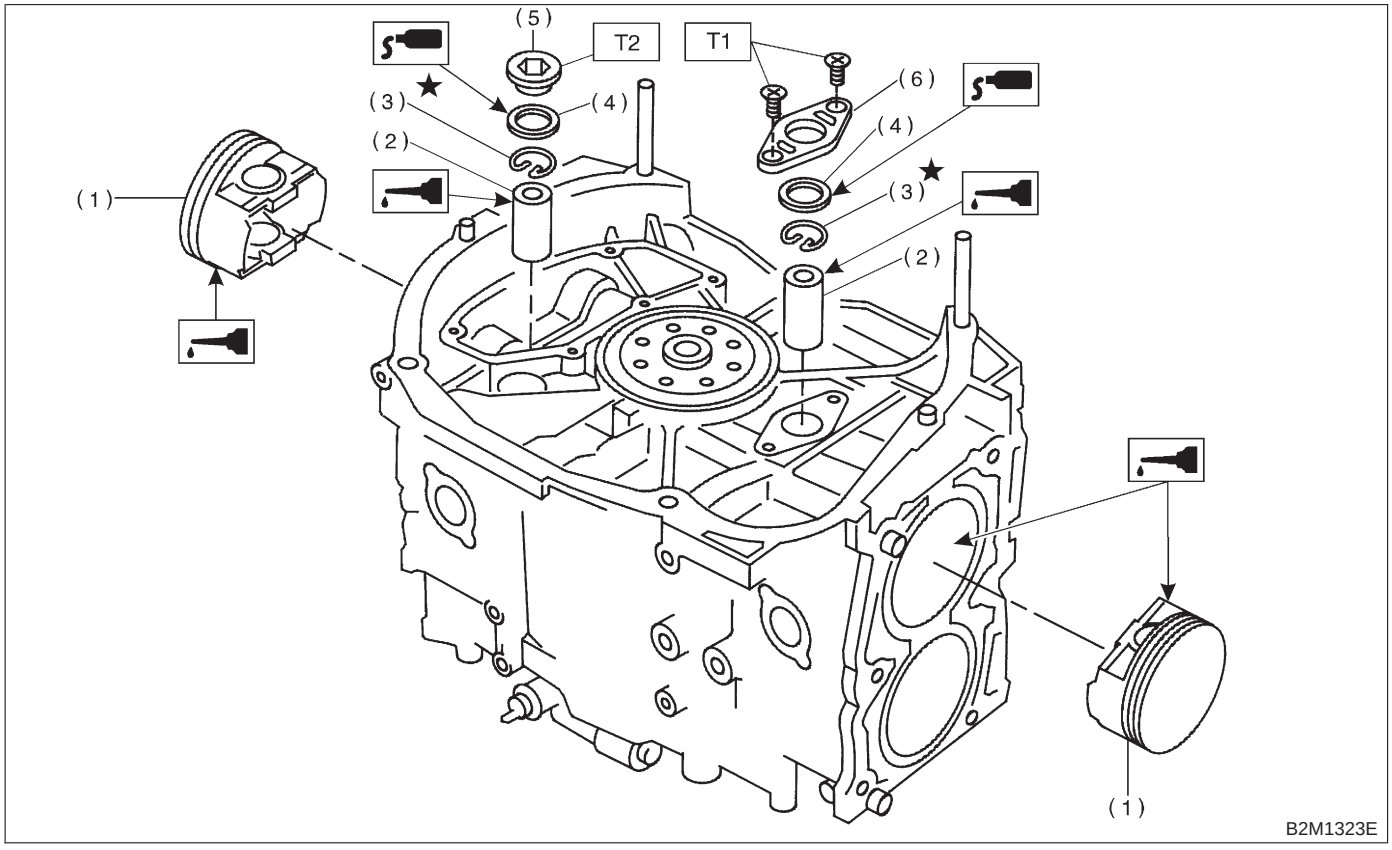


(4) Install service hole plug and gasket.

CAUTION:
Use a new gasket and apply a coat of fluid packing to it before installation.

Fluid packing:
THREE BOND 1215 or equivalent

4. PISTON AND PISTON PIN (#3 AND #4)



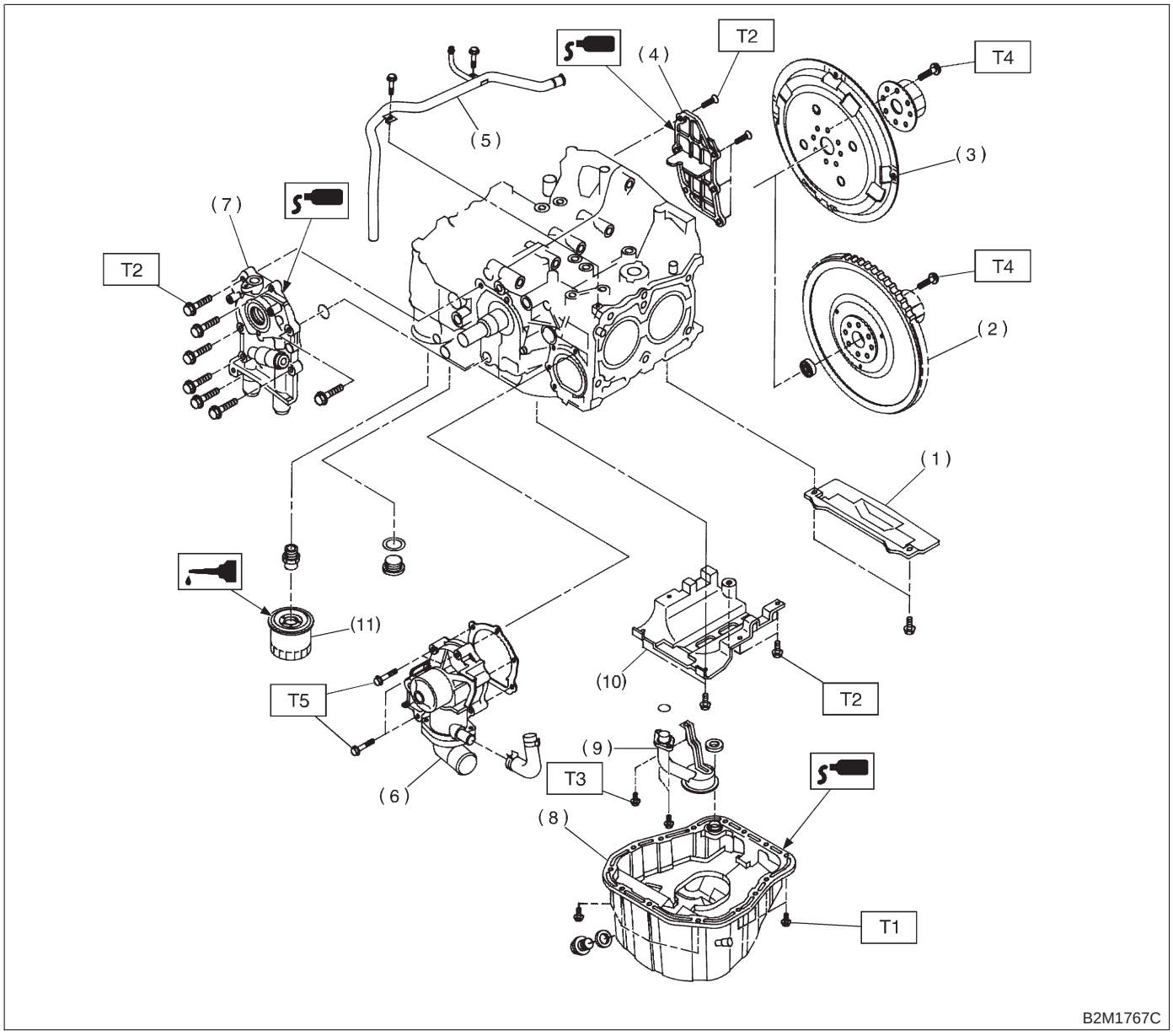
(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
(6) Service hole cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 69±7 (7.0±0.7, 50.6±5.1)

Turn cylinder block so that #3 and #4 cylinders face upward. Using the same procedures as used for #1 and #2 cylinders, install pistons and piston pins.

E: INSTALLATION

1. OIL PUMP AND WATER PUMP

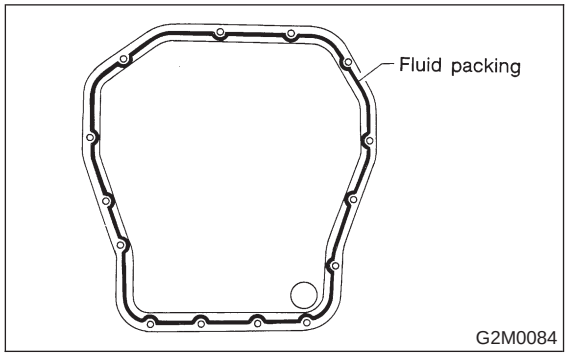


(1) Baffle plate
(2) Oil strainer
(3) Oil pan
(4) Oil separator cover
(5) Drive plate (AT vehicles only)
(6) Flywheel (MT vehicles only)
(7) Clutch housing cover (MT vehicles only)
(8) Oil pump
(9) Water pump
(10) Water by-pass pipe
(11) Oil filter

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 72±3 (7.3±0.3, 52.8±2.2)
T5: First 12±2 (1.2±0.2, 8.7±1.4)
Second 12±2 (1.2±0.2, 8.7±1.4)

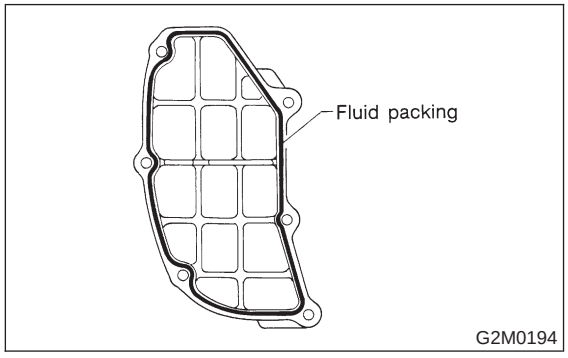
1) Install baffle plate.
2) Install oil strainer and O-ring.
3) Install oil strainer stay.
4) Apply fluid packing to matching surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent

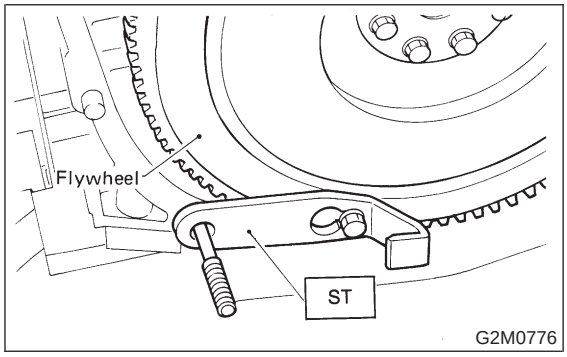


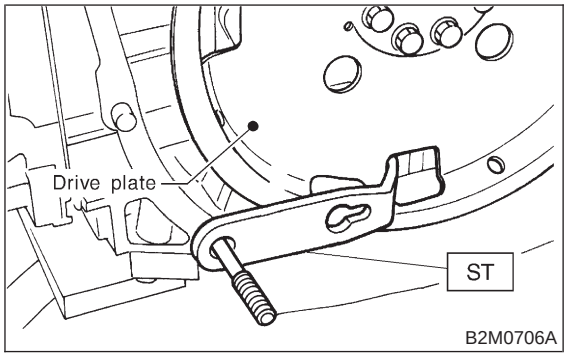
5) Apply fluid packing to matching surfaces and install oil separator cover.

Fluid packing:
THREE BOND 1215 or equivalent

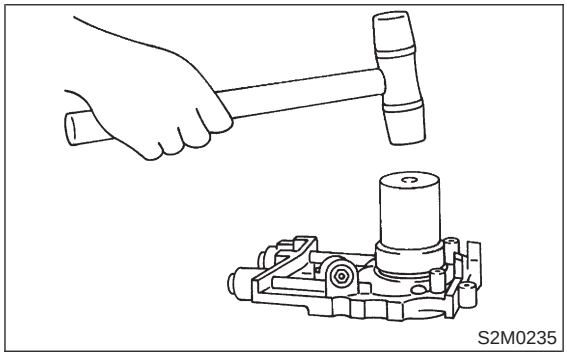


6) Install flywheel (MT vehicles only) or drive plate (AT vehicles only).
To lock crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER



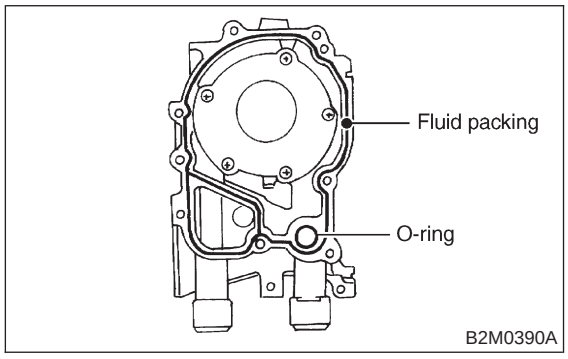


7) Install clutch housing cover. (MT vehicles only)
8) Installation of oil pump
(1) Discard front oil seal after removal. Replace with a new one by using ST.
ST 499587100 OIL SEAL INSTALLER



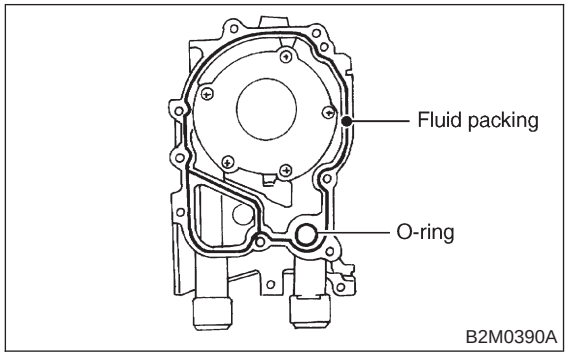
(2) Apply fluid packing to matching surface of oil pump.

Fluid packing:
THREE BOND 1215 or equivalent



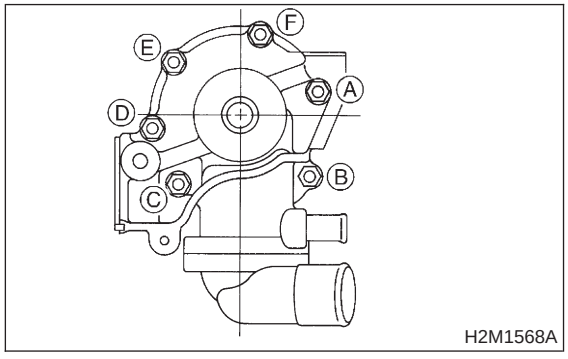
(3) Install oil pump on cylinder block. Be careful not to damage oil seal during installation.

CAUTION:
● Do not forget to install O-ring and seal when installing oil pump.
● Align flat surface of oil pump's inner rotor with crankshaft before installation.



9) Install water pump and gasket.

CAUTION:
● Be sure to use a new gasket.
● When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.

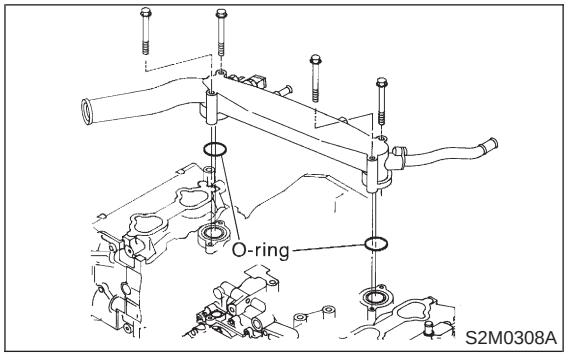


10) Install water by-pass pipe for heater.
11) Install oil filter.

2. RELATED PARTS

1) Install water pipe. <Ref. to 2-5 [W8B0].>

CAUTION:
Always use a new O-ring.



2) Install cylinder heads.
<Ref. to 2-3b [W4E0].>
3) Install camshafts, rocker cover and related parts.
<Ref. to 2-3b [W3C0].>
4) Install camshaft sprockets, timing belt and related parts.
<Ref. to 2-3b [W2C0].>

1. Engine Trouble in General

NOTE:
A, B and C shown in the RANK of table refer to the possibility of reason for the trouble in order (“Very often” to “Rarely”).

A : Very often
B : Sometimes
C : Rarely

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
1. Engine will not start.			
1) Starter does not turn.	● Starter	● Defective battery-to-starter harness	B
		● Defective starter switch	C
		● Defective inhibitor switch or neutral switch	C
		● Defective starter	B
	● Battery	● Poor terminal connection	A
		● Run-down battery	A
		● Defective charging system	B
	● Friction	● Seizure of crankshaft and connecting rod bearing	C
		● Seized camshaft	C
		● Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	● Starter	● Defective starter	C
	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Fuel line	● Defective fuel pump and relay	A
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B
3) Initial combustion occurs.	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Intake system	● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of/or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
4) Engine stalls after initial combustion.	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Intake system	● Loosened or cracked intake duct	B
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	C
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Dirty air cleaner element	C
	● Fuel line	● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B
2. Rough idle and engine stall	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	C
		● Loosened oil filler cap	B
		● Dirty air cleaner element	C
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of/or insufficient fuel	B
	● Belt	● Defective timing	C
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
		● Defective rocker cover gasket	C
	● Cooling system	● Overheating	C
	● Others	● Malfunction of evaporative emission control system	A
		● Stuck or damaged throttle valve	B
		● Accelerator cable out of adjustment	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	B
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filler cap	B
		● Dirty air cleaner element	A
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of/or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
	● Cooling system	● Overheating	C
		● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	A
4. Surging	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filler cap	B
		● Dirty air cleaner element	B
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of/or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Cooling system	● Overheating	B
	● Others	● Malfunction of evaporative emission control system	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
5. Engine does not return to idle.	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Intake system	● Loosened or cracked vacuum hose	A
	● Others	● Stuck or damaged throttle valve	A
		● Accelerator cable out of adjustment	B
6. Dieseling (Run-on)	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Cooling system	● Overheating	B
	● Others	● Accelerator cable out of adjustment	B
7. After burning in exhaust system	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Intake system	● Loosened or cracked intake duct	C
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	B
		● Defective PCV valve	B
		● Loosened oil filler cap	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	C
8. Knocking	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Intake system	● Loosened oil filler cap	B
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Incorrect valve timing	B
	● Cooling system	● Overheating	A
9. Excessive engine oil consumption	● Intake system	● Loosened or cracked PCV hose	A
		● Defective PCV valve	B
		● Loosened oil filler cap	C
	● Compression	● Defective valve stem	A
		● Worn or stuck piston rings, cylinder and piston	A
	● Lubrication system	● Loosened oil pump attaching bolts and defective gasket	B
		● Defective oil filter seal	B
		● Defective crankshaft oil seal	B
		● Defective rocker cover gasket	B
		● Loosened oil drain plug or defective gasket	B
		● Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System>		A
	● Intake system	● Dirty air cleaner element	A
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken spring	C
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	B
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Accelerator cable out of adjustment	B

2. Engine Noise

If noise still exists, conduct diagnostics procedures in accordance with the following table.

CAUTION:
Do not disconnect spark plug cord while engine is running.

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	Valve mechanism is defective. ● Incorrect valve clearance ● Worn camshaft ● Broken valve spring
Heavy and dull clank	Oil pressure is low.	● Worn crankshaft main bearing ● Worn connecting rod bearing (big end)
	Oil pressure is normal.	● Loose flywheel mounting bolts ● Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	● Ignition timing advanced ● Accumulation of carbon inside combustion chamber ● Wrong spark plug ● Improper gasoline
Clank when engine speed is medium (1,000 to 2,000 rpm).	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	● Worn crankshaft main bearing ● Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm.	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	● Worn cylinder liner and piston ring ● Broken or stuck piston ring ● Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	● Unusually worn valve lifter ● Worn camshaft journal bore in crankcase
Squeaky sound	—	● Insufficient generator lubrication
Rubbing sound	—	● Defective generator brush and rotor contact
Gear scream when starting engine	—	● Defective ignition starter switch ● Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	● Loose drive belt ● Defective engine coolant pump shaft
Hissing sound	—	● Loss of compression ● Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	● Loose timing belt ● Belt contacting case/adjacent part
Valve tappet noise	—	● Incorrect valve clearance

NOTE*:
When disconnecting fuel injector connector, Malfunction Indicator Light (CHECK ENGINE light) illuminates and trouble code is stored in ECM memory.
Therefore, carry out the CLEAR MEMORY MODE and INSPECTION MODE after connecting fuel injector connector. (Ref. to 2-7 On-Board Diagnostics II System.)

ENGINE LUBRICATION SYSTEM 2-4

1. Specifications

A: 2200 cc MODEL

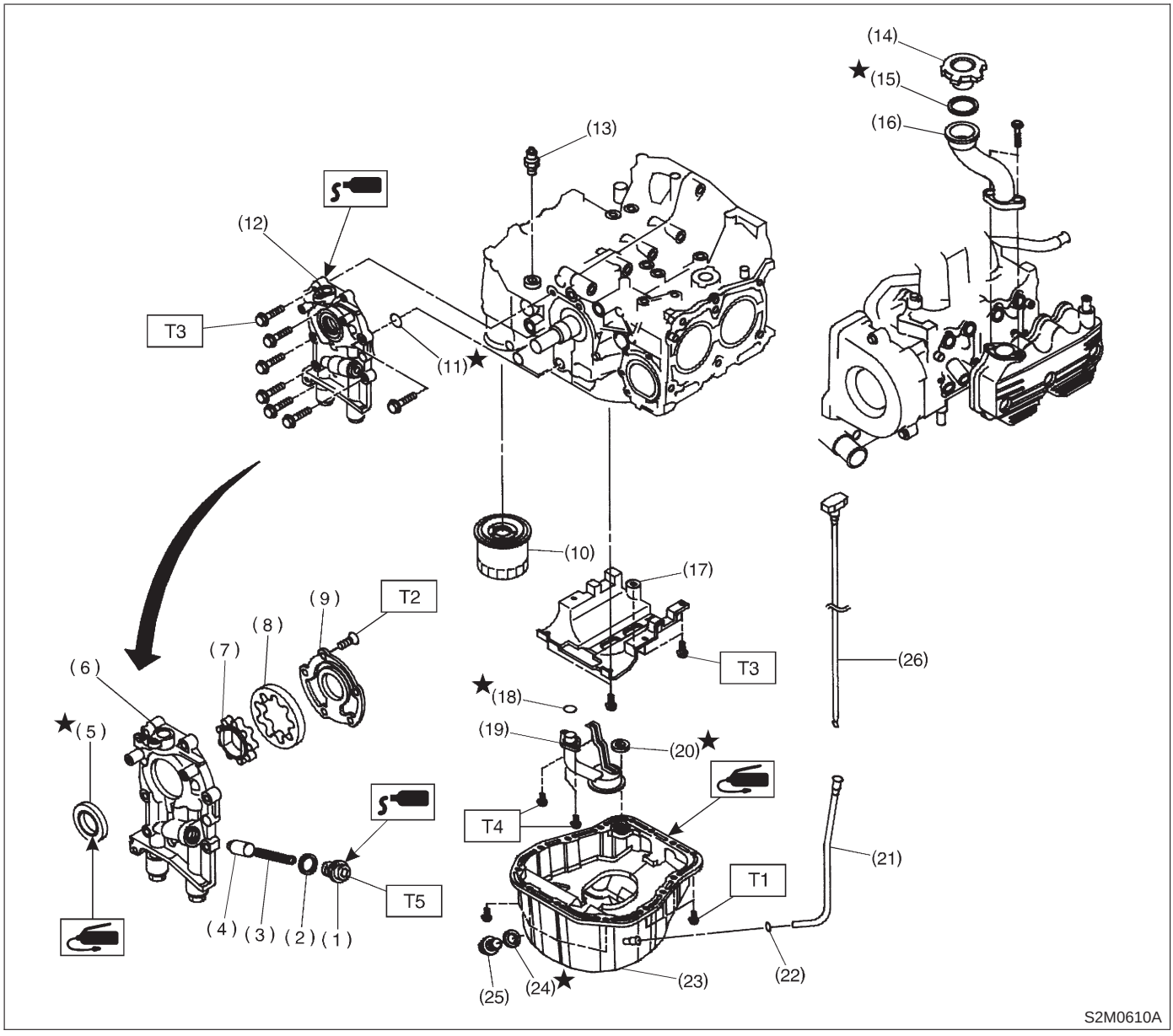
Lubrication method					Forced lubrication
Oil pump	Pump type				Trochoid type
	Number of teeth		Inner rotor		9
			Outer rotor		10
	Outer rotor diameter × thickness				78 × 9 mm (3.07 × 0.35 in)
	Tip clearance between inner and outer rotor			STANDARD	0.04 — 0.14 mm (0.0016 — 0.0055 in)
				LIMIT	0.18 mm (0.0071 in)
	Side clearance between inner rotor and pump case			STANDARD	0.02 — 0.07 mm (0.0008 — 0.0028 in)
				LIMIT	0.15 mm (0.0059 in)
	Case clearance between outer rotor and pump case			STANDARD	0.10 — 0.175 mm (0.0039 — 0.0069 in)
				LIMIT	0.20 mm (0.0079 in)
	Capacity at 80°C (176°F)	700 rpm	Discharge	- pressure	98 kPa (1.0 kg/cm^2, 14 psi) or more
				- quantity	4.2 ℓ (4.4 US qt, 3.7 Imp qt)/min.
		5,000 rpm	Discharge	- pressure	294 kPa (3.0 kg/cm^2, 43 psi) or more
				- quantity	42.0 ℓ (11.10 US gal, 9.24 Imp gal)/min.
	Relief valve operation pressure				490 kPa (5.0 kg/cm^2, 71 psi)
Oil filter	Type				Full-flow filter type
	Filtration area				1,000 cm^2 (155 sq in)
	By-pass valve opening pressure				157 kPa (1.6 kg/cm^2, 23 psi)
	Outer diameter × width				80 × 70 mm (3.15 × 2.76 in)
	Oil filter to engine thread size				M 20 × 1.5
Relief valve (on rocker shaft) operation pressure					69 kPa (0.7 kg/cm^2, 10 psi)
Oil pressure switch	Type				Immersed contact point type
	Working voltage — wattage				12 V — 3.4 W or less
	Warning light activation pressure				14.7 kPa (0.15 kg/cm^2, 2.1 psi)
	Proof pressure				More than 981 kPa (10 kg/cm^2, 142 psi)
Oil pan capacity					4.0 ℓ (4.2 US qt, 3.5 Imp qt)

B: 2500 cc MODEL

Lubrication method					Forced lubrication
Oil pump	Pump type				Trochoid type
	Number of teeth		Inner rotor		9
			Outer rotor		10
	Outer rotor diameter × thickness				78 × 10 mm (3.07 × 0.39 in)
	Tip clearance between inner and outer rotor			STANDARD	0.04 — 0.14 mm (0.0016 — 0.0055 in)
				LIMIT	0.18 mm (0.0071 in)
	Side clearance between inner rotor and pump case			STANDARD	0.02 — 0.07 mm (0.0008 — 0.0028 in)
				LIMIT	0.15 mm (0.0059 in)
	Case clearance between outer rotor and pump case			STANDARD	0.10 — 0.175 mm (0.0039 — 0.0069 in)
				LIMIT	0.20 mm (0.0079 in)
	Capacity at 80°C (176°F)	600 rpm	Discharge	- pressure	98 kPa (1.0 kg/cm^2, 14 psi) or more
				- quantity	4.6 ℓ (4.9 US qt, 4.0 Imp qt)/min.
		5,000 rpm	Discharge	- pressure	294 kPa (3.0 kg/cm^2, 43 psi) or more
				- quantity	47.0 ℓ (12.4 US gal, 10.3 Imp gal)/min.
	Relief valve operation pressure				588 kPa (6.0 kg/cm^2, 85 psi)
Oil filter	Type				Full-flow filter type
	Filtration area				1,000 cm^2 (155 sq in)
	By-pass valve opening pressure				157 kPa (1.6 kg/cm^2, 23 psi)
	Outer diameter × width				80 × 70 mm (3.15 × 2.76 in)
	Oil filter to engine thread size				M 20 × 1.5
Oil pressure switch	Type				Immersed contact point type
	Working voltage — wattage				12 V — 3.4 W or less
	Warning light activation pressure				14.7 kPa (0.15 kg/cm^2, 2.1 psi)
	Proof pressure				More than 981 kPa (10 kg/cm^2, 142 psi)
Oil pan capacity					4.5 ℓ (4.8 US qt, 4.0 Imp qt)

1. Lubrication System

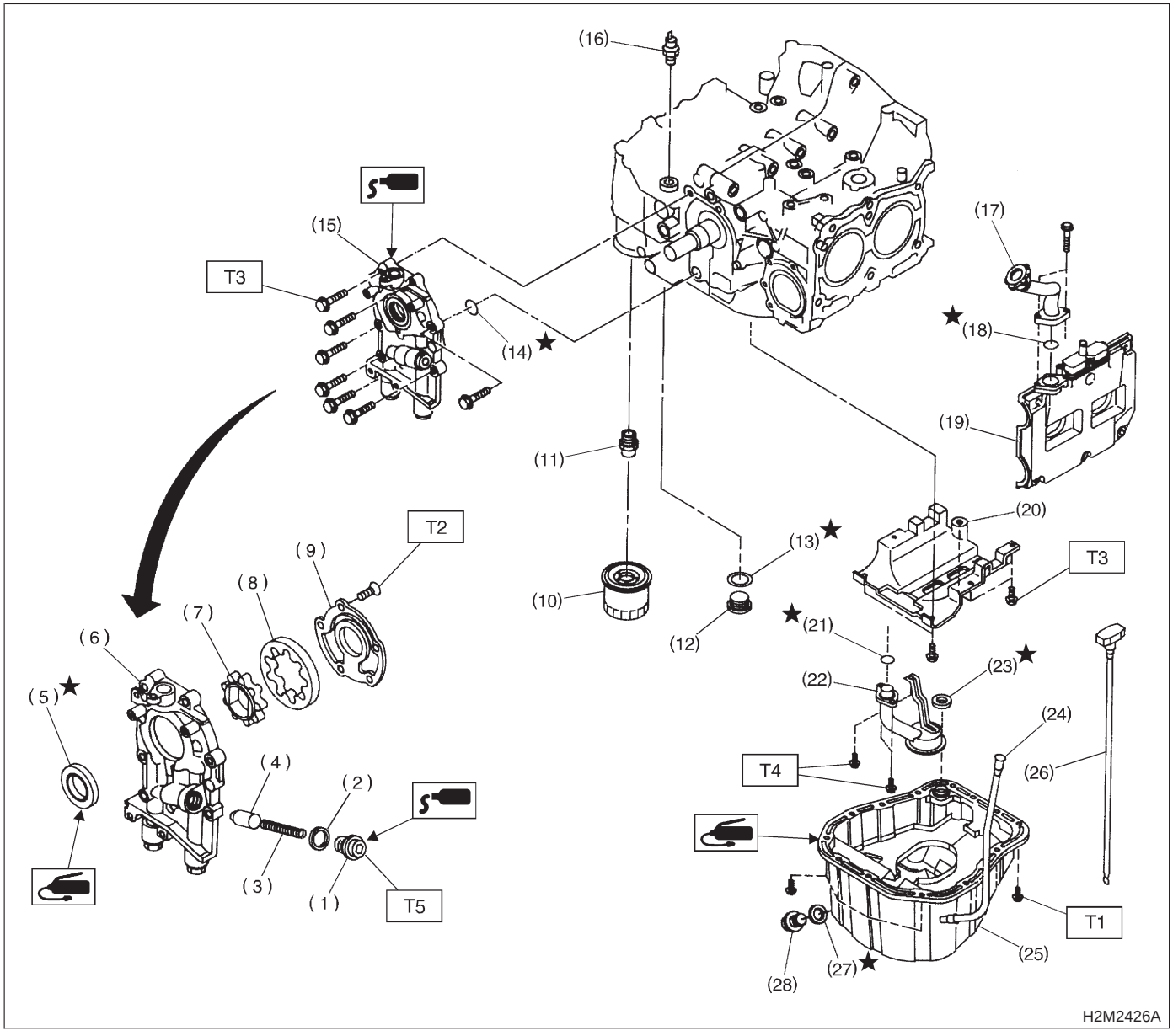
A: 2200 cc MODEL



(1) Plug
(2) Washer
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) O-ring
(12) Oil pump ASSY
(13) Oil pressure switch
(14) Oil filler duct
(15) Baffle plate
(16) Oil strainer stay
(17) O-ring
(18) Oil strainer
(19) Oil level gauge guide
(20) Oil pan
(21) Oil level gauge
(22) Washer
(23) Drain plug
(24) Metal gasket
(25) Drain plug
(26) Oil level gauge

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: $5^{+1}/_{-0}$($0.5^{+0.1}/_{-0}$,$3.6^{+0.7}/_{-0}$)
T3: 6.4 (0.65, 4.7)
T4: 9.8 (1.0, 7.0)
T5: 44.1±3.4 (4.5±0.35, 32.5±2.5)

B: 2500 cc MODEL



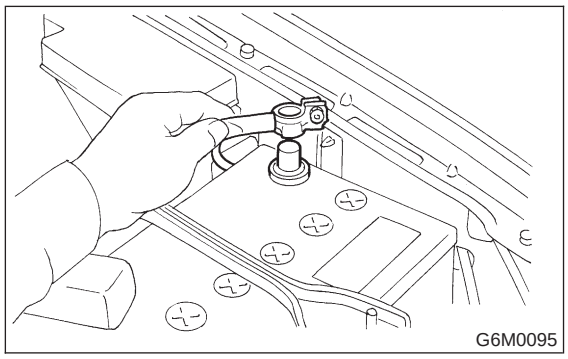
(1) Plug
(2) Washer
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) Plug
(12) Gasket
(13) Oil filter connector
(14) O-ring
(15) Oil pump ASSY
(16) Oil pressure switch
(17) Oil filler duct
(18) O-ring
(19) Cylinder head cover
(20) Baffle plate
(21) O-ring
(22) Oil strainer
(23) Gasket
(24) Oil level gauge guide
(25) Oil pan
(26) Oil level gauge
(27) Metal gasket
(28) Drain plug

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: $5^{+1}/_{-0}$ ($0.5^{+0.1}/_{-0}$, $3.6^{+0.7}/_{-0}$)
T3: 6.4 (0.65, 4.7)
T4: 10 (1.0, 7.0)
T5: 44.1±3.4 (4.5±0.35, 32.5±2.5)

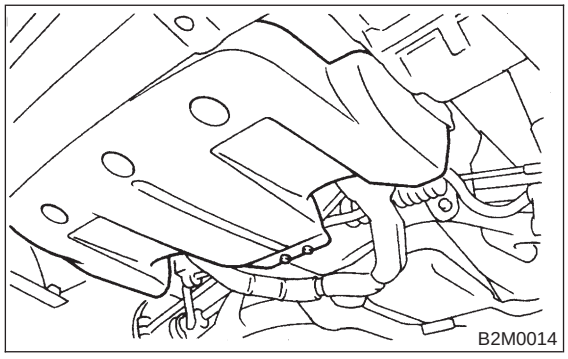
1. Oil Pump

A: REMOVAL

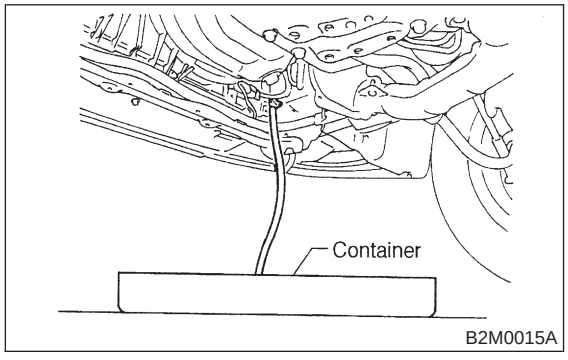
1) Disconnect battery ground cable.


G6M0095

2) Lift-up the vehicle.
3) Remove under cover.

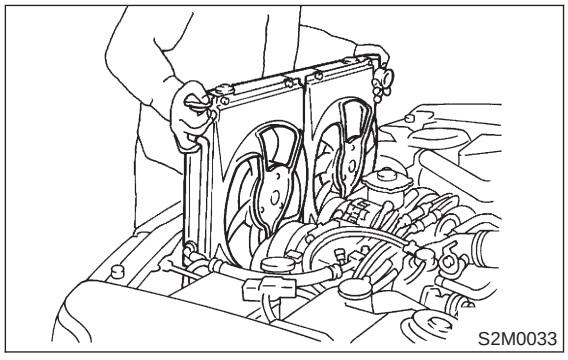

B2M0014

4) Drain coolant. <Ref. to 2-5 [W1A0].>

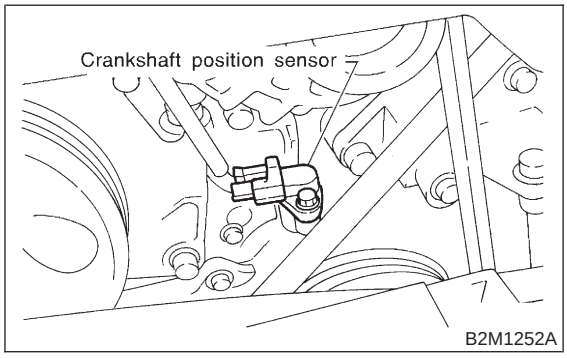


B2M0015A

5) Remove radiator. <Ref. to 2-5 [W4A0].>

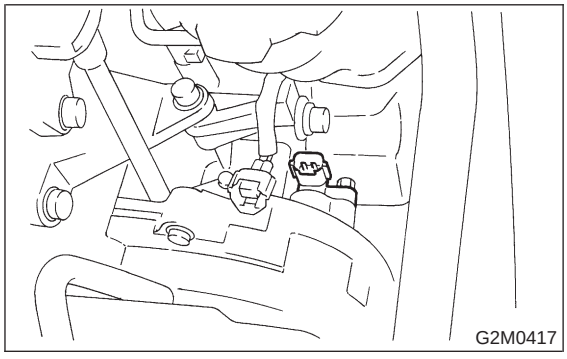

S2M0033

6) Lower the vehicle.
7) Remove crankshaft position sensor.

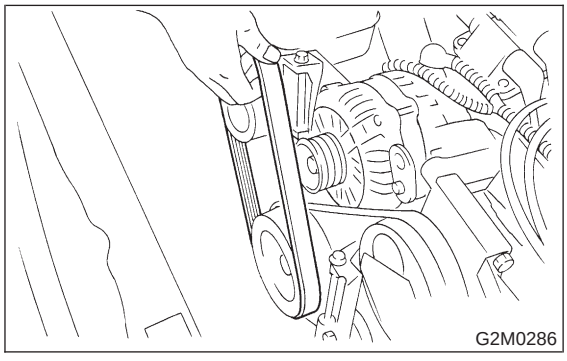


B2M1252A

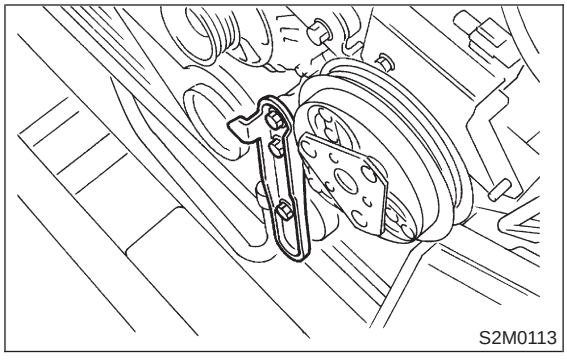
8) Remove camshaft position sensor.


G2M0417

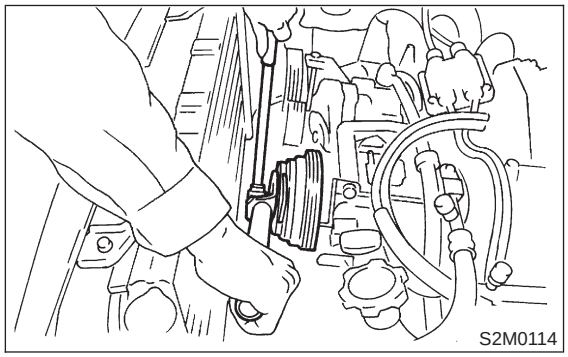
9) Remove V-belts. <Ref. to 1-5 [G2A0].>


G2M0286

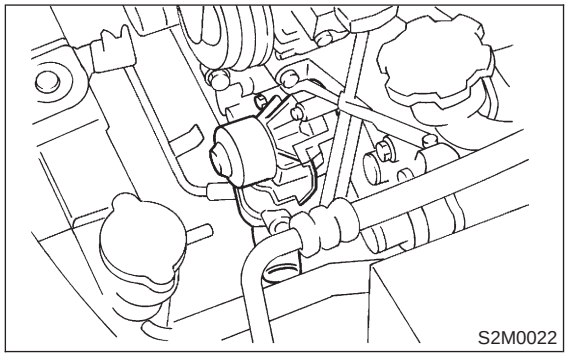
10) Remove rear side V-belt tensioner.


S2M0113

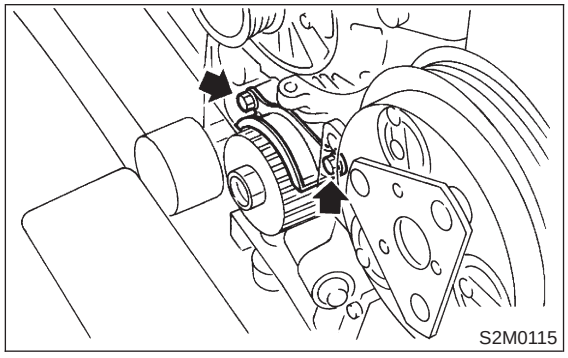
11) Remove crankshaft pulley by using ST.
ST 49997700 CRANKSHAFT PULLEY WRENCH


S2M0114

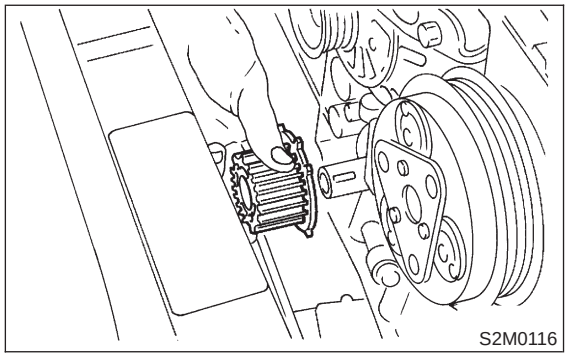
12) Remove water pump. <Ref. to 2-5 [W2A0].>


S2M0022

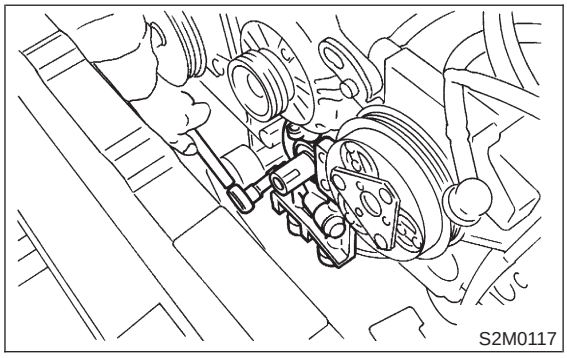
13) Remove timing belt guide. (MT vehicles only)


S2M0115

14) Remove crankshaft sprocket.

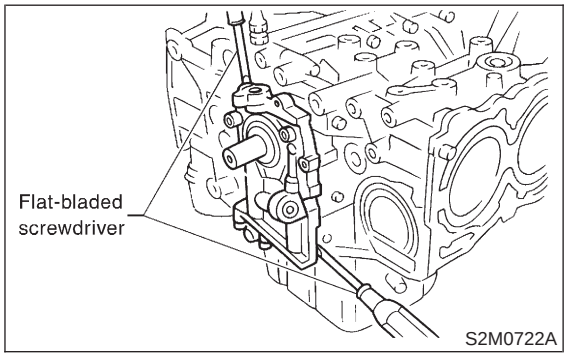

S2M0116

15) Remove bolts which install oil pump onto cylinder block.


S2M0117

16) Remove oil pump by using flat bladed screwdriver.

CAUTION:
Be careful not to scratch mating surfaces of cylinder block and oil pump.

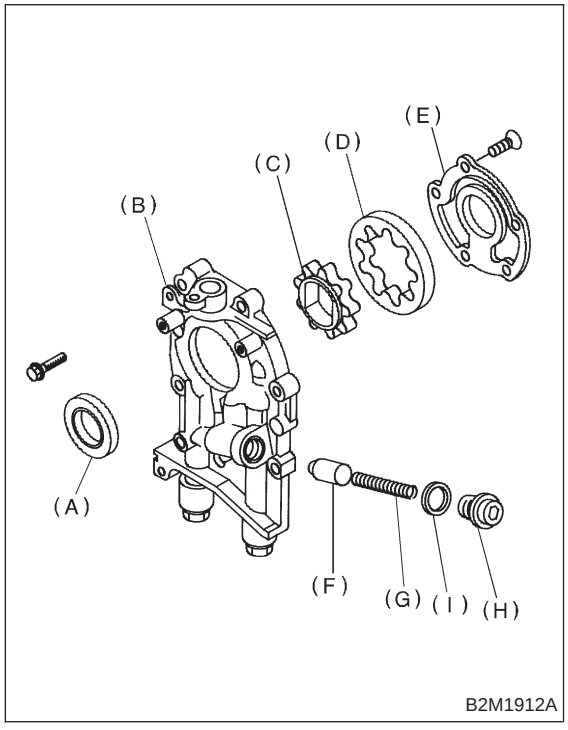


S2M0722A

B: DISASSEMBLY

Remove screws which secure oil pump cover and disassemble oil pump.
Inscribe alignment marks on inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:
Before removing relief valve, loosen plug when removing oil pump from cylinder block.



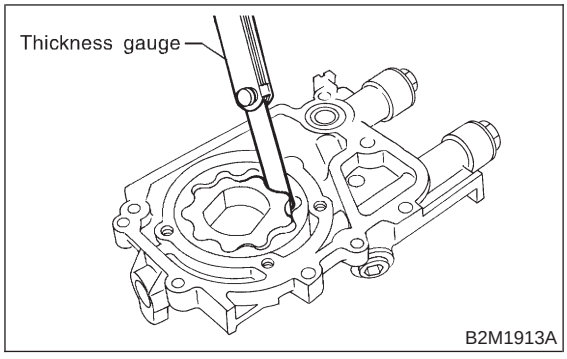
(A) Oil seal
(B) Pump case
(C) Inner rotor
(D) Outer rotor
(E) Pump cover
(F) Relief valve
(G) Relief spring
(H) Plug
(I) Washer

C: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If the clearance exceeds the limit, replace rotors as a matched set.

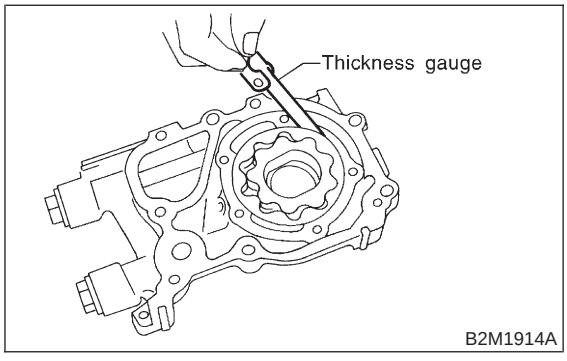
Tip clearance:
Standard
0.04 — 0.14 mm (0.0016 — 0.0055 in)
Limit
0.18 mm (0.0071 in)



2. CASE CLEARANCE

Measure the clearance between the outer rotor and the cylinder block rotor housing. If the clearance exceeds the limit, replace the rotor.

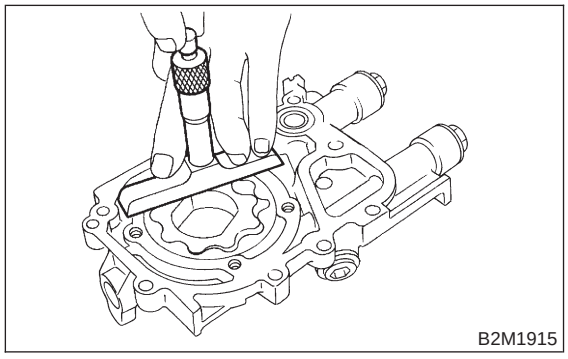
Case clearance:
Standard
0.10 — 0.175 mm (0.0039 — 0.0069 in)
Limit
0.20 mm (0.0079 in)



3. SIDE CLEARANCE

Measure clearance between oil pump inner rotor and pump cover. If the clearance exceeds the limit, replace rotor or pump body.

Side clearance:
Standard
0.02 — 0.07 mm (0.0008 — 0.0028 in)
Limit
0.15 mm (0.0059 in)



4. OIL RELIEF VALVE

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:
Free length; 71.8 mm (2.827 in)
Installed length; 54.7 mm (2.154 in)
Load when installed; 77.08 N (7.86 kg, 17.33 lb)

5. OIL PUMP CASE

Check the oil pump case for worn shaft hole, clogged oil passage, worn rotor chamber, cracks, and other faults.

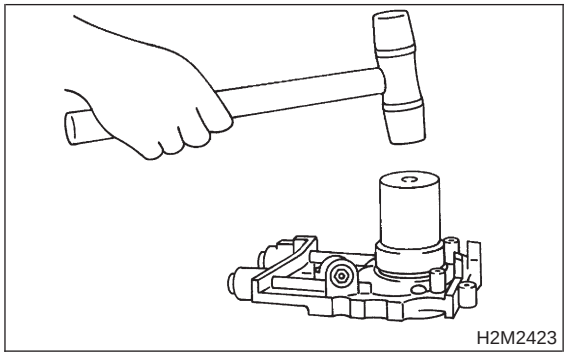
6. OIL SEAL

Check the oil seal lips for deformation, hardening, wear, etc. and replace if defective.

D: ASSEMBLY

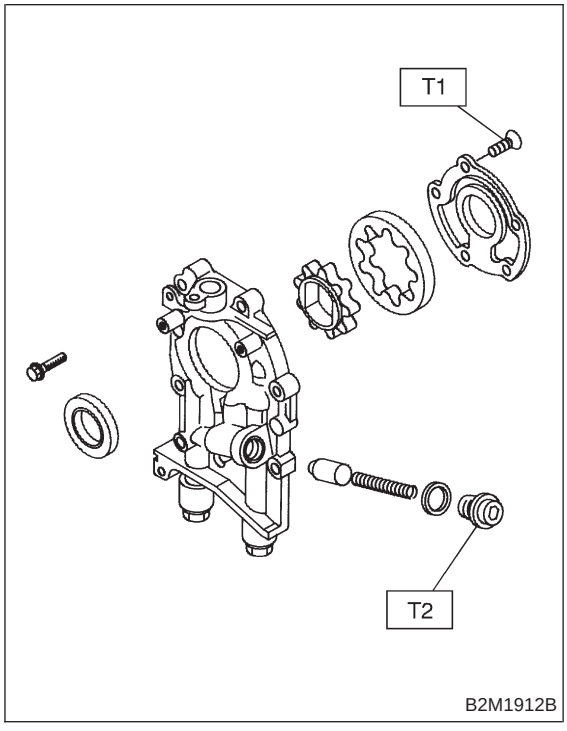
1) Install front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

CAUTION:
Use a new oil seal.



2) Install inner and outer rotors in their original positions.
3) Install oil relief valve and relief spring.
4) Install oil pump cover.

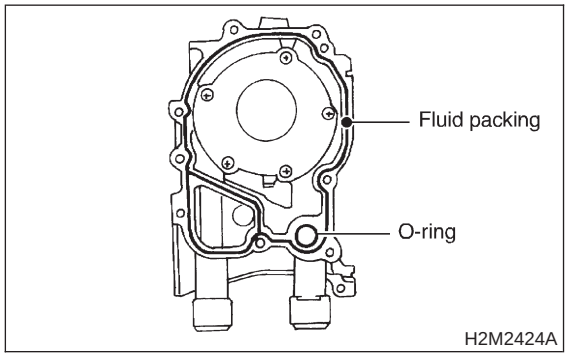
Tightening torque:
T1: 5 — 6 N·m (0.5 — 0.6 kg-m, 3.6 — 4.3 ft-lb)
T2: 40.7 — 47.6 N·m (4.15 — 4.85 kg-m, 30.0 — 35.1 ft-lb)



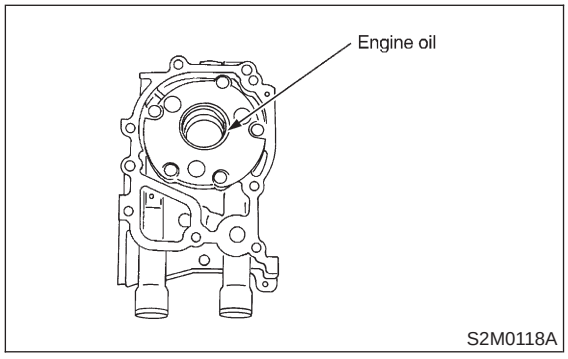
E: INSTALLATION

Installation is in the reverse order of removal.
Observe the following:
1) Apply fluid packing to matching surfaces of oil pump.

Fluid packing:
THREE BOND 1215 or equivalent



2) Replace O-ring with a new one.
3) Apply a coat of engine oil to the inside of the oil seal.

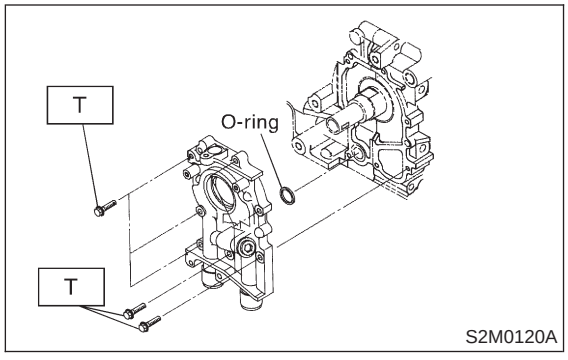


4) Be careful not to scratch oil seal when installing oil pump on cylinder block.
5) Position the oil pump, aligning the notched area with the crankshaft, and push the oil pump straight.

CAUTION:
Make sure the oil seal lip is not folded.

6) Install oil pump.

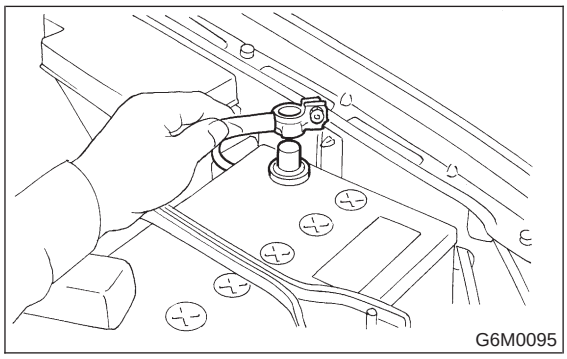
Tightening torque:
6.4 N·m (0.65 kg-m, 4.7 ft-lb)



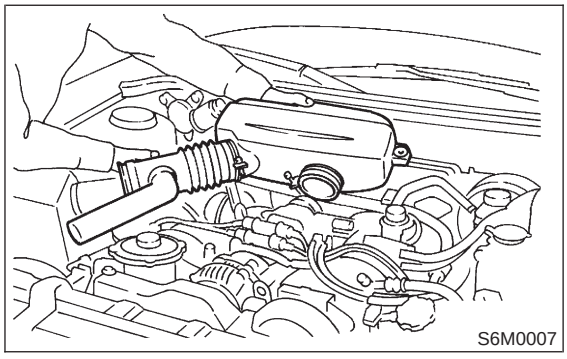
2. Oil Pan and Oil Strainer

A: REMOVAL

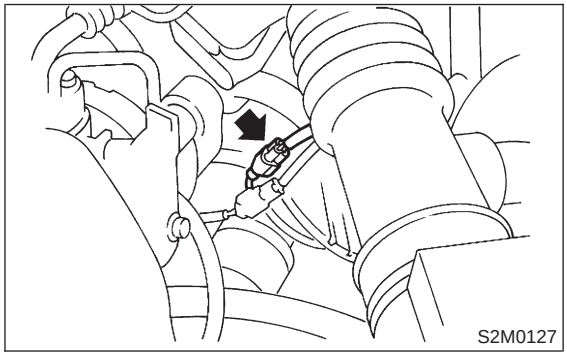
1) Disconnect battery ground cable.



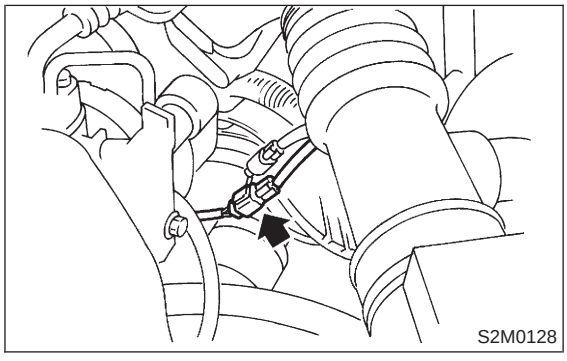
2) Remove front wheels.
3) Remove air intake duct and air intake chamber.



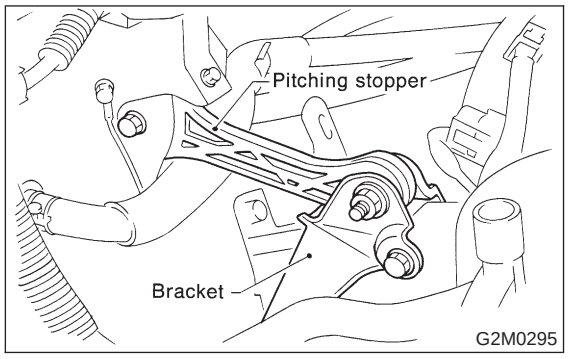
4) Disconnect front oxygen sensor connector.



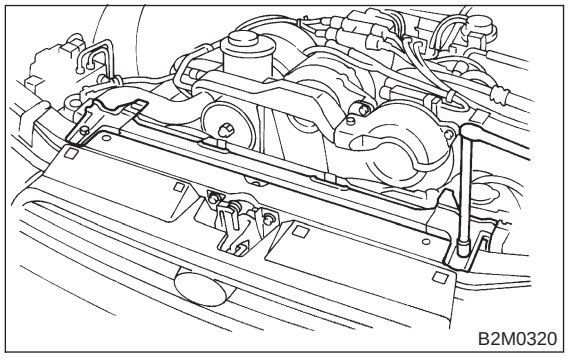
5) Disconnect rear oxygen sensor connector. (California spec. vehicles)



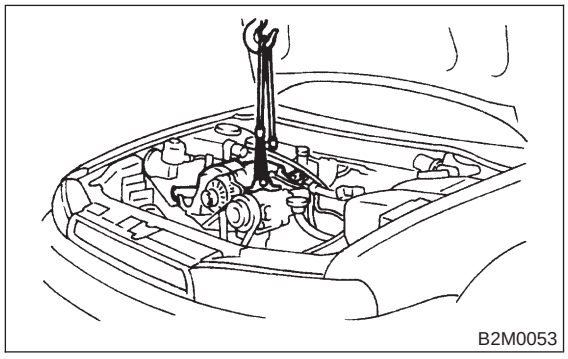
6) Remove pitching stopper.



7) Remove radiator upper bracket.



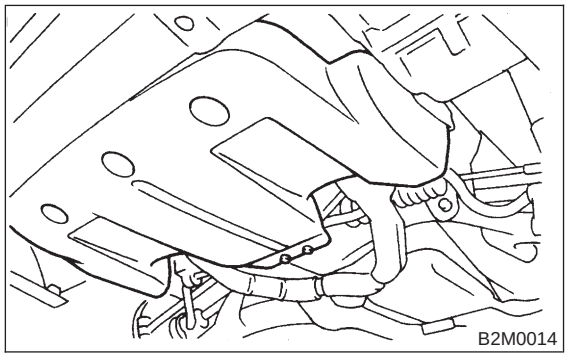
8) Support engine with a lifting device and wire ropes.



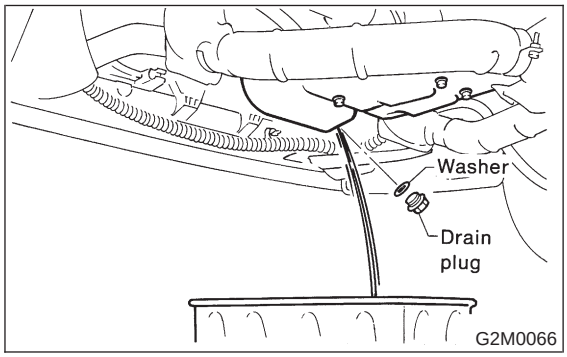
9) Lift-up the vehicle.

CAUTION:
At this time, raise up wire ropes.

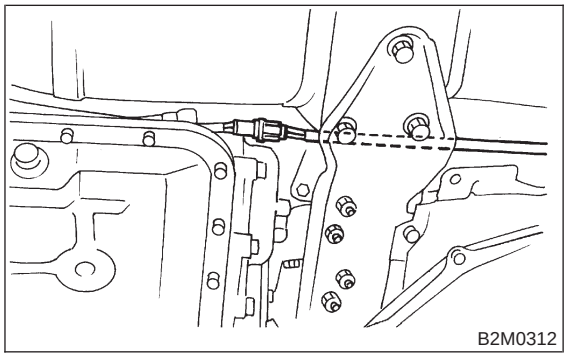
10) Remove under cover.



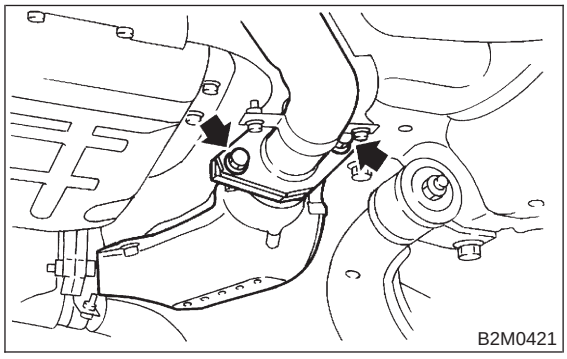
11) Drain engine oil.
Set container under the vehicle, and remove drain plug from oil pan.



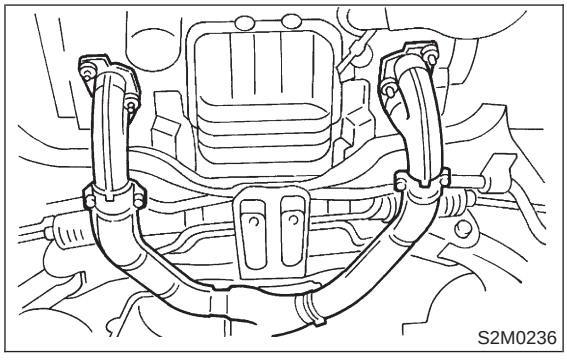
12) Disconnect connector from rear oxygen sensor. (Except California spec. vehicles)



13) Remove front exhaust pipe.
(1) Separate front catalytic converter from center exhaust pipe.

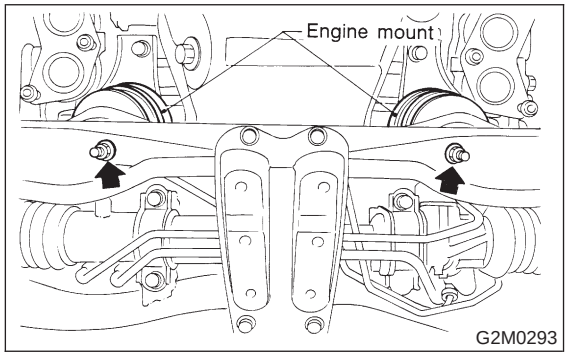


(2) Remove front exhaust pipe from engine.

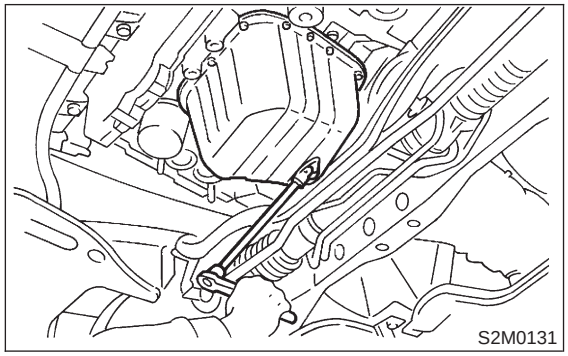


(3) Remove bolt which installs front exhaust pipe on bracket.

14) Remove nuts which install front cushion rubber onto front crossmember.



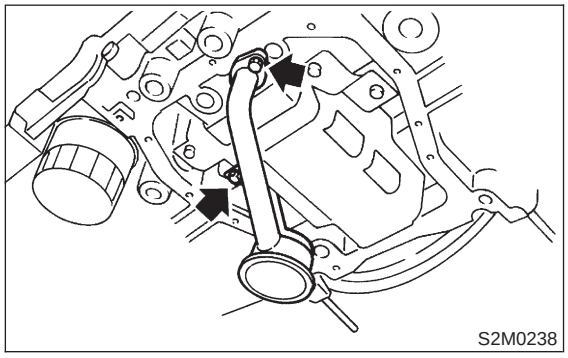
15) Remove bolts which install oil pan on cylinder block while raising up engine.



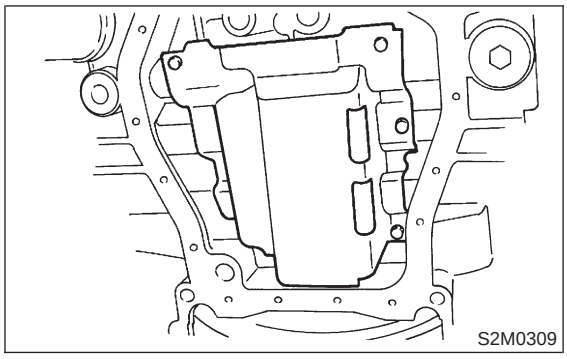
16) Insert oil pan cutter blade between cylinder block-to-oil pan clearance.

CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.

17) Remove oil strainer.



18) Remove baffle plate.



B: INSPECTION

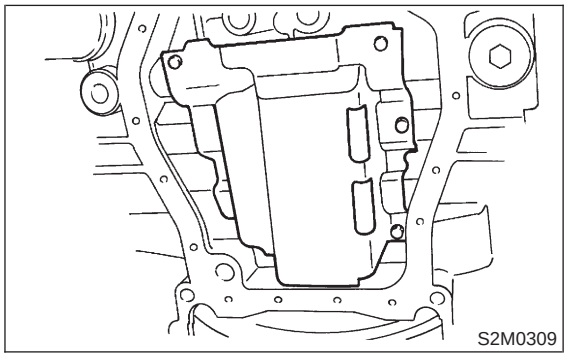
By visual check make sure oil pan, oil strainer and baffle plate are not damaged.

C: INSTALLATION

CAUTION:
Before installing oil pan, clean sealant from oil pan and engine block.

1) Install baffle plate.

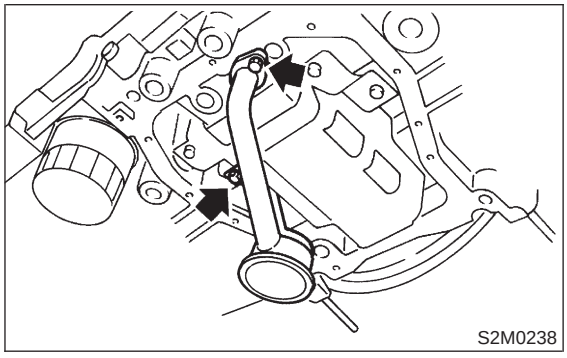
Tightening torque:
6.4 N·m (0.65 kg-m, 4.7 ft-lb)



2) Install oil strainer onto baffle plate.

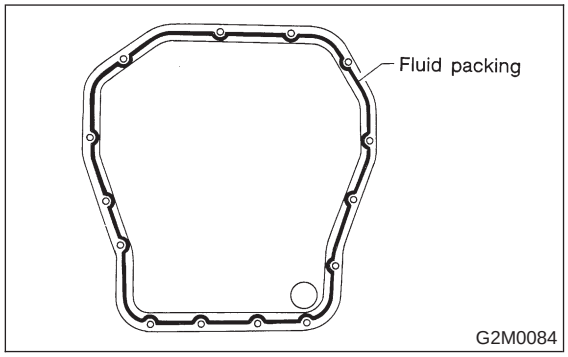
CAUTION:
Replace O-ring with a new one.

Tightening torque:
10 N·m (1.0 kg-m, 7 ft-lb)



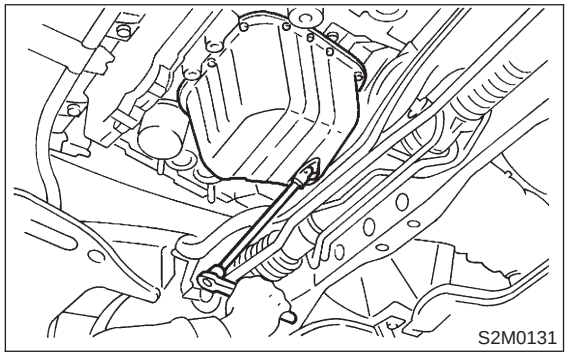
3) Apply fluid packing to mating surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent



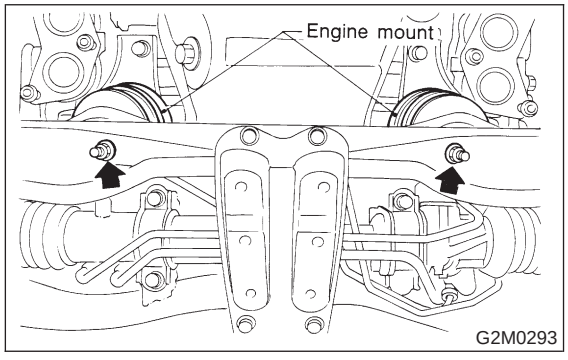
4) Tighten bolts which install oil pan onto engine block.

Tightening torque:
5 N·m (0.5 kg-m, 3.6 ft-lb)



5) Lower engine onto front crossmember.
6) Tighten nuts which install front cushion rubber onto front crossmember.

Tightening torque:
69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)

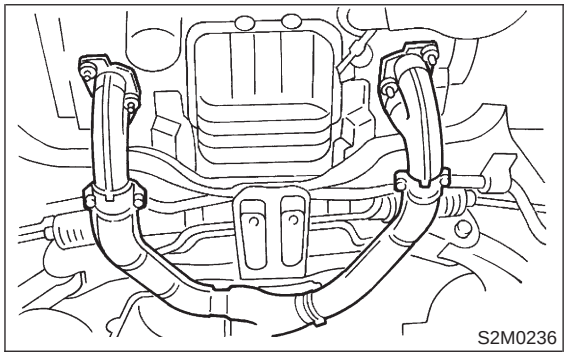


7) Install front exhaust pipe.

CAUTION:
Always use the new gaskets.

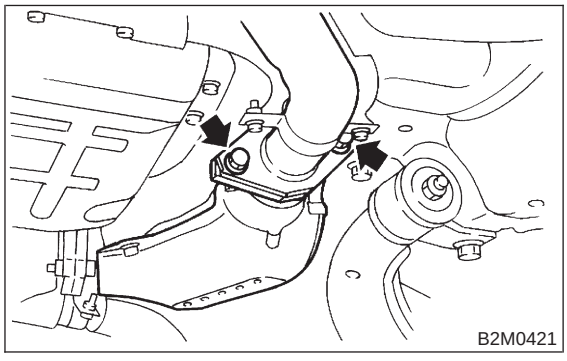
(1) Place front exhaust pipe on bracket.
(2) Tighten nuts which install front exhaust pipe on engine.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)



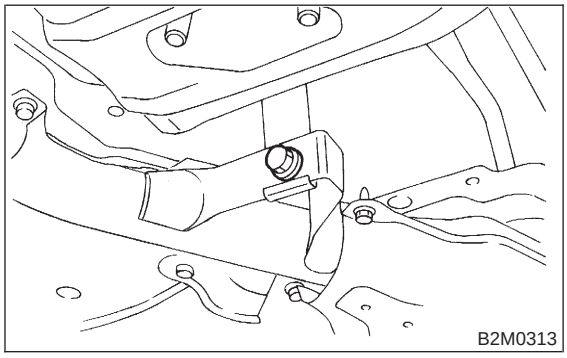
(3) Tighten nuts which install front catalytic converter to center exhaust pipe.

Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)

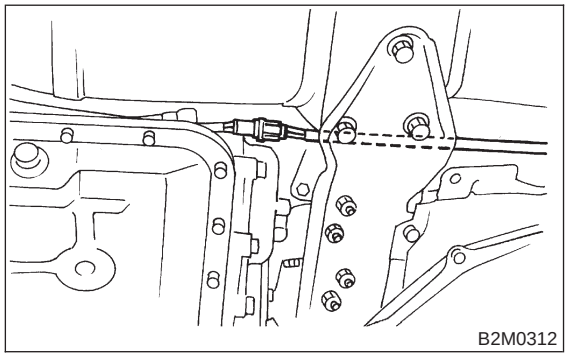


(4) Tighten bolt which installs front exhaust pipe on bracket.

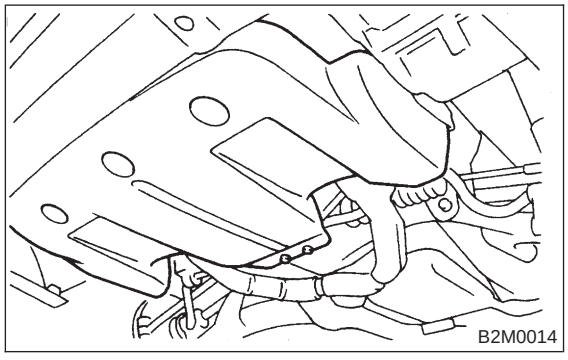
Tightening torque:
24±3 N·m (2.4±0.3 kg-m, 17.4±2.2 ft-lb)



8) Connect connector to rear oxygen sensor. (Except California spec. vehicles)


B2M0312

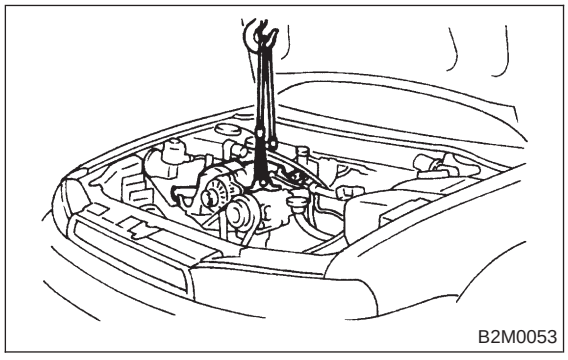
9) Install under cover.


B2M0014

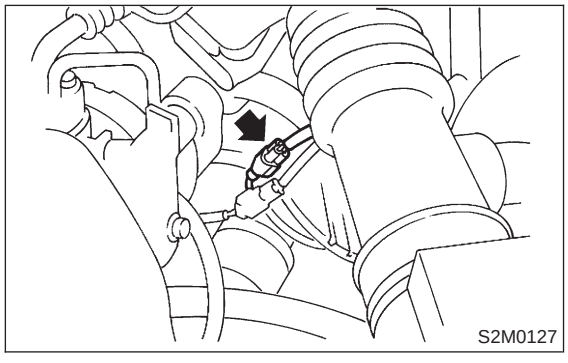
10) Lower the vehicle.

CAUTION:
At this time, lower lifting device and release steel cables.

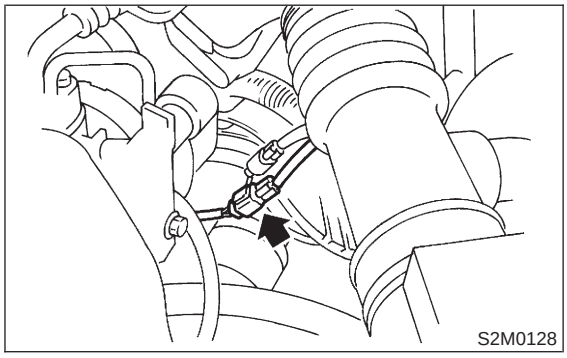
11) Remove lifting device and steel cables.


B2M0053

12) Connect connector to front oxygen sensor.

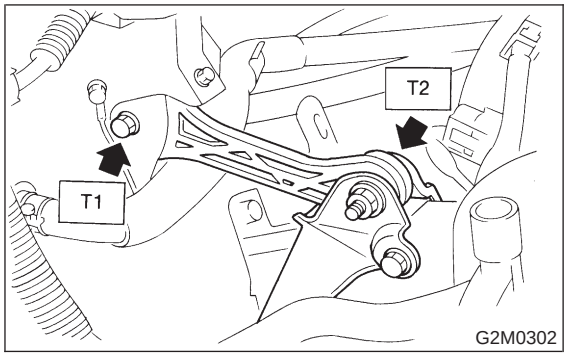

S2M0127

13) Connect connector to rear oxygen sensor. (California spec. vehicles)


S2M0128

14) Install pitching stopper.

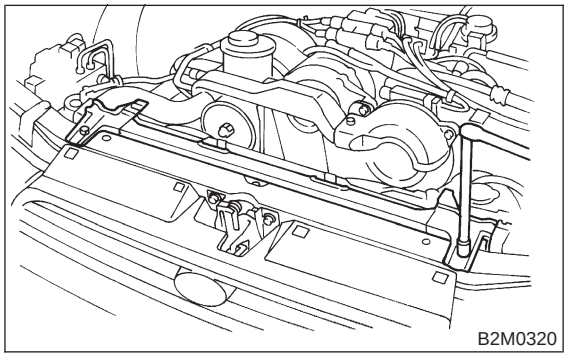
Tightening torque:
T1: 49±5 N·m (5.0±0.5 kg-m, 36.2±3.6 ft-lb)
T2: 57±10 N·m (5.8±1.0 kg-m, 42±7 ft-lb)



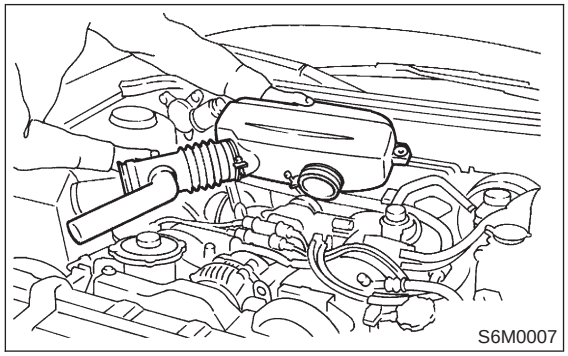
G2M0302

15) Install radiator upper brackets.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13±4 ft-lb)


B2M0320

16) Install air intake duct and air intake chamber.


S6M0007

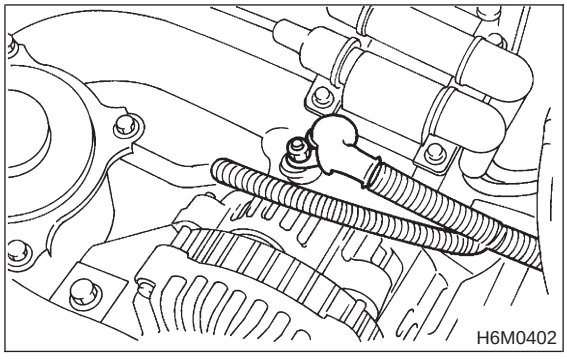
17) Fill engine oil through filler pipe up to upper point of level gauge. <Ref. to 1-5 [G4A0].>

Engine oil capacity:
2200 cc ; Upper level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
2200 cc ; Lower level
3.0 ℓ (3.2 US qt, 2.6 Imp qt)
2500 cc ; Upper level
4.5 ℓ (4.8 US qt, 4.0 Imp qt)
2500 cc ; Lower level
3.5 ℓ (3.7 US qt, 3.1 Imp qt)

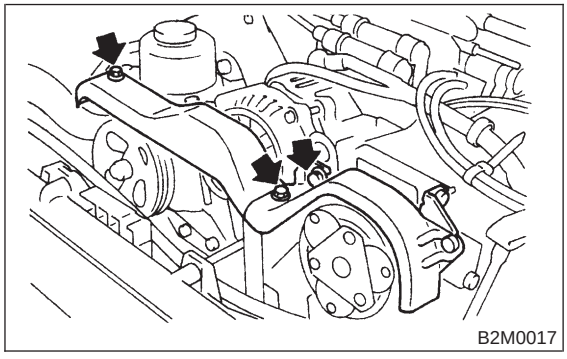
3. Oil Pressure Switch

A: REMOVAL

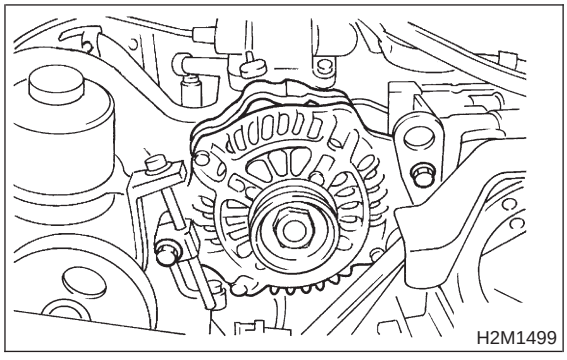
1) Remove alternator from bracket.
(1) Disconnect connector and terminal from generator.


H6M0402

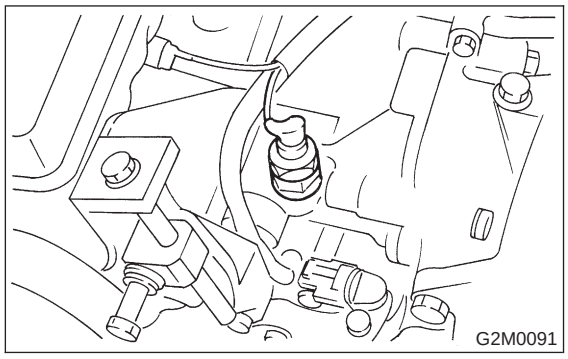
(2) Remove V-belt cover.


B2M0017

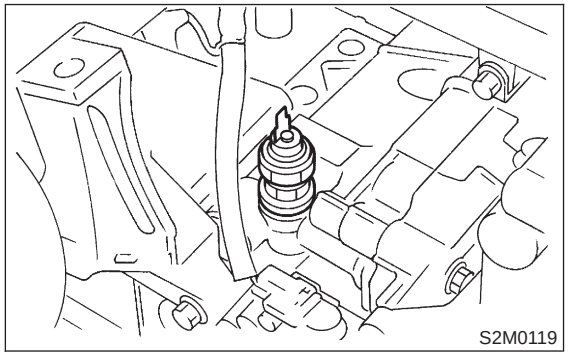
(3) Loosen lock bolt and slider bolt, and remove front side V-belt.
(4) Remove bolts which install generator on bracket.


H2M1499

2) Disconnect terminal from oil pressure switch.



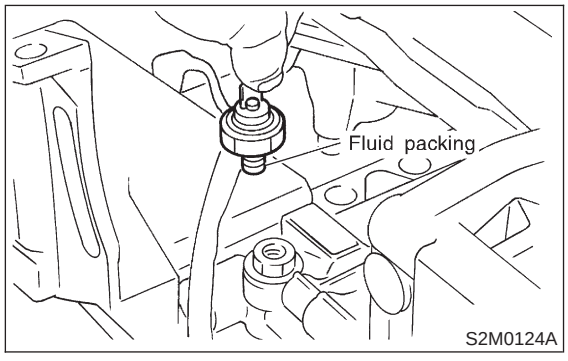
3) Remove oil pressure switch.



B: INSTALLATION

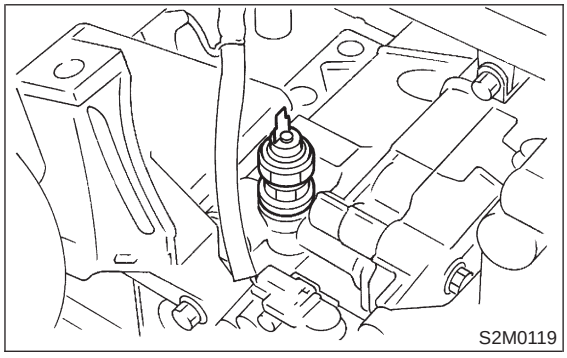
1) Apply fluid packing to oil pressure switch threads before installation.

Fluid packing:
THREE BOND 1215 or equivalent

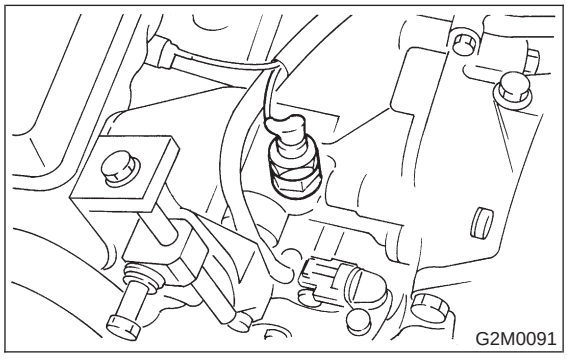


2) Install oil pressure switch onto engine block.

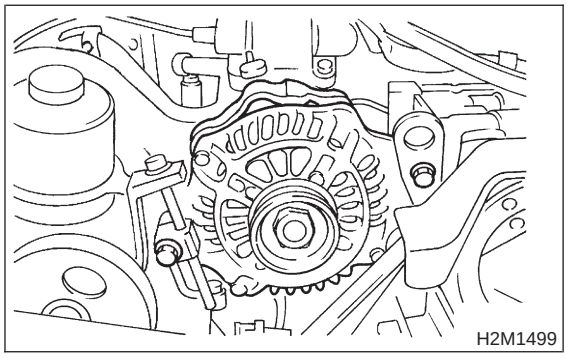
Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)



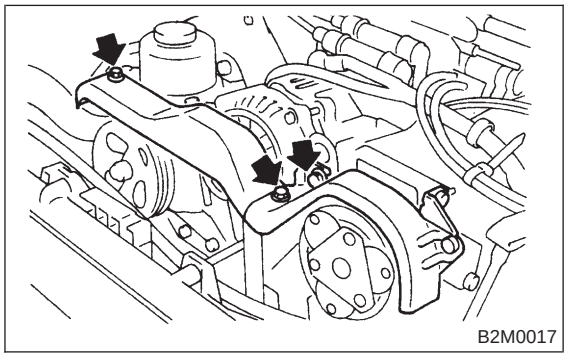
3) Connect terminal of oil pressure switch.



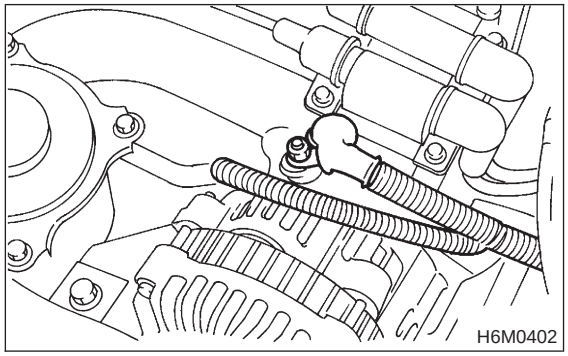
4) Install generator on bracket and temporary tighten installing bolts.



5) Install front side V-belt and adjust it. <Ref. to 1-5 [G2A0].>
6) Install V-belt cover.



7) Connect connector and terminal to generator.



1. Engine Lubrication System Trouble in General

Before troubleshooting, make sure that the engine oil level is correct and no oil leakage exists.

Trouble	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogged oil filter	Replace.
		Malfunction of oil by-pass valve of oil filter	Clean or replace.
		Malfunction of oil relief valve of oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Insufficient engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not go on.	1) Burn-out bulb		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1.—2)

ENGINE COOLING SYSTEM 2-5

1. Specifications

A: 2200 cc MODEL

Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)			Approx. 6.1 (6.4, 5.4)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge	20 ℓ (5.3 US gal, 4.4 Imp gal)/min.
		Pump speed—total engine coolant head	760 rpm — 0.3 mAq (1.0 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance II	Discharge	100 ℓ (26.4 US gal, 22.0 Imp gal)/min.
		Pump speed—total engine coolant head	3,000 rpm — 5.0 mAq (16.4 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance III	Discharge	200 ℓ (52.8 US gal, 44.0 Imp gal)/min.
		Pump speed—total engine coolant head	6,000 rpm — 23.0 mAq (75.5 ftAq)
		Engine coolant temperature	85°C (185°F)
	Impeller diameter		76 mm (2.99 in)
	Number of impeller vanes		8
	Pump pulley diameter		60 mm (2.36 in)
Thermostat	Type		Wax pellet type
	Starts to open		76 — 80°C (169 — 176°F)
	Fully opened		91°C (196°F)
	Valve lift		9.0 mm (0.354 in) or more
	Valve bore		35 mm (1.38 in)
Radiator fan	Motor		120 W
	Fan diameter × Blade		320 mm (12.60 in) × 5
Radiator	Type		Cross flow, pressure type
	Core dimensions		670 × 361 × 16 mm (26.38 × 14.21 × 0.63 in)
	Pressure range in which cap valve is open		Above: 88±10 kPa (0.9±0.1 kg/cm^2, 12.8±1.4 psi) Below: −4.9 to −9.8 kPa (−0.05 to −0.1 kg/cm^2, −0.7 to −1.4 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.5 ℓ (0.5 US qt, 0.4 Imp qt)

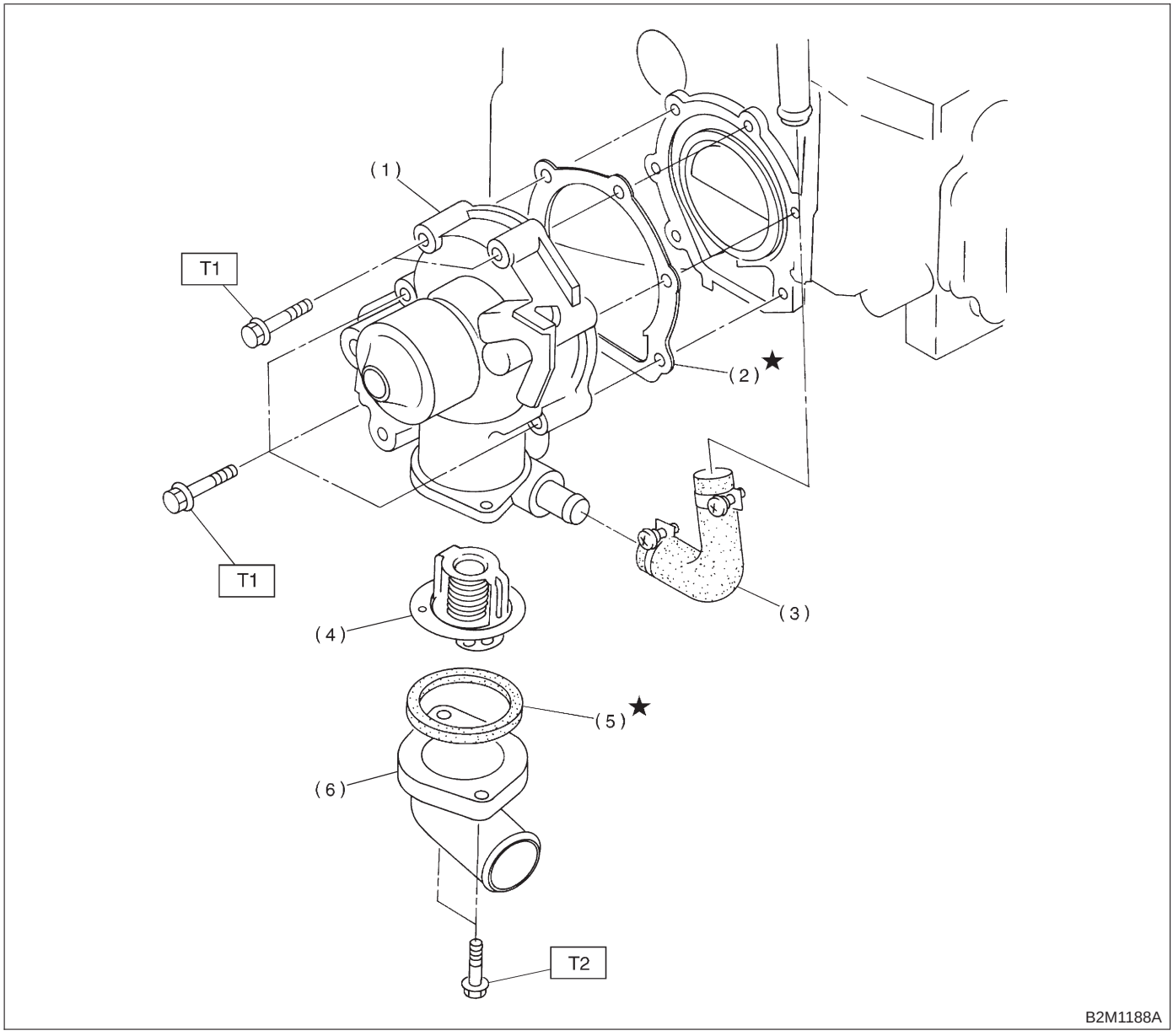
B: 2500 cc MODEL

Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)			Approx. 6.1 (6.4, 5.4)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge	20 ℓ (5.3 US gal, 4.4 Imp gal)/min.
		Pump speed—total engine coolant head	760 rpm — 0.3 mAq (1.0 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance II	Discharge	100 ℓ (26.4 US gal, 22.0 Imp gal)/min.
		Pump speed—total engine coolant head	3,000 rpm — 5.0 mAq (16.4 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance III	Discharge	200 ℓ (52.8 US gal, 44.0 Imp gal)/min.
		Pump speed—total engine coolant head	6,000 rpm — 23.0 mAq (75.5 ftAq)
		Engine coolant temperature	85°C (185°F)
	Impeller diameter		76 mm (2.99 in)
	Number of impeller vanes		8
	Pump pulley diameter		60 mm (2.36 in)
Thermostat	Type		Wax pellet type
	Starts to open		76 — 80°C (169 — 176°F)
	Fully opened		91°C (196°F)
	Valve lift		9.0 mm (0.354 in) or more
	Valve bore		35 mm (1.38 in)
Radiator fan	Motor		120 W (main fan) 140 W (sub fan)
	Fan diameter × Blade		340 mm (13.39 in) × 5 (main fan) 280 mm (11.02 in) × 4 (sub fan)
Radiator	Type		Cross flow, pressure type
	Core dimensions		670 × 361 × 16 mm (26.38 × 14.21 × 0.63 in)
	Pressure range in which cap valve is open		Above: 88±10 kPa (0.9±0.1 kg/cm^2, 12.8±1.4 psi) Below: −4.9 to −9.8 kPa (−0.05 to −0.1 kg/cm^2, −0.7 to −1.4 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.5 ℓ (0.5 US qt, 0.4 Imp qt)

2. Service Data

Water pump	Clearance between impeller and case	Standard	0.5 — 0.7 mm (0.020 — 0.028 in)
		Limit	1.0 mm (0.039 in)
	“Thrust” runout of impeller end		0.5 mm (0.020 in)

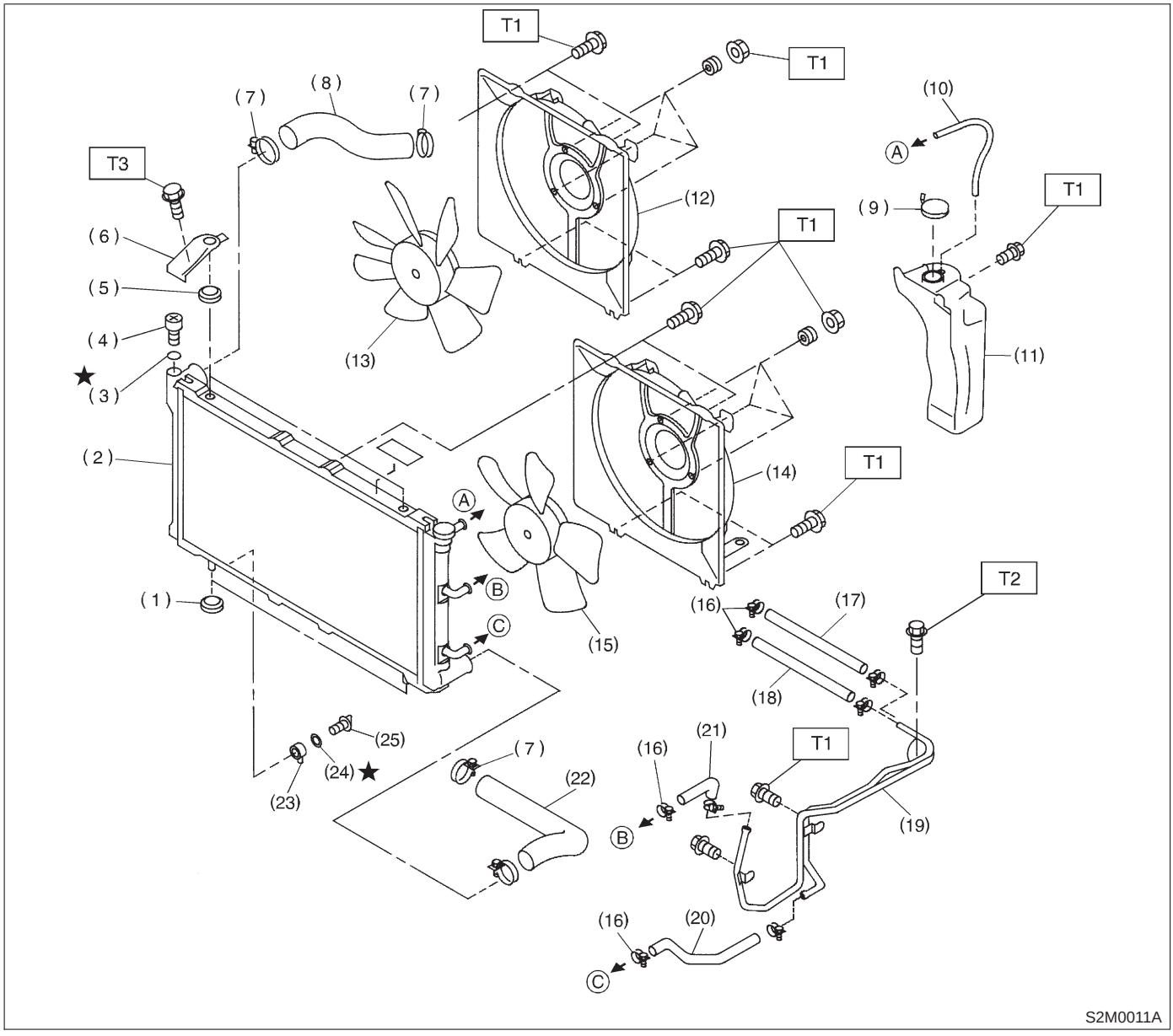
1. Water Pump



(1) Water pump ASSY
(2) Gasket
(3) Heater hose
(4) Thermostat
(5) Gasket
(6) Thermostat case

Tightening torque: N·m (kg-m, ft-lb)
T1: First 10^{+4}_{-0}
($1.0^{+0.4}_{-0}$, $7.2^{+2.9}_{-0}$)
Second 10^{+4}_{-0}
($1.0^{+0.4}_{-0}$, $7.2^{+2.9}_{-0}$)
T2: 6.4±0.5 (0.65±0.05, 4.7±0.4)

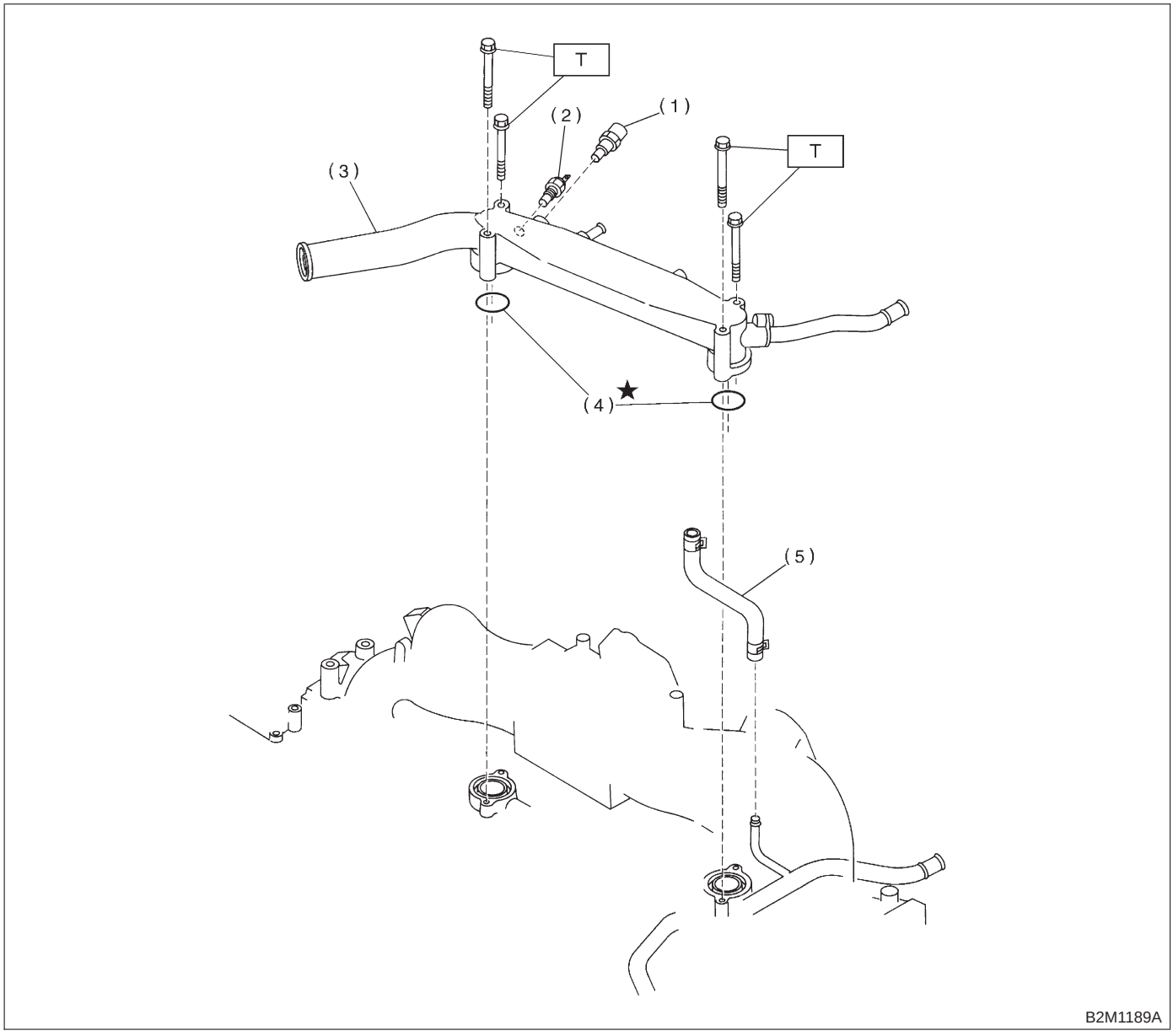
2. Radiator and Radiator Fan



(1) Radiator lower cushion
(2) Radiator
(3) O-ring
(4) Air vent plug
(5) Radiator upper cushion
(6) Radiator upper bracket
(7) Clamp
(8) Radiator inlet hose
(9) Engine coolant reservoir tank cap
(10) Over flow hose
(11) Engine coolant reservoir tank
(12) Sub fan shroud
(13) Radiator sub fan ASSY
(14) Main fan shroud
(15) Radiator main fan ASSY
(16) ATF hose clamp (AT vehicles only)
(17) ATF inlet hose A (AT vehicles only)
(18) ATF outlet hose A (AT vehicles only)
(19) ATF pipe (AT vehicles only)
(20) ATF outlet hose B (AT vehicles only)
(21) ATF inlet hose B (AT vehicles only)
(22) Radiator outlet hose
(23) Radiator drain pipe
(24) Gasket
(25) Radiator drain plug

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.20, 5.4±1.4)
T2: 12±3 (1.2±0.3, 8.7±2.2)
T3: 18±5 (1.8±0.5, 13.0±3.6)

3. Water Pipe



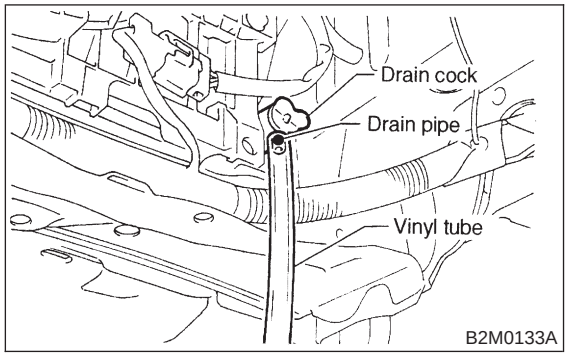
(1) Engine coolant temperature sensor
(2) Engine coolant temperature gauge
(3) Water pipe
(4) O-ring
(5) By-pass hose

Tightening torque: N·m (kg-m, ft-lb)
T: 6.4±0.5 (0.65±0.05, 4.7±0.4)

1. On-car Service

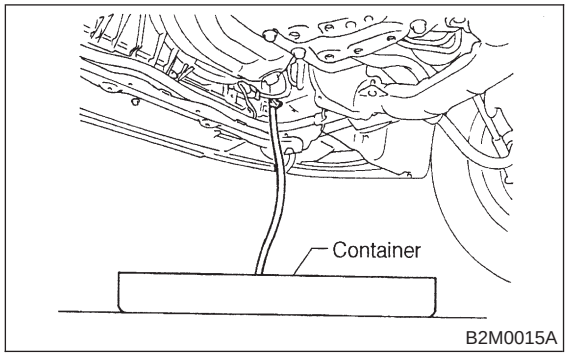
A: DRAINING OF ENGINE COOLANT

1) Lift-up the vehicle.
2) Fit vinyl tube to drain pipe.



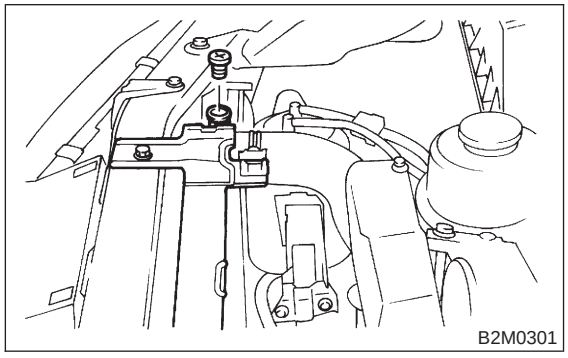
3) Loosen drain cock to drain engine coolant into container.

NOTE:
Remove radiator cap so that engine coolant will drain faster.

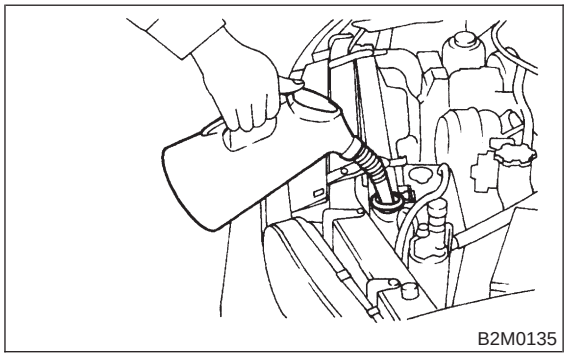


B: FILLING OF ENGINE COOLANT

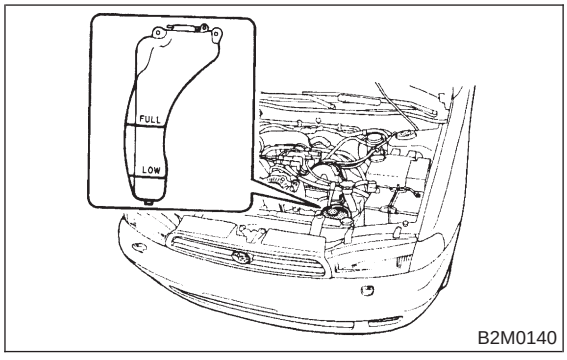
1) Remove air vent plug from radiator.



2) Fill engine coolant into radiator up to filler neck position.



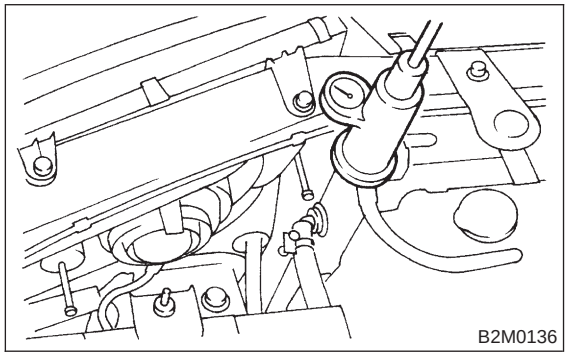
3) Fill engine coolant into reservoir tank up to upper level.



4) Attach radiator cap and reservoir tank cap properly.
5) Install air vent plug.
6) Warm-up engine completely for more than five minutes at 2,000 to 3,000 rpm.
7) Stop engine and wait until temperature drops to a safe level.
8) If engine coolant level drops in radiator, add engine coolant to filler neck position.
9) If engine coolant level drops from upper level of reservoir tank, add engine coolant to upper level.
10) Attach radiator cap and reservoir tank cap properly.

C: CHECKING OF COOLING SYSTEM

1) Remove radiator cap, top off radiator, and attach tester to radiator in place of cap.



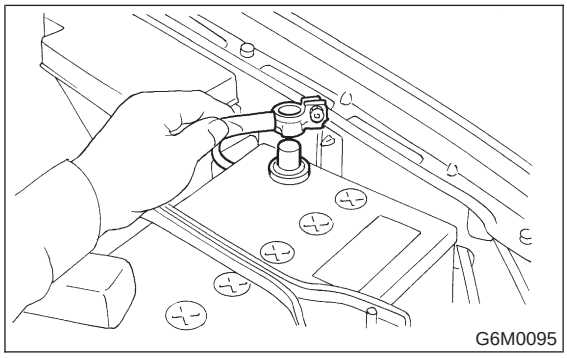
2) Apply a pressure of 157 kPa (1.6 kg/cm^2, 23 psi) to radiator to check if:
   (1) Engine coolant leaks at/around radiator.
   (2) Engine coolant leaks at/around hoses or connections.

CAUTION:
- **Engine should be off.**
- **Wipe engine coolant from check points in advance.**
- **Be careful to prevent engine coolant from spurting out when removing tester.**
- **Be careful also not to deform filler neck of radiator when installing or removing tester.**

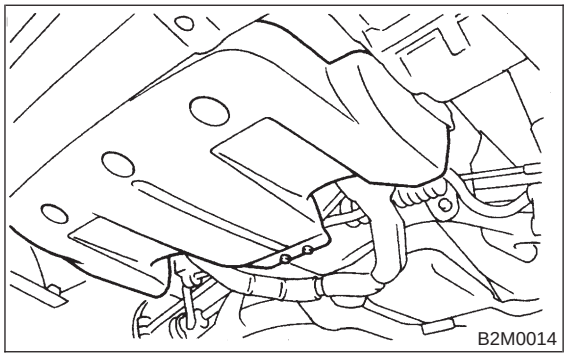
2. Water Pump

A: REMOVAL

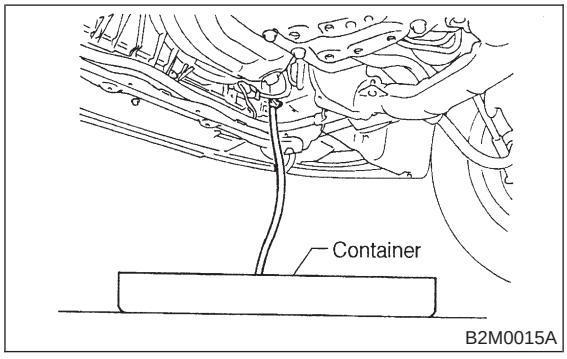
1) Disconnect ground cable from the battery.



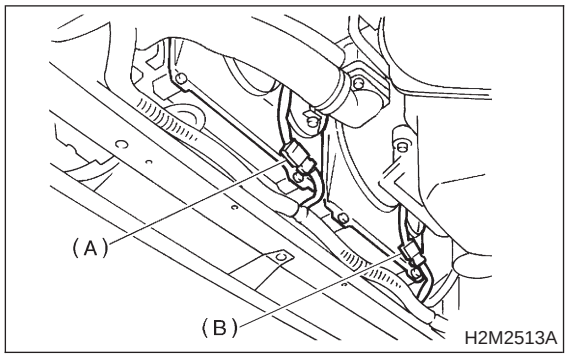
2) Lift-up the vehicle.
3) Remove under cover.



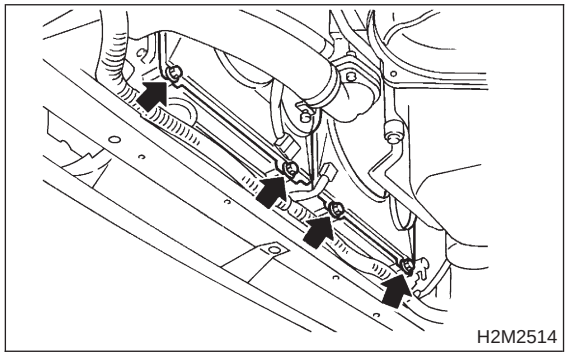
4) Drain engine coolant completely.
<Ref. to 2-5 [W1A0].>



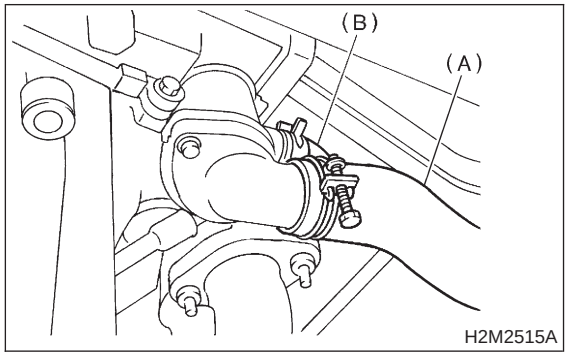
5) Disconnect connectors from radiator main fan (A) and sub fan (B) motors.



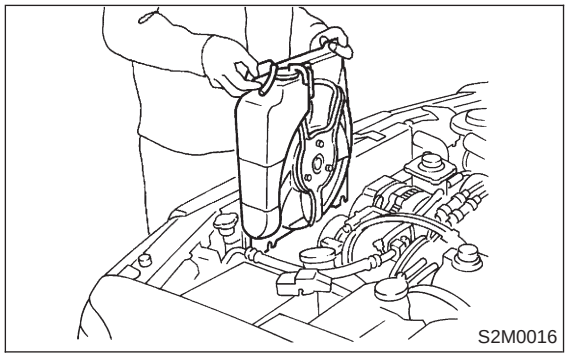
6) Loosen bolts which hold lower side of radiator main fan and sub fan shrouds.



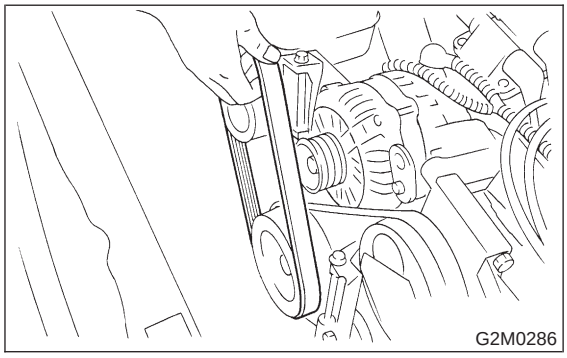
7) Disconnect radiator outlet hose (A) and heater hose (B) from water pump.



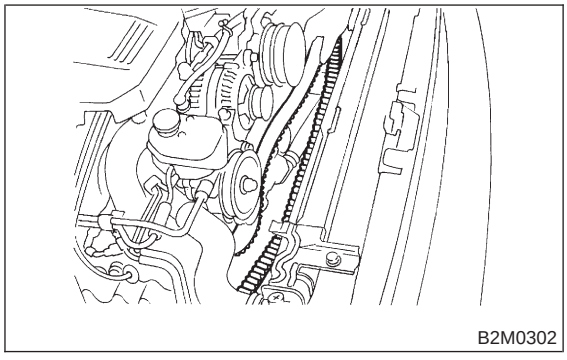
8) Lower the vehicle.
9) Remove radiator main fan and sub fan assemblies. <Ref. to 2-5 [W6A0].> and <Ref. to 2-5 [W7A0].>



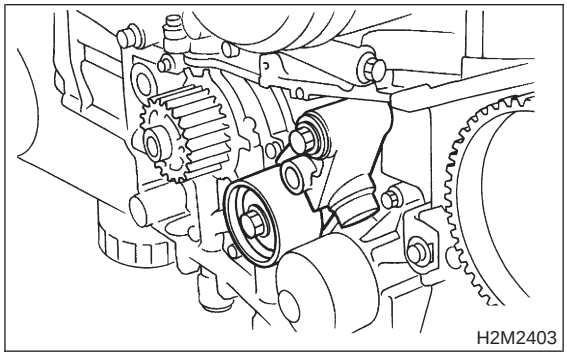
10) Remove V-belts.
<Ref. to 1-5 [G1B0].>



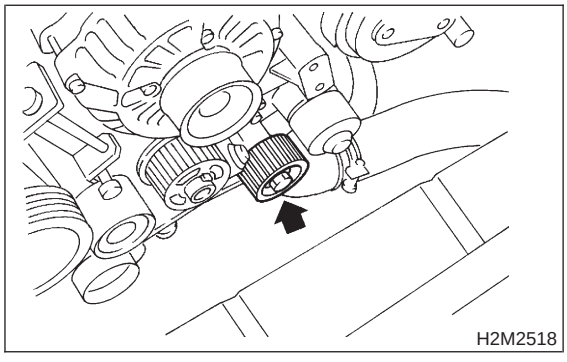
11) Remove timing belt.
<Ref. to 2-3a [W2A0].> and <Ref. to 2-3b [W2A0].>



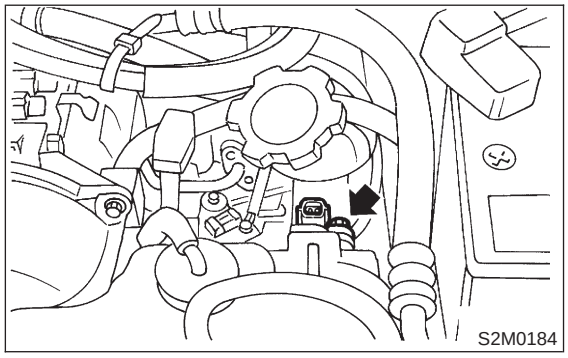
12) Remove automatic belt tension adjuster.



13) Remove belt idler No. 2.



14) Remove camshaft position sensor.
<Ref. to 2-7 [W10A0].>



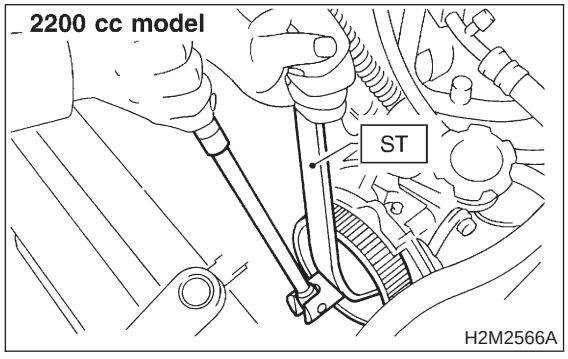
15) Remove left-hand camshaft sprockets by using ST.

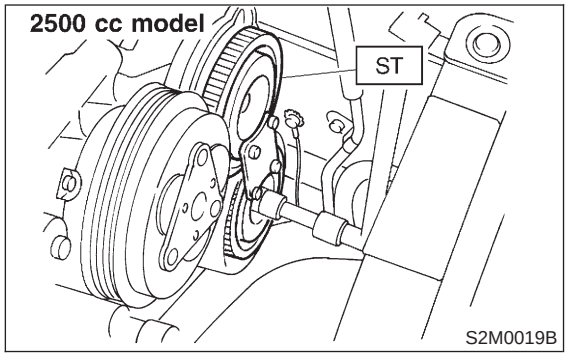
- **2200 cc model**

ST 499207100 CAMSHAFT SPROCKET WRENCH

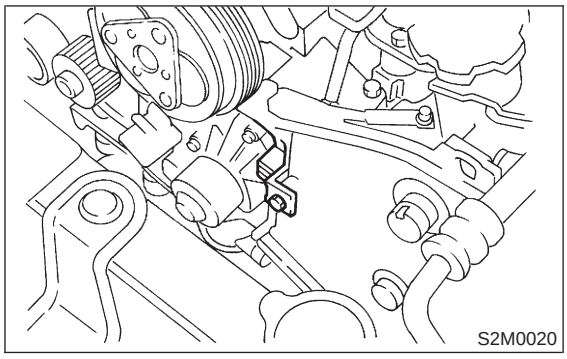
- **2500 cc model**

ST 499207300 CAMSHAFT SPROCKET WRENCH

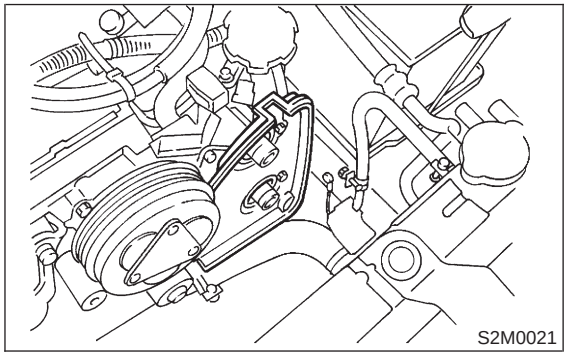




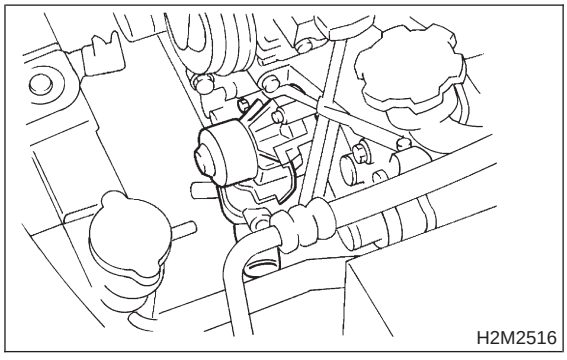
16) Remove tensioner bracket.



17) Remove left-hand belt cover No. 2.



18) Remove water pump.

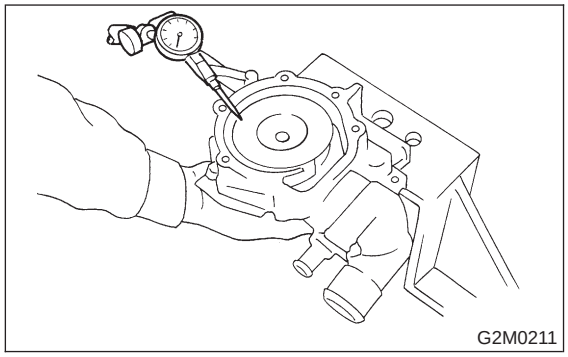


B: INSPECTION

1) Check water pump bearing for smooth rotation.
2) Check water pump pulley for abnormalities.

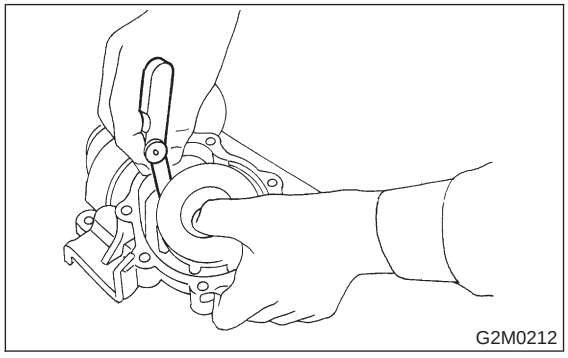
3) Using a dial gauge, measure impeller runout in thrust direction while rotating the pulley.

"Thrust" runout limit:
0.5 mm (0.020 in)



4) Check clearance between impeller and pump case.

Clearance between impeller and pump case:
Standard
0.5 — 0.7 mm (0.020 — 0.028 in)
Limit
1.0 mm (0.039 in)



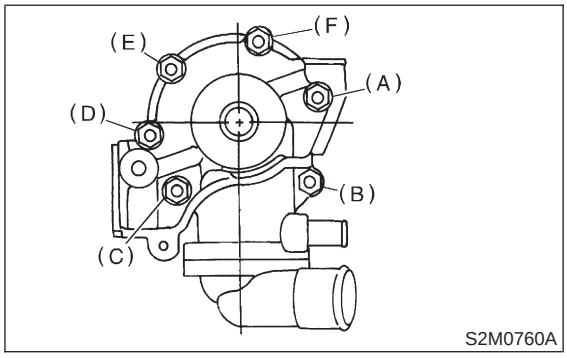
5) After water pump installation, check pulley shaft for engine coolant leaks. If leaks are noted, replace water pump assembly.

C: INSTALLATION

1) Install water pump onto left-hand cylinder head.

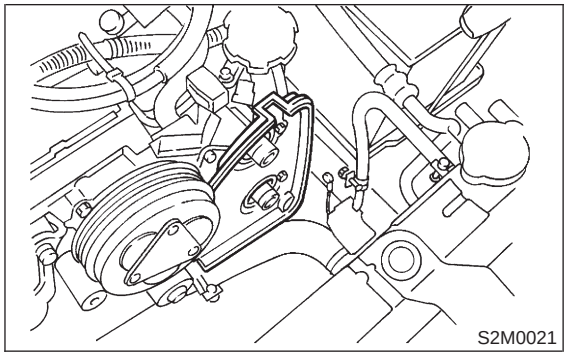
CAUTION:
- **Replace gasket with a new one.**
- **When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.**

Tightening torque:
10^{+4}_{-0} N·m ($1.0^{+0.4}_{-0}$ kg-m, $7.2^{+2.9}_{-0}$ ft-lb)



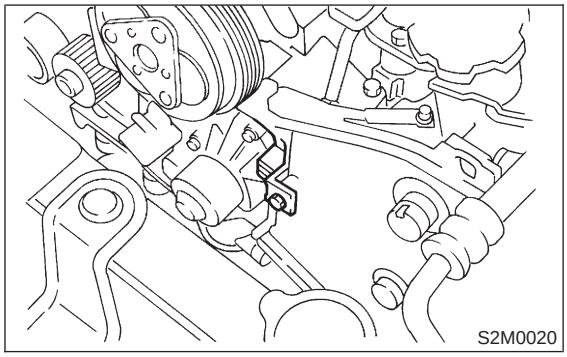
2) Install left-hand belt cover No. 2.

Tightening torque:
4.9±0.5 N·m (0.5±0.05 kg-m, 3.6±0.4 ft-lb)



3) Install tensioner bracket.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



4) Install left-hand camshaft sprockets by using ST.

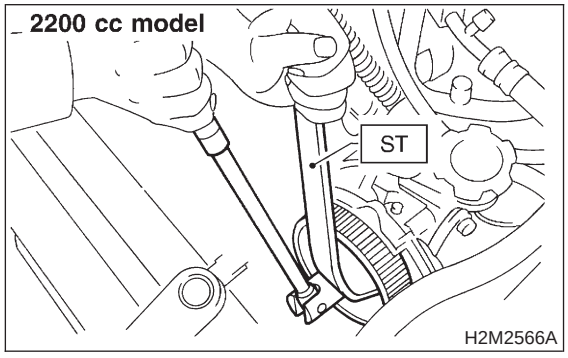
- **2200 cc model**

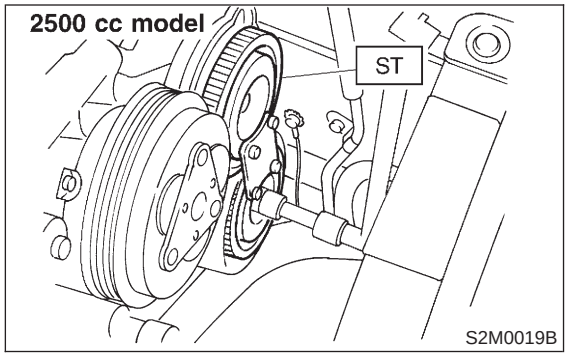
ST 499207100 CAMSHAFT SPROCKET WRENCH

- **2500 cc model**

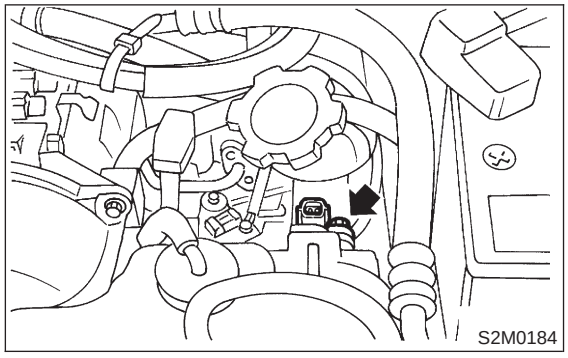
ST 499207300 CAMSHAFT SPROCKET WRENCH

Tightening torque:
78±5 N·m (8.0±0.5 kg-m, 57.9±3.6 ft-lb)



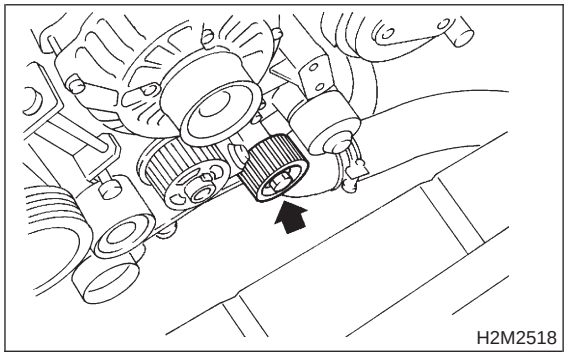


5) Install camshaft position sensor. <Ref. to 2-7 [W10A0].>

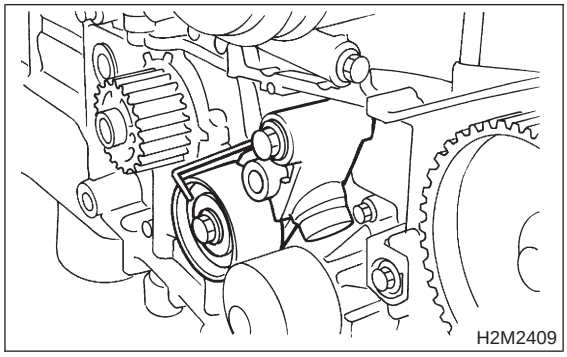


6) Install belt idler No. 2.

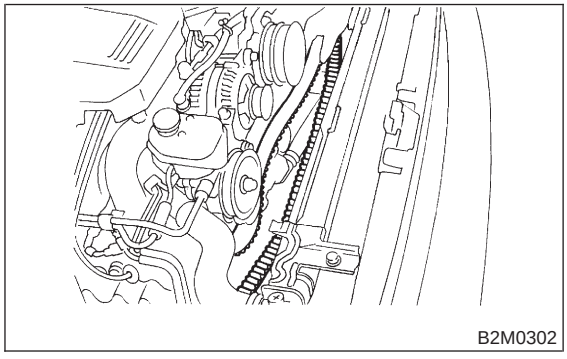
Tightening torque:
39±4 N·m (4.0±0.4 kg-m, 28.9±2.9 ft-lb)



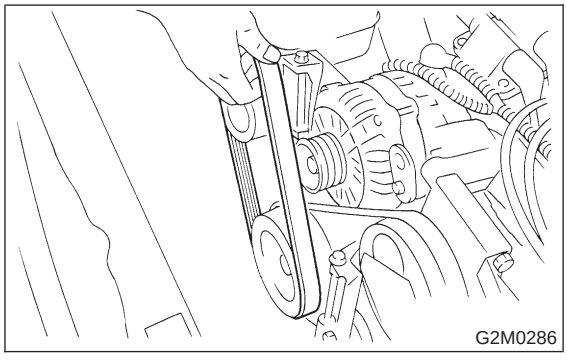
7) Install automatic belt tension adjuster which tension rod is holded with pin.



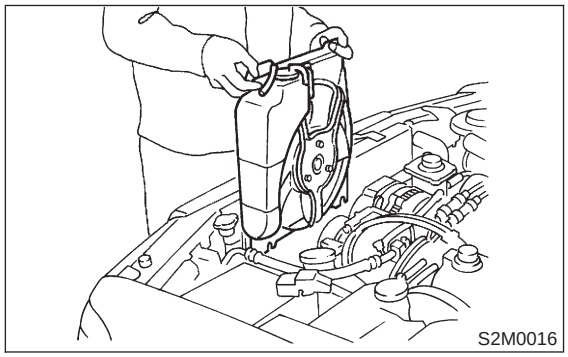
8) Install timing belt. <Ref. to 2-3a [W2C0].> and <Ref. to 2-3b [W2C0].>



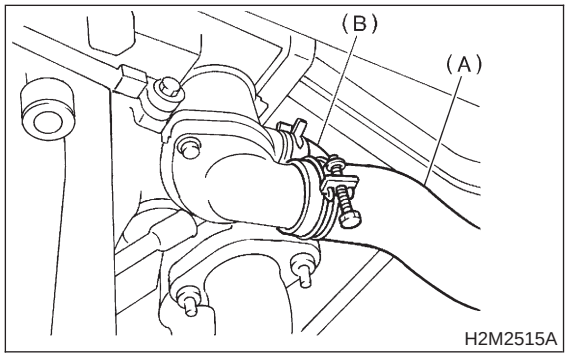
9) Install V-belts. <Ref. to 1-5 [G2B0].>



10) Install radiator main fan and sub fan motor assemblies. <Ref. to 2-5 [W6A0].> and <Ref. to 2-5 [W7A0].>

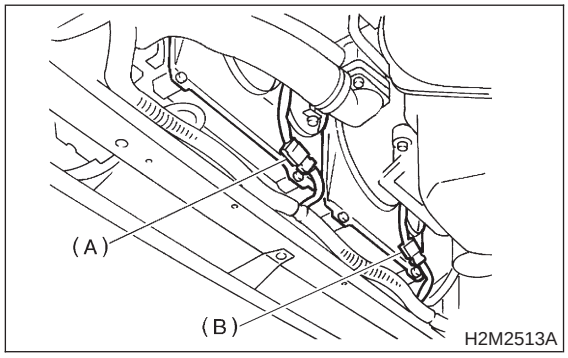

S2M0016

11) Connect radiator outlet hose (A) and heater hose (B) to water pump.



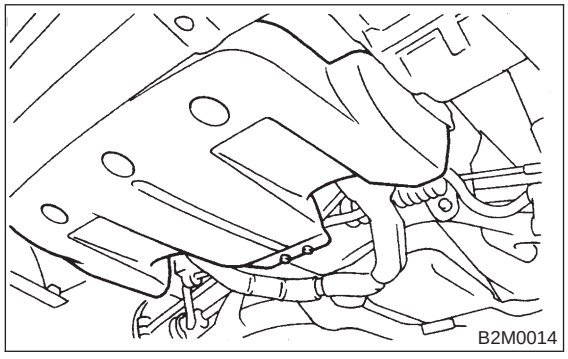
H2M2515A

12) Connect connectors to radiator main fan (A) and sub fan (B) motors.

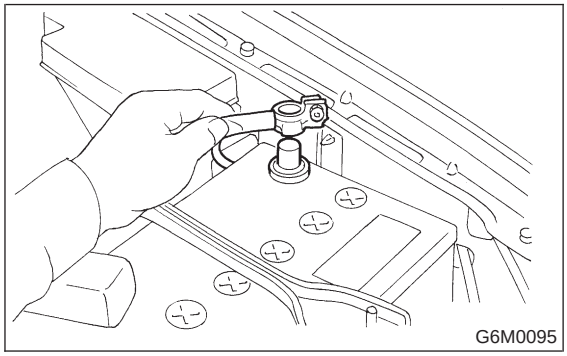


H2M2513A

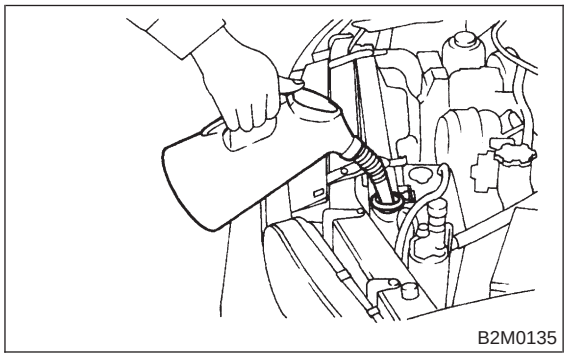
13) Install under cover.


B2M0014

14) Lower the vehicle.
15) Connect battery ground cable.


G6M0095

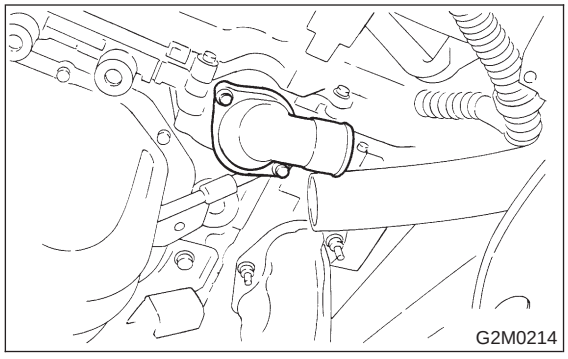
16) Fill coolant. <Ref. to 2-5 [W1B0].>


B2M0135

3. Thermostat

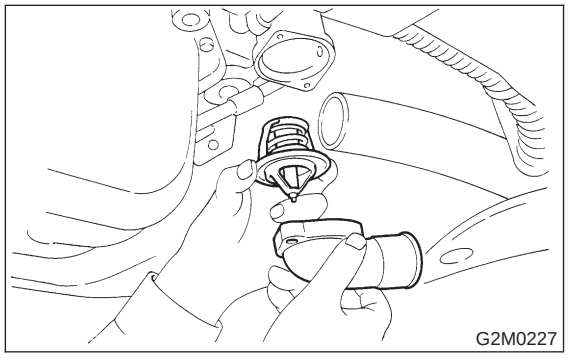
A: REMOVAL AND INSTALLATION

1) Drain engine coolant.
Set container under the vehicle, and remove drain cock from radiator.
2) Disconnect radiator outlet hose from thermostat cover.
3) Remove thermostat cover and gasket, and pull out the thermostat.



4) Install the thermostat in the intake manifold, and install the thermostat cover together with a gasket.

CAUTION:
● When reinstalling the thermostat, use a new gasket.
● The thermostat must be installed with the jiggle pin upward.
● In this time, set the jiggle pin of thermostat for front side.

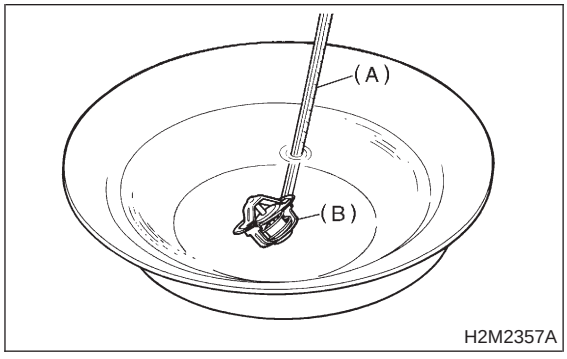


B: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.
Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

Starts to open:
76.0 — 80.0°C (169 — 176°F)

Fully opens:
91°C (196°F)

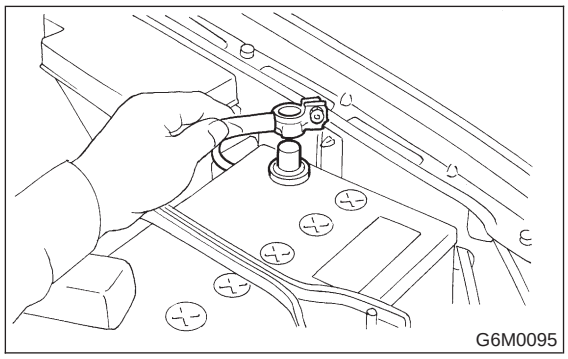


(A) Thermometer
(B) Thermostat

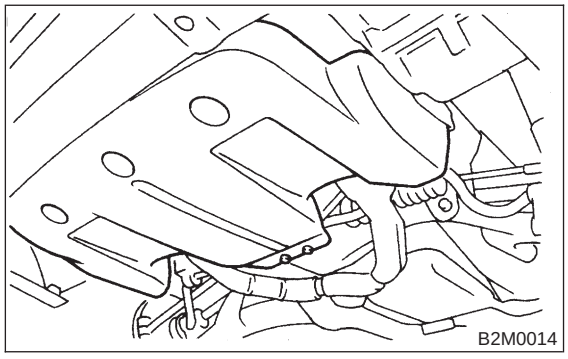
4. Radiator

A: REMOVAL

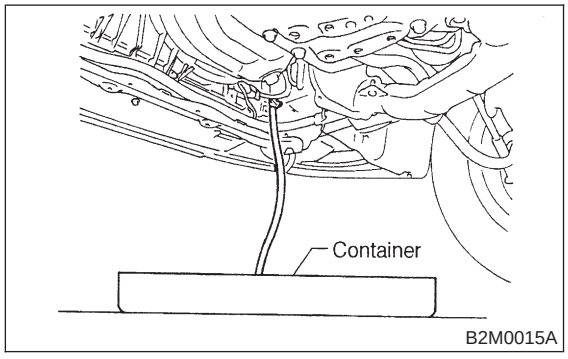
1) Disconnect battery ground cable.



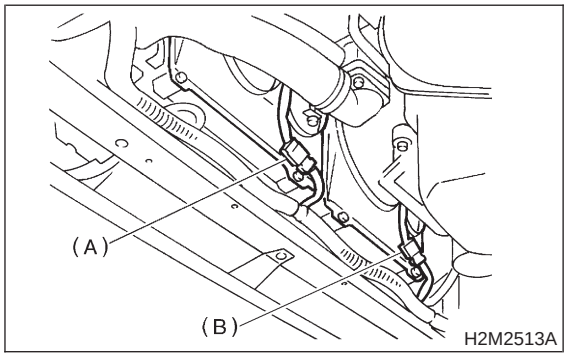
2) Lift-up the vehicle.
3) Remove under cover.



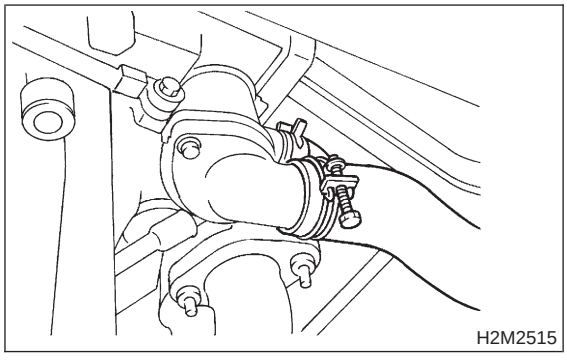
4) Drain engine coolant completely. <Ref. to 2-5 [W1A0].>



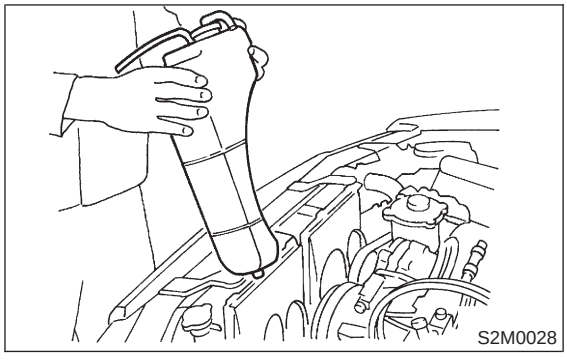
5) Disconnect connectors of radiator main fan and sub fan motor.



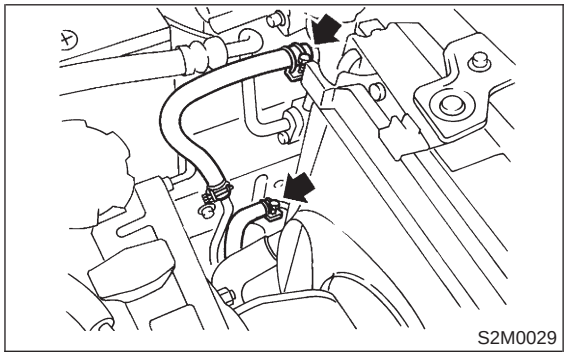
6) Disconnect radiator outlet hose from thermostat cover.



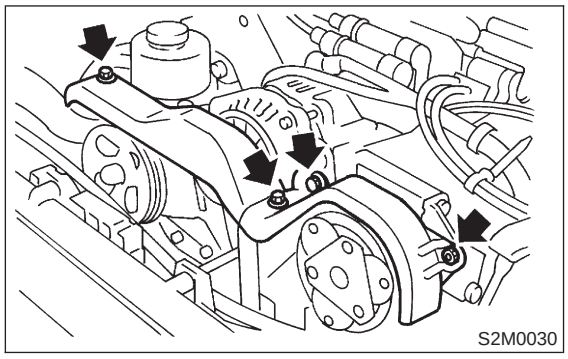
7) Lower the vehicle.
8) Remove reservoir tank.



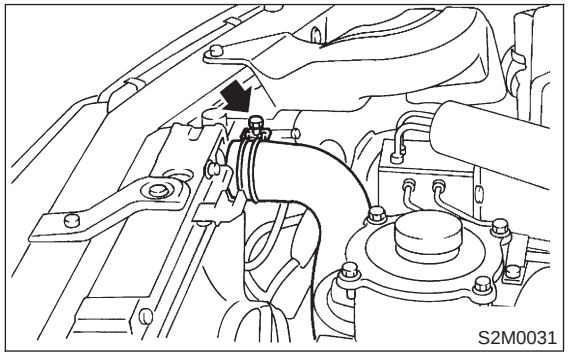
9) Disconnect ATF cooler hoses from radiator. (AT vehicles only)



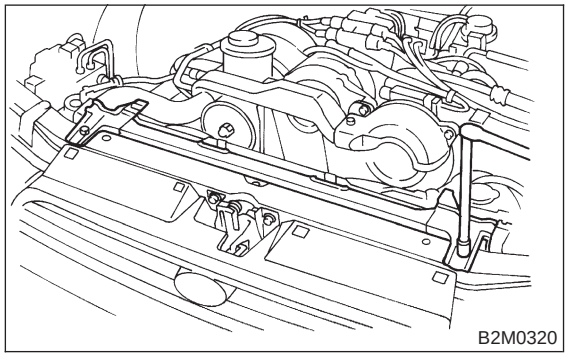
10) Remove V-belt covers.


S2M0030

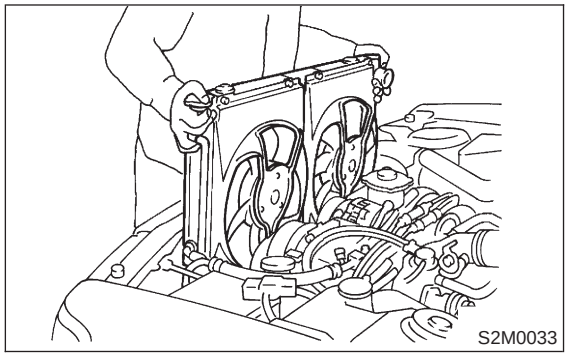
11) Disconnect radiator inlet hose from radiator.


S2M0031

12) Remove radiator upper brackets.

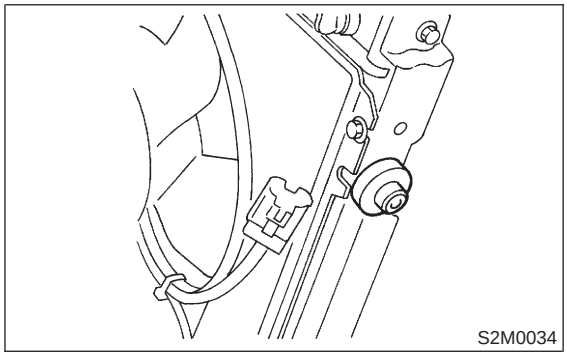

B2M0320

13) While slightly lifting radiator, slide it to left.
14) Lift radiator up and away from vehicle.


S2M0033

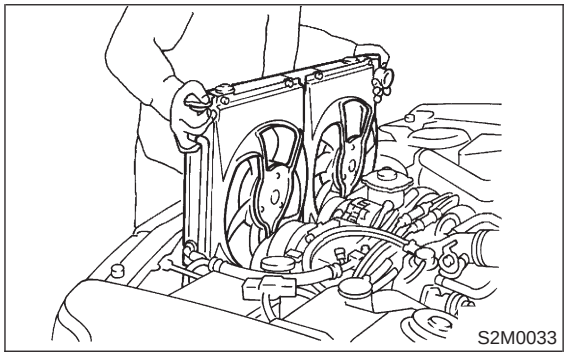
B: INSTALLATION

1) Attach radiator mounting cushions to pins on the lower side of radiator.


S2M0034

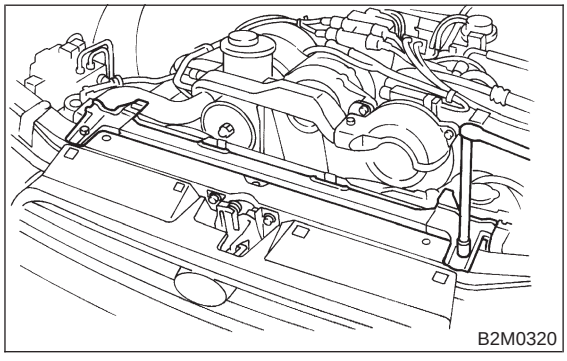
2) Install radiator while fitting radiator pins to cushions.

NOTE:
Fit cushion on lower side of radiator into holes on body side.

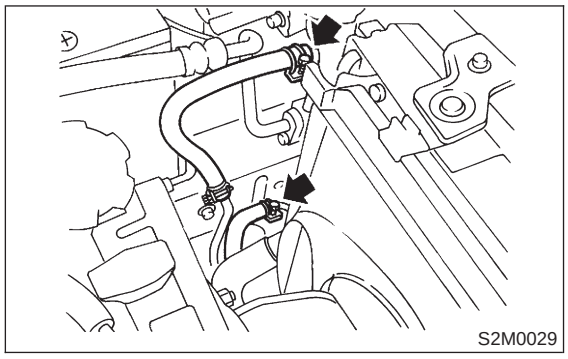

S2M0033

3) Install radiator brackets and tighten bolts.

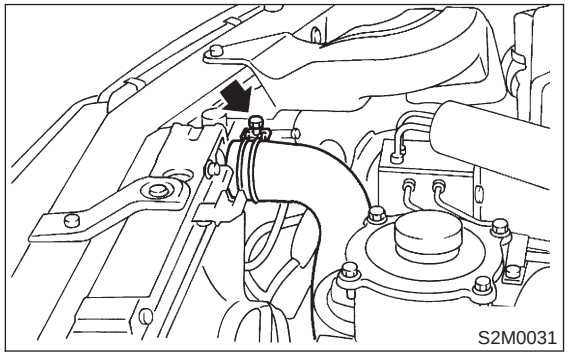
Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)


B2M0320

4) Connect ATF cooler hoses. (AT vehicles only)

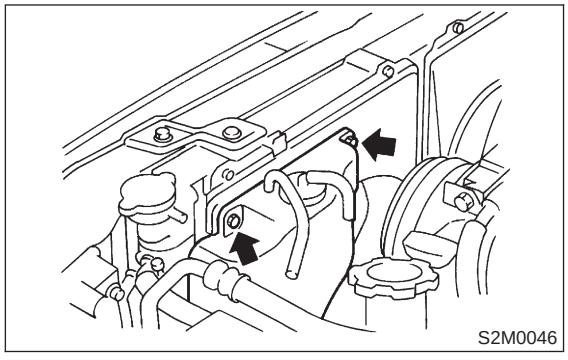


5) Connect radiator inlet hose.

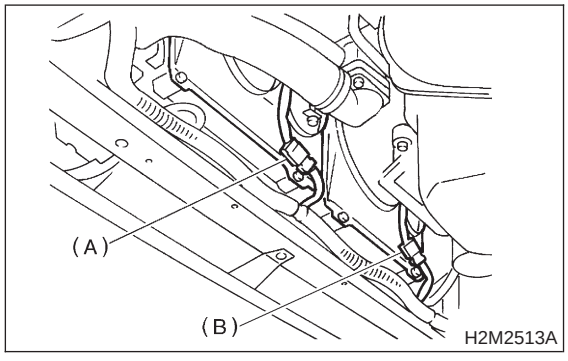


6) Install reservoir tank.

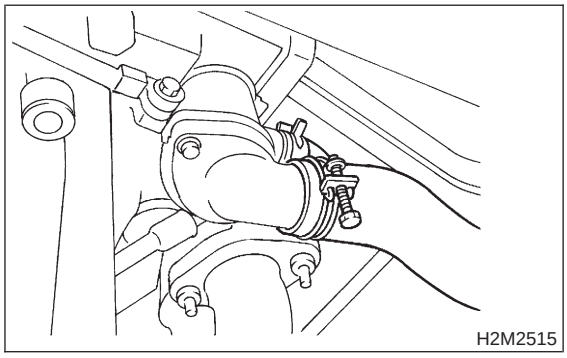
Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)



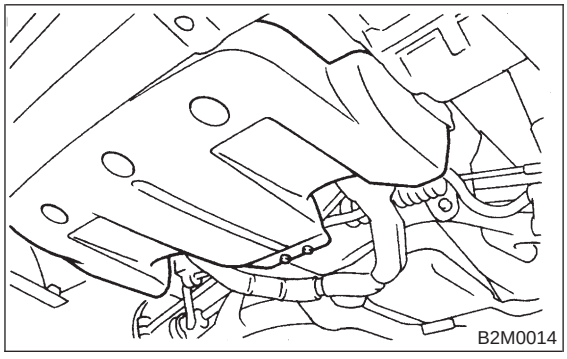
7) Lift-up the vehicle.
8) Connect connectors to radiator main fan motor and sub fan motor.



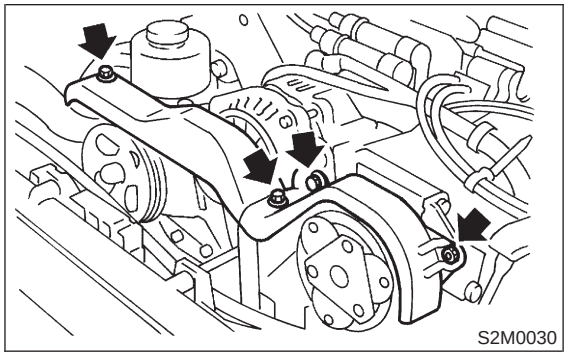
9) Connect radiator outlet hose and water by-pass hose B (AT vehicles).



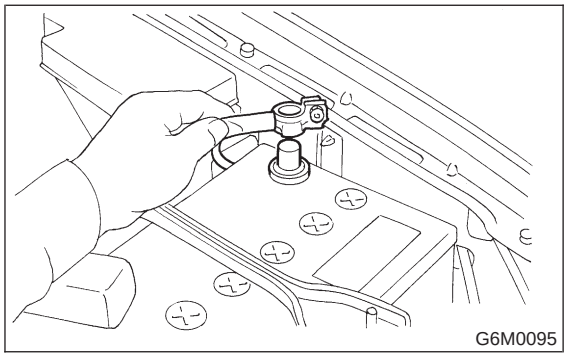
10) Install under cover.



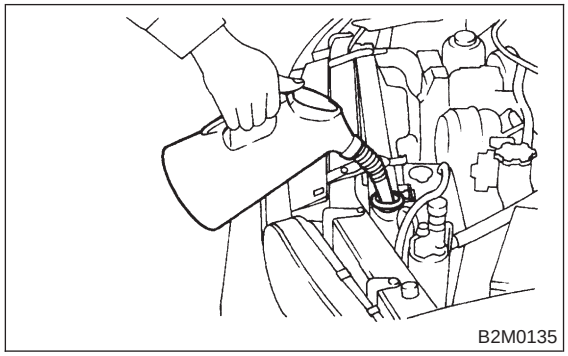
11) Lower the vehicle.
12) Install V-belt covers.



13) Connect battery ground cable.



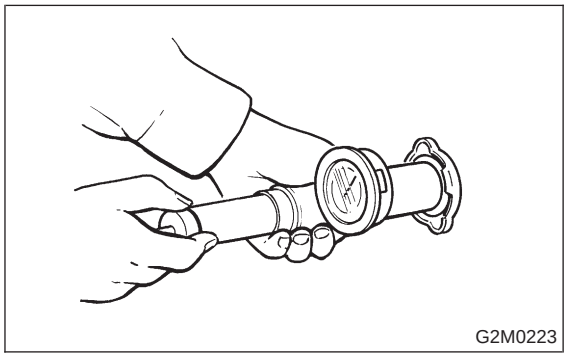
14) Fill coolant. <Ref. to 2-5 [W1B0].>



5. Radiator Cap

A: INSPECTION

1) Attach radiator cap to tester.



2) Increase pressure until tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds.

Standard pressure:
78 — 98 kPa (0.8 — 1.0 kg/cm^2, 11 — 14 psi)

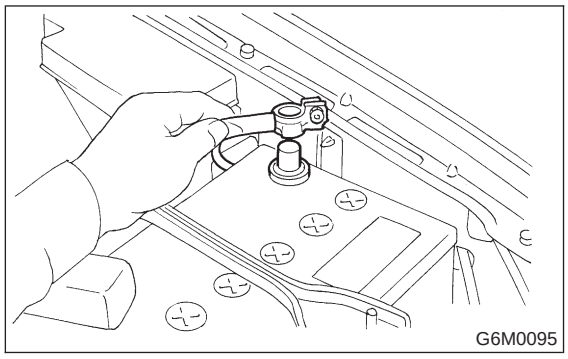
Service limit pressure:
69 kPa (0.7 kg/cm^2, 10 psi)

CAUTION:
Be sure to remove foreign matter and rust from the cap in advance; otherwise, results of pressure test will be incorrect.

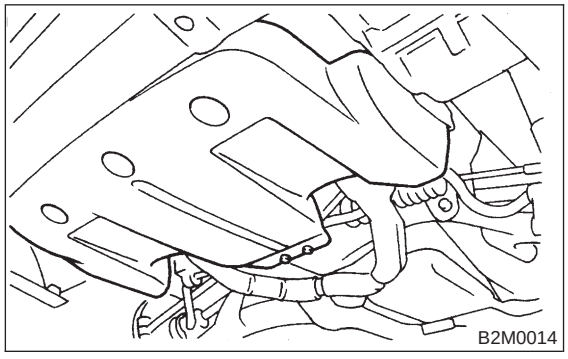
6. Radiator Main Fan and Fan Motor

A: REMOVAL AND INSTALLATION

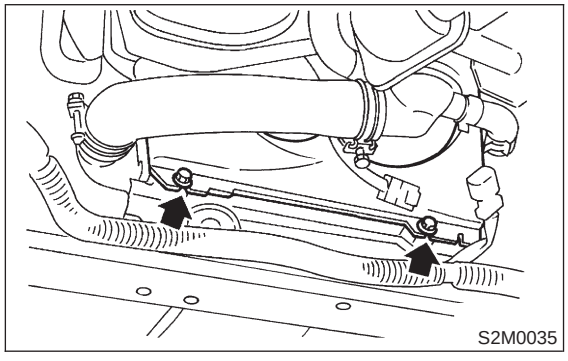
1) Disconnect battery ground cable.



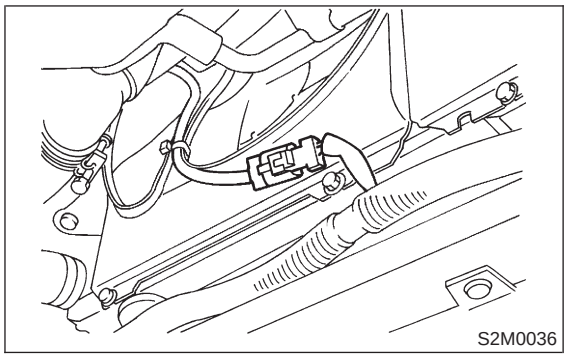
2) Lift-up the vehicle.
3) Remove under cover.



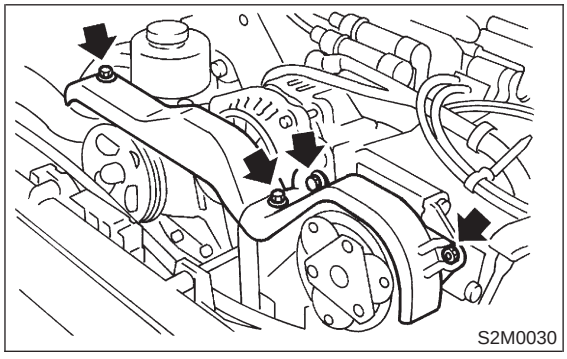
4) Loosen bolts which install the lower side of radiator main fan shroud.



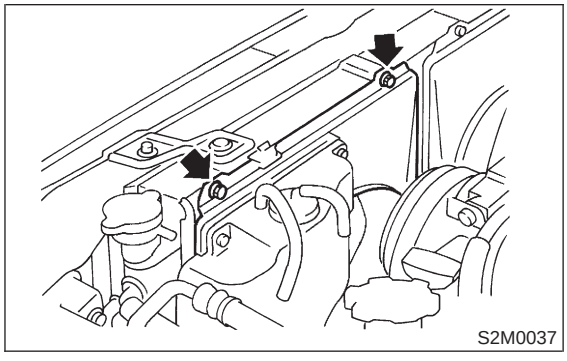
5) Disconnect connector of main fan motor.



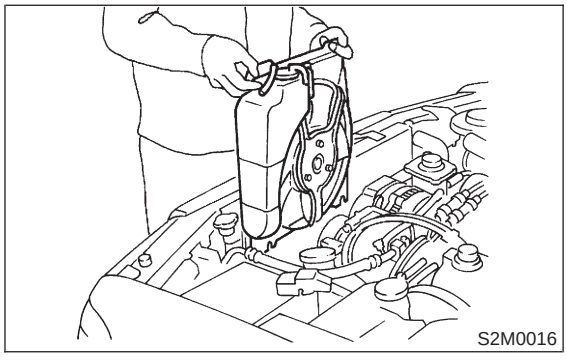
6) Lower the vehicle.
7) Remove V-belt covers.



8) Remove bolts which hold main fan shroud to radiator.

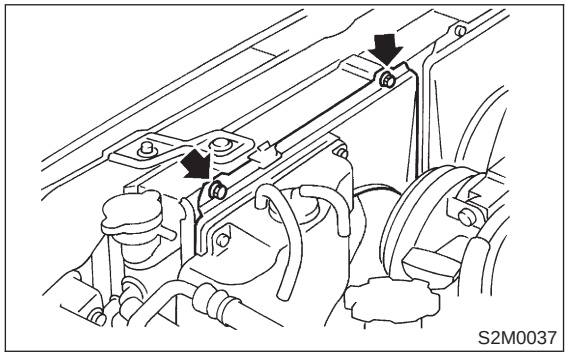


9) Remove radiator main fan motor assembly.



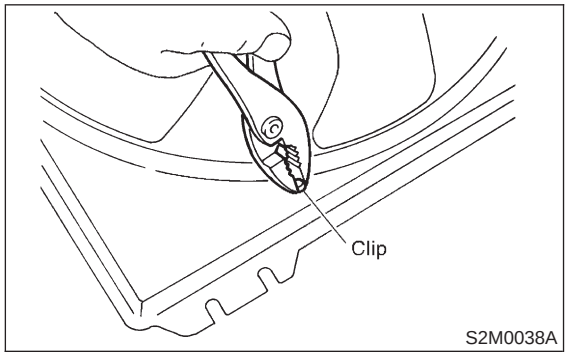
10) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)

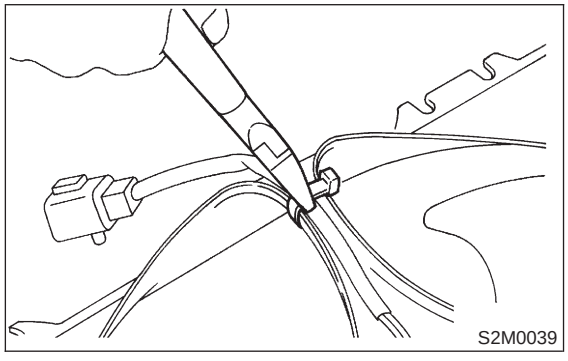


B: DISASSEMBLY AND ASSEMBLY

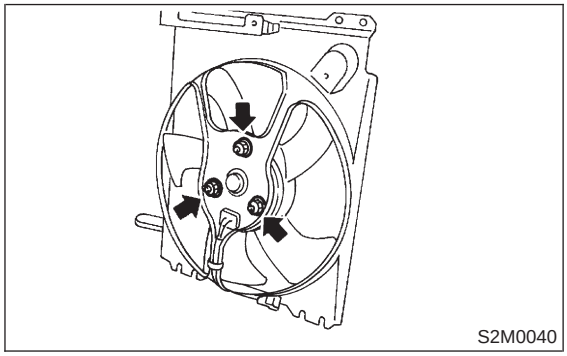
1) Remove clip which holds motor harness onto shroud.



2) Cut band which holds motor harness on shroud.

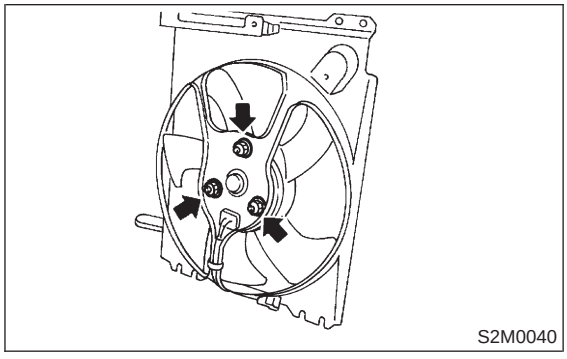


3) Remove bolts which install fan motor onto shroud.



4) Installation is in the reverse order of removal.

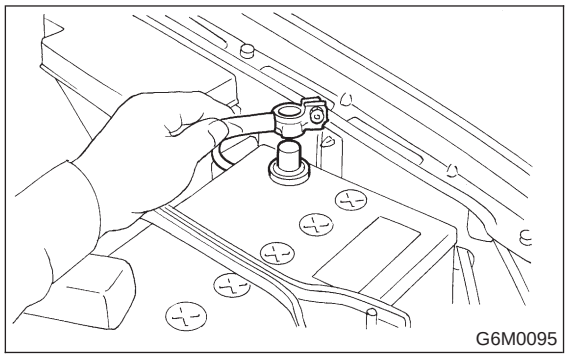
Tightening torque:
4.4±0.5 N·m (0.45±0.05 kg-m, 3.3±0.4 ft-lb)



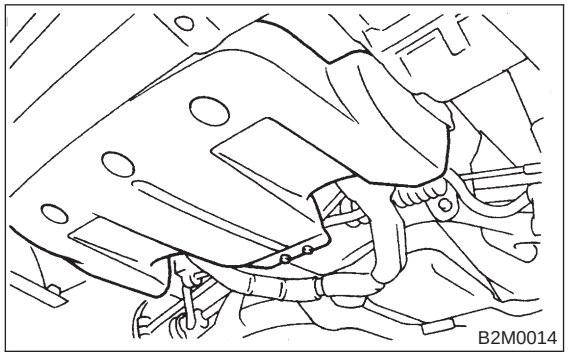
7. Radiator Sub Fan and Fan Motor

A: REMOVAL AND INSTALLATION

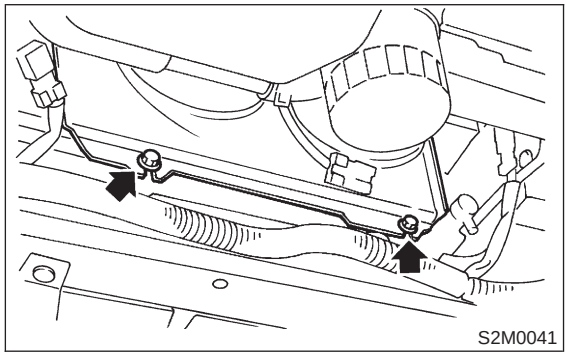
1) Disconnect battery ground cable.



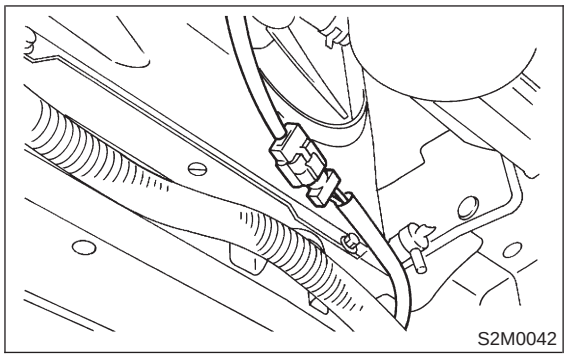
2) Lift-up the vehicle.
3) Remove under cover.



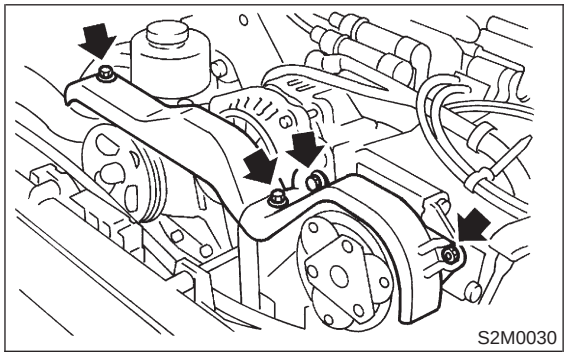
4) Loosen bolts which install the lower side of radiator sub fan shroud.



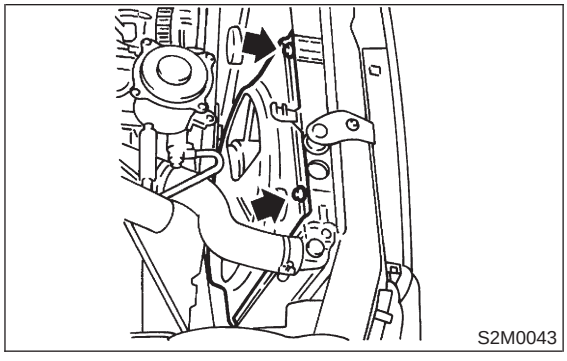
5) Disconnect connector of sub fan motor.



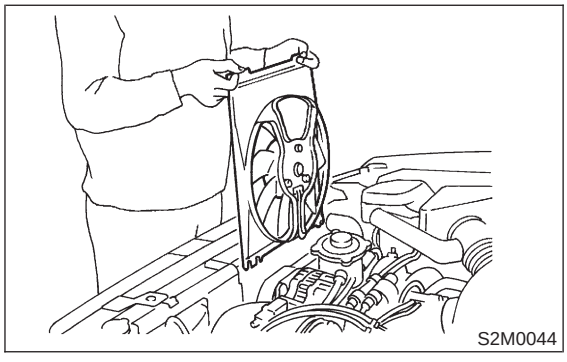
6) Lower the vehicle.
7) Remove V-belt covers.



8) Remove bolts which hold sub fan shroud to radiator.

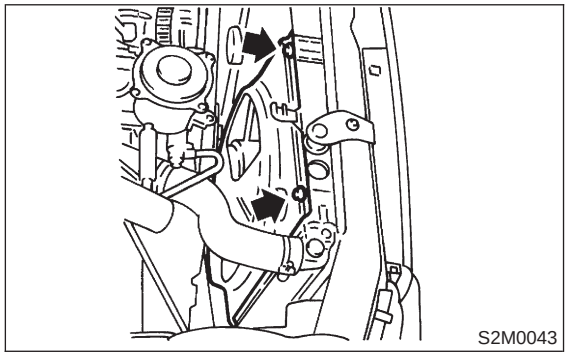


9) Remove radiator sub fan motor assembly.



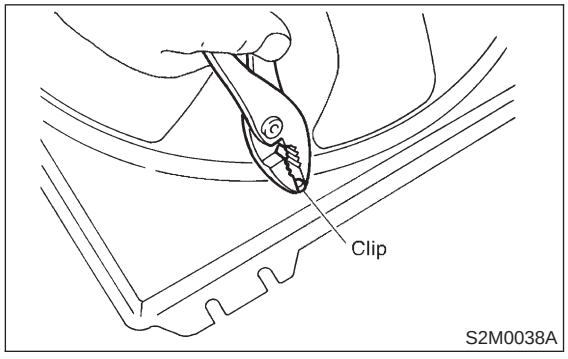
10) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)

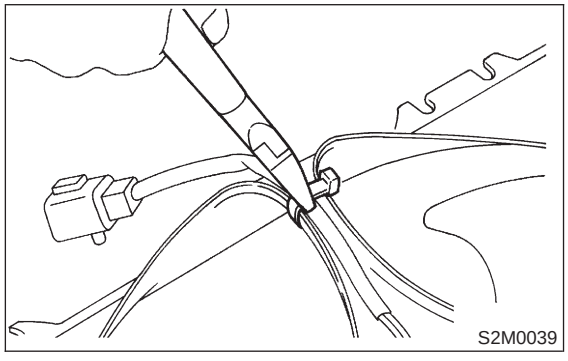


B: DISASSEMBLY AND ASSEMBLY

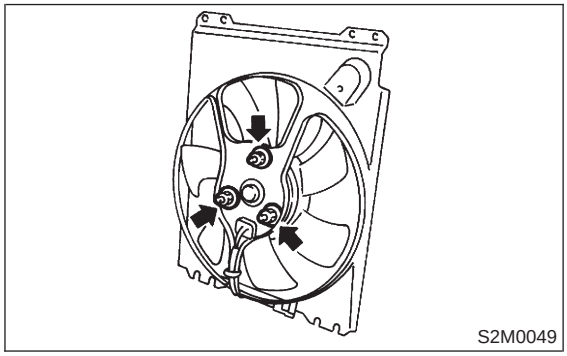
1) Remove clip which holds motor harness onto shroud.



2) Cut band which holds motor harness on shroud.

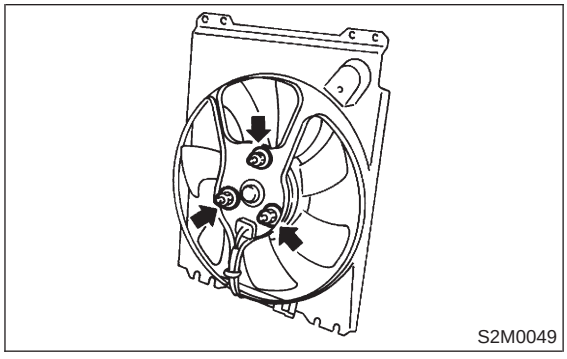


3) Remove bolts which install fan motor onto shroud.



4) Installation is in the reverse order of removal.

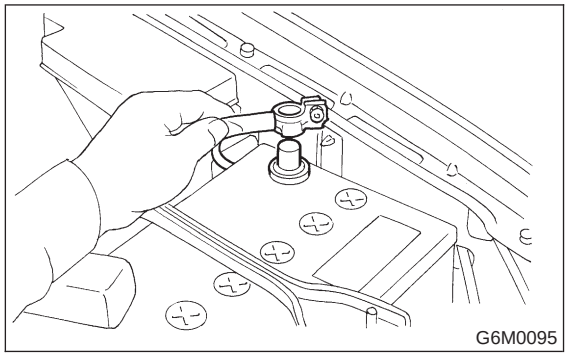
Tightening torque:
4.4±0.5 N·m (0.45±0.05 kg-m, 3.3±0.4 ft-lb)



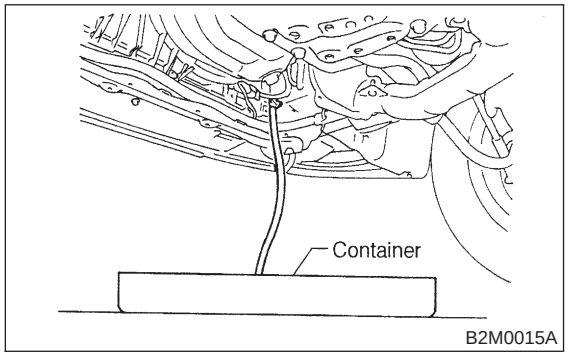
8. Water Pipe

A: REMOVAL

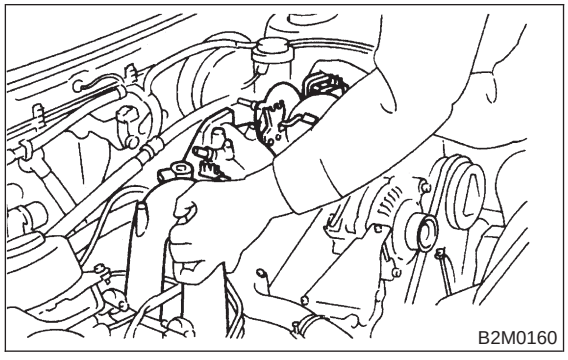
1) Release fuel pressure.
<Ref. to 2-8 [W1B0].>
2) Disconnect ground cable from the battery.



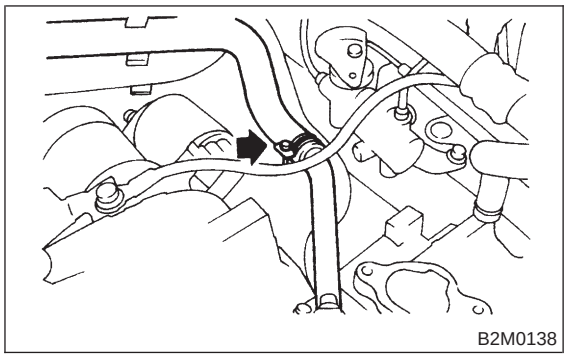
3) Drain engine coolant completely.
<Ref. to 2-5 [W1A0].>



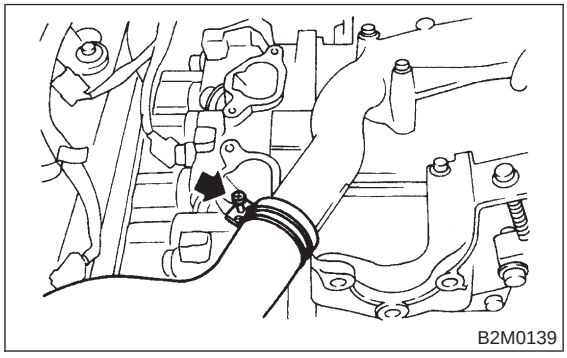
4) Remove intake manifold.
<Ref. to 2-7 [W4A0].>



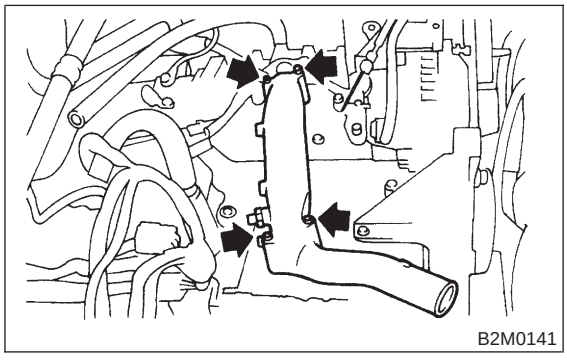
5) Disconnect heater inlet hose.



6) Disconnect radiator inlet hose from water pipe.



7) Remove bolts which install water pipe on cylinder block.

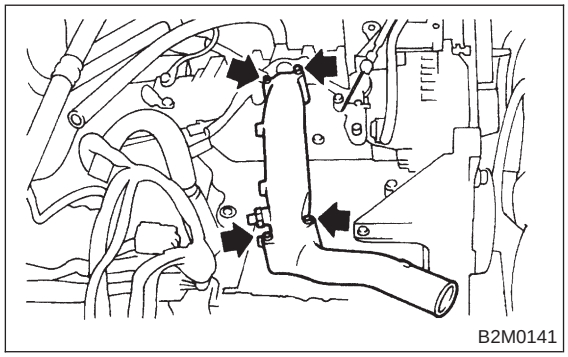


B: INSTALLATION

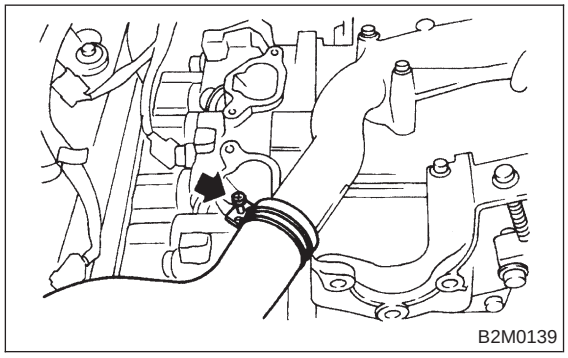
1) Install water pipe on cylinder block.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

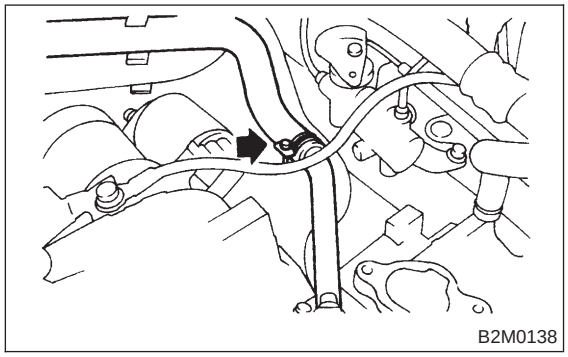
CAUTION:
Use a new O-ring.



2) Connect radiator inlet hose.



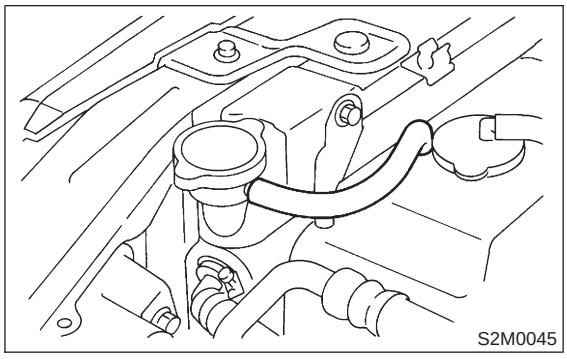
3) Connect heater inlet hose.



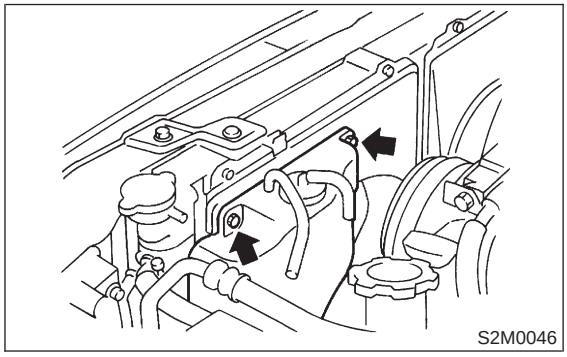
9. Reservoir Tank

A: REMOVAL AND INSTALLATION

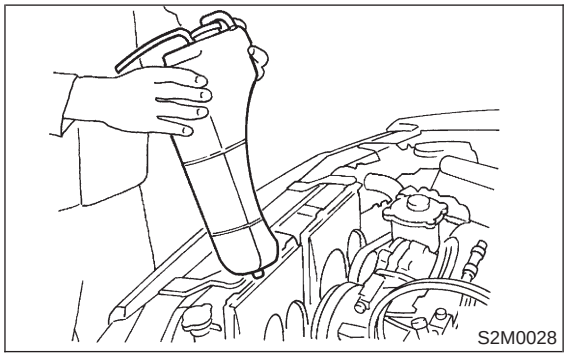
1) Disconnect over flow hose from radiator filler neck position.



2) Remove bolts which install reservoir tank onto radiator main fan shroud.

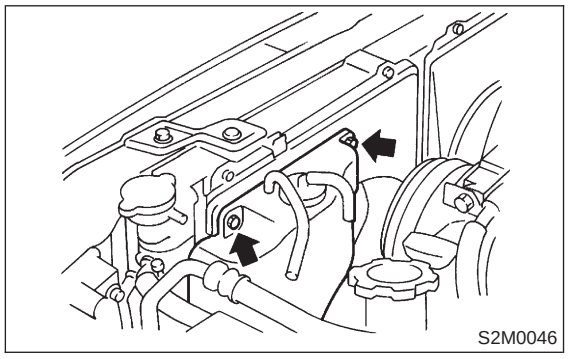


3) Remove reservoir tank.



4) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)



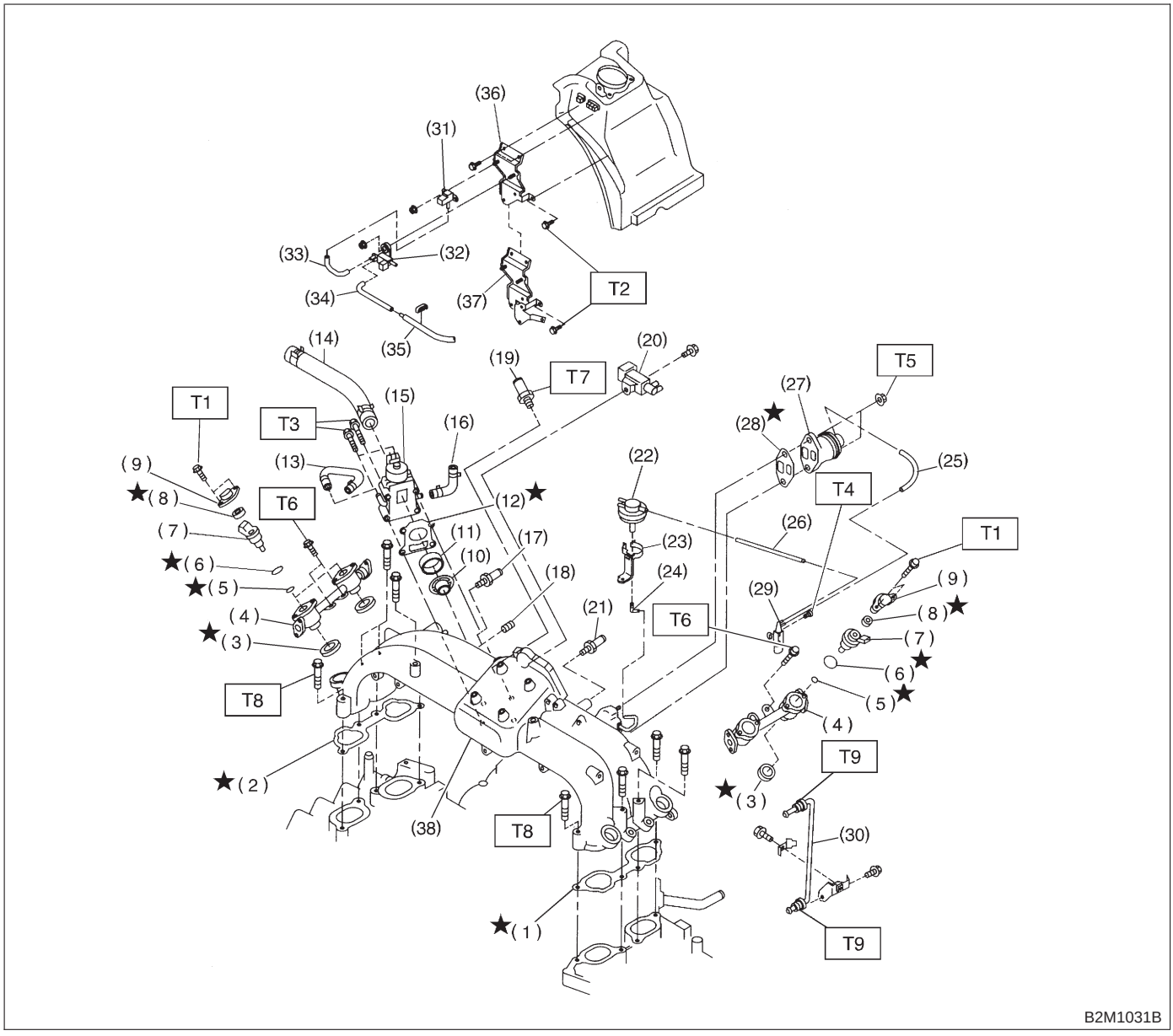
1. Engine Cooling System Trouble in General

Trouble		Corrective action
Over-heating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair.
	b. Loose timing belt	Repair or replace timing belt tensioner.
	c. Oil on drive belt	Replace.
	d. Malfunction of thermostat	Replace.
	e. Malfunction of water pump	Replace.
	f. Clogged engine coolant passage	Clean.
	g. Improper ignition timing	Inspect and repair ignition control system. <Ref. to 2-7 [T8D0].> On-Board Diagnostics II System
	h. Clogged or leaking radiator	Clean or repair, or replace.
	i. Improper engine oil in engine coolant	Replace engine coolant.
	j. Air/fuel mixture ratio too lean	Inspect and repair fuel injection system. <Ref. to 2-7 [T8G0].> On-Board Diagnostics II System
	k. Excessive back pressure in exhaust system	Clean or replace.
	l. Insufficient clearance between piston and cylinder	Adjust or replace.
	m. Slipping clutch	Repair or replace.
	n. Dragging brake	Adjust.
	o. Improper transmission oil	Replace.
	p. Defective thermostat	Replace.
	q. Malfunction of electric fan	Inspect radiator fan relay, engine coolant temperature sensor or radiator motor and replace there.
Over-cooling	a. Atmospheric temperature extremely low	Partly cover radiator front area.
	b. Defective thermostat	Replace.
Engine coolant leaks.	a. Loosened or damaged connecting units on hoses	Repair or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Repair or replace.
	d. Leakage around cylinder head gasket	Retighten cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crank-case	Repair or replace.
	f. Damaged or cracked thermostat case	Repair or replace.
	g. Leakage from radiator	Repair or replace.
Noise	a. Defective drive belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.

FUEL INJECTION SYSTEM 2-7

1. Intake Manifold

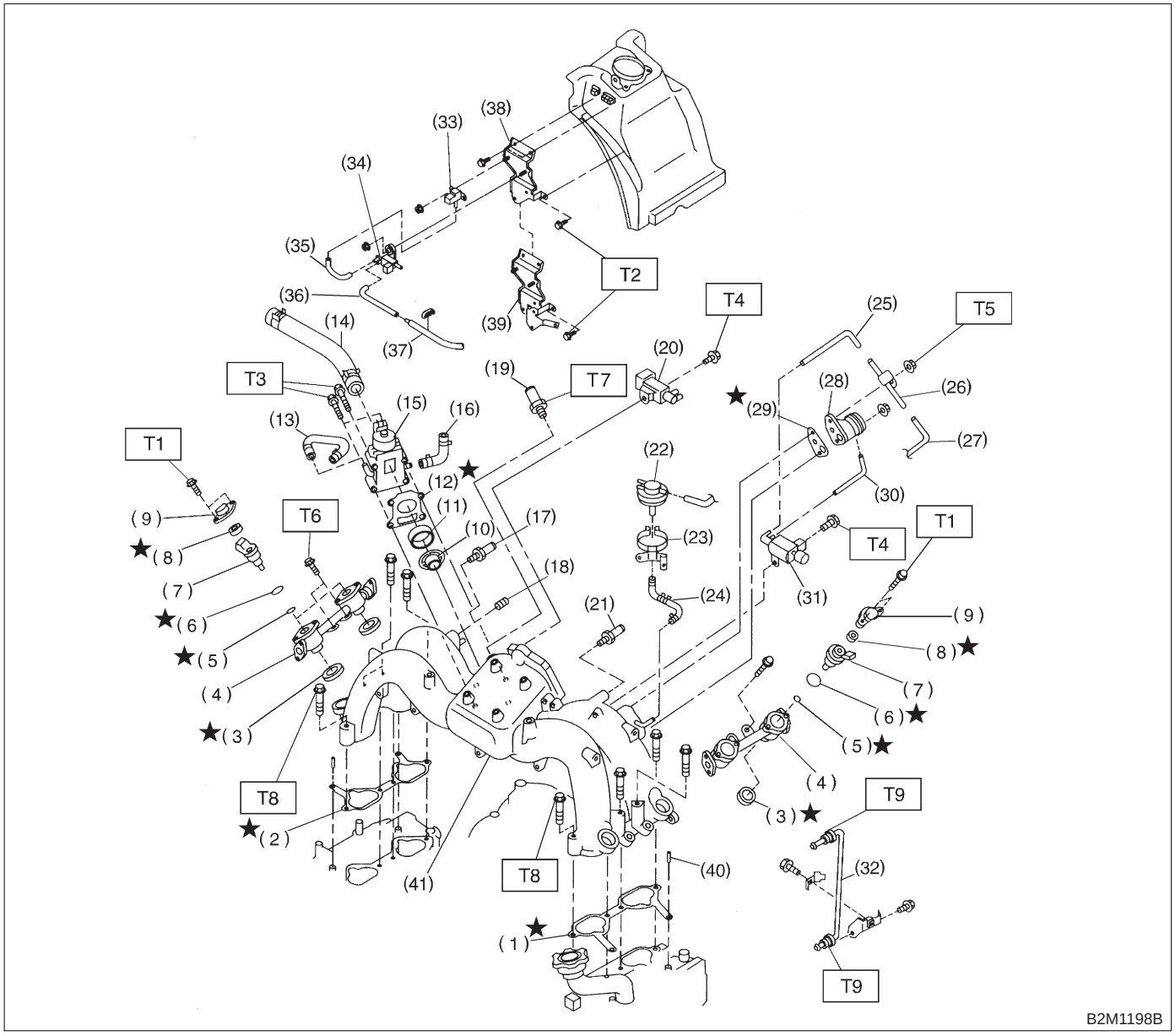
A: 2200 cc MODEL



(1) Intake manifold gasket LH
(2) Intake manifold gasket RH
(3) Fuel injector pipe insulator
(4) Fuel injector pipe
(5) O-ring A
(6) O-ring B
(7) Fuel injector
(8) Insulator
(9) Fuel injector cap
(10) Plate
(11) Sealing
(12) Gasket
(13) Engine coolant hose B
(14) Air by-pass hose
(15) Idle air control solenoid valve
(16) Engine coolant hose A
(17) Nipple (AT vehicles)
(18) Plug
(19) PCV valve
(20) Purge control solenoid valve
(21) Nipple
(22) BPT (Except MT vehicles)
(23) BPT holder bracket (Except MT vehicles)
(24) Back pressure hose (Except MT vehicles)
(25) EGR vacuum hose A (Except MT vehicles)
(26) EGR vacuum hose B (Except MT vehicles)
(27) EGR valve (Except MT vehicles)
(28) Gasket (Except MT vehicles)
(29) EGR solenoid valve (Except MT vehicles)
(30) EGR pipe (Except MT vehicles)
(31) Pressure sensor
(32) Pressure sources switching solenoid valve
(33) Vacuum hose A
(34) Vacuum hose B
(35) Vacuum hose C
(36) Bracket (Except Canada spec. vehicles)
(37) Bracket (For Canada spec. vehicles)
(38) Intake manifold

Tightening torque: N·m (kg-m, ft-lb)
T1: 3.4±0.5 (0.35±0.05, 2.5±0.4)
T2: 4.9±0.5 (0.5±0.05, 3.6±0.4)
T3: 6.4±0.5 (0.65±0.05, 4.7±0.4)
T4: 16±1.5 (1.6±0.15, 11.6±1.1)
T5: 19±1.5 (1.9±0.15, 13.7±1.1)
T6: 19±2 (1.9±0.2, 13.7±1.4)
T7: 23±3 (2.3±0.3, 16.6±2.2)
T8: 25±2 (2.5±0.2, 18.1±1.4)
T9: 34±2 (3.5±0.2, 25.3±1.4)

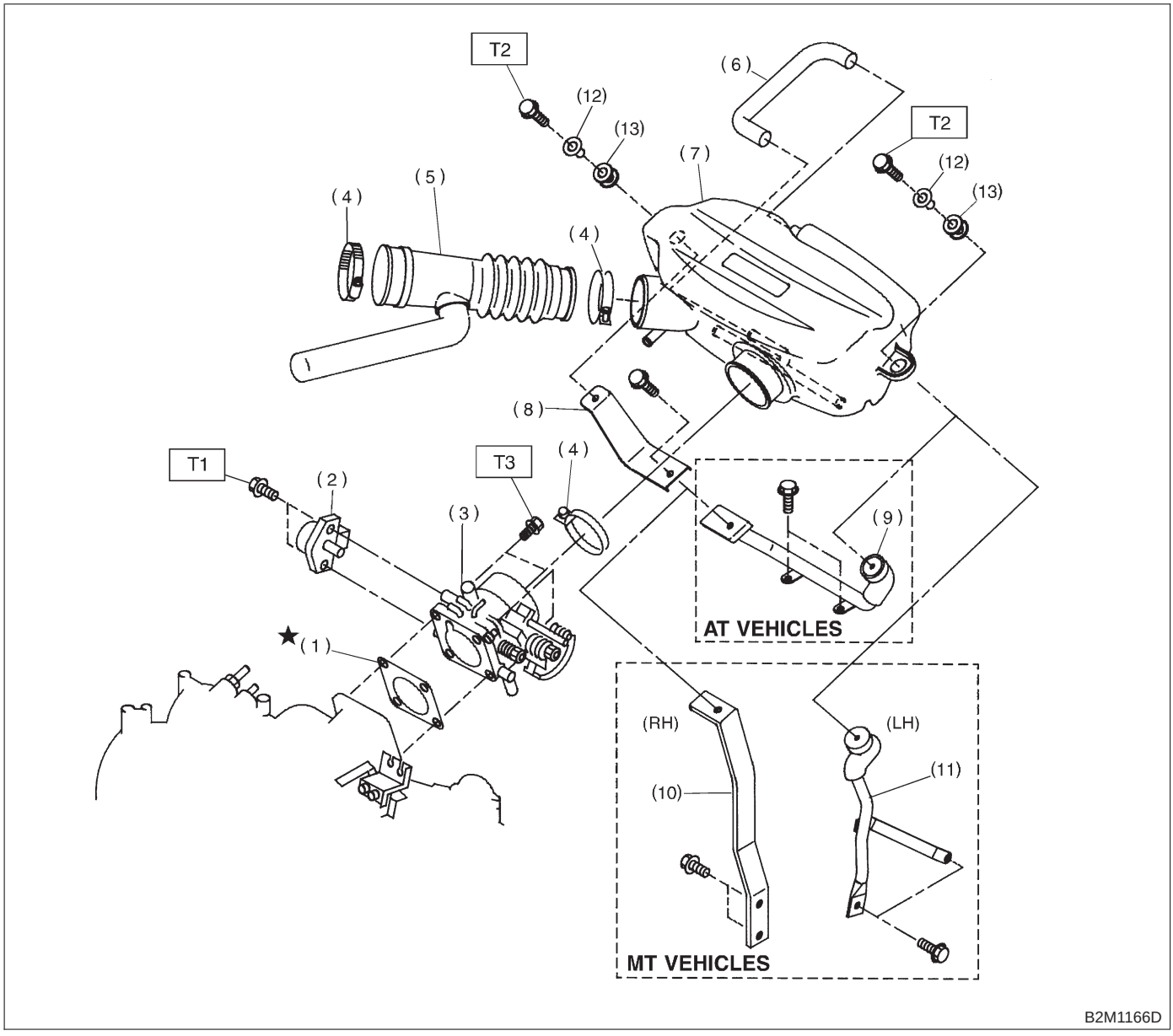
B: 2500 cc MODEL



(1) Intake manifold gasket LH
(2) Intake manifold gasket RH
(3) Fuel injector pipe insulator
(4) Fuel injector pipe
(5) O-ring A
(6) O-ring B
(7) Fuel injector
(8) Insulator
(9) Fuel injector cap
(10) Plate
(11) Sealing
(12) Gasket
(13) Engine coolant hose B
(14) Air by-pass hose
(15) Idle air control solenoid valve
(16) Engine coolant hose A
(17) Nipple (AT vehicles)
(18) Plug
(19) PCV valve
(20) Purge control solenoid valve
(21) Nipple
(22) BPT
(23) BPT holder bracket
(24) Back pressure hose
(25) EGR vacuum hose A
(26) EGR vacuum pipe
(27) EGR vacuum hose C
(28) EGR valve
(29) Gasket
(30) EGR vacuum hose B
(31) EGR solenoid valve
(32) EGR pipe
(33) Pressure sensor
(34) Pressure sources switching solenoid valve
(35) Vacuum hose A
(36) Vacuum hose B
(37) Vacuum hose C
(38) Bracket (Except Canada spec. vehicles)
(39) Bracket (For Canada spec. vehicles)
(40) Collar
(41) Intake manifold

Tightening torque: N·m (kg-m, ft-lb)
T1: 3.4±0.5 (0.35±0.05, 2.5±0.4)
T2: 4.9±0.5 (0.5±0.05, 3.6±0.4)
T3: 6.4±0.5 (0.65±0.05, 4.7±0.4)
T4: 16±1.5 (1.6±0.15, 11.6±1.1)
T5: 19±1.5 (1.9±0.15, 13.7±1.1)
T6: 19±2 (1.9±0.2, 13.7±1.4)
T7: 23±3 (2.3±0.3, 16.6±2.2)
T8: 25±2 (2.5±0.2, 18.1±1.4)
T9: 34±2 (3.5±0.2, 25.3±1.4)

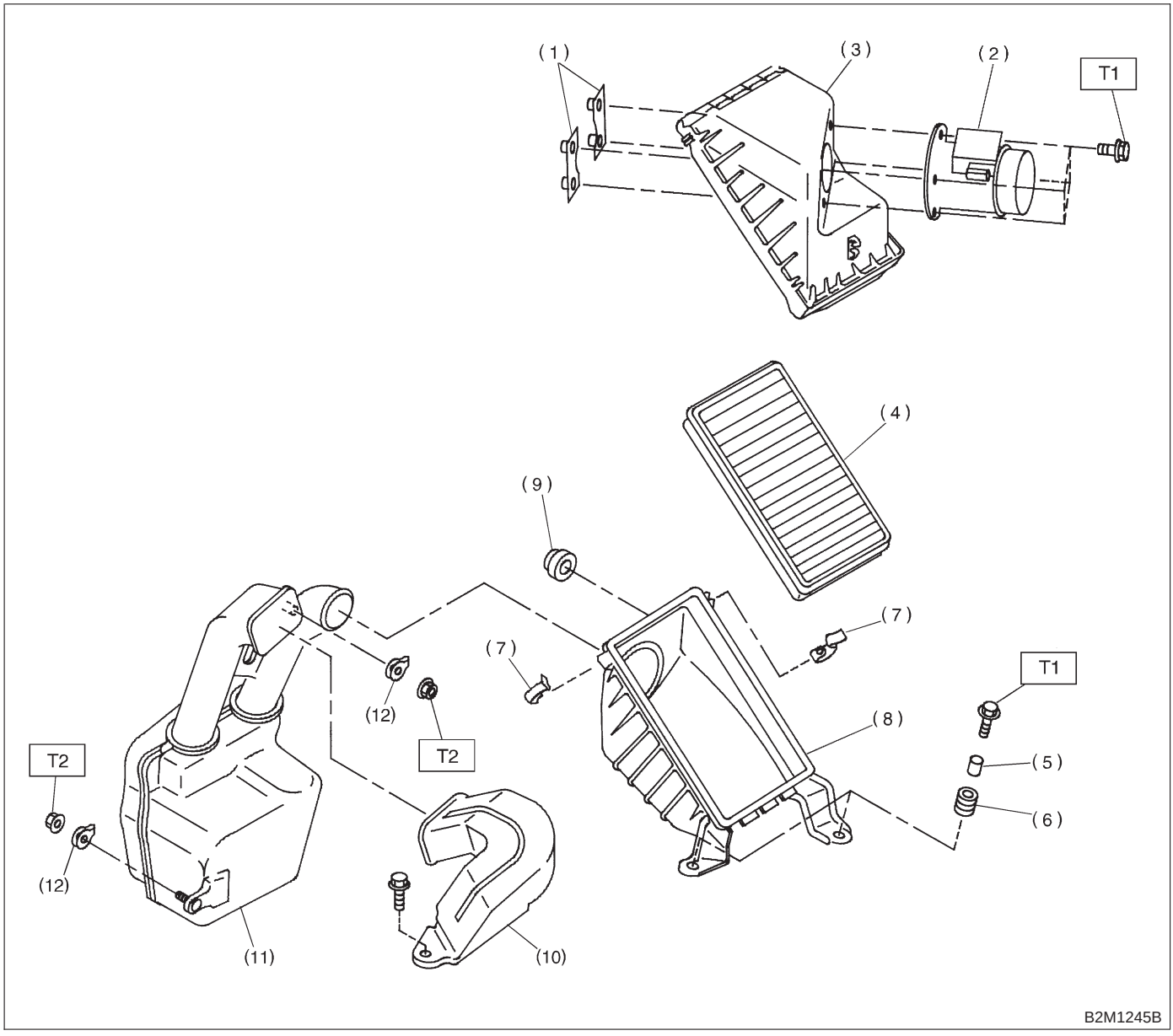
2. Air Intake System



(1) Gasket
(2) Throttle position sensor
(3) Throttle body
(4) Clamp
(5) Air intake duct
(6) By-pass hose
(7) Air intake chamber
(8) Stay A
(9) Stay B (AT vehicles)
(10) Stay C (MT vehicles)
(11) Stay D (MT vehicles)
(12) Spacer
(13) Bush

Tightening torque: N·m (kg-m, ft-lb)
T1: 2.2±0.2 (0.22±0.02, 1.6±0.1)
T2: 4.9±0.5 (0.5±0.05, 3.6±0.4)
T3: 22±2 (2.2±0.2, 15.9±1.4)

3. Air Cleaner



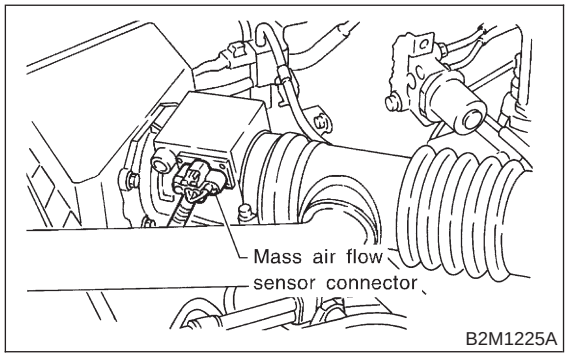
(1) Mass air flow sensor bracket
(2) Mass air flow sensor ASSY
(3) Air cleaner upper cover
(4) Air cleaner element
(5) Spacer
(6) Bush
(7) Clip
(8) Air cleaner case
(9) Cushion rubber
(10) Air intake duct
(11) Resonator chamber ASSY
(12) Clip

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 33±10 (3.4±1.0, 25±7)

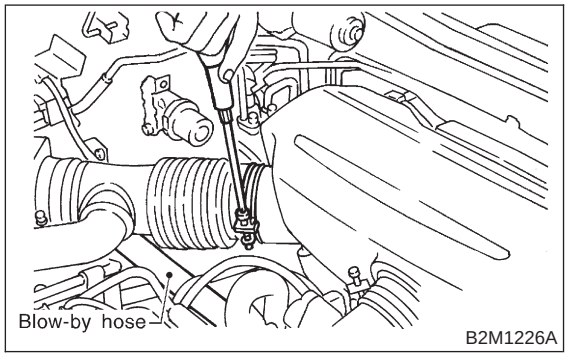
1. Air Cleaner and Air Intake Duct

A: REMOVAL AND INSTALLATION

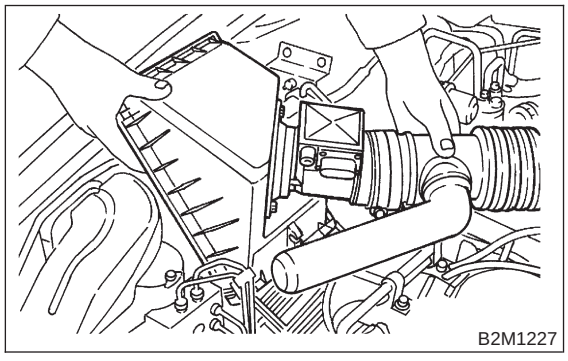
1) Disconnect connector from mass air flow sensor.



2) Loosen clamp which connects air intake duct to air intake chamber.

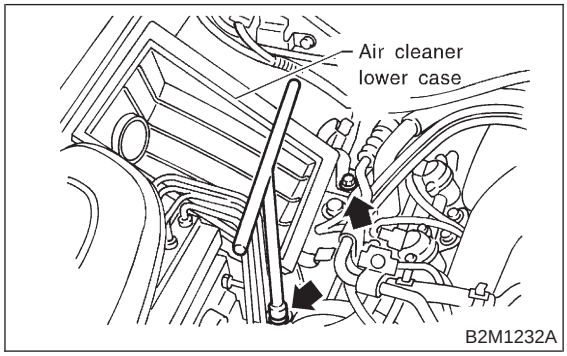


3) Remove two clips of air cleaner upper cover.
4) Disconnect blow-by hose from air intake duct.
5) Remove air intake duct and air cleaner upper cover as a unit.



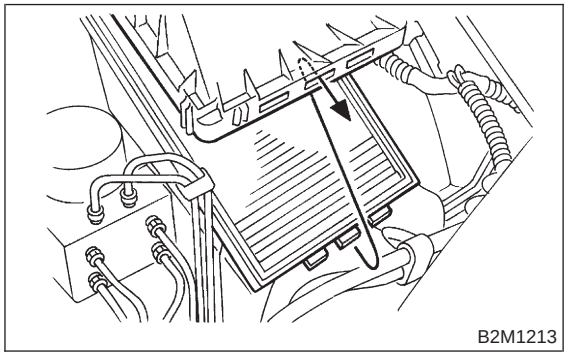
6) Remove air cleaner element.

7) Remove air cleaner lower case.



8) Installation is in the reverse order of removal.

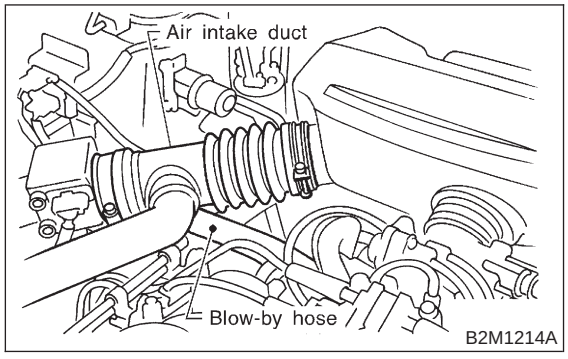
CAUTION:
Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.



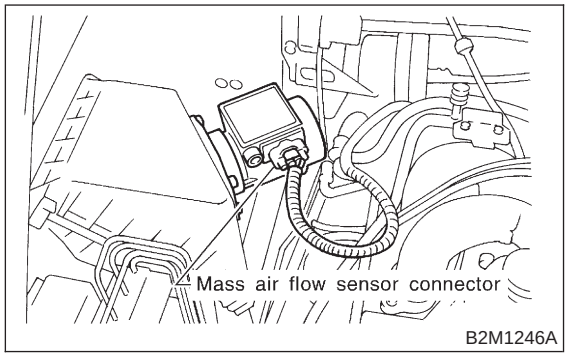
2. Mass Air Flow Sensor

A: REMOVAL AND INSTALLATION

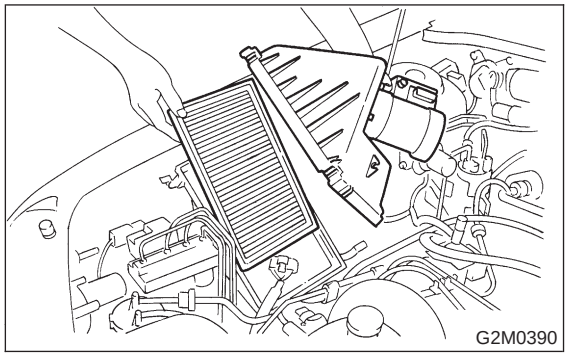
1) Loosen clamps which connect air intake duct to air intake chamber and mass air flow sensor.
2) Disconnect blow-by hose from air intake duct.



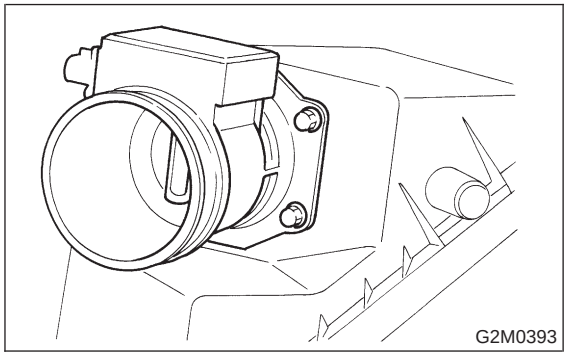
3) Remove air intake duct.
4) Disconnect connector from mass air flow sensor.



5) Remove two clips, then remove air cleaner upper cover.



6) Remove mass air flow sensor from air cleaner upper cover.



7) Installation is in the reverse order of removal.

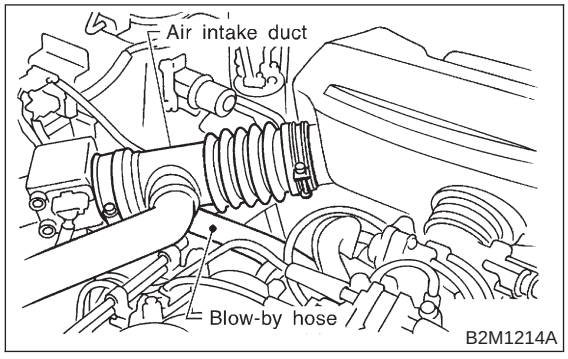
Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

CAUTION:
Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.

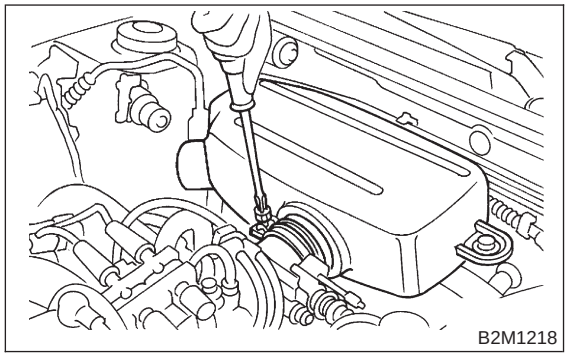
3. Throttle Body

A: REMOVAL AND INSTALLATION

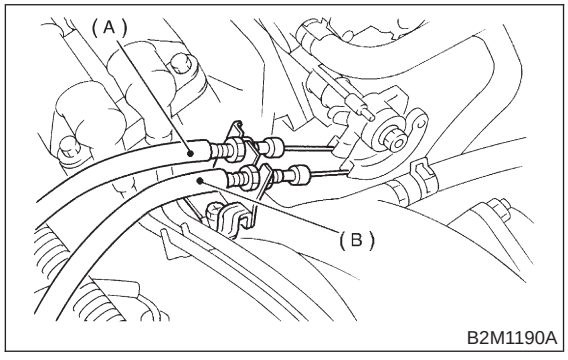
1) Loosen clamps which connect air intake duct to air intake chamber and mass air flow sensor.
2) Disconnect blow-by hose from air intake duct.



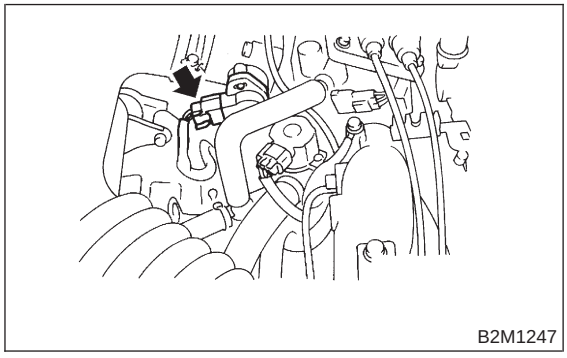
3) Remove air intake duct.
4) Loosen clamp which connects air intake chamber to throttle body.



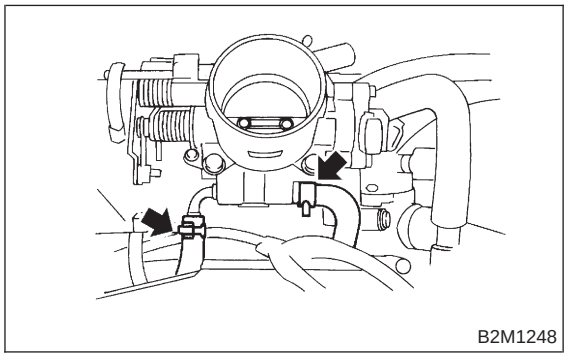
5) Disconnect air hoses, and remove air intake chamber.
6) Disconnect accelerator cable (A).
7) Disconnect cruise control cable (B). (With cruise control model)



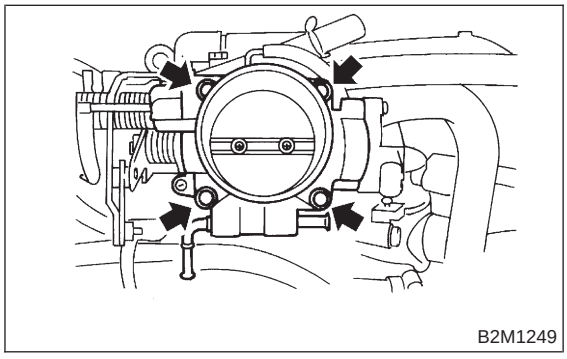
8) Disconnect connector from throttle position sensor.



9) Disconnect engine coolant hoses from throttle body.



10) Remove bolts which install throttle body to intake manifold.



11) Installation is in the reverse order of removal.

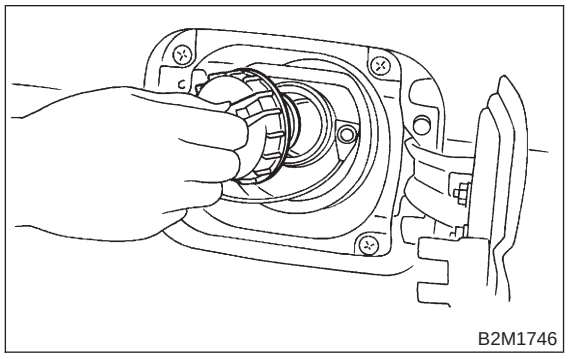
CAUTION:
- **Always use a new gasket.**
- **Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.**

Tightening torque:
Throttle body:
22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)
Air intake chamber:
4.9±0.5 N·m (0.5±0.05 kg-m, 3.6±0.4 ft-lb)

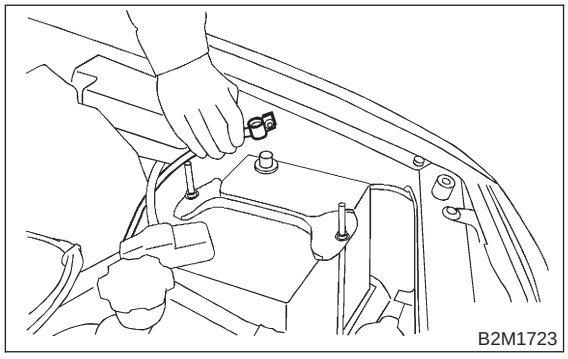
4. Intake Manifold

A: REMOVAL

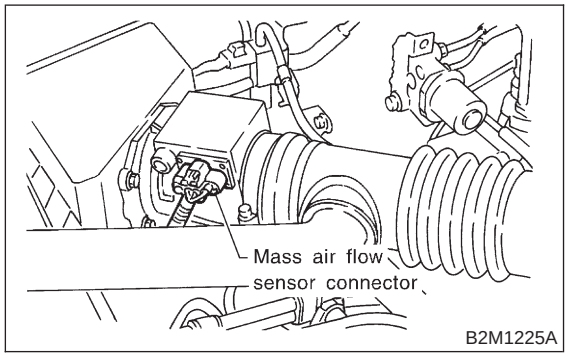
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Remove fuel filler cap.


B2M1746

3) Disconnect battery ground cable.

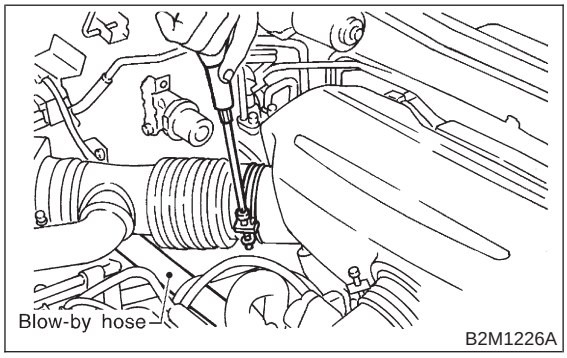

B2M1723

4) Disconnect connector from mass air flow sensor.



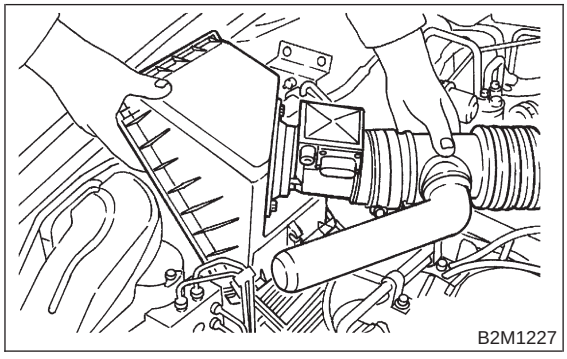
B2M1225A

5) Loosen clamp which connects air intake duct to air intake chamber.

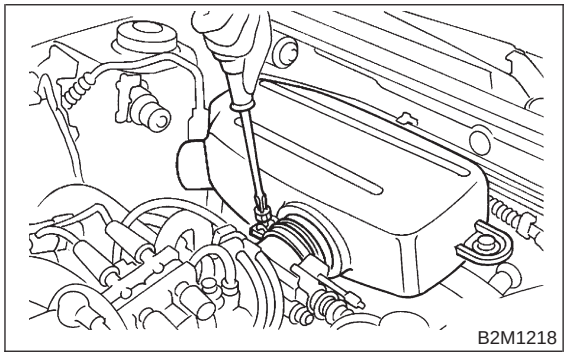


B2M1226A

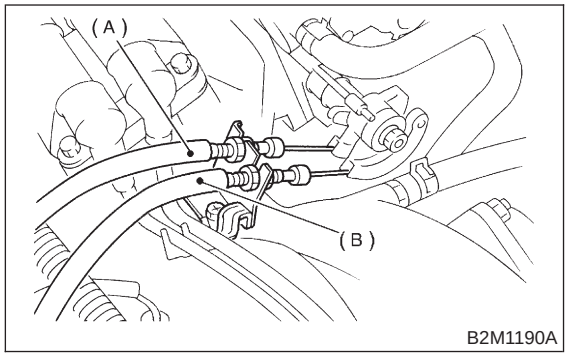
6) Remove two clips of air cleaner upper cover.
7) Disconnect blow-by hose from air intake duct.
8) Remove air intake duct and air cleaner upper cover as a unit.


B2M1227

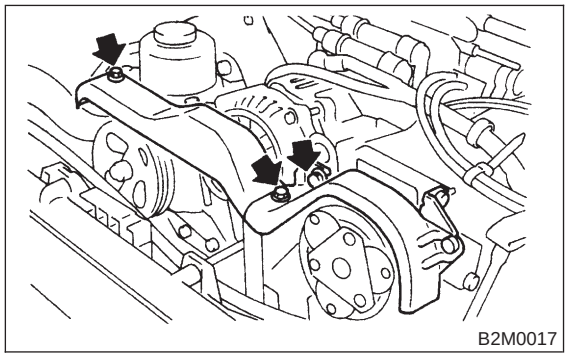
9) Remove air cleaner element.
10) Loosen clamp which connects air intake chamber to throttle body.


B2M1218

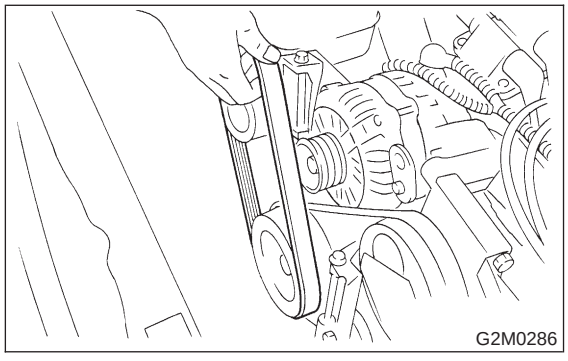
11) Disconnect air hoses, and remove air intake chamber.
12) Disconnect accelerator cable (A).
13) Disconnect cruise control cable (B). (With cruise control model)



14) Disconnect vacuum hoses from pressure sources switching solenoid valve.
15) Remove power steering pump from bracket.
(1) Remove V-belt cover.

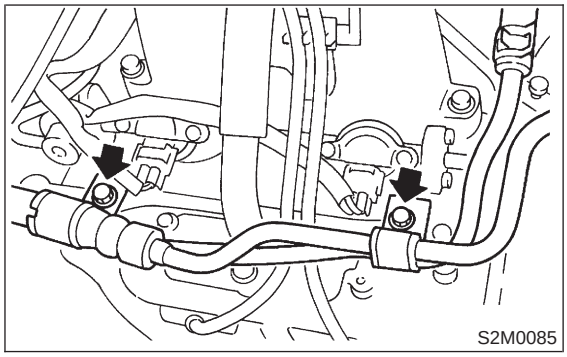


(2) Loosen lock bolt and slider bolt, and remove power steering pump drive V-belt.

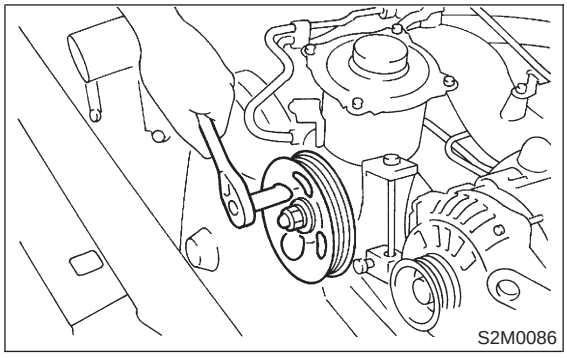


(3) Remove bolts which secure power steering pipe brackets to intake manifold.

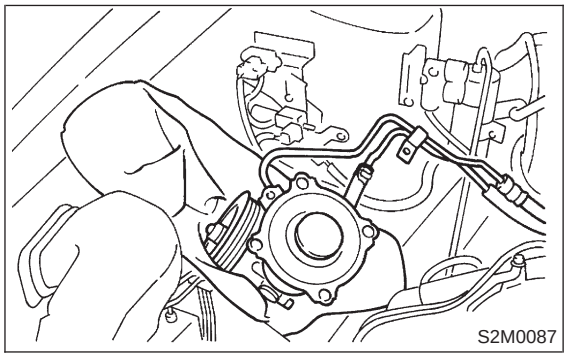
NOTE:
Do not disconnect power steering hose.



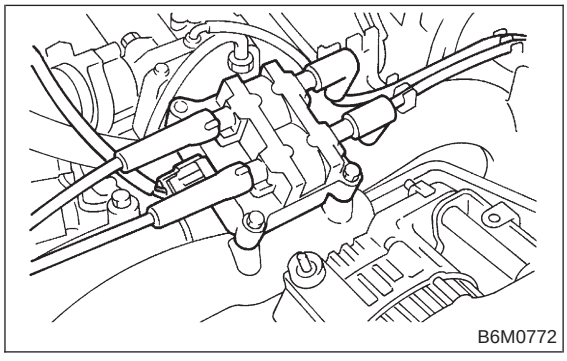
(4) Remove bolts which install power steering pump to bracket.



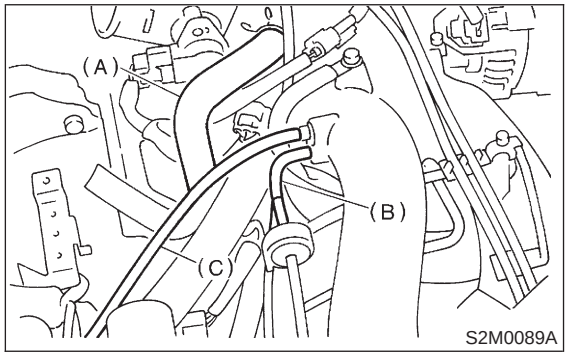
(5) Place power steering pump on the right side wheel apron.



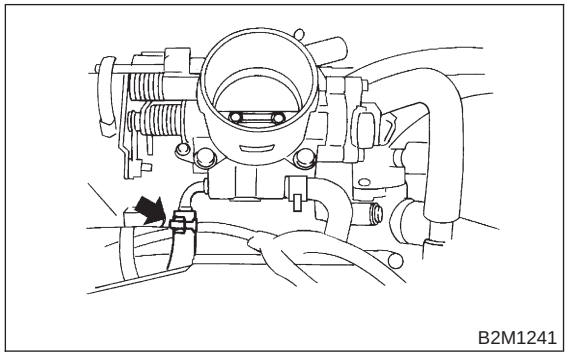
16) Disconnect spark plug cords from ignition coil.



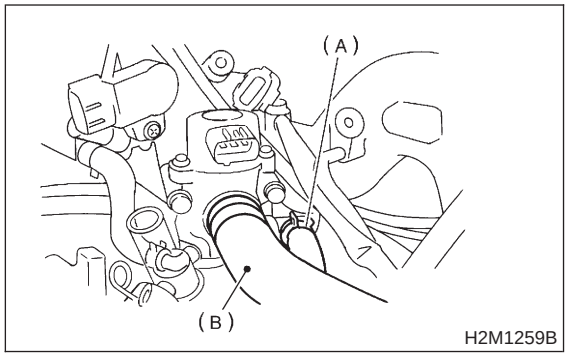
17) Disconnect PCV hose (A) and pressure regulator vacuum hose (B) from intake manifold.
18) Disconnect vacuum hose (C) to cruise control diaphragm. (With cruise control models)



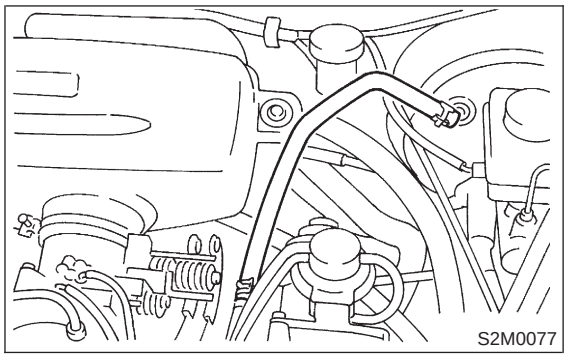
19) Disconnect engine coolant hose from throttle body.



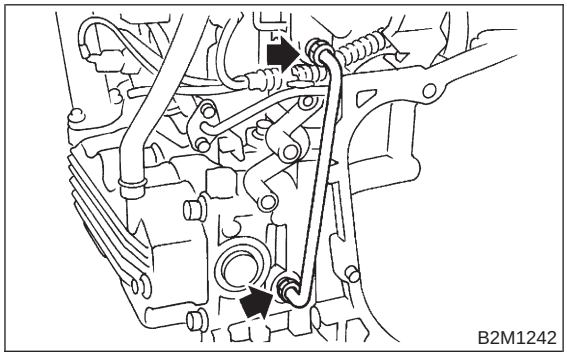
20) Disconnect engine coolant hose (A) from idle air control solenoid valve.
21) Disconnect air by-pass hose (B) from idle air control solenoid valve.



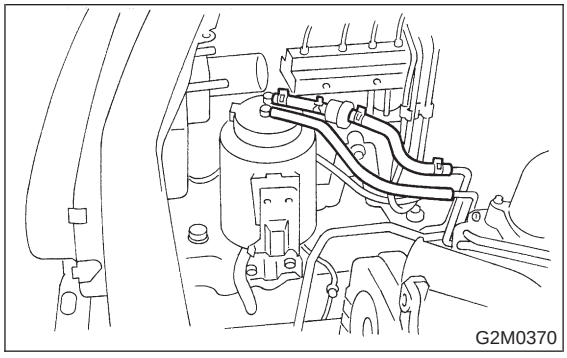
22) Disconnect brake booster hose.



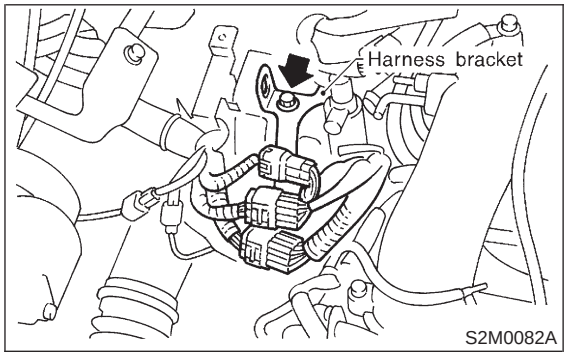
23) Remove EGR pipe. (Except 2200 cc MT vehicles)



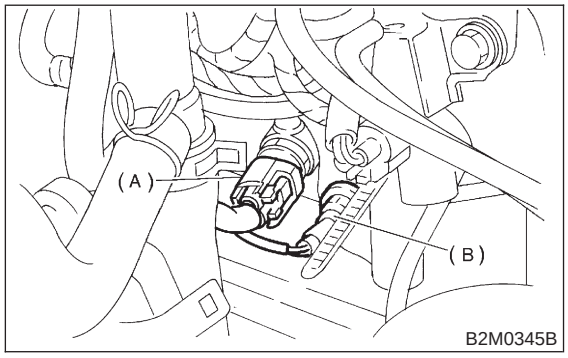
24) Disconnect canister hoses from pipes. (2200 cc FWD and Taiwan spec. vehicles)



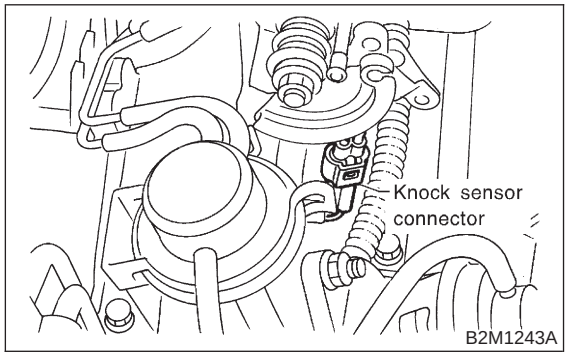
25) Remove engine harness bracket from transmission housing, and disconnect engine harness connectors from bulkhead harness connectors.



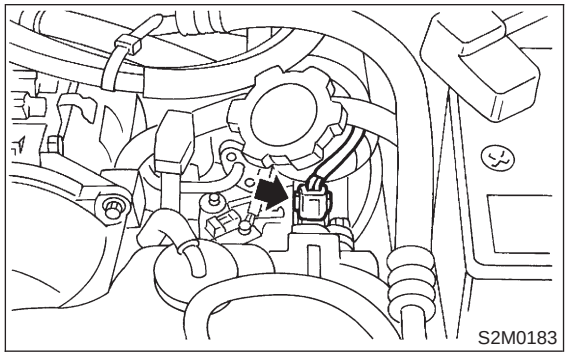
26) Disconnect connectors from engine coolant temperature sensor (A) and thermometer (B).



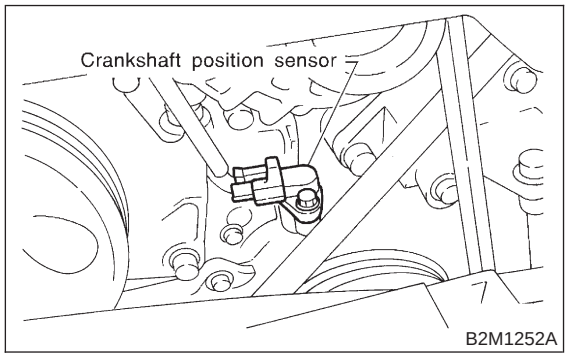
27) Disconnect knock sensor connector.



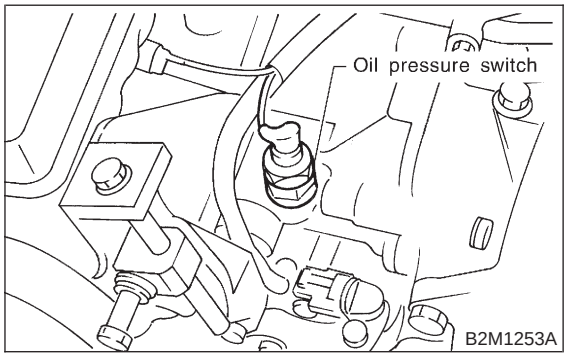
28) Disconnect connector from camshaft position sensor.



29) Disconnect connector from crankshaft position sensor.

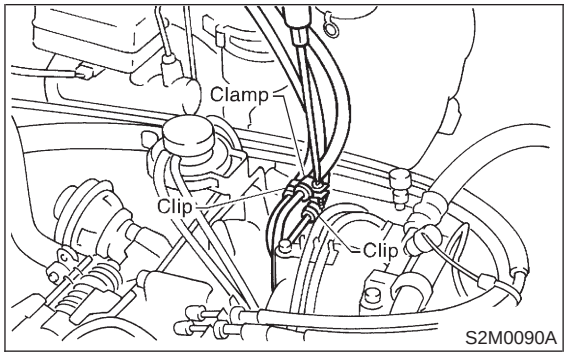


30) Disconnect connector from oil pressure switch.

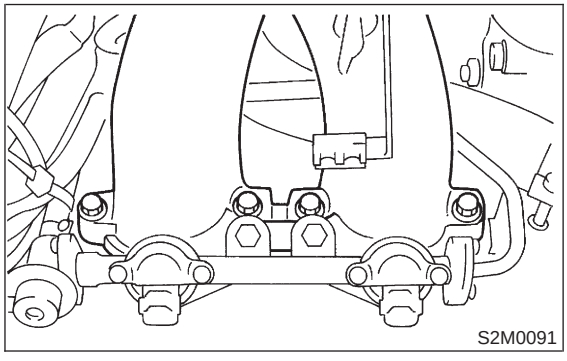


31) Disconnect fuel hoses from fuel pipes.

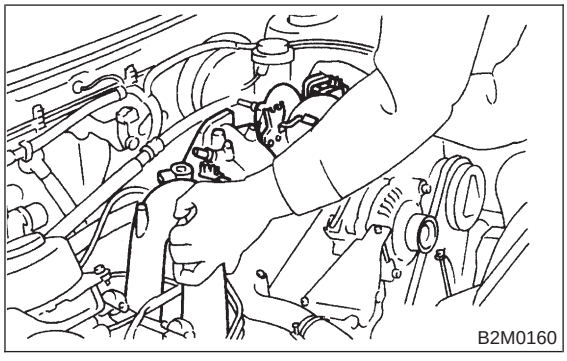
WARNING:
Catch fuel from hoses in a container.



32) Remove bolts which hold intake manifold onto cylinder heads.



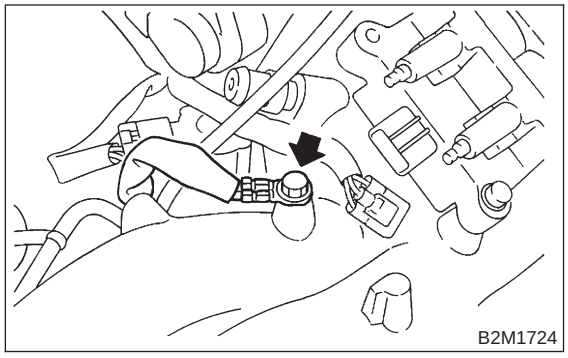
33) Remove intake manifold.



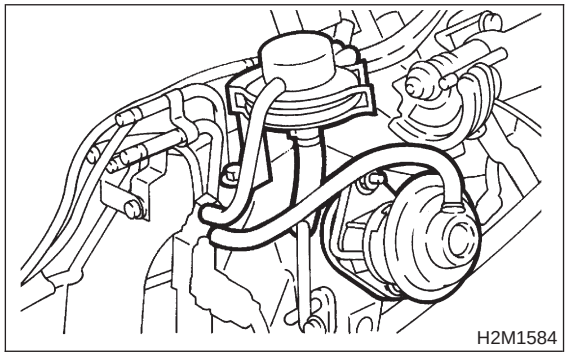
B: DISASSEMBLY

1. 2200 cc MODEL

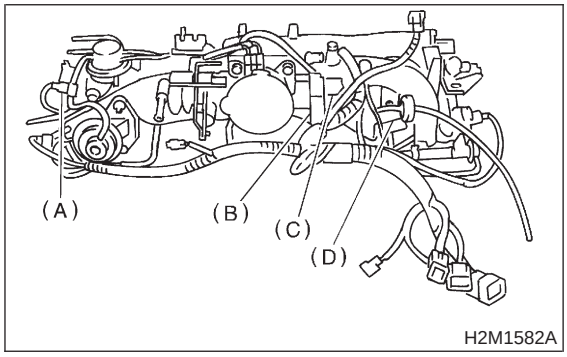
1) Disconnect engine ground terminal from intake manifold.



2) Disconnect EGR vacuum hose from EGR valve. (AT vehicles)
3) Disconnect back pressure hose from pipe. (AT vehicles)
4) Disconnect BPT hoses from EGR solenoid valve and intake manifold. (AT vehicles)
5) Remove BPT with BTP holder bracket. (AT vehicles)
6) Remove EGR valve. (AT vehicles)

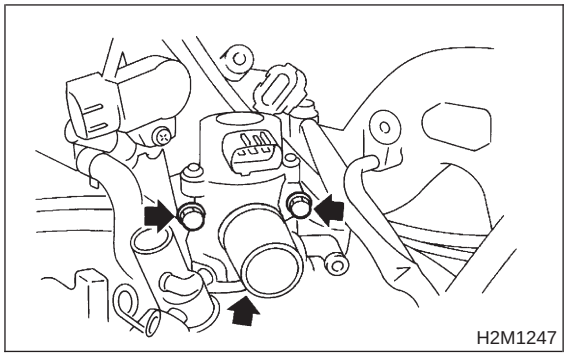


7) Disconnect connectors from throttle position sensor, ignition coil, fuel injectors, idle air control solenoid valve, purge control solenoid valve and EGR solenoid valve. (AT vehicles)

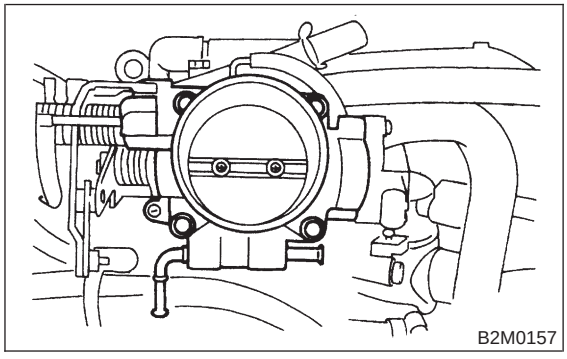


(A) EGR solenoid valve (AT vehicles)
(B) Throttle position sensor
(C) Idle air control solenoid valve
(D) Purge control solenoid valve

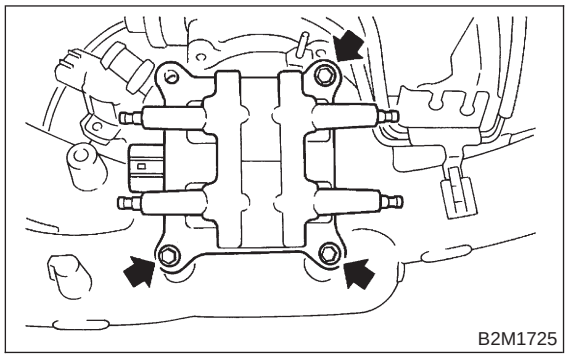
8) Remove engine harness from intake manifold.
9) Remove idle air control solenoid valve from intake manifold.



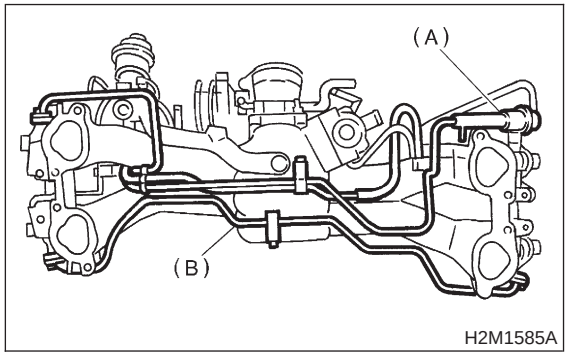
10) Remove throttle body from intake manifold.



11) Remove ignition coil.

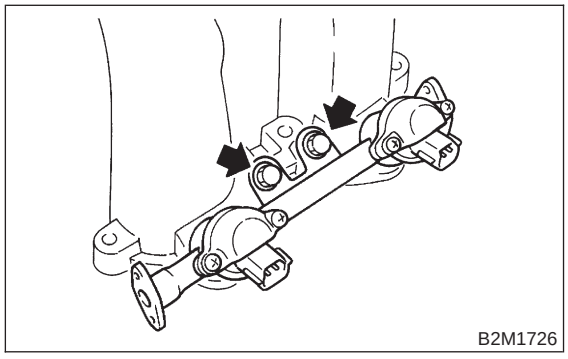


12) Remove fuel pipes, etc. from intake manifold.



(A) Pressure regulator
(B) Fuel pipe ASSY

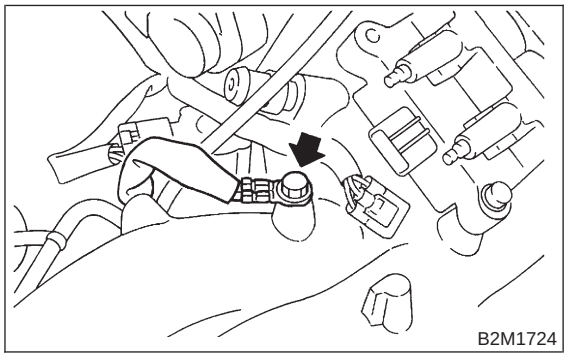
13) Remove fuel injector pipes.



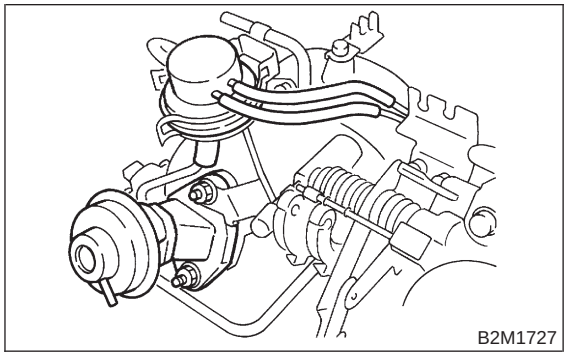
14) Remove EGR solenoid valve (AT vehicles) and purge control solenoid valve.

2. 2500 cc MODEL

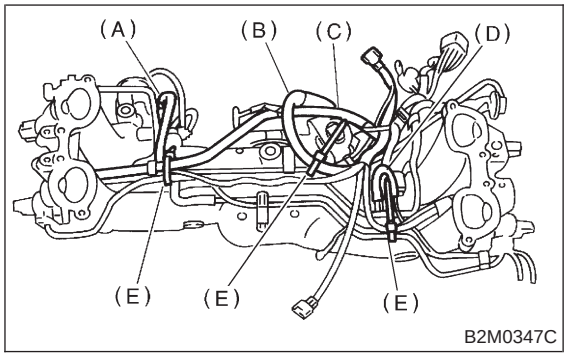
1) Disconnect engine ground terminal from intake manifold.



2) Disconnect EGR vacuum hose from EGR valve.
3) Disconnect back pressure hose from pipe.
4) Disconnect BPT hoses from EGR solenoid valve and intake manifold.
5) Remove BPT with BTP holder bracket.
6) Remove EGR valve.



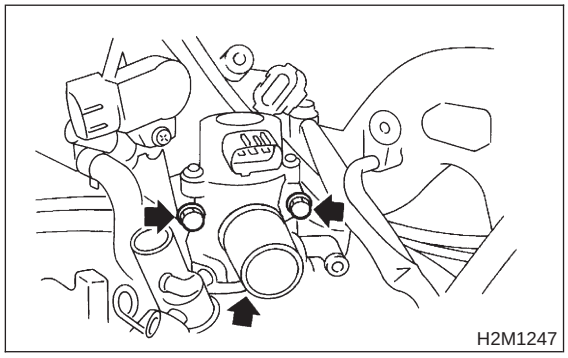
7) Disconnect connectors from throttle position sensor, ignition coil, fuel injectors, idle air control solenoid valve, purge control solenoid valve and EGR solenoid valve.



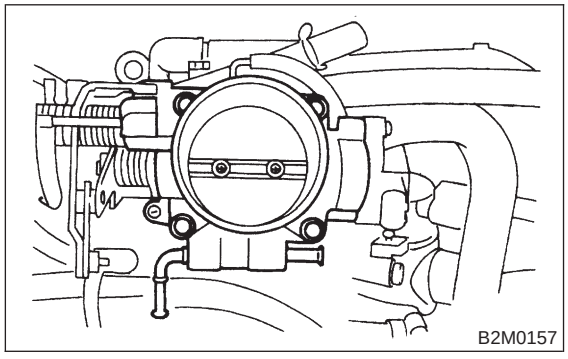
(A) EGR solenoid valve
(B) Throttle position sensor
(C) Idle air control solenoid valve
(D) Purge control solenoid valve
(E) Harness band

8) Remove engine harness from intake manifold.

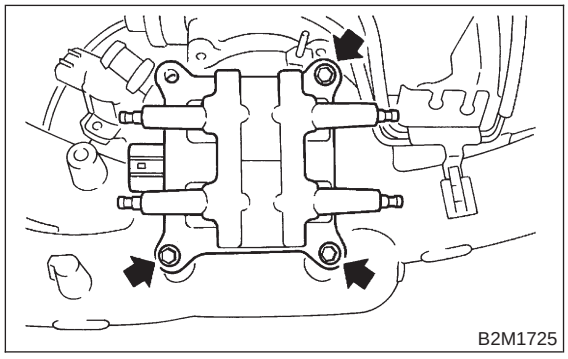
9) Remove idle air control solenoid valve from intake manifold.



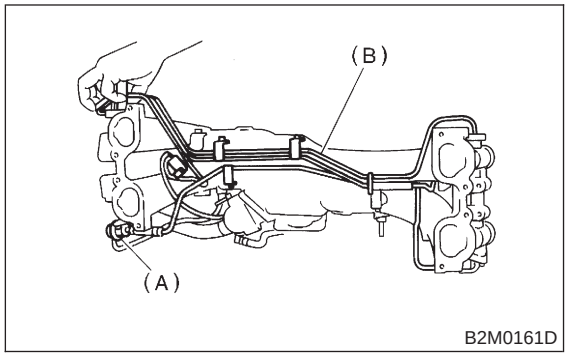
10) Remove throttle body from intake manifold.



11) Remove ignition coil.

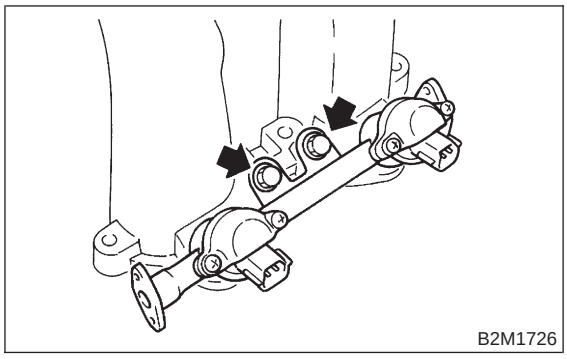


12) Remove fuel pipes, etc. from intake manifold.



(A) Pressure regulator
(B) Fuel pipe ASSY

13) Remove fuel injector pipes.

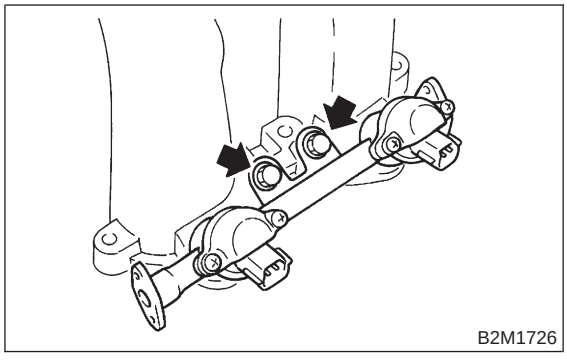


14) Remove EGR solenoid valve and purge control solenoid valve.

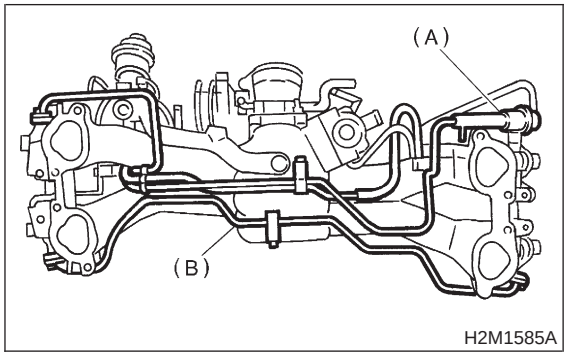
C: ASSEMBLY

1. 2200 cc MODEL

1) Install EGR solenoid valve (AT vehicles) and purge control solenoid valve.
2) Install fuel injector pipes.

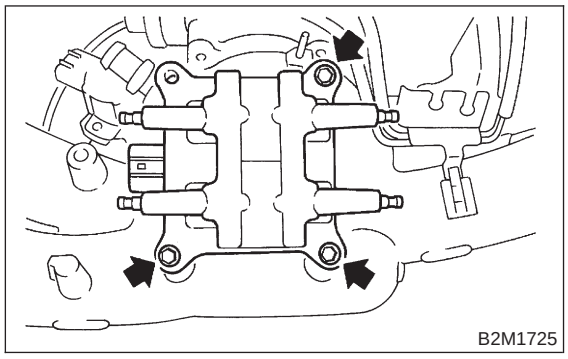


3) Assemble fuel pipes, etc. to intake manifold.



(A) Pressure regulator
(B) Fuel pipe ASSY

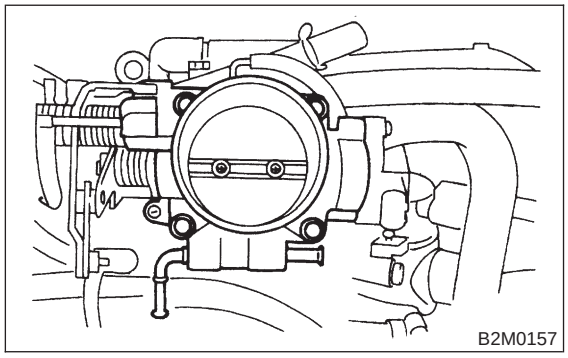
4) Install ignition coil.



5) Assemble throttle body to intake manifold.

CAUTION:
Replace gasket with a new one.

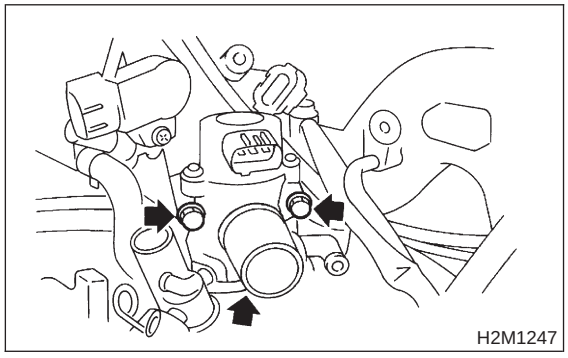
Tightening torque:
22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)



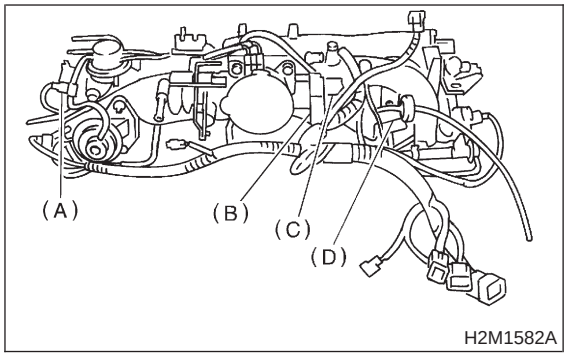
6) Install idle air control solenoid valve to intake manifold.

CAUTION:
Replace gasket with a new one.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)



7) Install engine harness onto intake manifold.
8) Connect connectors to throttle position sensor, ignition coil, fuel injectors, idle air control solenoid valve, purge control solenoid valve and EGR solenoid valve. (AT vehicles)



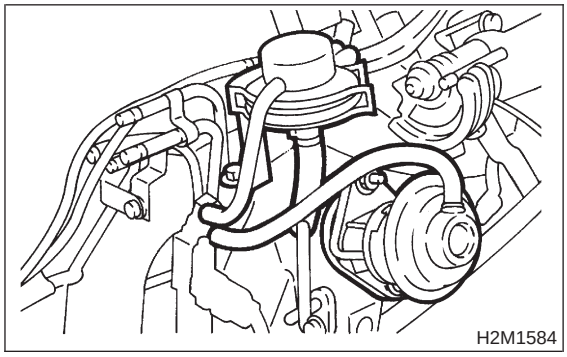
(A) EGR solenoid valve (AT vehicles)
(B) Throttle position sensor
(C) Idle air control solenoid valve
(D) Purge control solenoid valve

9) Install EGR valve. (AT vehicles)

CAUTION:
Replace gasket with a new one.

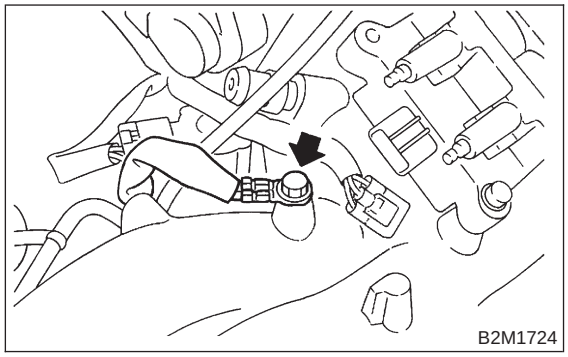
Tightening torque:
19±1.5 N·m (1.9±0.15 kg-m, 13.7±1.1 ft-lb)

10) Install BPT with BPT holder bracket. (AT vehicles)
11) Connect BPT hoses from EGR solenoid valve and intake manifold. (AT vehicles)
12) Connect back pressure hose from pipe. (AT vehicles)
13) Connect EGR vacuum hose from EGR vale. (AT vehicles)



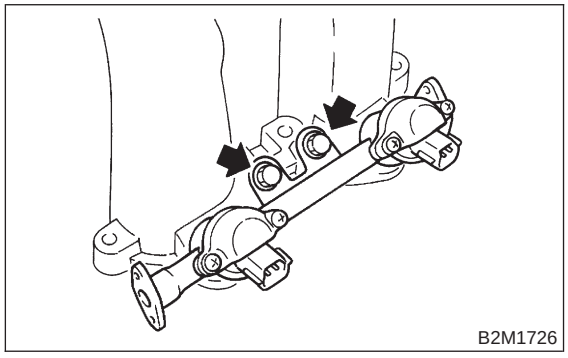
14) Connect engine ground terminal to intake manifold.

Tightening torque:
19±1.5 N·m (1.9±0.15 kg-m, 13.7±1.1 ft-lb)

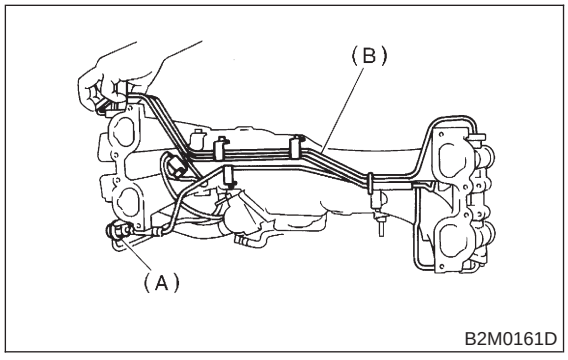

B2M1724

2. 2500 cc MODEL

1) Install EGR solenoid valve and purge control solenoid valve.
2) Install fuel injector pipes.


B2M1726

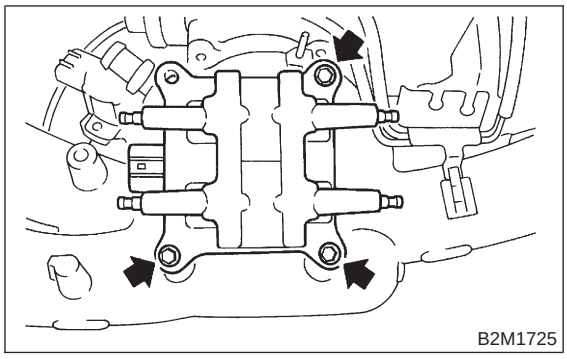
3) Assemble fuel pipes, etc. to intake manifold.



B2M0161D

(A) Pressure regulator
(B) Fuel pipe ASSY

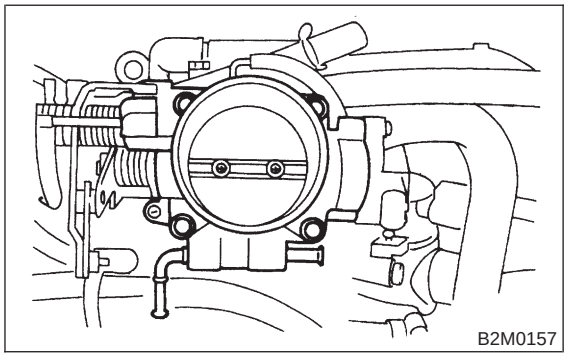
4) Install ignition coil.


B2M1725

5) Assemble throttle body to intake manifold.

CAUTION:
Replace gasket with a new one.

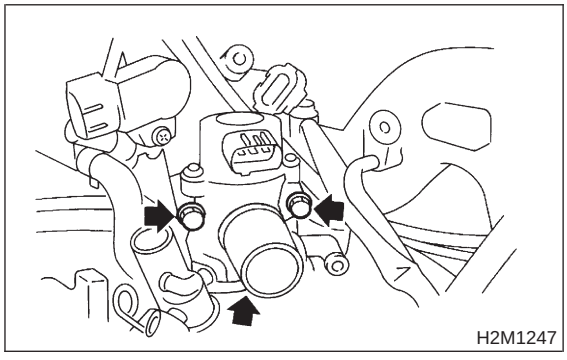
Tightening torque:
22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)


B2M0157

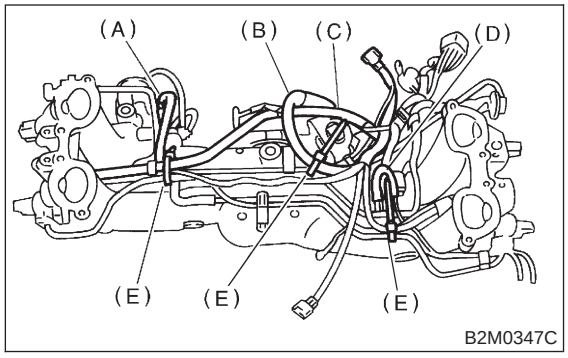
6) Install idle air control solenoid valve to intake manifold.

CAUTION:
Replace gasket with a new one.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)


H2M1247

7) Install engine harness onto intake manifold.
8) Connect connectors to throttle position sensor, ignition coil, fuel injectors, idle air control solenoid valve, purge control solenoid valve and EGR solenoid valve.



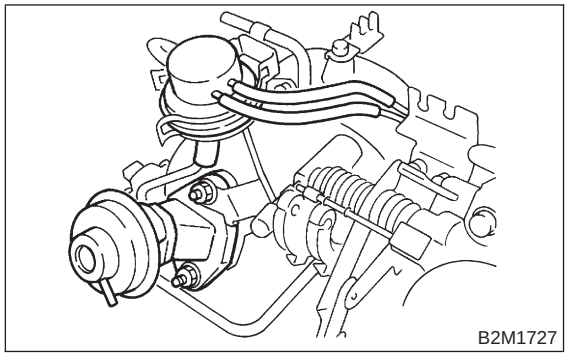
(A) EGR solenoid valve
(B) Throttle position sensor
(C) Idle air control solenoid valve
(D) Purge control solenoid valve
(E) Harness band

9) Install EGR valve.

CAUTION:
Replace gasket with a new one.

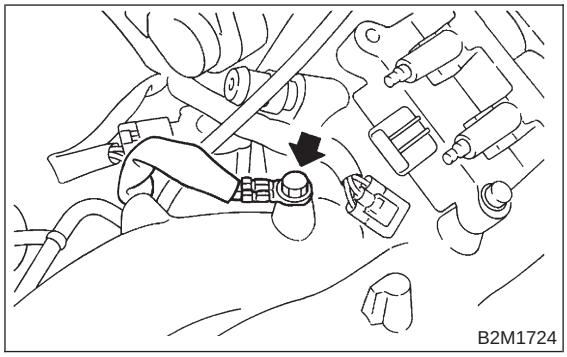
Tightening torque:
19±1.5 N·m (1.9±0.15 kg-m, 13.7±1.1 ft-lb)

10) Install BPT with BPT holder bracket.
11) Connect BPT hoses from EGR solenoid valve and intake manifold.
12) Connect back pressure hose from pipe.
13) Connect EGR vacuum hose from EGR valve.



14) Connect engine ground terminal to intake manifold.

Tightening torque:
19±1.5 N·m (1.9±0.15 kg-m, 13.7±1.1 ft-lb)

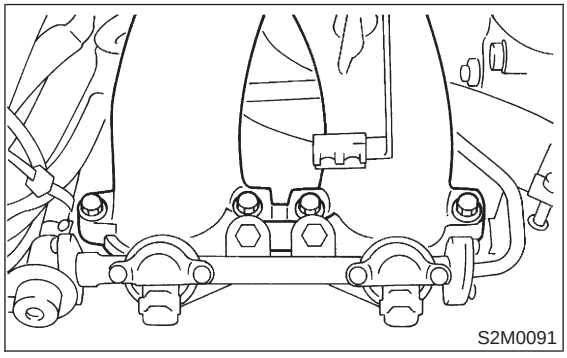


D: INSTALLATION

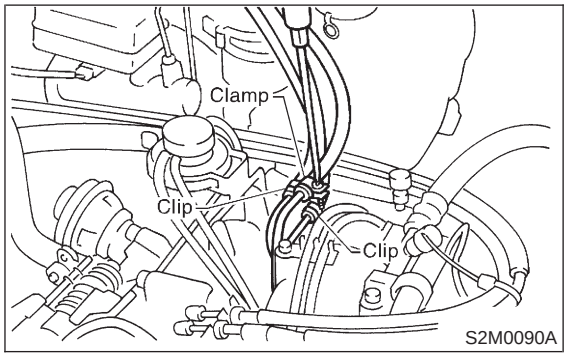
1) Install intake manifold onto cylinder heads.

CAUTION:
Always use new gaskets.

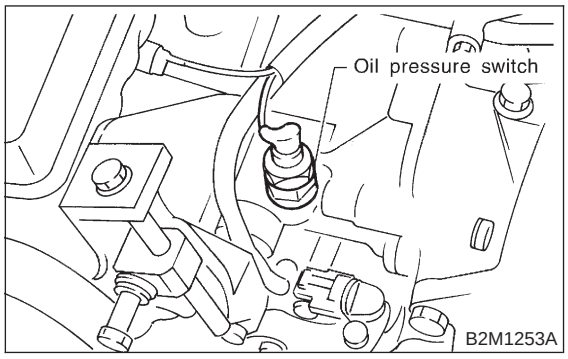
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



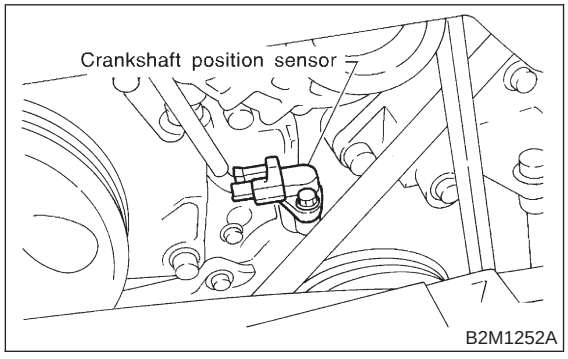
2) Connect fuel hoses.



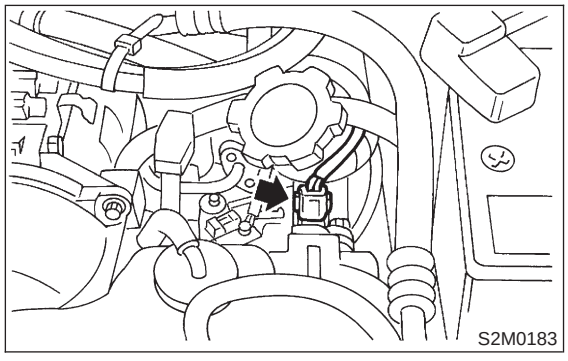
3) Connect connector to oil pressure switch.



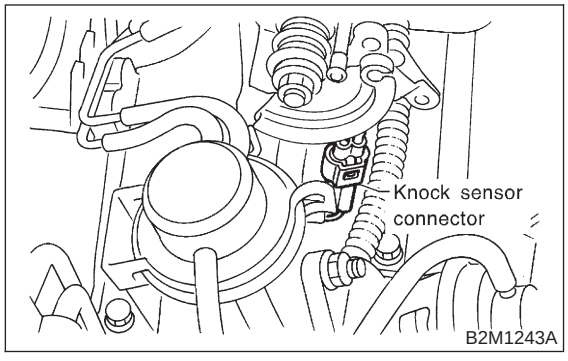
4) Connect connector to crankshaft position sensor.



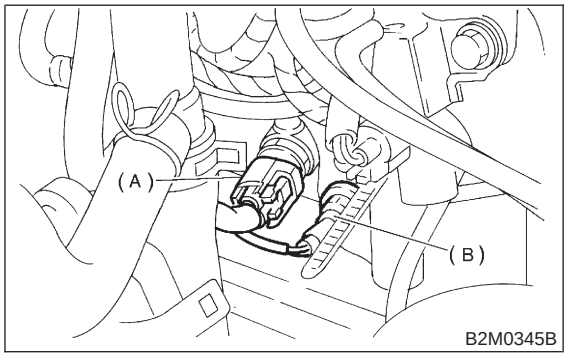
5) Connect connector to camshaft position sensor.



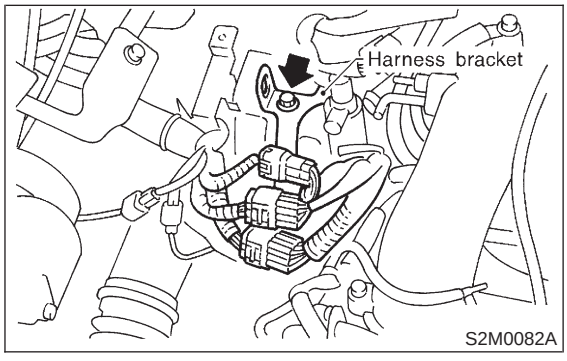
6) Connect knock sensor connector.



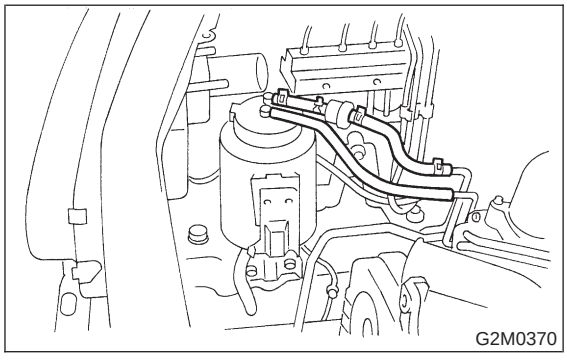
7) Connect connectors to engine coolant temperature sensor (A) and thermometer (B).



8) Install engine harness bracket, and connect engine harness connectors to bulkhead connectors.

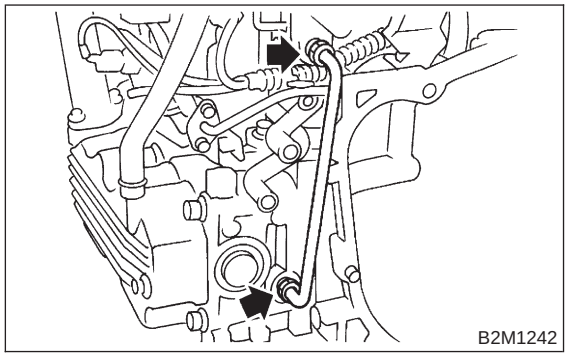


9) Connect canister hoses. (2200 cc FWD and Taiwan spec. vehicles)

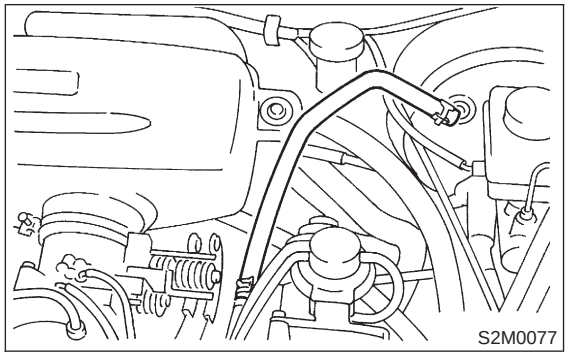


10) Install EGR pipe. (Except 2200 cc MT vehicles)

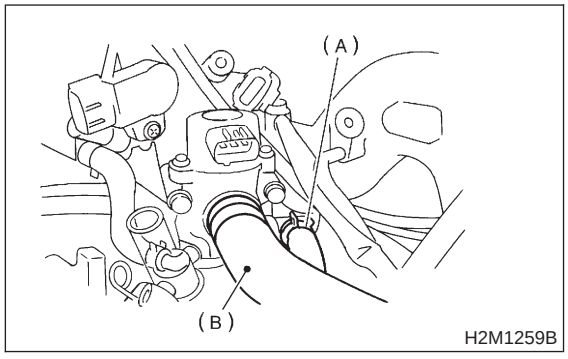
Tightening torque:
34±2 N·m (3.5±0.2 kg-m, 25.3±1.4 ft-lb)


B2M1242

11) Connect brake booster hose.

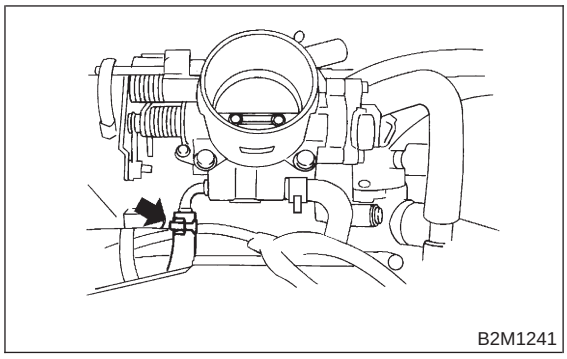

S2M0077

12) Connect engine coolant hose (A) to idle air control solenoid valve.
13) Connect air by-pass hose (B) to idle air control solenoid valve.

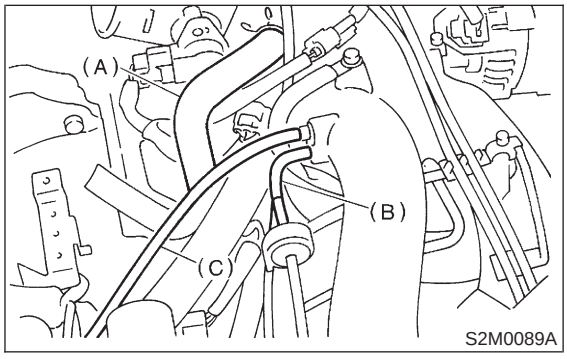


H2M1259B

14) Connect engine coolant hose to throttle body.

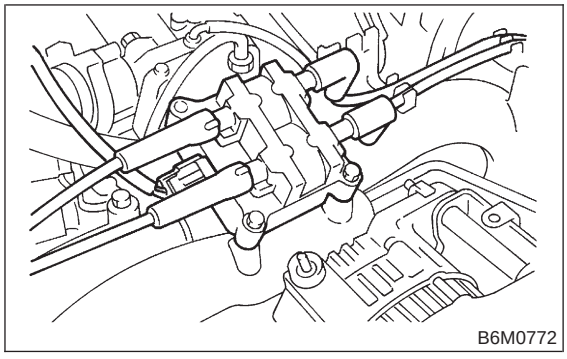

B2M1241

15) Connect vacuum hose (C) to cruise control diaphragm. (With cruise control models)
16) Connect PCV hose (A) and pressure regulator vacuum hose (B) to intake manifold.



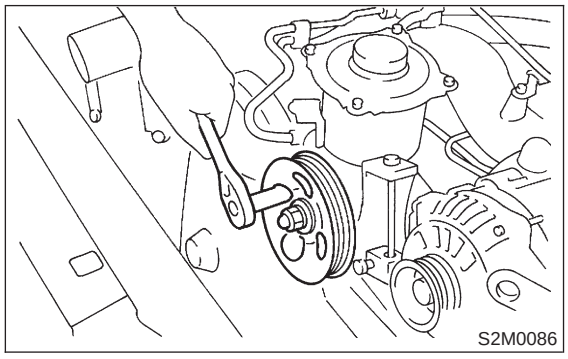
S2M0089A

17) Connect spark plug cords to ignition coil.

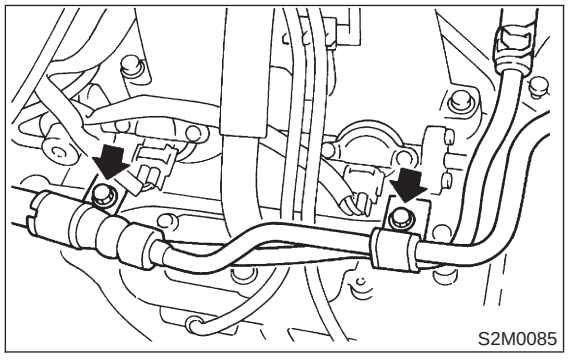

B6M0772

18) Install power steering pump on bracket.
(1) Install power steering pump on bracket, and tighten bolts.

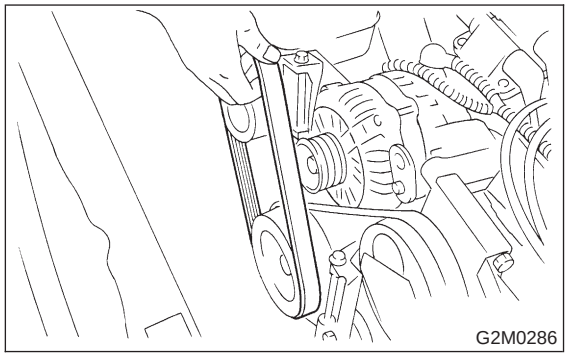
Tightening torque:
20.1±2.5 N·m (2.05±0.25 kg-m, 14.8±1.8 ft-lb)


S2M0086

(2) Install power steering pipe brackets on right side intake manifold.

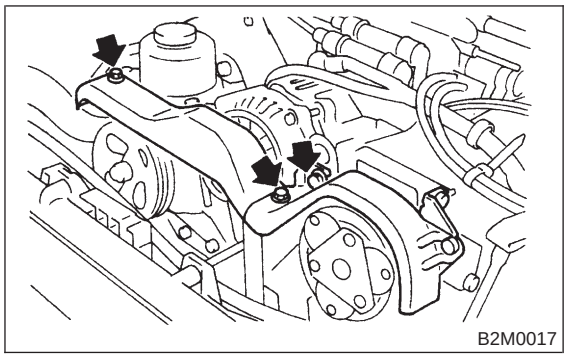

S2M0085

(3) Install power steering pump drive V-belt.

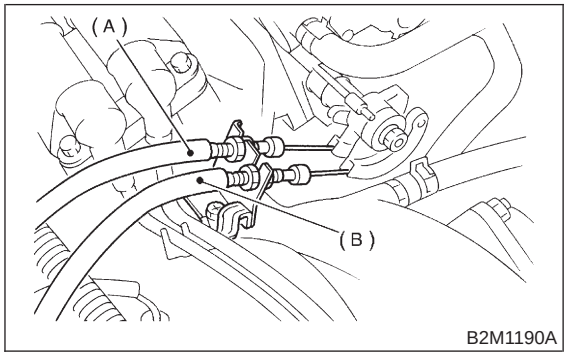

G2M0286

(4) Adjust V-belt. <Ref. to 1-5 [G2A0].>

(5) Install V-belt cover.


B2M0017

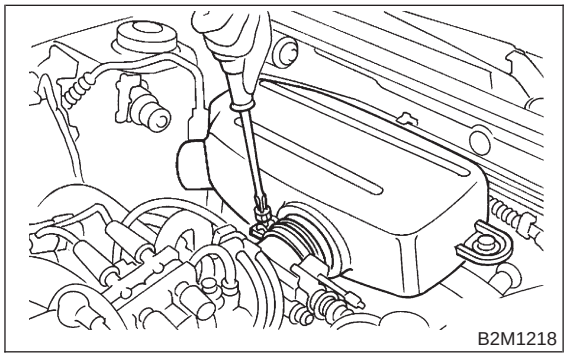
19) Connect vacuum hoses to pressure sources switching solenoid valve.
20) Connect accelerator cable (A).
21) Connect cruise control cable (B). (With cruise control model)



B2M1190A

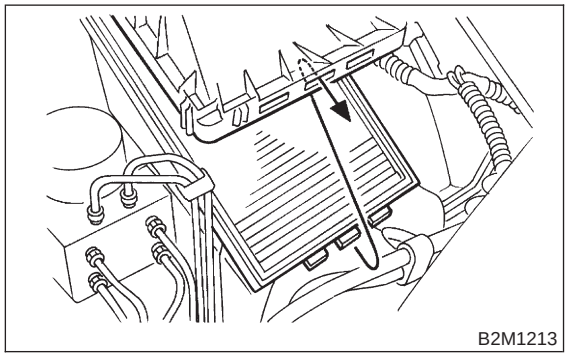
22) Install air intake chamber and connect air hoses.

Tightening torque:
4.9±0.5 N·m (0.5±0.05 kg-m, 3.6±0.4 ft-lb)

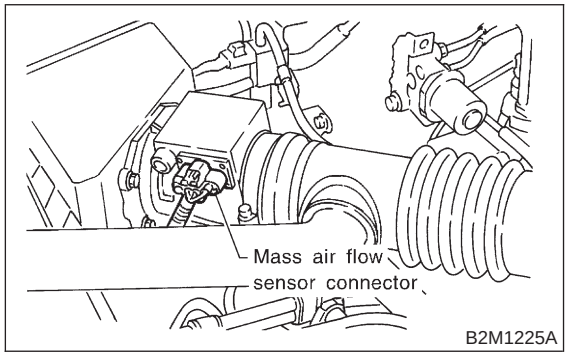

B2M1218

23) Install air cleaner element.
24) Install air cleaner upper cover and air intake duct as a unit.

CAUTION:
Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.

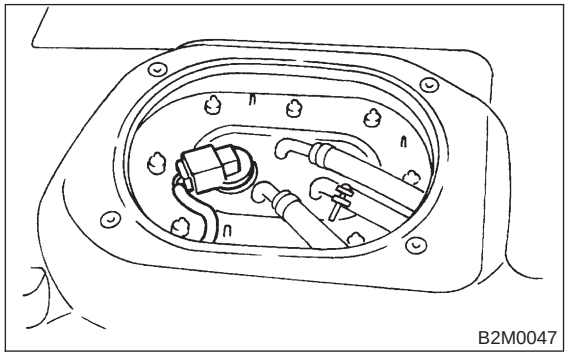

B2M1213

25) Connect connector to mass air flow sensor.

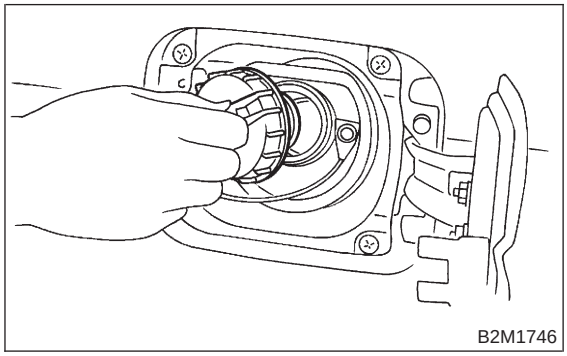


B2M1225A

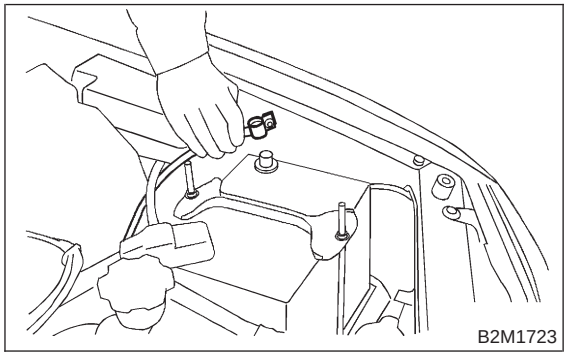
26) Connect connector to fuel pump, and install lid cover.


B2M0047

27) Install fuel filler cap.


B2M1746

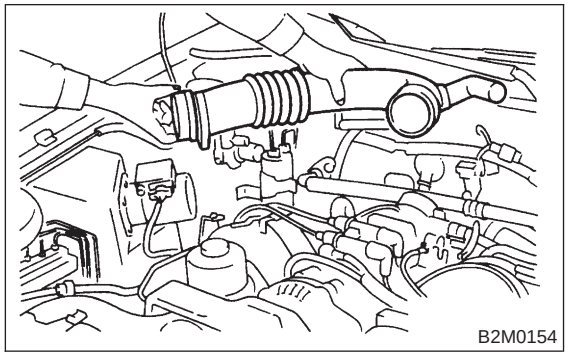
28) Connect battery ground cable.


B2M1723

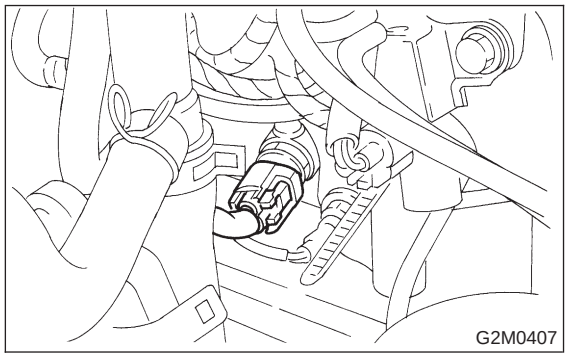
5. Engine Coolant Temperature Sensor

A: REMOVAL AND INSTALLATION

1) Remove air intake duct.

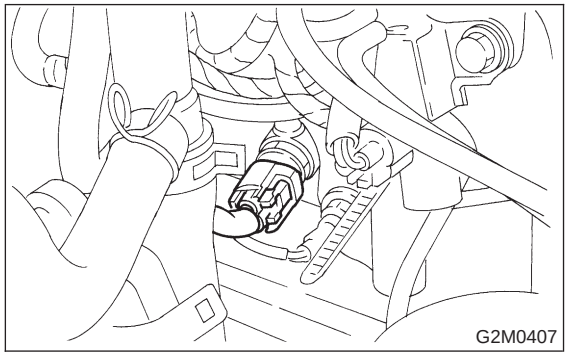


2) Disconnect connector from engine coolant temperature sensor.



3) Remove engine coolant temperature sensor.
4) Installation is in the reverse order of removal.

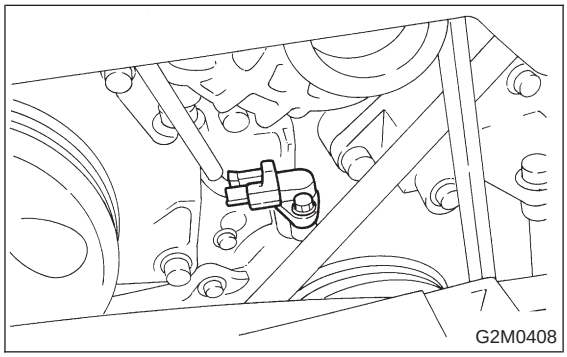
Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)



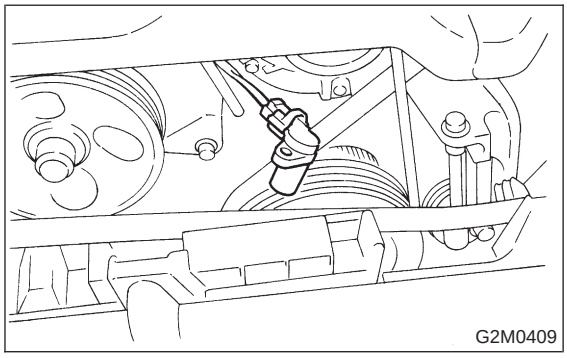
6. Crankshaft Position Sensor

A: REMOVAL AND INSTALLATION

1) Remove bolt which install crankshaft position sensor to cylinder block.

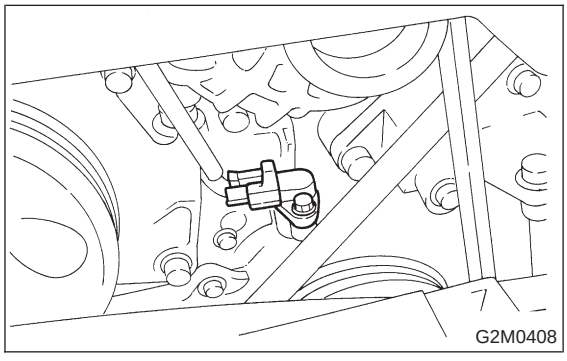


2) Remove crankshaft position sensor, and disconnect connector from it.



3) Installation is in the reverse order of removal.

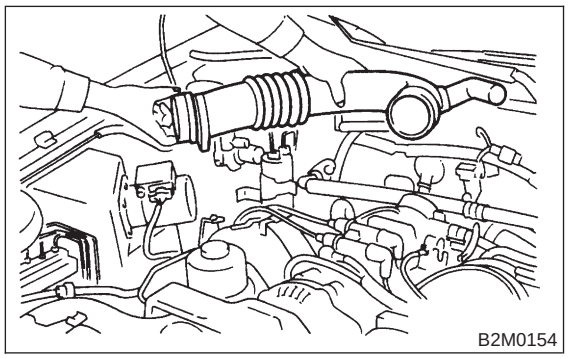
Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)



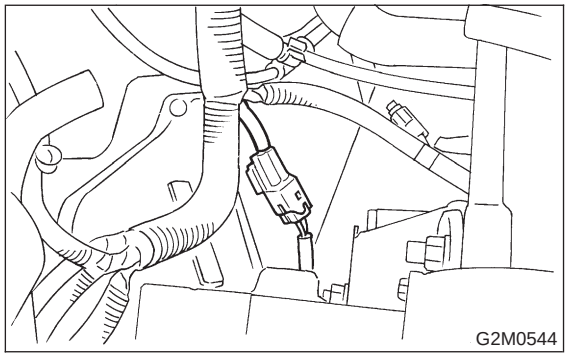
7. Front Oxygen Sensor

A: REMOVAL

1) Remove air intake duct.



2) Disconnect connector from front oxygen sensor.

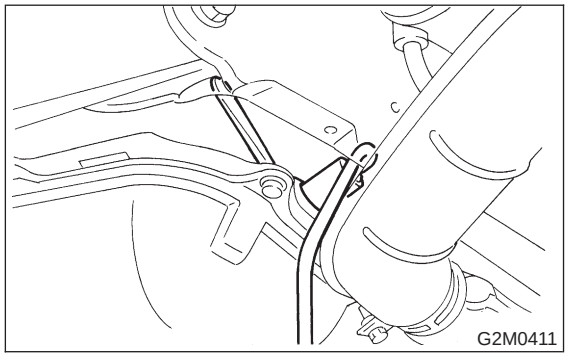


3) Lift-up the vehicle.
4) Apply SUBARU CRC or its equivalent to threaded portion of front oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

5) Remove front oxygen sensor.

CAUTION:
When removing oxygen sensor, do not force oxygen sensor especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.

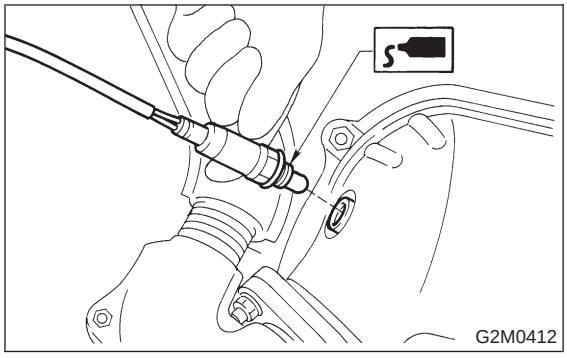


B: INSTALLATION

1) Before installing front oxygen sensor, apply anti-seize compound only to threaded portion of front oxygen sensor to make the next removal easier.

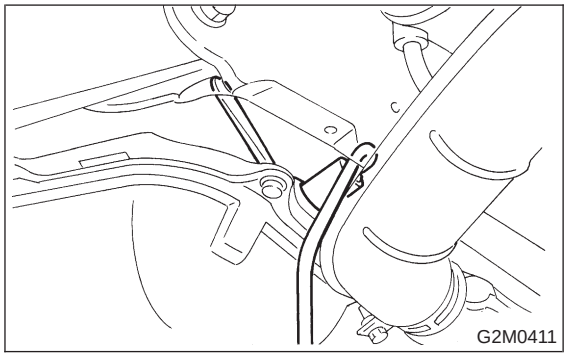
Anti-seize compound:
SS-30 by JET LUBE

CAUTION:
Never apply anti-seize compound to protector of front oxygen sensor.



2) Install front oxygen sensor.

Tightening torque:
21±3 N·m (2.1±0.3 kg-m, 15.2±2.2 ft-lb)



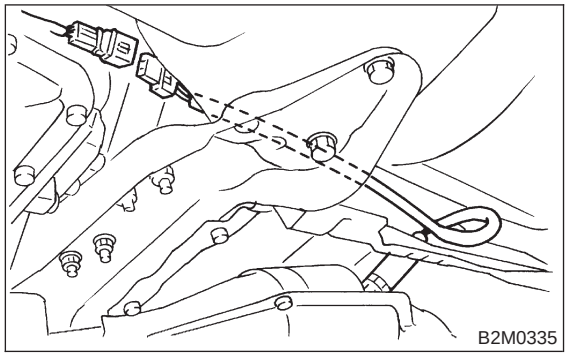
3) Lower the vehicle.
4) Connect connector of front oxygen sensor.
5) Install air intake duct.

8. Rear Oxygen Sensor

A: REMOVAL

1. EXCEPT CALIFORNIA 2200 cc MODEL

1) Lift-up the vehicle.
2) Disconnect connector from rear oxygen sensor.

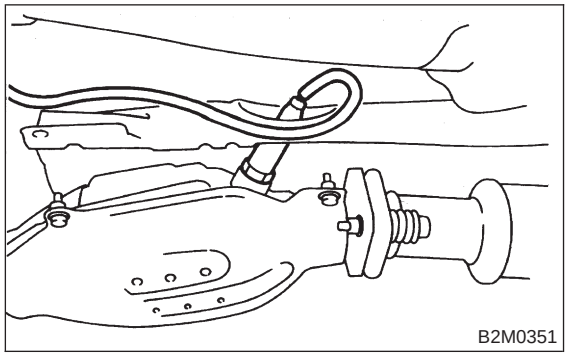


3) Apply SUBARU CRC or its equivalent to threaded portion of rear oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

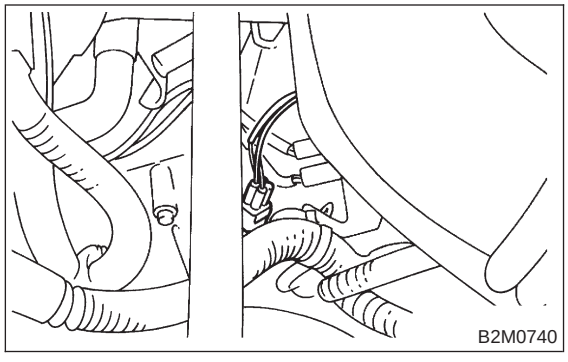
4) Remove rear oxygen sensor.

CAUTION:
When removing rear oxygen sensor, do not force rear oxygen sensor especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.



2. CALIFORNIA 2200 cc MODEL

1) Disconnect connector from rear oxygen sensor.

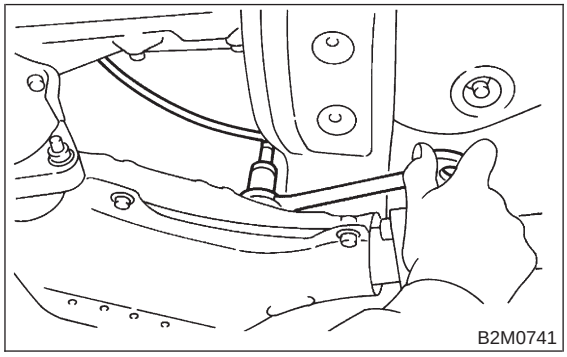


2) Lift-up the vehicle.
3) Apply SUBARU CRC or its equivalent to threaded portion of rear oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

4) Remove rear oxygen sensor.

CAUTION:
When removing rear oxygen sensor, do not force rear oxygen sensor especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.



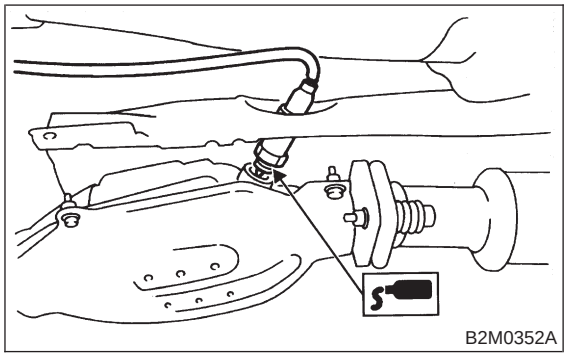
B: INSTALLATION

1. EXCEPT CALIFORNIA 2200 cc MODEL

1) Before installing rear oxygen sensor, apply anti-seize compound only to threaded portion of rear oxygen sensor to make the next removal easier.

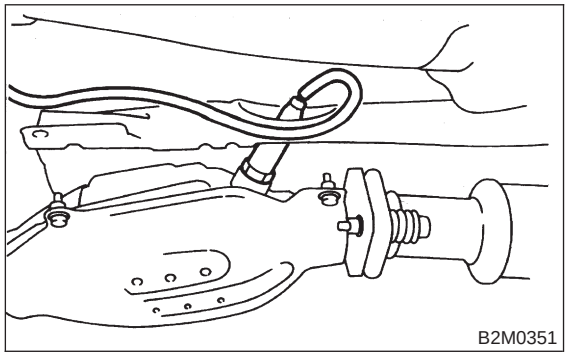
Anti-seize compound:
SS-30 by JET LUBE

CAUTION:
Never apply anti-seize compound to protector of rear oxygen sensor.



2) Install rear oxygen sensor.

Tightening torque:
21±3 N·m (2.1±0.3 kg-m, 15.2±2.2 ft-lb)



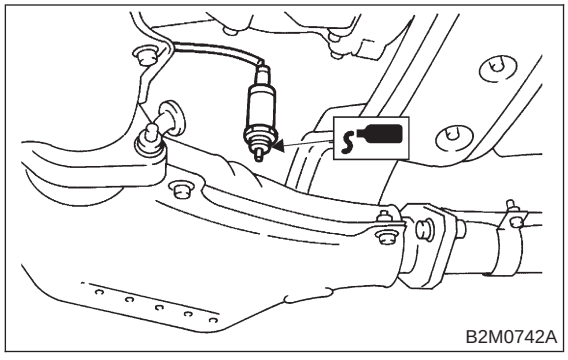
3) Connect connector of rear oxygen sensor.
4) Lower the vehicle.

2. CALIFORNIA 2200 cc MODEL

1) Before installing rear oxygen sensor, apply anti-seize compound only to threaded portion of rear oxygen sensor to make the next removal easier.

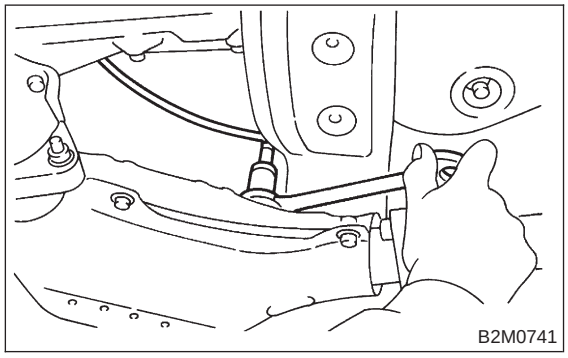
Anti-seize compound:
SS-30 by JET LUBE

CAUTION:
Never apply anti-seize compound to protector of rear oxygen sensor.



2) Install rear oxygen sensor.

Tightening torque:
21±3 N·m (2.1±0.3 kg-m, 15.2±2.2 ft-lb)

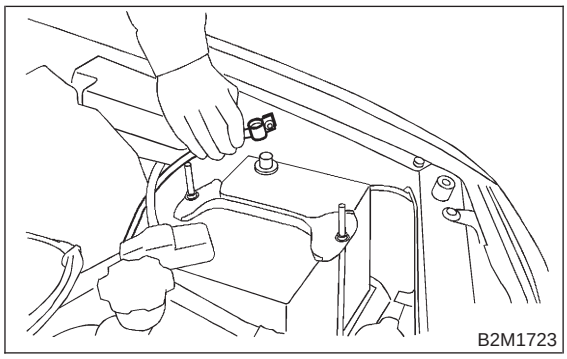


3) Lower the vehicle.
4) Connect connector to rear oxygen sensor.

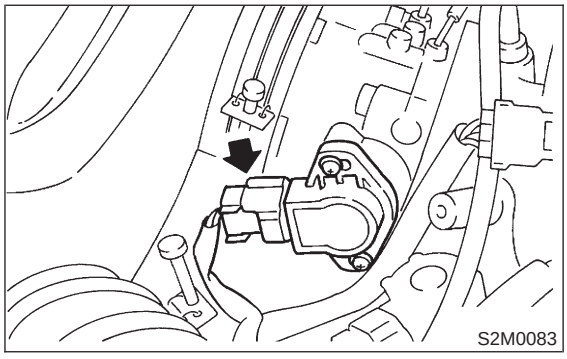
9. Throttle Position Sensor

A: REMOVAL AND INSTALLATION

1) Disconnect battery ground cable.



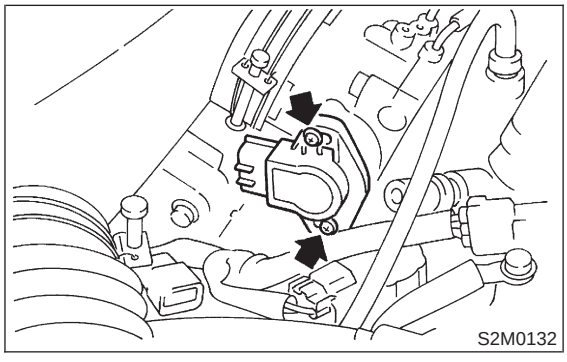
2) Disconnect connector from throttle position sensor.



3) Remove throttle position sensor holding screws, and remove it.
4) Installation is in the reverse order of removal.

Tightening torque:
2.2±0.2 N·m (0.22±0.02 kg-m, 1.6±0.1 ft-lb)

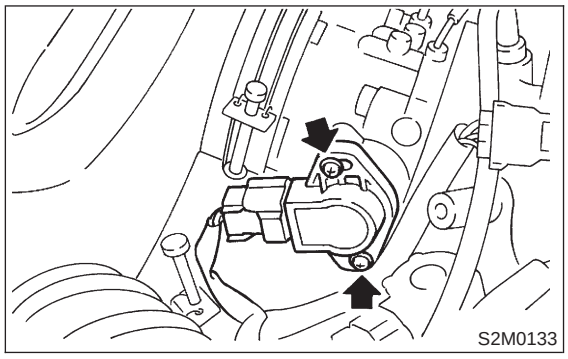
CAUTION:
When installing throttle position sensor, adjust to the specified data.



B: ADJUSTMENT

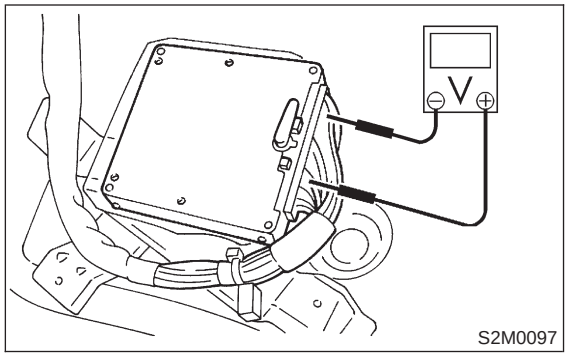
1) Turn ignition switch to OFF.

2) Loosen throttle position sensor holding screws.



3) When using voltage meter;
(1) Take out ECM.
(2) Turn ignition switch to ON.
(3) Adjust throttle position sensor so that signal voltage to ECM may be in specification.

Connector & terminal / Specified voltage
(B84) No. 24 — (B84) No. 25 / 0.45 — 0.55 V
[Fully closed.]



(4) Tighten throttle position sensor holding screws.

Tightening torque:
2.2±0.2 N·m (0.22±0.02 kg-m, 1.6±0.1 ft-lb)

4) When using SUBARU SELECT MONITOR;

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

(1) Insert the cartridge to SUBARU SELECT MONITOR.
(2) Connect SUBARU SELECT MONITOR to the data link connector.
(3) Turn ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
(4) Select {2. Each System Check} in Main Menu.
(5) Select {EGI/EMPI} in Selection Menu.
(6) Select {1. Current Data Display & Save} in EGI/EMPI Diagnosis.
(7) Select {1.12 Data Display} in Data Display Menu.
(8) Adjust throttle position sensor to the following specifications.

Condition: Throttle fully closed
Throttle opening angle 0.00%
Throttle sensor voltage 0.50 V

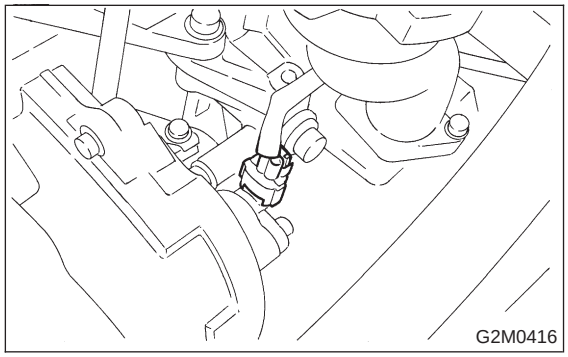
(9) Tighten throttle position sensor holding screws.

Tightening torque:
2.2±0.2 N·m (0.22±0.02 kg-m, 1.6±0.1 ft-lb)

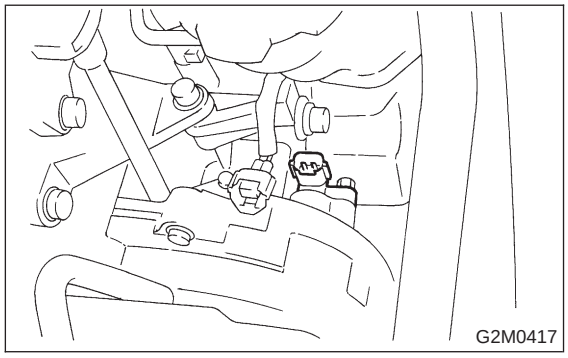
10. Camshaft Position Sensor

A: REMOVAL AND INSTALLATION

1) Disconnect connector from camshaft position sensor.

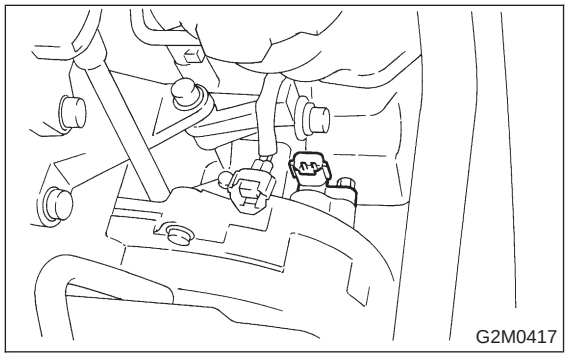


2) Remove camshaft position sensor from camshaft support LH.



3) Installation is in the reverse order of removal.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

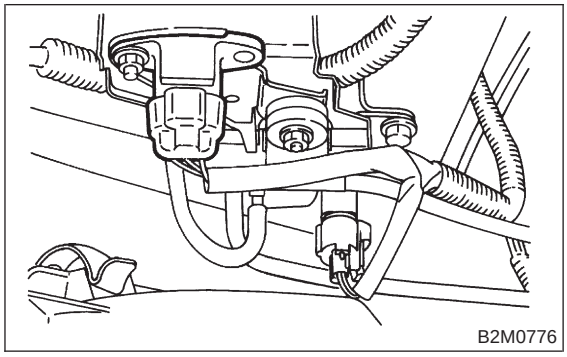


11. Pressure Sensor (AT model)

A: REMOVAL AND INSTALLATION

1) Disconnect connector from pressure sensor.
2) Disconnect hose from pressure sensor.
3) Remove pressure sensor from bracket.
4) Installation is in the reverse order of removal.

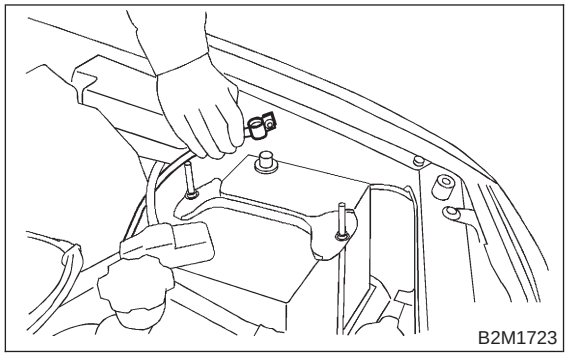
Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)



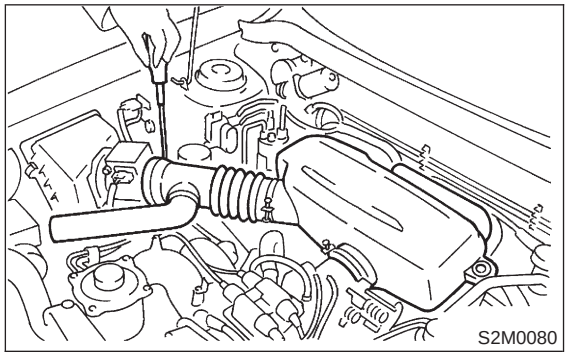
12. Idle Air Control Solenoid Valve

A: REMOVAL AND INSTALLATION

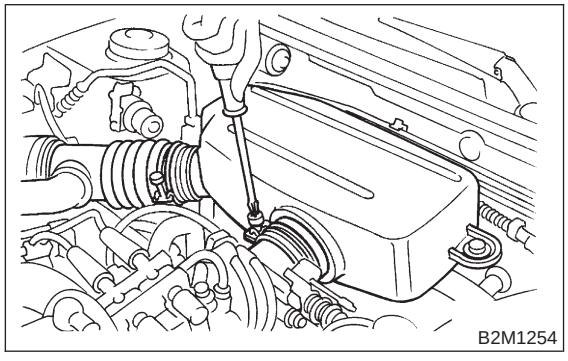
1) Disconnect battery ground cable.



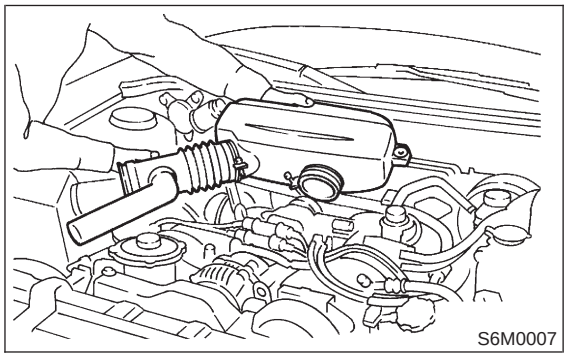
2) Loosen clamp which connects air intake duct to mass air flow sensor.



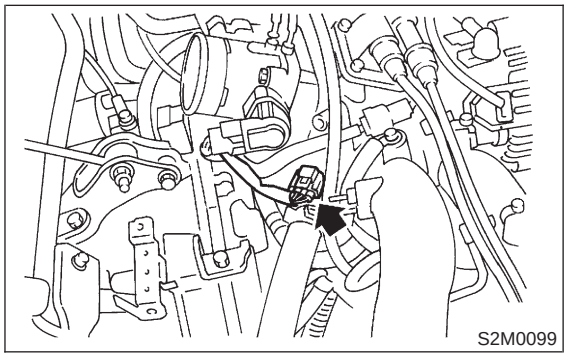
3) Loosen clamp which connects air intake chamber to throttle body.



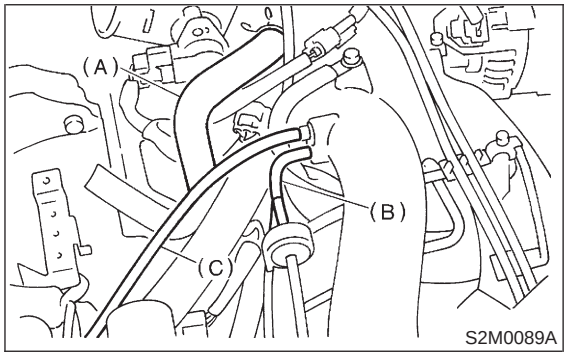
4) Disconnect blow-by hose and air hose, and remove air intake chamber and air intake duct as a unit.



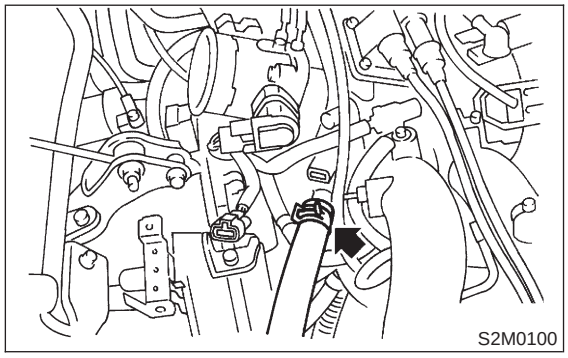
5) Disconnect connector from idle air control solenoid valve.



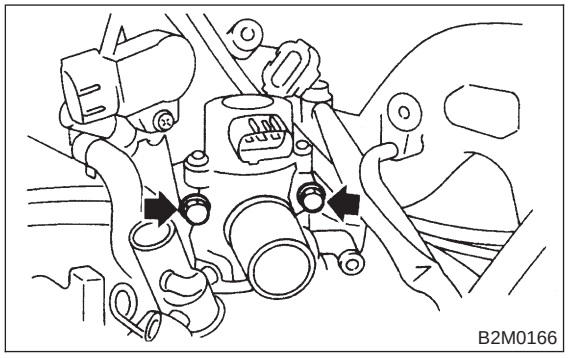
6) Disconnect PCV hose (A) and pressure regulator vacuum hose (B).
7) Disconnect vacuum hose (C) from cruise control diaphragm. (With cruise control models)



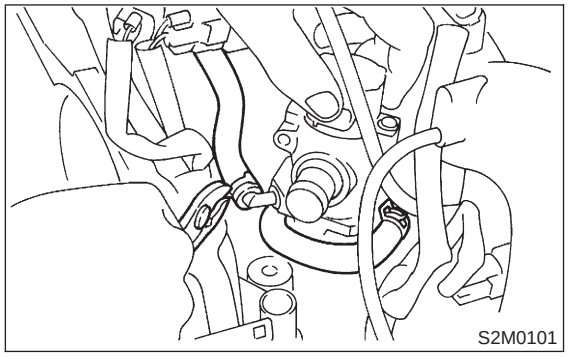
8) Disconnect air by-pass hose from idle air control solenoid valve.


S2M0100

9) Remove bolts which install idle air control solenoid valve to throttle body.


B2M0166

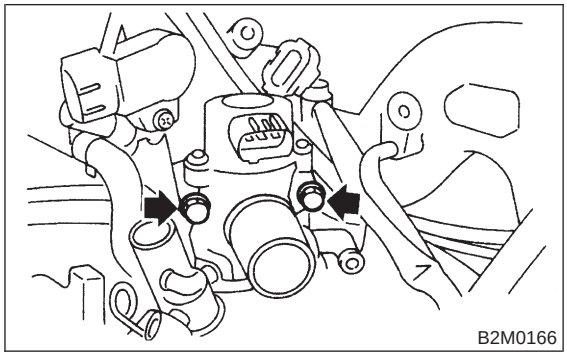
10) Disconnect engine coolant hoses from idle air control solenoid valve, and take them off.


S2M0101

11) Installation is in the reverse order of removal.

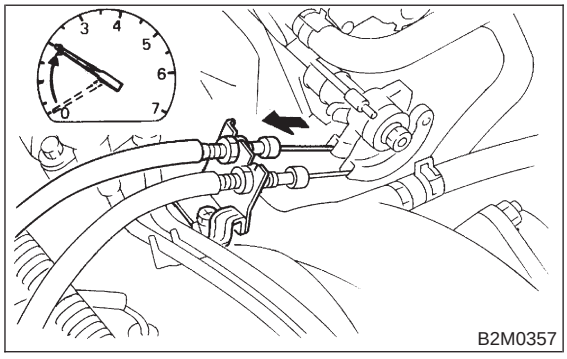
CAUTION:
Replace gasket with a new one.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)


B2M0166

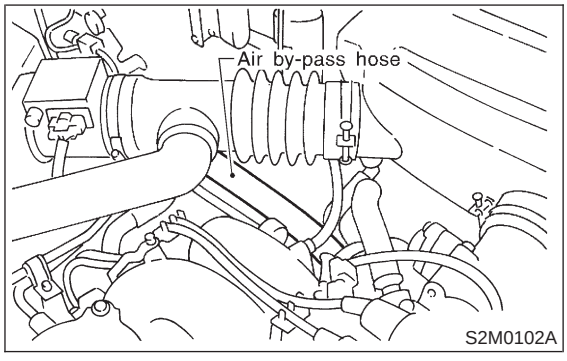
B: CLEANING

1) Start and warm-up the engine until radiator fan operates.
2) Hold throttle valve so that engine speed is at 2,000 rpm.



B2M0357

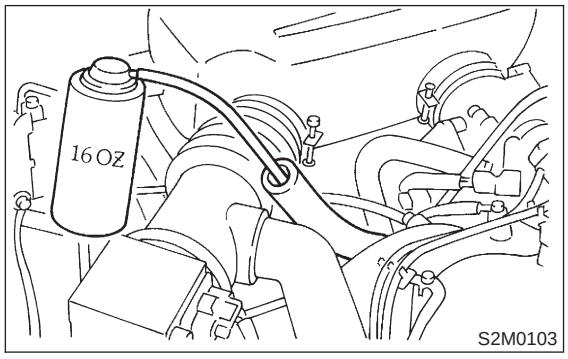
3) Disconnect air by-pass hose from air intake duct.



S2M0102A

4) Slowly pour one can (16 oz) of cleaner into by-pass air hole.

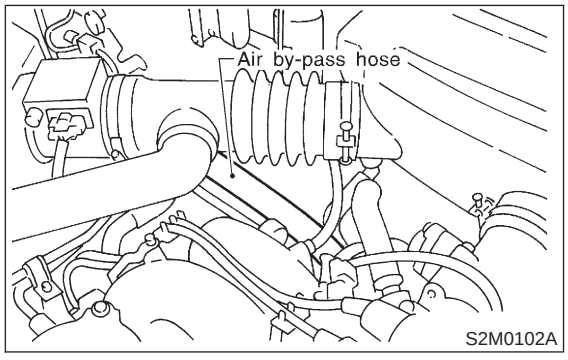
Cleaner:
Part No. 1050002 GM Top Engine Cleaner
Part No. X66-A AC Delco Carburetor Tune-up Conditioner



5) Leave the engine running for five minutes.

NOTE:
White smoke comes out of the muffler until the cleaner is used up.

6) Stop the engine.
7) Release the throttle valve.
8) Connect air by-pass hose to air intake duct.



9) Check duty ratio of idle air control solenoid valve using SUBARU SELECT MONITOR.

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

(1) Insert the cartridge to SUBARU SELECT MONITOR.
(2) Connect SUBARU SELECT MONITOR to the data link connector.
(3) Turn ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
(4) Select {2. Each System Check} in Main Menu.
(5) Select {EGI/EMPI} in Selection Menu.
(6) Select {1. Current Data Display & Save} in EGI/EMPI Diagnosis.
(7) Select {1.12 Data Display} in Data Display Menu.
(8) Adjust throttle position sensor to the following specification.

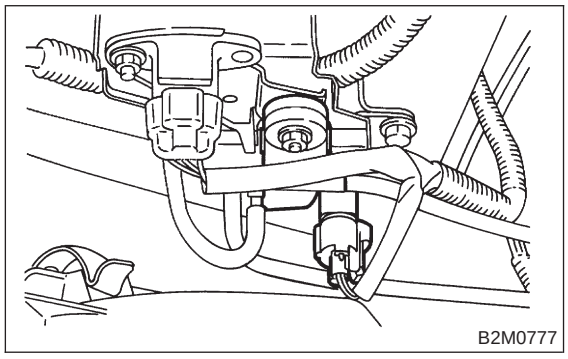
ISC valve duty ratio: 25 — 40%

13. Pressure Sources Switching Solenoid Valve (AT model)

A: REMOVAL AND INSTALLATION

1) Disconnect connector from pressure sources switching solenoid valve.
2) Disconnect hoses from pressure sources switching solenoid valve.
3) Remove pressure sources switching solenoid valve from bracket.
4) Installation is in the reverse order of removal.

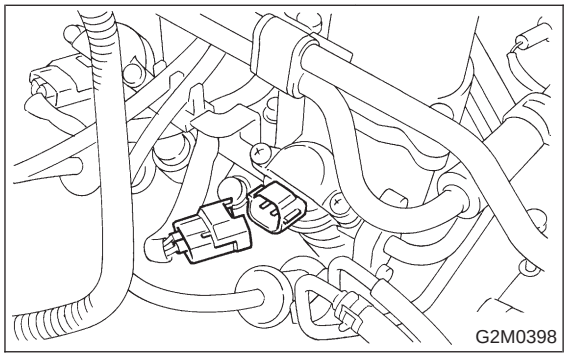
Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)



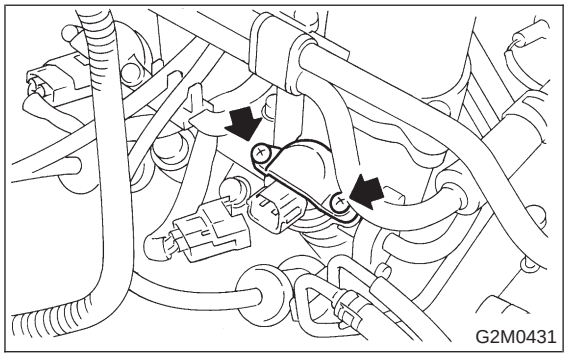
14. Fuel Injector

A: REMOVAL AND INSTALLATION

1) Release fuel pressure.
<Ref. to 2-8 [W1B0].>
2) Disconnect connector from fuel injector.



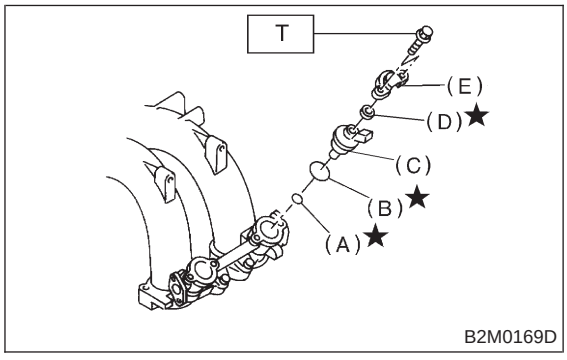
3) Remove fuel injector from fuel pipe assembly.



4) Installation is in the reverse order of removal.

CAUTION:
Replace O-rings and insulator.

Tightening torque:
T: 3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

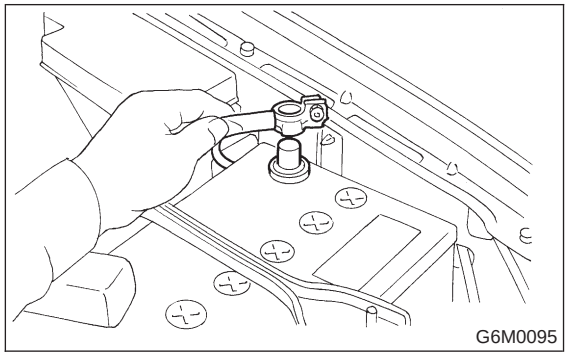


(A) O-ring B
(B) O-ring A
(C) Fuel injector
(D) Insulator
(E) Fuel injector cup

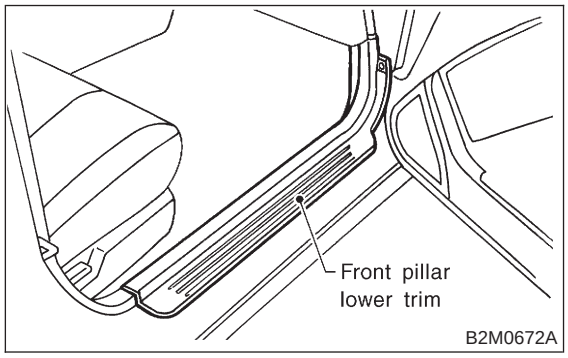
15. Engine Control Module (ECM)

A: REMOVAL AND INSTALLATION

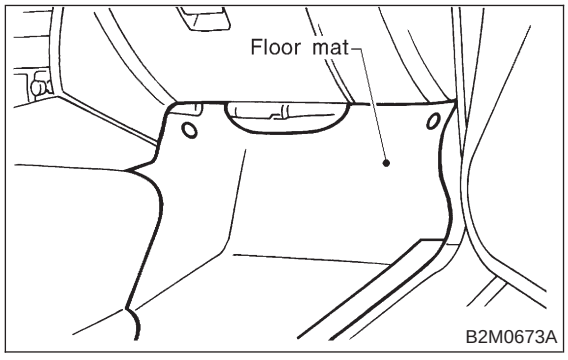
1) Disconnect battery ground cable.



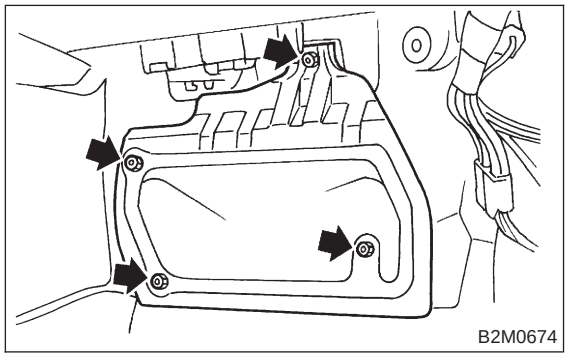
2) Remove front pillar lower trim.
<Ref. to 5-3 [W5A1].>



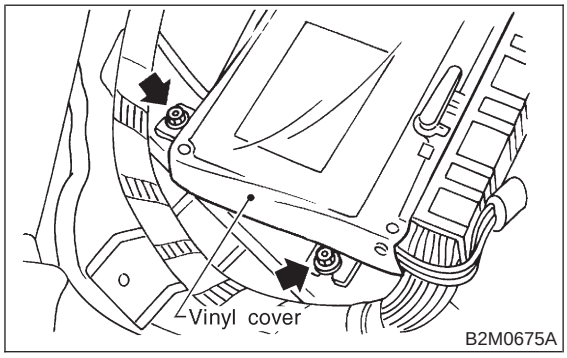
3) Detach floor mat of front passenger seat.



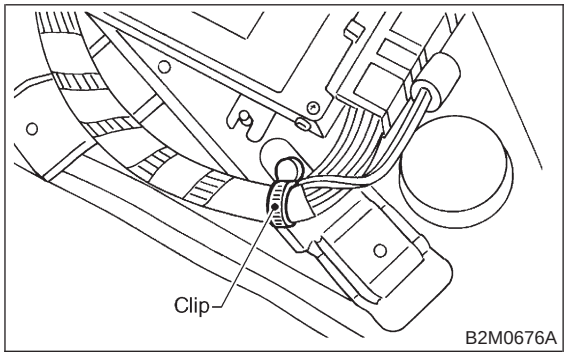
4) Remove protect cover.



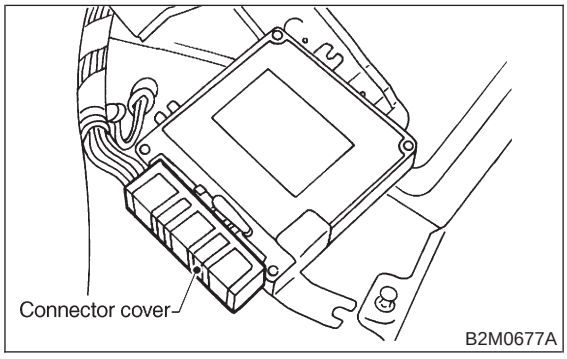
5) Remove vinyl cover and nuts which attach ECM to bracket.



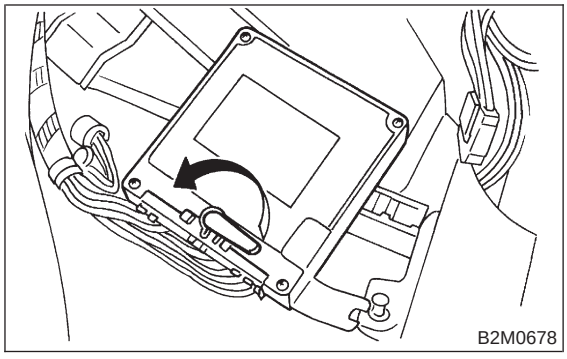
6) Detach clip from bracket.



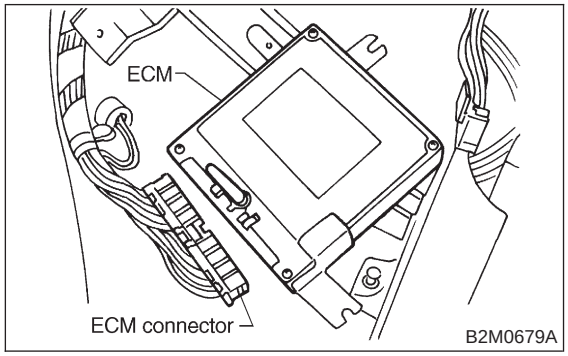
7) Remove connector cover.



8) Disconnect ECM connector.



9) Take out ECM.

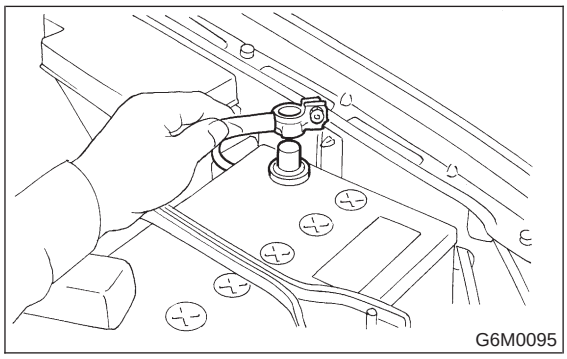


10) Installation is in the reverse order of removal.

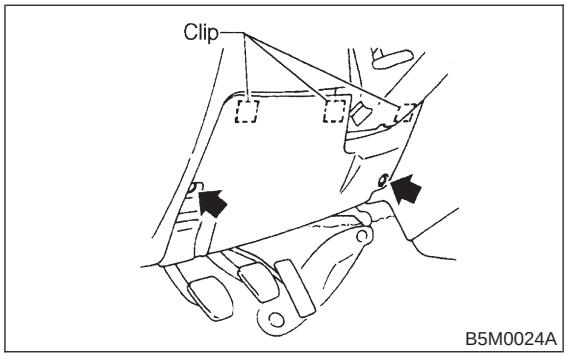
16. Main Relay

A: REMOVAL AND INSTALLATION

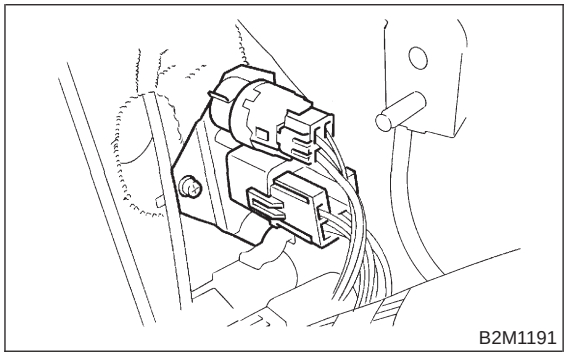
1) Disconnect battery ground cable.



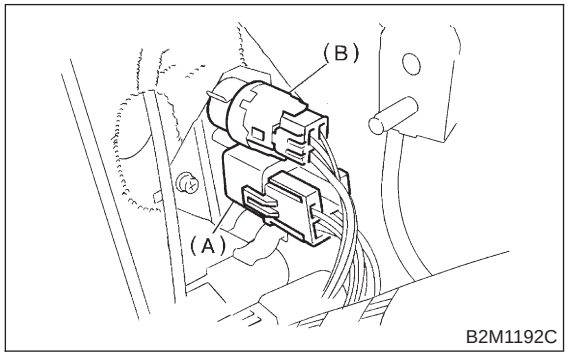
2) Remove lower cover and then disconnect connectors.



3) Lower transmission control module.
4) Remove the front pillar lower trim.
<Ref. to 5-3 [W5A1].>
5) Remove fuse box mounting nuts.
6) Lower fuse box.
7) Remove fuse box mounting bracket.
8) Remove screw which retains bracket of main relay and fuel pump relay.



9) Disconnect connector from main relay.



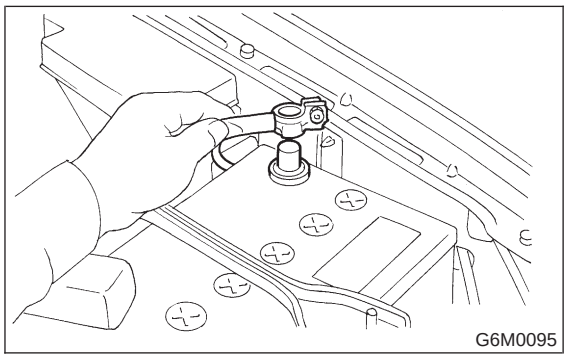
(A) Main relay
(B) Fuel pump relay

10) Installation is in the reverse order of removal.

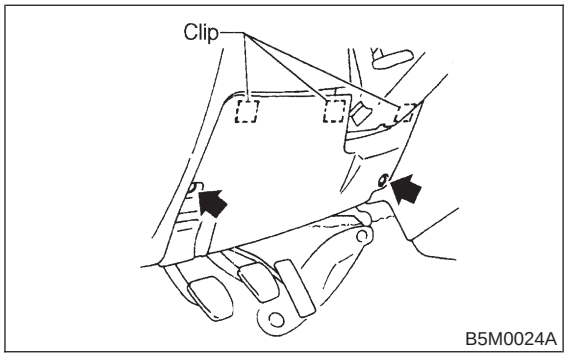
17. Fuel Pump Relay

A: REMOVAL AND INSTALLATION

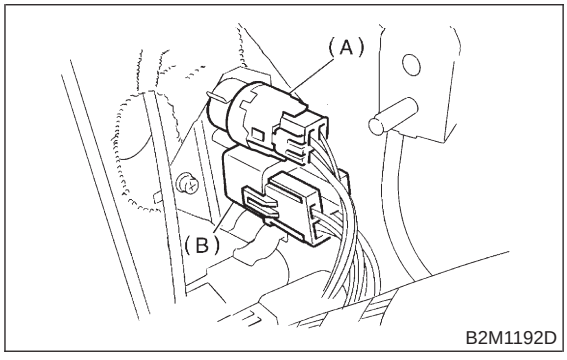
1) Disconnect battery ground cable.



2) Remove lower cover and then disconnect connectors.

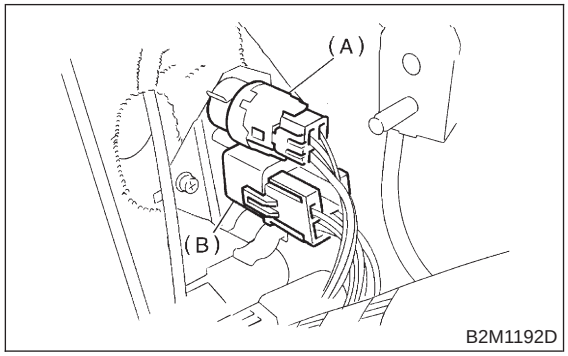


3) Lower transmission control module.
4) Remove the front pillar lower trim.
<Ref. to 5-3 [W5A1].>
5) Remove fuse box mounting nuts.
6) Lower fuse box.
7) Remove fuse box mounting bracket.
8) Remove fuse pump relay (A) from main relay and fuel pump relay mounting bracket.



(A) Fuel pump relay
(B) Main relay

9) Disconnect connector from fuel pump relay.



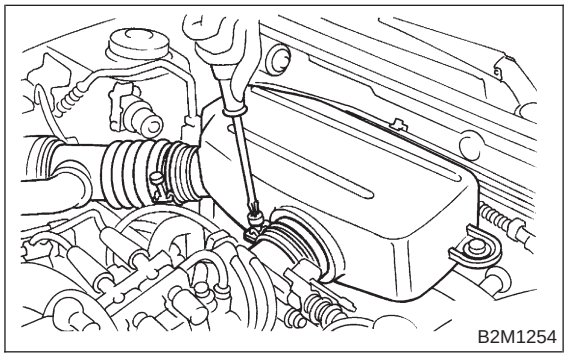
(A) Fuel pump relay
(B) Main relay

10) Installation is in the reverse order of removal.

18. Air Intake Chamber

A: REMOVAL AND INSTALLATION

1) Loosen clamps which connect air intake chamber to throttle body and air intake duct.



2) Disconnect air hoses from air intake chamber.
3) Remove bolts which secure air intake chamber to stays.
4) Remove air intake chamber.
5) Installation is in the reverse order of removal.

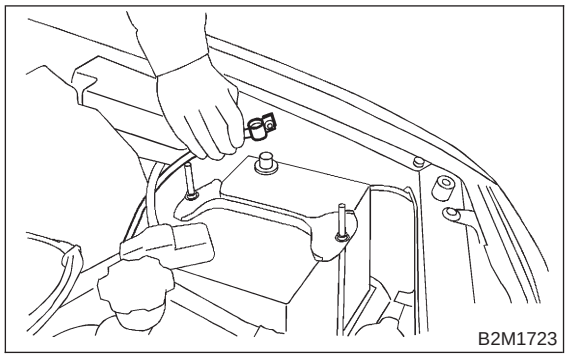
Tightening torque:
4.9±0.5 N·m (0.5±0.05 kg-m, 3.6±0.4 ft-lb)

19. Knock Sensor

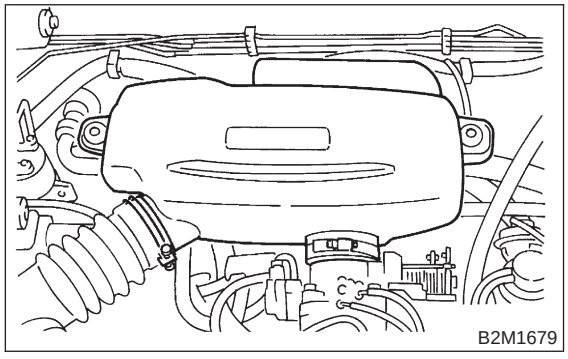
A: REMOVAL

1. 2200 cc MODEL

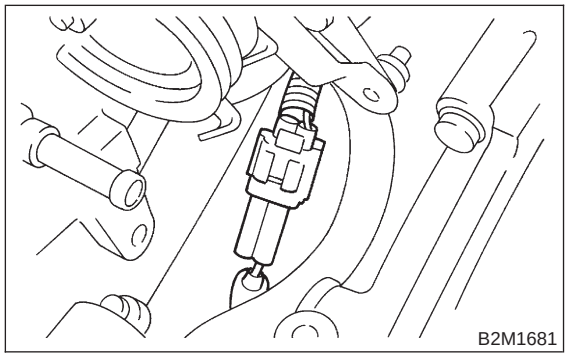
1) Disconnect battery ground cable from battery ground terminal.


B2M1723

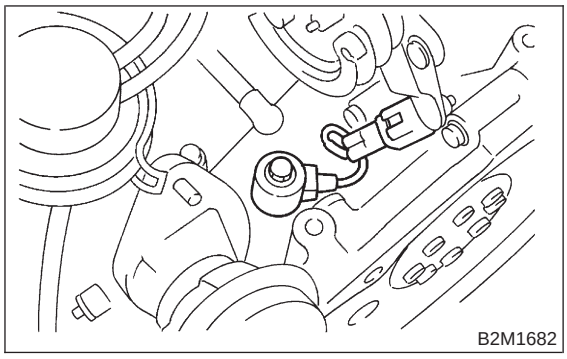
2) Remove air intake chamber.
<Ref. to 2-7 [W18A0].>


B2M1679

3) Disconnect knock sensor connector.

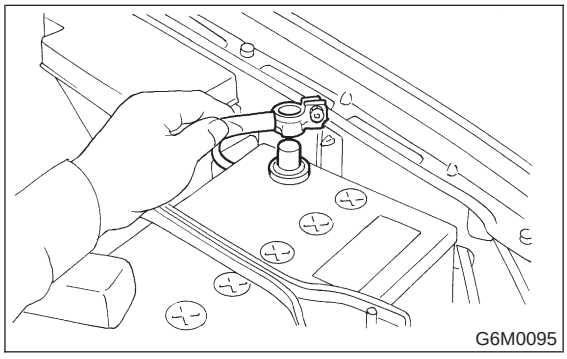

B2M1681

4) Remove knock sensor from cylinder block.

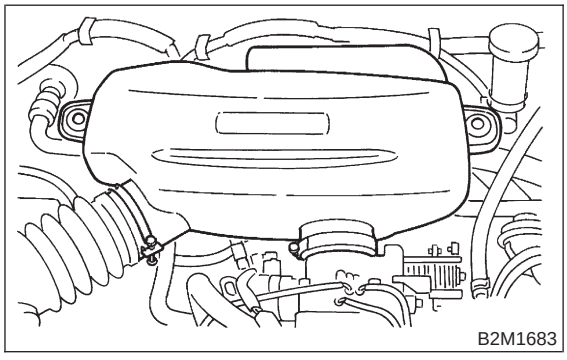

B2M1682

2. 2500 cc MODEL

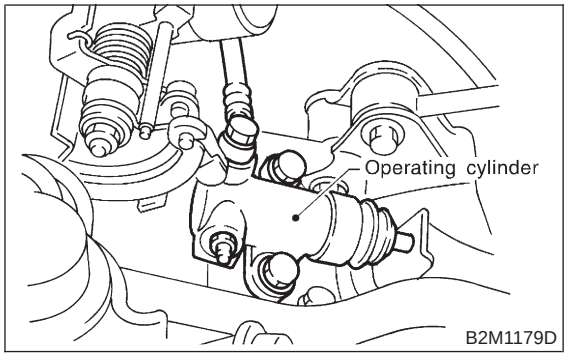
1) Disconnect battery ground cable from battery ground terminal.


G6M0095

2) Remove air intake chamber.
<Ref. to 2-7 [W18A0].>

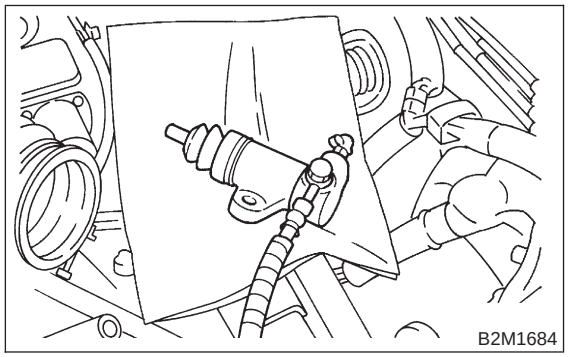

B2M1683

3) Remove operating cylinder. (MT vehicle only)
<Ref. to 2-10 [W5A0].>

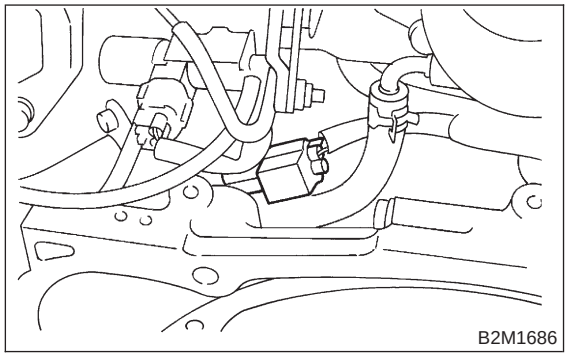


B2M1179D

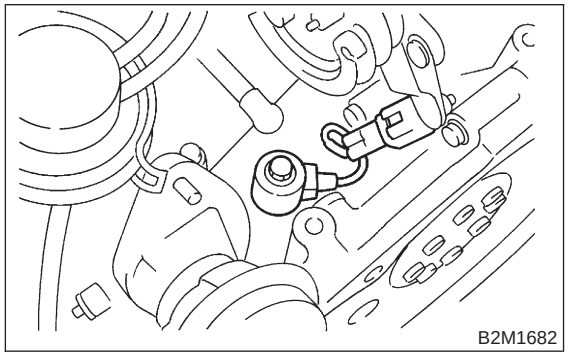
NOTE:
Place the operating cylinder where it will not interfere with the work in process.


B2M1684

4) Disconnect knock sensor connector.


B2M1686

5) Remove knock sensor from cylinder block.


B2M1682

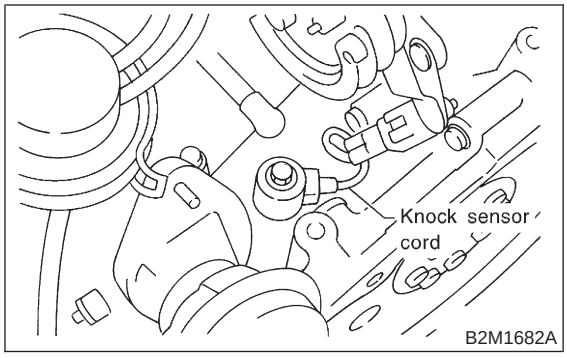
B: INSTALLATION

1. 2200 cc MODEL

1) Install knock sensor to cylinder block.

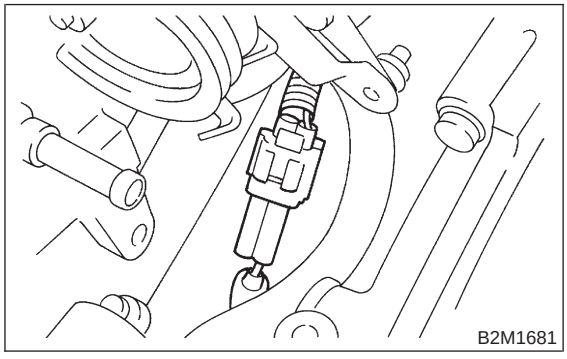
Tightening torque:
23.5±2.9 N·m (2.4±0.3 kg-m, 17.3±2.1 ft-lb)

NOTE:
The extraction area of the knock sensor cord must be positioned at a 45° angle relative to the engine rear.

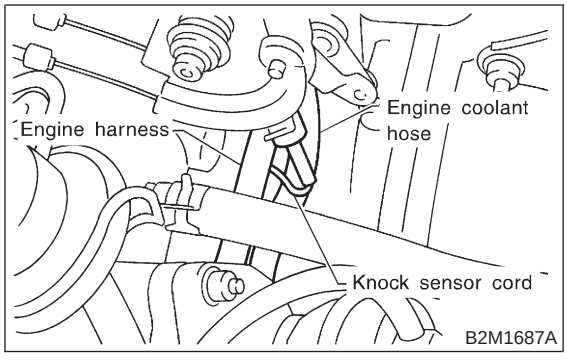


B2M1682A

2) Connect knock sensor connector.

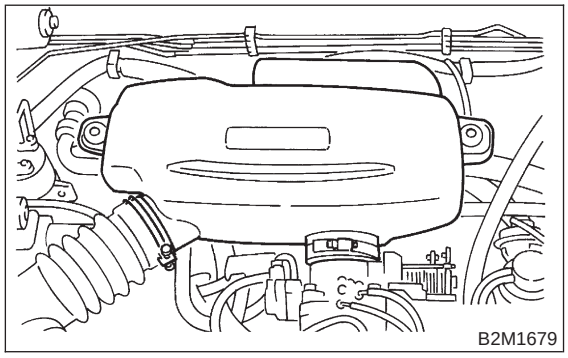

B2M1681

NOTE:
The knock sensor cord must pass between the engine harness and engine coolant hose.

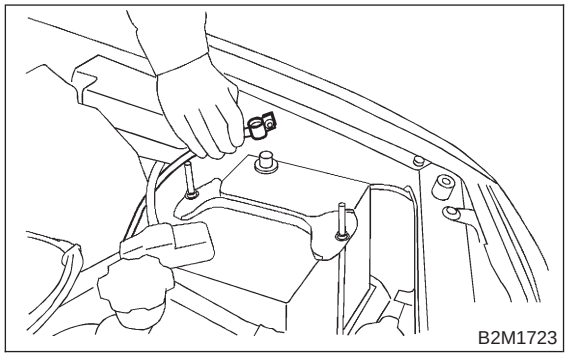


B2M1687A

3) Install air intake chamber. <Ref. to 2-7 [W18A0].>


B2M1679

4) Connect battery ground cable to battery ground terminal.

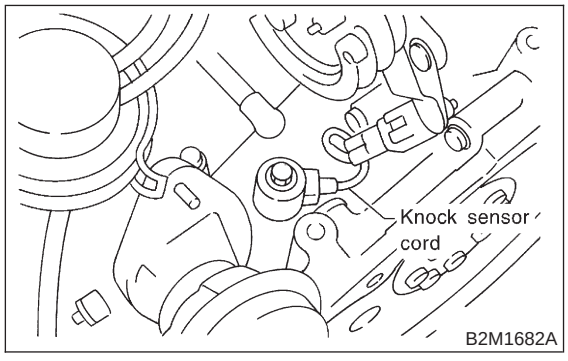

B2M1723

2. 2500 cc MODEL

1) Install knock sensor to cylinder block.

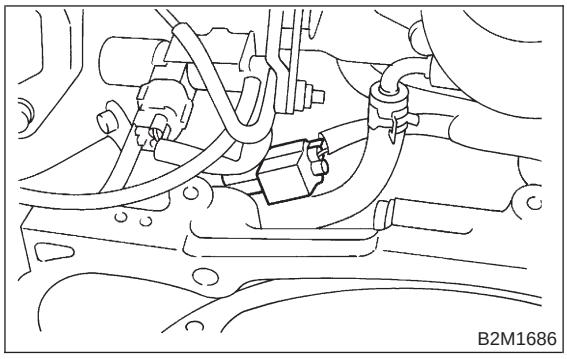
Tightening torque:
23.5±2.9 N·m (2.4±0.3 kg-m, 17.3±2.1 ft-lb)

NOTE:
The extraction area of the knock sensor cord must be positioned at a 45° angle relative to the engine rear.

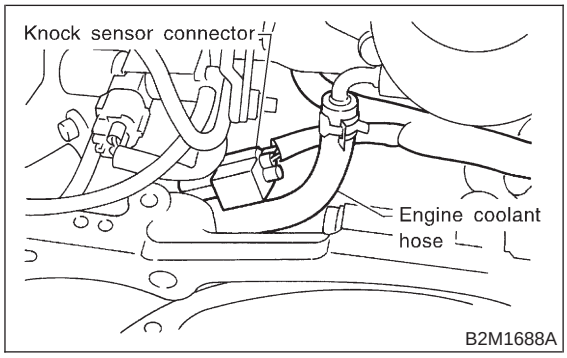


B2M1682A

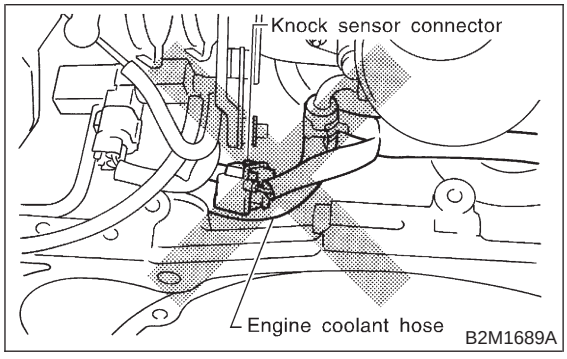
2) Connect knock sensor connector.


B2M1686

NOTE:
The connector must be connected to the engine front end of the engine coolant hose.



B2M1688A

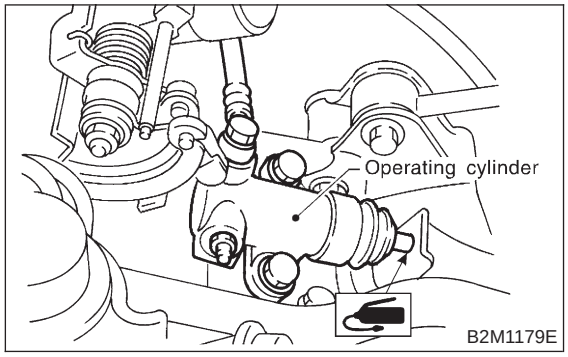


B2M1689A

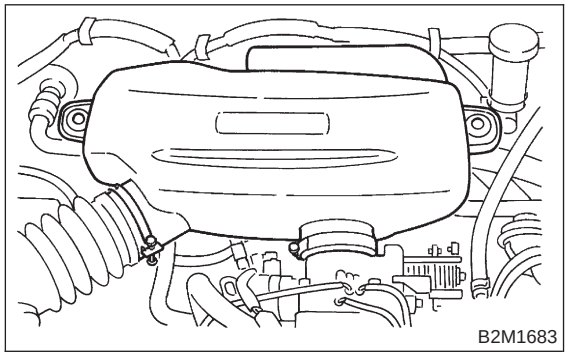
3) Install operating cylinder. (MT vehicle only)

Tightening torque:
37±3 N·m (3.8±0.3 kg-m, 27.3±2.2 ft-lb)

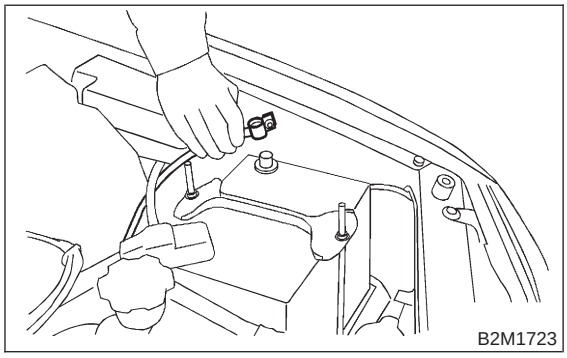
NOTE:
Apply grease to contact point of release lever and operating cylinder rod. <Ref. to 2-10 [W5A0].>



4) Install air intake chamber. <Ref. to 2-7 [W18A0].>



5) Connect battery ground cable to battery ground terminal.



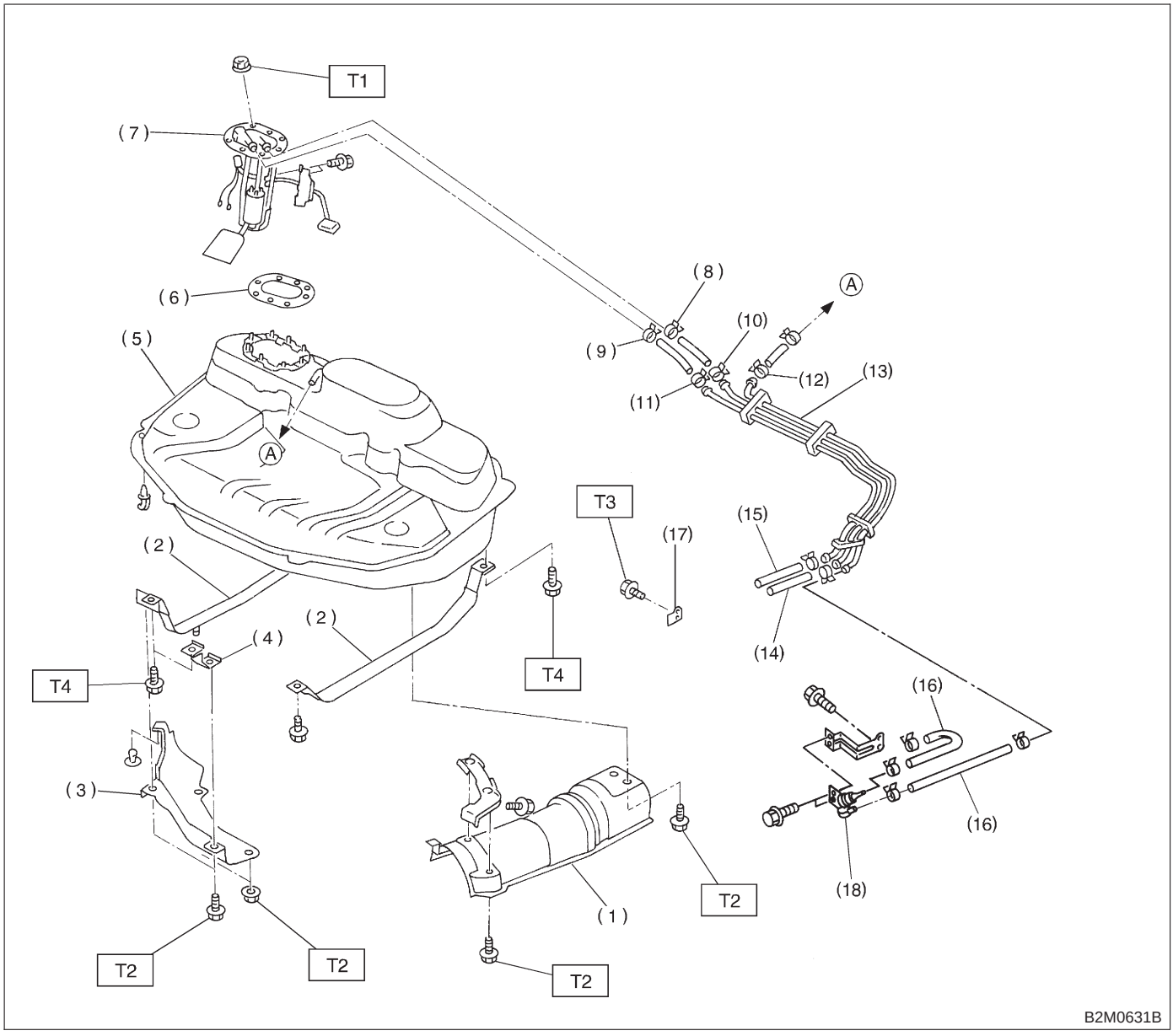
FUEL SYSTEM 2-8

1. Specifications

Fuel tank	Capacity	60 ℓ (15.9 US gal, 13.2 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Discharge pressure	250.1 kPa (2.55 kg/cm^2, 36.3 psi)
	Discharge flow	AWD: More than 80 ℓ (21.1 US gal, 17.6 Imp gal)/h FWD: More than 65 ℓ (17.2 US gal, 14.3 Imp gal)/h [12 V at 300 kPa (3.06 kg/cm^2, 43.5 psi)]
Fuel filter		Cartridge type

1. Fuel Tank

A: FWD MODEL

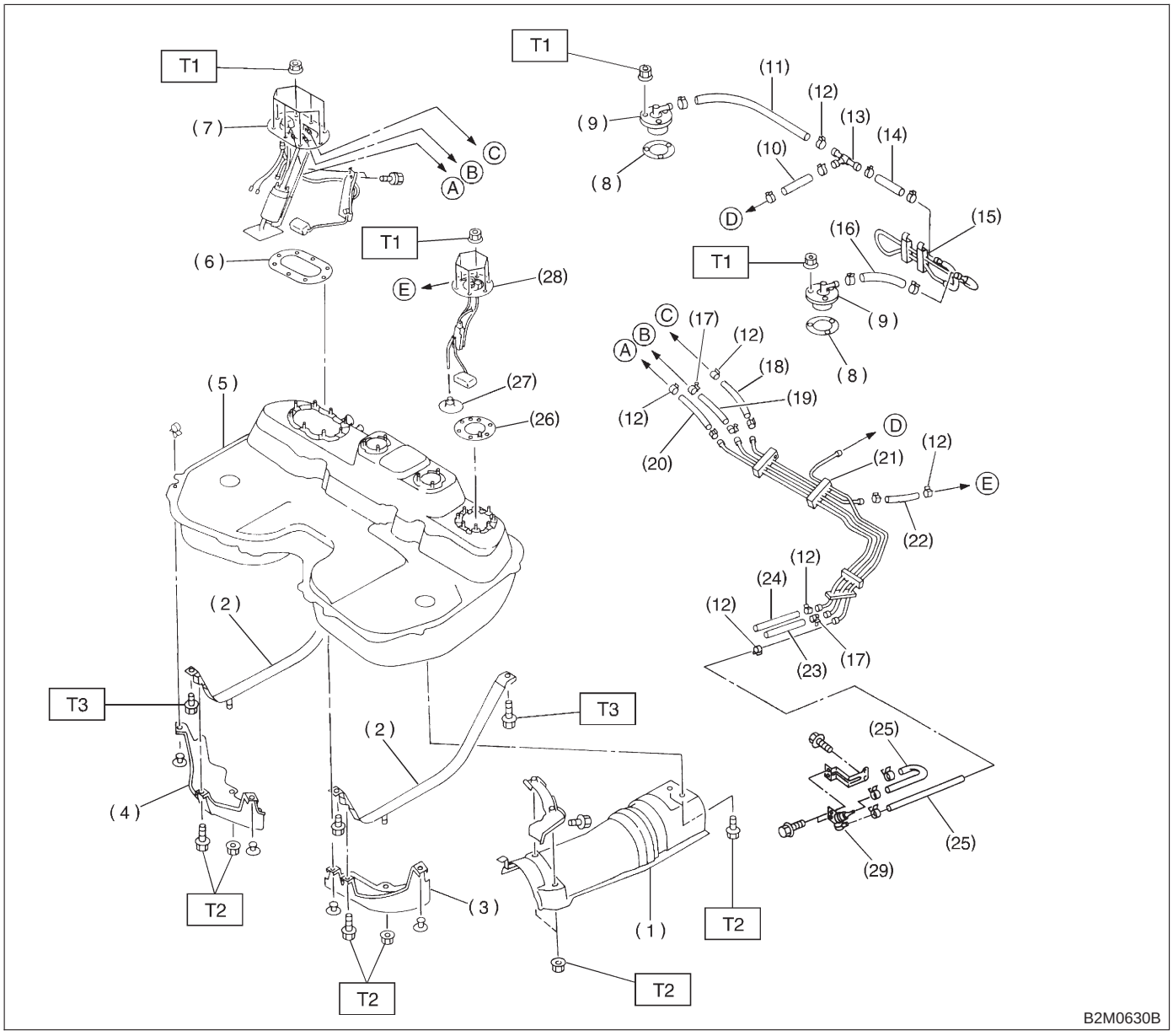


(1) Heat seated cover
(2) Fuel tank band
(3) Protector
(4) Protector bracket
(5) Fuel tank
(6) Fuel pump gasket
(7) Fuel pump ASSY
(8) Clamp
(9) Clip
(10) Fuel delivery hose A
(11) Fuel return hose A
(12) Evaporation hose A
(13) Fuel pipe ASSY
(14) Fuel delivery hose B
(15) Fuel return hose B
(16) Evaporation hose B
(17) Plate
(18) Roll over valve

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 7.4±0.2 (0.75±0.2, 5.4±1.4)
T3: 18±5 (1.8±0.5, 13.0±3.6)
T4: 33±10 (3.4±1.0, 25±7)

B: AWD MODEL

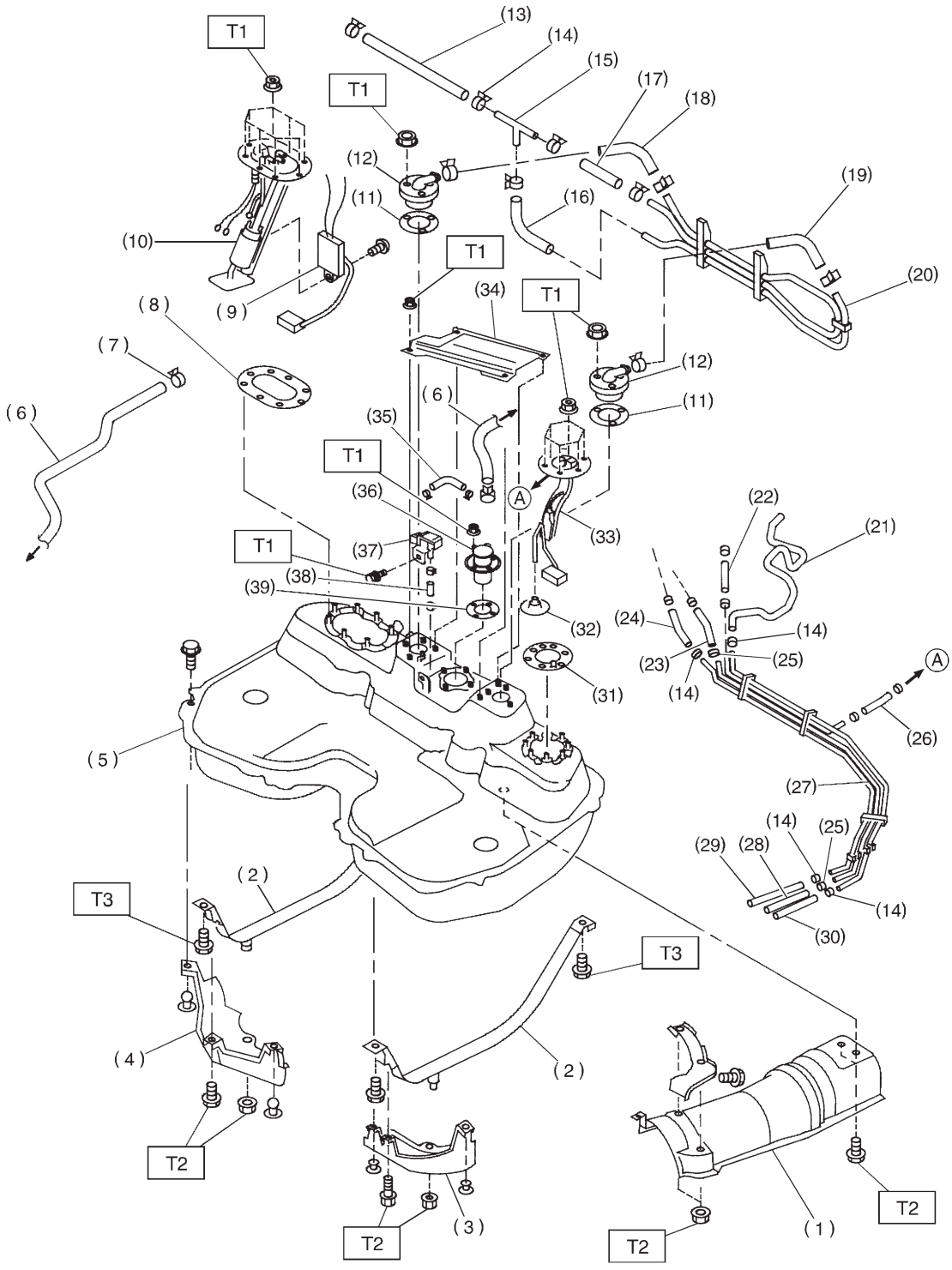
1. 2200 cc TAIWAN SPEC. VEHICLES



(1) Heat sealed cover
(2) Fuel tank band
(3) Protector LH
(4) Protector RH
(5) Fuel tank
(6) Fuel pump gasket
(7) Fuel pump ASSY
(8) Fuel cut valve gasket
(9) Fuel cut valve
(10) Evaporation hose C
(11) Evaporation hose A
(12) Clip
(13) Joint pipe
(14) Evaporation hose B
(15) Evaporation pipe ASSY
(16) Evaporation hose D
(17) Clamp
(18) Jet pump hose A
(19) Fuel delivery hose A
(20) Fuel return hose A
(21) Fuel pipe ASSY
(22) Jet pump hose B
(23) Fuel delivery hose B
(24) Fuel return hose B
(25) Evaporation hose E
(26) Fuel sub meter gasket
(27) Jet pump filter
(28) Fuel sub meter unit
(29) Roll over valve

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 33±10 (3.4±1.0, 25±7)

2. 2200 cc EXCEPT TAIWAN SPEC. VEHICLES

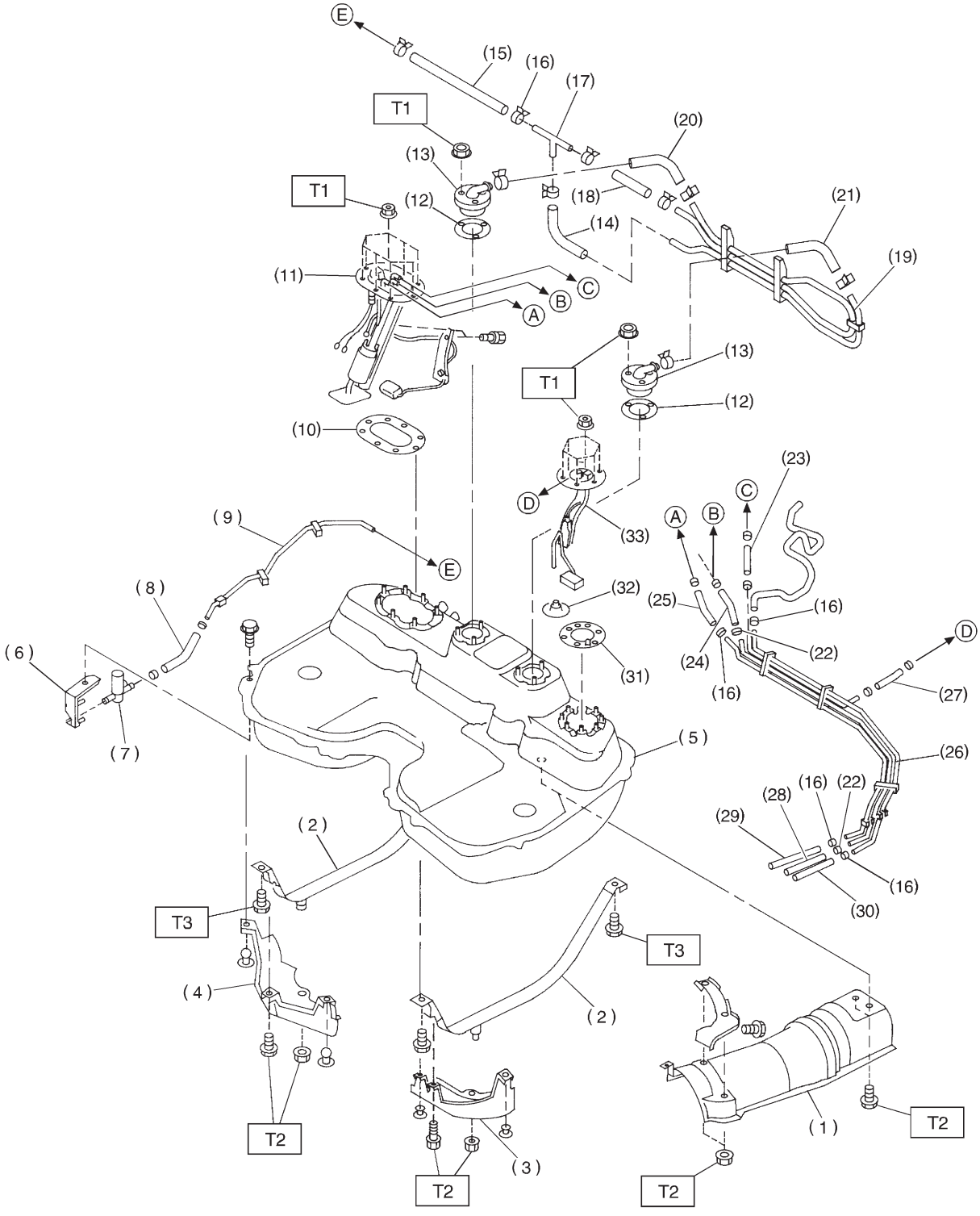


COMPONENT PARTS

(1) Heat sealed cover
(2) Fuel tank band
(3) Protector LH
(4) Protector RH
(5) Fuel tank
(6) Canister hose A
(7) Clip
(8) Fuel pump gasket
(9) Main fuel meter unit
(10) Fuel pump ASSY
(11) Fuel cut valve gasket
(12) Fuel cut valve
(13) Evaporation hose A
(14) Clip
(15) Joint pipe
(16) Evaporation hose C
(17) Evaporation hose B
(18) Evaporation hose D
(19) Evaporation hose E
(20) Evaporation pipe ASSY
(21) Canister hose B
(22) Jet pump hose A
(23) Fuel delivery hose A
(24) Fuel return hose A
(25) Clamp
(26) Jet pump hose B
(27) Fuel pipe ASSY
(28) Fuel delivery hose B
(29) Fuel return hose B
(30) Evaporation hose F
(31) Fuel sub meter gasket
(32) Jet pump filter
(33) Fuel sub meter unit
(34) Protector cover
(35) Vent valve hose
(36) Vent valve
(37) Fuel tank pressure sensor
(38) Fuel tank pressure sensor hose
(39) Vent valve gasket

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 33±10 (3.4±1.0, 25±7)

3. 2500 cc MODEL



B2M0975B

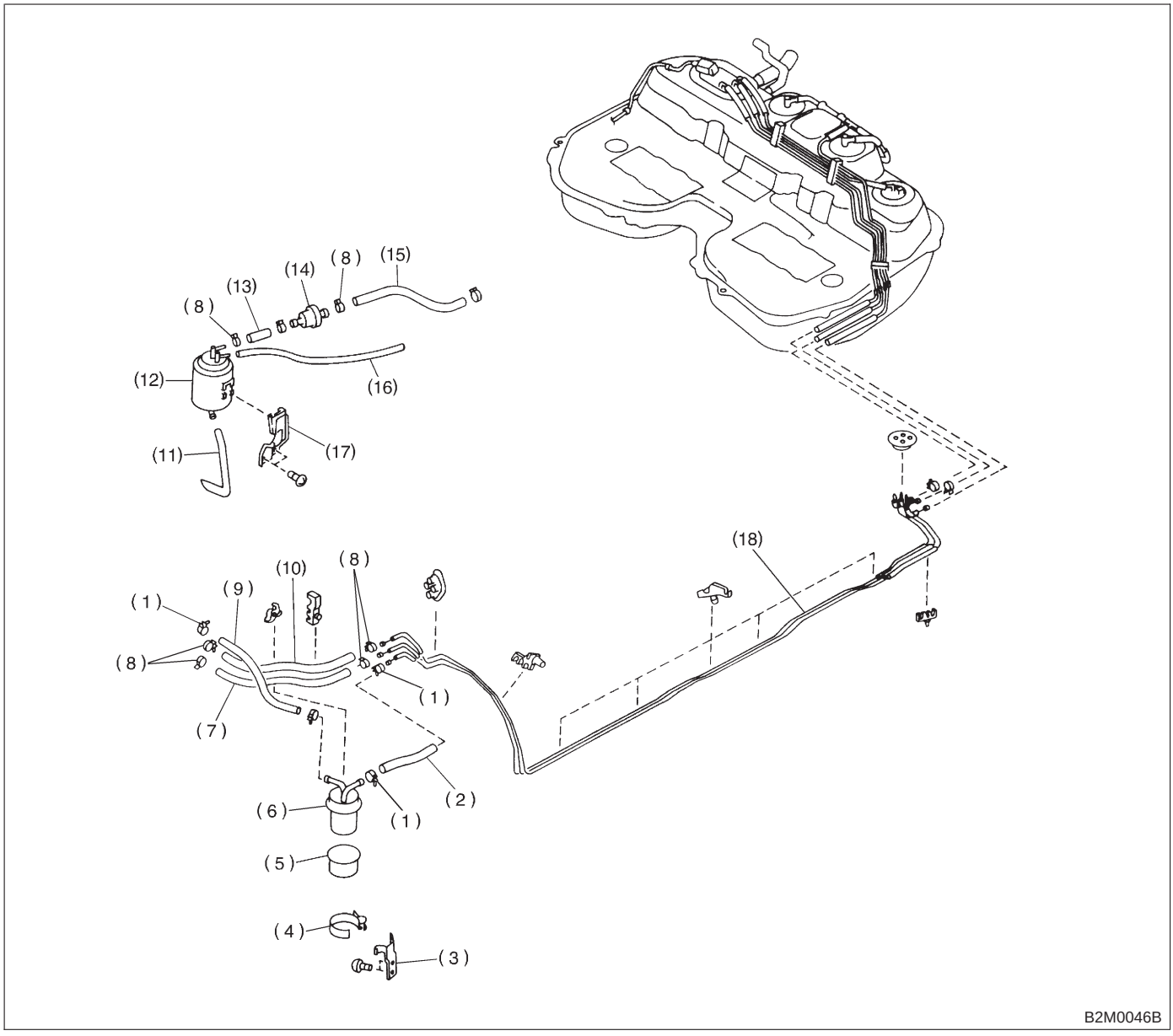
COMPONENT PARTS

(1) Heat sealed cover
(2) Fuel tank band
(3) Protector LH
(4) Protector RH
(5) Fuel tank
(6) Pressure control solenoid valve bracket
(7) Pressure control solenoid valve
(8) Evaporation hose G
(9) Evaporation pipe A
(10) Fuel pump gasket
(11) Fuel pump ASSY
(12) Fuel cut valve gasket
(13) Fuel cut valve
(14) Evaporation hose C
(15) Evaporation hose A
(16) Clip
(17) Joint pipe
(18) Evaporation hose B
(19) Evaporation pipe ASSY
(20) Evaporation hose D
(21) Evaporation hose E
(22) Clamp
(23) Jet pump hose A
(24) Fuel delivery hose A
(25) Fuel return hose A
(26) Fuel pipe ASSY
(27) Jet pump hose B
(28) Fuel delivery hose B
(29) Fuel return hose B
(30) Evaporation hose F
(31) Fuel sub meter gasket
(32) Jet pump filter
(33) Fuel sub meter unit

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 33±10 (3.4±1.0, 25±7)

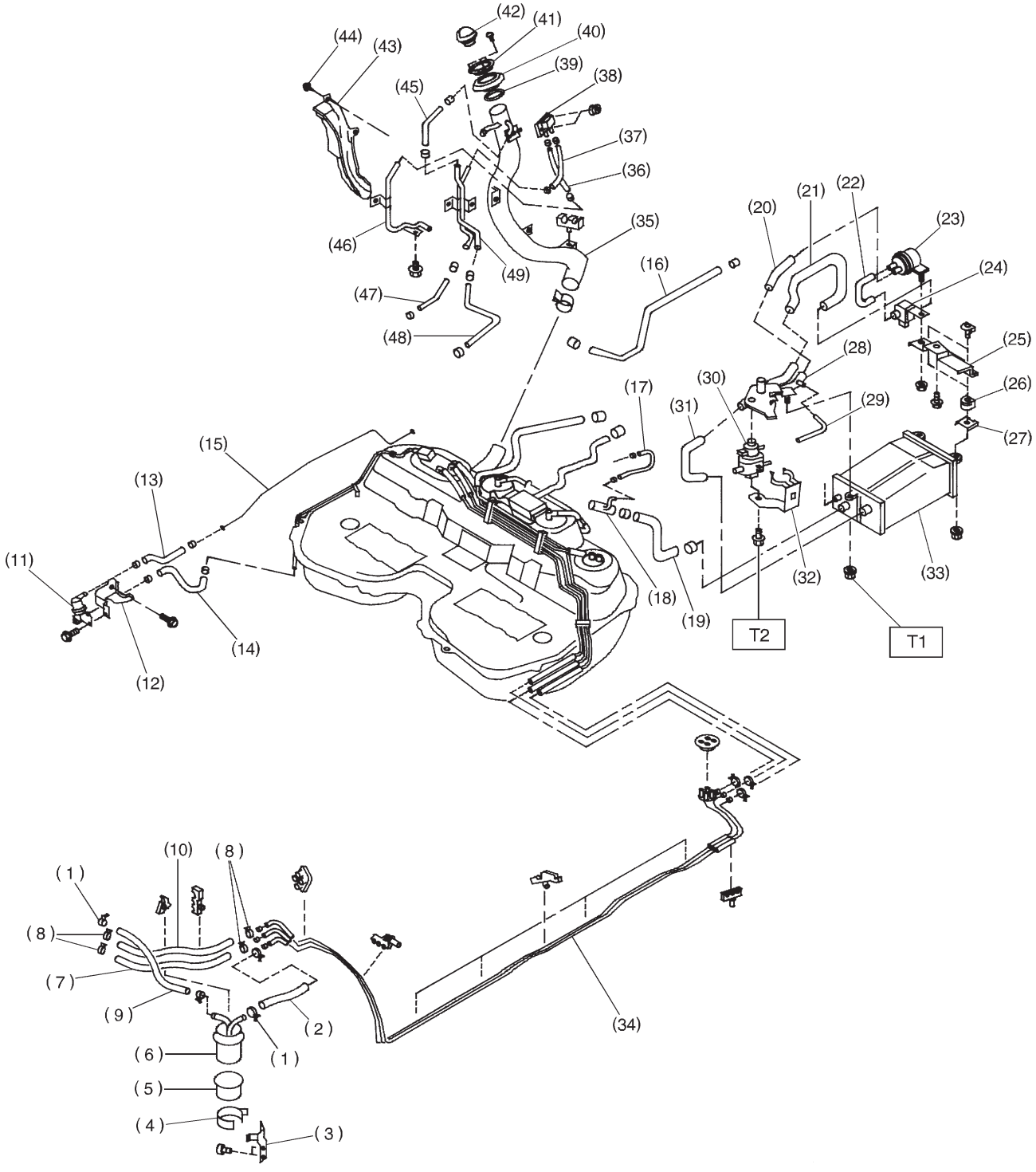
2. Fuel Line

A: 2200 cc FWD AND TAIWAN SPEC. VEHICLES



(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Clip
(9) Fuel delivery hose B
(10) Fuel return hose
(11) Air vent hose
(12) Canister
(13) Canister hose A
(14) Two-way valve
(15) Canister hose B
(16) Canister hose C
(17) Canister bracket
(18) Fuel pipe ASSY

B: 2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES

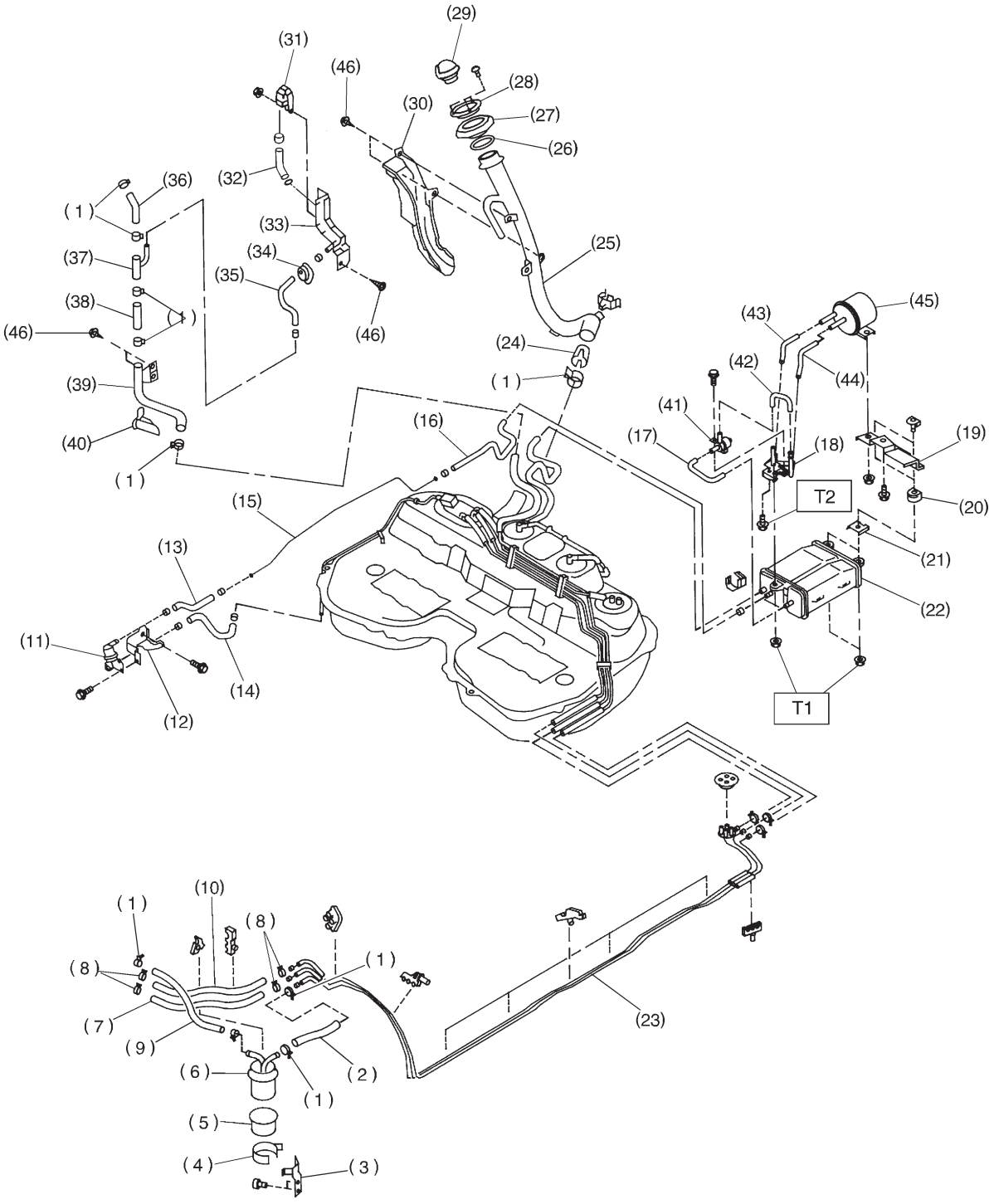


B2M1708A

(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Clip
(9) Fuel delivery hose B
(10) Fuel return hose
(11) Roll over valve
(12) Roll over valve bracket
(13) Evaporation hose H
(14) Evaporation hose I
(15) Evaporation pipe B
(16) Evaporation hose J
(17) Evaporation hose K
(18) Joint pipe
(19) Canister hose A
(20) Air filter hose A
(21) Drain valve hose
(22) Air filter hose B
(23) Air filter
(24) Drain valve
(25) Canister upper bracket
(26) Cushion rubber
(27) Canister lower bracket
(28) Canister holder
(29) Evaporation hose L
(30) Pressure control solenoid valve
(31) Canister hose B
(32) Pressure control solenoid valve holder
(33) Canister
(34) Fuel pipe ASSY
(35) Fuel filler pipe
(36) Evaporation hose M
(37) Evaporation hose N
(38) Shut valve
(39) Packing
(40) Ring A
(41) Ring B
(42) Fuel filler cap
(43) Fuel filler pipe protector
(44) Tapping screw
(45) Evaporation hose O
(46) Joint pipe
(47) Evaporation hose P
(48) Evaporation hose Q
(49) Evaporation pipe

Tightening torque: N·m (kg-m, ft-lb)
T1: 23±7 (2.3±0.7, 16.6±5.1)
T2: 25±7 (2.5±0.7, 18.1±5.1)

C: 2500 cc MODEL



B2M0974B

(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Clip
(9) Fuel delivery hose B
(10) Fuel return hose
(11) Roll over valve
(12) Roll over valve bracket
(13) Evaporation hose H
(14) Evaporation hose I
(15) Evaporation pipe B
(16) Canister hose A
(17) Canister hose B
(18) Canister holder
(19) Canister upper bracket
(20) Cushion rubber
(21) Canister lower bracket
(22) Canister
(23) Fuel pipe ASSY
(24) Fuel filler valve
(25) Fuel filler pipe
(26) Packing
(27) Ring A
(28) Ring B
(29) Fuel filler cap
(30) Fuel filler pipe protector
(31) Fuel tank pressure sensor
(32) Fuel tank pressure sensor hose A
(33) Fuel tank pressure sensor bracket
(34) Grommet
(35) Fuel tank pressure sensor hose B
(36) Air ventilator hose A
(37) Air ventilator pipe A
(38) Air ventilator hose B
(39) Air ventilator pipe B
(40) Air ventilator pipe protector
(41) Vent control solenoid valve
(42) Vent control solenoid valve hose
(43) Air filter hose A
(44) Air filter hose B
(45) Air filter
(46) Tapping screw

Tightening torque: N·m (kg-m, ft-lb)
T1: 23±7 (2.3±0.7, 16.6±5.1)
T2: 25±7 (2.5±0.7, 18.1±5.1)

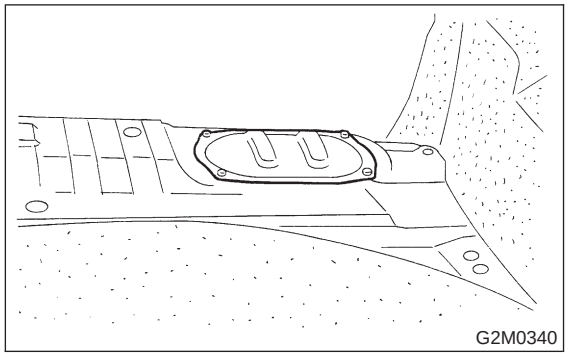
1. On-car Services

A: PRECAUTIONS

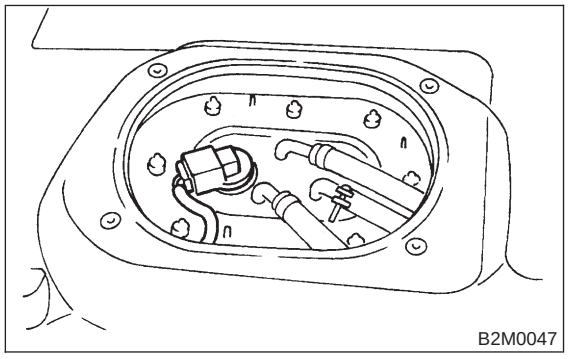
WARNING:
- **Place “No fire” signs near the working area.**
- **Disconnect ground terminal from battery.**
- **Be careful not to spill fuel on the floor.**

B: RELEASING OF FUEL PRESSURE

1) Take off floor mat.
2) Remove access hole lid.



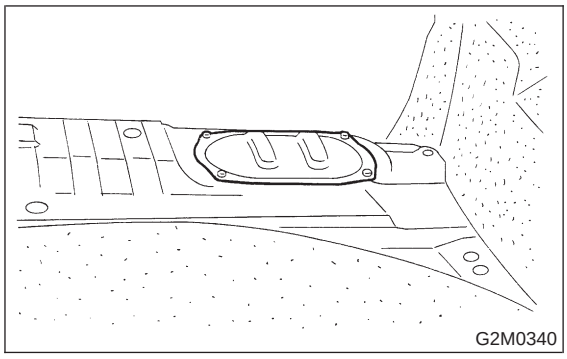
3) Disconnect connector from fuel pump.



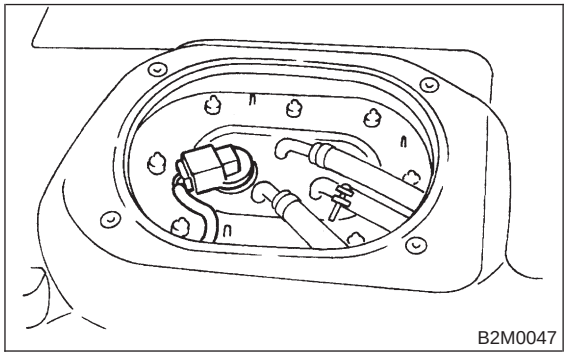
4) Start the engine, and run it until it stalls.
5) After the engine stalls, crank it for five more seconds.
6) Turn ignition switch OFF.

C: DRAINING OF FUEL

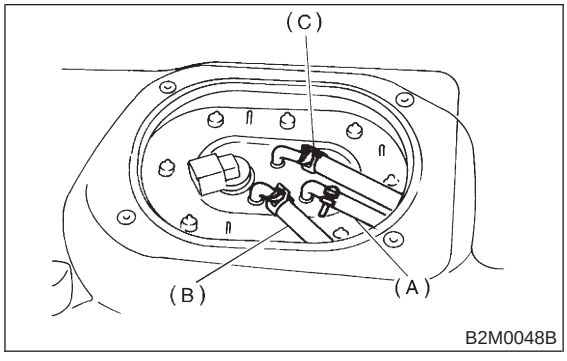
1) Remove rear seat and seat back.
2) Remove access hole lid.



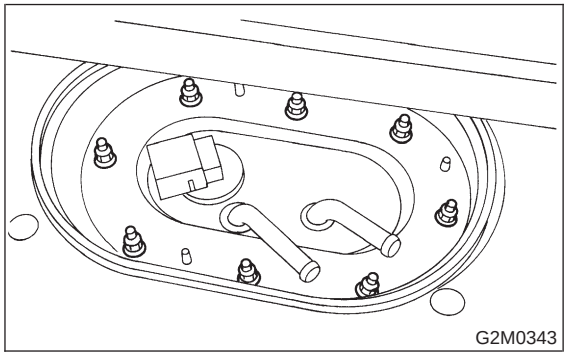
3) Disconnect connector from fuel pump.



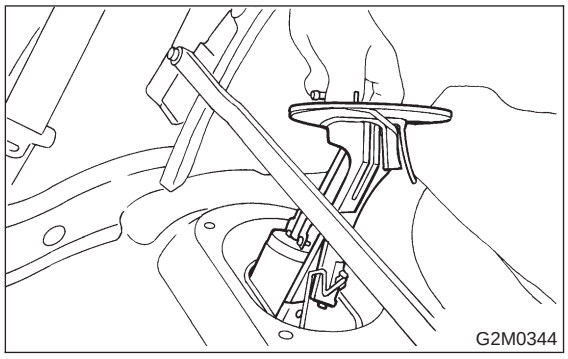
4) Release fuel pressure. <Ref. to 2-8 [W1B0].>
5) Disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C) (AWD model only).



6) Remove nuts which install fuel pump assembly onto fuel tank.

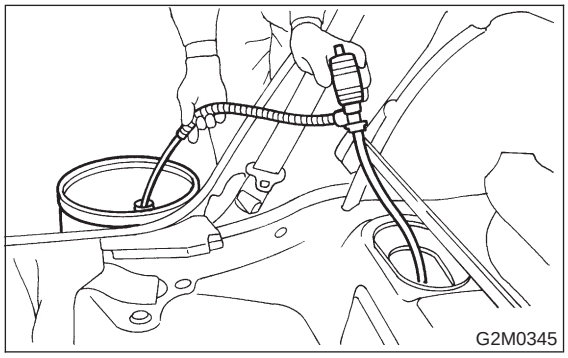


7) Take off fuel pump from fuel tank.



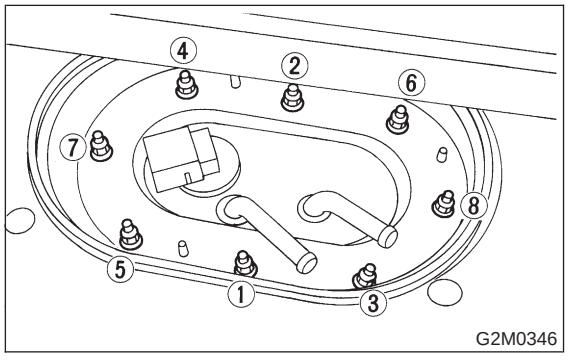
8) Drain fuel from fuel tank by using a hand pump.

WARNING:
Do not use a motor pump when draining fuel.



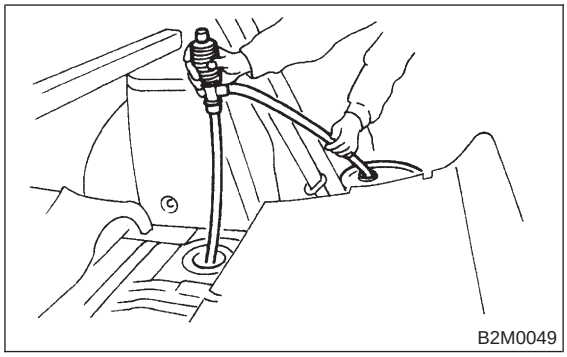
9) After draining fuel, reinstall fuel pump.
Tighten nuts in numerical sequence shown in figure to specified torque.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)



10) On AWD model, after removing fuel sub meter unit, drain fuel from there.

WARNING:
Do not use a motor pump when draining fuel.

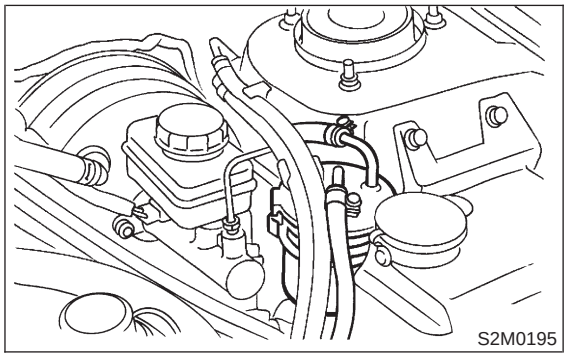


D: MEASUREMENT OF FUEL PRESSURE

WARNING:
Before removing fuel pressure gauge, release fuel pressure.

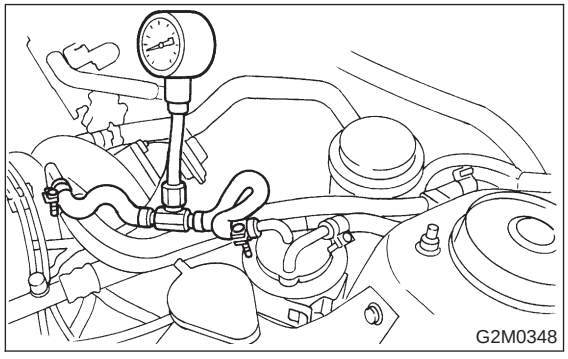
NOTE:
If out of specification as measured at step 6), check or replace pressure regulator and pressure regulator vacuum hose.

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Connect connector to fuel pump.
3) Disconnect fuel delivery hoses from fuel filter, and connect fuel pressure gauge.



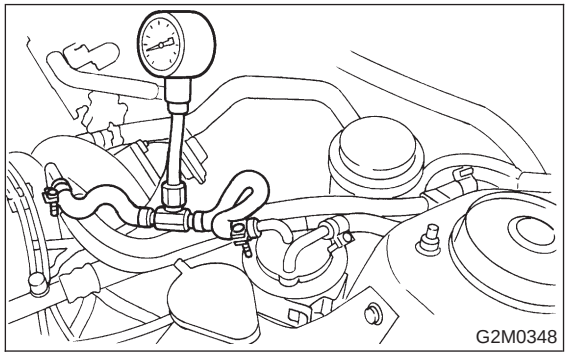
4) Start the engine.
5) Measure fuel pressure while disconnecting pressure regulator vacuum hose from collector chamber.

Fuel pressure:
235 — 265 kPa (2.4 — 2.7 kg/cm², 34 — 38 psi)



6) After connecting pressure regulator vacuum hose, measure fuel pressure.

Fuel pressure:
177 — 206 kPa (1.8 — 2.1 kg/cm², 26 — 30 psi)

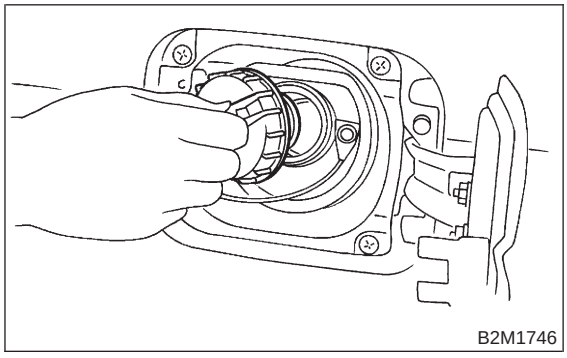


2. Fuel Tank

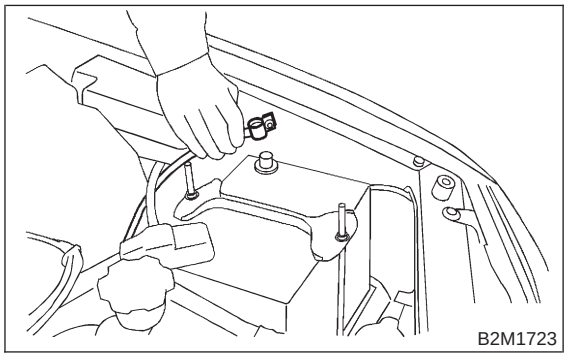
A: REMOVAL

1. 2200 cc FWD AND TAIWAN SPEC. VEHICLES

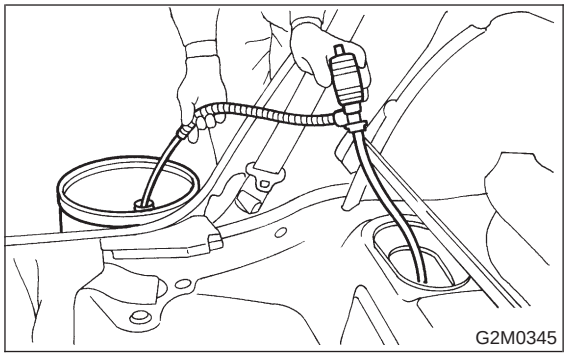
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



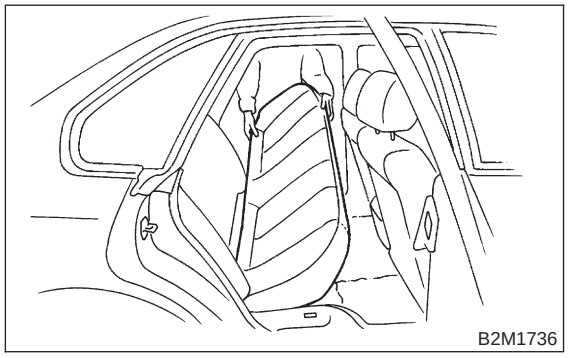
3) Disconnect battery ground cable.



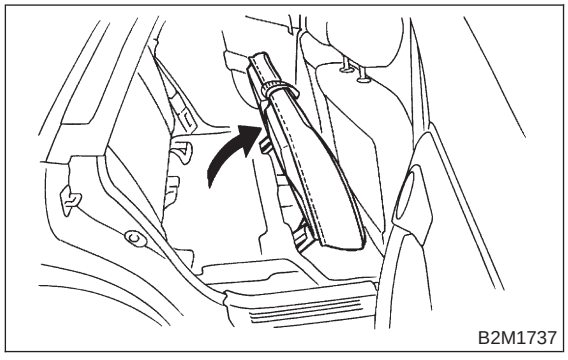
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



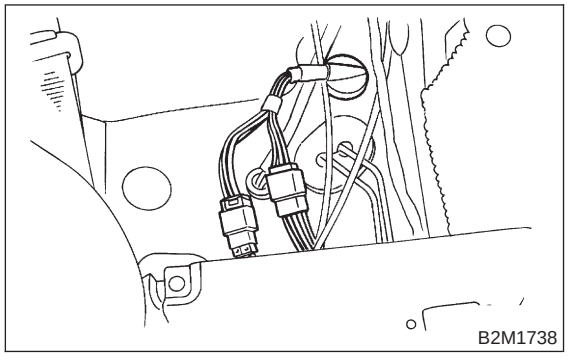
5) Remove rear seat cushion. (Sedan model) <Ref. to 5-3 [W2A1].>


B2M1736

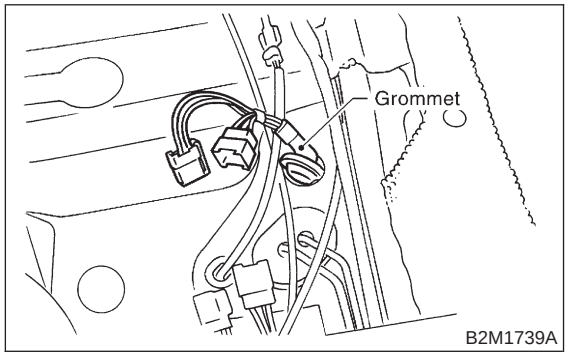
6) Move rear seat cushion forward. (Wagon model) <Ref. to 5-3 [W2A2].>


B2M1737

7) Disconnect connector of fuel tank cord from rear harness.


B2M1738

8) Push grommet which holds fuel tank cord on floor panel into under the body.

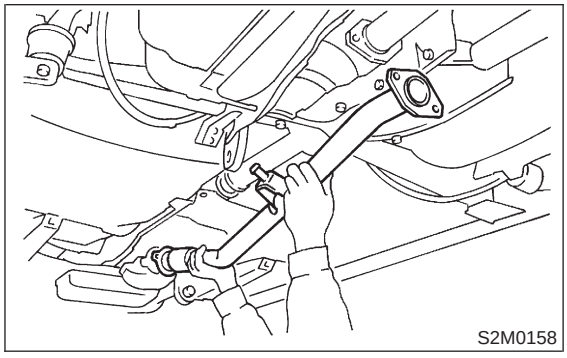


B2M1739A

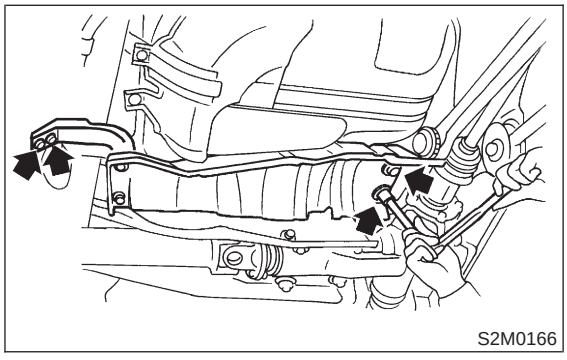
9) Lift-up the vehicle.

10) Remove rear exhaust pipe.
(1) Separate rear exhaust pipe from center exhaust pipe.
(2) Separate rear exhaust pipe from muffler.
(3) Remove bracket from rubber cushion, and remove exhaust pipe.

NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003). <Ref. to 2-9 [W3A0].>

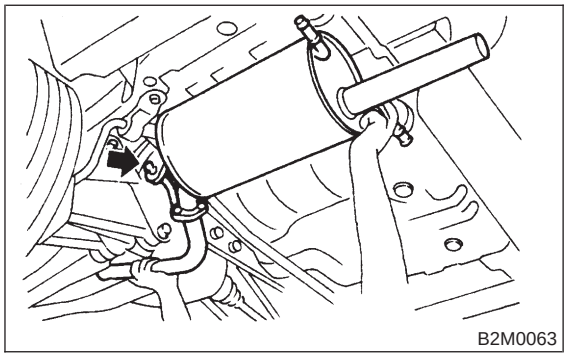

S2M0158

11) Remove heat sealed cover.

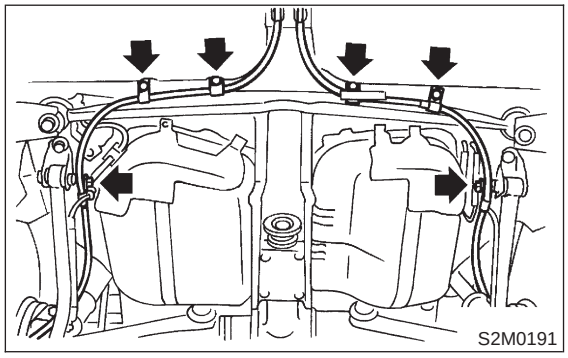

S2M0166

12) Remove muffler assembly.
<Ref. to 2-9 [W4A0].>

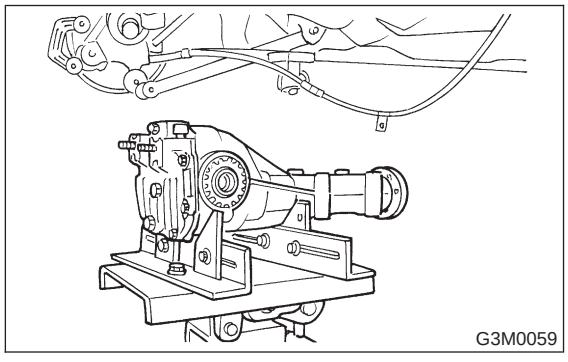
NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003).


B2M0063

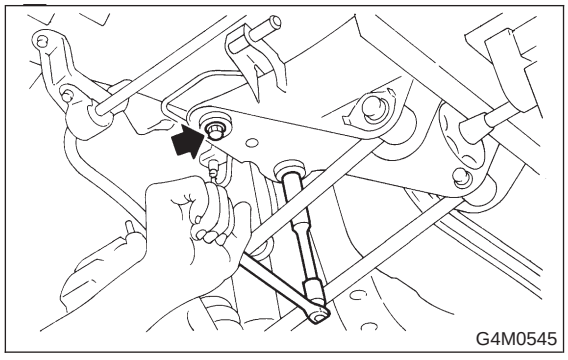
13) Remove bolts which hold parking brake cable holding bracket.


S2M0191

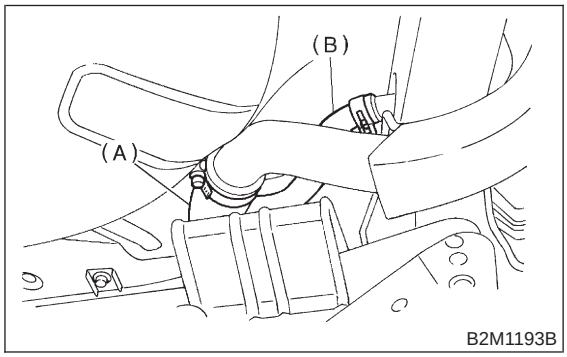
14) Remove rear differential assembly. (AWD model)
(1) Remove rear axle shafts from rear differential assembly.
(2) Remove rear differential front cover.
(3) Remove propeller shaft.
(4) Remove lower differential bracket.
(5) Set transmission jack under rear differential.
(6) Remove bolts which install rear differential onto rear crossmember.
<Ref. to 3-4 [W2B0].>


G3M0059

15) Remove rear crossmember.
- FWD model: <Ref. to 4-1 [W10A0].>
- AWD model: <Ref. to 4-1 [W11A0].>

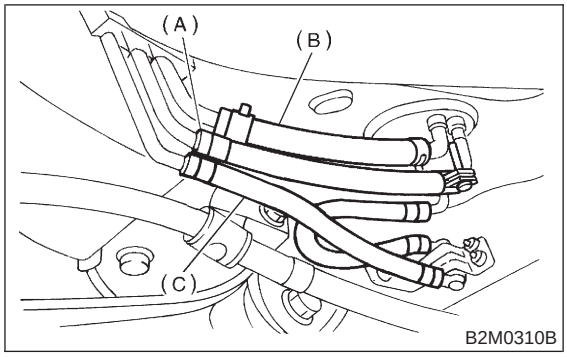

G4M0545

16) Loosen clamp, and disconnect fuel filler hose (A) and air vent hose (B) from fuel filler pipe and air vent pipe.



B2M1193B

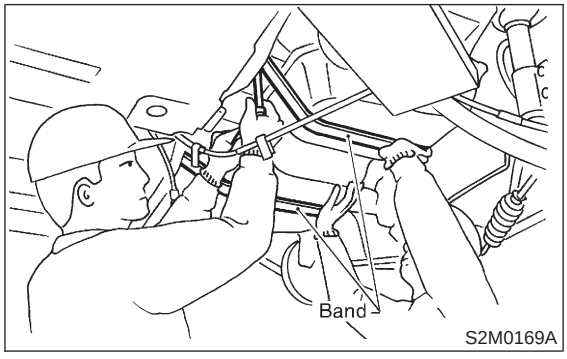
17) Loosen clamp, and then disconnect fuel delivery hose (A).
18) Move clips, and disconnect fuel return hose (B) and evaporation hose (C).



B2M0310B

19) While holding fuel tank, remove bolts from bands and dismount fuel tank.

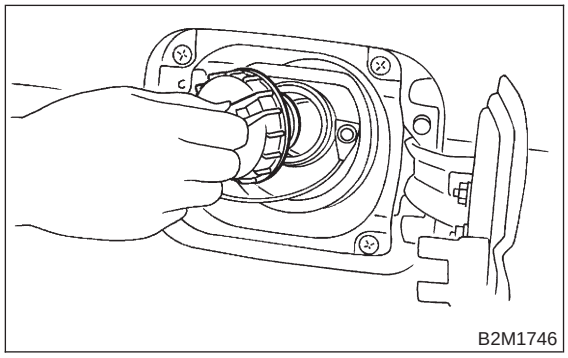
WARNING:
A helper is required to perform this work.



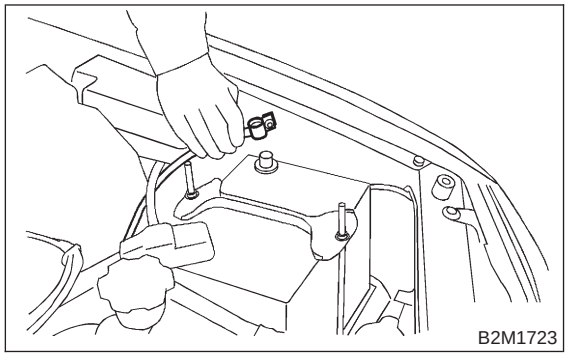
S2M0169A

2. 2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES

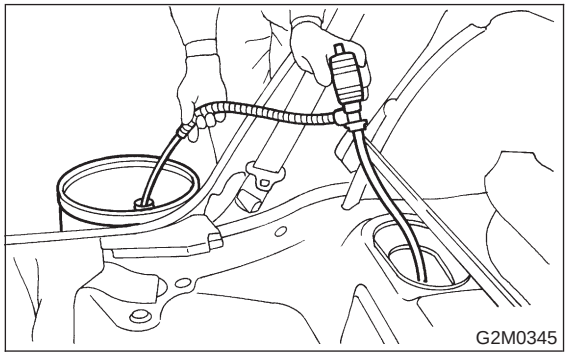
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


B2M1746

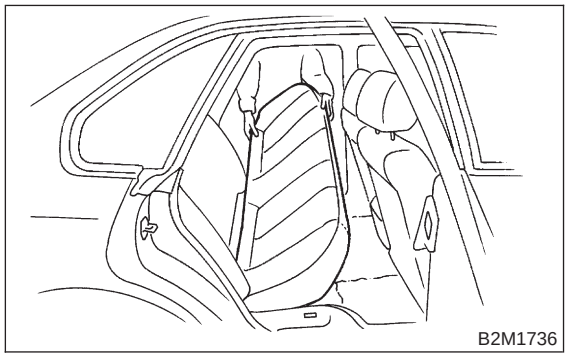
3) Disconnect battery ground cable.


B2M1723

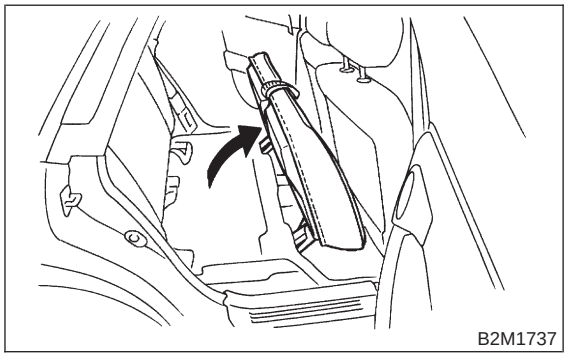
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>


G2M0345

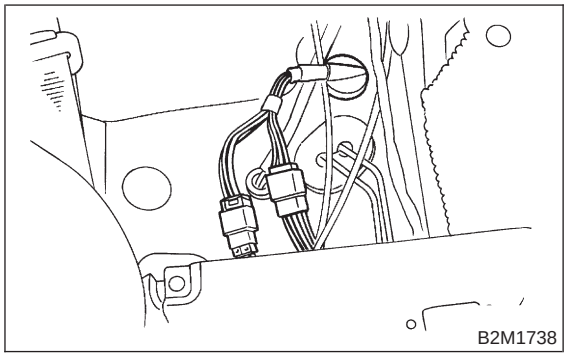
5) Remove rear seat cushion. (Sedan model) <Ref. to 5-3 [W2A1].>


B2M1736

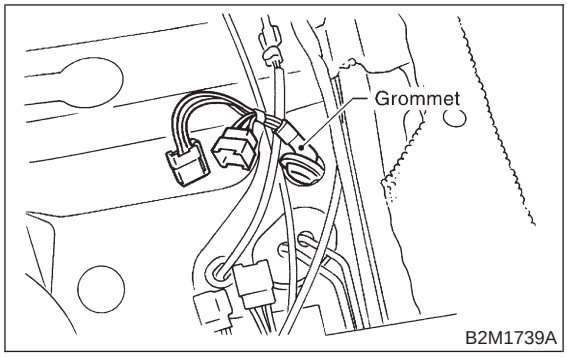
6) Move rear seat cushion forward. (Wagon model) <Ref. to 5-3 [W2A2].>


B2M1737

7) Disconnect connector of fuel tank cord from rear harness.


B2M1738

8) Push grommet which holds fuel tank cord on floor panel into under the body.

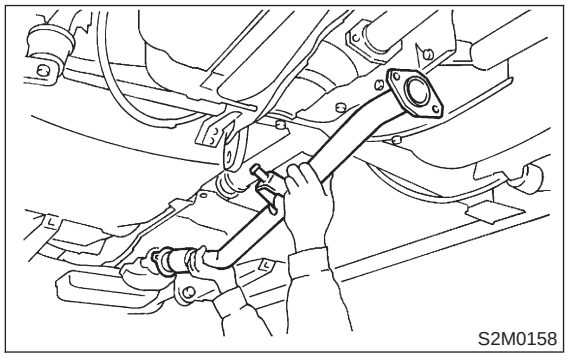


B2M1739A

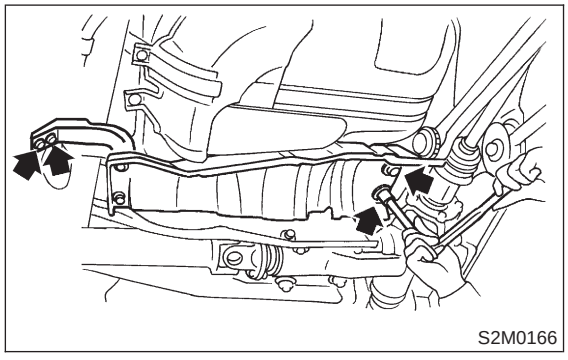
9) Lift-up the vehicle.
10) Remove rear exhaust pipe.
(1) Separate rear exhaust pipe from center exhaust pipe.
(2) Separate rear exhaust pipe from muffler.
(3) Remove bracket from rubber cushion, and remove exhaust pipe.

NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003). <Ref. to 2-9 [W3A0].>

Separate rear exhaust pipe from muffler.

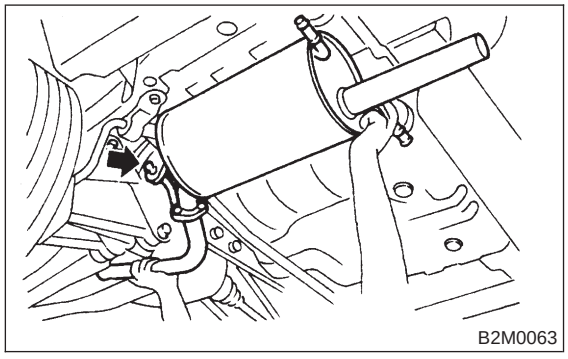

S2M0158

11) Remove heat sealed cover.

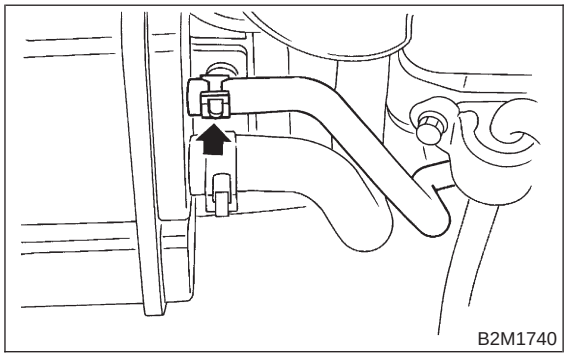

S2M0166

12) Remove muffler assembly.
<Ref. to 2-9 [W4A0].>

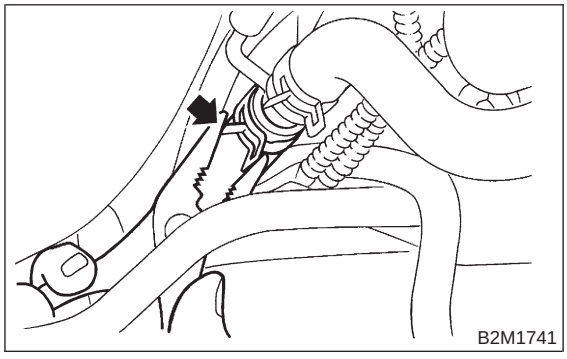
NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003).


B2M0063

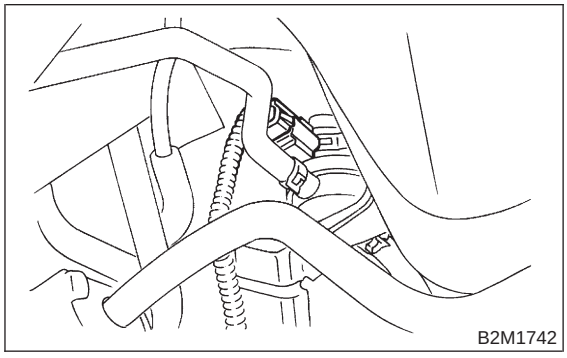
13) Move clip, and disconnect evaporation hose from canister.


B2M1740

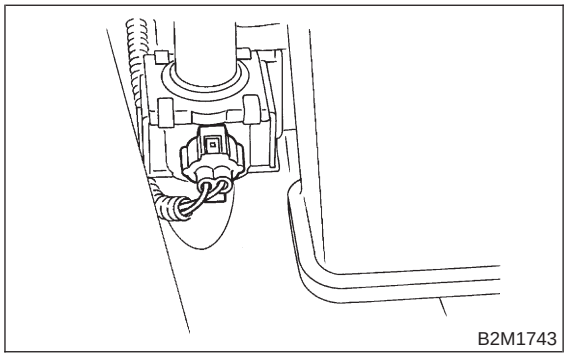
14) Disconnect hose from joint pipe.


B2M1741

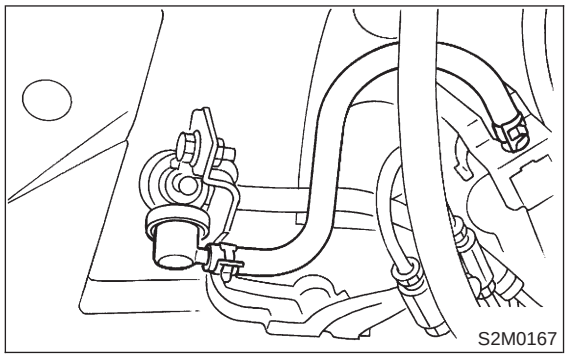
15) Disconnect connector from pressure control solenoid valve.


B2M1742

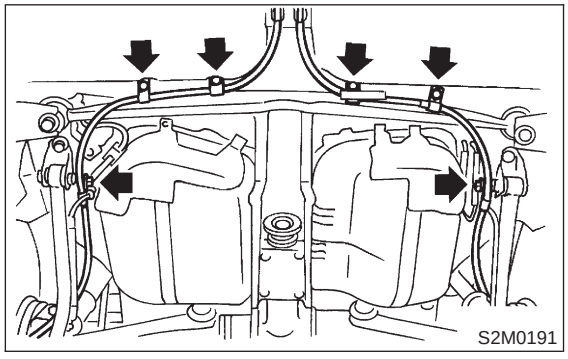
16) Disconnect connector from drain valve.


B2M1743

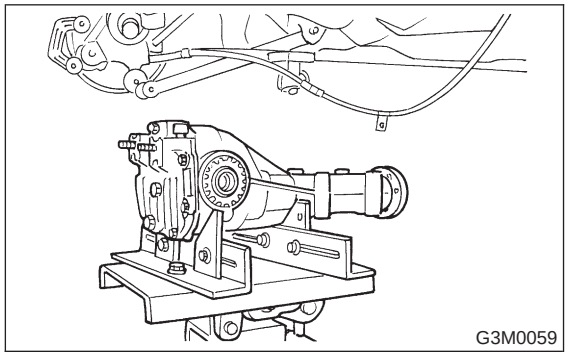
17) Disconnect hoses from roll over valve.



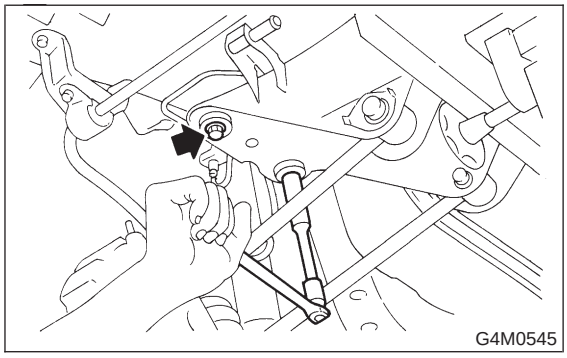
18) Remove bolts which hold parking brake cable holding bracket.



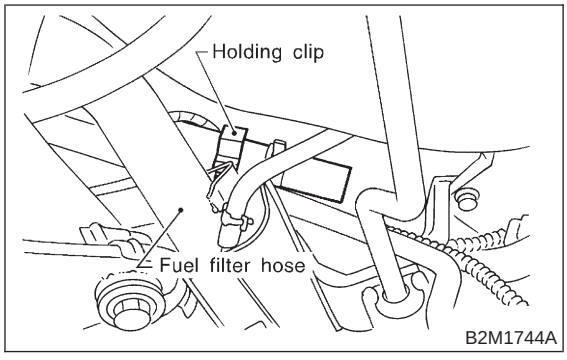
19) Remove rear differential assembly.
(1) Remove rear axle shafts from rear differential assembly.
(2) Remove rear differential front cover.
(3) Remove propeller shaft.
(4) Remove lower differential bracket.
(5) Set transmission jack under rear differential.
(6) Remove bolts which install rear differential onto rear crossmember.
<Ref. to 3-4 [W2B0].>



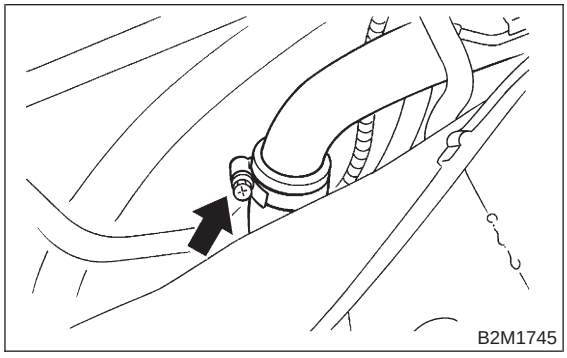
20) Remove rear crossmember.
<Ref. to 4-1 [W11A0].>



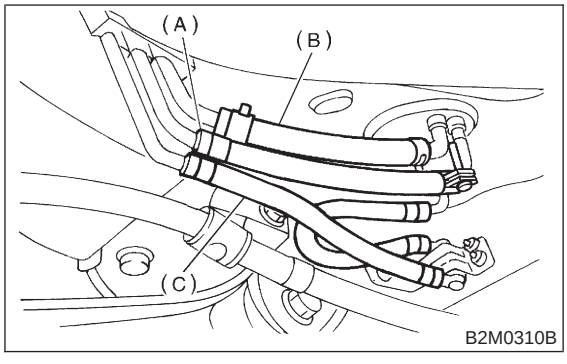
21) Remove two evaporation hoses from holding clip.



22) Loosen clamp, and disconnect fuel filler hose.

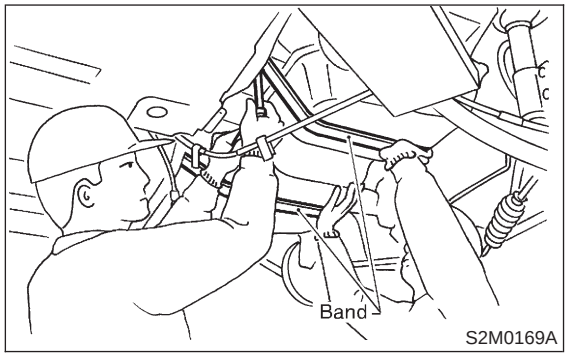


23) Loosen clamp, and then disconnect fuel delivery hose (A).
24) Move clips, and disconnect fuel return hose (B) and evaporation hose (C).



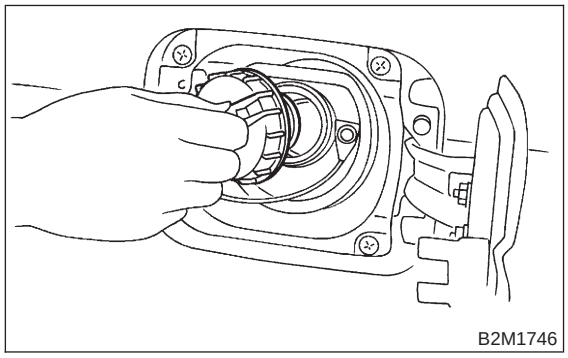
25) While holding fuel tank, remove bolts from bands and dismount fuel tank.

WARNING:
A helper is required to perform this work.

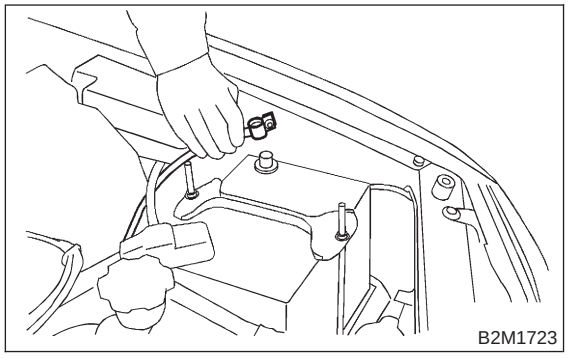


3. 2500 cc MODEL

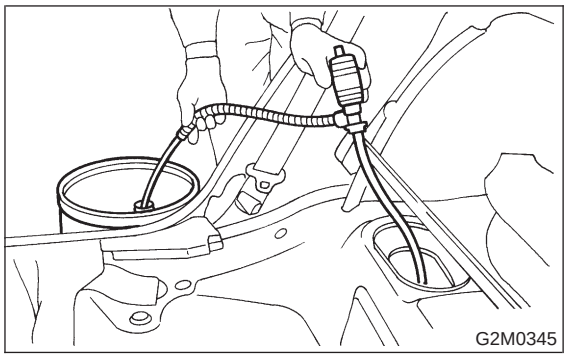
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



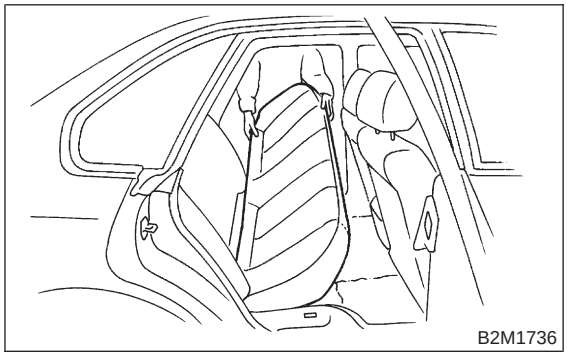
3) Disconnect battery ground cable.



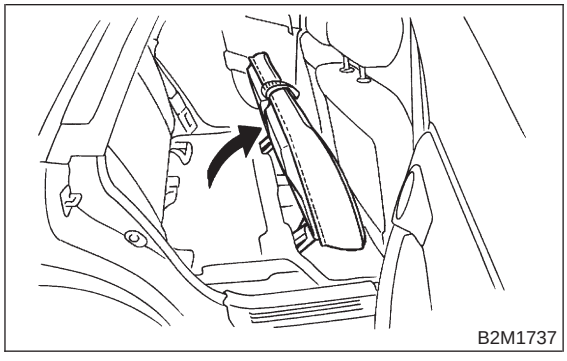
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



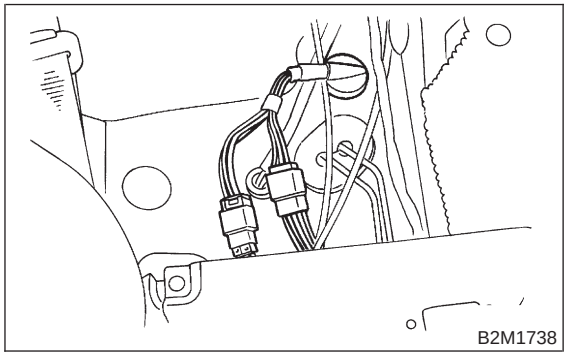
5) Remove rear seat cushion. (Sedan model) <Ref. to 5-3 [W2A1].>



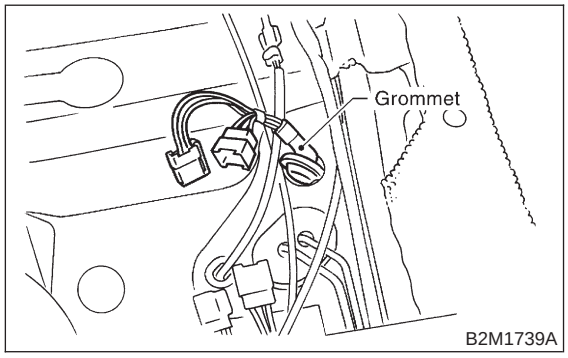
6) Move rear seat cushion forward. (Wagon model) <Ref. to 5-3 [W2A2].>



7) Disconnect connector of fuel tank cord from rear harness.

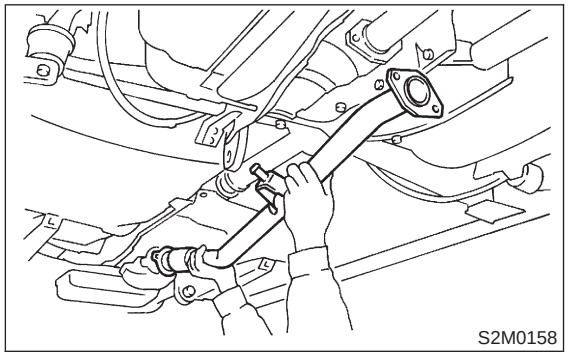


8) Push grommet which holds fuel tank cord on floor panel into under the body.

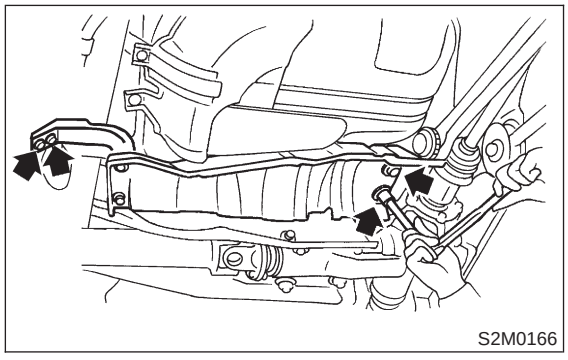


9) Lift-up the vehicle.
10) Remove rear exhaust pipe.
(1) Separate rear exhaust pipe from center exhaust pipe.
(2) Separate rear exhaust pipe from muffler.
(3) Remove bracket from rubber cushion, and remove exhaust pipe.

NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003). <Ref. to 2-9 [W3A0].>

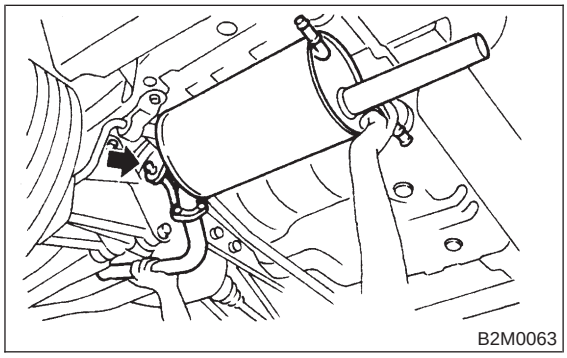


11) Remove heat sealed cover.

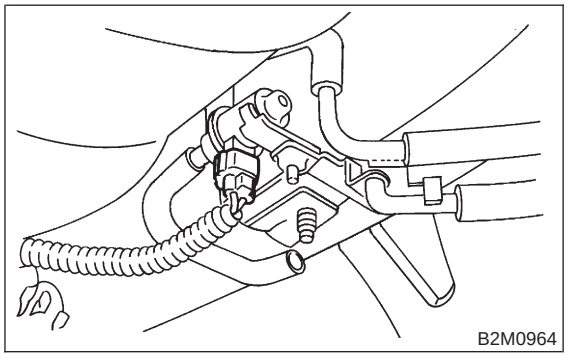


12) Remove muffler assembly.
<Ref. to 2-9 [W4A0].>

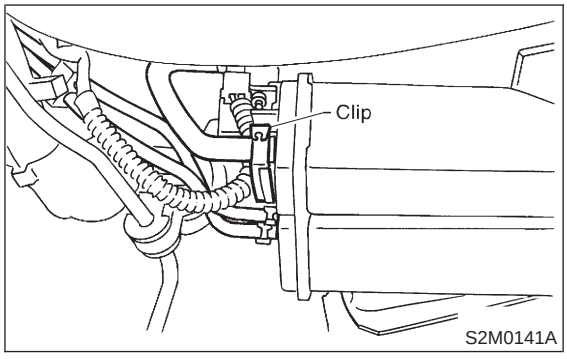
NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003).



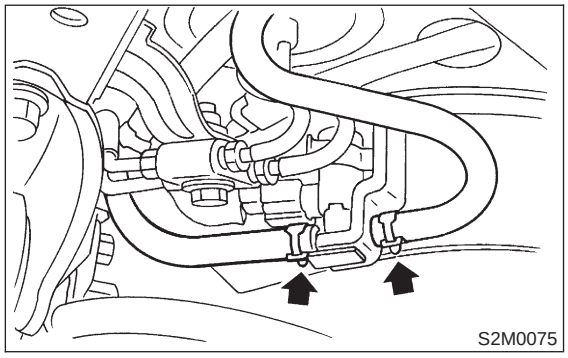
13) Disconnect connector from vent control solenoid valve.



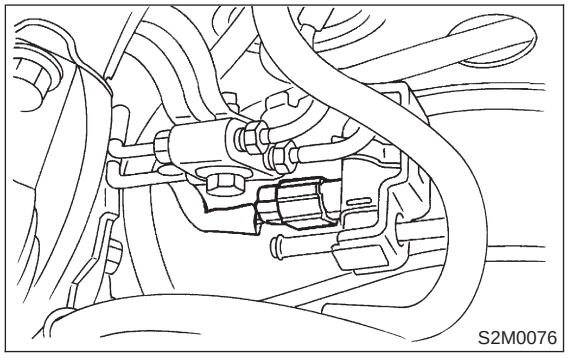
14) Remove clip, and disconnect evaporation hose from canister.



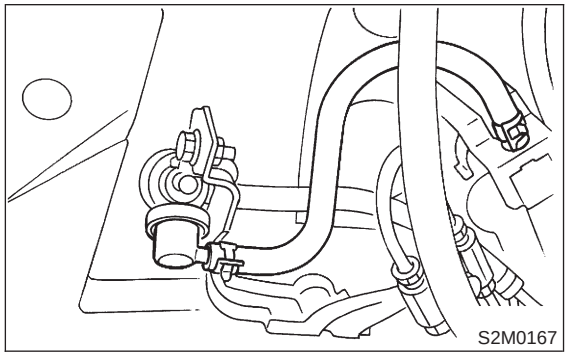
15) Disconnect hoses from pressure control solenoid valve.



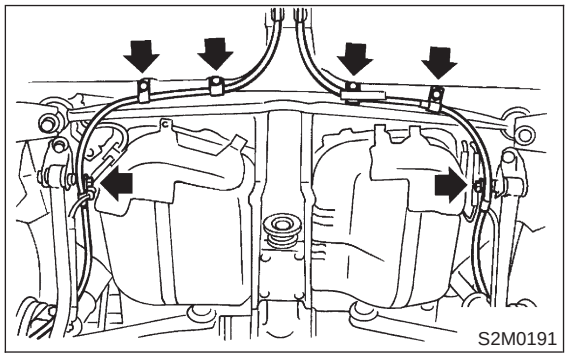
16) Disconnect connector of pressure control solenoid valve.



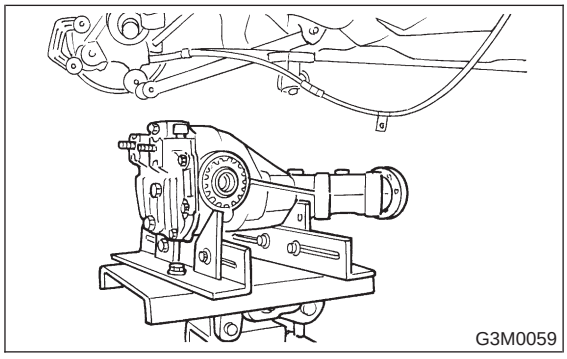
17) Disconnect hoses from roll over valve.



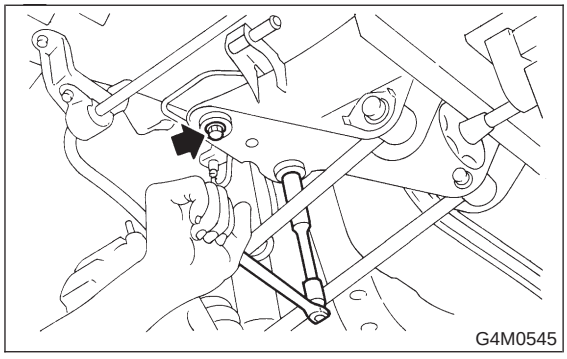
18) Remove bolts which hold parking brake cable holding bracket.



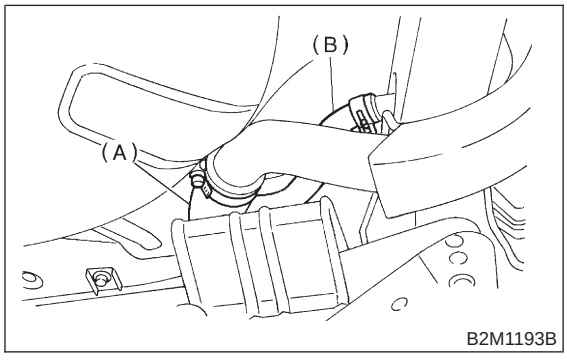
19) Remove rear differential assembly.
(1) Remove rear axle shafts from rear differential assembly.
(2) Remove rear differential front cover.
(3) Remove propeller shaft.
(4) Remove lower differential bracket.
(5) Set transmission jack under rear differential.
(6) Remove bolts which install rear differential onto rear crossmember.
<Ref. to 3-4 [W2B0].>



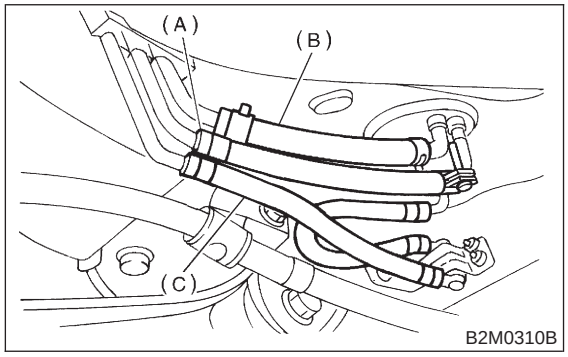
20) Remove rear crossmember.
<Ref. to 4-1 [W11A0].>



21) Loosen clamp, and disconnect fuel filler hose (A) and air vent hose (B) from fuel filler pipe and air vent pipe.

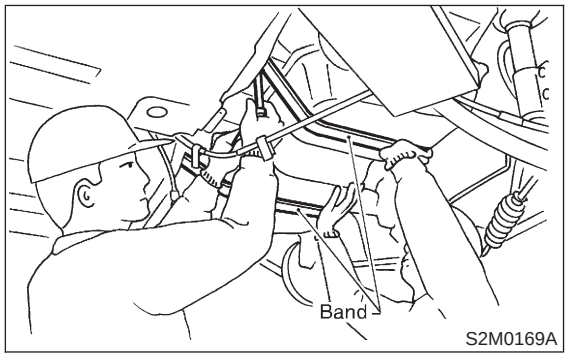


22) Loosen clamp, and then disconnect fuel delivery hose (A).
23) Move clips, and disconnect fuel return hose (B) and evaporation hose (C).



24) While holding fuel tank, remove bolts from bands and dismount fuel tank.

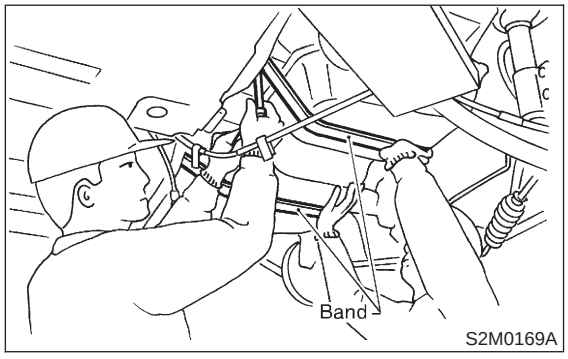
WARNING:
A helper is required to perform this work.



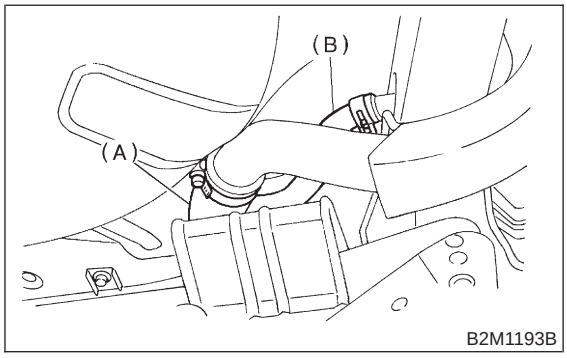
B: INSTALLATION

1. 2200 cc FWD AND TAIWAN SPEC. VEHICLES

1) While a helper holds fuel tank, push fuel tank harness into access hole with grommet.
2) Set fuel tank, and temporary tighten bolts for installing fuel tank bands.



3) Connect fuel filler hose (A) and air vent hose (B).



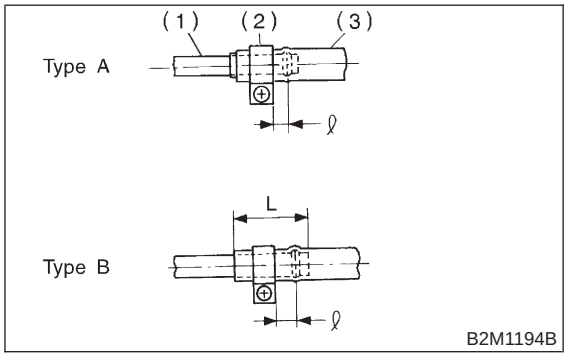
4) Install hose and hold down clips at positions indicated in Figure.

Tightening torque:
$1.0^{+0.5}/_{-0}$ N·m ($0.1^{+0.05}/_{-0}$ kg-m, $0.7^{+0.4}/_{-0}$ ft-lb)

Type A: When fitting length is specified.
Type B: When fitting length is not specified.

ℓ : 1.0 — 4.0 mm (0.039 — 0.157 in)

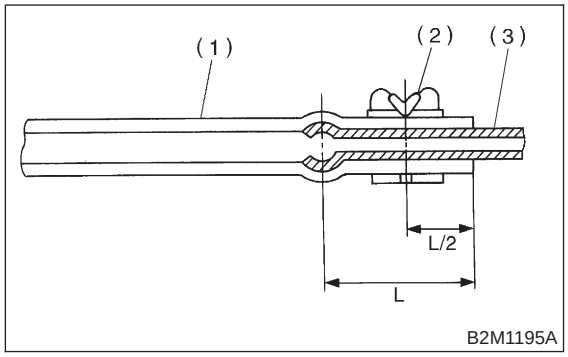
L: 20 — 25 mm (0.79 — 0.98 in)



(1) Fitting
(2) Clamp
(3) Hose

Fuel return hose:
L = 20 — 25 mm (0.79 — 0.98 in)

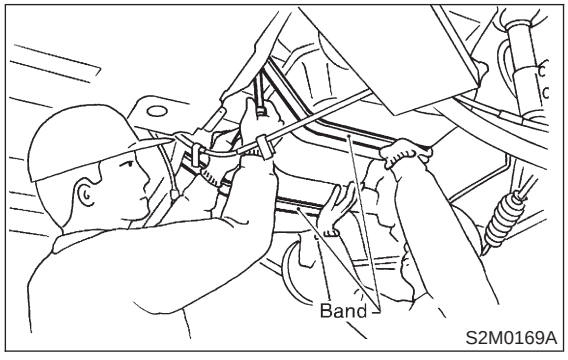
Evaporation hose:
L = 15 — 20 mm (0.59 — 0.79 in)



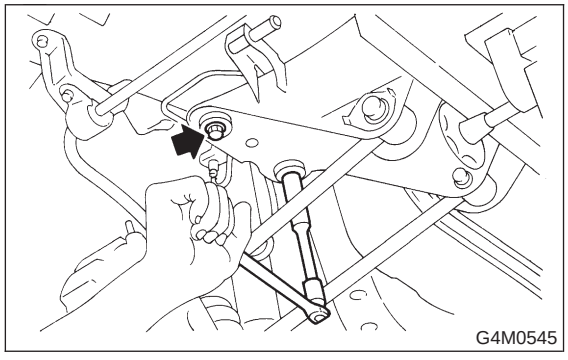
(1) Hose
(2) Clip
(3) Pipe

5) Tighten band mounting bolts.

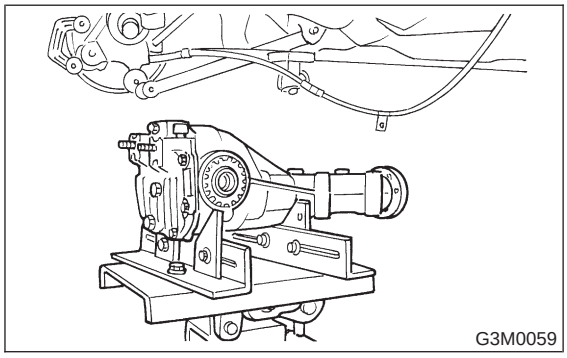
Tightening torque:
33±10 N·m (3.4±1.0 kg-m, 25±7 ft-lb)



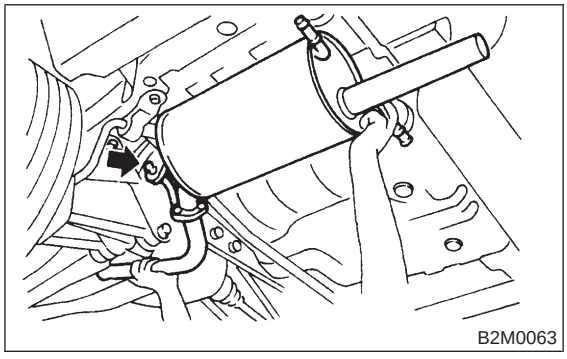
6) Install rear crossmember.
- FWD model: <Ref. to 4-1 [W10C0].>
- AWD model: <Ref. to 4-1 [W11C0].>



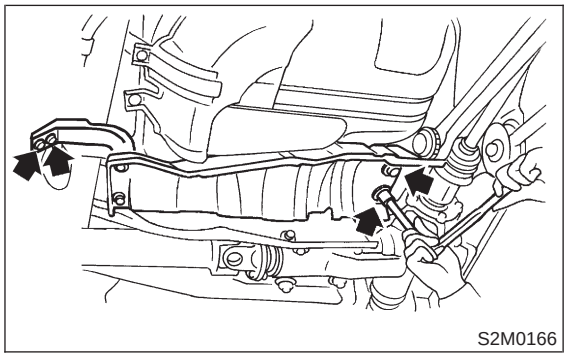
7) Install rear differential assembly. (AWD model) <Ref. to 3-4 [W2F0].>



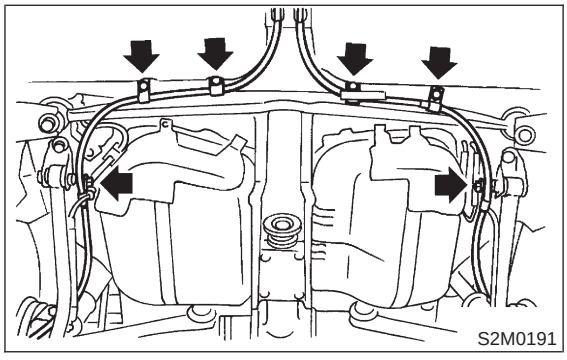
8) Install muffler assembly. <Ref. to 2-9 [W4A0].>



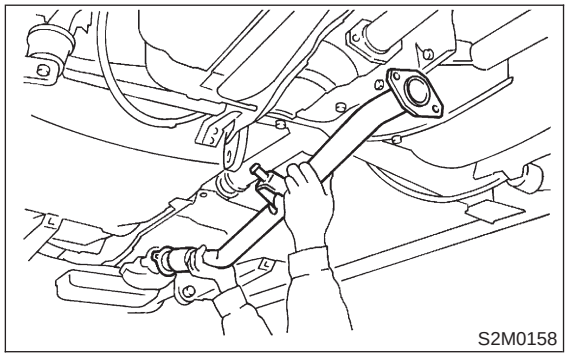
9) Install heat sealed cover.



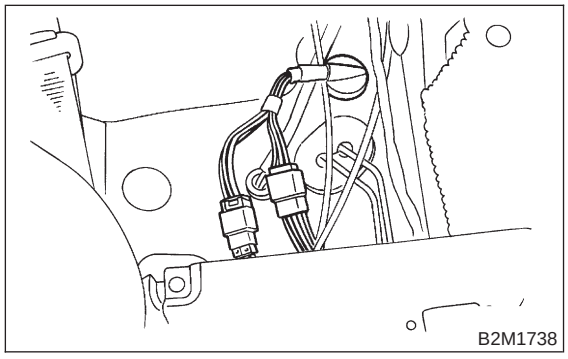
10) Install bolts which hold parking brake holding bracket.



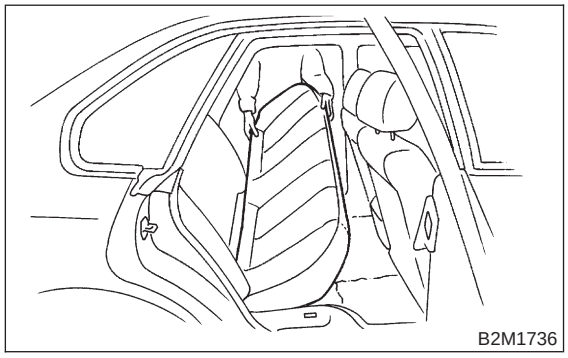
11) Install rear exhaust pipe. <Ref. to 2-9 [W3B0].>


S2M0158

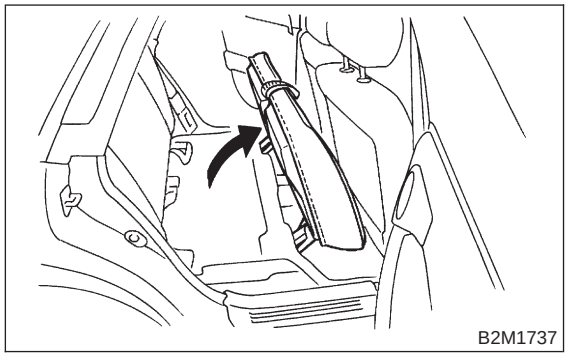
12) Lower the vehicle.
13) Connect connectors to fuel tank harness, and plug access hole with grommet.


B2M1738

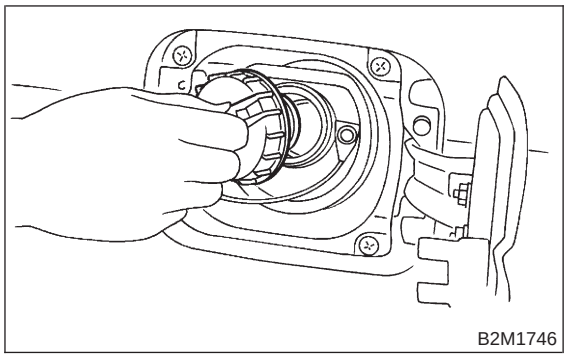
14) Install rear seat cushion. (Sedan model) <Ref. to 5-3 [W2B1].>


B2M1736

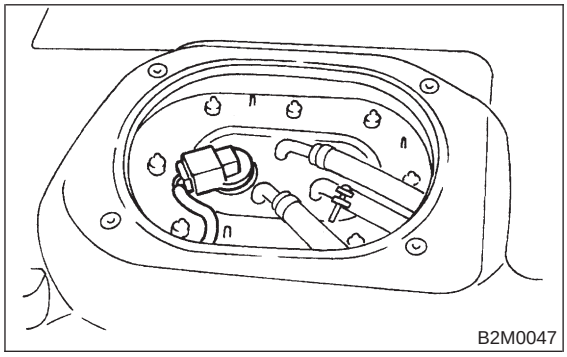
15) Set rear seat cushion. (Wagon model) <Ref. to 5-3 [W2B2].>


B2M1737

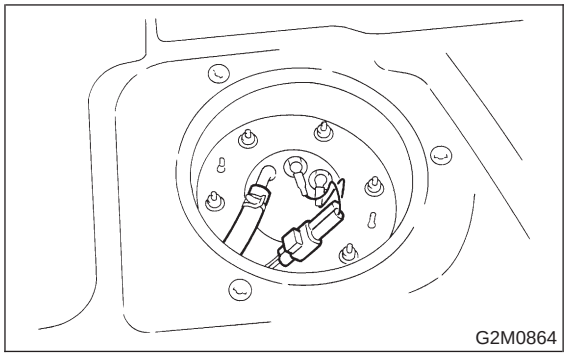
16) Install fuel filler cap.


B2M1746

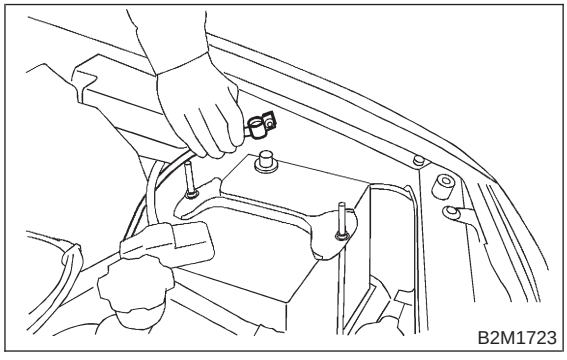
17) Install fuel pump, and connect connector and fuel hoses. <Ref. to 2-8 [W5C0].>


B2M0047

18) Install fuel sub meter unit, and connect connector and jet pump hose. (AWD model only) <Ref. to 2-8 [W9A0].>

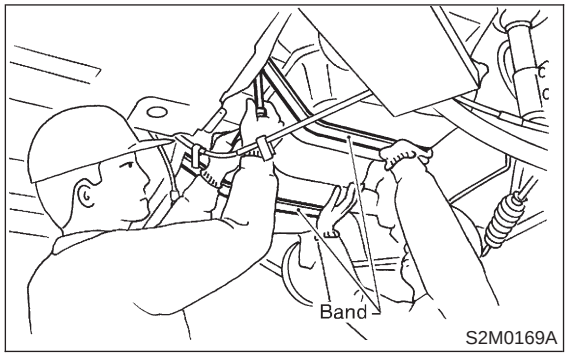

G2M0864

19) Connect battery ground cable.

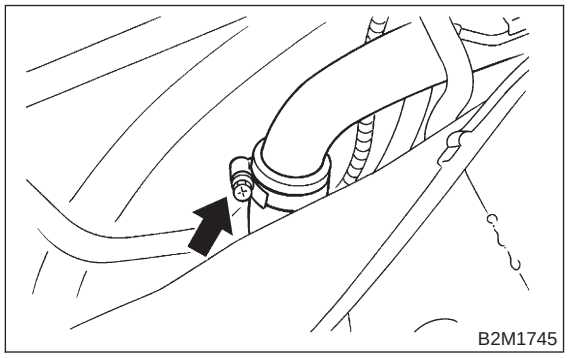

B2M1723

2. 2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES

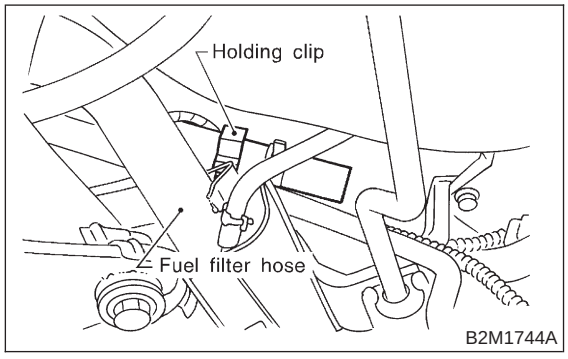
1) While a helper holds fuel tank, push fuel tank harness into access hole with grommet.
2) Set fuel tank, and temporary tighten bolts for installing fuel tank bands.



3) Connect fuel filler hose, and tighten clamp.



4) Install two evaporation hoses to holding clip.



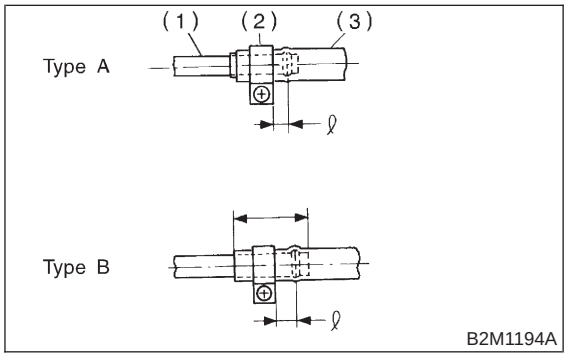
5) Install hose and hold down clips at positions indicated in Figure.

Tightening torque:
$1.0^{+0.5}/_{-0}$ N·m ($0.1^{+0.05}/_{-0}$ kg-m, $0.7^{+0.4}/_{-0}$ ft-lb)

Type A: When fitting length is specified.
Type B: When fitting length is not specified.

ℓ : 1.0 — 4.0 mm (0.039 — 0.157 in)

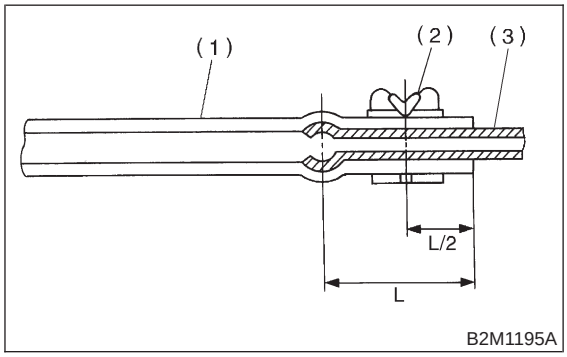
L: 20 — 25 mm (0.79 — 0.98 in)



(1) Fitting
(2) Clamp
(3) Hose

Fuel return hose:
L = 20 — 25 mm (0.79 — 0.98 in)

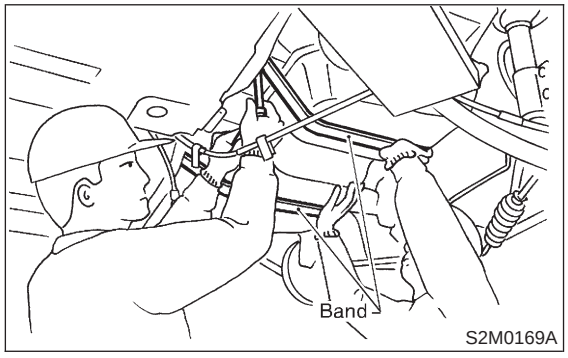
Evaporation hose:
L = 15 — 20 mm (0.59 — 0.79 in)



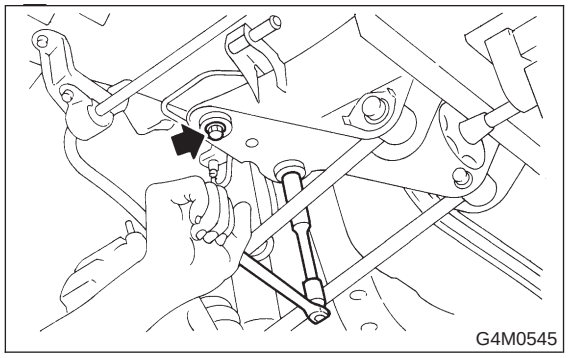
(1) Hose
(2) Clip
(3) Pipe

6) Tighten band mounting bolts.

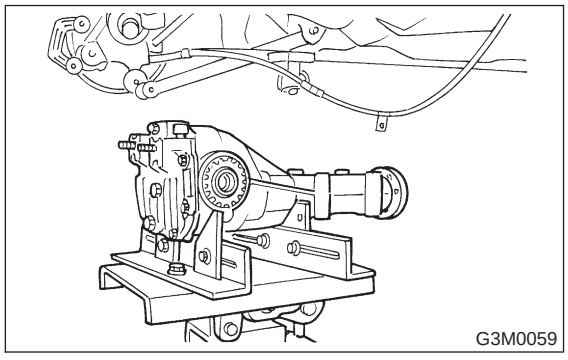
Tightening torque:
33±10 N·m (3.4±1.0 kg-m, 25±7 ft-lb)



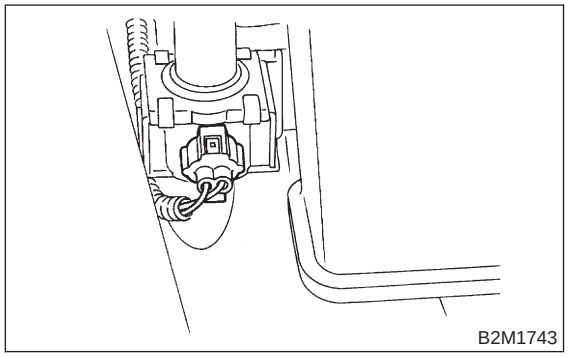
7) Install rear crossmember. <Ref. to 4-1 [W11C0].>



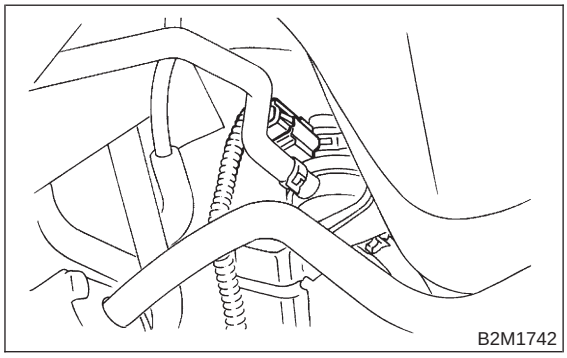
8) Install rear differential assembly. <Ref. to 3-4 [W2F0].>



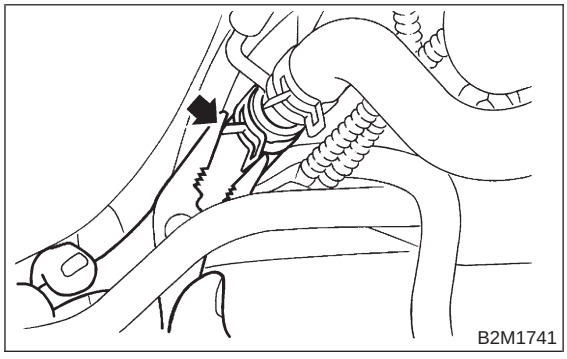
9) Connect connector to drain valve.



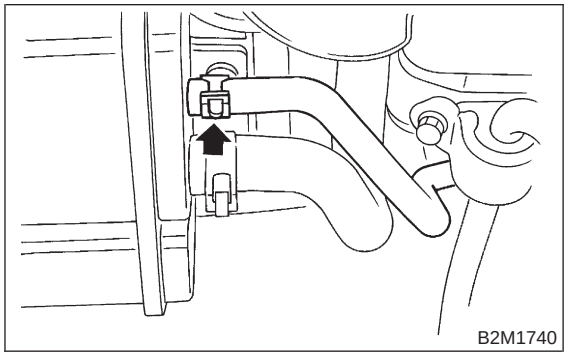
10) Connect connector to pressure control solenoid valve.



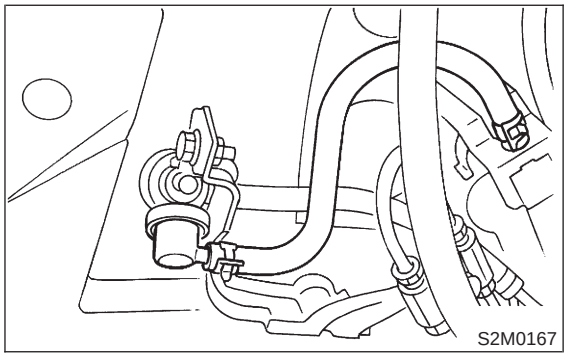
11) Connect hose to joint pipe.



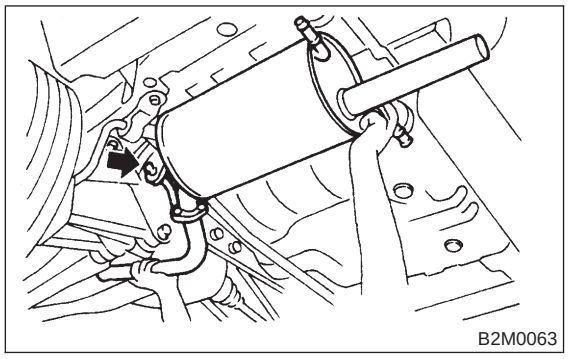
12) Connect evaporation hose to canister, and hold them with clip.



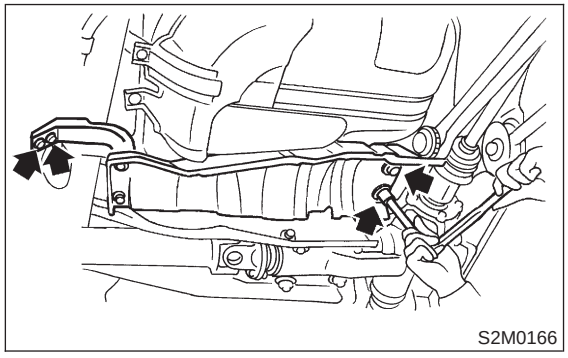
13) Connect hoses to roll over valve.



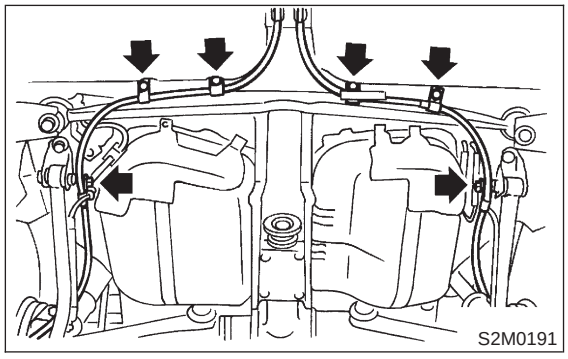
14) Install muffler assembly. <Ref. to 2-9 [W4A0].>



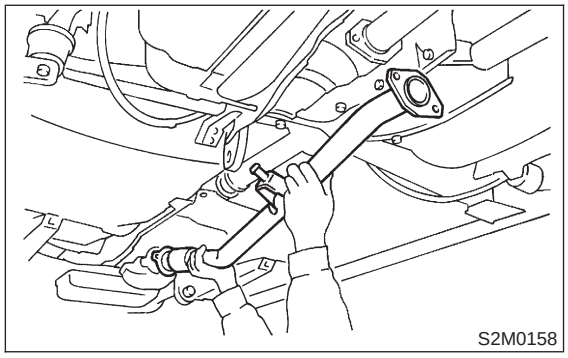
15) Install heat sealed cover.



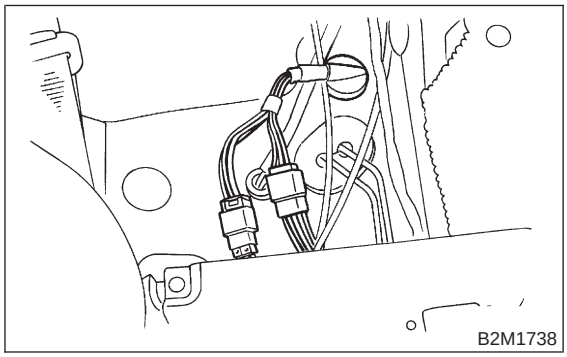
16) Install bolts which hold parking brake holding bracket.



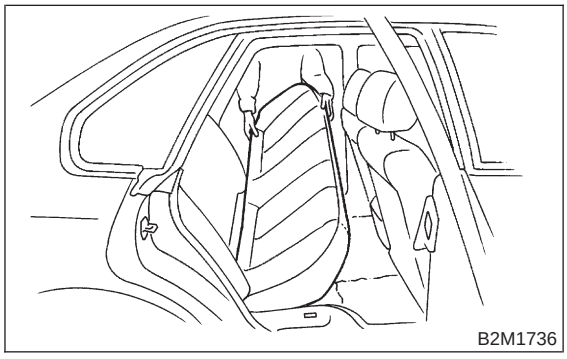
17) Install rear exhaust pipe. <Ref. to 2-9 [W3B0].>



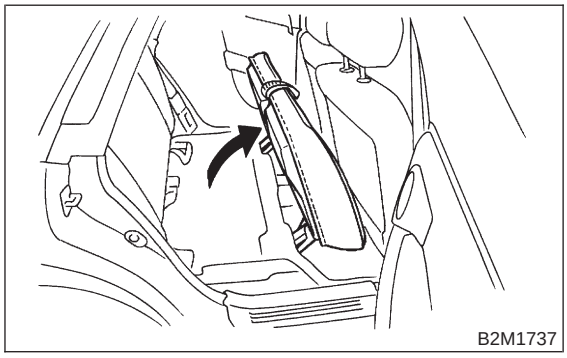
18) Lower the vehicle.
19) Connect connectors to fuel tank harness, and plug access hole with grommet.



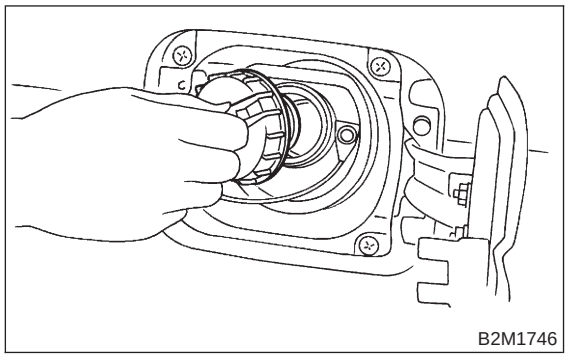
20) Install rear seat cushion. (Sedan model) <Ref. to 5-3 [W2B1].>



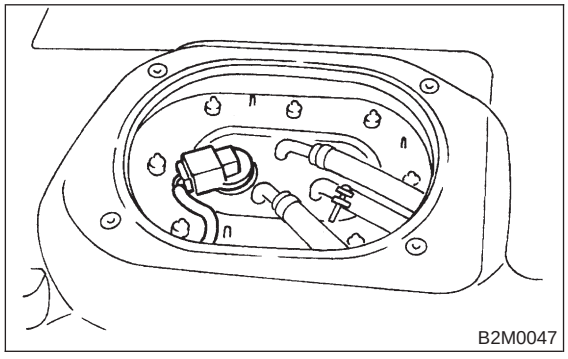
21) Set rear seat cushion. (Wagon model) <Ref. to 5-3 [W2B2].>



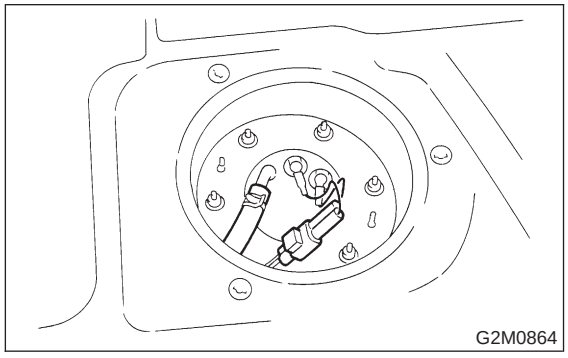
22) Install fuel filler cap.


B2M1746

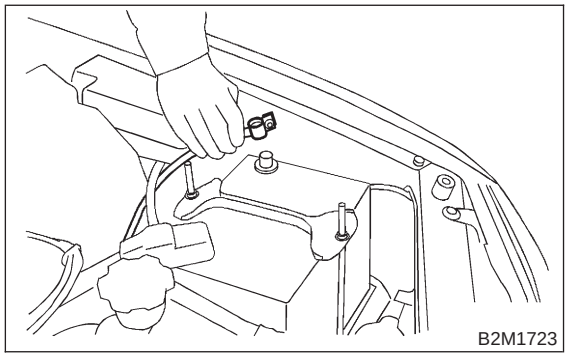
23) Install fuel pump, and connect connector and fuel hoses. <Ref. to 2-8 [W5C0].>


B2M0047

24) Install fuel sub meter unit, and connect connector and jet pump hose. <Ref. to 2-8 [W9A0].>

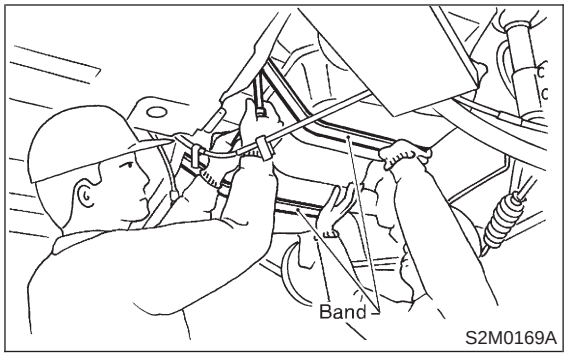

G2M0864

25) Connect battery ground cable.


B2M1723

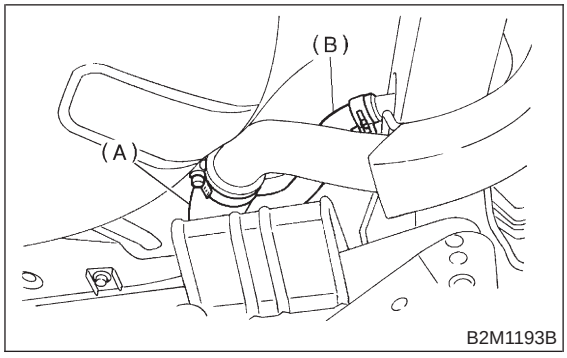
3. 2500 cc MODEL

1) While a helper holds fuel tank, push fuel tank harness into access hole with grommet.
2) Set fuel tank, and temporary tighten bolts for installing fuel tank bands.



S2M0169A

3) Connect fuel filler hose (A) and air vent hose (B).



B2M1193B

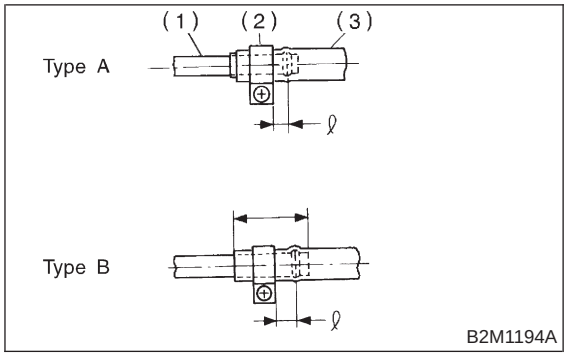
4) Install hose and hold down clips at positions indicated in Figure.

Tightening torque:
$1.0^{+0.5}/_{-0}$ N·m ($0.1^{+0.05}/_{-0}$ kg-m, $0.7^{+0.4}/_{-0}$ ft-lb)

Type A: When fitting length is specified.
Type B: When fitting length is not specified.

ℓ : 1.0 — 4.0 mm (0.039 — 0.157 in)

L: 20 — 25 mm (0.79 — 0.98 in)

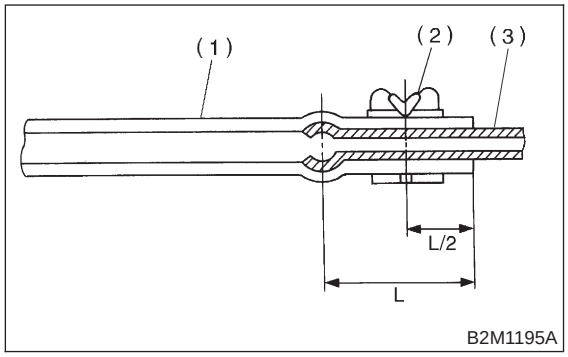


B2M1194A

(1) Fitting
(2) Clamp
(3) Hose

Fuel return hose:
L = 20 — 25 mm (0.79 — 0.98 in)

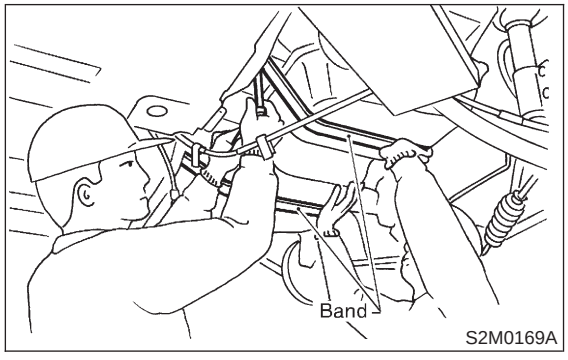
Evaporation hose:
L = 15 — 20 mm (0.59 — 0.79 in)



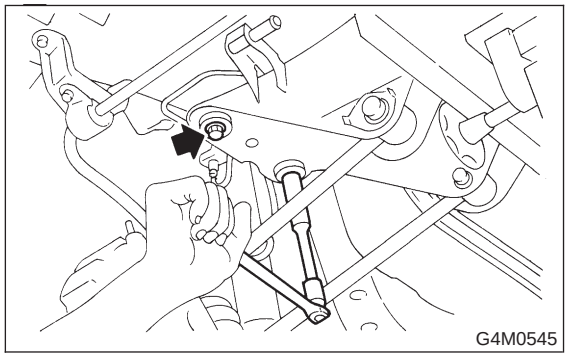
(1) Hose
(2) Clip
(3) Pipe

5) Tighten band mounting bolts.

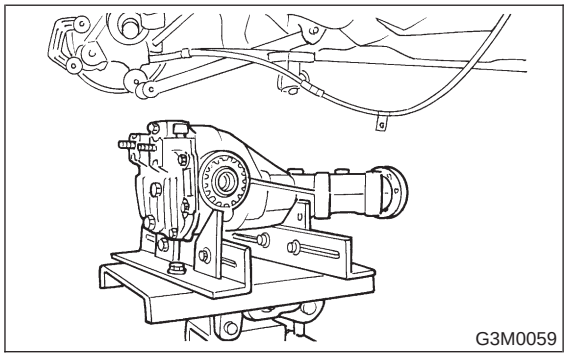
Tightening torque:
33±10 N·m (3.4±1.0 kg-m, 25±7 ft-lb)



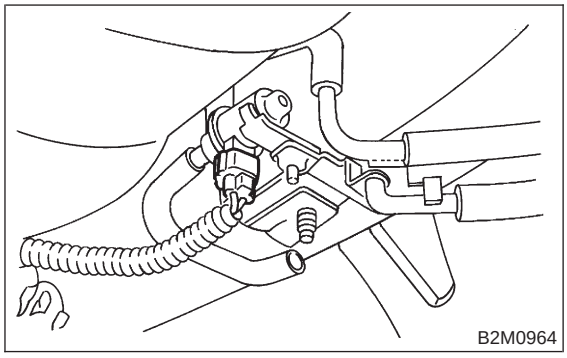
6) Install rear crossmember. <Ref. to 4-1 [W11C0].>



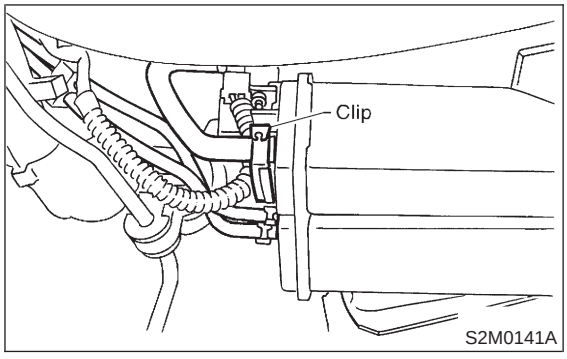
7) Install rear differential assembly. <Ref. to 3-4 [W2F0].>



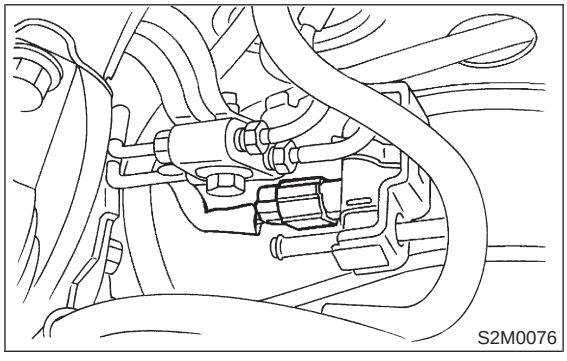
8) Connect connector to vent control solenoid valve.



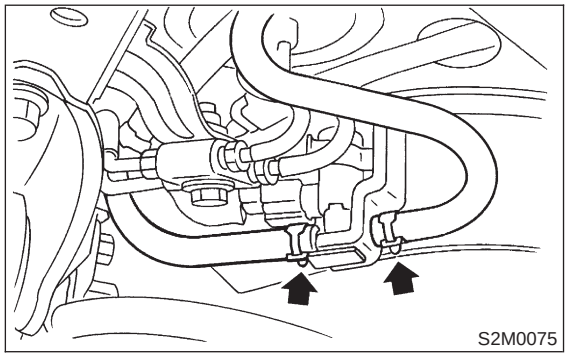
9) Connect evaporation hose to canister, and hold them with clip.



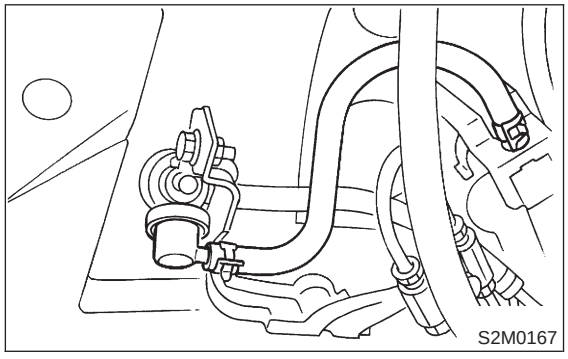
10) Connect connector to pressure control solenoid valve.



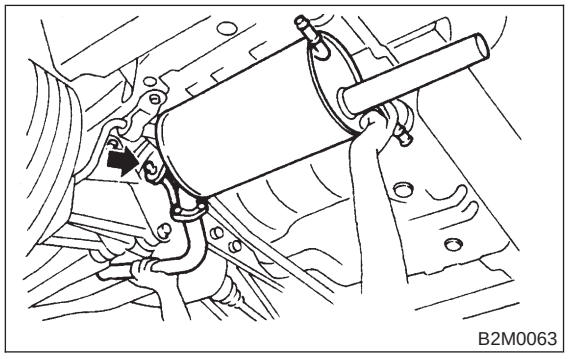
11) Connect hoses to pressure control solenoid valve.


S2M0075

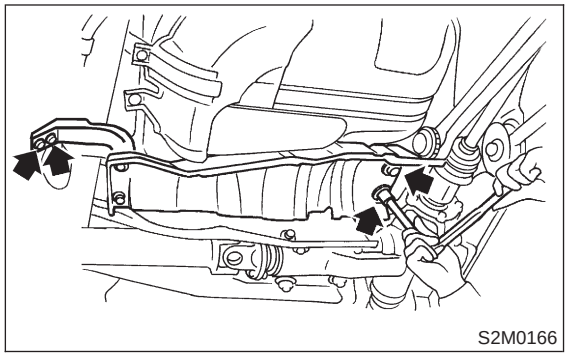
12) Connect hoses to roll over valve.


S2M0167

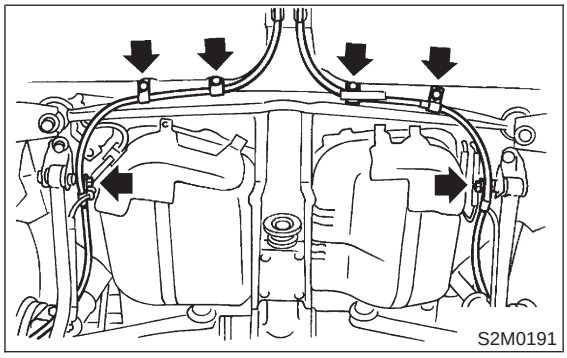
13) Install muffler assembly. <Ref. to 2-9 [W4A0].>


B2M0063

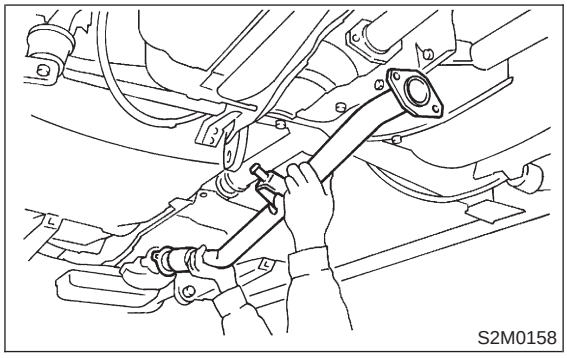
14) Install heat sealed cover.


S2M0166

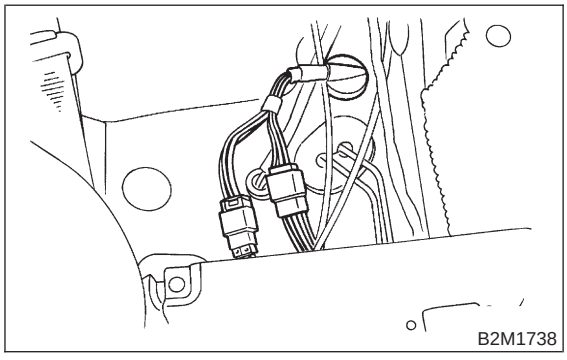
15) Install bolts which hold parking brake holding bracket.


S2M0191

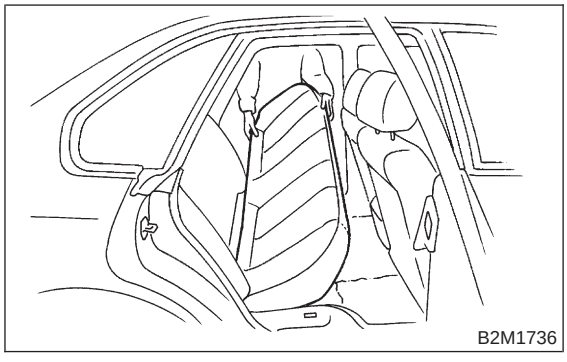
16) Install rear exhaust pipe. <Ref. to 2-9 [W3B0].>


S2M0158

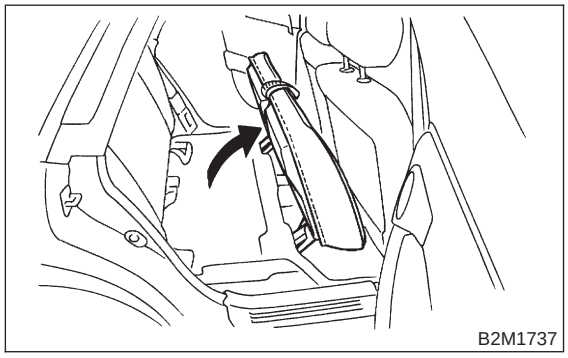
17) Lower the vehicle.
18) Connect connectors to fuel tank harness, and plug access hole with grommet.


B2M1738

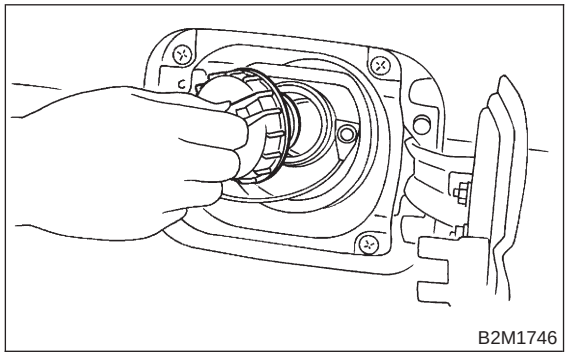
19) Install rear seat cushion. (Sedan model) <Ref. to 5-3 [W2B1].>


B2M1736

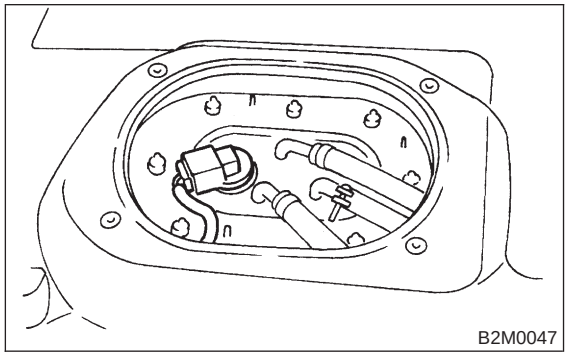
20) Set rear seat cushion. (Wagon model) <Ref. to 5-3 [W2B2].>


B2M1737

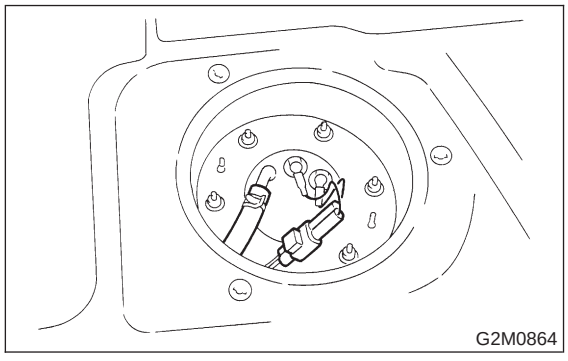
21) Install fuel filler cap.


B2M1746

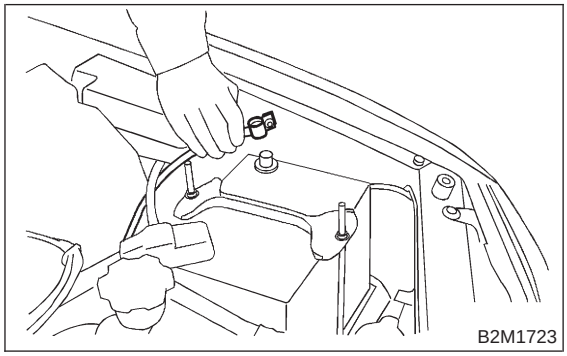
22) Install fuel pump, and connect connector and fuel hoses. <Ref. to 2-8 [W5C0].>


B2M0047

23) Install fuel sub meter unit, and connect connector and jet pump hose. <Ref. to 2-8 [W9A0].>


G2M0864

24) Connect battery ground cable.

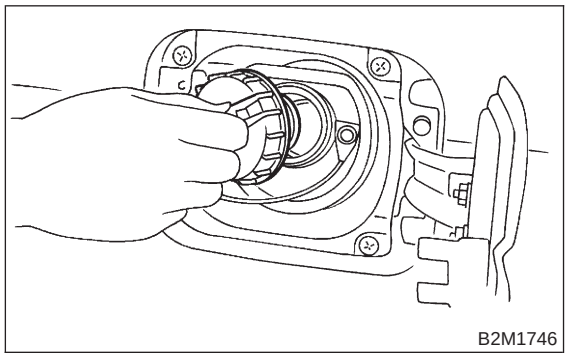

B2M1723

3. Fuel Filler Pipe

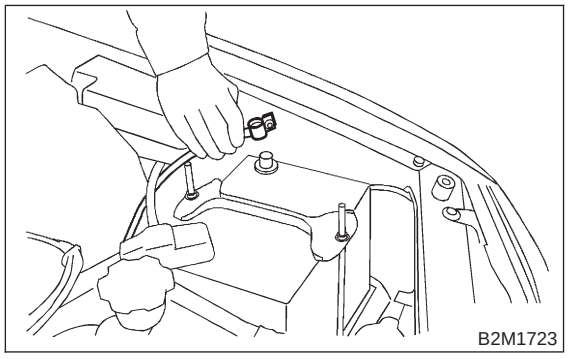
A: REMOVAL

1. 2200 cc FWD MODEL, 2500 cc MODEL AND TAIWAN SPEC. VEHICLES

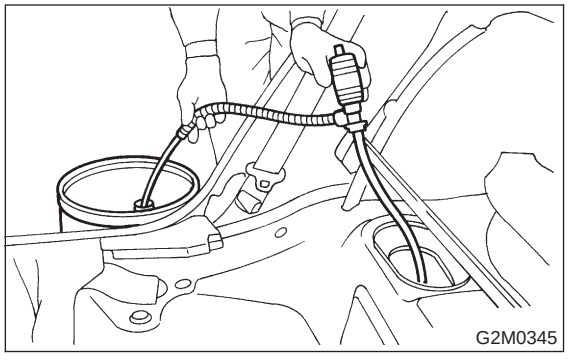
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


B2M1746

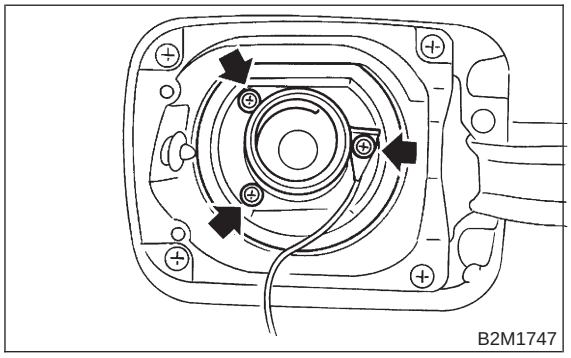
3) Disconnect battery ground cable.


B2M1723

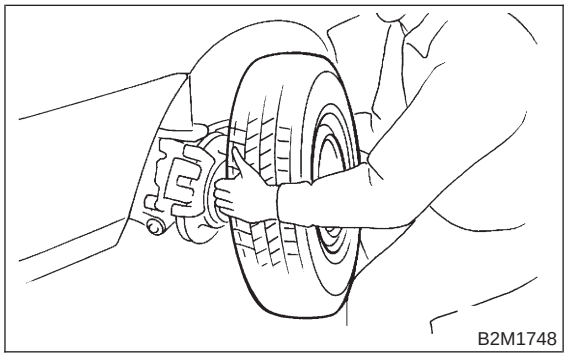
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>


G2M0345

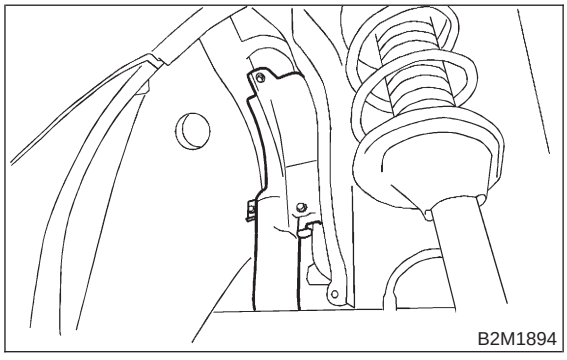
5) Remove screws which install fuel filler pipe on filler lid open.


B2M1747

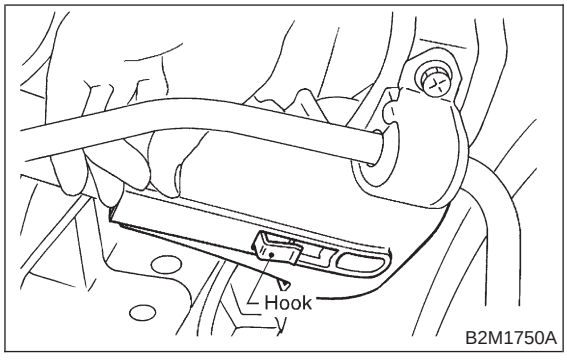
6) Remove wheel nuts of rear right side.
7) Lift-up the vehicle.
8) Remove rear right side wheel.


B2M1748

9) Remove bolts which install protector cover on body.

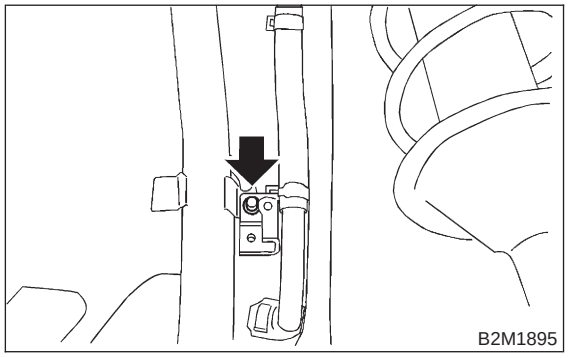

B2M1894

10) While releasing the under side of protector cover from hook, remove it.

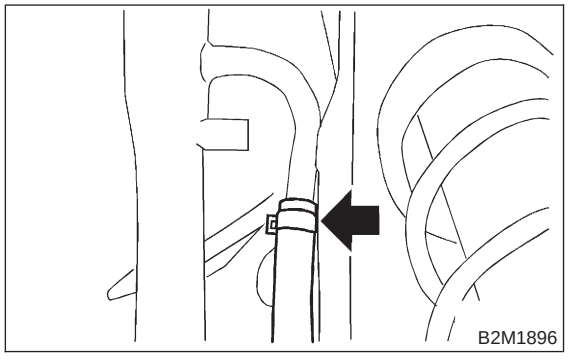


B2M1750A

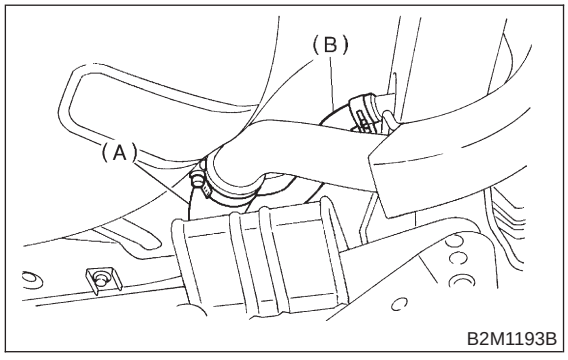
11) Remove bolts which hold fuel filler pipe bracket.



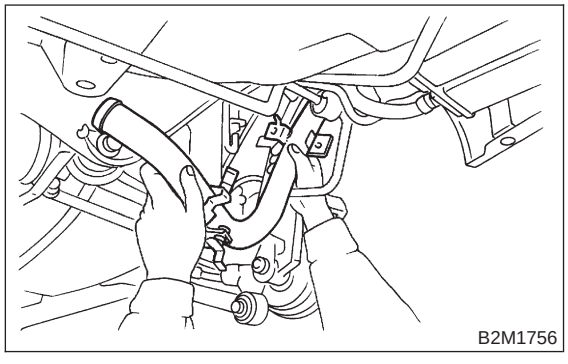
12) Move clip, and disconnect air vent hose from air vent pipe.



13) Loosen clamp, and separate air vent hose (B) and fuel filler hose (A) from air vent and fuel filler pipe.

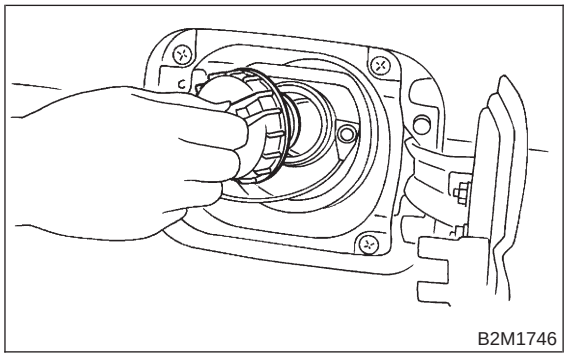


14) Remove fuel filler pipe to under side of the vehicle.

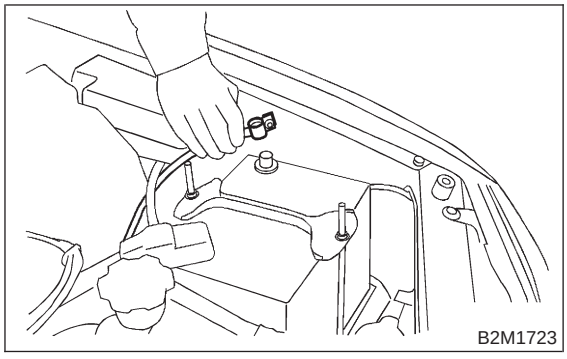


2. 2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES

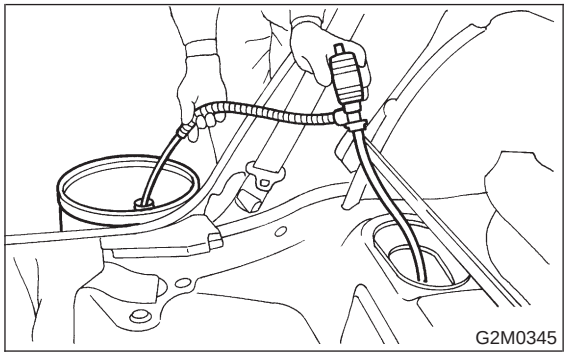
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



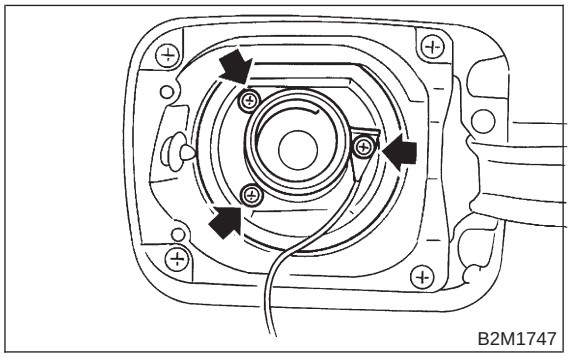
3) Disconnect battery ground cable.



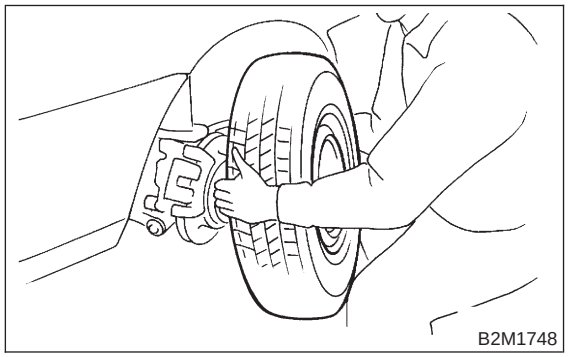
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



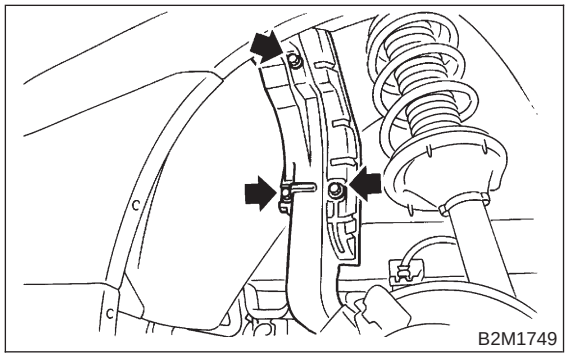
5) Remove screws which install fuel filler pipe on filler lid open.



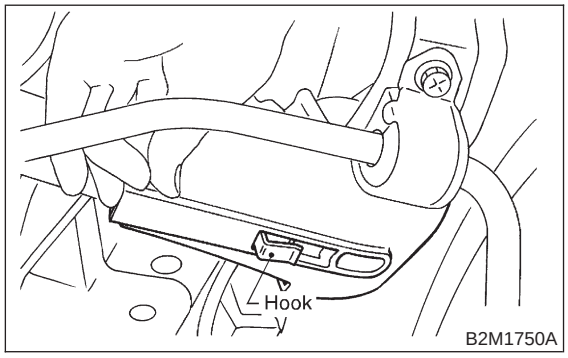
6) Remove wheel nuts of rear right side.
7) Lift-up the vehicle.
8) Remove rear right side wheel.



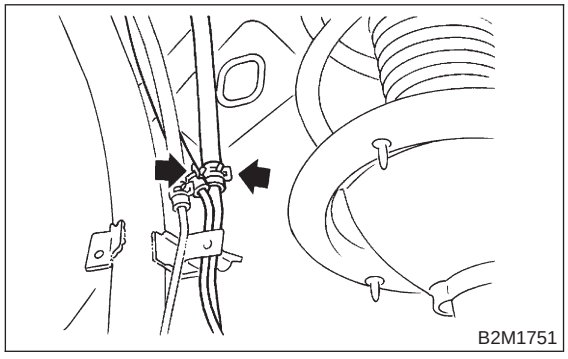
9) Remove bolts which install protector cover on body.



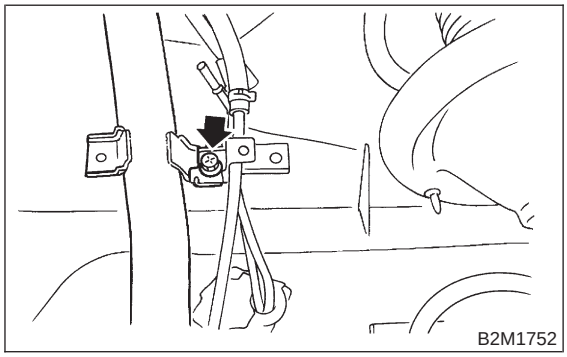
10) While releasing the under side of protector cover from hook, remove it.



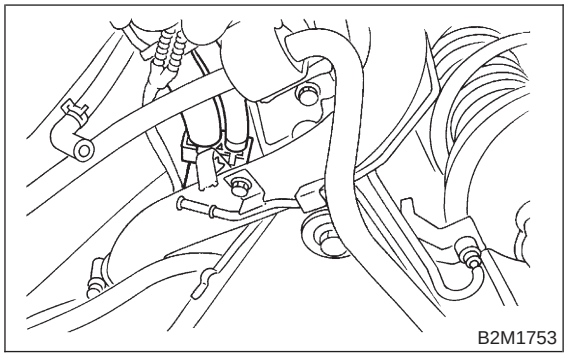
11) Disconnect evaporation hoses from pipes.



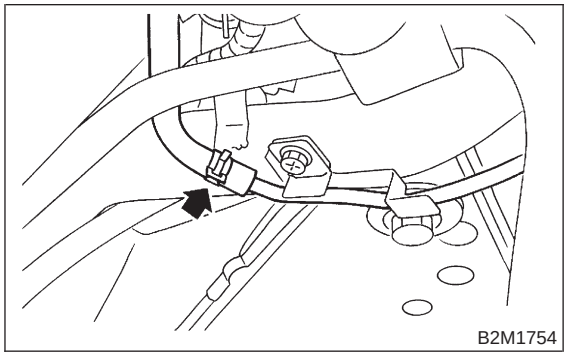
12) Remove bolts which hold fuel filler pipe bracket.



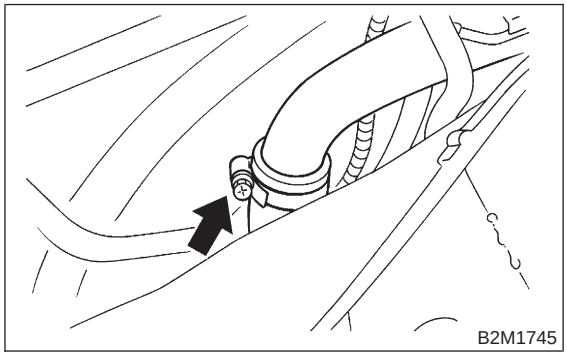
13) Lift-up the vehicle more.
14) Remove two evaporation hoses from clip.



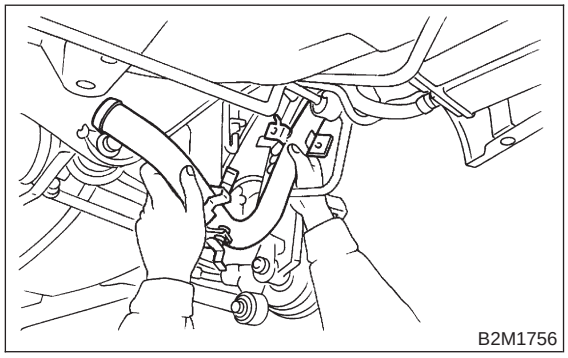
15) Disconnect evaporation hose from joint pipe.



16) Loosen clamp, and disconnect fuel filler hose from fuel filler pipe.



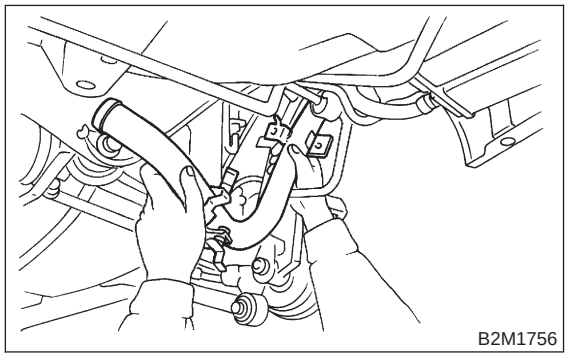
17) Remove fuel filler pipe to under side of vehicle.



B: INSTALLATION

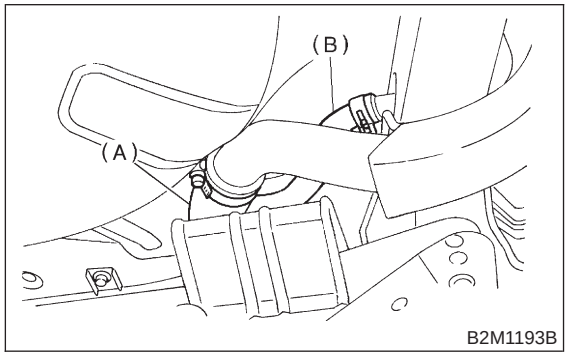
1. 2200 cc FWD MODEL, 2500 cc MODEL AND TAIWAN SPEC. VEHICLES

1) Set fuel filler pipe from under side of vehicle, and hold it on fuel filler flap open.



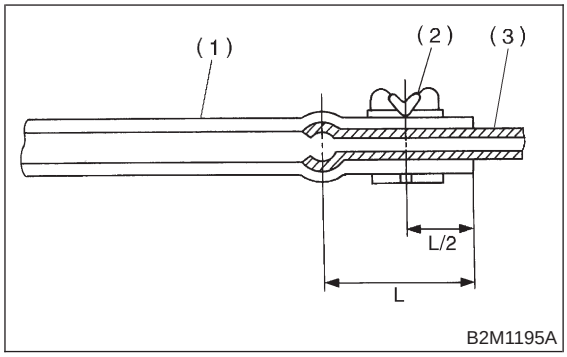
2) Insert fuel filler hose (A) approximately 25 to 30 mm (0.98 to 1.18 in) over the lower end of fuel filler pipe and tighten clamp.

CAUTION:
Do not allow clips to touch air vent hose (B) and rear suspension crossmember.



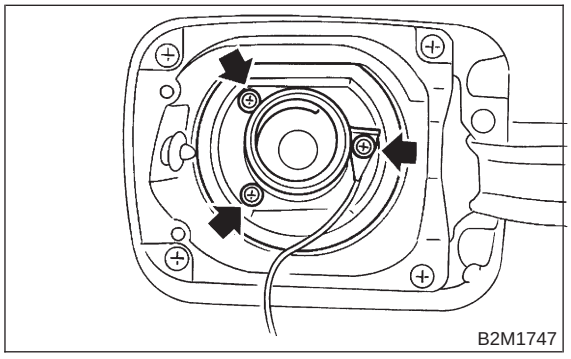
3) Insert air vent hose approximately 25 to 30 mm (0.98 to 1.18 in) into the lower end of air vent pipe and hold clip.

L = 25 — 30 mm (0.98 — 1.18 in)

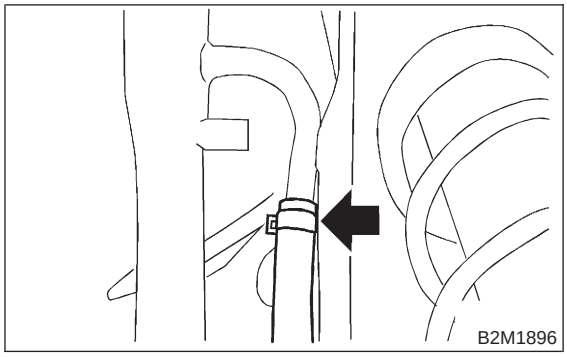


(1) Hose
(2) Clip
(3) Pipe

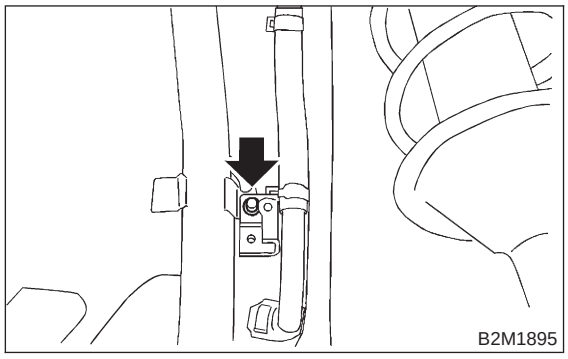
4) Lower the vehicle.
5) Temporarily tighten screws which install fuel filler pipe on filler lid open.



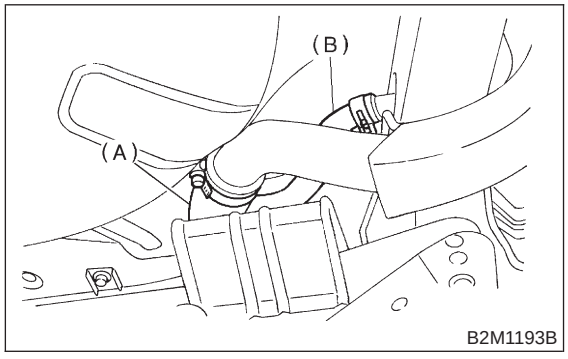
6) Connect air vent hose to air vent pipe.



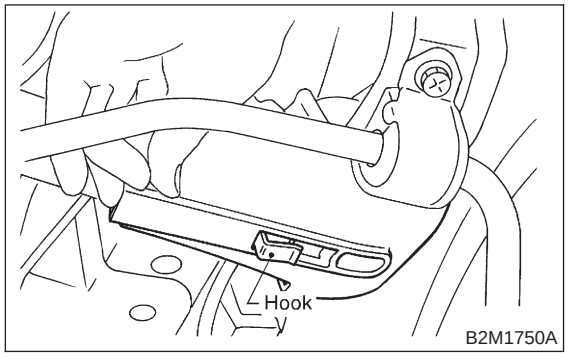
7) Tighten bolt which holds fuel filler pipe on body.



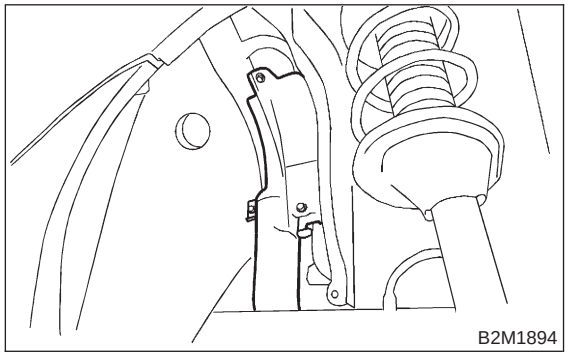
8) Lift-up the vehicle.
9) Tighten clamp bolt which holds fuel filler hose.



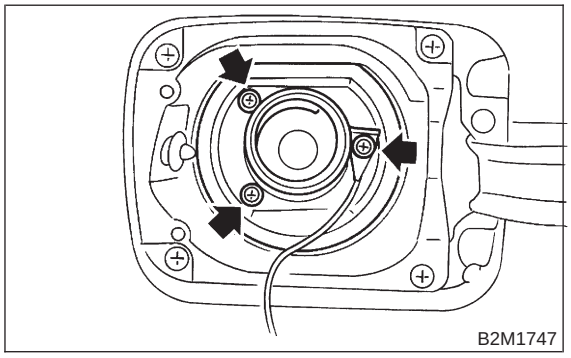
10) Lower the vehicle.
11) While holding the under side of protector cover on bracket, install protector cover.



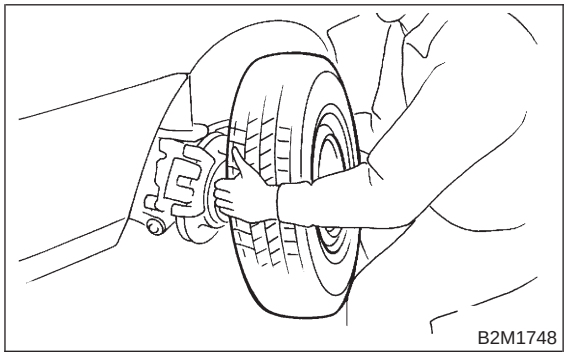
12) Tighten bolts which install protector cover on body.



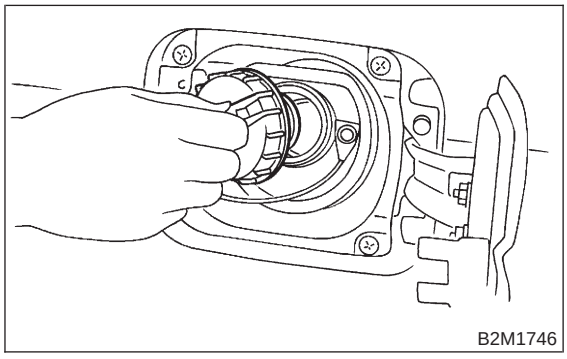
13) Tighten screws which install fuel filler pipe on filler lid open.



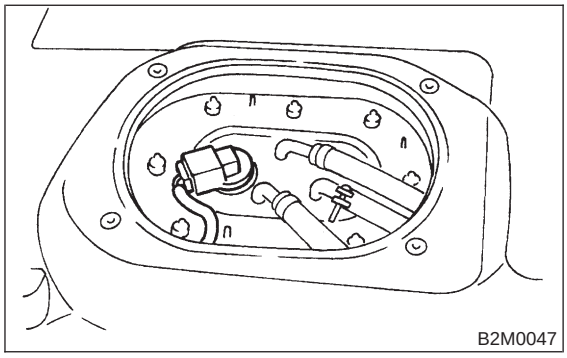
14) Install rear right wheel.



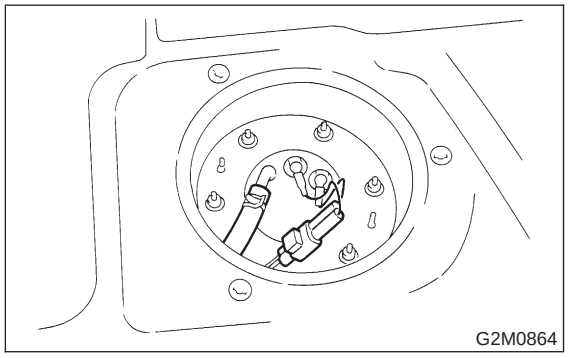
15) Install fuel filler cap.



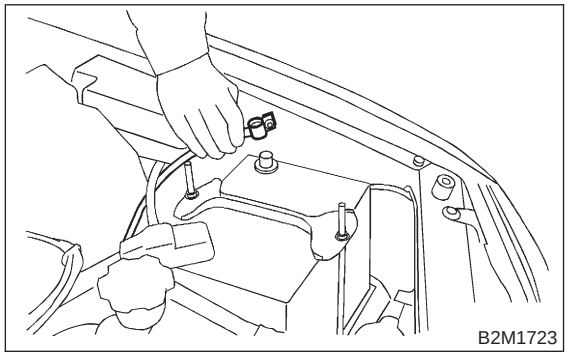
16) Install fuel pump, and connect connector and fuel hoses. <Ref. to 2-8 [W5C0].>



17) Install fuel sub meter unit, and connect connector and jet pump hose. <Ref. to 2-8 [W9A0].>

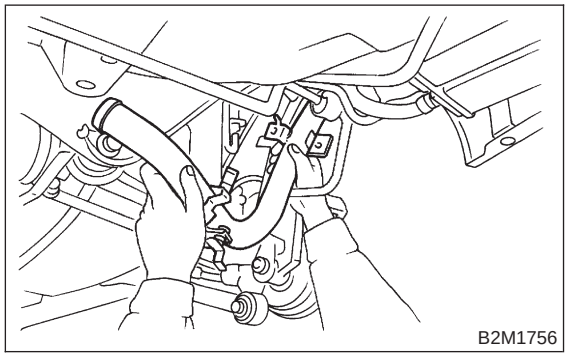


18) Connect battery ground terminal.

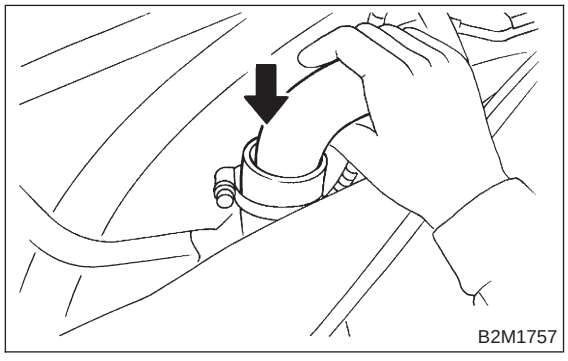


2. 2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES

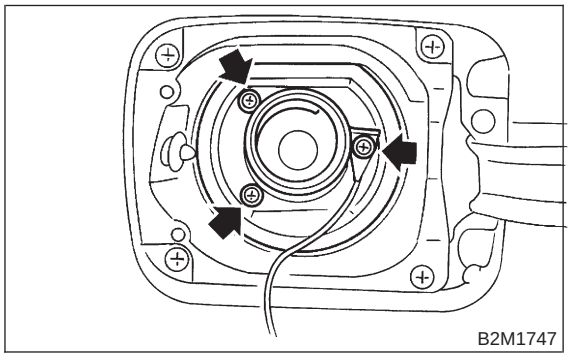
1) Set fuel filler pipe from under side of vehicle, and hold it on fuel filler flap open.



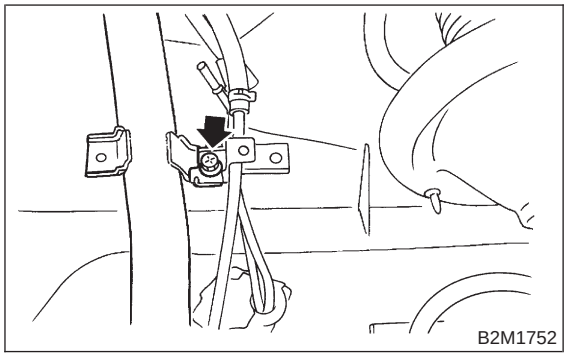
2) Connect fuel filler pipe into fuel filler hose.



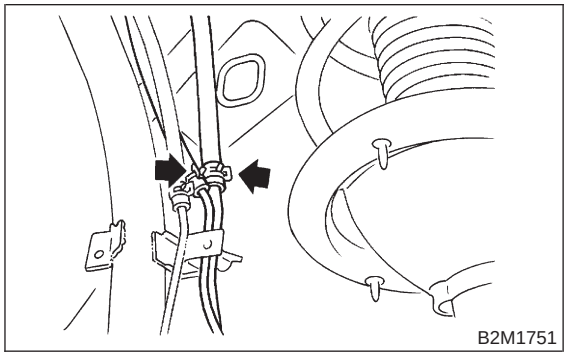
3) Lower the vehicle.
4) Temporarily tighten screws which install fuel filler pipe on filler lid open.



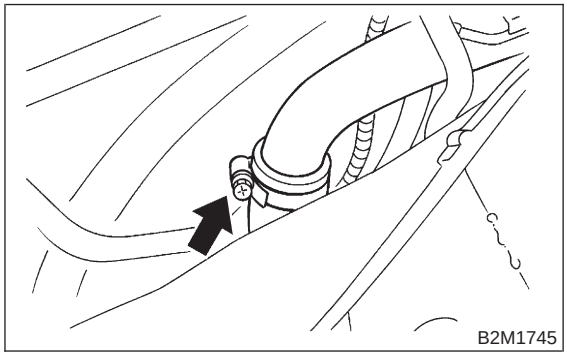
5) Tighten bolt which holds fuel filler pipe on body.



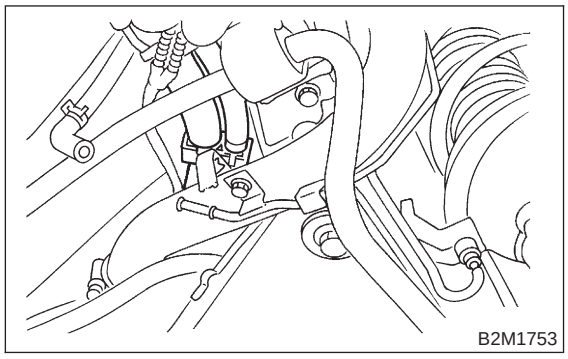
6) Connect evaporation hoses to pipes.



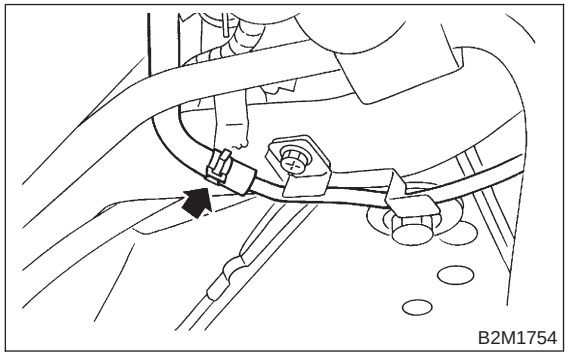
7) Lift-up the vehicle.
8) Tighten clamp bolt which holds fuel filler hose.



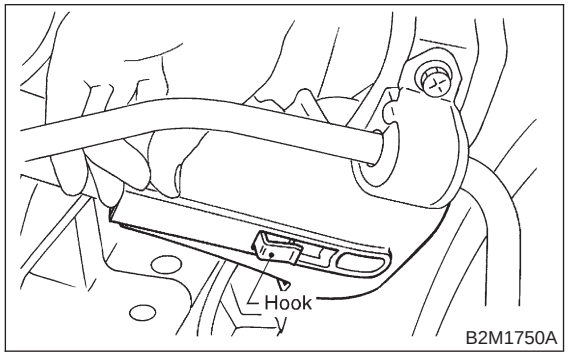
9) Install two evaporation hoses to clip.



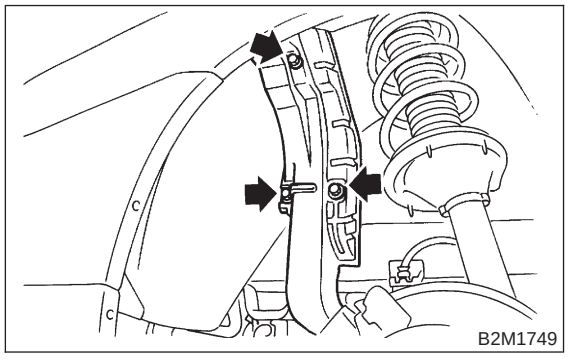
10) Connect evaporation hose to joint pipe.



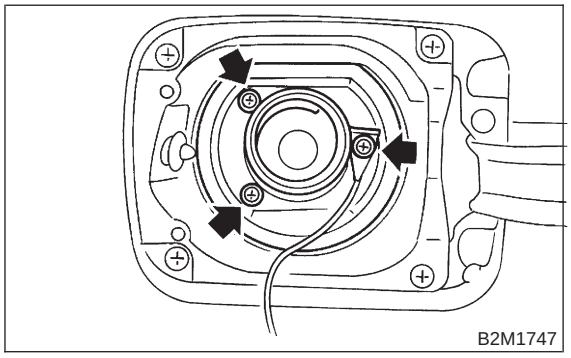
11) Lower the vehicle.
12) While holding the under side of protector cover on bracket, install it.



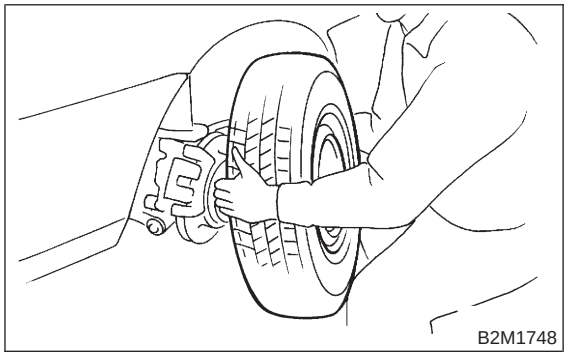
13) Tighten bolts which install protector cover on body.



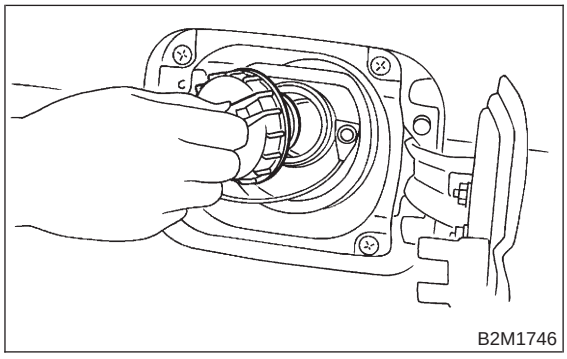
14) Tighten screws which install fuel filler pipe on filler lid open.



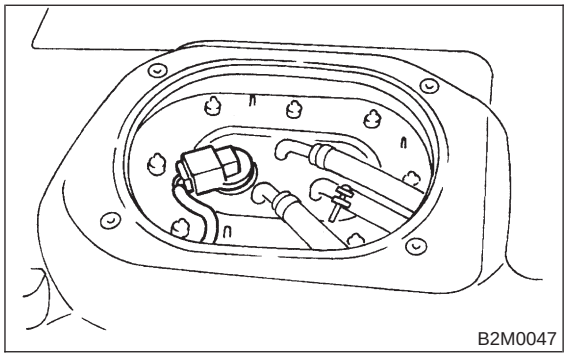
15) Install rear right wheel.



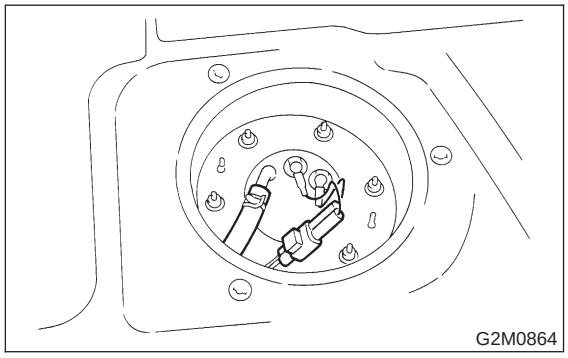
16) Install fuel filler cap.



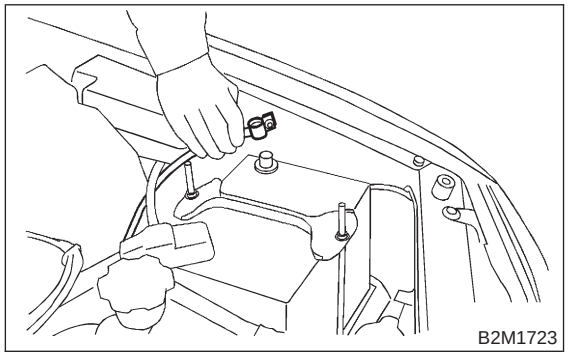
17) Install fuel pump, and connect connector and fuel hoses. <Ref. to 2-8 [W5C0].>



18) Install fuel sub meter unit, and connect connector and jet pump hose. <Ref. to 2-8 [W9A0].>

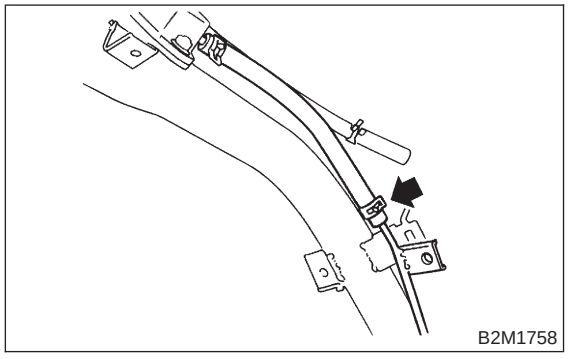

G2M0864

19) Connect battery ground terminal.

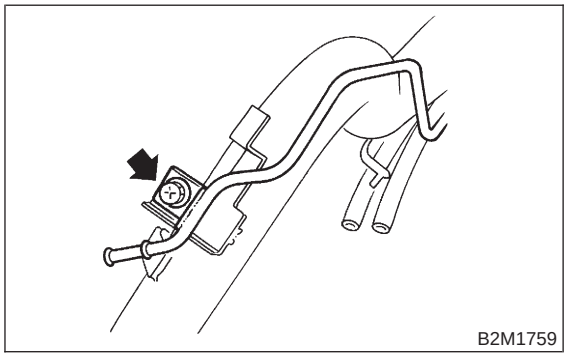

B2M1723

C: DISASSEMBLY (2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES)

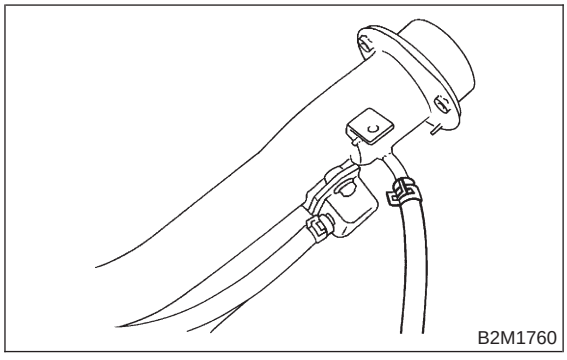
1) Move clip, and disconnect evaporation hose from joint pipe.


B2M1758

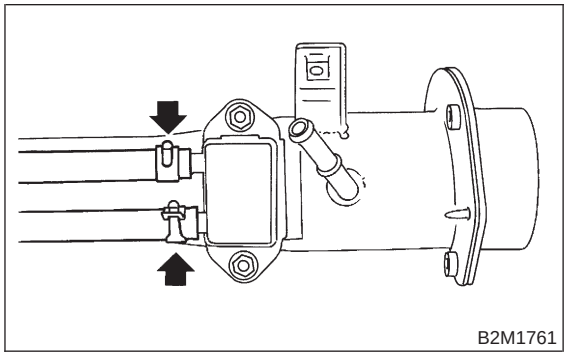
2) Remove bolt which installs joint pipe on fuel filler pipe.


B2M1759

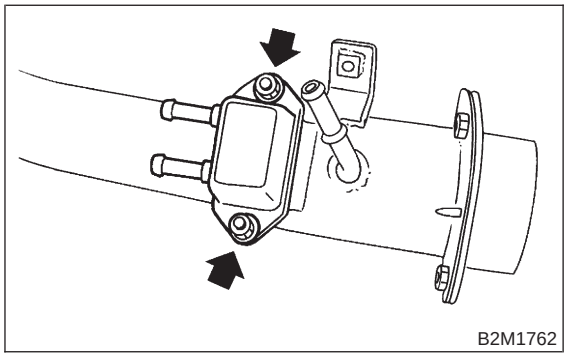
3) Disconnect evaporation hose from fuel filler pipe.


B2M1760

4) Disconnect evaporation hoses from shut valve.


B2M1761

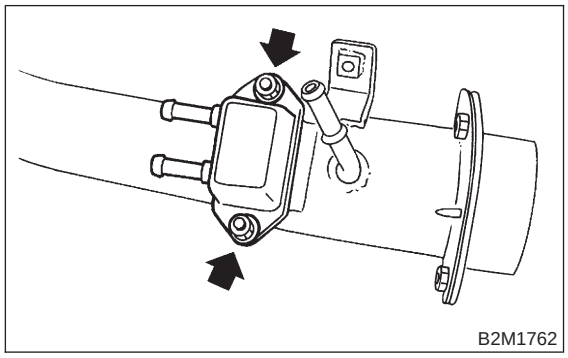
5) Remove shut valve from fuel filler pipe.


B2M1762

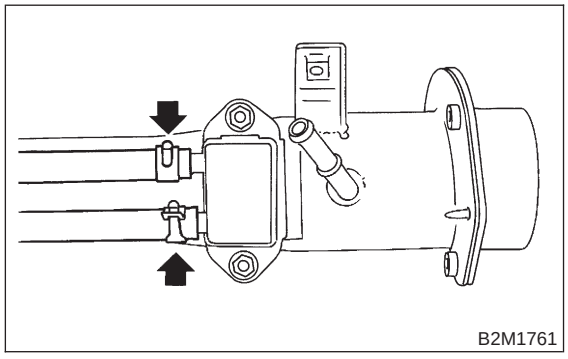
D: ASSEMBLY (2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES)

1) Install shut valve on fuel filler pipe.

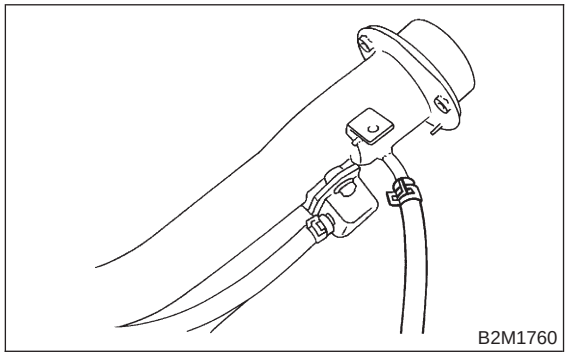
Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)


B2M1762

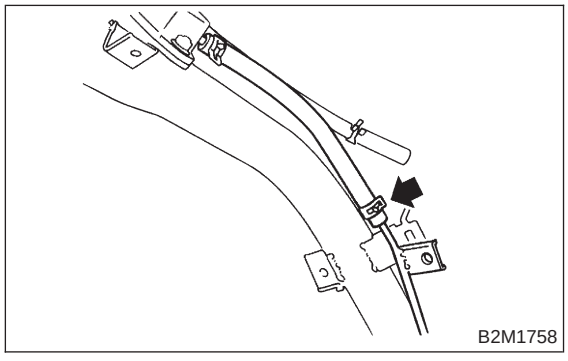
2) Connect evaporation hoses to shut valve.


B2M1761

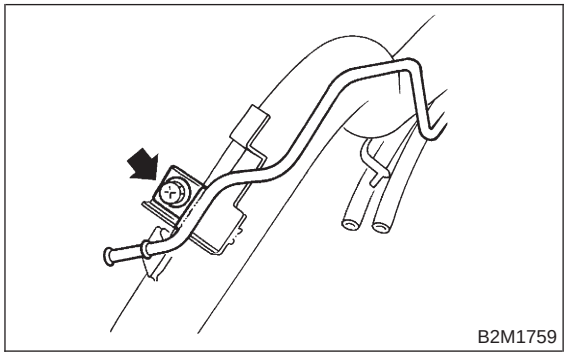
3) Connect evaporation hose to fuel filler pipe.


B2M1760

4) Connect evaporation hose to evaporation pipe.


B2M1758

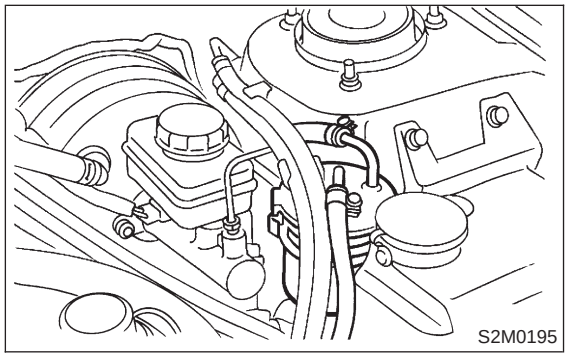
5) Install evaporation pipe to fuel filler pipe.


B2M1759

4. Fuel Filter

A: REMOVAL

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Disconnect fuel delivery hoses from fuel filter.



3) Remove filter from holder.

B: INSPECTION

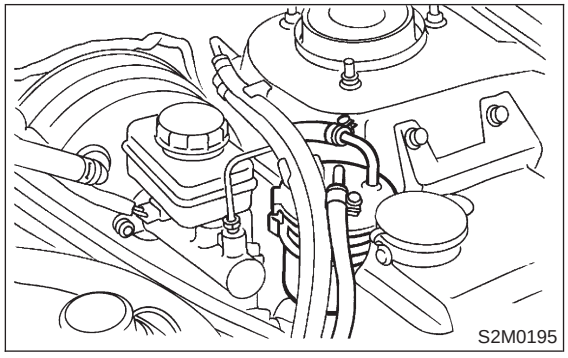
1) Check the inside of fuel filter for dirt and water sediment.
2) If it is clogged, or if replacement interval has been reached, replace it.
3) If water is found in it, shake and expel the water from inlet port.

C: INSTALLATION

CAUTION:
● If fuel hoses are damaged at the connecting portion, replace it with a new one.
● If clamps are badly damaged, replace with new ones.

1) Installation is in the reverse order of removal.
2) Tighten hose clamp screws.

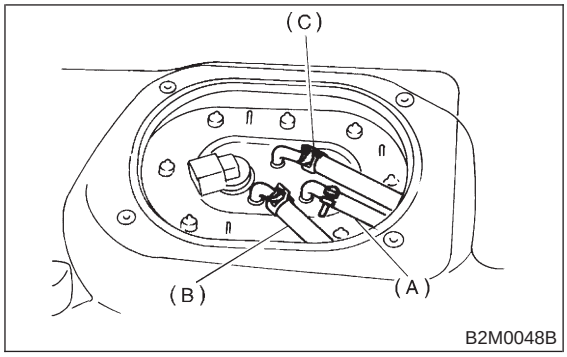
Tightening torque:
1.0 $^{+0.5}/_{-0}$ N·m (0.1$^{+0.05}/_{-0}$ kg-m, 0.7$^{+0.4}/_{-0}$ ft-lb)



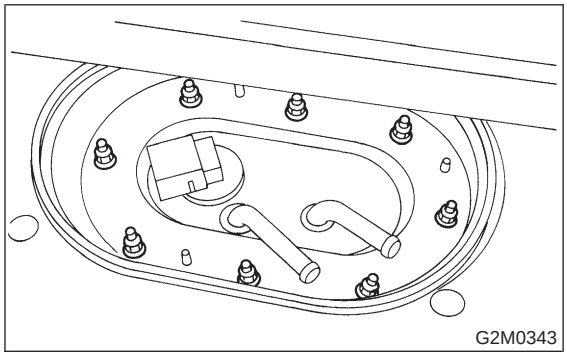
5. Fuel Pump

A: REMOVAL

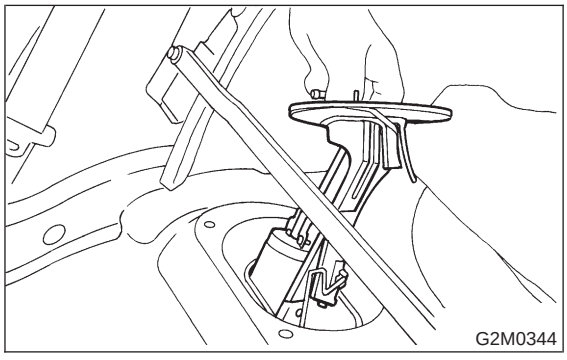
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C) (AWD model only).



3) Remove nuts which install fuel pump assembly onto fuel tank.



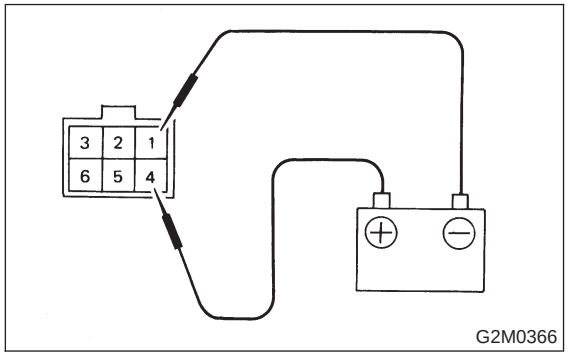
4) Take off fuel pump from fuel tank.



B: INSPECTION

Connect lead harness to connector terminal of fuel pump, and apply battery power supply to check whether the pump operate.

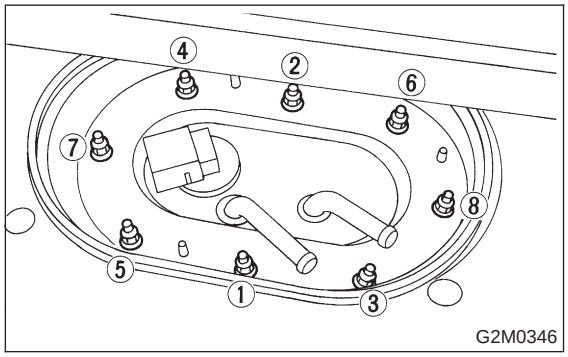
WARNING:
- **Wipe off the fuel completely.**
- **Keep battery as far apart from fuel pump as possible.**
- **Be sure to turn the battery supply ON and OFF on the battery side.**
- **Do not run fuel pump for a long time under non-load condition.**



C: INSTALLATION

Installation is in the reverse order of removal. Do the following:
(1) Always use new gaskets.
(2) Ensure sealing portion is free from fuel or foreign particles before installation.
(3) Tighten nuts in numerical sequence shown in Figure to specified torque.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)

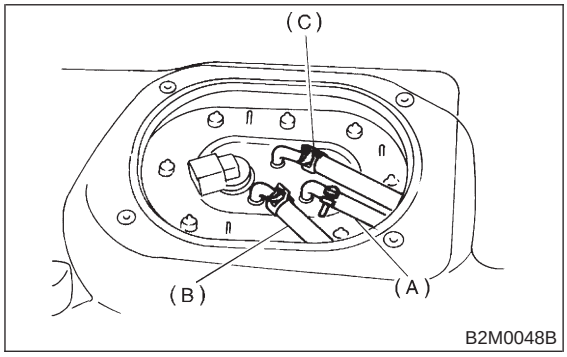


6. Fuel Meter Unit

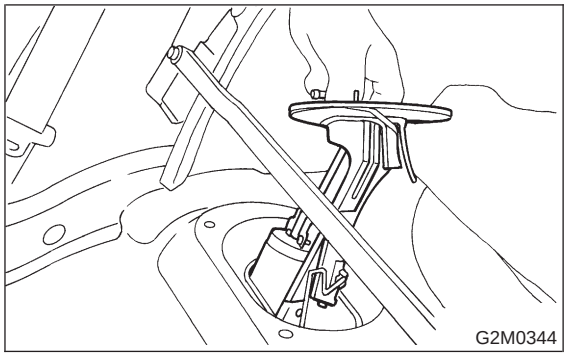
A: REMOVAL

NOTE:
Fuel meter unit is built in fuel pump assembly.

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C) (AWD model only).



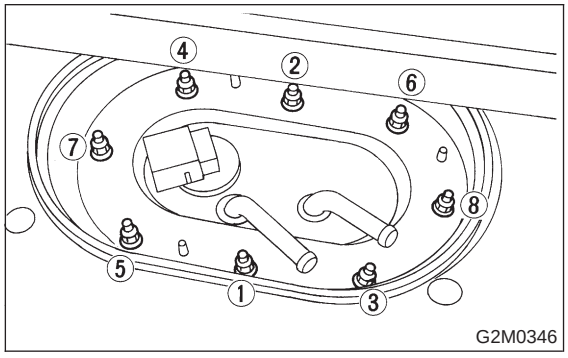
3) Remove nuts which install fuel pump assembly onto fuel tank.
4) Take off fuel pump assembly.



B: INSTALLATION

Installation is in the reverse order of removal. Do the following:
(1) Always use new gaskets.
(2) Ensure sealing portion is free from fuel or foreign particles before installation.
(3) Tighten nuts in numerical sequence shown in Figure to specified torque.

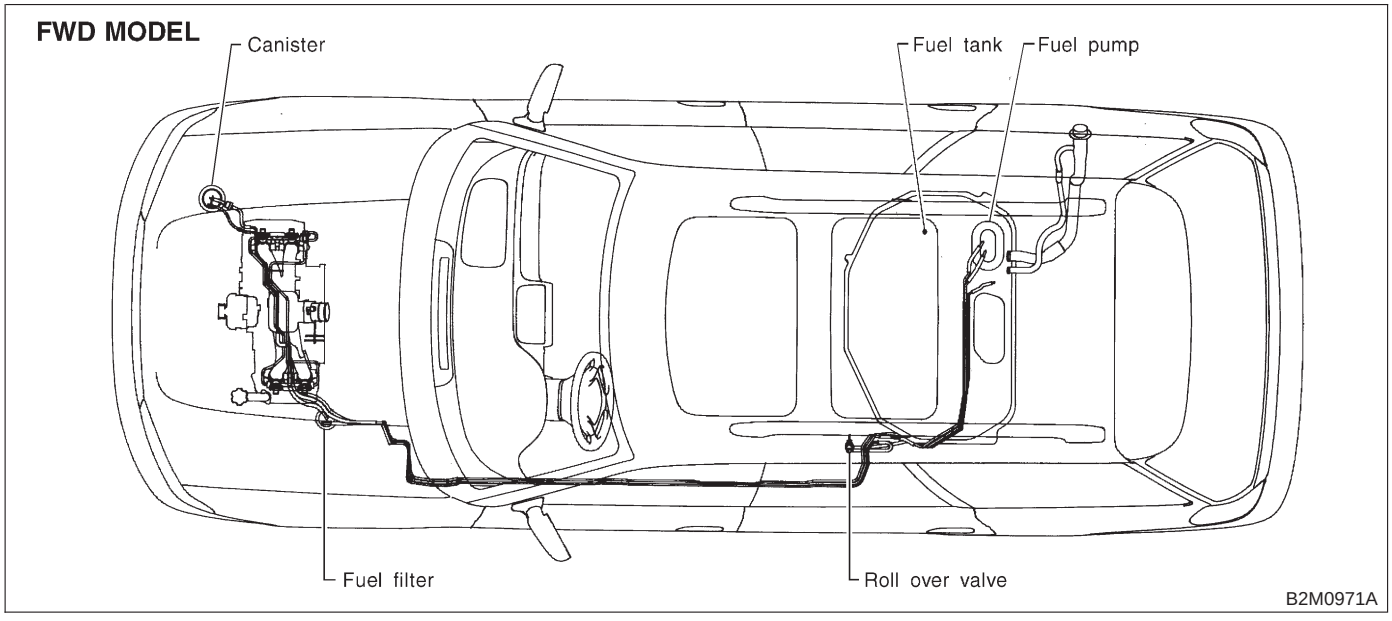
Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)



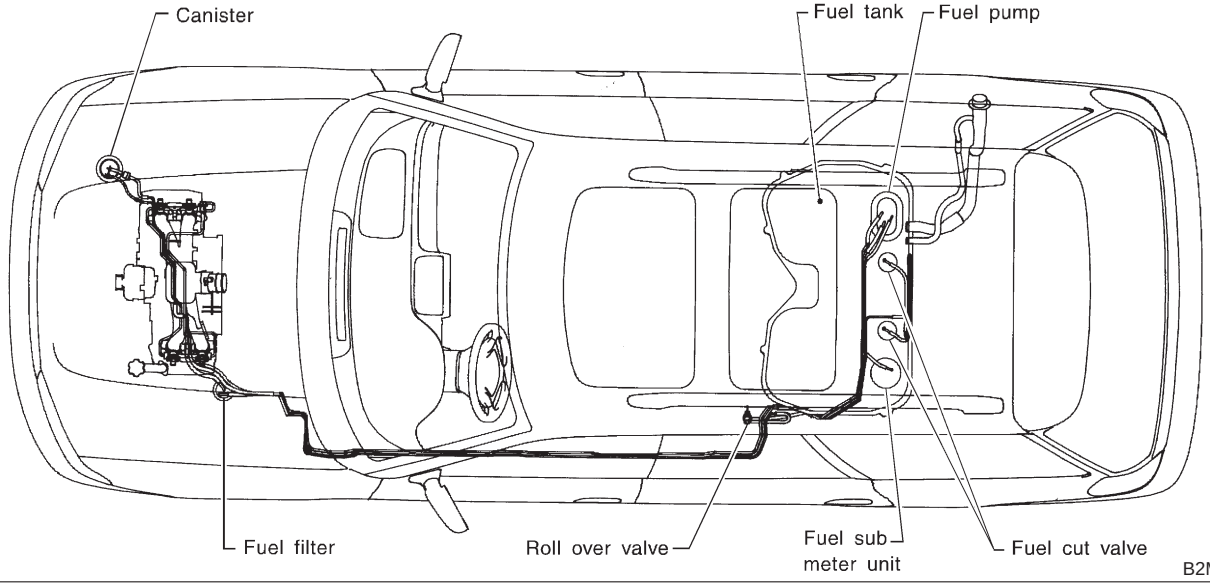
7. Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

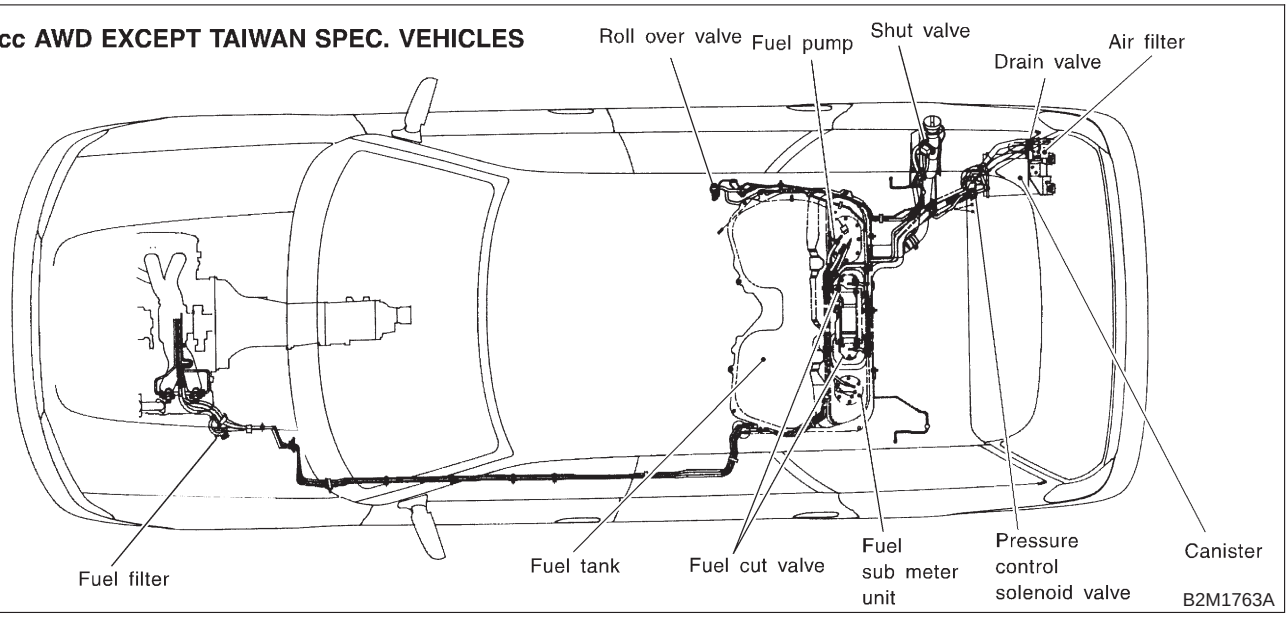
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Remove fuel filler cap.
3) Remove inner trim, insulator and rear seat.
4) Remove fuel delivery pipes and hoses, fuel return pipes and hoses, and evaporation pipes and hoses.

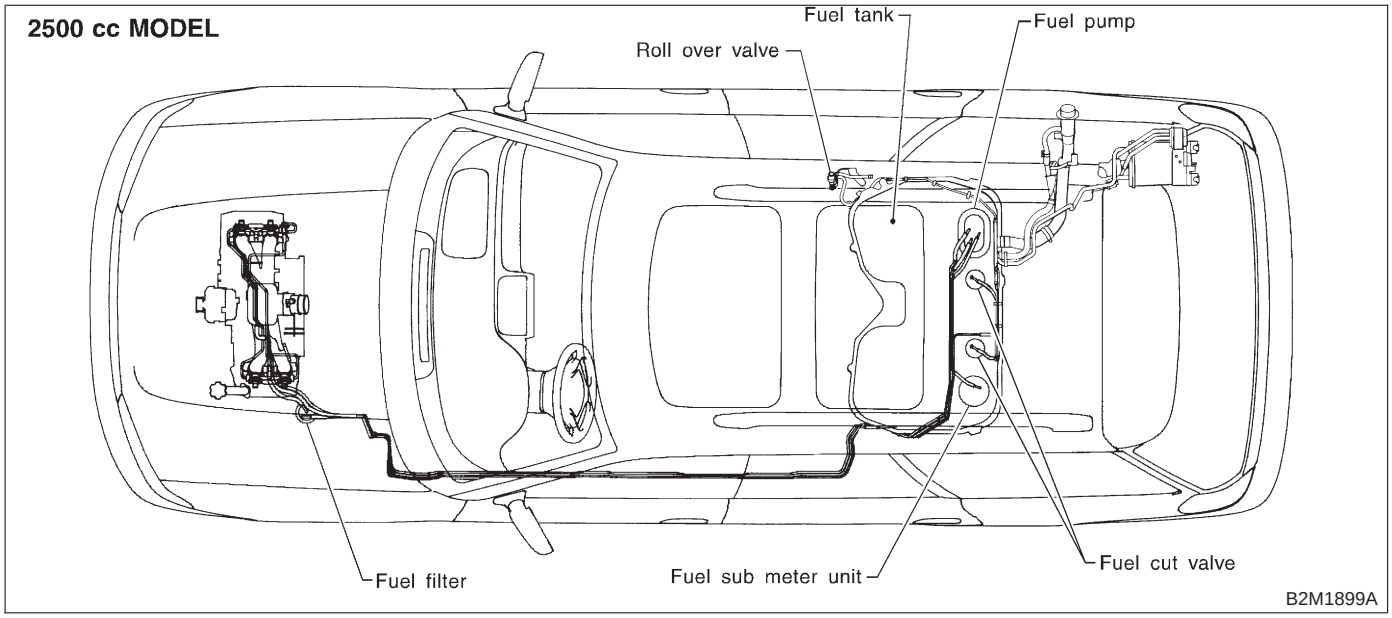


2200 cc AWD TAIWAN SPEC. VEHICLES

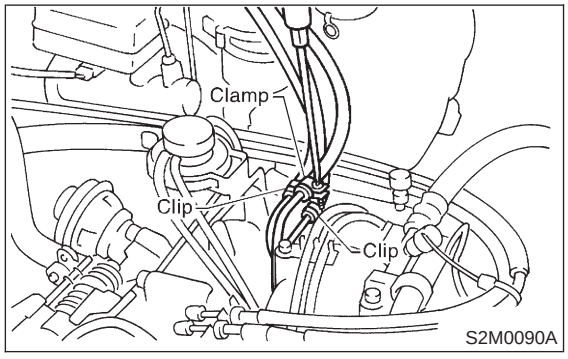


2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES

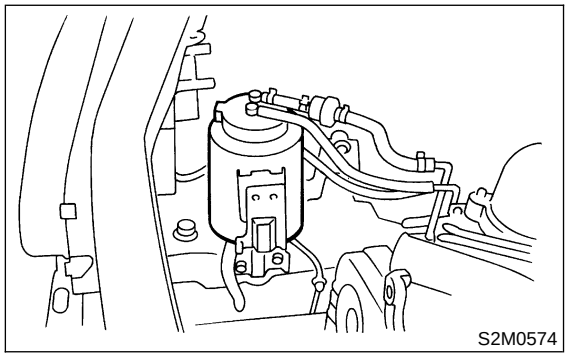




5) In engine compartment, detach fuel delivery hose, return hose and evaporation hose.



6) In engine compartment, detach canister hoses from canister. (2200 cc FWD and Taiwan spec. vehicles only)



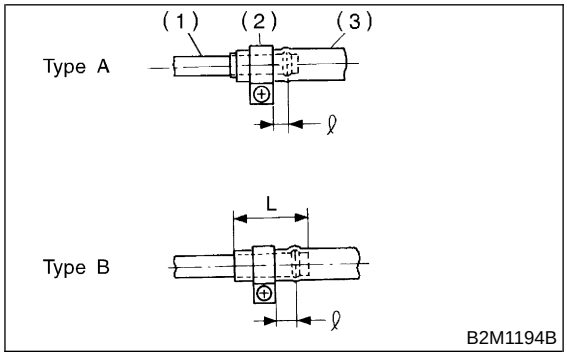
B: INSTALLATION

Installation is in the reverse order of removal.

1) Connect fuel delivery hose to pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When fitting length is specified.
Type B: When fitting length is not specified.

ℓ : 1.0 — 4.0 mm (0.039 — 0.157 in)

L: 20 — 25 mm (0.79 — 0.98 in)

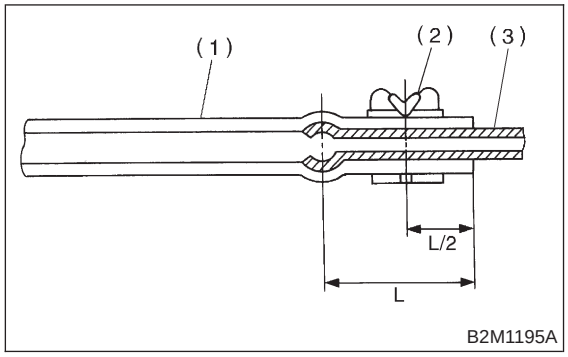


(1) Fitting
(2) Clamp
(3) Hose

2) Connect evaporation hose to pipe by approx. 15 mm (0.59 in) from hose end.

L = 15 — 20 mm (0.59 — 0.79 in)

CAUTION:
Be sure to inspect hoses and their connections for any leakage of fuel.

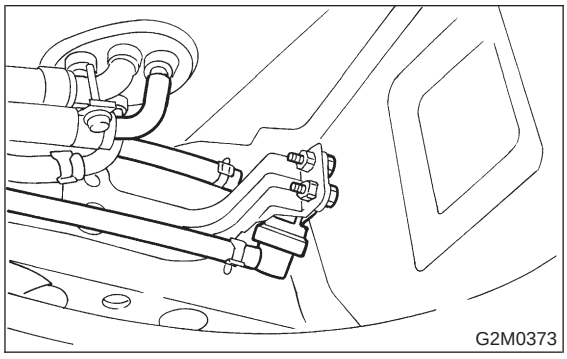


(1) Hose
(2) Clip
(3) Pipe

8. Roll Over Valve

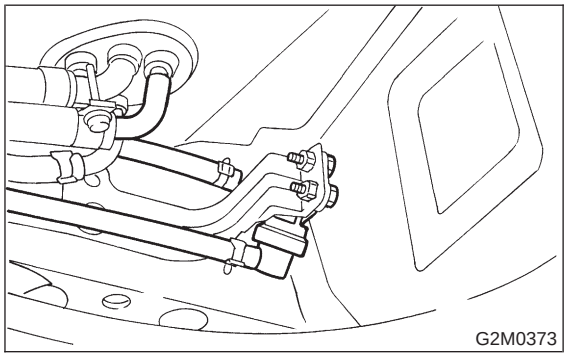
A: REMOVAL AND INSTALLATION

1) Lift up the vehicle.
2) Remove roll over valve with bracket.



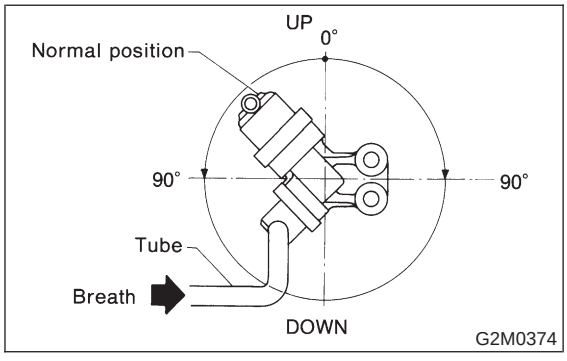
3) Disconnect hoses from roll over valve, and remove it from bracket.
4) Installation is in the reverse order of removal.

CAUTION:
- **Do not install top side of valve down.**
- **Before installing bracket on body, securely fit concave part of bracket to hole in body.**



B: INSPECTION

1) Connect hoses to roll over valve as shown in Figure.



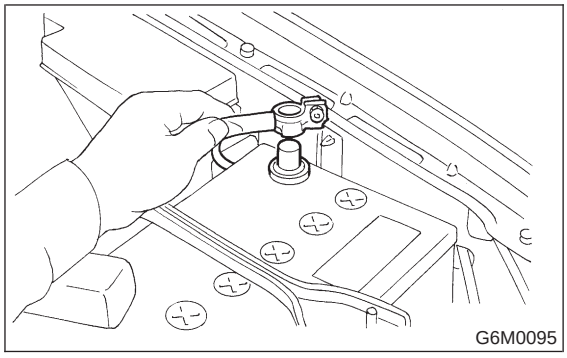
2) While blowing through open end of hose, tilt valve at least 90° left and right from normal position.

3) Ensure that there is no air flow when hose is tilted greater than 90°.

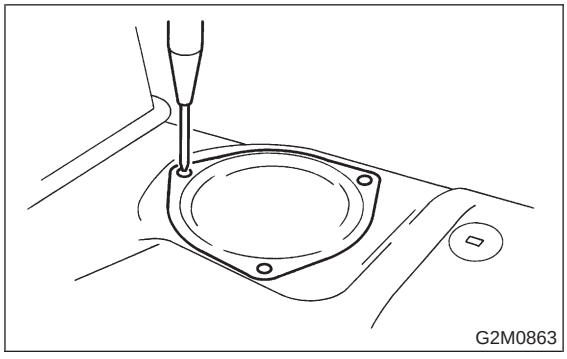
9. Fuel Sub Meter Unit (AWD model only)

A: REMOVAL AND INSTALLATION

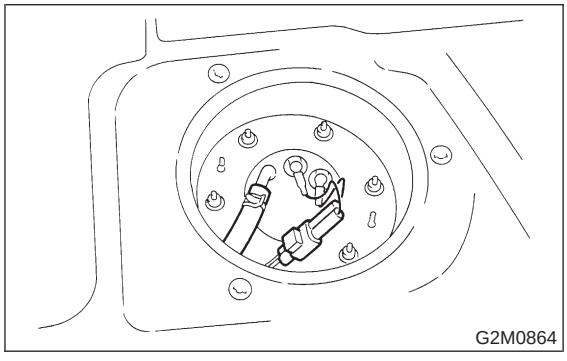
1) Disconnect battery ground cable.



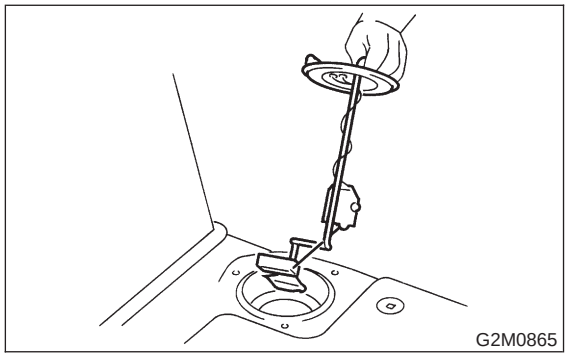
2) Remove rear seat.
3) Remove service hole cover.



4) Disconnect connector from fuel sub meter, and disconnect jet pump hose.

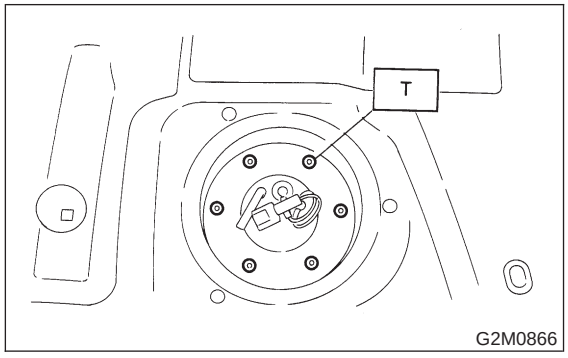


5) Remove fuel sub meter unit.



6) Installation is in the reverse order of removal.

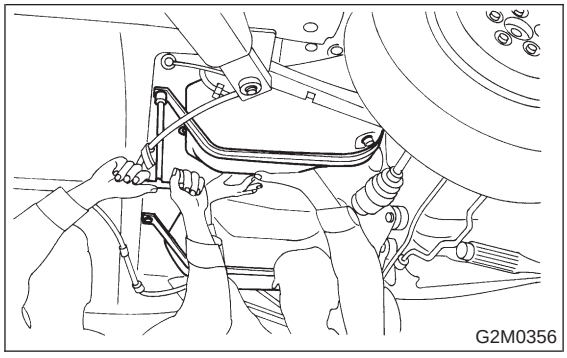
Tightening torque:
T: 4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)



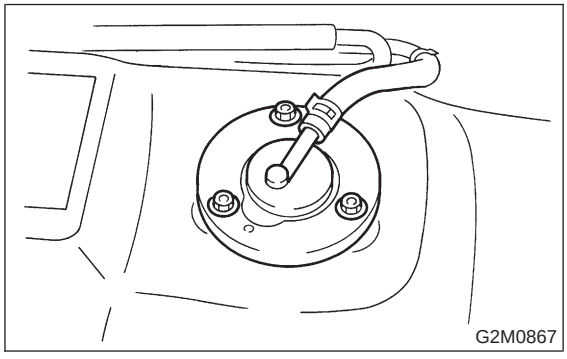
10. Fuel Cut Valve (AWD model only)

A: REMOVAL AND INSTALLATION

1) Remove fuel tank. <Ref. to 2-8 [W2A0].>

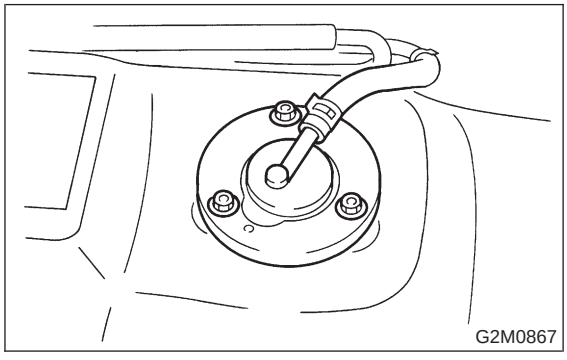


2) Disconnect evaporation hose from fuel cut valve.



3) Remove fuel cut valve.
4) Installation is in the reverse order of removal.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)



1. Fuel System Trouble in General

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to the injector		
1)	Fuel pump will not operate.	
	◯ Defective terminal contact.	Inspect connections, especially ground, and tighten securely.
	◯ Trouble in electromagnetic or electronic circuit parts.	Replace fuel pump.
2)	Lowering of fuel pump function.	Replace fuel pump.
3)	Clogged dust or water in the fuel filter.	Replace fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose.	Clean, correct or replace fuel pipe or hose.
5)	Air is mixed in the fuel system.	Inspect or retighten each connection part.
6)	Clogged or bent breather tube or pipe.	Clean, correct or replace air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator.	Replace.
2. Leakage or blow out fuel		
1)	Loosened joints of the fuel pipe.	Retightening.
2)	Cracked fuel pipe, hose and fuel tank.	Replace.
3)	Defective welding part on the fuel tank.	Replace.
4)	Defective drain packing of the fuel tank.	Replace.
5)	Clogged or bent air breather tube or air vent tube.	Clean, correct or replace air breather tube or air vent tube.
3. **Gasoline smell inside of compartment**		
1)	Loose joints at air breather tube, air vent tube and fuel filler pipe.	Retightening.
2)	Defective packing air tightness on the fuel saucer.	Correct or replace packing.
3)	Cracked fuel separator.	Replace separator.
4. Defective fuel meter indicator		
1)	Defective operation of fuel meter unit.	Replace.
2)	Defective operation of fuel meter.	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump.	Replace.

NOTE:
When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank.

1) To prevent water condensation:
- Top off the fuel tank or drain the fuel completely.
- Drain water condensation from the fuel filter.

2) Refilling the fuel tank:
Refill the fuel tank while there is still some fuel left in the tank.

3) Protecting the fuel system against freezing and water condensation:
- Cold areas

In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use an anti-freeze solution in the cooling system.

Refueling will also complement the effect of anti-freeze solution each time the fuel level drops to about one-half. After the winter season, drain water which may have accumulated in the fuel filter and fuel tank in the manner same as that described under affected areas as below.
- Affected areas

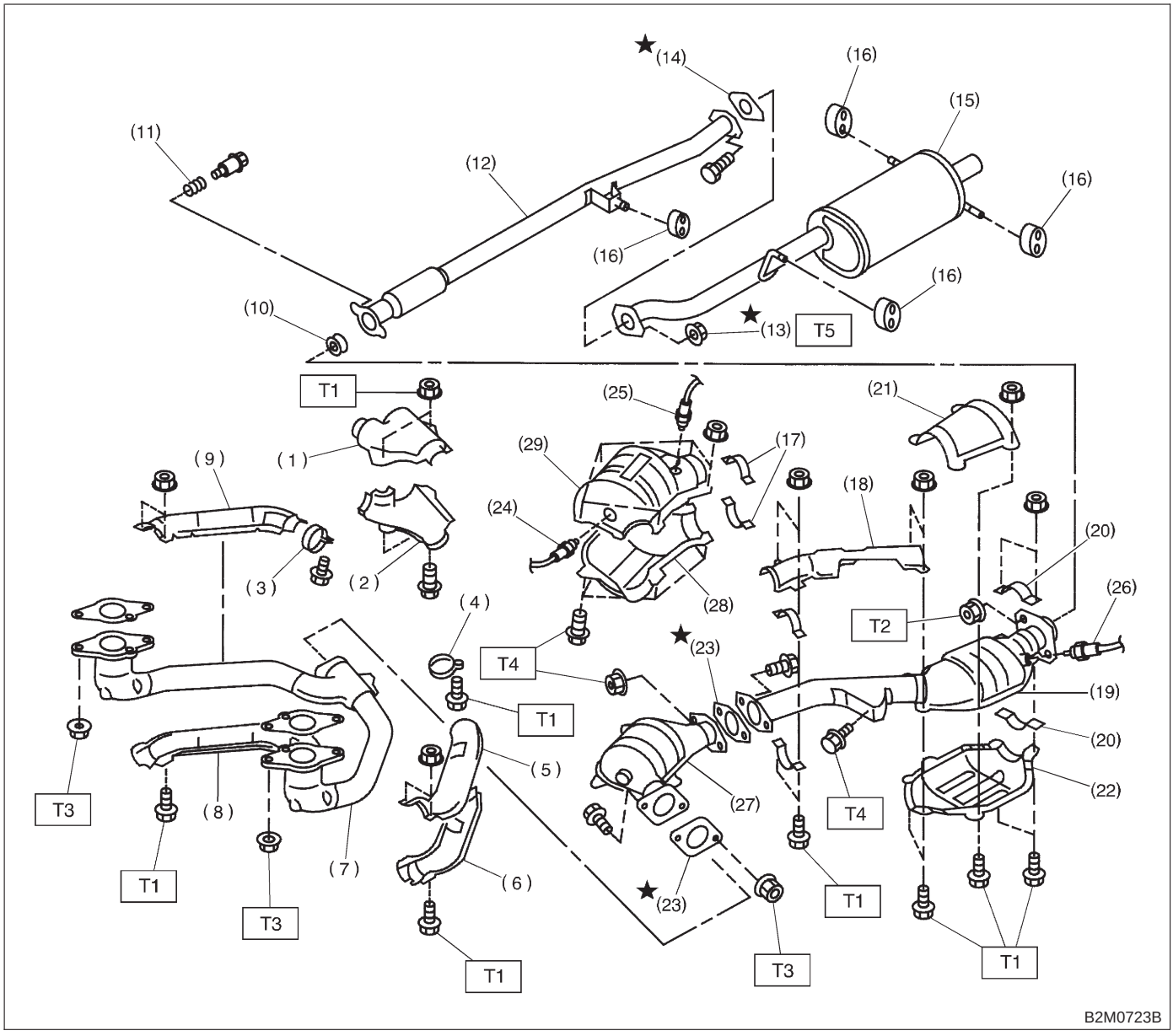
When water condensation is notched in the fuel filter, drain water from both the fuel filter and fuel tank or use a water removing agent (or anti-freeze solution) in the fuel tank.

4) Observe the instructions, notes, etc., indicated on the label affixed to the anti-freeze solution (water removing agent) container before use.

EXHAUST SYSTEM 2-9

1. Exhaust System

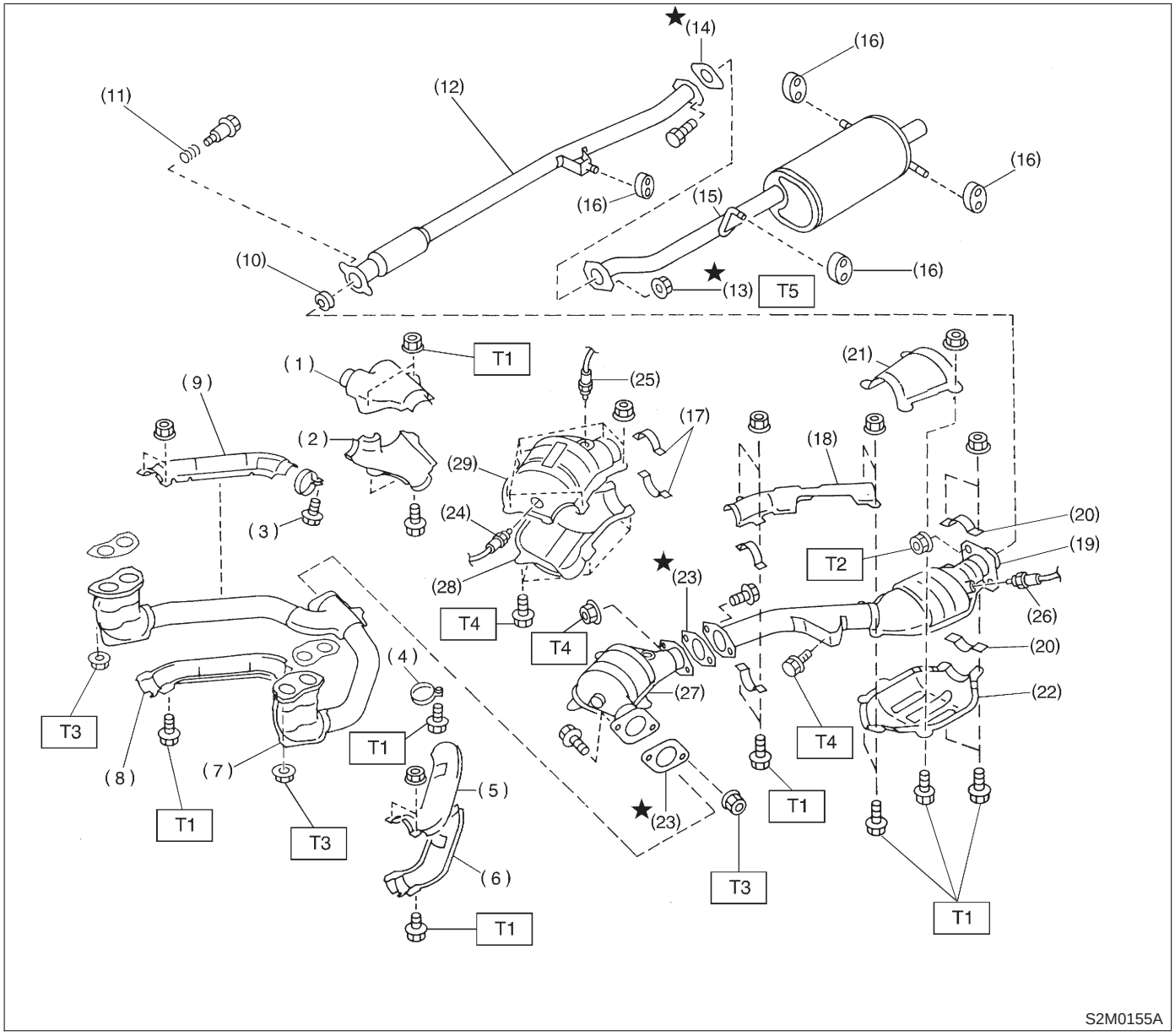
A: 2200 cc MODEL



(1) Upper front exhaust pipe cover CTR
(2) Lower front exhaust pipe cover CTR
(3) Band RH
(4) Band LH
(5) Upper front exhaust pipe cover LH
(6) Lower front exhaust pipe cover LH
(7) Front exhaust pipe
(8) Lower front exhaust pipe cover RH
(9) Upper front exhaust pipe cover RH
(10) Gasket
(11) Spring
(12) Rear exhaust pipe
(13) Self-locking nut
(14) Gasket
(15) Muffler
(16) Cushion rubber
(17) Clamp
(18) Upper center exhaust pipe cover
(19) Center exhaust pipe
(20) Clamp B
(21) Upper rear catalytic converter cover
(22) Lower rear catalytic converter cover
(23) Gasket
(24) Front oxygen sensor
(25) Rear oxygen sensor (California spec. vehicles)
(26) Rear oxygen sensor (Except California spec. vehicles)
(27) Front catalytic converter
(28) Lower front catalytic converter cover
(29) Upper front catalytic converter cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 30±5 (3.1±0.5, 22.4±3.6)
T4: 35±5 (3.6±0.5, 26.0±3.6)
T5: 48±5 (4.9±0.5, 35.4±3.6)

B: 2500 cc MODEL



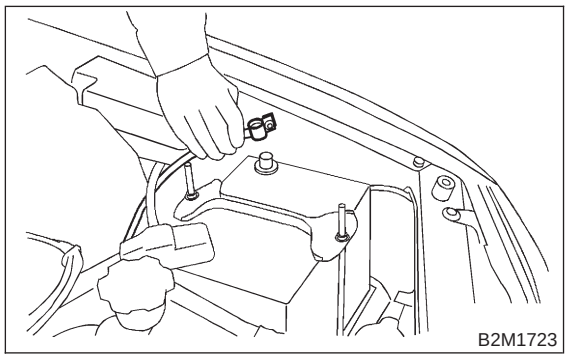
(1) Upper front exhaust pipe cover CTR
(2) Lower front exhaust pipe cover CTR
(3) Band RH
(4) Band LH
(5) Upper front exhaust pipe cover LH
(6) Lower front exhaust pipe cover LH
(7) Front exhaust pipe
(8) Lower front exhaust pipe cover RH
(9) Upper front exhaust pipe cover RH
(10) Gasket
(11) Spring
(12) Rear exhaust pipe
(13) Self-locking nut
(14) Gasket
(15) Muffler
(16) Cushion rubber
(17) Clamp
(18) Upper center exhaust pipe cover
(19) Center exhaust pipe
(20) Clamp B
(21) Upper rear catalytic converter cover
(22) Lower rear catalytic converter cover
(23) Gasket
(24) Front oxygen sensor
(25) Rear oxygen sensor (California spec. vehicles)
(26) Rear oxygen sensor (Except California spec. vehicles)
(27) Front catalytic converter
(28) Lower front catalytic converter cover
(29) Upper front catalytic converter cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 30±5 (3.1±0.5, 22.4±3.6)
T4: 35±5 (3.6±0.5, 26.0±3.6)
T5: 48±5 (4.9±0.5, 35.4±3.6)

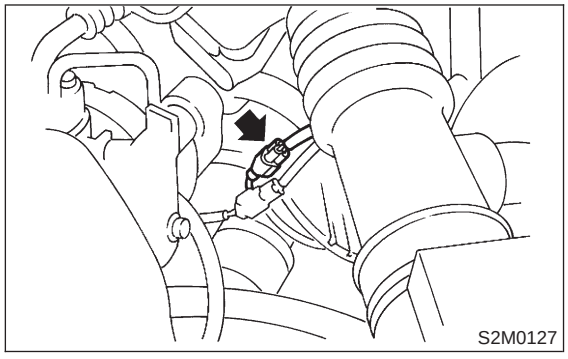
1. Front Exhaust Pipe

A: REMOVAL

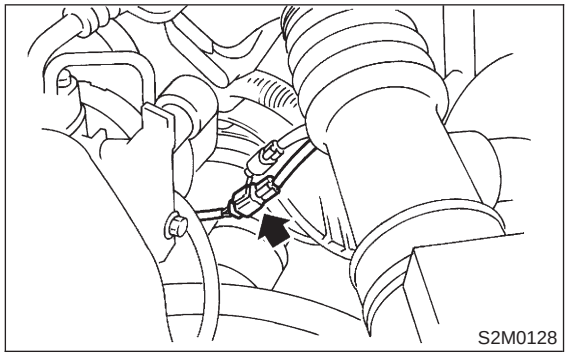
1) Disconnect battery ground cable.



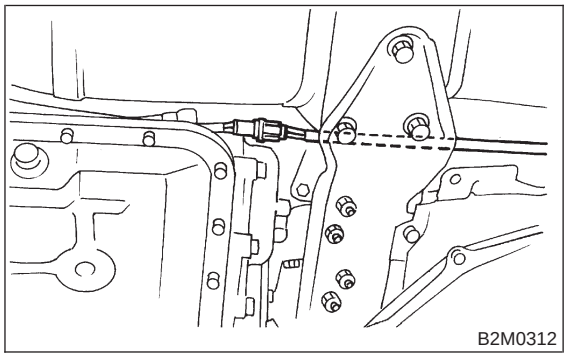
2) Disconnect front oxygen sensor connector.



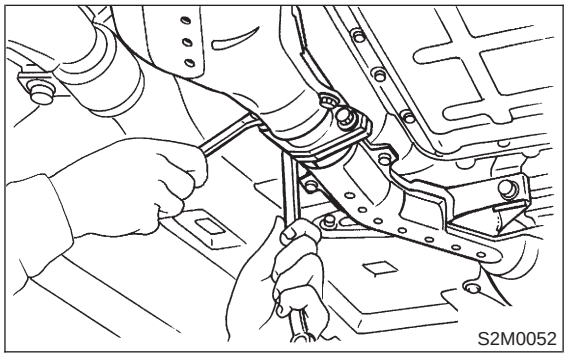
3) Disconnect rear oxygen sensor connector. (California spec. vehicles)



4) Lift-up the vehicle.
5) Disconnect rear oxygen sensor connector. (Except California spec. vehicles)

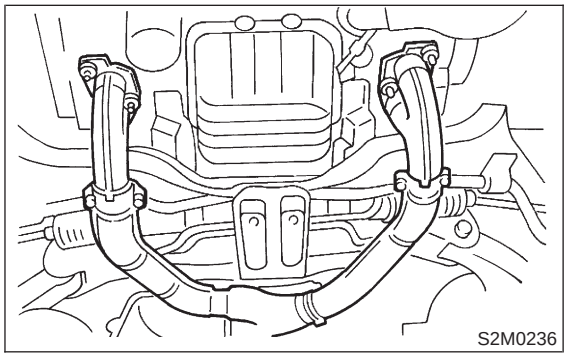


6) Separate center exhaust pipe from front exhaust pipe.

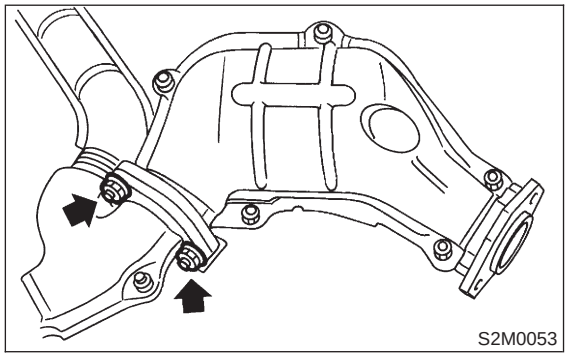


7) Remove bolts which hold front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down front exhaust pipe and center exhaust pipe.



8) Separate front exhaust pipe from front catalytic converter.

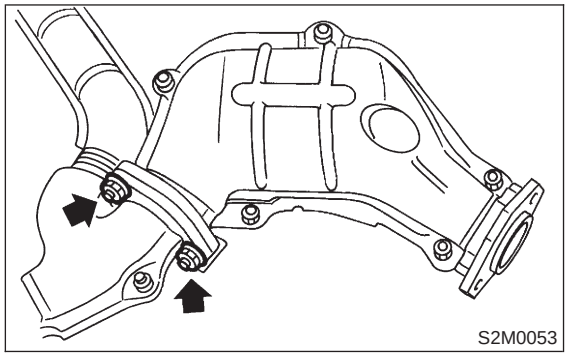


B: INSTALLATION

1) Install front catalytic converter to front exhaust pipe.

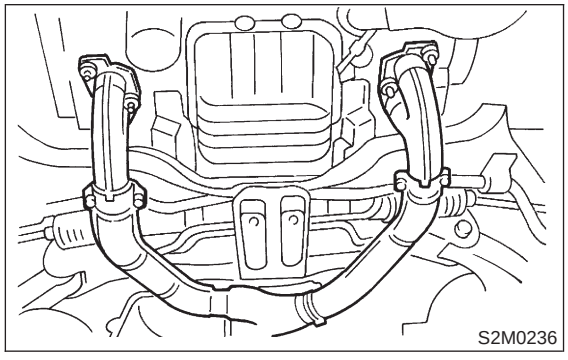
CAUTION:
Replace gaskets with new ones.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)



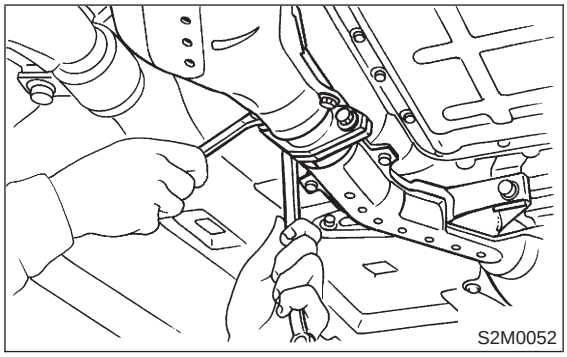
2) Tighten bolts which hold front exhaust pipe onto cylinder heads.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)

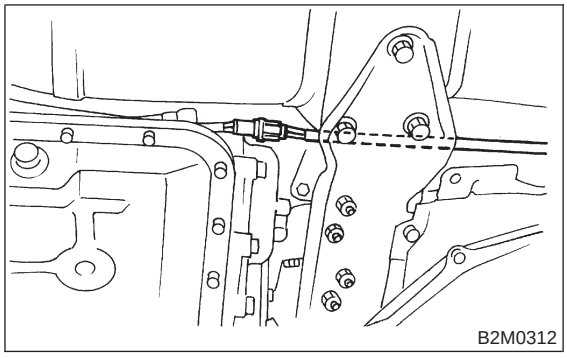


3) Install center exhaust pipe to front exhaust pipe.

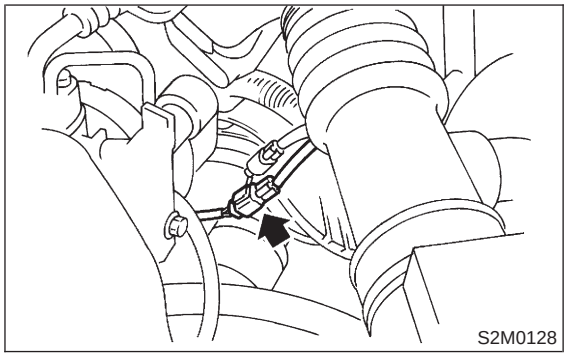
Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)



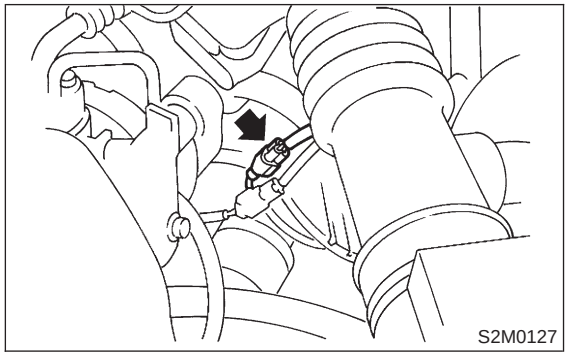
4) Connect rear oxygen sensor connector. (Except California spec. vehicles)



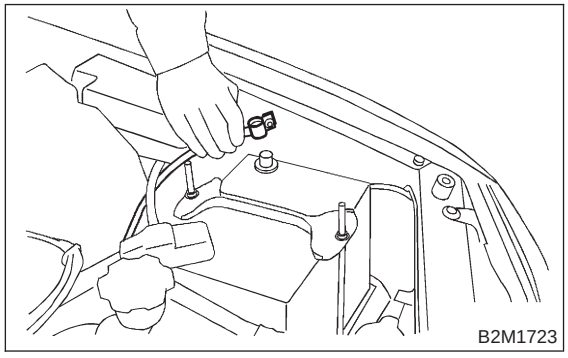
5) Lower the vehicle.
6) Connect rear oxygen sensor connector. (California spec. vehicles)



7) Connect front oxygen sensor connector.



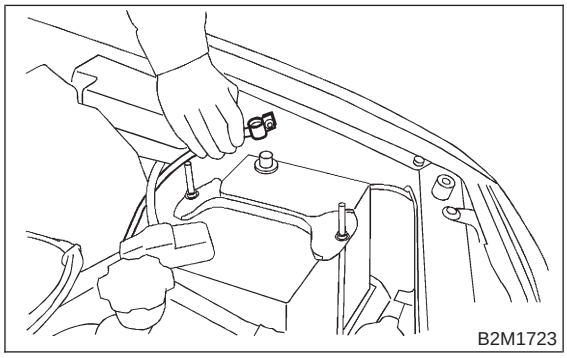
8) Connect battery ground cable.



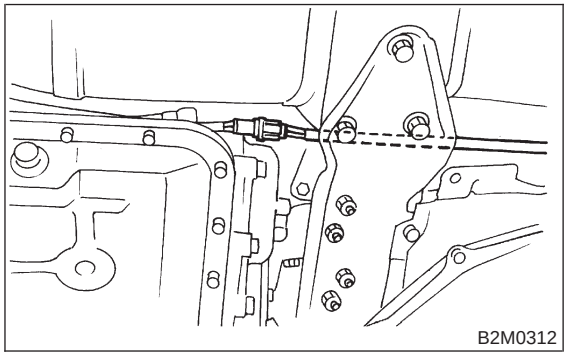
2. Center Exhaust Pipe

A: REMOVAL

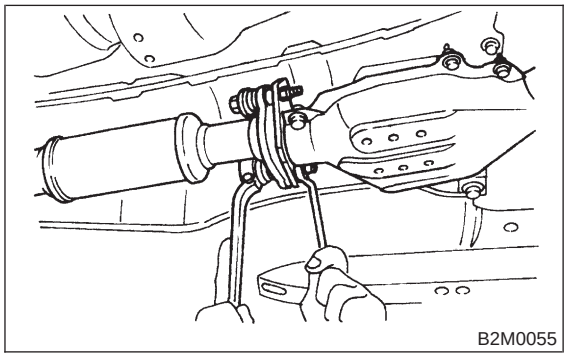
1) Disconnect battery ground cable.



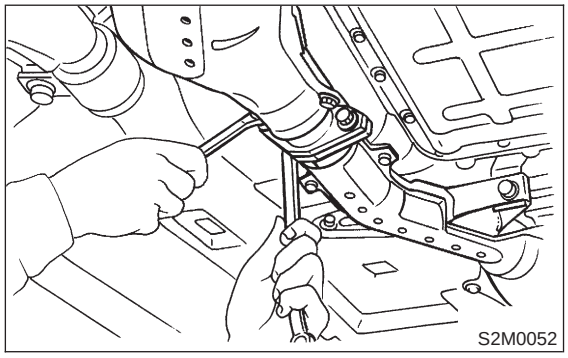
2) Lift-up the vehicle.
3) Disconnect rear oxygen sensor connector. (Except California spec. vehicles)



4) Separate center exhaust pipe and rear catalytic converter assembly from rear exhaust pipe.

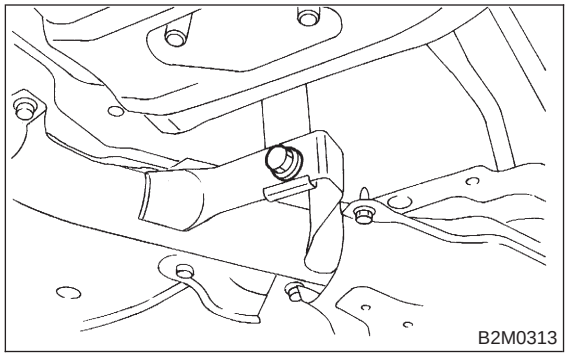


5) Separate center exhaust pipe and rear catalytic converter assembly from front catalytic converter.


S2M0052

6) Remove center exhaust pipe and rear catalytic converter assembly from hanger bracket.

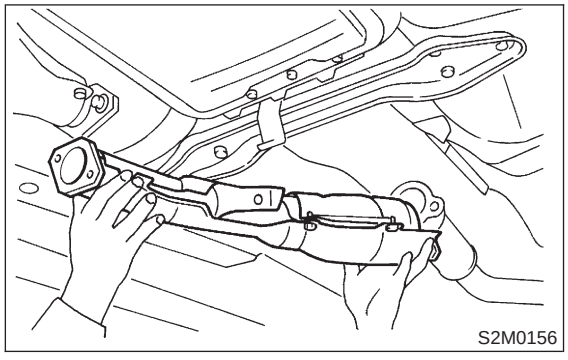
CAUTION:
● Be careful not to pull down center exhaust pipe.
● After removing center exhaust pipe, do not apply excessive pulling force on front catalytic converter and front exhaust pipe.


B2M0313

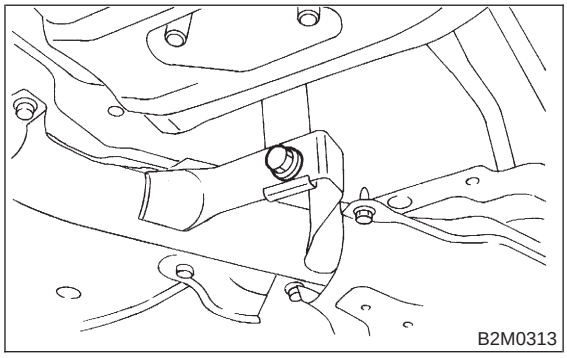
B: INSTALLATION

CAUTION:
Replace gaskets with new ones.

1) Install center exhaust pipe and rear catalytic converter assembly.

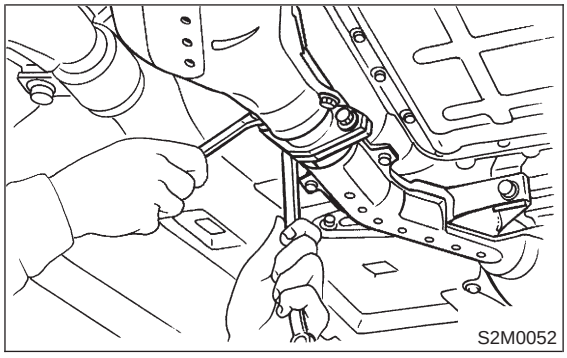

S2M0156

2) Temporarily tighten bolt which installs center exhaust pipe to hanger bracket.


B2M0313

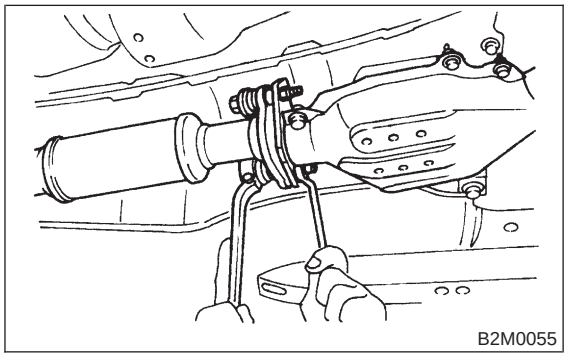
3) Install center exhaust pipe to front catalytic converter.

Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)


S2M0052

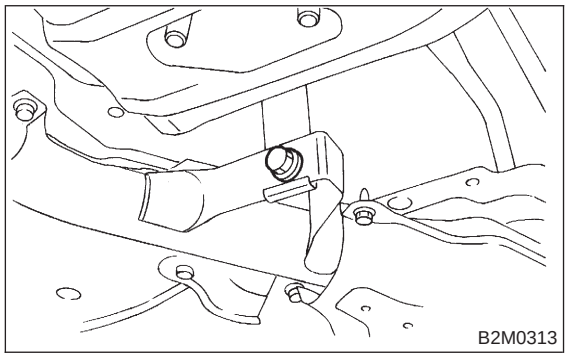
4) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

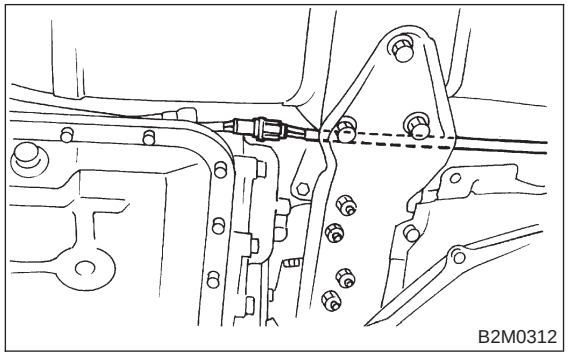

B2M0055

5) Tighten bolt which holds center exhaust pipe to hanger bracket.

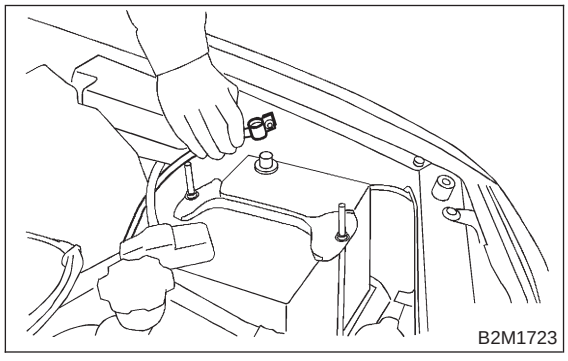
Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)


B2M0313

6) Connect rear oxygen sensor connector. (Except California spec. vehicles)


B2M0312

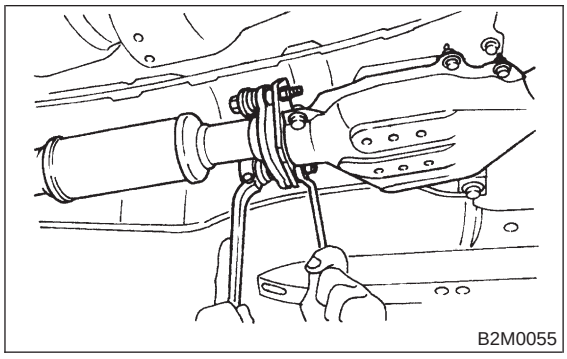
7) Lower the vehicle.
8) Connect battery ground cable.


B2M1723

3. Rear Exhaust Pipe

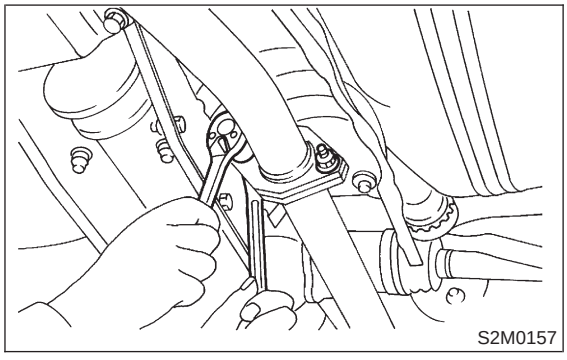
A: REMOVAL

1) Separate rear exhaust pipe from center exhaust pipe.


B2M0055

2) Separate rear exhaust pipe from muffler.

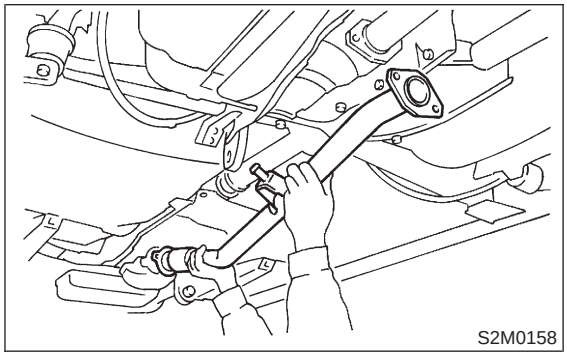
CAUTION:
Be careful not to pull down rear exhaust pipe.


S2M0157

3) Remove rear exhaust pipe bracket from rubber cushion.

NOTE:
To facilitate removal, apply a coat of SUBARU CRC or equivalent to pipe bracket in advance.

SUBARU CRC (Part No. 004301003)


S2M0158

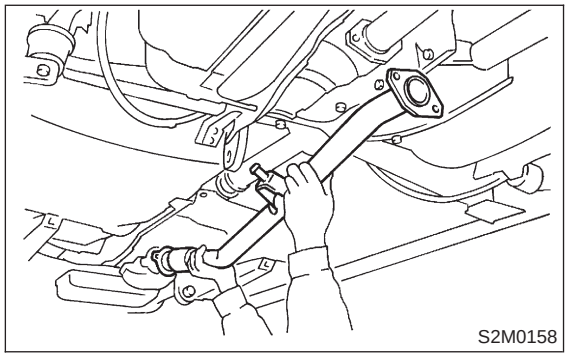
B: INSTALLATION

CAUTION:
Replace gaskets with new ones.

1) Install rear exhaust pipe bracket to rubber cushion.

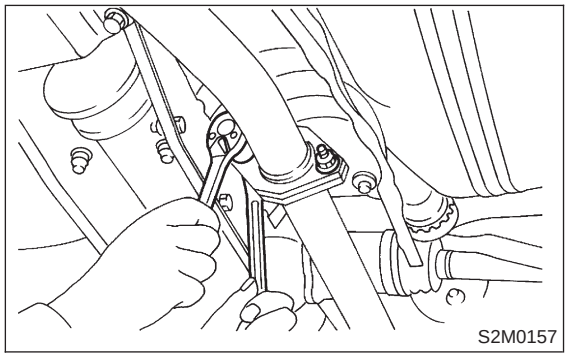
NOTE:
To facilitate installation, apply a coat of SUBARU CRC or equivalent to mating area of rubber cushion in advance.

SUBARU CRC (Part No. 004301003)


S2M0158

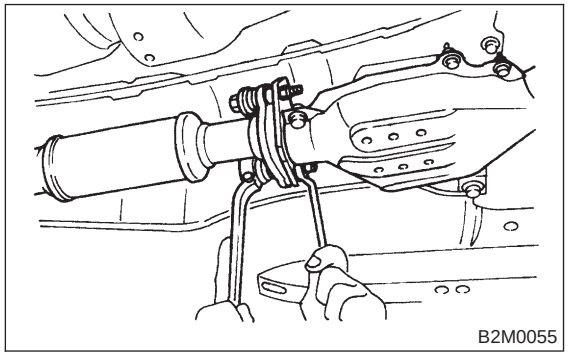
2) Install rear exhaust pipe to muffler.

Tightening torque:
48±5 N·m (4.9±0.5 kg-m, 35.4±3.6 ft-lb)


S2M0157

3) Install rear exhaust pipe to center exhaust pipe.

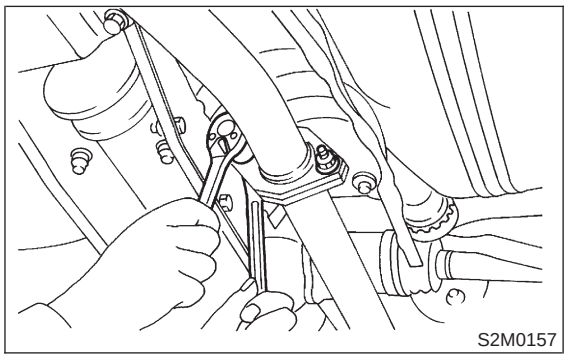
Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)


B2M0055

4. Muffler

A: REMOVAL AND INSTALLATION

1) Separate muffler from rear exhaust pipe.

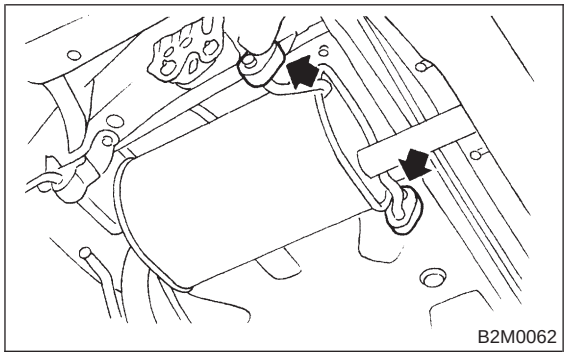

S2M0157

2) Remove left and right rubber cushions.

CAUTION:
Be careful not to pull down muffler.

NOTE:
To facilitate removal, apply a coat of SUBARU CRC or equivalent to mating area of rubber cushions in advance.

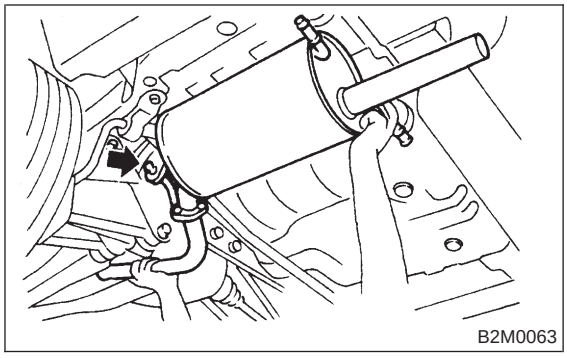
SUBARU CRC (Part No. 004301003)


B2M0062

3) Remove front rubber cushion, and detach muffler assembly.

NOTE:
To facilitate removal, apply a coat of SUBARU CRC or equivalent to mating area of rubber cushion in advance.

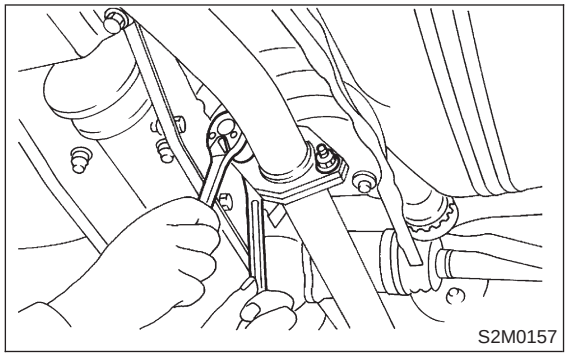
SUBARU CRC (Part No. 004301003)


B2M0063

4) Installation is in the reverse order of removal.

CAUTION:
Replace gasket with a new one.

Tightening torque:
48±5 N·m (4.9±0.5 kg-m, 35.4±3.6 ft-lb)



MEMO:

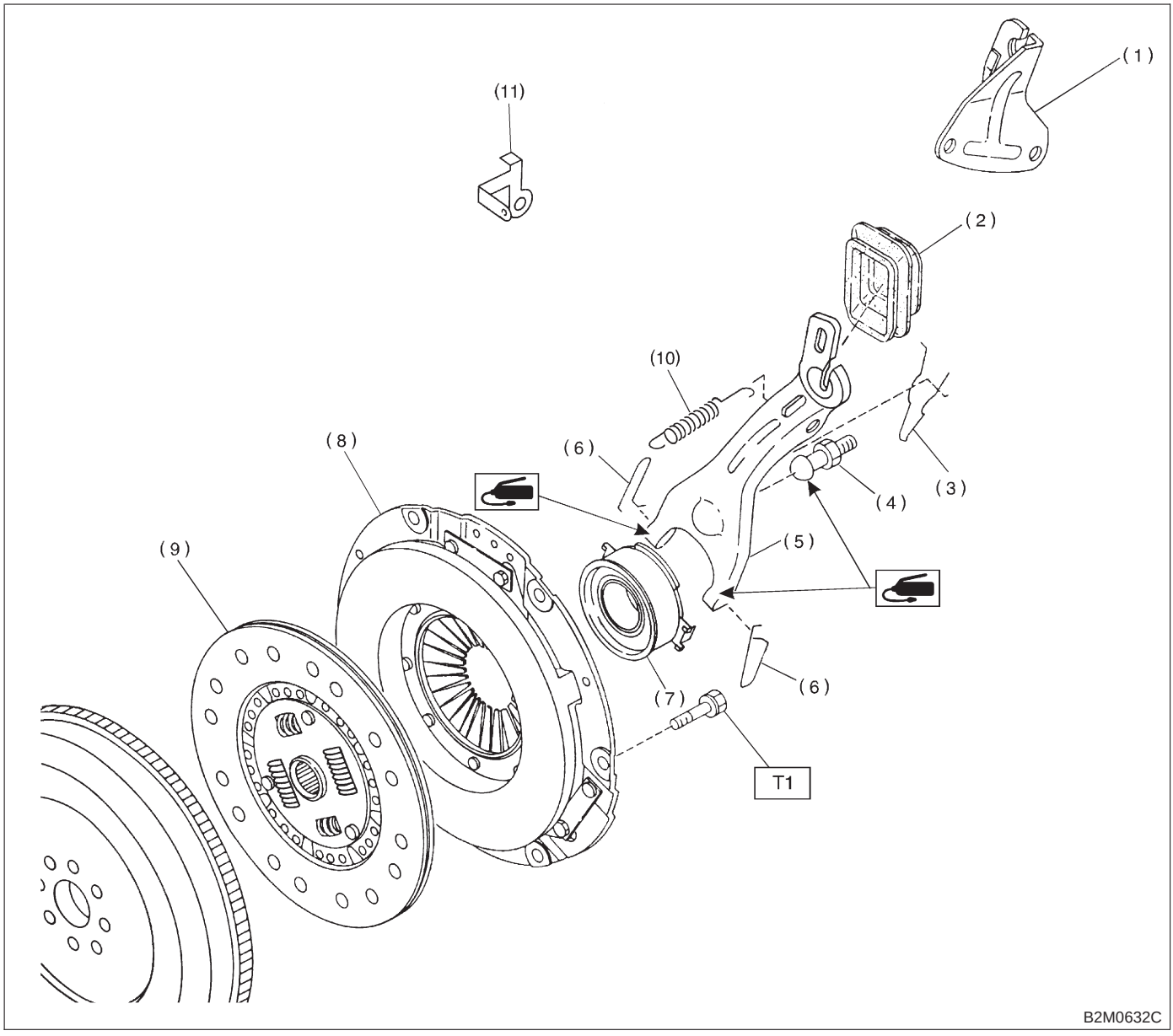
CLUTCH 2-10

1. Clutch System

			2200 cc	2500 cc
Clutch cover	Diaphragm set load kg (lb)		450 (992)	550 (1,213)
Clutch disc	Facing material		Woven	
	O.D. × I.D. × thickness mm (in)		225 × 150 × 3.5 (8.86 × 5.91 × 0.138)	
	Spline O.D. (No. of teeth) mm (in)		25.2 (0.992) (24)	
	Depth of rivet head mm (in)	Standard	1.3 — 1.9 (0.051 — 0.075)	
		Limit of sinking	0.3 (0.012)	
	Limit for runout mm (in)		1.0 (0.039) at R = 107 (4.21)	
Clutch release lever ratio			3.0	1.6
Release bearing			Grease-packed self-aligning	
Release lever	Stroke mm (in)		24 — 26 (0.94 — 1.02)	
	Play at release lever center mm (in)		3 — 4 (0.12 — 0.16)	
Clutch pedal	Full stroke mm (in)		140 — 150 (5.51 — 5.91)	130 — 135 (5.12 — 5.31)

1. Clutch System

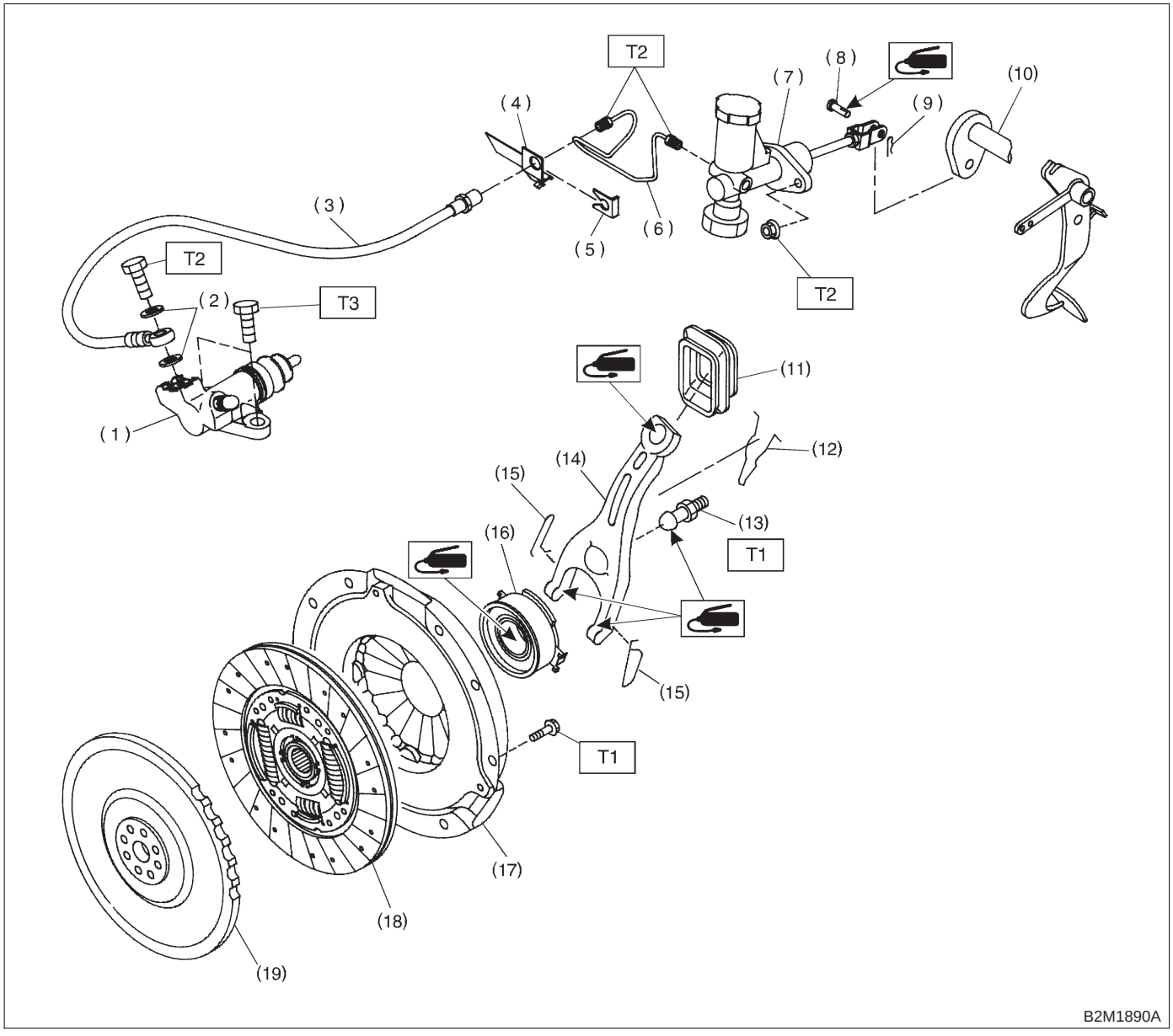
A: MECHANICAL APPLICATION TYPE



(1) Clutch cable bracket
(2) Clutch release lever sealing
(3) Retainer spring
(4) Pivot
(5) Clutch release lever
(6) Clip
(7) Clutch release bearing
(8) Clutch cover
(9) Clutch disc
(10) Return spring (Models without hill holder only)
(11) Clutch return spring bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 15.7±1.5 (1.6±0.15, 11.6±1.1)

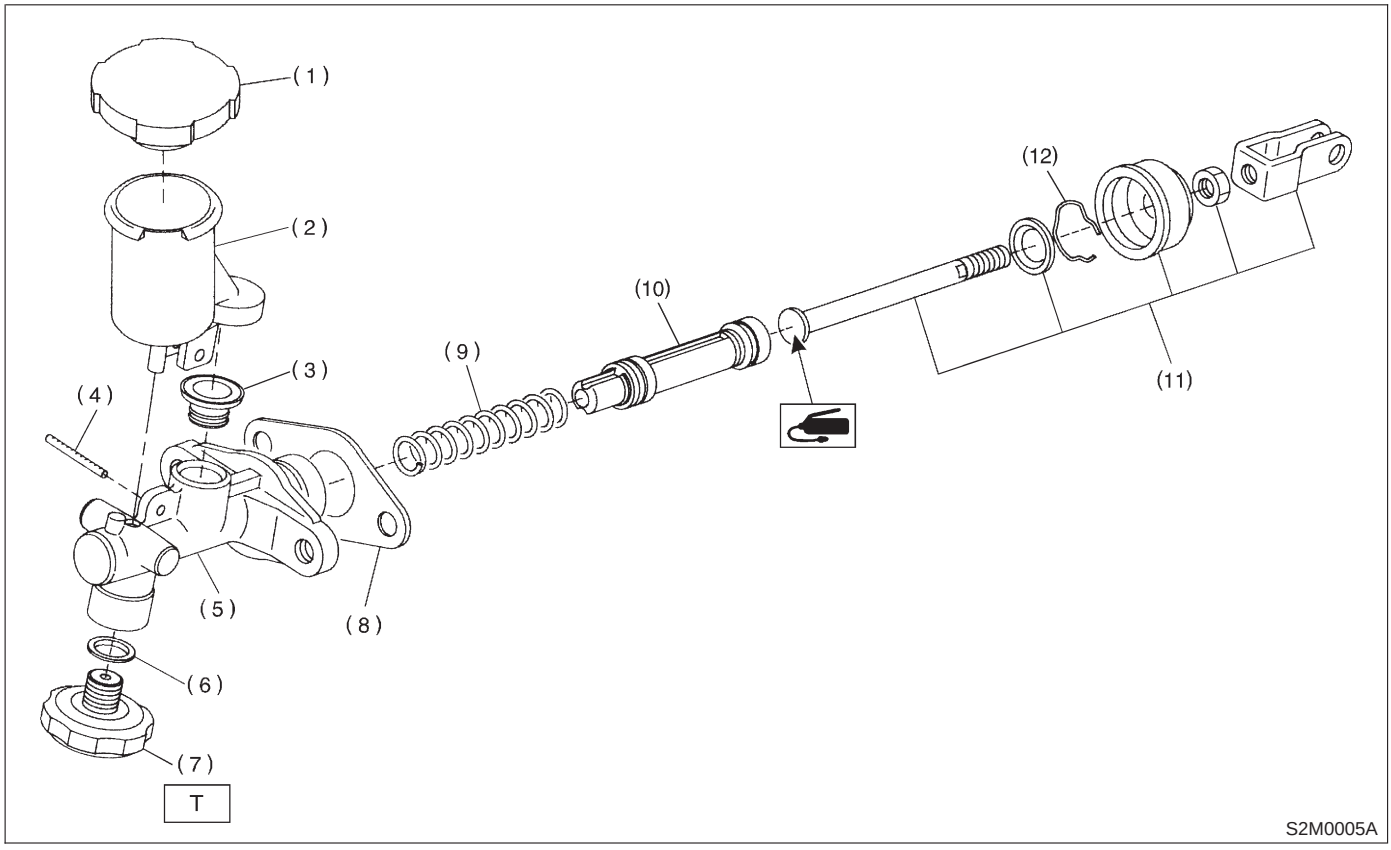
B: HYDRAULIC APPLICATION TYPE



(1) Operating cylinder
(2) Washer
(3) Clutch hose
(4) Bracket
(5) Clamp
(6) Pipe
(7) Master cylinder ASSY
(8) Clevis pin
(9) Snap pin
(10) Lever
(11) Clutch release lever sealing
(12) Retainer spring
(13) Pivot
(14) Release lever
(15) Clip
(16) Release bearing
(17) Clutch cover
(18) Clutch disc
(19) Flywheel

Tightening torque: N·m (kg-m, ft-lb)
T1: 15.7±1.5 (1.6±0.15, 11.6±1.1)
T2: 18±3 (1.8±0.3, 13.0±2.2)
T3: 37±3 (3.8±0.3, 27.5±2.2)

2. Master Cylinder and Reservoir Tank



(1) Reservoir cap
(2) Reservoir tank
(3) Oil seal
(4) Straight pin
(5) Master cylinder
(6) Washer
(7) Diaphragm spring
(8) Seat
(9) Return spring
(10) Piston
(11) Push rod
(12) Piston stop ring

Tightening torque: N·m (kg-m, ft-lb)
T: 46.6±7.4 (4.75±0.75, 34.4±5.4)

1. General

A: PRECAUTION

When servicing clutch system, pay attention to the following items.

1. MECHANICAL APPLICATION TYPE

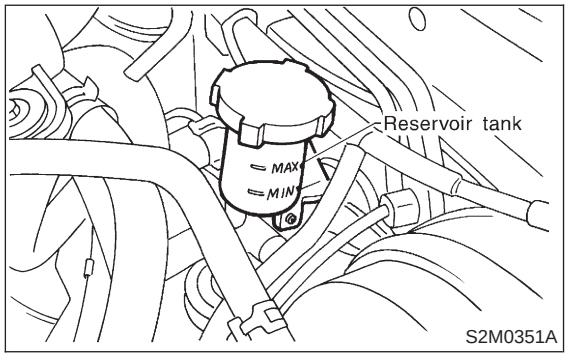
1) Check the routing of clutch cable for smoothness.
2) Excessive tightness or looseness of clutch cable have a bad influence upon the cable durability.
3) Apply grease sufficiently to the connecting portion of clutch pedal.
4) Apply grease sufficiently to the release lever portion.
5) Position clutch cable through the center of toe board hole and route it smoothly. Adjustment is done by moving the outer cable.
6) Make sure not to let the clutch chatter when starting forward or rearward. If clutch chattering occurs, readjust so that the bend of clutch outer cable becomes flatter.

2. HYDRAULIC APPLICATION TYPE

1) Check fluid level using a scale on outside of reservoir tank. If the level is below “MIN”, add clutch fluid to bring it up to “MAX”.

Recommended clutch fluid:
FMVSS No. 116, fresh DOT3 or DOT4 brake fluid

CAUTION:
● Avoid mixing different brakes of brake fluid to prevent degradation of the fluid.
● Be careful not to allow dirt or dust to get into the reservoir tank.
● Use fresh DOT3 or DOT4 brake fluid when refilling fluid.



2) Make sure that brake fluid does not leak from master cylinder, operating cylinder and piping.
3) Apply grease sufficiently to the release lever pinion.
4) Check for proper clutch disengagement and clutch pedal return ability.

2. On-car Service

A: ADJUSTMENT

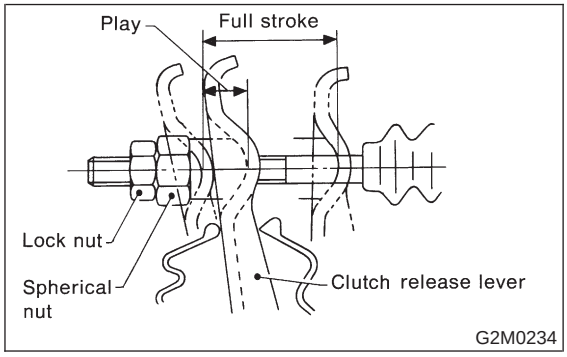
1. MECHANICAL APPLICATION TYPE

1) Remove release lever return spring from lever (Models without hill holder only).
2) Adjust spherical nut so that the play is within the specified value at the lever end (center of spherical nut).

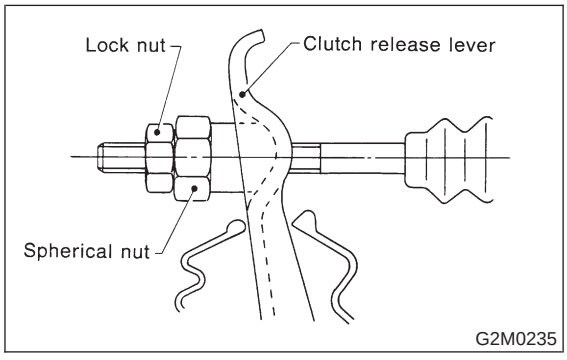
Play:
3 — 4 mm (0.12 — 0.16 in)

Full stroke:
24 — 26 mm (0.94 — 1.02 in)

CAUTION:
Take care not to twist the cable during adjustment.



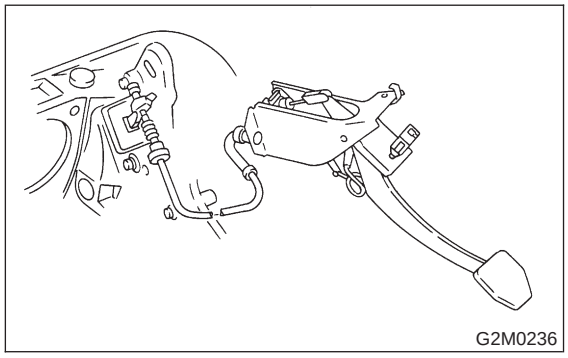
3) Upon completion of adjustment, securely lock spherical nut with lock nut.



4) Install return spring on lever (Models without hill holder only).

NOTE:
Hook the long hook side of the return spring with the lever (Models without hill holder only).

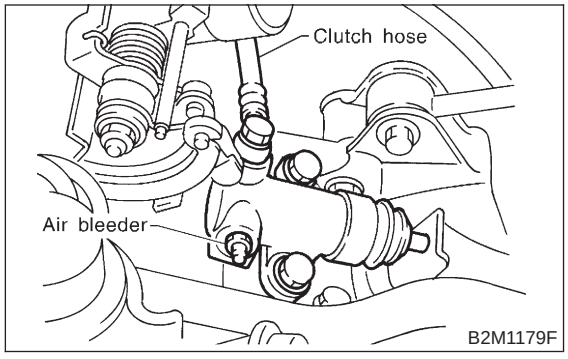
5) Depress clutch pedal to assure there is no abnormality in the clutch system.



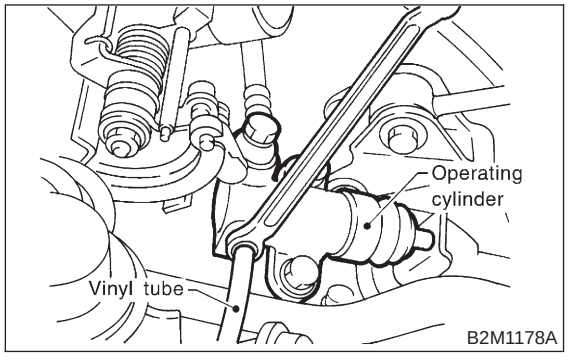
2. HYDRAULIC APPLICATION TYPE

NOTE:
Bleed air from oil line with the help of a co-worker.

1) Remove air chamber.
2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.

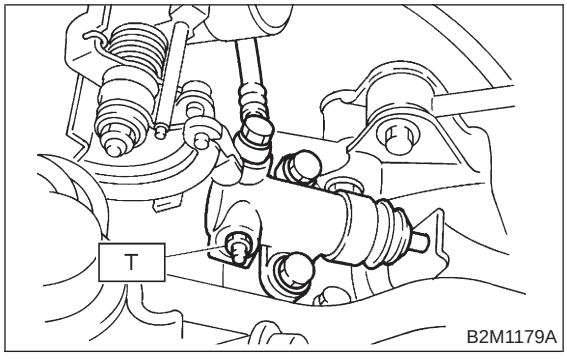


4) Repeat these steps until there are no more air bubbles in the vinyl tube.

CAUTION:
Cover bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

5) Tighten air bleeder.

Tightening torque:
T: 18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)



6) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
7) After bleeding air from system, ensure that clutch operates properly.

3. Release Bearing and Lever

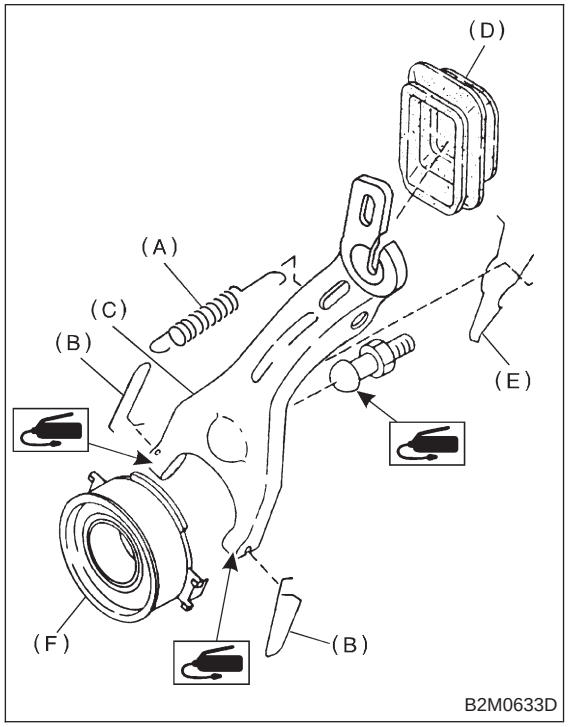
A: REMOVAL

1. MECHANICAL APPLICATION TYPE

1) Remove transmission assembly from vehicle body.
<Ref. to 2-11 [W2B0].>
2) Remove release lever return spring (Models without hill holder only).
3) Remove the two clips from clutch release lever and remove release bearing.

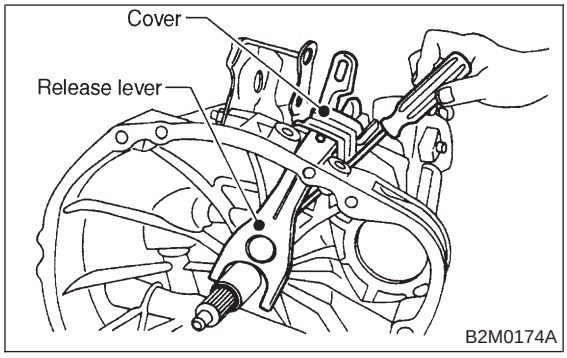
CAUTION:
Be careful not to deform clips.

4) Remove release lever seal.



(A) Release lever return spring
(B) Clip
(C) Release lever
(D) Release lever seal
(E) Retainer spring
(F) Clutch release lever

5) Remove release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove release lever.

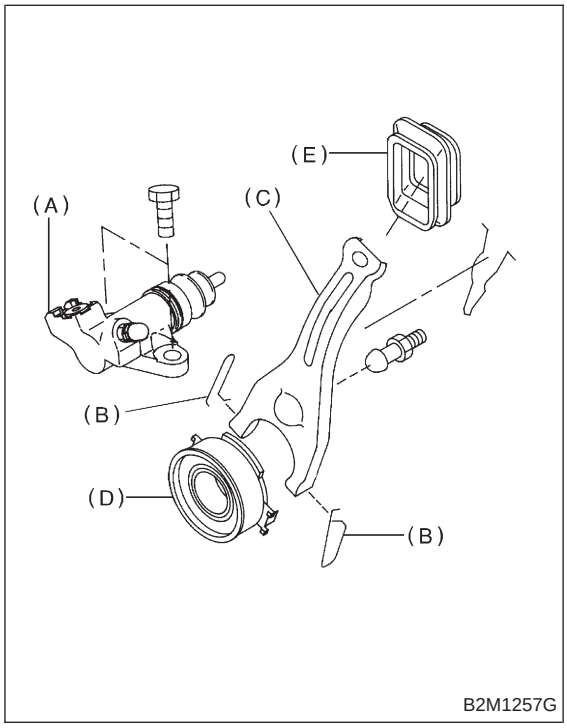


2. HYDRAULIC APPLICATION TYPE

1) Remove transmission assembly from vehicle body.
<Ref. to 2-11 [W2B0].>
2) Remove operating cylinder.
<Ref. to 2-10 [W5A0].>
3) Remove the two clips from clutch release lever and remove release bearing.

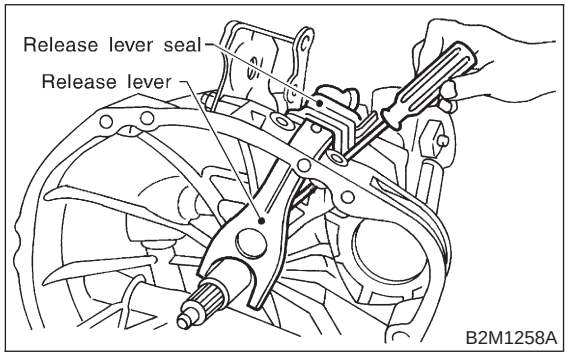
CAUTION:
Be careful not to deform clips.

4) Remove release lever seal.



(A) Operating cylinder
(B) Clip
(C) Clutch release lever
(D) Release bearing
(E) Release lever seal

5) Remove release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove release lever.



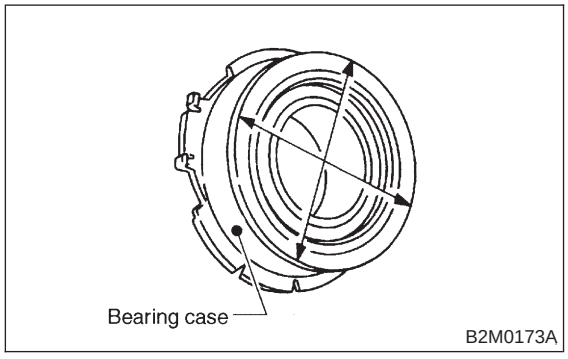
B: INSPECTION

1. RELEASE BEARING

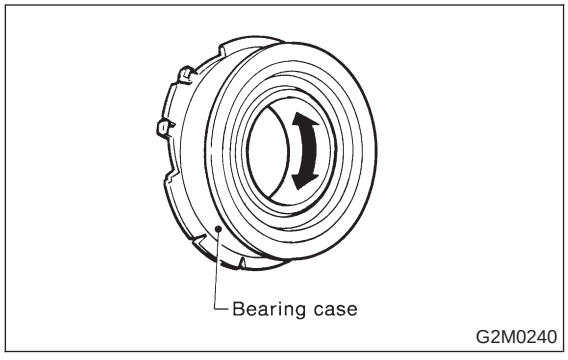
CAUTION:
Since this bearing is grease sealed and is of a nonlubrication type, do not wash with gasoline or any solvent when servicing the clutch.

1) Check the bearing for smooth movement by applying force in the radial direction.

Radial direction stroke:
FWD; Approx.
1.0 mm (0.039 in)
AWD; Approx.
1.4 mm (0.055 in)



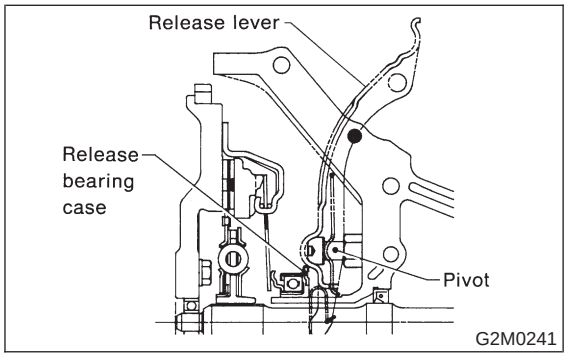
2) Check the bearing for smooth rotation by applying pressure in the thrust direction.



3) Check wear and damage of bearing case surface contacting with lever.

2. RELEASE LEVER

1) Check lever pivot portion and the point of contact with release bearing case for wear.



C: INSTALLATION

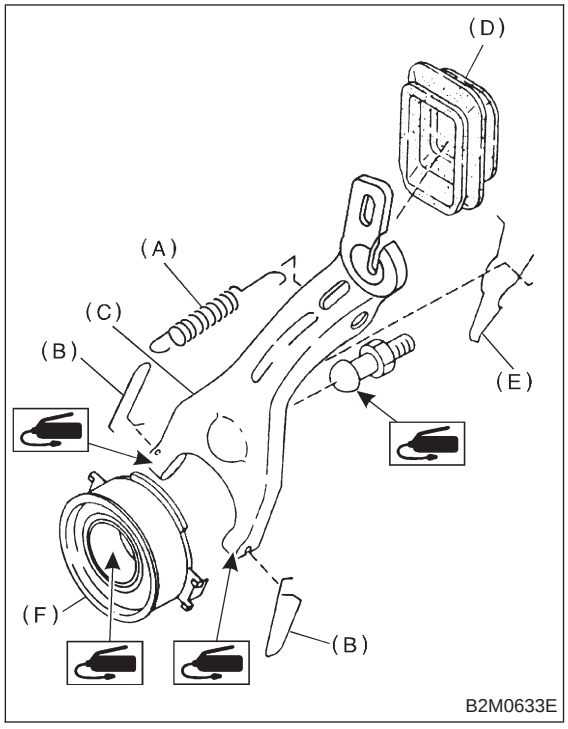
CAUTION:
Before or during assembling, lubricate the following points with a light coat of grease.
- **Inner groove of release bearing**
- **Contact surface of lever and pivot**
- **Contact surface of lever and bearing**
- **Transmission main shaft spline (Use grease containing molybdenum disulphide.)**

1. MECHANICAL APPLICATION TYPE

1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

NOTE:
Confirm that retainer spring is securely fitted by observing it through the main case hole.

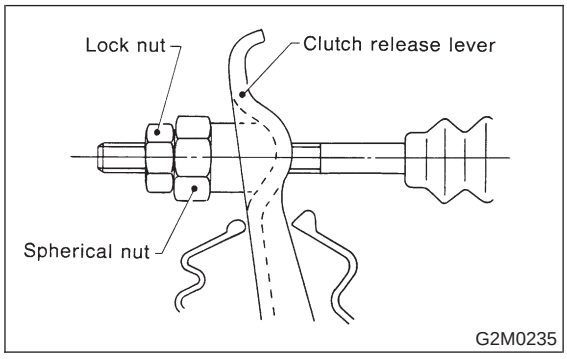
2) Install release bearing and fasten it with two clips.
3) Install release lever seal.



(A) Release lever return spring
(B) Clip
(C) Release lever
(D) Release lever seal
(E) Retainer spring
(F) Release lever bearing

4) After remounting engine and transmission on body, make adjustment of the clutch release lever end play.

CAUTION:
Take care not to twist the cable during adjustment.



5) Install release lever return spring (Models without hill holder only).

NOTE:
Hook up the return spring to right side hole of the release lever.

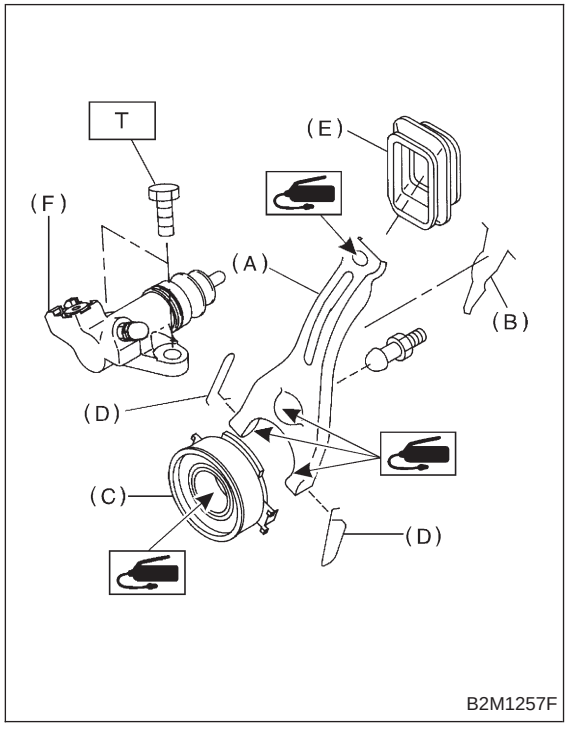
2. HYDRAULIC APPLICATION TYPE

1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

NOTE:
● Apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.
● Confirm that retainer spring is securely fitted by observing it through the main case hole.

2) Install release bearing and fasten it with two clips.
3) Install release lever seal.
4) Install operating cylinder.

Tightening torque:
T: 37±3 N·m (3.8±0.3 kg-m, 27.5±2.2 ft-lb)



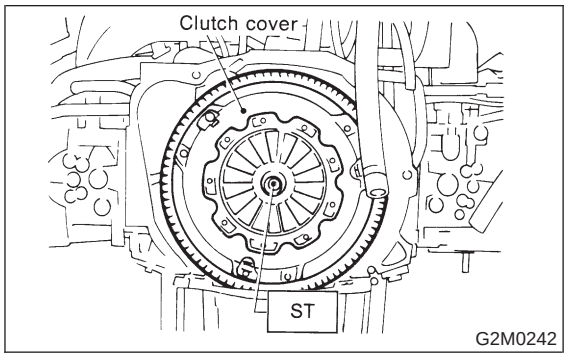
(A) Release lever
(B) Retainer spring
(C) Release bearing
(D) Clip
(E) Release lever seal
(F) Operating cylinder

5) After remounting engine and transmission on body.
<Ref. to 2-11 [W2C0].>
6) Bleed air from oil line with the help of a coworker.
<Ref. to 2-10 [W2A2].>

4. Clutch Disc and Cover

A: REMOVAL

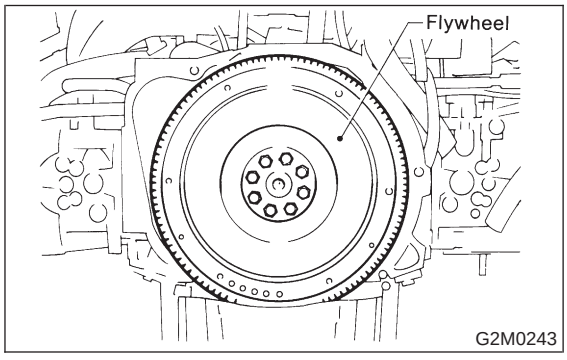
1) Install ST on flywheel.
ST 498497100C RANKSHAFT STOPPER



2) Remove clutch cover and clutch disc.

CAUTION:
● Take care not to allow oil on the clutch disc facing.
● Do not disassemble either clutch cover or clutch disc.

3) Remove flywheel.



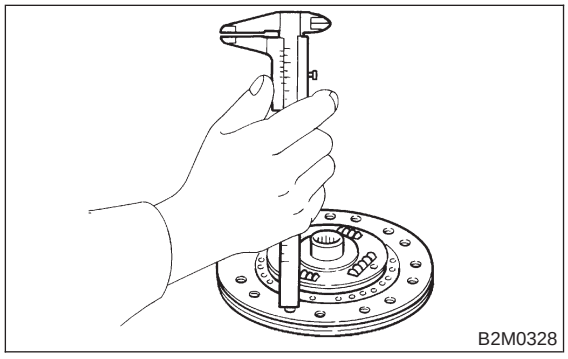
B: INSPECTION

1. CLUTCH DISC

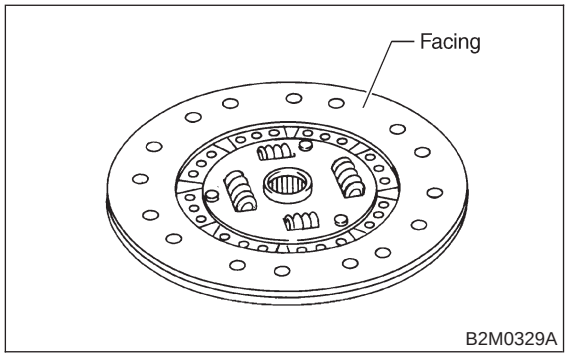
1) Facing wear
Measure the depth of rivet head from the surface of facing. Replace if facings are worn locally or worn down to less than the specified value.

Depth of rivet head:
Standard value
1.3 — 1.9 mm (0.051 — 0.075 in)
Limit of sinking
0.3 mm (0.012 in)

CAUTION:
Do not wash clutch disc with any cleaning fluid.


B2M0328

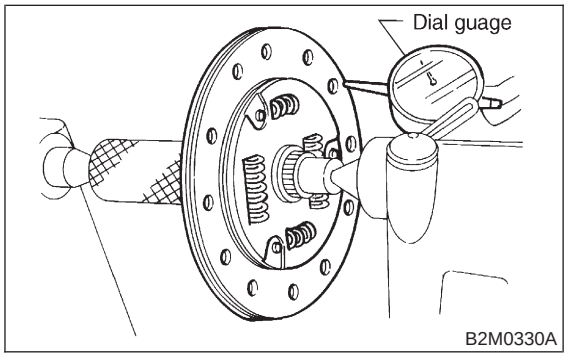
2) Hardened facing
Correct by using emery paper or replace.
3) Oil soakage on facing
Replace clutch disc and inspect transmission front oil seal, transmission case mating surface, engine rear oil seal and other points for oil leakage.



B2M0329A

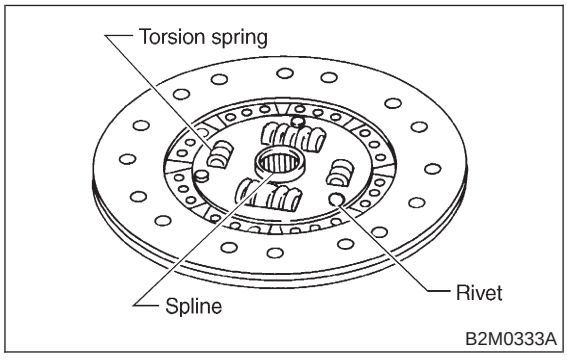
4) Deflection on facing
If deflection exceeds the specified value at the outer circumference of facing, repair or replace.

Limit for deflection:
1.0 mm (0.039 in) at R = 107 mm (4.21 in)



B2M0330A

5) Worn spline, loose rivets and torsion spring failure
Replace defective parts.

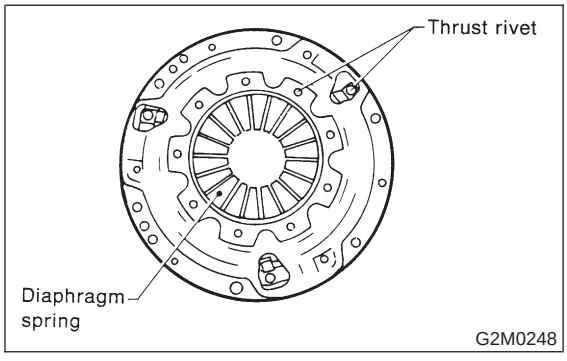


B2M0333A

2. CLUTCH COVER

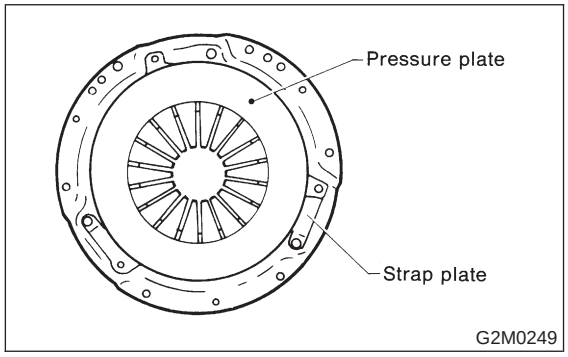
NOTE:
Visually check for the following items without disassembling, and replace or repair if defective.

1) Loose thrust rivet.
2) Damaged or worn bearing contact area at center of diaphragm spring.



G2M0248

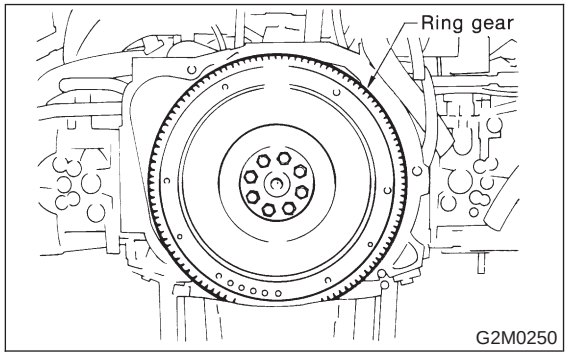
3) Damaged or worn disc contact surface of pressure plate.
4) Loose strap plate setting bolt.
5) Worn diaphragm sliding surface.



3. FLYWHEEL

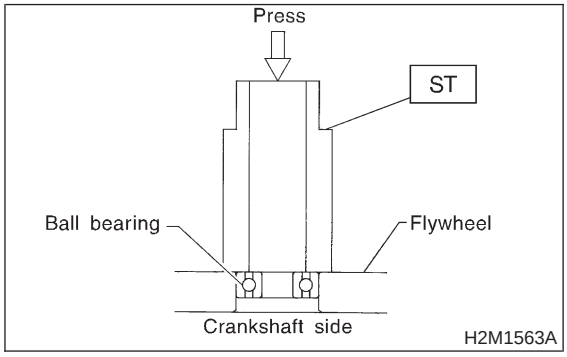
CAUTION:
Since this bearing is grease sealed and is of a nonlubrication type, do not wash with gasoline or any solvent.

1) Damage of facing and ring gear
If defective, replace flywheel.



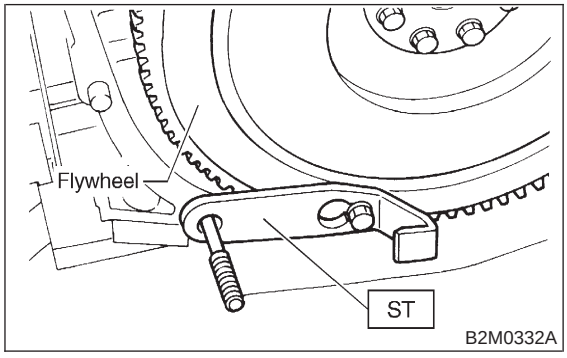
2) Smoothness of rotation
Rotate ball bearing applying pressure in thrust direction.

3) If noise or excessive play is noted, replace ball bearing as follows:
(1) Drive out ball bearing from flywheel.
(2) Press bearing into flywheel until bearing end surface is flush with clutch disc contact surface of flywheel. Do not press inner race.
ST 899754112 SNAP RING PRESS



C: INSTALLATION

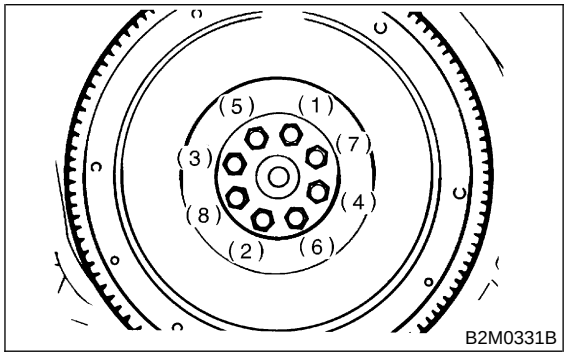
1) Install flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



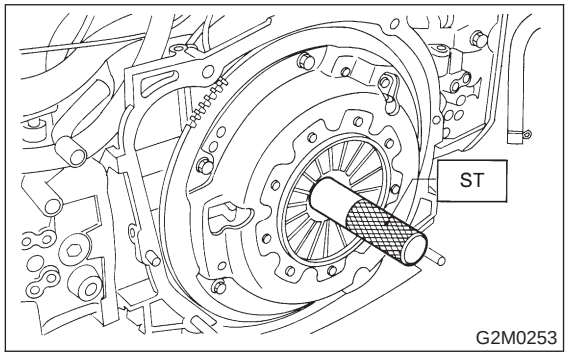
2) Tighten the flywheel attaching bolts to the specified torque.

NOTE:
Tighten flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
72±3 N·m (7.3±0.3 kg-m, 52.8±2.2 ft-lb)



3) Insert ST into the clutch disc and install them on the flywheel by inserting the ST end into the pilot bearing.
ST 499747100 CLUTCH DISC GUIDE

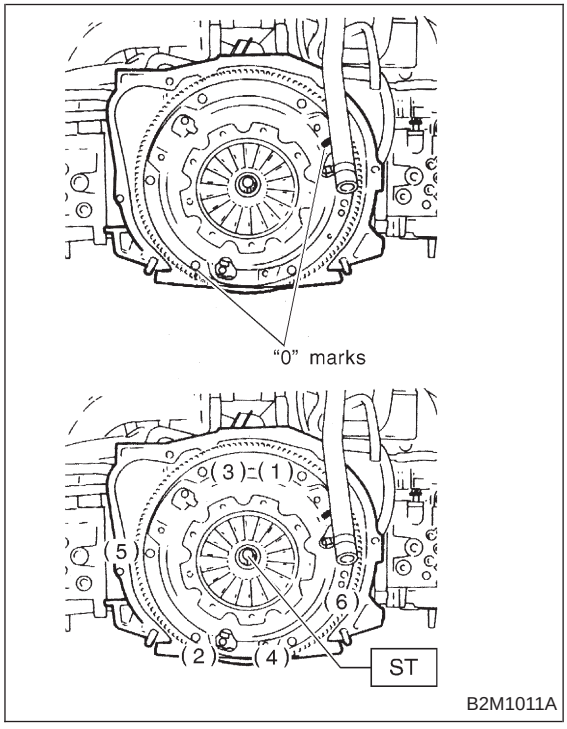


4) Install clutch cover on flywheel and tighten bolts to the specified torque.

NOTE:
- When installing the clutch cover on the flywheel, position the clutch cover so that there is a gap of 120° or more between “0” marks on the flywheel and clutch cover. (“0” marks indicate the directions of residual unbalance.)
- Note the front and rear of the clutch disc when installing.
- Tighten clutch cover installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)

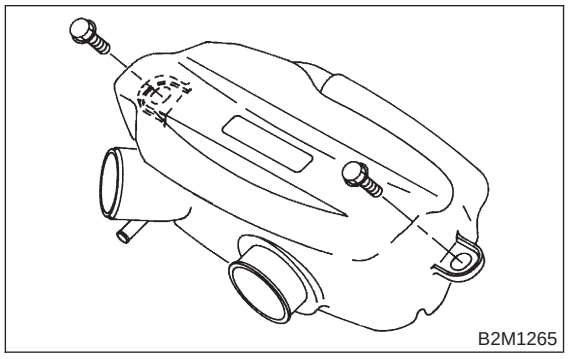
5) Remove ST.
ST 499747100 CLUTCH DISC GUIDE



5. Operating Cylinder

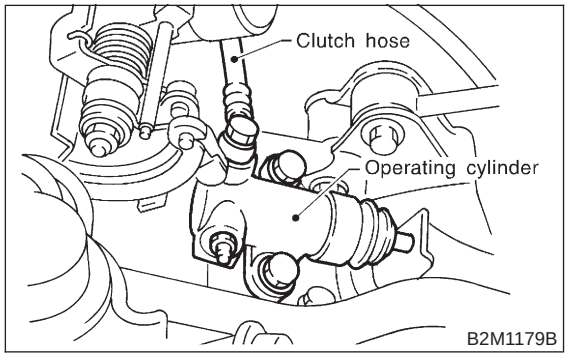
A: REMOVAL AND INSTALLATION

1) Remove air chamber.
<Ref. to 2-7 [W18A0].>

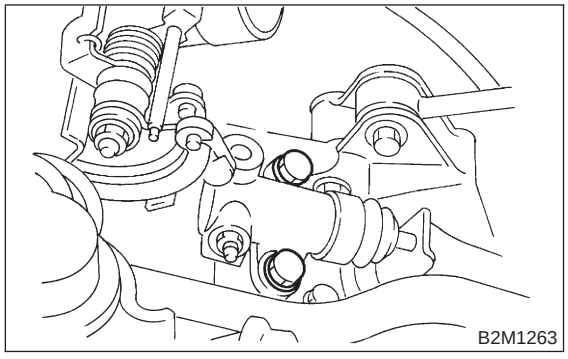


2) Remove clutch hose from operating cylinder.

CAUTION:
Cover hose joint to prevent brake fluid from flowing out.



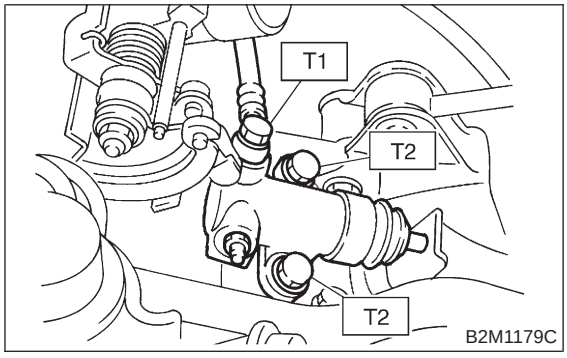
3) Remove operating cylinder from transmission.



4) Installation is in the reverse order of removal.

NOTE:
Before installing operating cylinder, apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.

Tightening torque:
T1: 18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)
T2: 37±3 N·m (3.8±0.3 kg-m, 27.5±2.2 ft-lb)

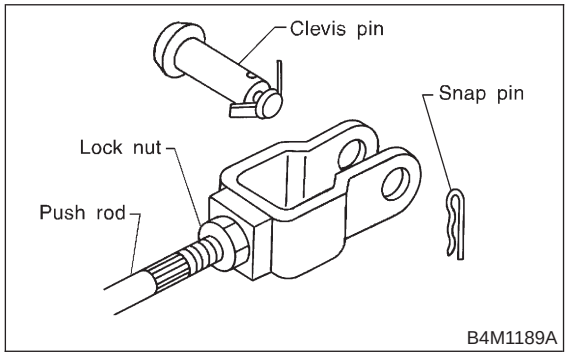


5) After bleeding air from operating cylinder, ensure that clutch operates properly.
<Ref. to 2-10 [W2A2].>

6. Master Cylinder and Reservoir Tank

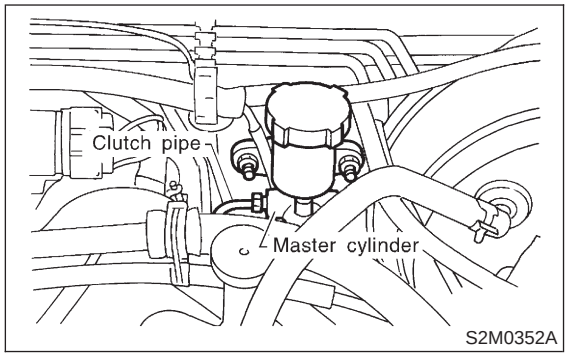
A: REMOVAL

1) Thoroughly drain brake fluid from reservoir tank.
2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



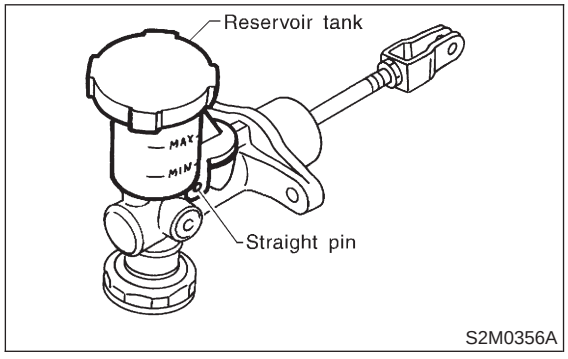
3) Remove clutch pipe from master cylinder.
4) Remove master cylinder with reservoir tank.

CAUTION:
Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the paint surface; wipe it off quickly if spilt.

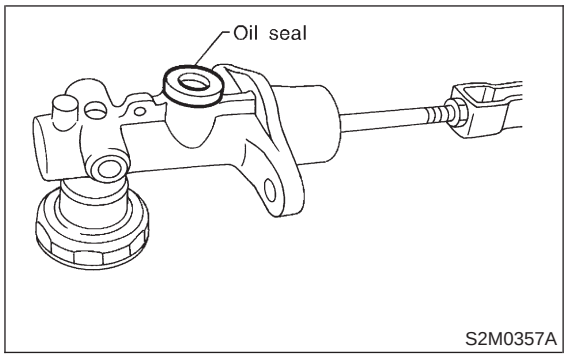


B: DISASSEMBLY

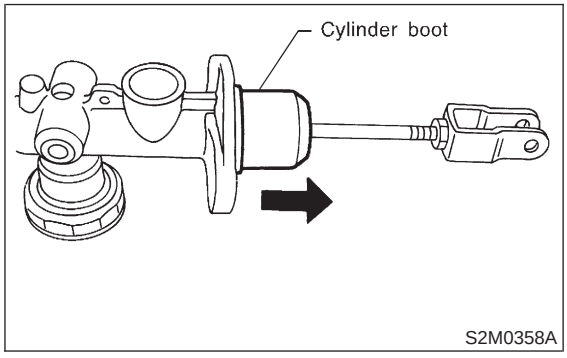
1) Remove straight pin and reservoir tank.



2) Remove oil seal.



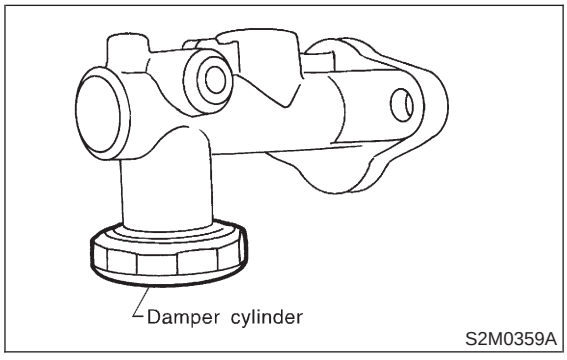
3) Move the cylinder boot backward.



4) Remove snap ring.

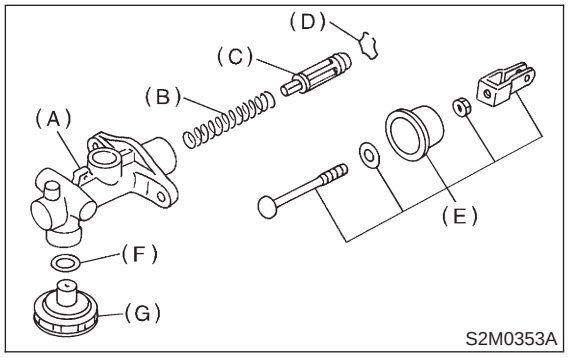
CAUTION:
Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

5) Remove damper cylinder from master cylinder body.



C: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring and gasket, replace the faulty part.



(A) Master cylinder body
(B) Return spring
(C) Piston
(D) Snap ring
(E) Rod assy
(F) Washer
(G) Damper cylinder

D: ASSEMBLY

CAUTION:
Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

1) To assemble the master cylinder reverse the sequence of disassembly procedure.
2) Install damper cylinder washer. Install damper cylinder and tighten to the specified torque.

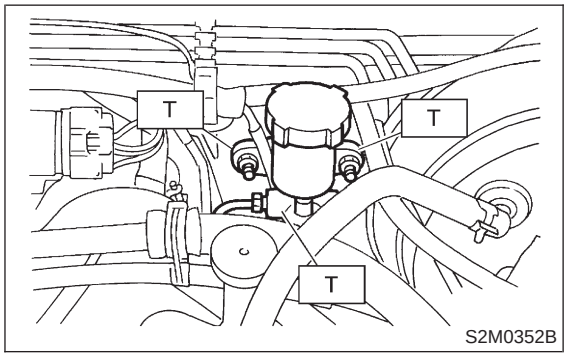
Tightening torque:
T: 46.6±7.4 N·m (4.75±0.75 kg-m, 34.4±5.4 ft-lb)

E: INSTALLATION

1) Install master cylinder to body, and install clutch pipe to master cylinder.

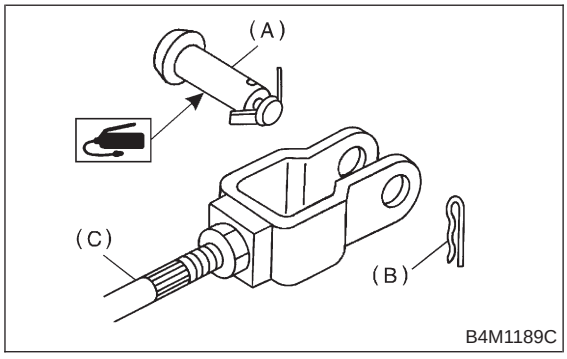
CAUTION:
Check that pipe is routed properly.

Tightening torque:
T: 18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)



2) Connect push rod of master cylinder to clutch pedal, and install clevis pin and snap pin.

NOTE:
Apply grease to clevis pin.



(A) Clevis pin
(B) Snap pin
(C) Push rod

3) After bleeding air from system, ensure that clutch operates properly.
<Ref. to 2-10 [W2A2].>

7. Brake Fluid

A: REPLACEMENT

CAUTION:
● The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
● Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
● Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
● Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:
● During bleeding operation, keep the clutch reserve tank filled with brake fluid to eliminate entry of air.
● Clutch pedal operating must be very slow.
● For convenience and safety, it is advisable to have two man working.
● The amount of brake fluid required is approximately 70 mℓ (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.

1) Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
2) Remove both front and rear wheels.
3) Draw out the brake fluid from reserve tank with syringe.
4) Refill reservoir tank with recommended brake fluid.

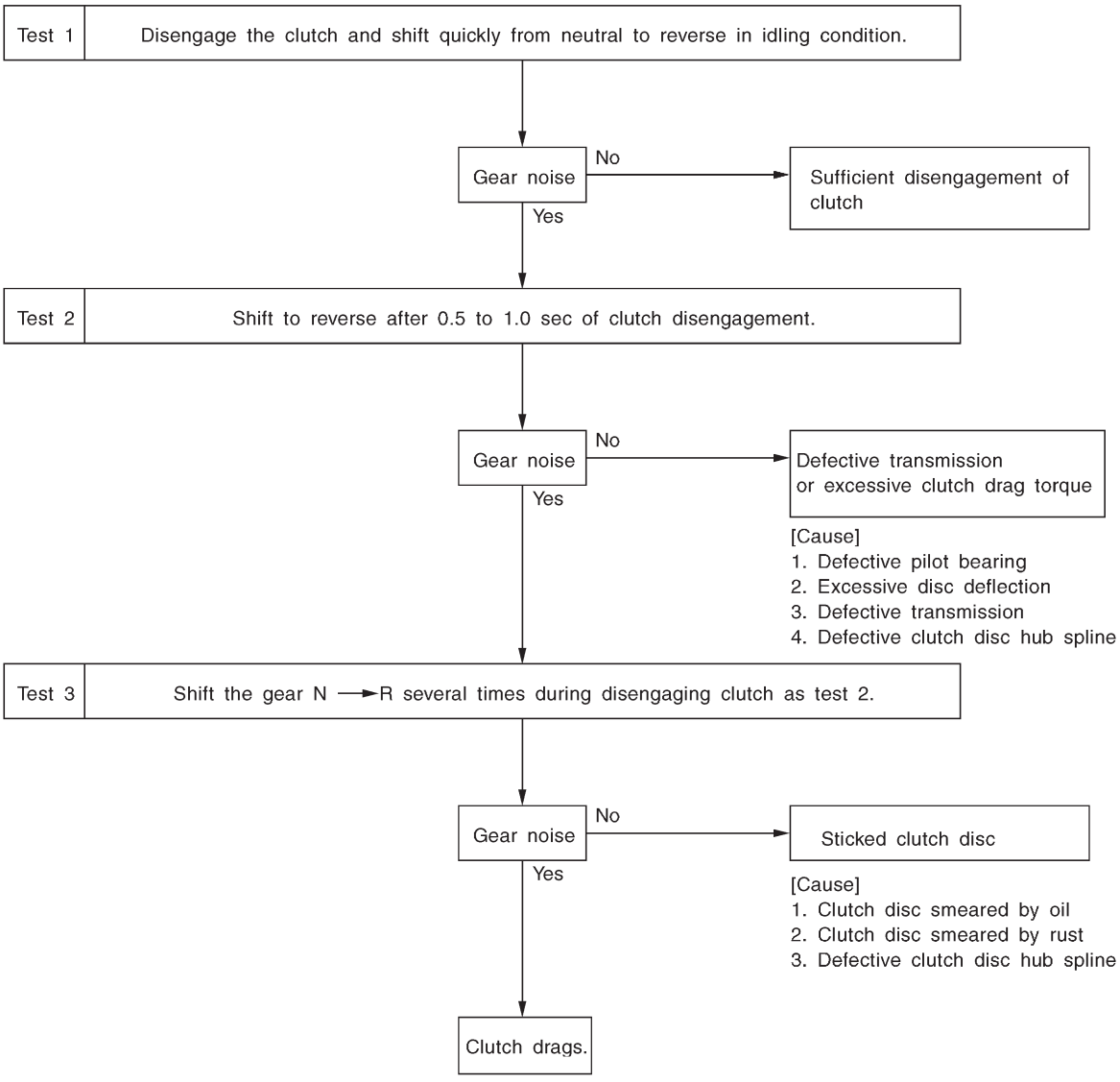
Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid

5) Bleed air from oil line with the help of a co-worker.
<Ref. to 2-10 [W2A2].>

1. Clutch System

Symptom	Possible cause	Corrective
1. Clutch slippage. It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms ● Engine revs up when shifting. ● High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed. ● Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. ● Method of testing: Put the vehicle in stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall.	(a) No clutch pedal play	Readjust.
	(b) No release lever end play	Readjust.
	(c) Clutch facing smeared by oil	Replace.
	(d) Worn clutch facing	Replace.
	(e) Deteriorated diaphragm spring	Replace.
	(f) Distorted pressure plate or flywheel	Correct or replace.
	(g) Defective release bearing holder	Correct or replace.
	(h) Defective pedal and cable system	Correct or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of the this sort is due to defective synchronization mechanism, carry out the test as described after. <Ref. to 2-10 [K1A0].> It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Excessive clutch pedal play	Readjust.
	(b) Excessive clutch release lever play	Readjust.
	(c) Worn or rusty clutch disc hub spline	Replace clutch disc.
	(d) Excessive deflection of clutch disc facing	Correct or replace.
	(e) Seized crankshaft pilot needle bearing	Replace.
	(f) Malfunction of pedal and cable system	Correct or replace.
	(g) Cracked clutch disc facing	Replace.
	(h) Sticked clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.	(a) Improper clutch cable routing	Correct.
	(b) Adhesion of oil on the facing	Replace clutch disc.
	(c) Weak or broken torsion spring	Replace clutch disc.
	(d) Defective facing contact or excessive disc	Replace clutch disc defection.
	(e) Warped pressure plate or flywheel	Correct or replace.
	(f) Loose disc rivets	Replace clutch disc.
	(g) Loose engine mounting	Retighten or replace mounting.
	(h) Improper adjustment of pitching stopper	Adjustment.
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace release bearing.
	(b) Insufficient lubrication of pilot bearing	Apply grease.
	(c) Loose clutch disc hub	Replace clutch disc.
	(d) Loose torsion spring retainer	Replace clutch disc.
	(e) Deteriorated or broken torsion spring	Replace clutch disc.
5. Clutch grabs. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace clutch disc.
	(b) Deteriorated cushioning spring	Replace clutch disc.
	(c) Worn or rusted spline of clutch disc or main	Take off rust, apply grease or replace clutch shaft disc or mainshaft.
	(d) Deteriorated or broken torsion spring	Replace clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

A: DIAGNOSTIC DIAGRAM OF CLUTCH DRAG



[Cause]
1. Cracked clutch disc facing
2. Damaged or worn clutch cover
3. Malfunction of clutch release system
4. Insufficient clutch release amount
5. Excessive clutch pedal play

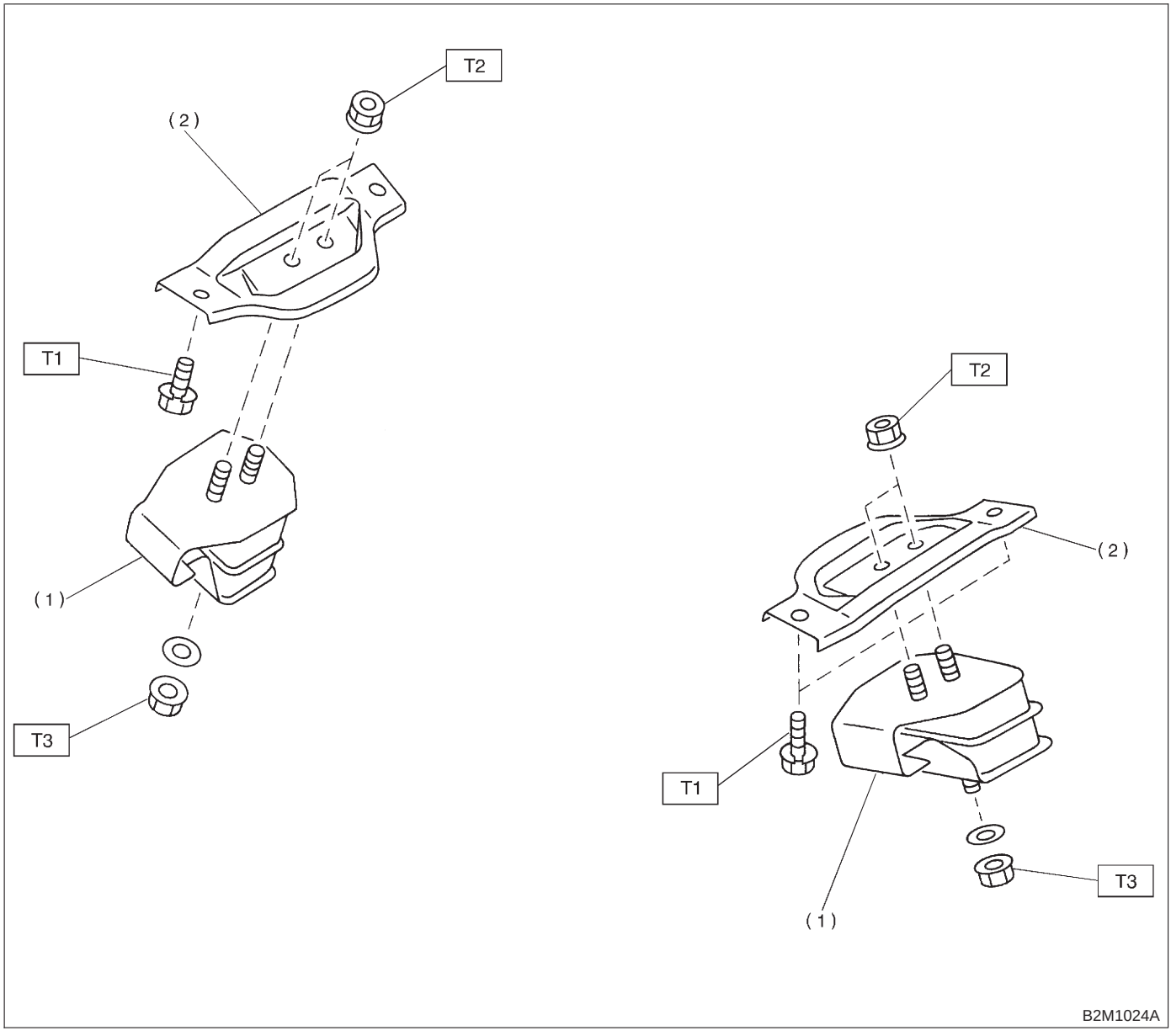
B2M1012A

MEMO:

MEMO:

ENGINE AND TRANSMISSION MOUNTING SYSTEM 2-11

1. Engine Mounting

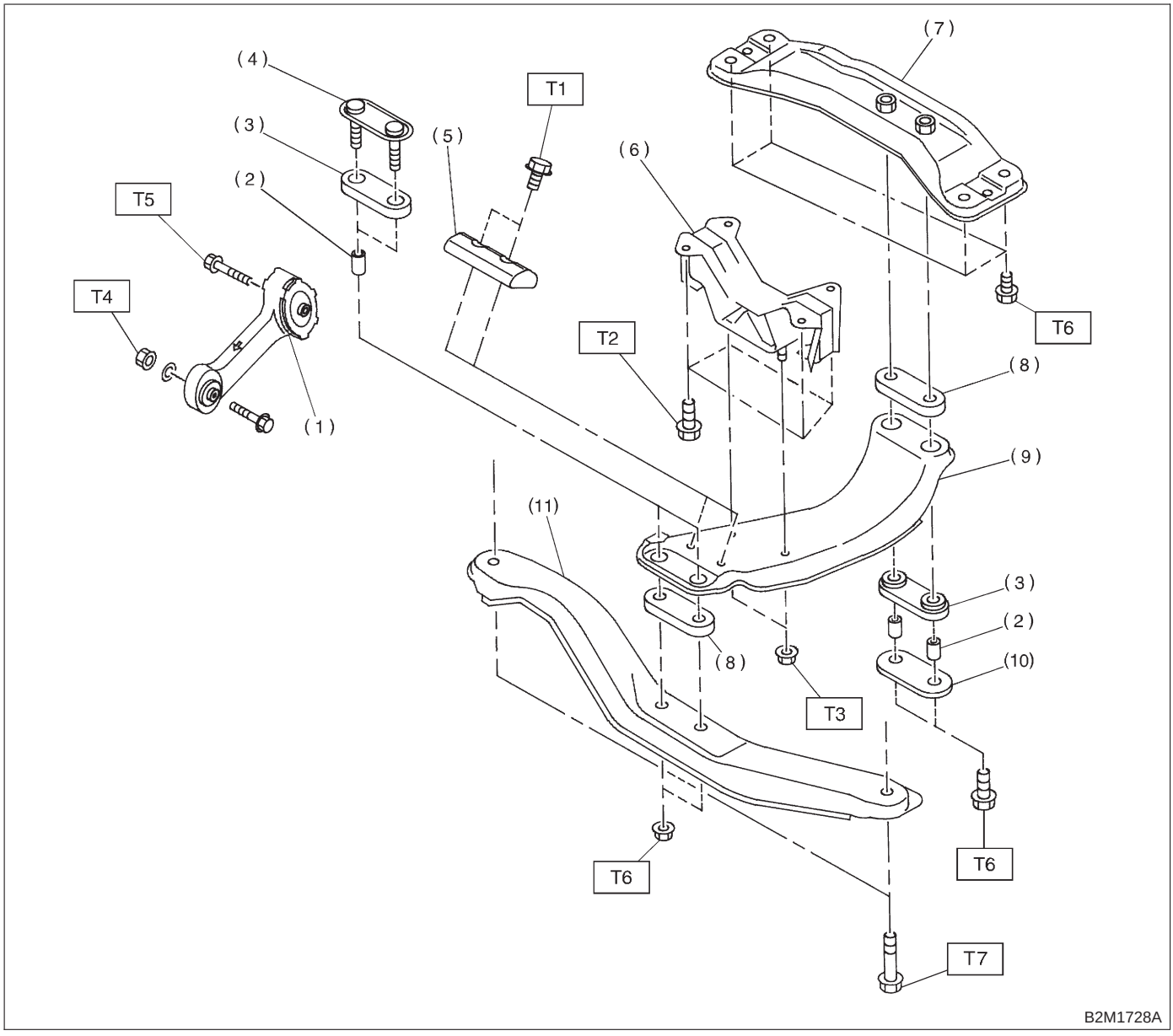


(1) Front cushion rubber
(2) Front engine mounting bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 26±7 (2.7±0.7, 19.5±5.1)
T2: 41±10 (4.2±1.0, 30±7)
T3: 79±15 (8.0±1.5, 58±11)

2. Transmission Mounting

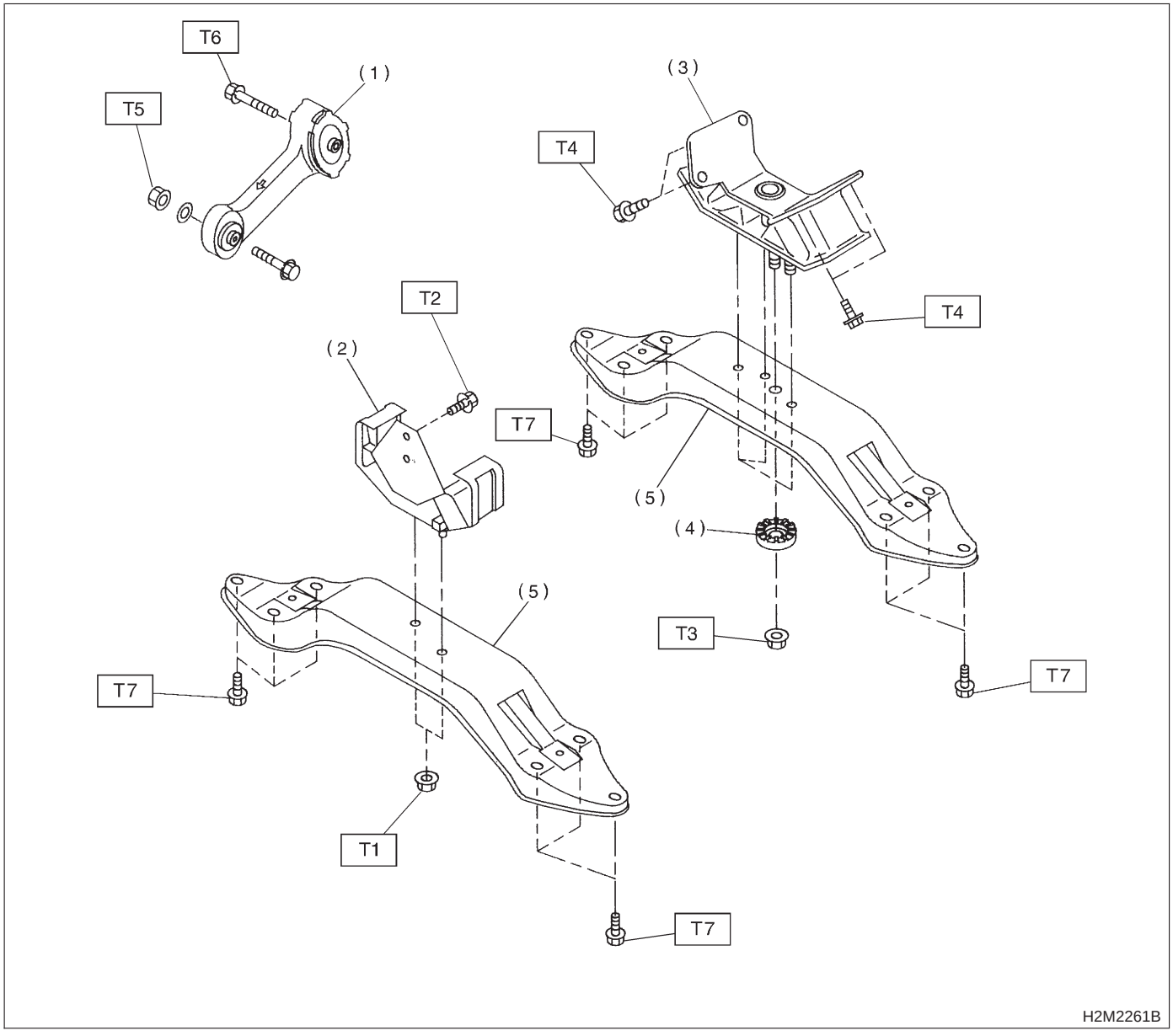
A: MT VEHICLES



(1) Pitching stopper
(2) Spacer
(3) Cushion C
(4) Front plate
(5) Damper (2500 cc LTD model)
(6) Rear cushion rubber
(7) Rear crossmember
(8) Cushion D
(9) Center crossmember
(10) Rear plate
(11) Front crossmember

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 33±5 (3.4±0.5, 24.6±3.6)
T3: 37±10 (3.8±1.0, 27±7)
T4: 49±5 (5.0±0.5, 36.2±3.6)
T5: 57±10 (5.8±1.0, 42±7)
T6: 69±15 (7.0±1.5, 51±11)
T7: 137±20 (14±2, 101±14)

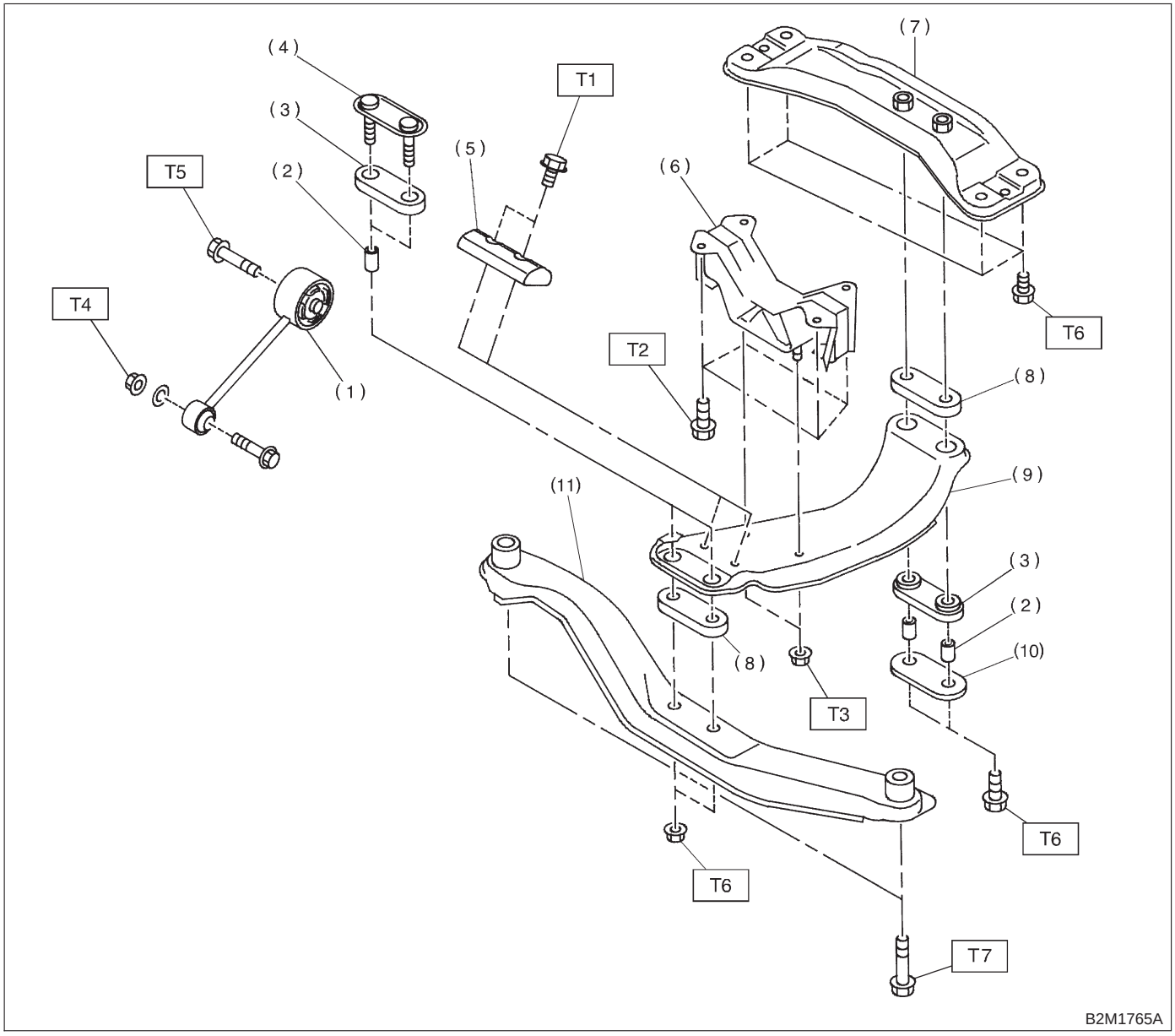
B: AT VEHICLES



(1) Pitching stopper
(2) Rear cushion rubber (FWD)
(3) Rear cushion rubber (AWD)
(4) Stopper
(5) Crossmember

Tightening torque: N·m (kg-m, ft-lb)
T1: 18±5 (1.8±0.5, 13.0±3.6)
T2: 26±7 (2.7±0.7, 19.5±5.1)
T3: 37±10 (3.8±1.0, 27±7)
T4: 38±15 (3.9±1.5, 28±11)
T5: 49±5 (5.0±0.5, 36.2±3.6)
T6: 57±10 (5.8±1.0, 42±7)
T7: 69±15 (7.0±1.5, 51±11)

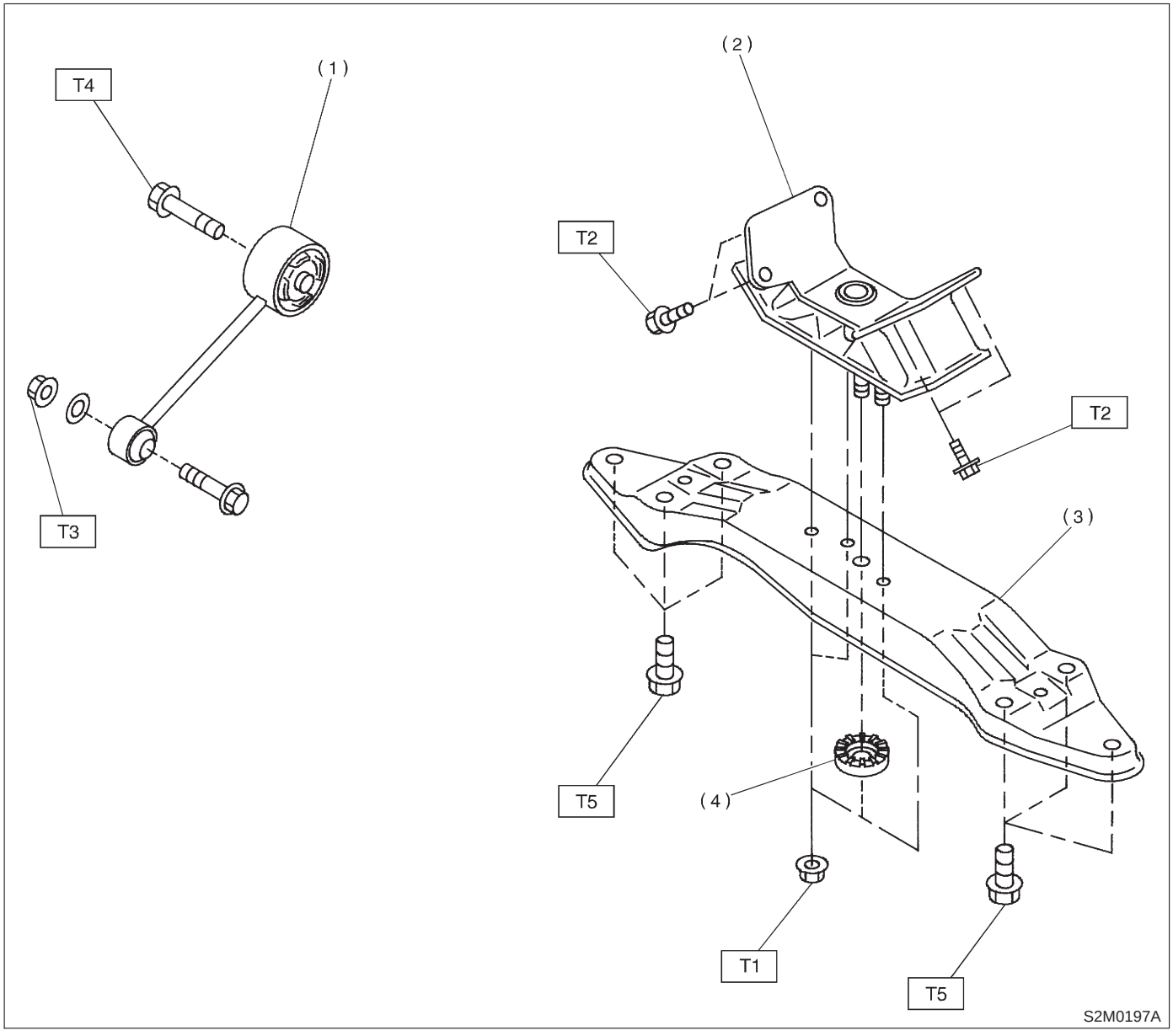
C: MT VEHICLES (OUTBACK)



(1) Pitching stopper
(2) Spacer
(3) Cushion C
(4) Front plate
(5) Damper (LTD model)
(6) Rear cushion rubber
(7) Rear crossmember
(8) Cushion D
(9) Center crossmember
(10) Rear plate
(11) Front crossmember

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 33±5 (3.4±0.5, 24.6±3.6)
T3: 37±10 (3.8±1.0, 27±7)
T4: 49±5 (5.0±0.5, 36.2±3.6)
T5: 57±10 (5.8±1.0, 42±7)
T6: 69±15 (7.0±1.5, 51±11)
T7: 137±20 (14±2, 101±14)

D: AT VEHICLES (OUTBACK)



(1) Pitching stopper
(2) Rear cushion rubber
(3) Crossmember
(4) Stopper

Tightening torque: N·m (kg-m, ft-lb)
T1: 37±10 (3.8±1.0, 27±7)
T2: 38±15 (3.9±1.5, 28±11)
T3: 49±5 (5.0±0.5, 36.2±3.6)
T4: 57±10 (5.8±1.0, 42±7)
T5: 69±15 (7.0±1.5, 51±11)

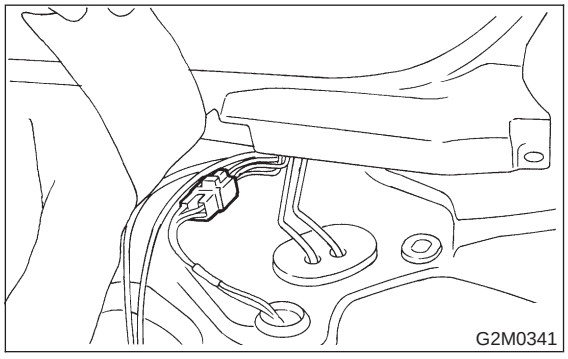
1. Engine

A: GENERAL PRECAUTION

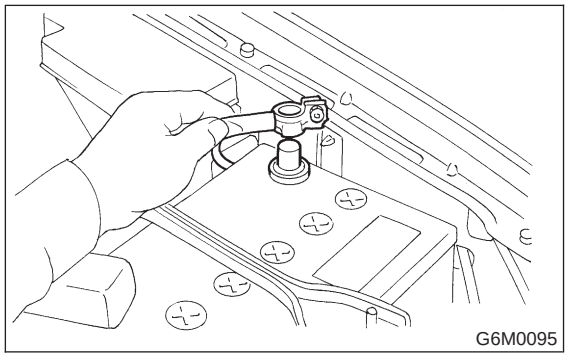
(1) Remove or install engine in an area where chain hoists, lifting devices, etc. are available for ready use.
(2) Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
(3) Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
(4) Lift-up or lower the vehicle when necessary. Make sure to support the correct positions. <Ref. to 1-3 [G700].>

B: REMOVAL

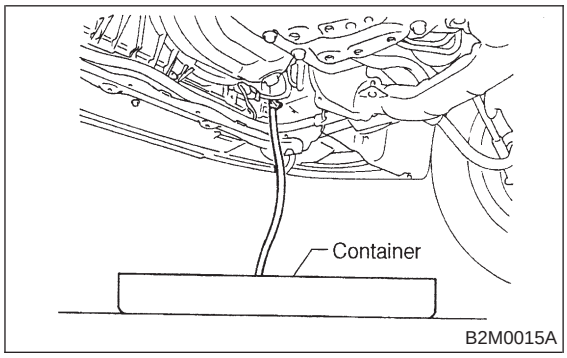
1) Set the vehicle on lift arms.
2) Open front hood and support with a stay.
3) Release fuel pressure.
   (1) Disconnect fuel tank connector.


G2M0341

   (2) Start the engine, and run until it stalls.
   (3) After the engine stalls, crank it for five seconds more.
   (4) Turn ignition switch to “OFF”. <Ref. to 2-8 [W1B0].>
4) Disconnect battery cables and remove battery from vehicle.

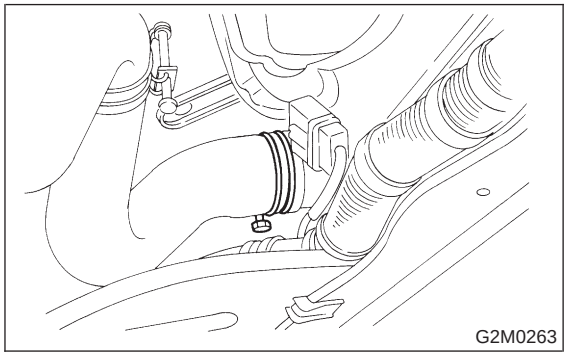

G6M0095

5) Drain coolant
Set container under the vehicle, and remove drain cock from radiator.

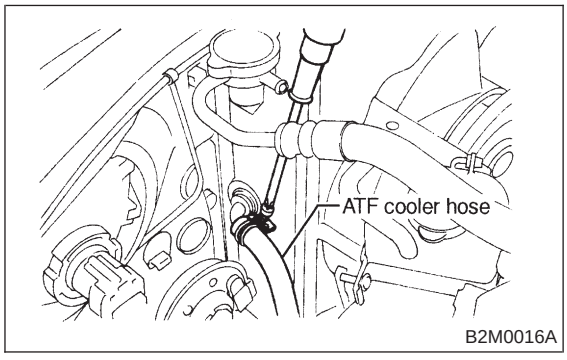


B2M0015A

6) Remove cooling system.
   (1) Disconnect radiator fan motor connector.
   (2) Disconnect radiator outlet hose from thermostat cover.

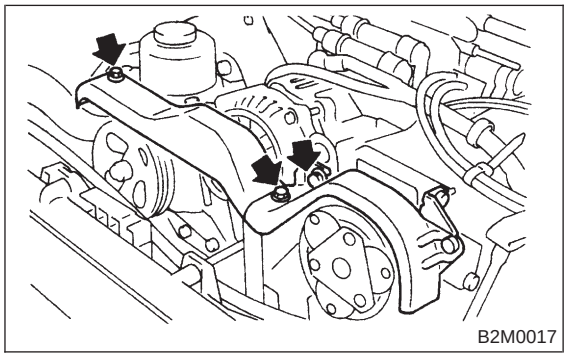

G2M0263

   (3) Disconnect ATF cooler hoses from pipes. (AT vehicles)

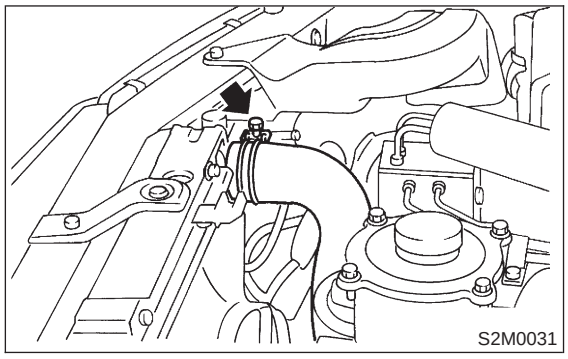


B2M0016A

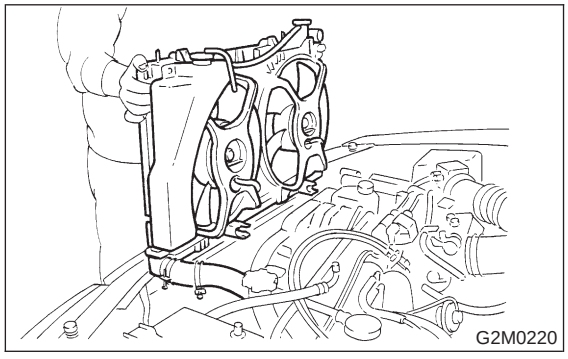
   (4) Remove V-belt cover.


B2M0017

(5) Disconnect radiator inlet hose from radiator.



(6) Remove radiator upper bracket, and remove radiator assembly from vehicle.

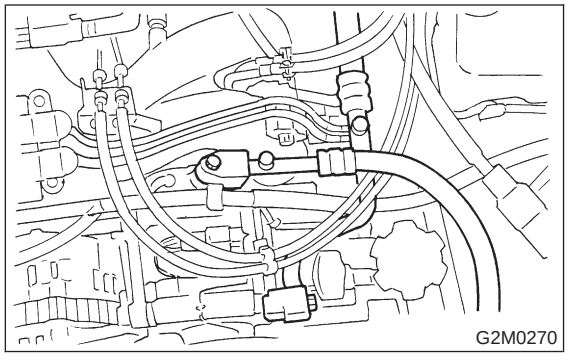


7) Collect refrigerant, and remove pressure hoses. (With A/C)

(1) Place and connect the attachment hose to the refrigerant recycle system.

(2) Collect refrigerant from A/C system.

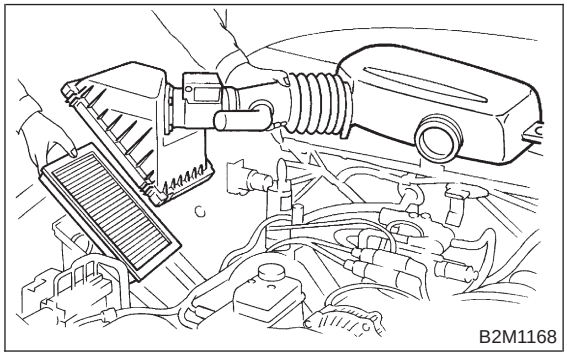
(3) Disconnect A/C flexible hoses from A/C compressor.



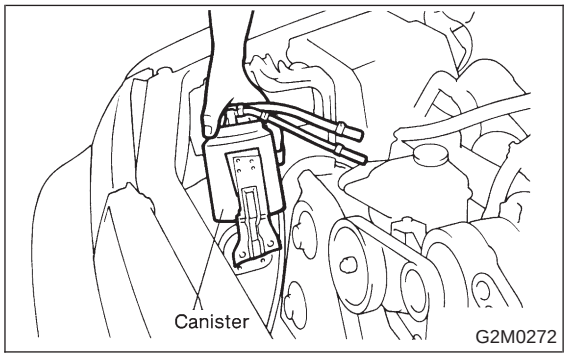
8) Remove air intake system.

(1) Disconnect connector from mass air flow sensor.

(2) Remove air intake duct with air cleaner upper cover, and remove air cleaner element.

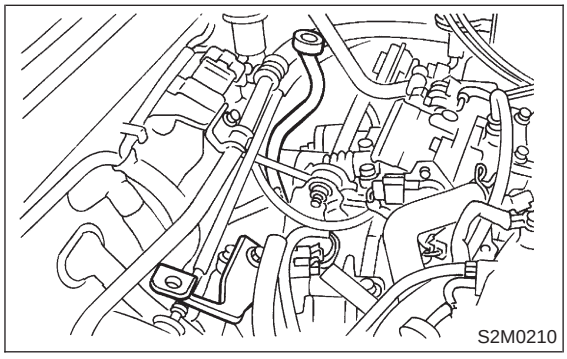


9) Remove canister and bracket. (2200 cc FWD and Taiwan spec. vehicles)

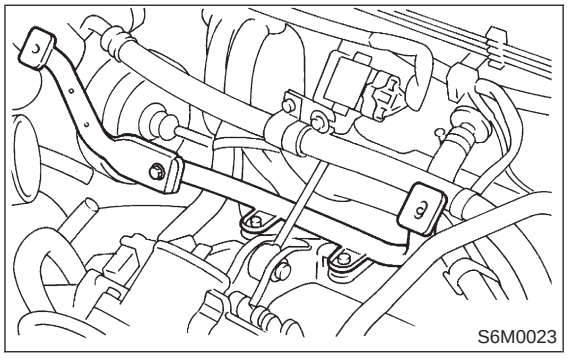


10) Remove chamber stay.

- MT vehicles

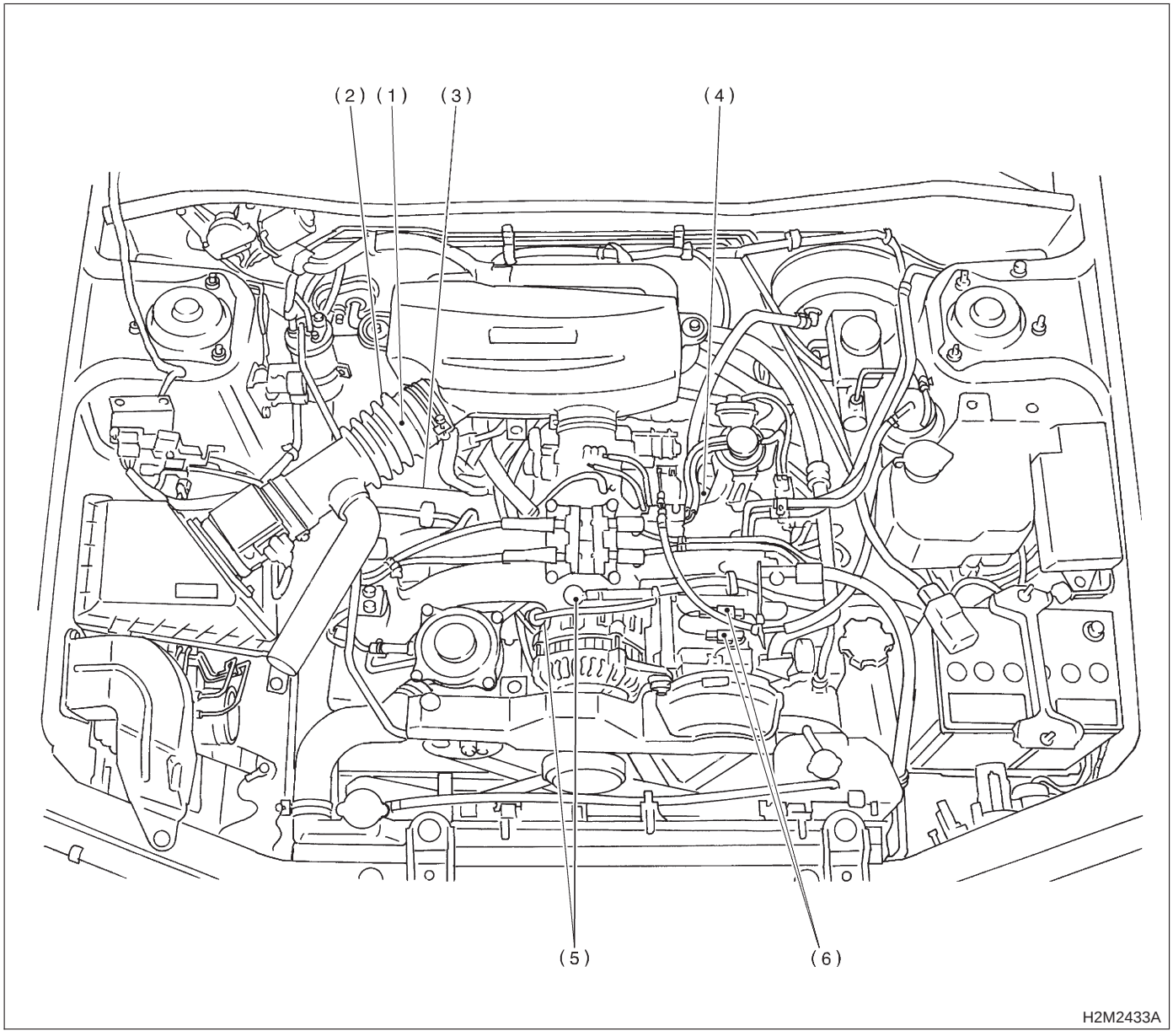


- AT vehicles

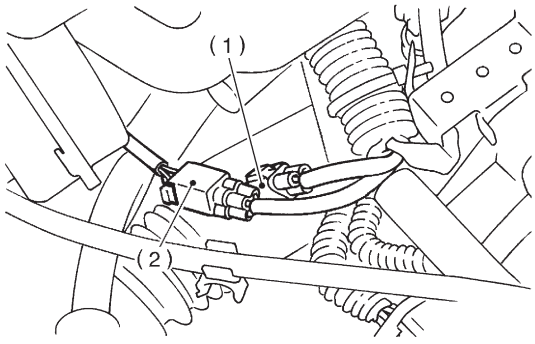


11) Disconnect connectors, cables and hoses.

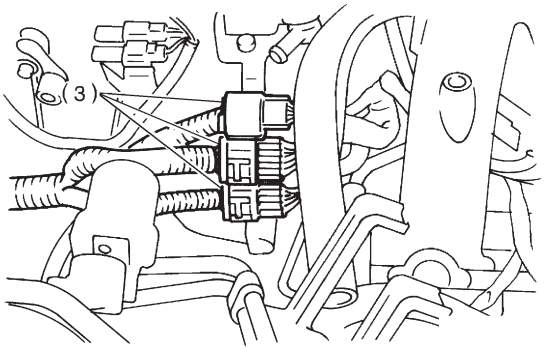
(1) Disconnect the following connectors.



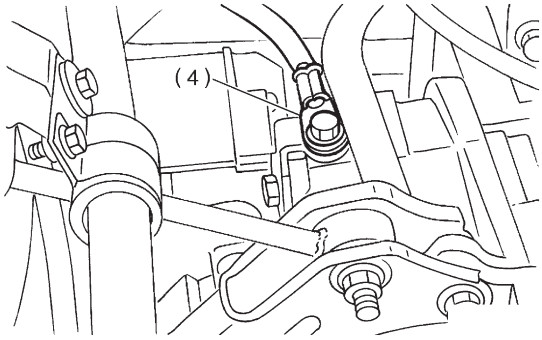
(1) Front oxygen sensor connector
(2) Rear oxygen sensor connector (California spec. vehicles)
(3) Engine harness connectors
(4) Engine ground terminal
(5) Alternator connector and terminal
(6) A/C compressor connectors (With A/C)



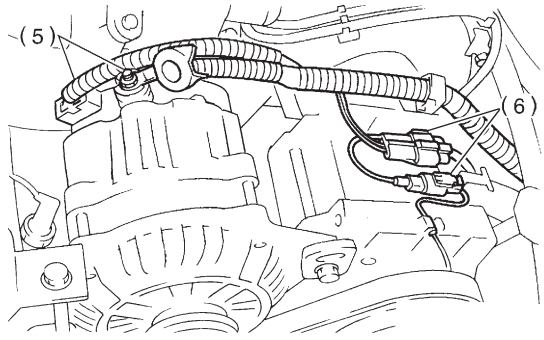
S2M0200A



B2M0019E

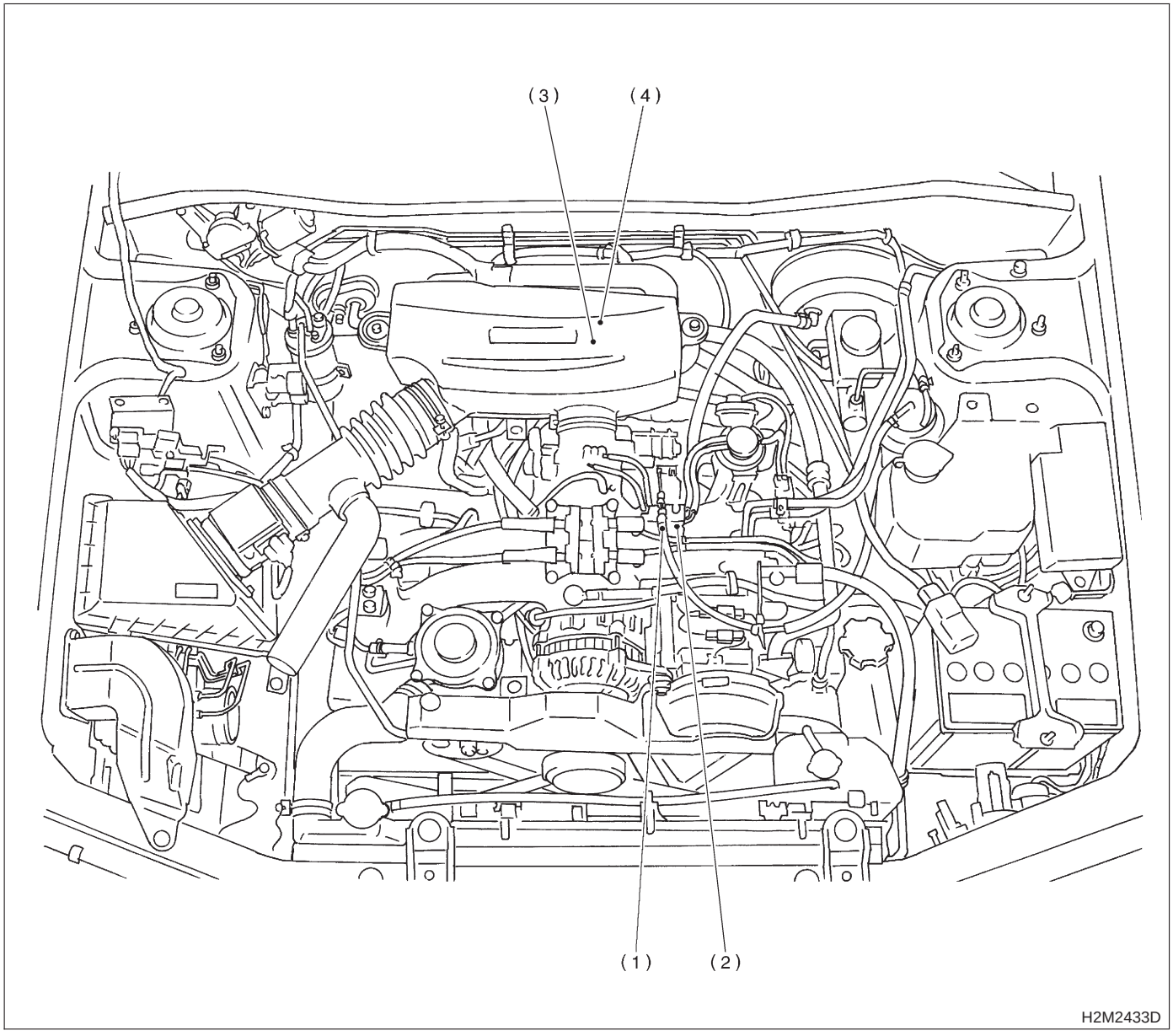


S2M0201A

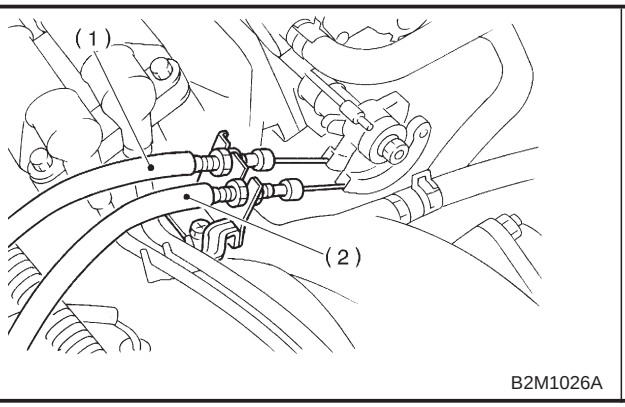


B2M1291E

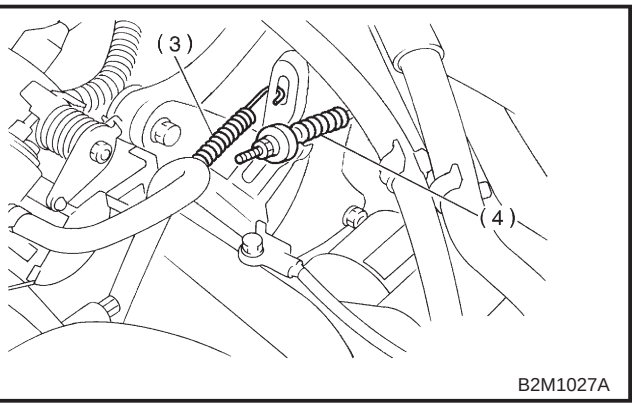
(2) Disconnect the following cables.



(1) Accelerator cable
(2) Cruise control cable (With cruise control vehicles)
(3) Clutch return spring (Without hill holder vehicles)
(4) Clutch cable (2200 cc MT vehicles)

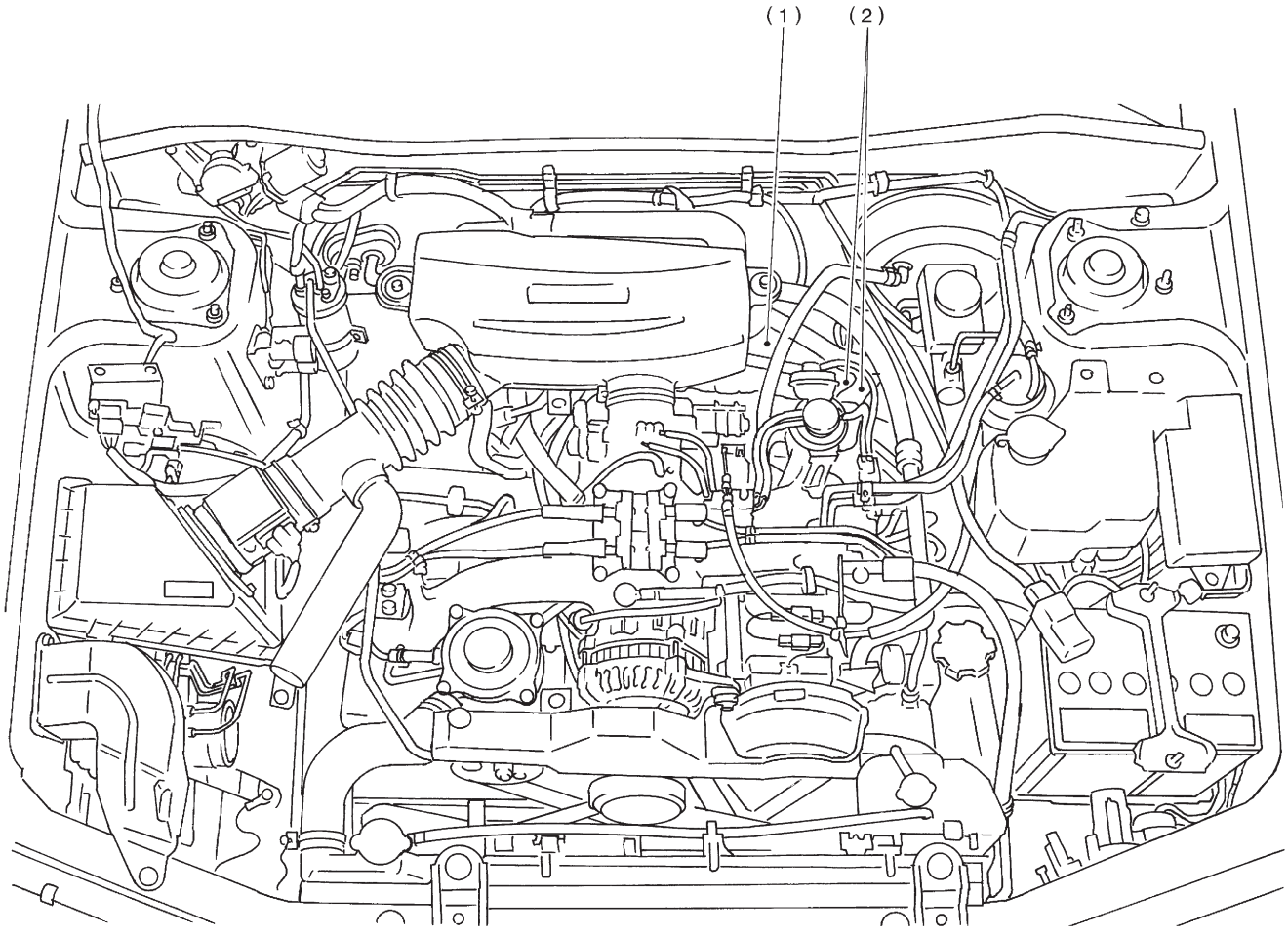


B2M1026A



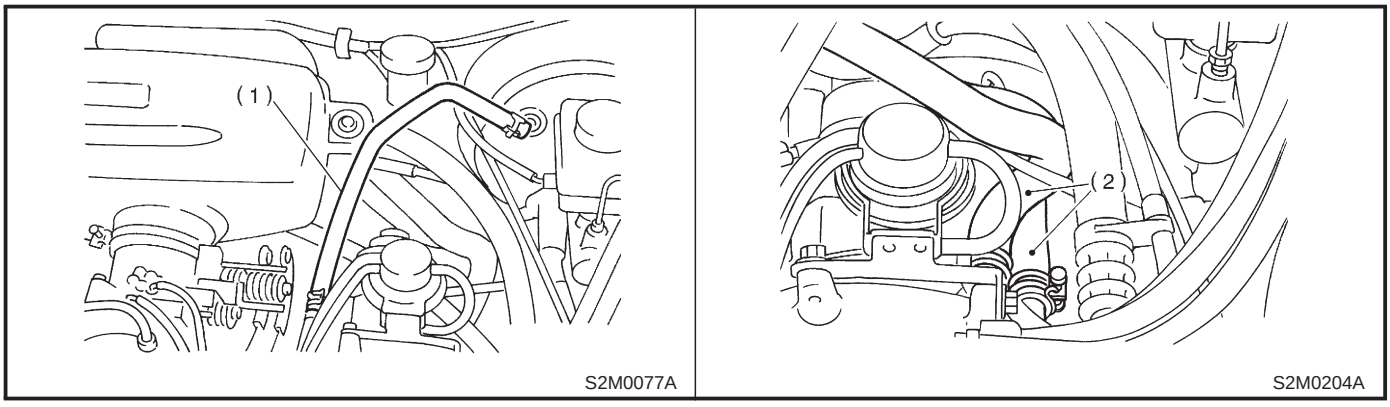
B2M1027A

(3) Disconnect the following hoses.

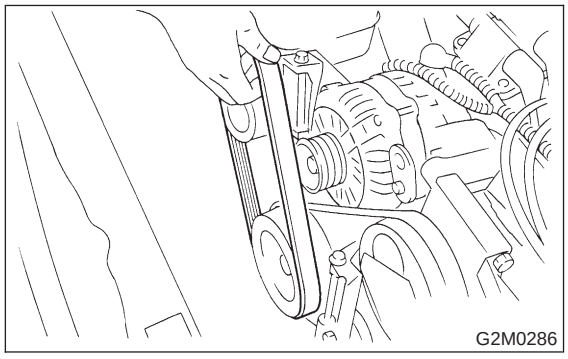


H2M2433C

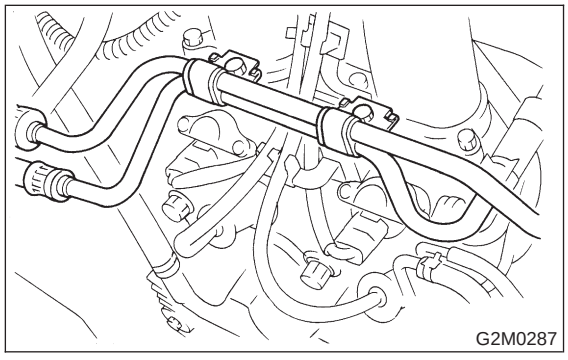
(1) Brake booster vacuum hose
(2) Heater inlet and outlet hose



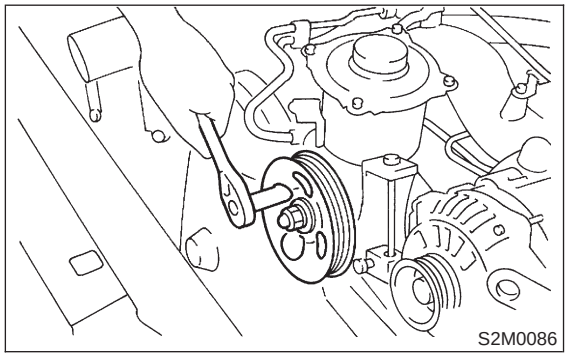
12) Remove power steering pump from bracket.
(1) Loosen lock bolt and slider bolt, and remove front side V-belt.



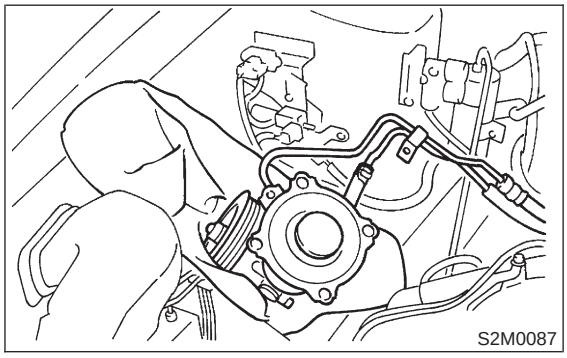
(2) Remove pipe with bracket from intake manifold.



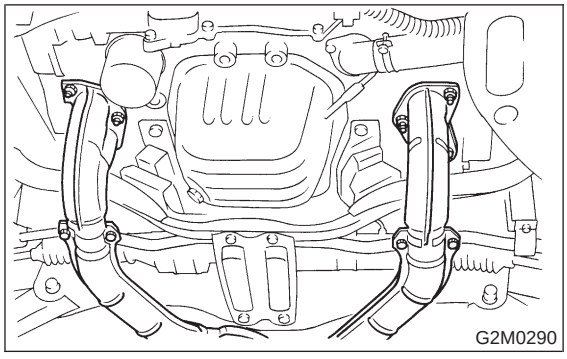
(3) Remove bolts which install power steering pump from bracket.



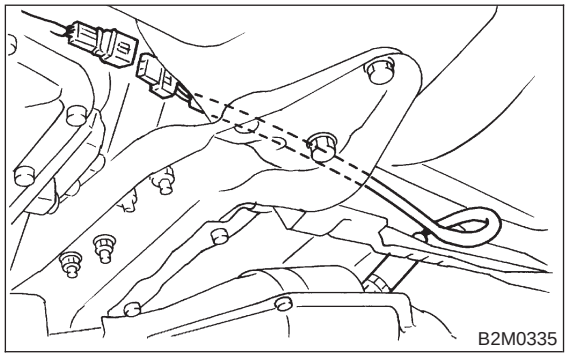
(4) Place power steering pump on the right side wheel apron.



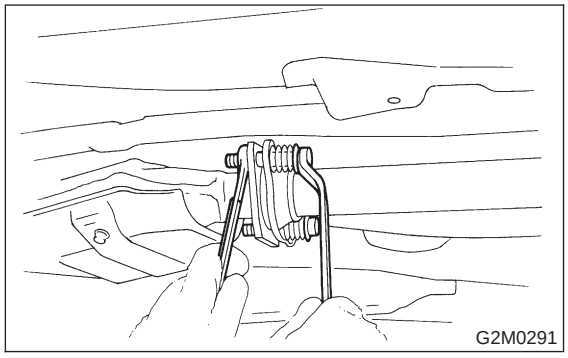
13) Remove front exhaust pipe and center exhaust pipe.
(1) Lift-up the vehicle.
(2) Remove nuts which install front exhaust pipe onto engine.



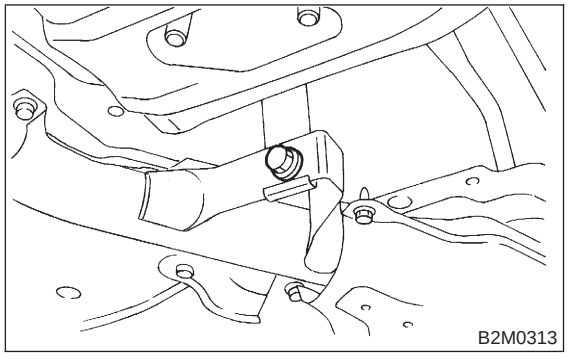
(3) Disconnect connector from rear oxygen sensor. (Except California spec. vehicles)


B2M0335

(4) Separate center exhaust pipe from rear exhaust pipe.


G2M0291

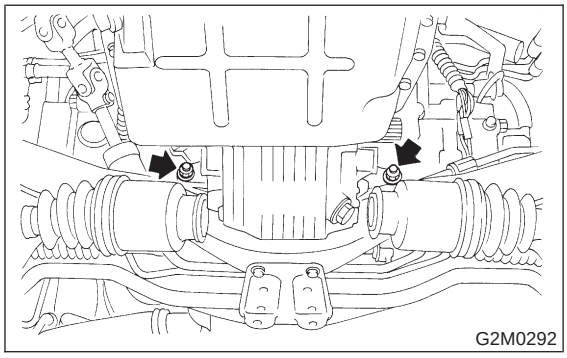
(5) Remove bolt which installs center exhaust pipe on hunger bracket.


B2M0313

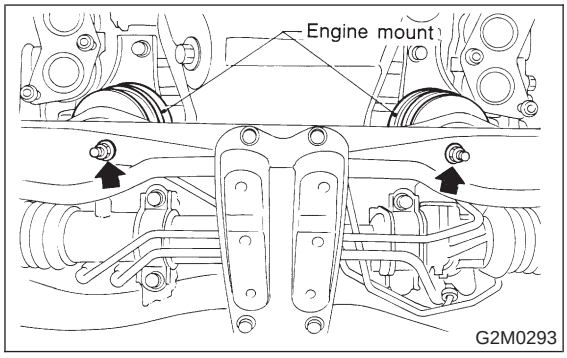
(6) Take off front and center exhaust pipes.

CAUTION:
Exhaust pipe will drop when all bolts are removed. So, hold it when removing the last bolt.

14) Remove nuts which hold lower side of transmission to engine.

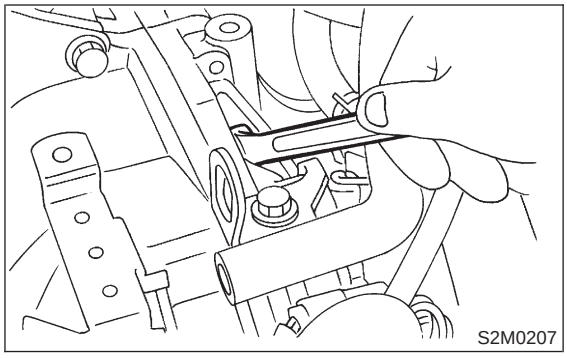

G2M0292

15) Remove nuts which install front cushion rubber onto front crossmember.



G2M0293

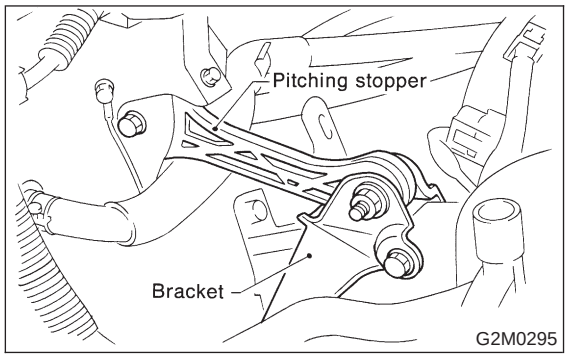
16) Separate torque converter from drive plate. (AT vehicles)
(1) Lower the vehicle.
(2) Remove service hole plug.
(3) Remove bolts which hold torque converter to drive plate.


S2M0207

(4) Remove other bolts while rotating the engine using ST.

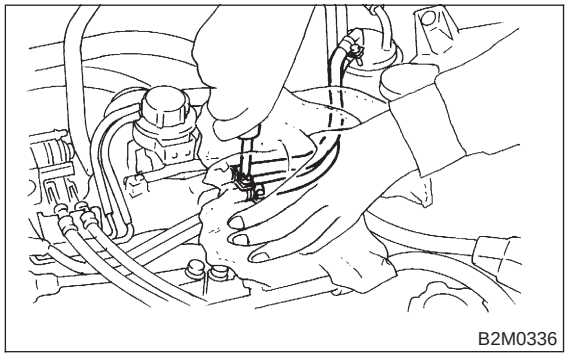
ST 499977000 CRANK PULLEY WRENCH

17) Remove pitching stopper.

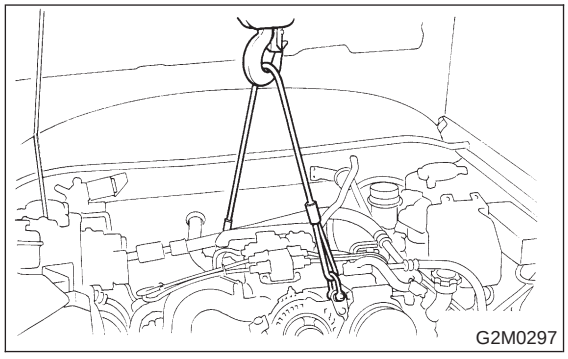


18) Disconnect fuel delivery hose, return hose and evaporation hose.

CAUTION:
● Disconnect hose with its end wrapped with cloth to prevent fuel from splashing.
● Catch fuel from hose into container.

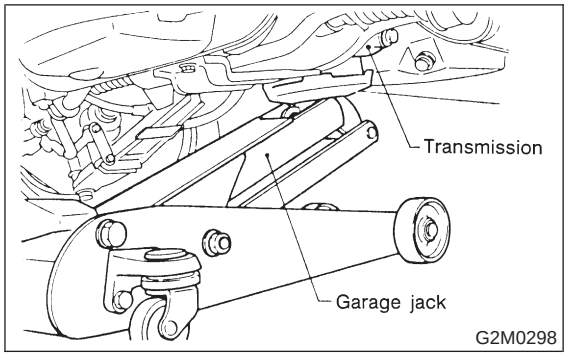


19) Support engine with a lifting device and wire ropes.

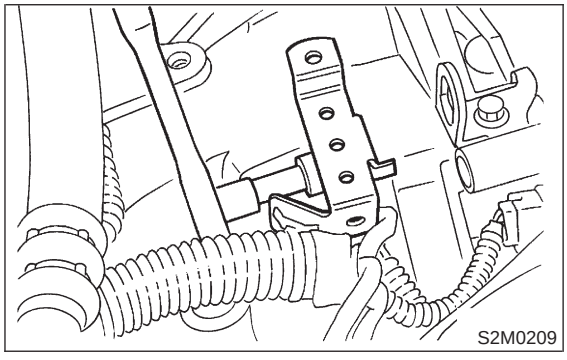


20) Support transmission with a garage jack.

CAUTION:
Before moving engine away from transmission, check to be sure no work has been overlooked. Doing this is very important in order to facilitate re-installation and because transmission lowers under its own weight.

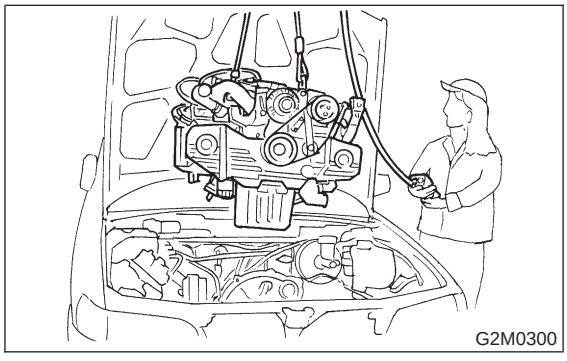


21) Remove bolts which hold upper side of transmission to engine.



22) Remove engine from vehicle
(1) Slightly raise engine.
(2) Raise transmission with garage jack.
(3) Move engine horizontally until mainshaft is withdrawn from clutch cover.
(4) Slowly move engine away from engine compartment.

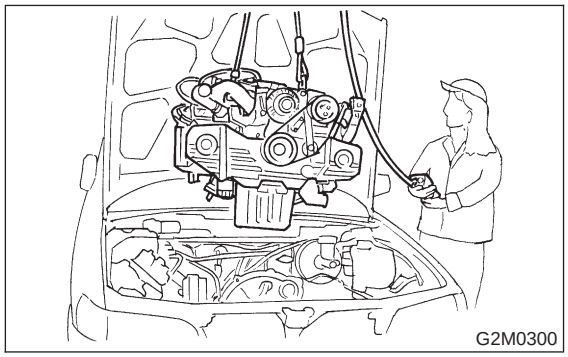
CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.



C: INSTALLATION

1) Install engine onto transmission.
(1) Position engine in engine compartment and align it with transmission.

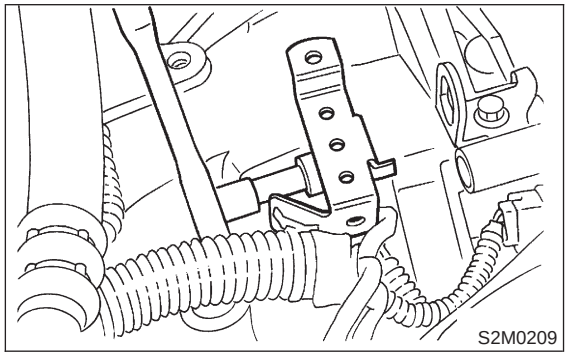
CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.


G2M0300

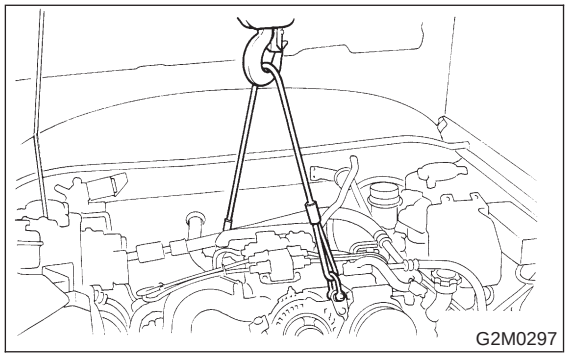
(2) Apply a small amount of grease to spline of mainshaft.

2) Tighten bolts which hold upper side of transmission to engine.

Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)


S2M0209

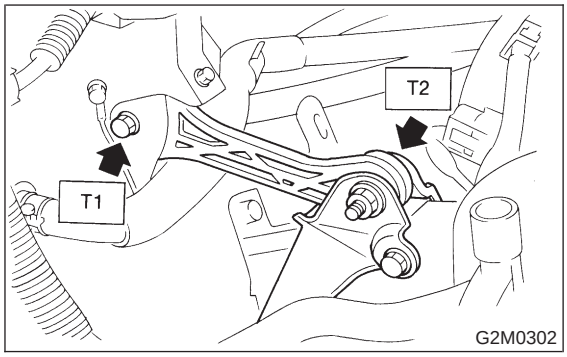
3) Remove lifting device and wire ropes.


G2M0297

4) Remove garage jack.

5) Install pitching stopper.

Tightening torque:
T1: 57±10 N·m (5.8±1.0 kg-m, 42±7 ft-lb)
T2: 49±5 N·m (5.0±0.5 kg-m, 36.2±3.6 ft-lb)



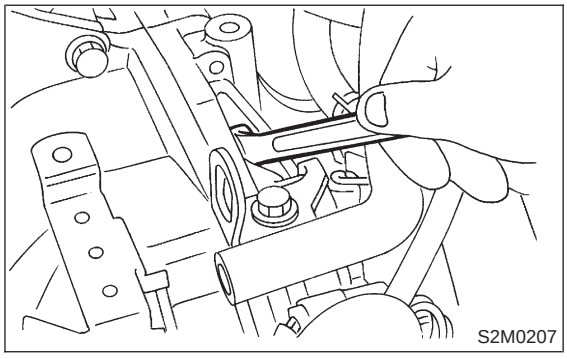
G2M0302

6) Install torque converter onto drive plate. (AT vehicles)
(1) Tighten bolts which hold torque converter to drive plate.
(2) Tighten other bolts while rotating the engine by using ST.

ST 499977000 CRANK PULLEY WRENCH

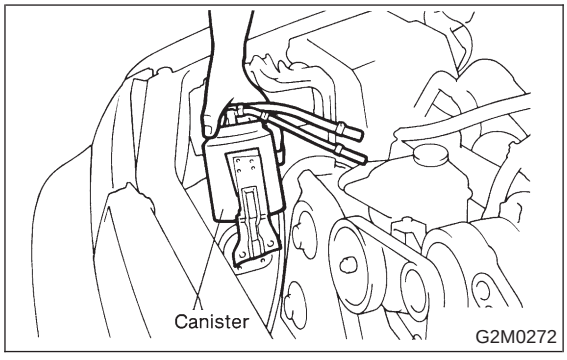
CAUTION:
Be careful not to drop bolts into torque converter housing.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)


S2M0207

(3) Clog plug onto service hole.

7) Install canister and bracket. (2200 cc FWD and Taiwan spec. vehicles)

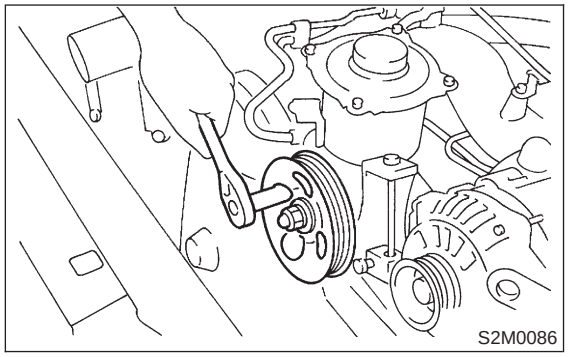


G2M0272

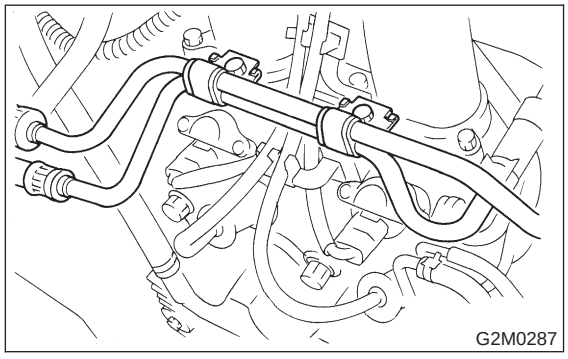
8) Install power steering pump on bracket.

(1) Install power steering pump on bracket, and tighten bolts.

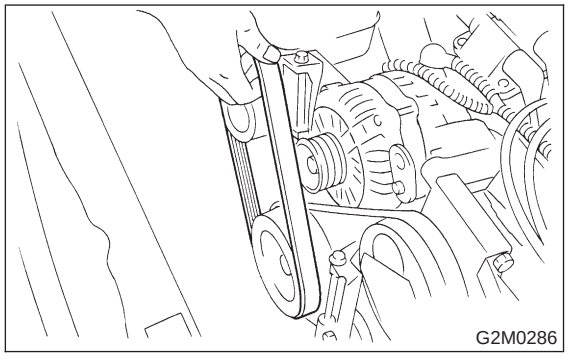
Tightening torque:
39±10 N·m (4.0±1.0 kg-m, 29±7 ft-lb)


S2M0086

(2) Install power steering pipe bracket on right side intake manifold, and install spark plug codes.

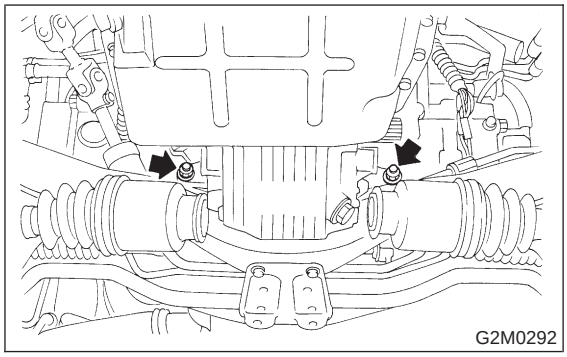

G2M0287

(3) Install front side V-belt, and adjust it. <Ref. to 1-5 [G2B0].>


G2M0286

9) Tighten nuts which hold lower side of transmission to engine.

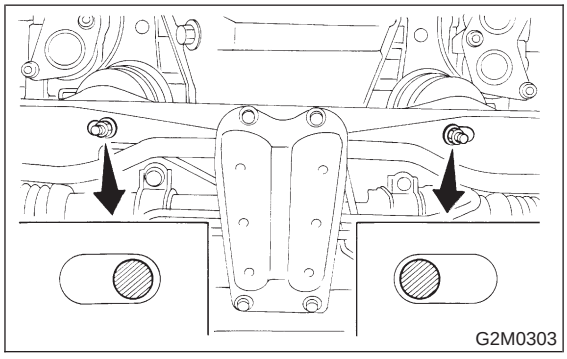
Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)


G2M0292

10) Tighten nuts which install front cushion rubber onto crossmember.

Tightening torque:
69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)

CAUTION:
Be sure to tighten front cushion rubber mounting bolts in the innermost elliptical hole in the front crossmember.

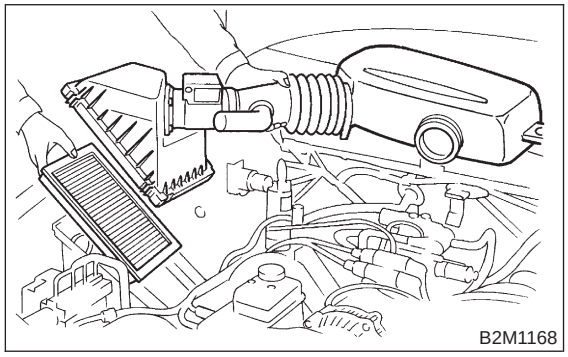

G2M0303

11) Install front exhaust pipe and center exhaust pipe. <Ref. to 2-9 [W1B0].> and <Ref. to 2-9 [W2B0].>
12) Connect the following hoses.
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
13) Connect the following connectors.
(1) Engine ground terminal
(2) Engine harness connectors
(3) Front oxygen sensor connector
(4) Rear oxygen sensor connector (California spec. vehicles)
(5) Alternator connector and terminal
(6) A/C compressor connectors (With A/C)
14) Connect the following cables.
(1) Accelerator cable
(2) Cruise control cables (With cruise control)
(3) Clutch cable (2200 cc MT vehicles)

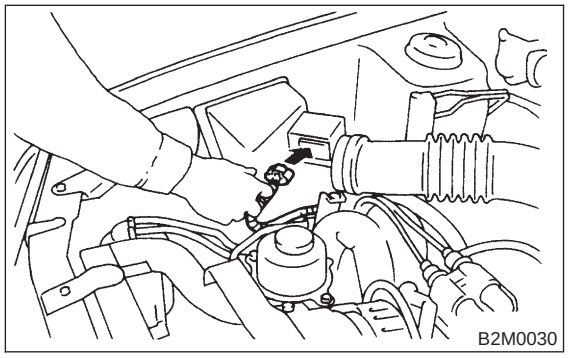
(4) Clutch return spring (Models without hill holder only)

CAUTION:
After connecting each cable, adjust them.

15) Install chamber stay.
16) Install air intake system.
(1) Install air cleaner element.
(2) Install air intake duct with air cleaner upper cover.


B2M1168

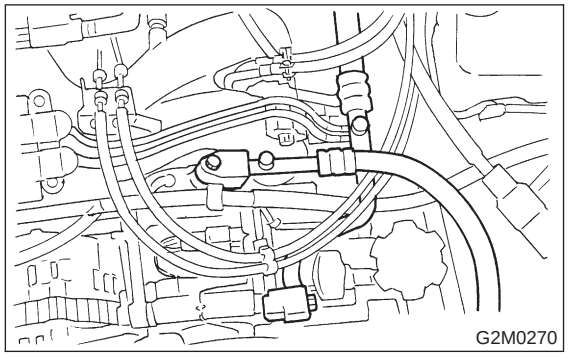
(3) Connect connector to mass air flow sensor.


B2M0030

17) Install A/C flexible hoses. (With A/C)
<Ref. to 4-7 [W16A0].>

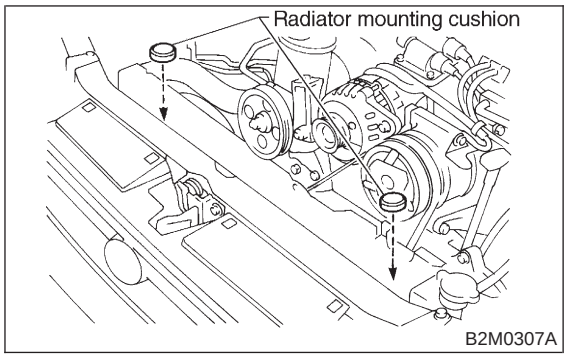
CAUTION:
Use new O-rings.

Tightening torque:
25±7 N·m (2.5±0.7 kg-m, 18.1±5.1 ft-lb)


G2M0270

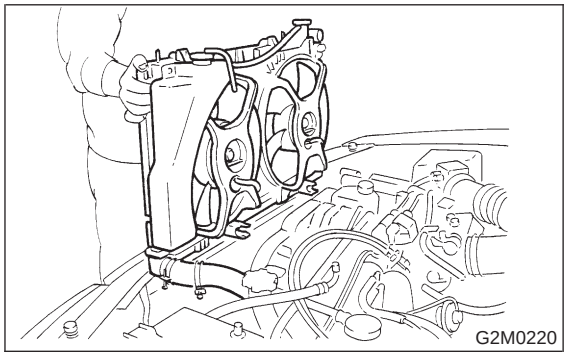
18) Install cooling system.

(1) Attach radiator mounting cushions to body.



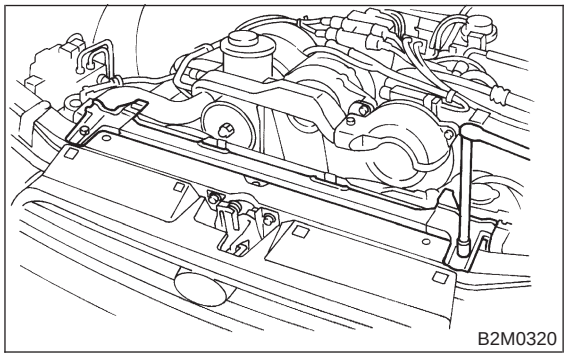
B2M0307A

(2) Install radiator while fitting radiator pins to cushions.

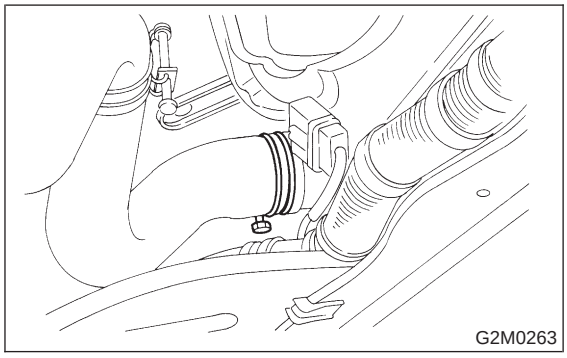

G2M0220

(3) Install radiator brackets and tighten bolts.

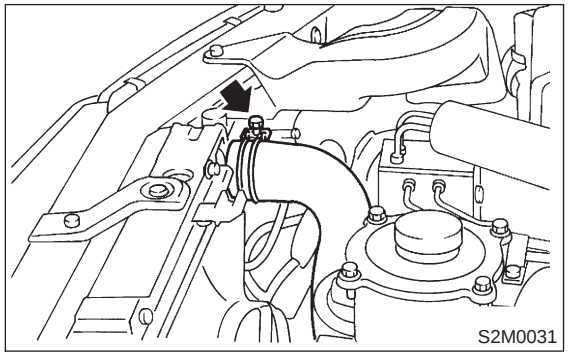
Tightening torque:
13.7±1.5 N·m (1.4±0.15 kg-m, 10.1±1.1 ft-lb)


B2M0320

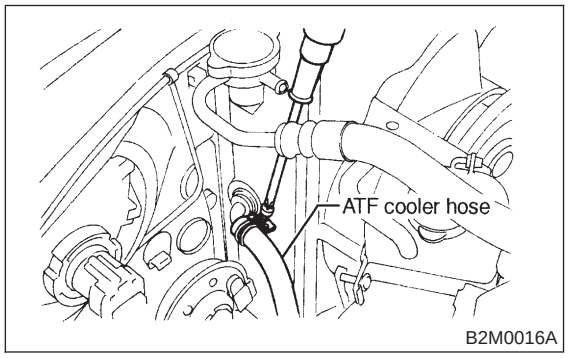
(4) Connect radiator fan motor connector.


G2M0263

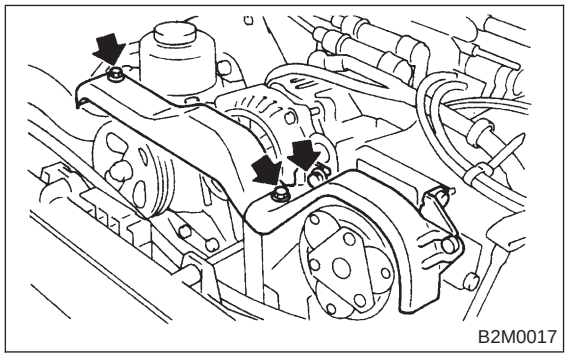
(5) Connect radiator inlet hose.



(6) Connect radiator outlet hose.
(7) Connect ATF cooler hoses. (AT vehicles)



(8) Install V-belt cover.



19) Install battery in the vehicle, and connect cables.
20) Fill coolant.
<Ref. to 2-5 [W1B0].>

Engine coolant capacity;
5.8 ℓ (6.1 US qt, 5.1 Imp qt)

21) Check ATF level and correct if necessary. (AT vehicles)
<Ref. to 3-2 [W1B1].>
22) Charge A/C system with refrigerant.
<Ref. to 4-7 [W700].>
23) Remove front hood stay, and close front hood.
24) Take off the vehicle from lift arms.

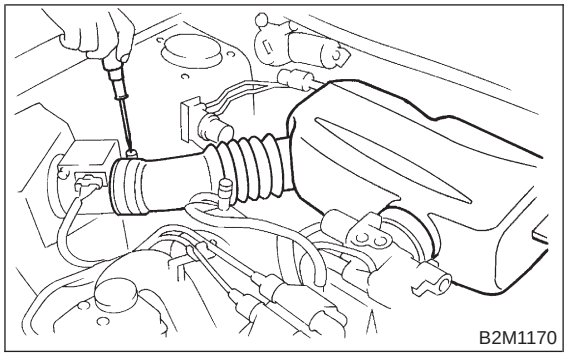
2. Transmission

A: GENERAL PRECAUTION

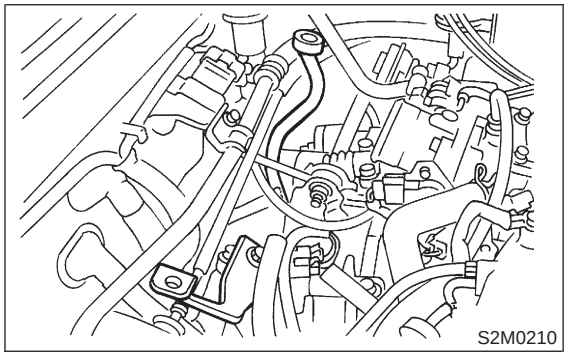
(1) Remove or install transmission in an area where chain hoists, lifting devices, etc. are available for ready use.
(2) Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
(3) Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
(4) Lift-up or lower the vehicle when necessary. Make sure to support the correct positions. <Ref. to 1-3 [G700].>

B: REMOVAL

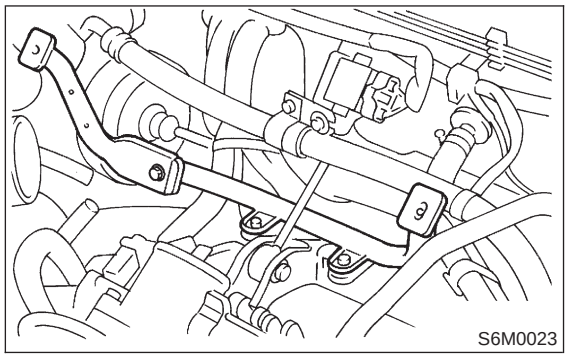
1) Open front hood fully, and support with stay.
2) Disconnect battery ground terminal.
3) Remove air intake duct and chamber.



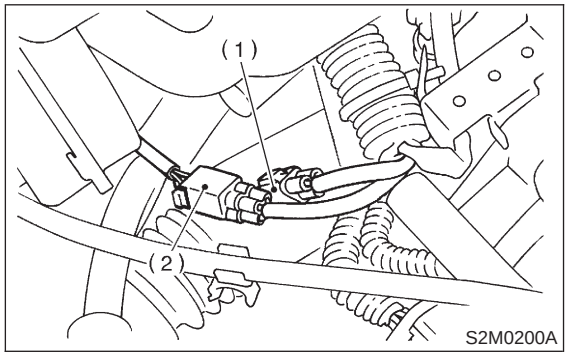
4) Remove chamber stay.
● MT vehicles



● AT vehicles

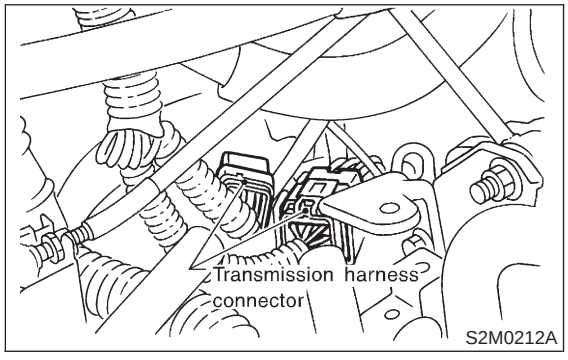


5) Disconnect the following connectors.
(1) Oxygen sensor connector



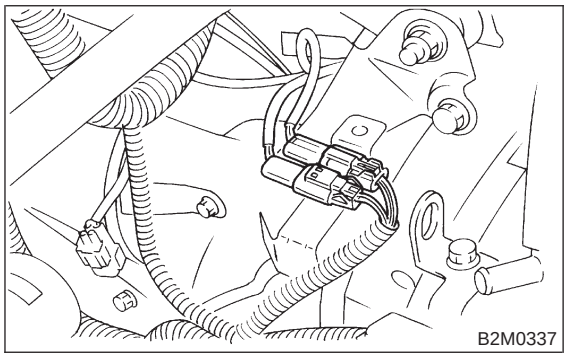
(1) Front oxygen sensor connector
(2) Rear oxygen sensor connector (California spec. vehicles)

(2) Transmission harness connector (AT vehicles)

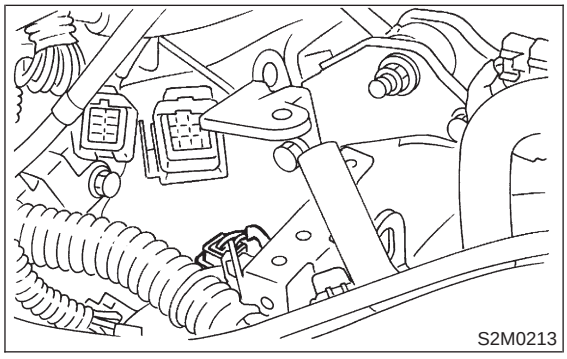


(3) Transmission ground terminal

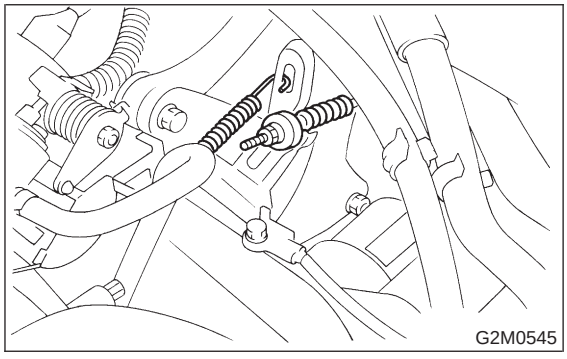
(4) Neutral position switch connector (MT vehicles)
(5) Back-up light switch connector (MT vehicles)



(6) Vehicle speed sensor 2 connector

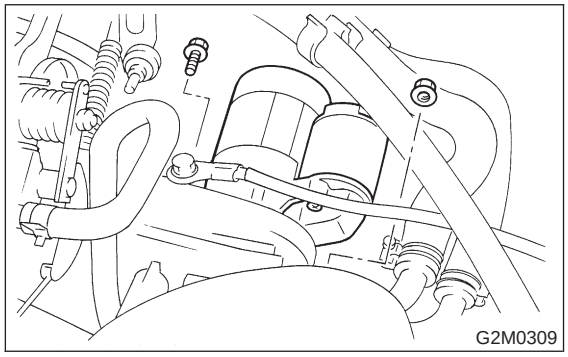


6) Disconnect the following cables.
(1) Clutch return spring (Without hill holder vehicles)
(2) Clutch cable (2200 cc MT vehicles)

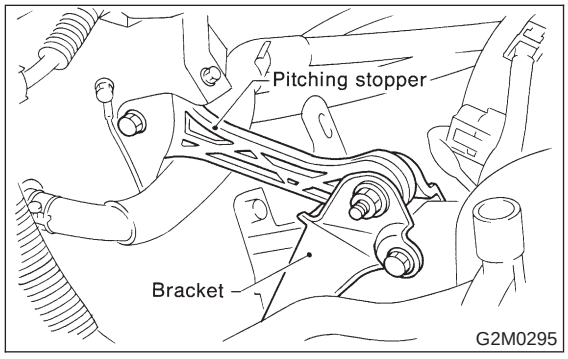


7) Remove starter.
(1) Disconnect connectors and terminal from starter.

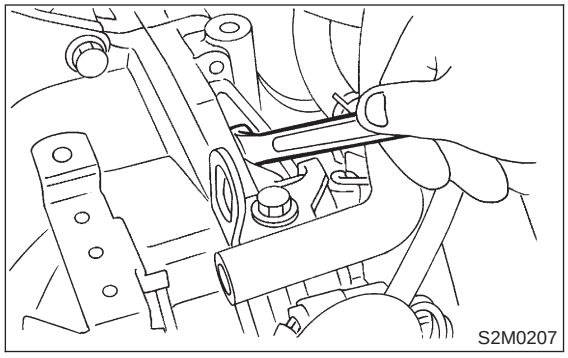
(2) Remove bolt which installs upper side of starter.
(3) Remove nut which installs lower side of starter, and remove starter from transmission.



8) Remove pitching stopper.



9) Separate torque converter from drive plate. (AT vehicles)
(1) Remove service hole plug.
(2) Remove bolts which hold torque converter to drive plate.



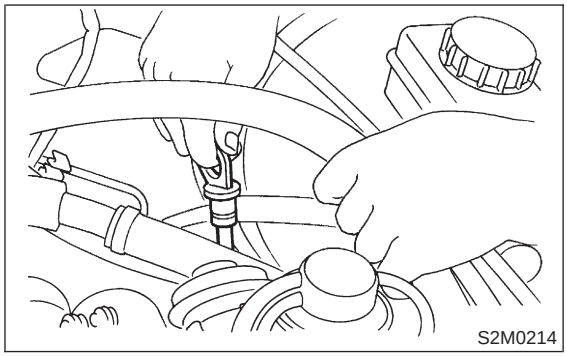
(3) While rotating the engine, remove other bolts using ST.

ST 499977000 CRANK PULLEY WRENCH

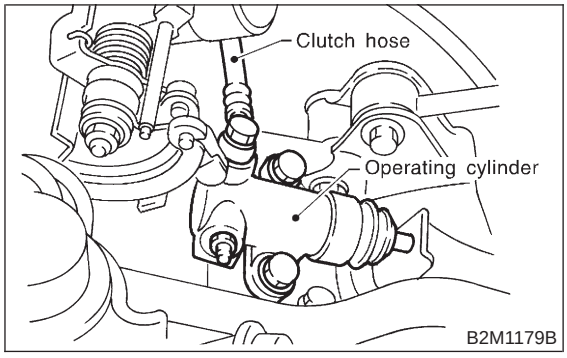
CAUTION:
Be careful not to drop bolts into torque converter housing.

10) Remove ATF level gauge. (AT vehicles)

CAUTION:
Plug opening to prevent entry of foreign particles into transmission fluid.



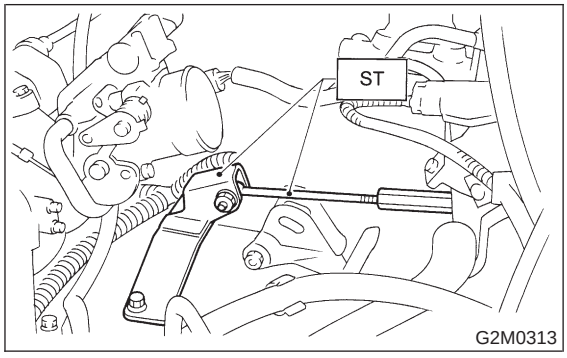
11) Remove operating cylinder. (2500 cc MT vehicles)



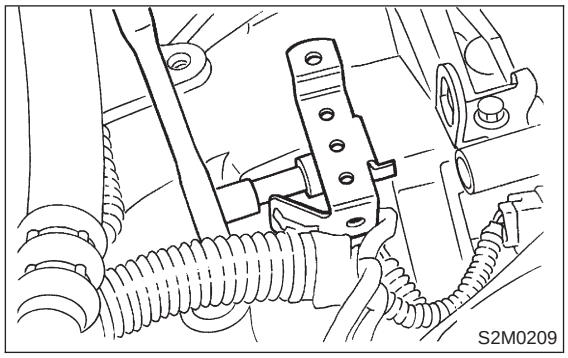
12) Set ST.

ST 41099AA020 ENGINE SUPPORT ASSY

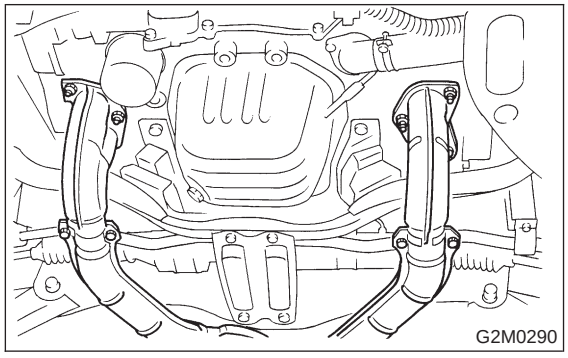
NOTE:
Also is available Part No. 927670000.



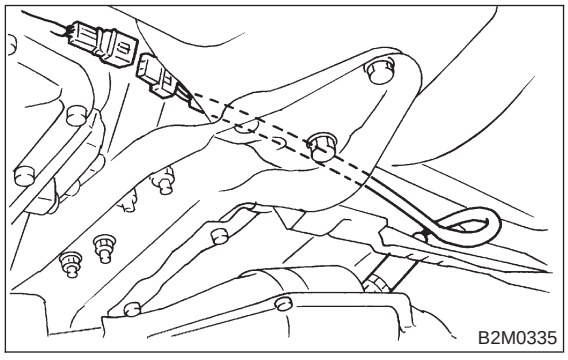
13) Remove bolt which holds right upper side of transmission to engine.


S2M0209

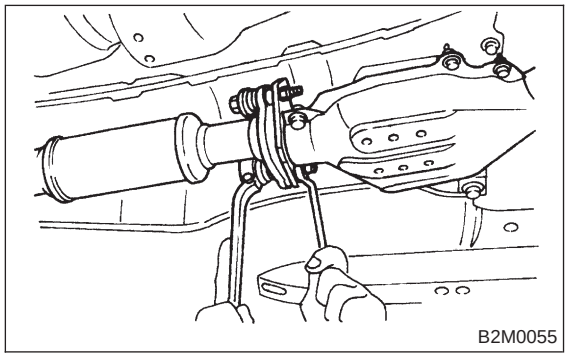
14) Remove exhaust system.
(1) Lift-up the vehicle.
(2) Remove nuts which install front exhaust pipe onto engine.


G2M0290

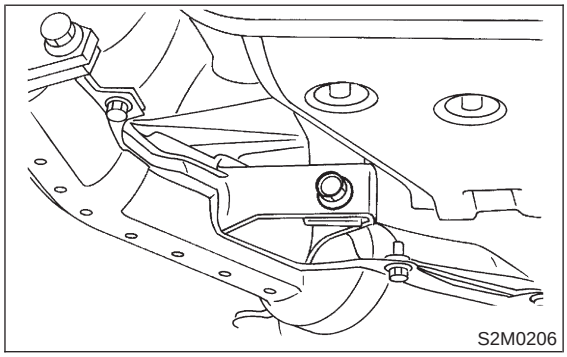
(3) Disconnect connector from rear oxygen sensor. (Except California spec. vehicles)


B2M0335

(4) Separate center exhaust pipe from rear exhaust pipe.

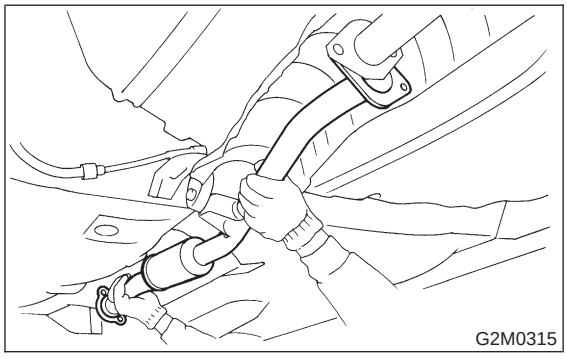

B2M0055

(5) Remove bolt which installs center exhaust pipe to hanger bracket.

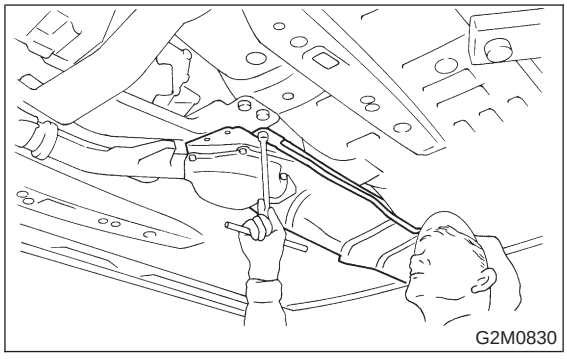

S2M0206

(6) Take off front and center exhaust pipes.
(7) Remove rear exhaust pipe. (AWD vehicles)

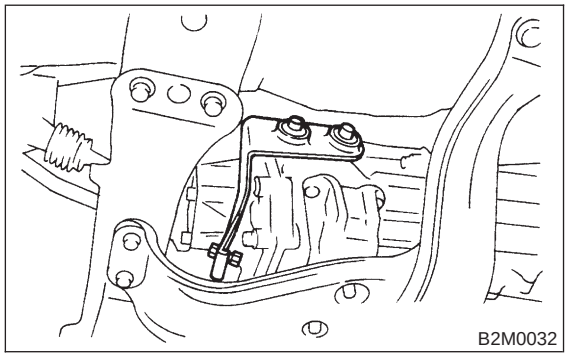
CAUTION:
When removing exhaust pipes, be careful each exhaust pipe does not drop out.


G2M0315

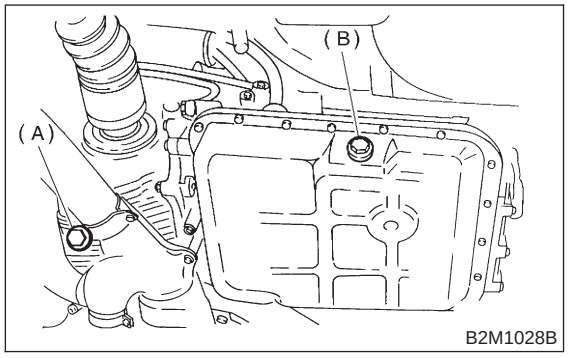
(8) Remove heat shield cover of rear exhaust pipe. (AWD vehicles)


G2M0830

(9) Remove hanger bracket from right side of transmission. (AWD vehicles)


B2M0032

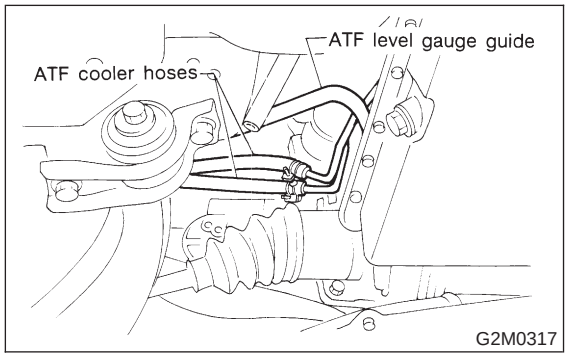
15) Drain ATF to remove ATF drain plug. (AT vehicles)



B2M1028B

(A) Front differential oil drain plug
(B) ATF drain plug

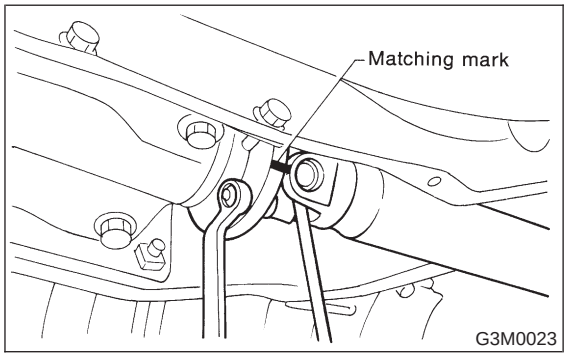
16) Disconnect ATF cooler hoses from pipes of transmission side, and remove ATF level gauge guide. (AT vehicles)



G2M0317

17) Remove propeller shaft. (AWD vehicles)
(1) Remove front cover of rear differential mount.

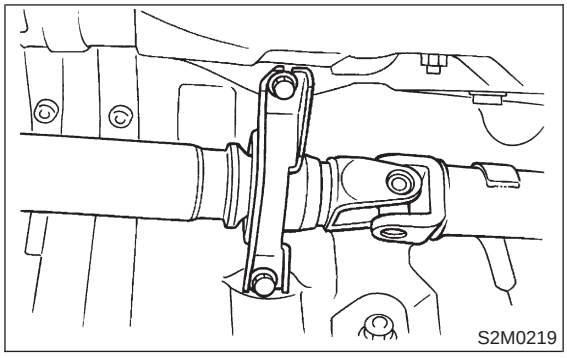
(2) Separate propeller shaft from rear differential.



G3M0023

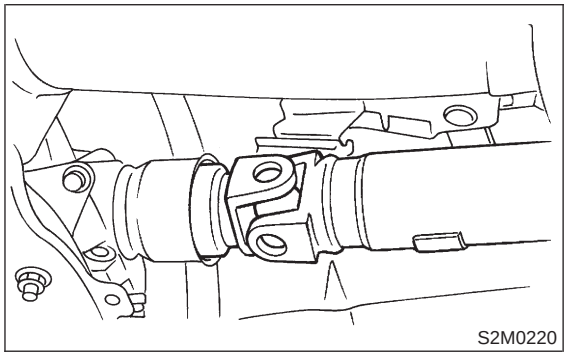
(3) Remove bolts which hold center bearing onto body.

CAUTION:
Be careful not to drop propeller shaft.


S2M0219

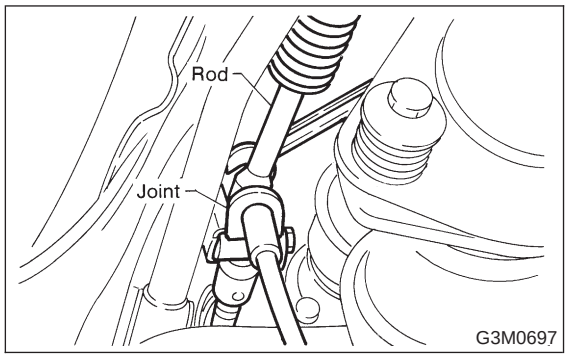
(4) Remove propeller shaft from transmission.

CAUTION:
● Be sure to use an empty container to catch oil flowing out when removing propeller shaft
● Be sure not to damage oil seals and the frictional surface of sleeve yoke.
● Be sure to plug the opening in transmission after removal of propeller shaft.

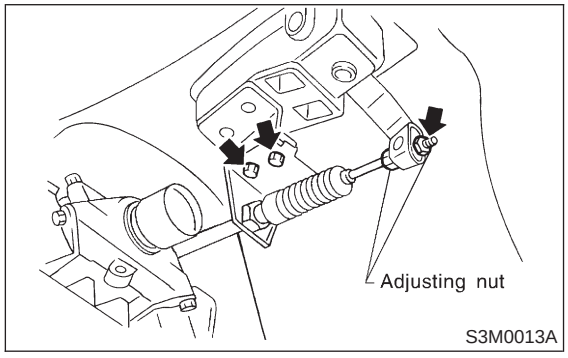

S2M0220

18) Remove gear shift rod and stay from transmission. (MT vehicles)
(1) Remove spring.
(2) Disconnect stay from transmission.

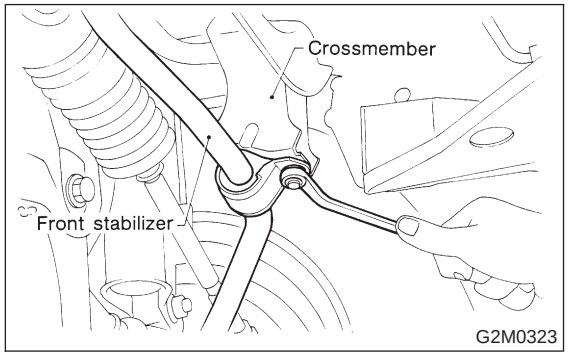
(3) Disconnect rod from transmission.



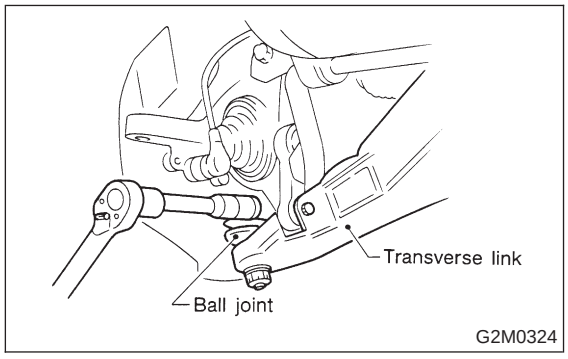
19) Remove shift selector cable. (AT vehicles)
(1) Disconnect shift selector cable from selector lever.
(2) Remove cable bracket from body.



20) Remove bolts which install stabilizer clamps onto crossmember.



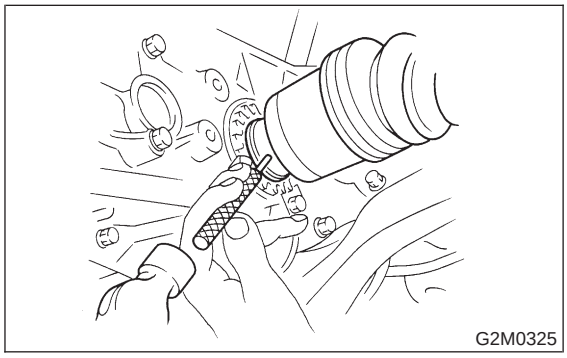
21) Remove front drive shafts from transmission.
(1) Remove transverse link from housing.



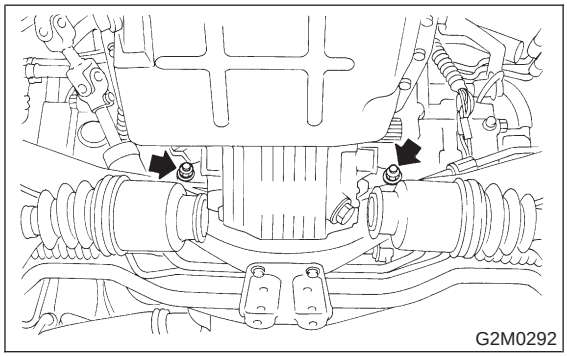
(2) Lower transverse link.

(3) Remove spring pins and separate front drive shafts from each side of the transmission.

CAUTION:
Discard removing spring pin. Replace with a new one.

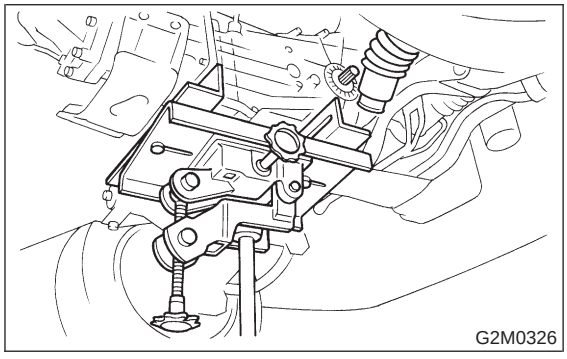


22) Remove nuts which hold lower side of transmission to engine.

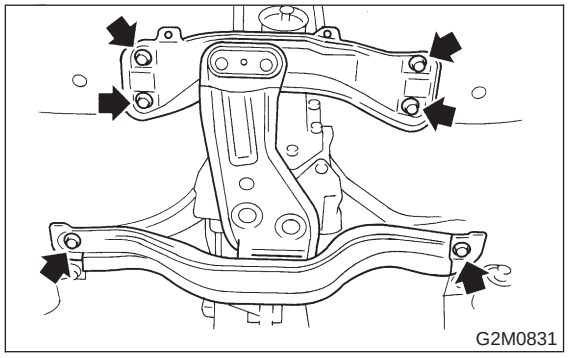


23) Place transmission jack under transmission.

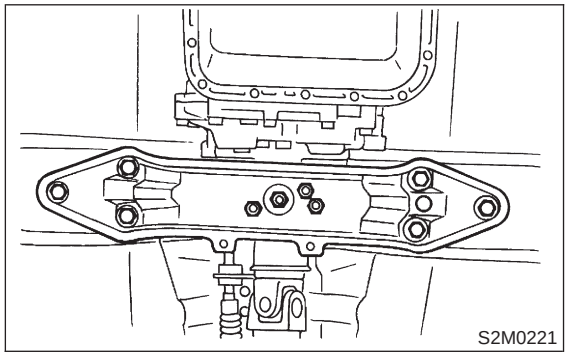
CAUTION:
● Always support transmission case with a transmission jack.
● On AT vehicles, make sure that the support plates of transmission jack don't touch the oil pan.



24) Remove transmission rear crossmember.
- **MT vehicles**

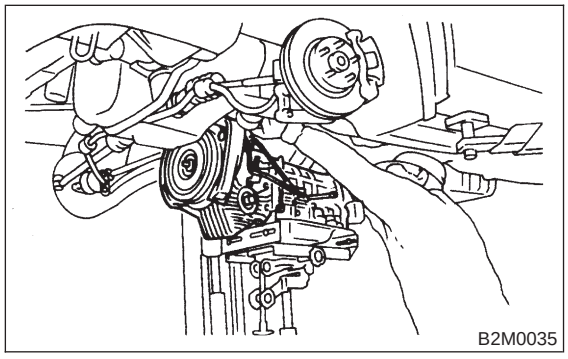


- **AT vehicles**



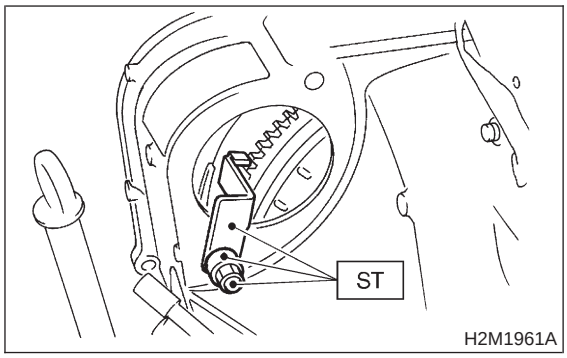
25) Remove transmission.

CAUTION:
- **Move transmission jack toward rear until mainshaft is withdrawn from clutch cover. (MT vehicles)**
- **Move transmission and torque converter as a unit away from engine. (AT vehicles)**

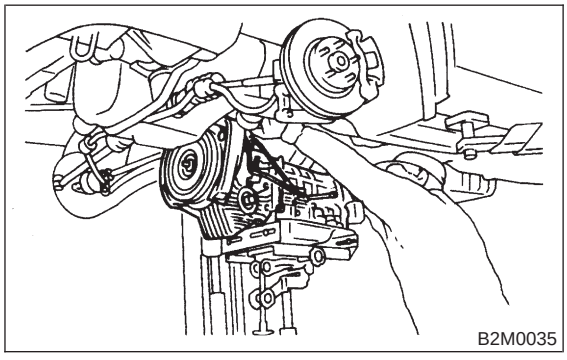


C: INSTALLATION

1) Install ST to torque converter clutch case. (AT vehicles)
ST 498277200 STOPPER SET



2) Install transmission to engine.
(1) Gradually raise transmission with transmission jack.

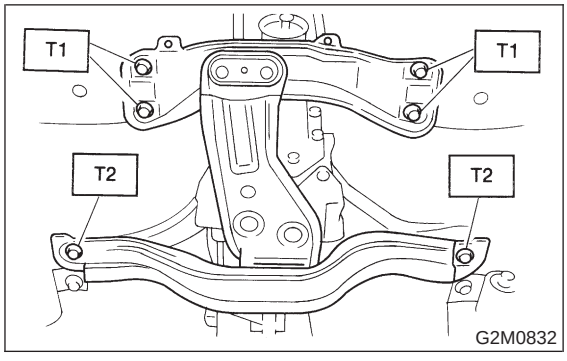


(2) Engage them at splines.

CAUTION:
Be careful not to strike mainshaft against clutch cover. (MT vehicles)

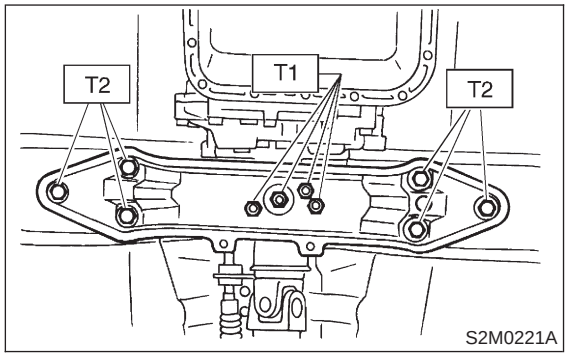
3) Install transmission rear crossmember.
- **MT vehicles**

Tightening torque:
T1: 69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)
T2: 137±20 N·m (14±2 kg-m, 101±14 ft-lb)



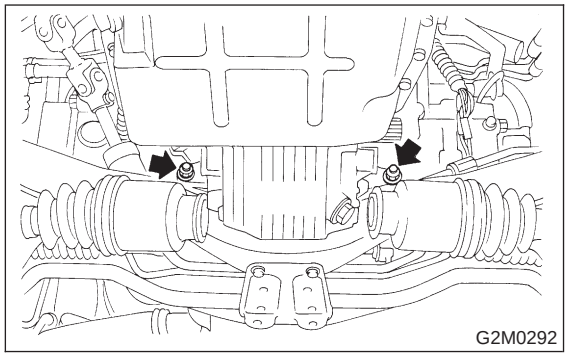
● **AT vehicles**

Tightening torque:
T1: 37±10 N·m (3.8±1.0 kg-m, 27±7 ft-lb)
T2: 69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)



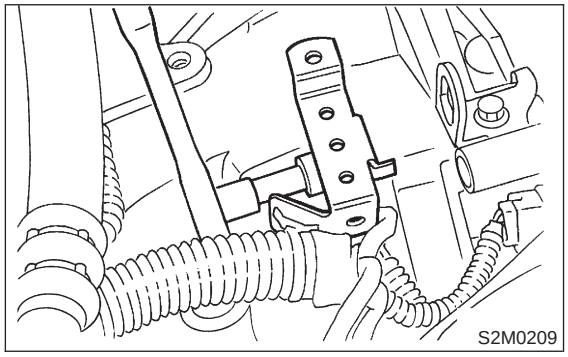
4) Take off transmission jack.
5) Tighten nuts which hold lower side of transmission to engine.

Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)



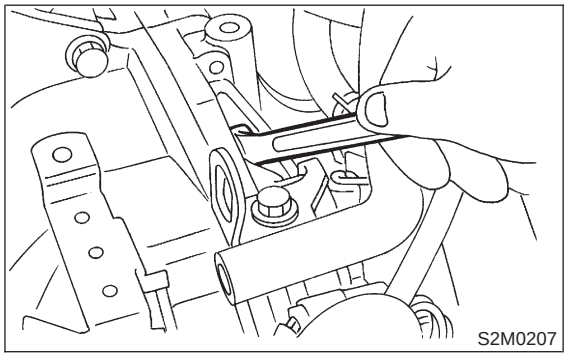
6) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)



7) Install torque converter to drive plate. (AT vehicles)

(1) Tighten bolts which hold torque converter to drive plate.

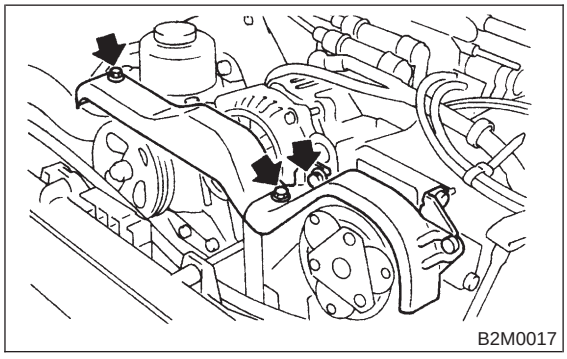


(2) Tighten other bolts while rotating the engine by using ST.
ST 499977000 CRANK PULLEY WRENCH

CAUTION:
Be careful not to drop bolts into torque converter housing.

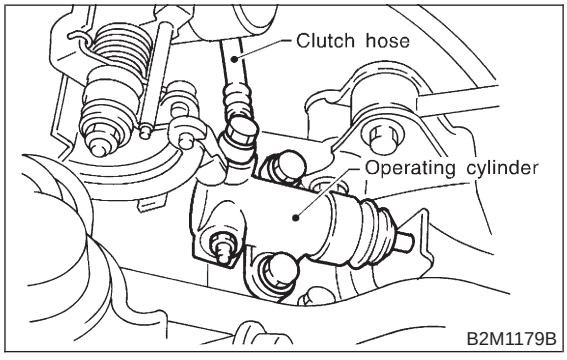
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)

(3) Clog plug onto service hole.
(4) Install V-belt cover.

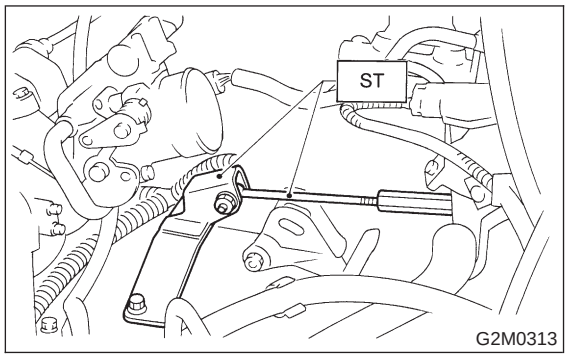


(5) Remove ST.
ST 498277200 STOPPER SET
8) Install operating cylinder. (2500 cc MT vehicles)

Tightening torque:
37±3 N·m (3.8±0.3 kg-m, 27.5±2.2 ft-lb)

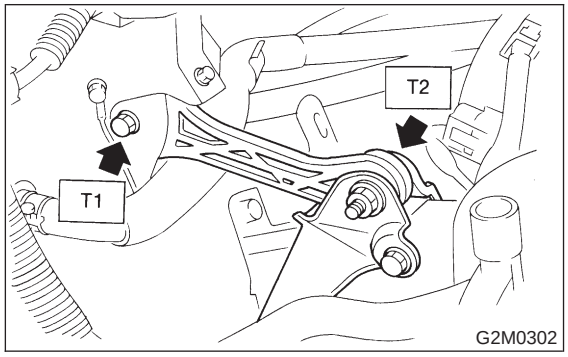


9) Remove special tools.



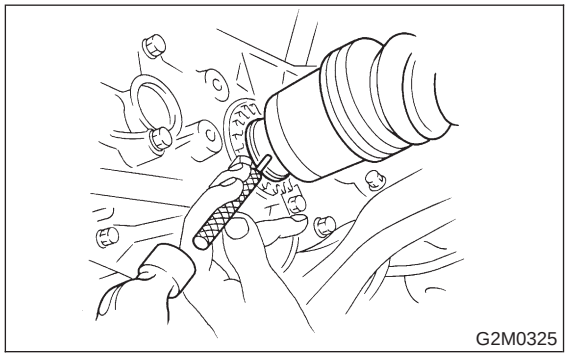
10) Install pitching stopper.

Tightening torque:
T1: 57±10 N·m (5.8±1.0 kg-m, 42±7 ft-lb)
T2: 49±5 N·m (5.0±0.5 kg-m, 36.2±3.6 ft-lb)



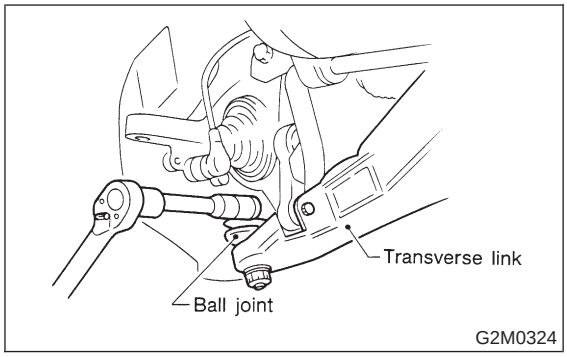
11) Install front drive shafts into transmission.
(1) Lift-up the vehicle.
(2) Install front drive shaft into transmission.
(3) Drive spring pin into chamfered hole of drive shaft.

CAUTION:
Always use a new spring pin.



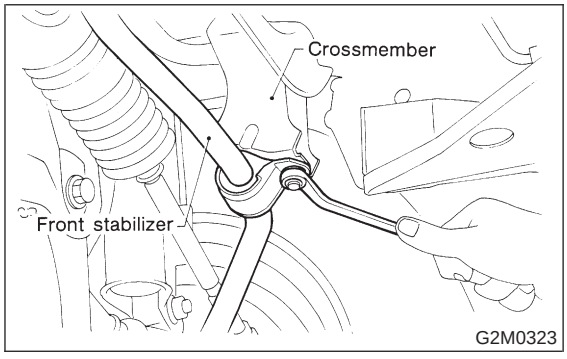
(4) Install ball joints of lower arm into knuckle arm of housing, and tighten installing bolts.

Tightening torque:
49±10 N·m (5.0±1.0 kg-m, 36±7 ft-lb)

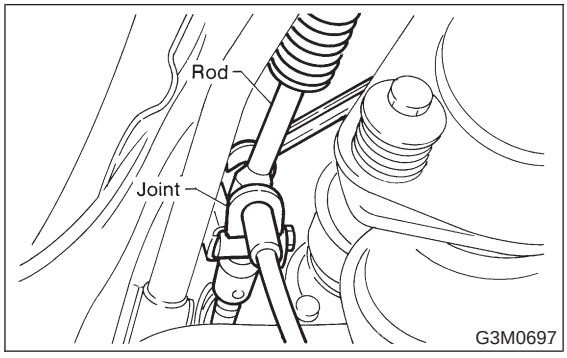


12) Install stabilizer clamps onto front crossmember.

Tightening torque:
25±4 N·m (2.5±0.4 kg-m, 18.1±2.9 ft-lb)



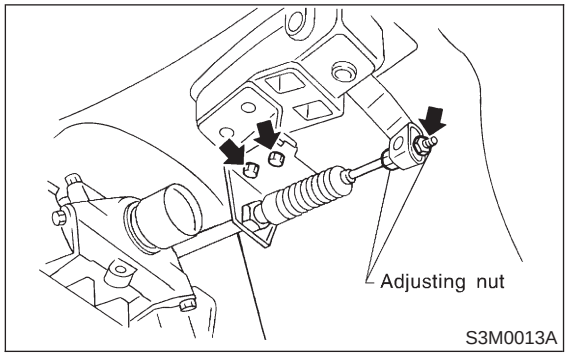
13) Install gear shift rod and stay. (MT vehicles)
(1) Install gear shift rod onto transmission.



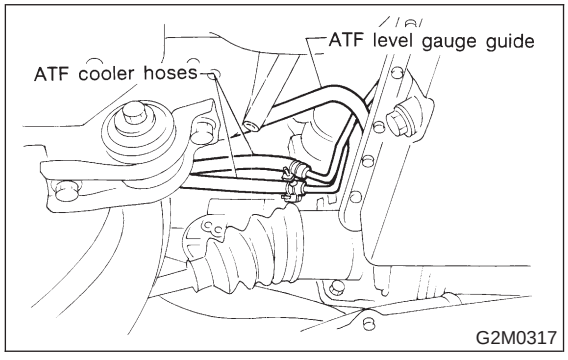
(2) Install stay onto transmission.
(3) Install spring.

14) Install shift selector cable onto selector lever. (AT vehicles)
(1) Install selector cable into selector lever.
(2) Install cable bracket onto body.

NOTE:
Tighten selector cable adjusting and lock nut after checking selector lever operation.

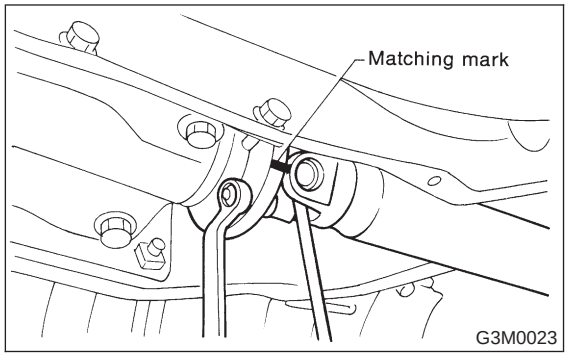


15) Install ATF level gauge guide, and ATF cooler hoses onto pipe. (AT vehicles)



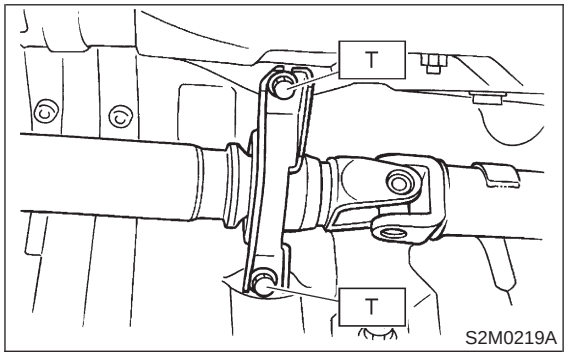
16) Install propeller shaft. (AWD vehicles)
(1) Install propeller shaft into transmission.
(2) Tighten bolts which install propeller shaft onto companion flange of rear differential.

Tightening torque:
31±8 N·m (3.2±0.8 kg-m, 23.1±5.8 ft-lb)

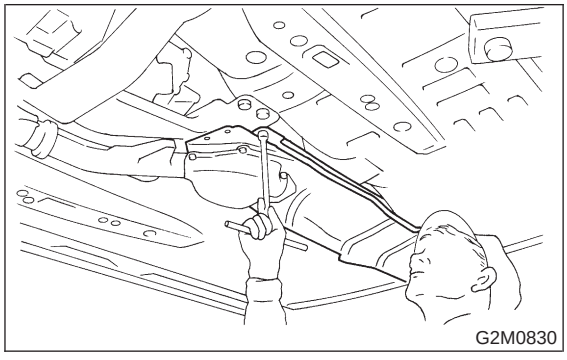


(3) Install center bearing bracket on body.

Tightening torque:
52±5 N·m (5.3±0.5 kg-m, 38.3±3.6 ft-lb)

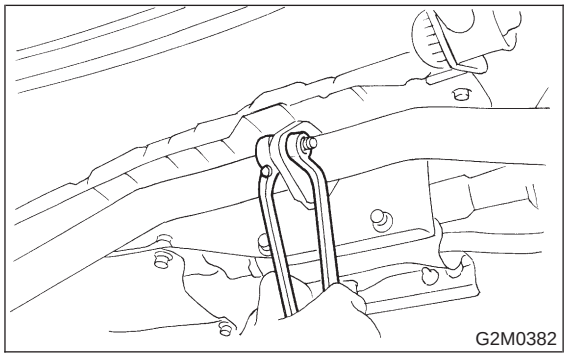


17) Install exhaust system.
(1) Install heat shield cover. (AWD vehicles)

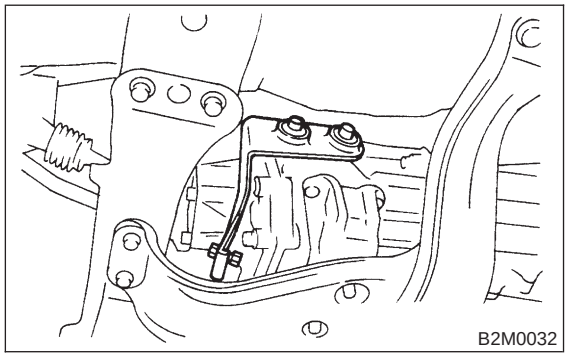


(2) Install rear exhaust pipe to muffler. (AWD vehicles)

Tightening torque:
48±9 N·m (4.9±0.9 kg-m, 35.4±6.5 ft-lb)

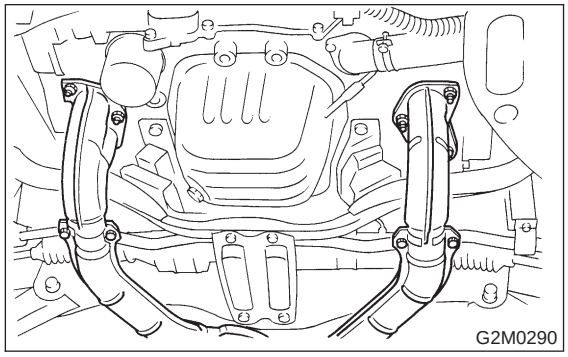


(3) Install hanger bracket on right side of transmission. (AWD vehicles)


B2M0032

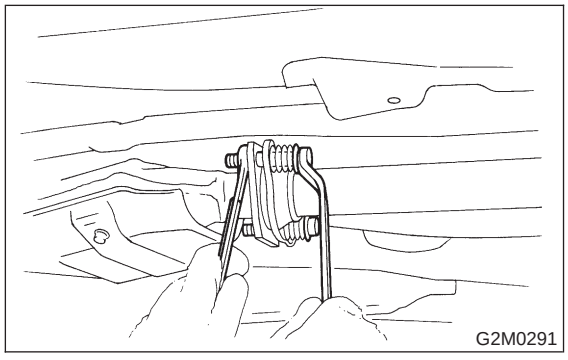
(4) Install front exhaust pipe onto engine.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)


G2M0290

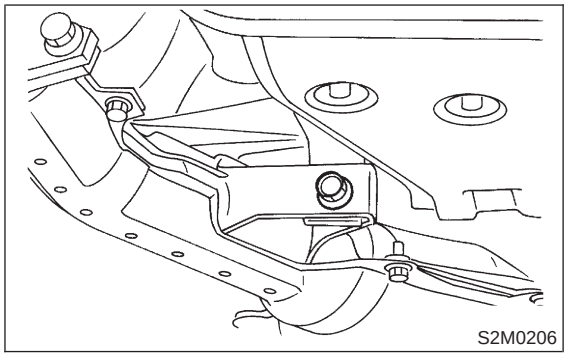
(5) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

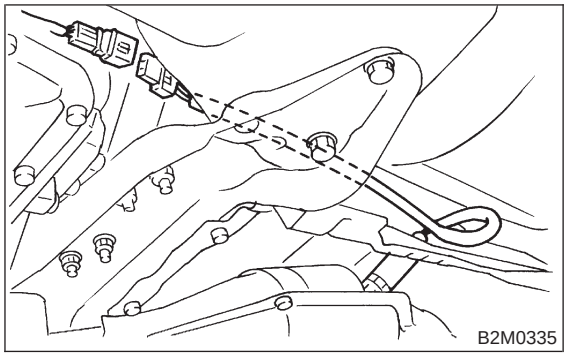

G2M0291

(6) Tighten bolt which installs center exhaust pipe to hanger bracket.

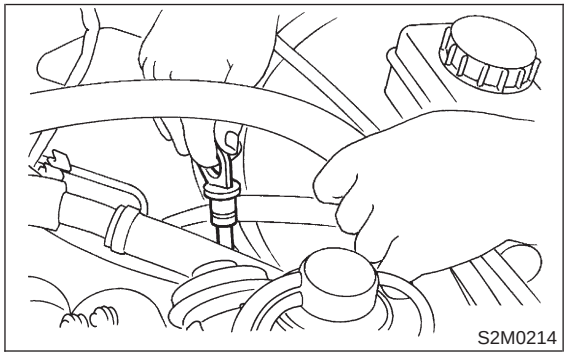
Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)


S2M0206

(7) Connect connector to rear oxygen sensor. (Except California spec. vehicles)


B2M0335

18) Install ATF level gauge. (AT vehicles)

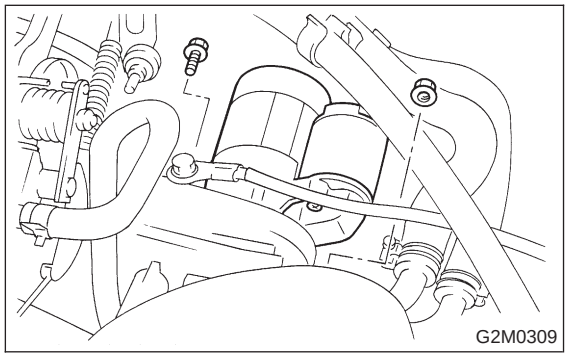

S2M0214

19) Connect the following connectors.
(1) Transmission harness connectors (AT vehicles)
(2) Transmission ground terminal (AT vehicles)
(3) Front oxygen sensor connector
(4) Rear oxygen sensor connector (California spec. vehicles)
(5) Vehicle speed sensor 2 connector
(6) Neutral position switch connector (MT vehicles)
(7) Back-up light switch connector (MT vehicles)

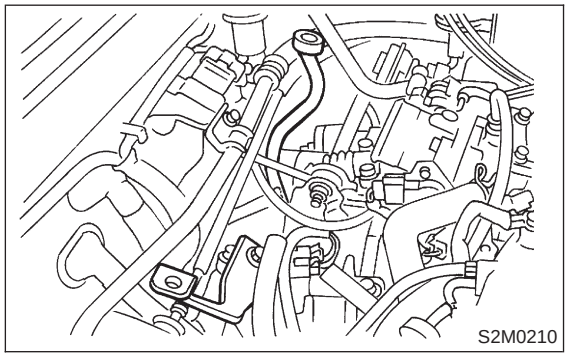
20) Connect the following cables.
(1) Cruise control cable

(With cruise control vehicles)
(2) Clutch cable (2200 cc MT vehicles)
21) Install return spring.
(Without hill holder vehicles)
22) Install starter.
(1) Install starter onto transmission case, and connect connectors and terminals.
(2) Tighten bolt and nut which install starter onto transmission.

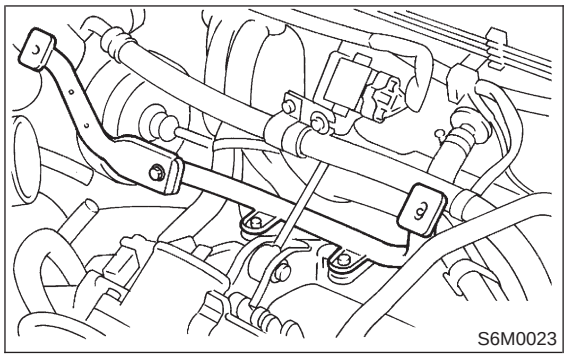
Tightening torque:
40±4 N·m (4.1±0.4 kg-m, 29.7±2.9 ft-lb)


G2M0309

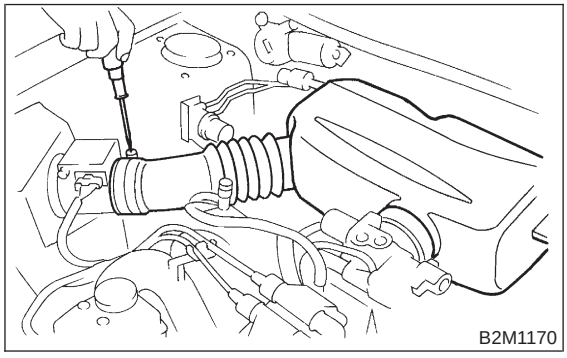
23) Install chamber stay.
- MT vehicles


S2M0210

- AT vehicles


S6M0023

24) Install air intake duct and chamber.


B2M1170

25) Connect battery ground cable.
26) Fill ATF and differential gear oil. (AT vehicles) <Ref. to 3-2 [S1A0].>
27) Check selector lever operation. (AT vehicles) <Ref. to 3-2 [T2C0].>
28) Take off vehicle from lift arms.
29) Check the vehicle on road tester. (AT vehicles) <Ref. to 3-2 [W7A0].>

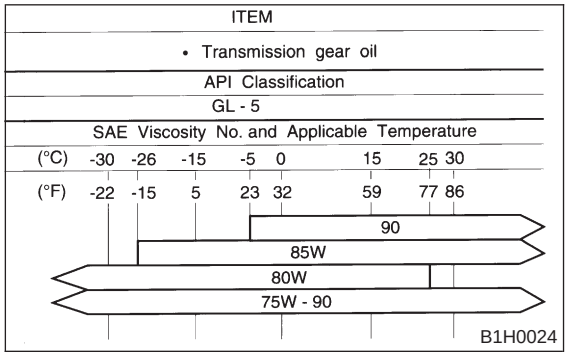
MANUAL TRANSMISSION AND DIFFERENTIAL 3-1

1. Manual Transmission and Differential

Item			Model		
			AWD		
			2200 cc	2500 cc	2500 cc OUTBACK
Type			5-forward speeds with synchromesh and 1-reverse		
Transmission gear ratio		1st	3.545		
		2nd	2.111		
		3rd	1.448		
		4th	1.088		
		5th	0.780		0.871
		Reverse	3.416		
Front reduction gear	Final	Type of gear	Hypoid		
		Gear ratio	3.900	4.111	
Rear reduction gear	Transfer	Type of gear	Helical		
		Gear ratio	1.000		
	Final	Type of gear	Hypoid		
		Gear ratio	3.900	4.111	
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)		
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)		
Transmission gear oil			GL-5		
Transmission oil capacity			3.5 ℓ (3.7 US qt, 3.1 Imp qt)		

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

Drive pinion shim adjustment
Hypoid gear backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Drive pinion shim			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)	32295AA071	0.250 (0.0098)
32295AA041	0.175 (0.0069)	32295AA081	0.275 (0.0108)
32295AA051	0.200 (0.0079)	32295AA091	0.300 (0.0118)
32295AA061	0.225 (0.0089)	32295AA101	0.500 (0.0197)

Selection of main shaft rear plate

Main shaft rear plate		
Dimension “A” mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

4. Drive Pinion Assembly

Preload adjustment of thrust bearing
Starting torque
0.3 — 0.8 N·m (0.03 — 0.08 kg-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

Assemble a driven shaft and 1st driven gear that are selected for the proper radial clearance adjustment

Driven shaft		1st driven gear
Part No.	Diameter A mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA290
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA280

5. Reverse Idler Gear

Adjustment of reverse idler gear position
Reverse idler gear to transmission case (LH) wall clearance
6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part No.	Mark	Remarks
32820AA000	0	Further from case wall
32820AA010	No mark	Standard
32820AA020	2	Closer to the case wall

After installing a suitable reverse shifter lever, adjust reverse idler gear to transmission case wall clearance to within 0 to 0.5 mm (0 to 0.020 in) using washers.

Washer (20.5 × 26 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

6. Shifter Fork And Rod

Select suitable shifter forks so that both coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.
Rod end clearance
A: 1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)
B: 3rd-4th — 5th
0.5 — 1.3 mm (0.020 — 0.051 in)

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th shifter fork		
Part No.	Mark	Remarks
32812AA200	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA210	No mark	Standard
32812AA220	6	Become distant from 5th gear by 0.2 mm (0.008 in)

7. Transfer Case

Neutral position adjustment

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA040	1	Neutral position is closer to 1st.
32188AA011	No mark or 2	Standard
32188AA050	3	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

8. Extension

Snap ring (Inner-72) to ball bearing side clearance
0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Inner-72)	
Part No.	Thickness mm (in)
805172071	1.78 (0.0701)
805172072	1.90 (0.0748)
805172073	2.02 (0.0795)

Snap ring (Outer-30) to ball bearing side clearance
0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

9. Extension Assembly

Thrust washer (52 × 61 × t) to ball bearing side clearance
0.05 — 0.30 mm (0.0020 — 0.0118 in)

Thrust washer (52 × 61 × t)	
Part No.	Thickness mm (in)
803052021	0.50 (0.0197)
803052022	0.75 (0.0295)
803052023	1.00 (0.0394)

10. Front Differential

Bevel gear to pinion backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Washer (38.1 × 50 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

Pinion shaft to axle drive shaft clearance
0 — 0.2 mm (0 — 0.008 in)

Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

11. Center Differential

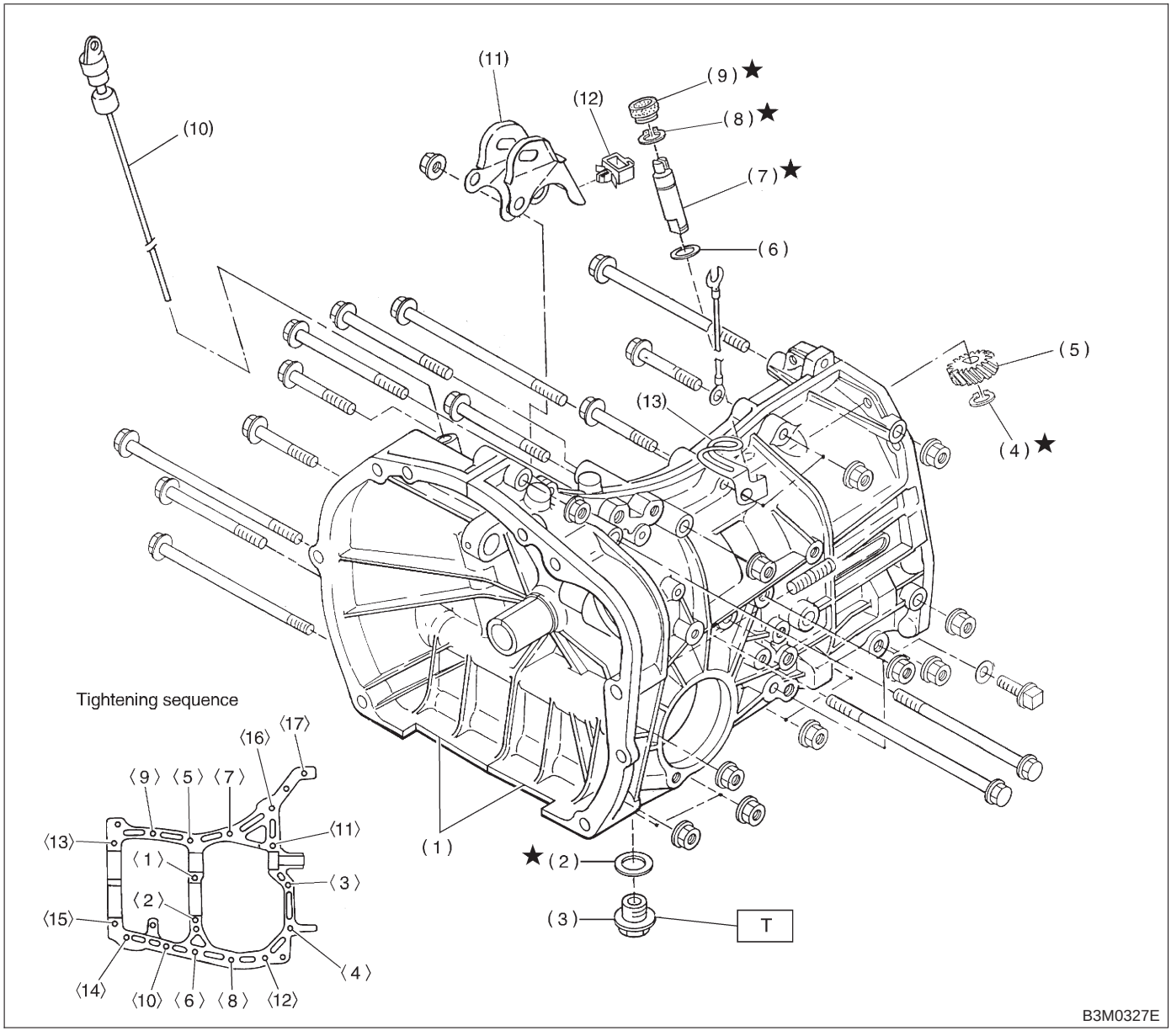
Snap ring (Inner-110) to center differential case clearance
0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Inner-110)	
Part No.	Thickness mm (in)
805100061	2.10 (0.0827)
805100062	2.21 (0.0870)
805100063	2.32 (0.0913)

Backlash adjustment axial movement
0.62 — 0.86 mm (0.0244 — 0.0339 in)

Adjusting washer (45 × 62 × t)	
Part No.	Thickness mm (in)
803045041	1.60 (0.0630)
803045042	1.80 (0.0709)
803045043	2.00 (0.0787)
803045044	2.20 (0.0866)
803045045	2.40 (0.0945)

1. Transmission Case



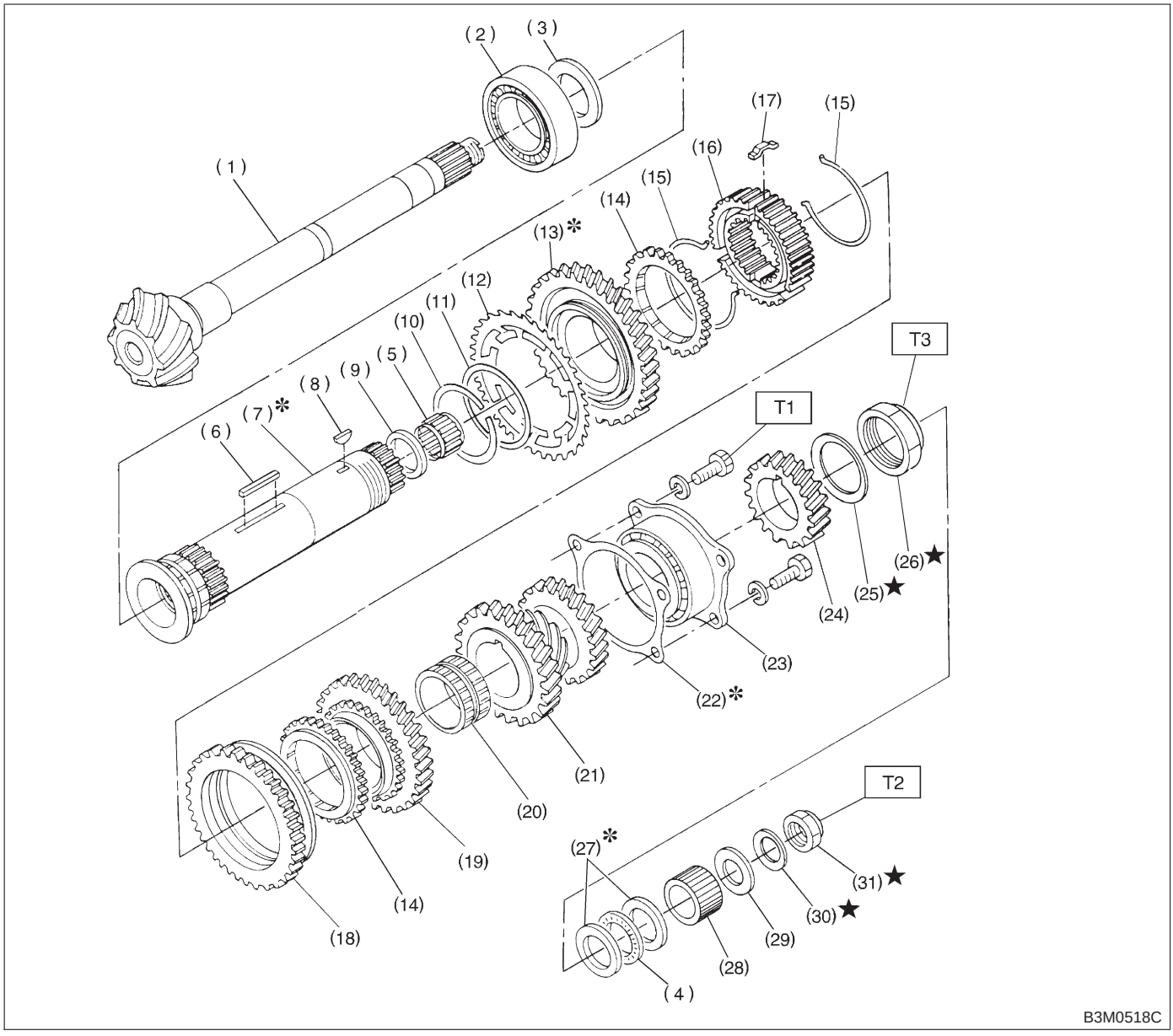
(1) Transmission case ASSY
(2) Gasket
(3) Drain plug
(4) Snap ring (Outer)
(5) Speedometer driven gear
(6) Washer
(7) Speedometer shaft
(8) Snap ring (Outer)
(9) Oil seal
(10) Oil level gauge
(11) Pitching stopper bracket
(12) Clamp
(13) Clip

Tightening torque: N·m (kg-m, ft-lb)
T: 44±3 (4.5±0.3, 32.5±2.2)

Size	All models	Torque
8 mm bolt	<5> — <15>	25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
10 mm bolt	<1> — <4> <16> — <17>	39±2 N·m (4.0±0.2 kg-m, 28.9±1.4 ft-lb)

2. Drive Pinion Assembly

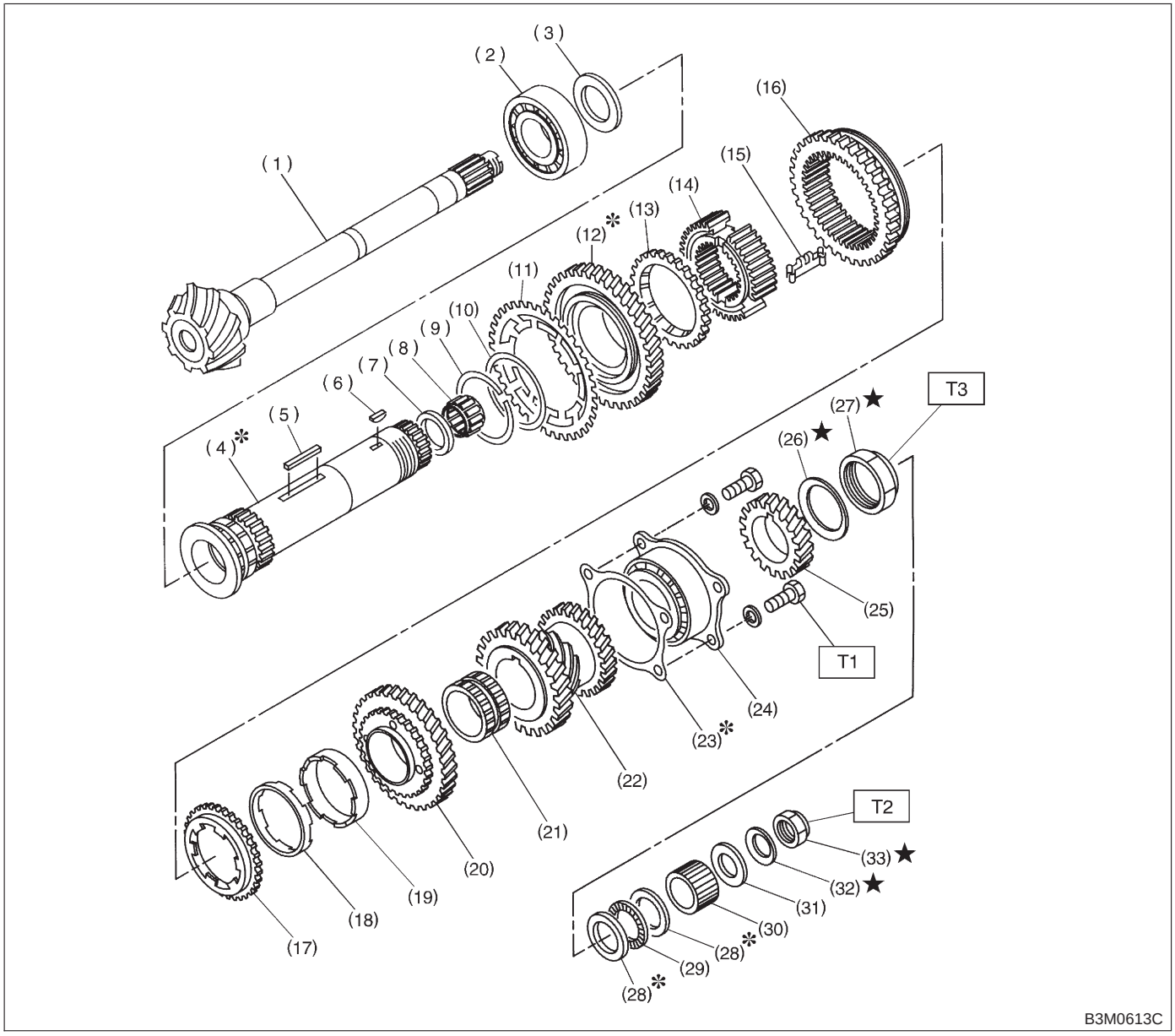
A: 2200 cc MODEL



(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Thrust bearing
(5) Needle bearing
(6) Key
(7) Driven shaft
(8) Woodruff key
(9) Drive pinion collar
(10) Snap ring (Outer)
(11) Washer
(12) Sub gear
(13) 1st driven gear
(14) Baulk ring
(15) Spring
(16) 1st-2nd synchronizer hub
(17) Insert
(18) Reverse driven gear
(19) 2nd driven gear
(20) 2nd driven gear bush
(21) 3rd-4th driven gear
(22) Driven pinion shim
(23) Roller bearing
(24) 5th driven gear
(25) Lock washer
(26) Lock nut
(27) Washer
(28) Differential bevel gear sleeve
(29) Washer
(30) Lock washer
(31) Lock nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 29±3 (3.0±0.3, 21.7±2.2)
T2: 118±8 (12.0±0.8, 86.8±5.8)
T3: 265±10 (27±1, 195±7)

B: 2500 cc MODEL

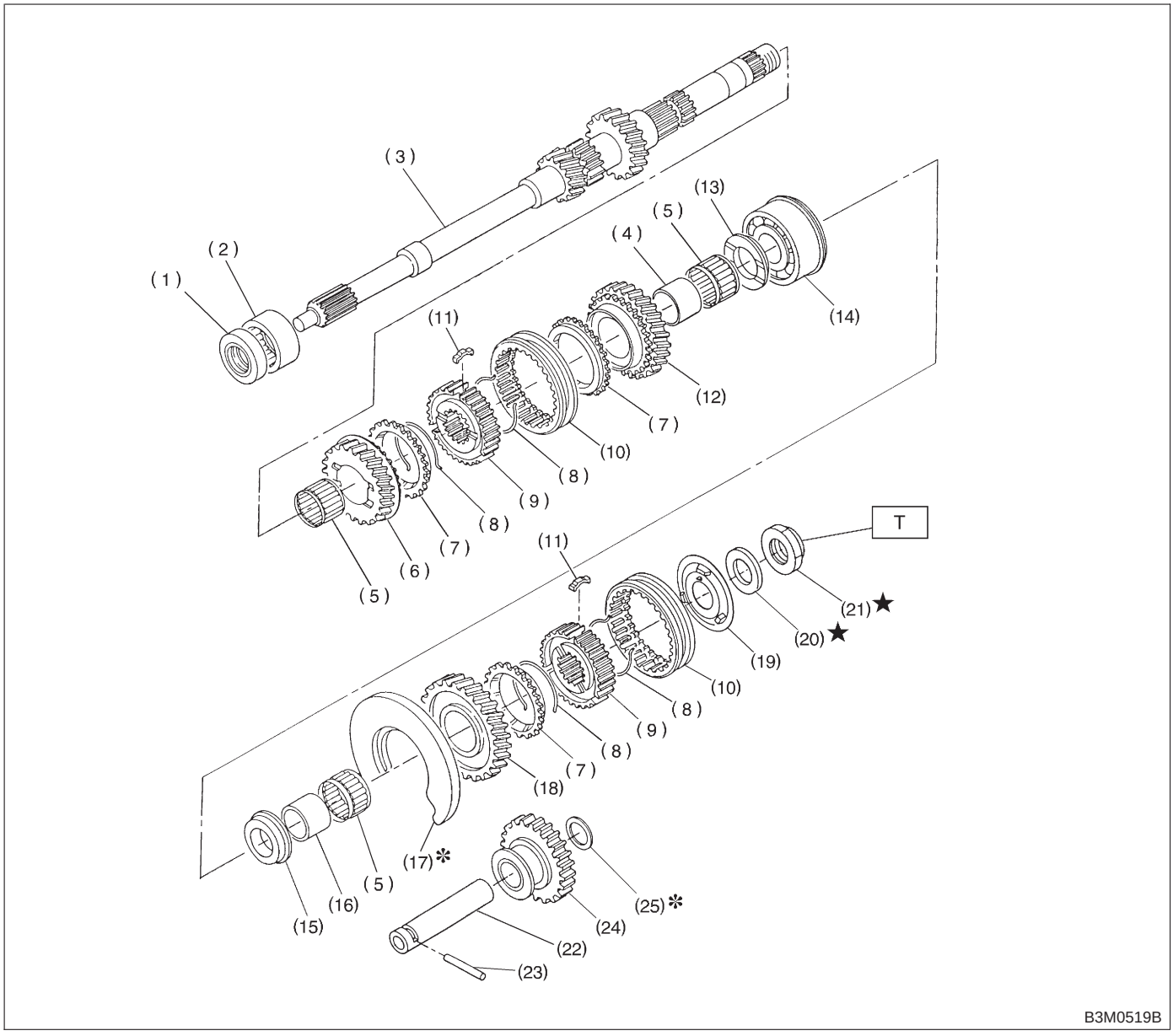


(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Driven shaft
(5) Key
(6) Woodruff key
(7) Drive pinion collar
(8) Needle bearing
(9) Snap ring (Outer)
(10) Washer
(11) Sub gear
(12) 1st driven gear
(13) Baulk ring
(14) 1st-2nd synchronizer hub
(15) Insert key
(16) Reverse driven gear
(17) Outer baulk ring
(18) Synchro cone
(19) Inner baulk ring
(20) 2nd driven gear
(21) 2nd driven gear bush
(22) 3rd-4th driven gear
(23) Driven pinion shim
(24) Roller bearing
(25) 5th driven gear
(26) Lock washer
(27) Lock nut
(28) Washer
(29) Thrust bearing
(30) Differential bevel gear sleeve
(31) Washer
(32) Lock washer
(33) Lock nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 29±3 (3.0±0.3, 21.7±2.2)
T2: 118±8 (12.0±0.8, 86.8±5.8)
T3: 265±10 (27±1, 195±7)

3. Main Shaft Assembly

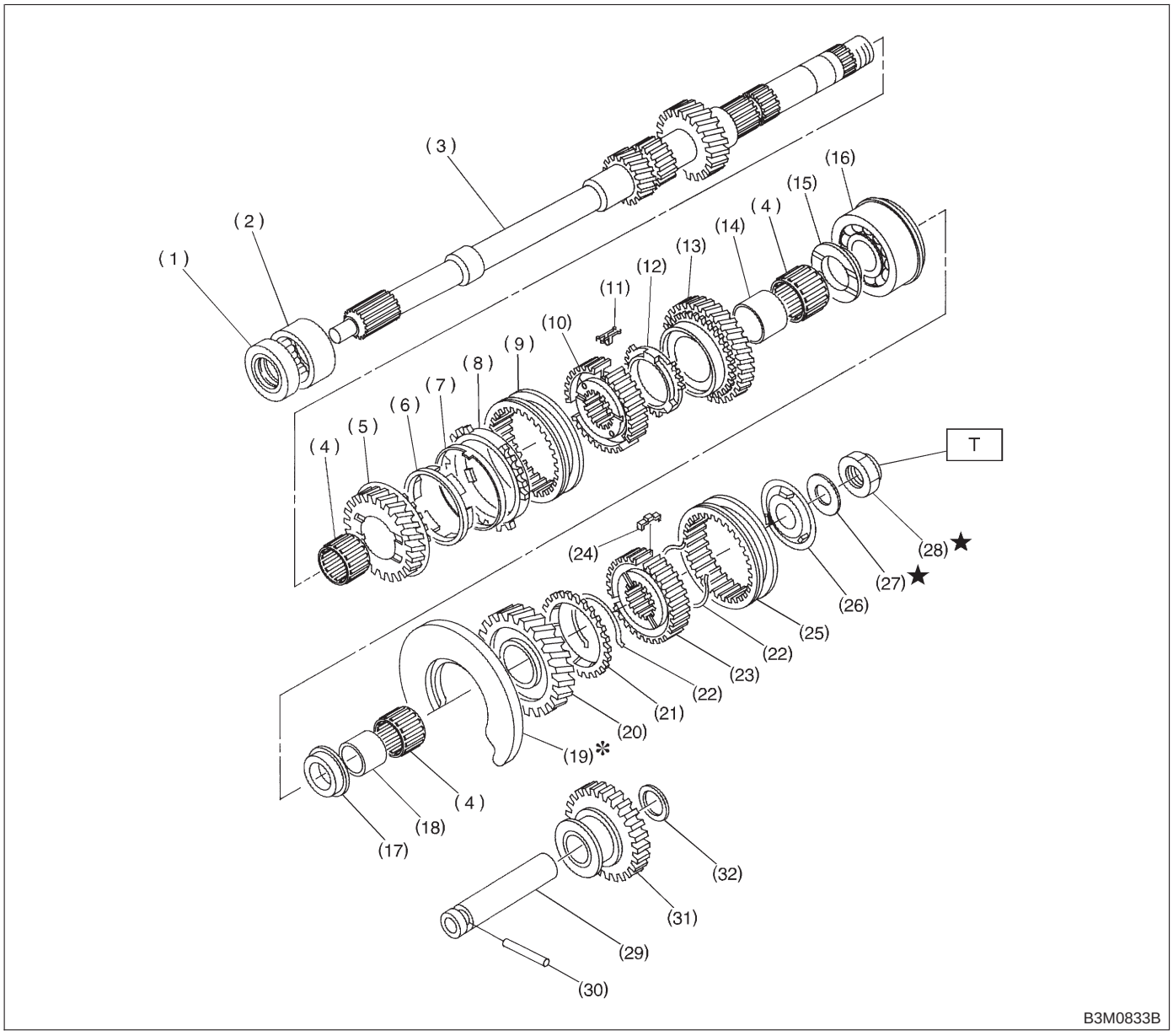
A: 2200 cc MODEL



(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) 4th needle bearing race
(5) Needle bearing
(6) 3rd drive gear
(7) Baulk ring
(8) Synchronizer spring
(9) Synchronizer hub
(10) Coupling sleeve
(11) Shifting insert
(12) 4th drive gear
(13) 4th gear thrust washer
(14) Ball bearing
(15) 5th gear thrust washer
(16) 5th needle bearing race
(17) Main shaft rear plate
(18) 5th drive gear
(19) Insert stopper plate
(20) Lock washer
(21) Lock nut
(22) Reverse idler gear shaft
(23) Straight pin
(24) Reverse idler gear
(25) Washer

Tightening torque: N·m (kg-m, ft-lb)
T: 118±6 (12.0±0.6, 86.8±4.3)

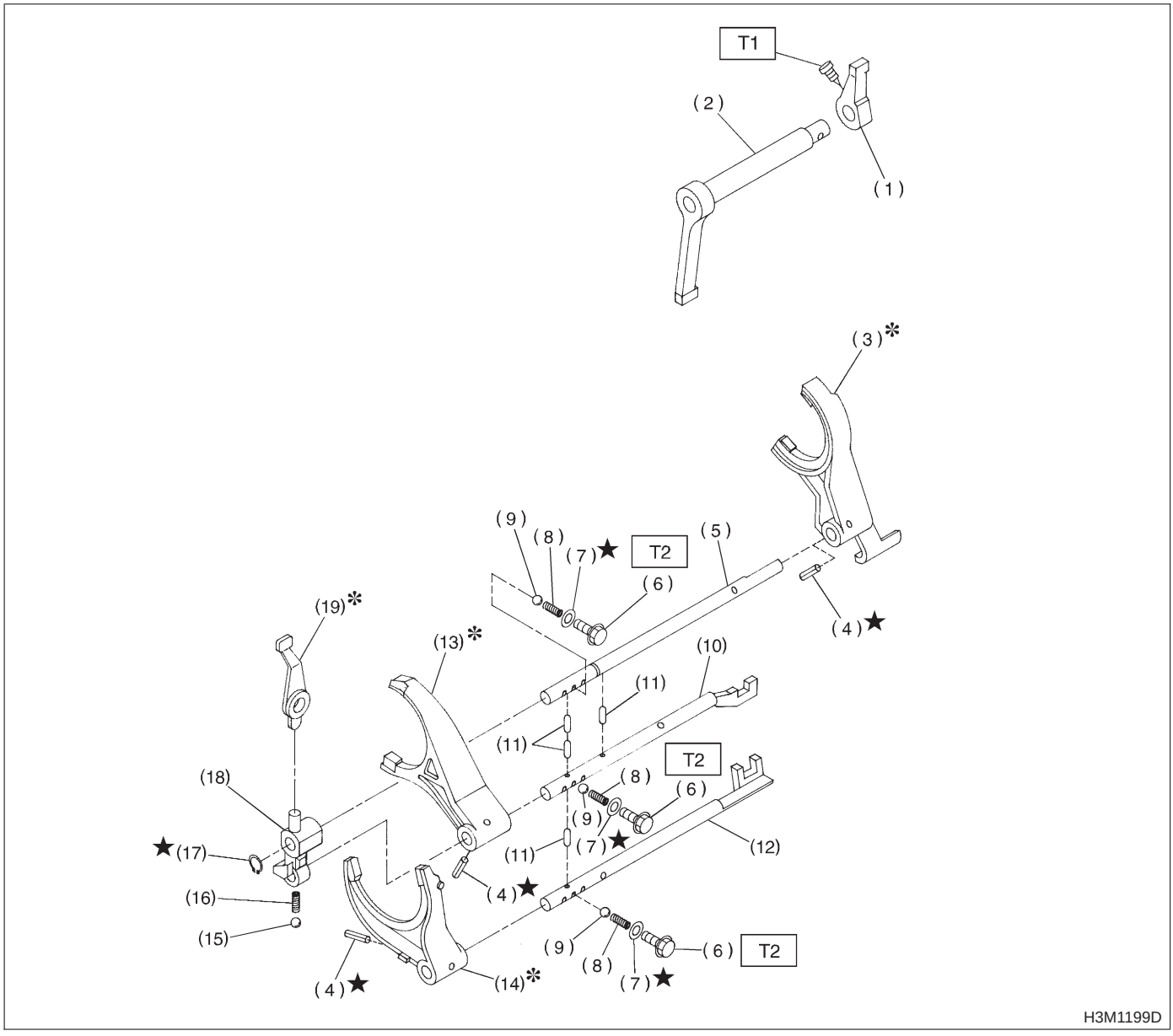
B: 2500 cc MODEL



(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) Inner baulk ring
(7) Synchro cone
(8) Outer baulk ring
(9) Coupling sleeve
(10) Synchronizer hub
(11) Insert key
(12) 4th baulk ring
(13) 4th drive gear
(14) 4th needle bearing race
(15) 4th gear thrust washer
(16) Ball bearing
(17) 5th gear thrust washer
(18) 5th needle bearing race
(19) Main shaft rear plate
(20) 5th drive gear
(21) 5th baulk ring
(22) Synchronizer spring
(23) Synchronizer hub
(24) Shifting insert
(25) Coupling sleeve
(26) Insert stopper plate
(27) Lock washer
(28) Lock nut
(29) Reverse idler gear shaft
(30) Straight pin
(31) Reverse idler gear
(32) Washer

Tightening torque: N·m (kg-m, ft-lb)
T: 118±6 (12.0±0.6, 86.8±4.3)

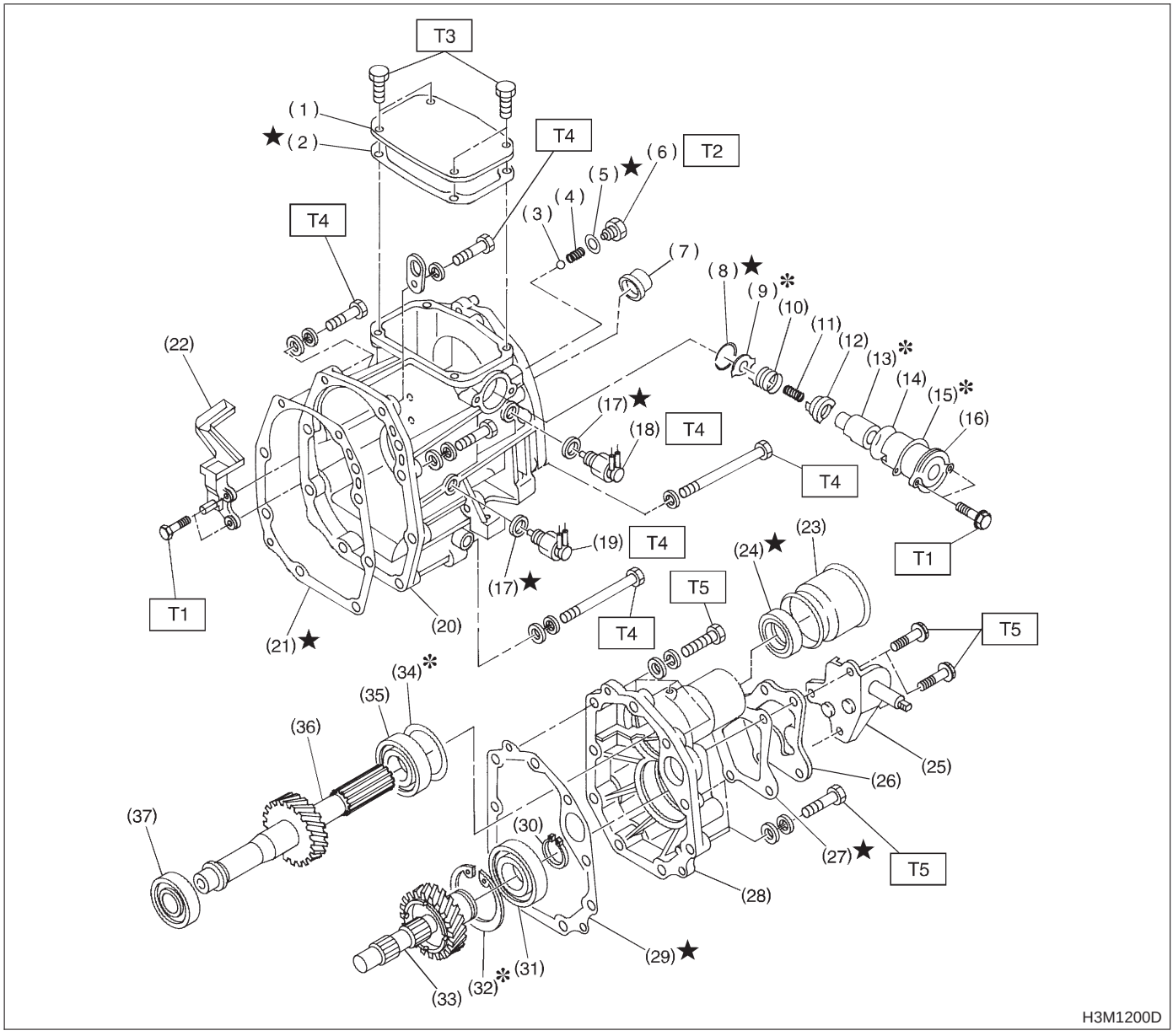
4. Shifter Fork and Shifter Rod



(1) Selector arm
(2) Shifter arm
(3) 5th shifter fork
(4) Straight pin
(5) Reverse fork rod
(6) Checking ball plug
(7) Gasket
(8) Checking ball spring
(9) Ball
(10) 3rd-4th fork rod
(11) Interlock plunger
(12) 1st-2nd fork rod
(13) 3rd-4th shifter fork
(14) 1st-2nd shifter fork
(15) Ball
(16) Spring
(17) Snap ring (Outer)
(18) Reverse fork rod arm
(19) Reverse shifter lever

Tightening torque: N·m (kg-m, ft-lb)
T1: 10±1 (1.0±0.1, 7.2±0.7)
T2: 19.6±1.5 (2.00±0.15, 14.5±1.1)

5. Transfer Case and Extension

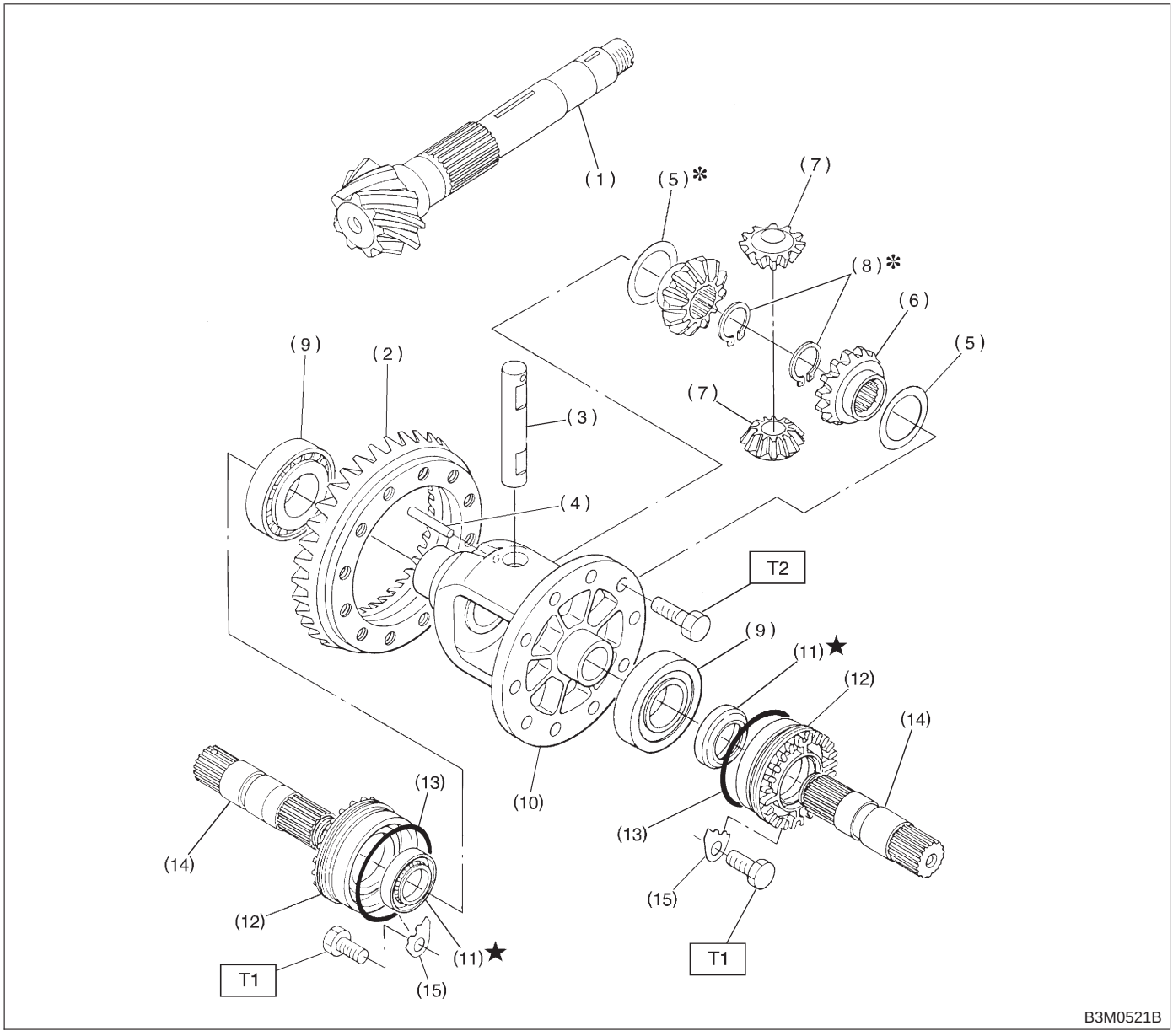


H3M1200D

(1) Transfer cover
(2) Cover gasket
(3) Ball
(4) Reverse accent spring
(5) Gasket
(6) Plug
(7) Oil seal
(8) Snap ring (Inner)
(9) Reverse check plate
(10) Reverse check spring
(11) Reverse return spring
(12) Reverse check cam
(13) Reverse accent shaft
(14) O-ring
(15) Adjusting select shim
(16) Reverse check sleeve
(17) Gasket
(18) Neutral switch
(19) Back-up light switch
(20) Transfer case
(21) Gasket
(22) Oil guide
(23) Dust cover
(24) Oil seal
(25) Shift bracket
(26) Extension cover
(27) Gasket
(28) Extension
(29) Gasket
(30) Snap ring (Outer-30)
(31) Ball bearing
(32) Snap ring (Inner-72)
(33) Transfer drive gear
(34) Adjusting washer
(35) Ball bearing
(36) Transfer driven gear
(37) Ball bearing

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 10±1 (1.0±0.1, 7.2±0.7)
T3: 15.7±1.5 (1.6±0.15, 11.6±1.1)
T4: 25±2 (2.5±0.2, 18.1±1.4)
T5: 37±3 (3.8±0.3, 27.5±2.2)

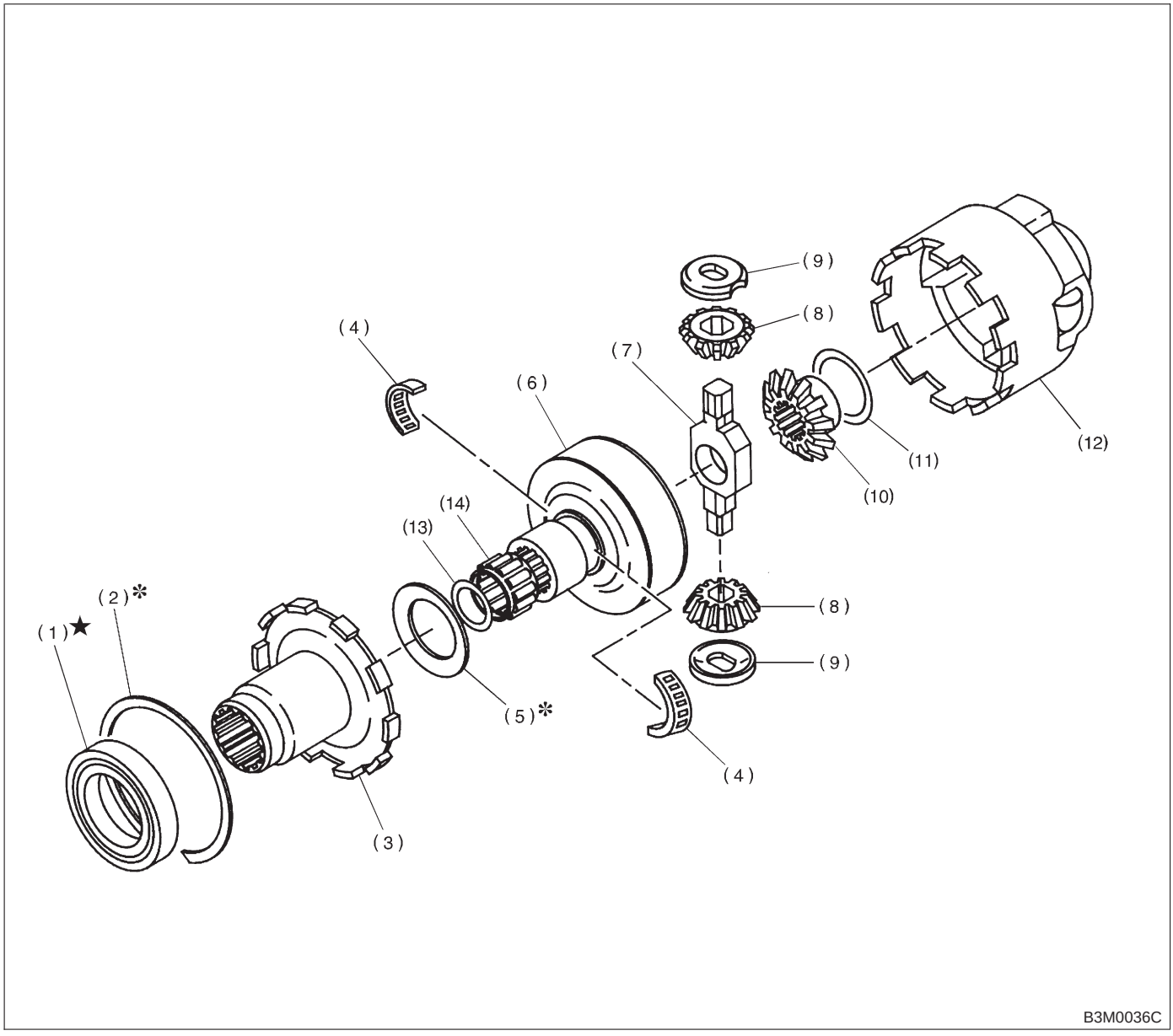
6. Front Differential



(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Pinion shaft
(4) Straight pin
(5) Washer
(6) Differential bevel gear
(7) Differential bevel pinion
(8) Snap ring (Outer)
(9) Roller bearing
(10) Differential case
(11) Oil seal
(12) Differential side retainer
(13) O-ring
(14) Axle drive shaft
(15) Retainer lock plate

Tightening torque: N·m (kg-m, ft-lb)
T1: 25±5 (2.5±0.5, 18.1±3.6)
T2: 62±5 (6.3±0.5, 45.6±3.6)

7. Center Differential



(1) Ball bearing
(2) Snap ring (Inner-110)
(3) Center differential cover
(4) Needle bearing
(5) Adjusting washer
(6) Viscous coupling
(7) Pinion shaft
(8) Differential bevel pinion
(9) Retainer
(10) Differential bevel gear
(11) Washer
(12) Center differential case
(13) Snap ring
(14) Roller bearing

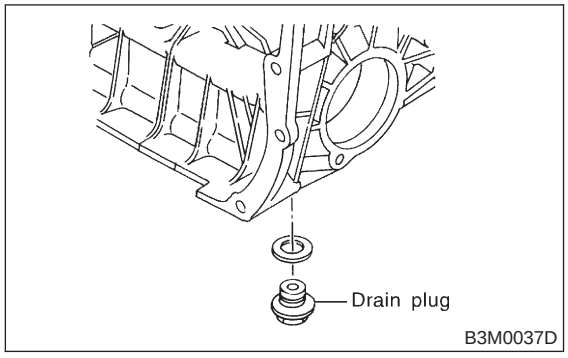
1. General

A: PRECAUTIONS

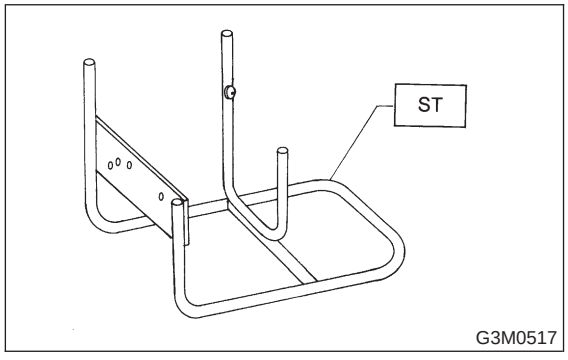
1) Clean oil, grease, dirt and dust from transmission.
2) Remove drain plug to drain oil. After draining, retighten it as before.

CAUTION:
Replace gasket with a new one.

Tightening torque:
44±3 N·m (4.5±0.3 kg-m, 32.5±2.2 ft-lb)



3) Attach transmission to ST.
ST 499937100 TRANSMISSION STAND SET

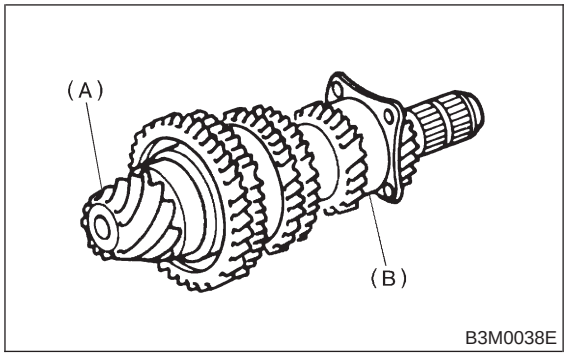


4) Rotating parts should be coated with oil prior to assembly.
5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
6) Gaskets and lock washers must be replaced with new ones.
7) Liquid gasket should be used where specified to prevent leakage.
8) Fill transmission gear oil through the oil level gauge hole up to upper point level gauge. <Ref. to 1-5 [G9A1].>

B: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.



(A) Drive pinion shaft
(B) Ball bearing

- Bearings having other defects

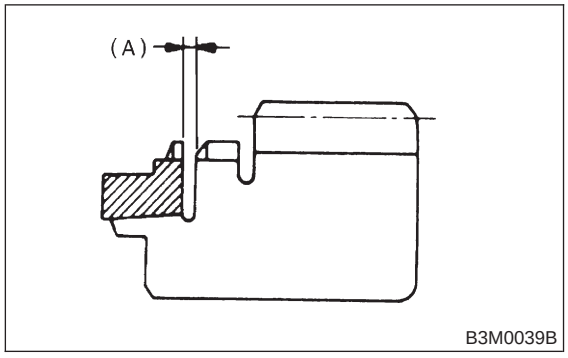
2) Bushing (each gear)
Replace the bushing in the following cases:
- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gears
- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

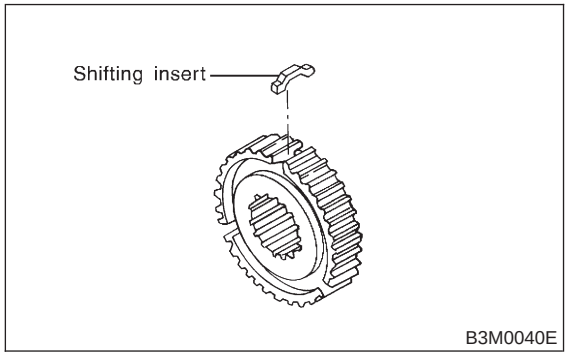
4) Baulk ring
Replace the ring in the following cases:
- When the inner surface and end face are damaged.

● When the ring inner surface is abnormally or partially worn down.
● If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

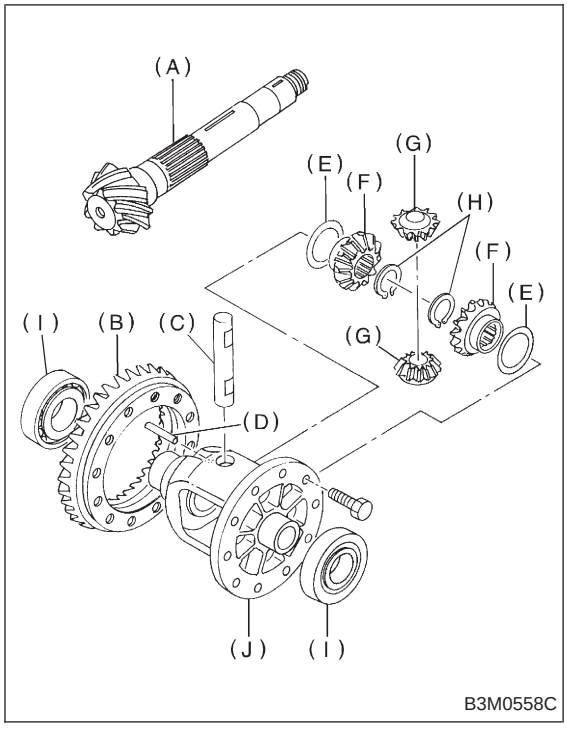
Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



● When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
5) Shifting insert
Replace the insert if deformed, excessively worn, or defective in any way.



6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.
8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.
9) Differential gear
Repair or replace the differential gear in the following cases:
● The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
● The roller bearing on the drive pinion shaft has a worn or damaged roller path.
● There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
● The differential case has worn or damaged sliding surfaces.

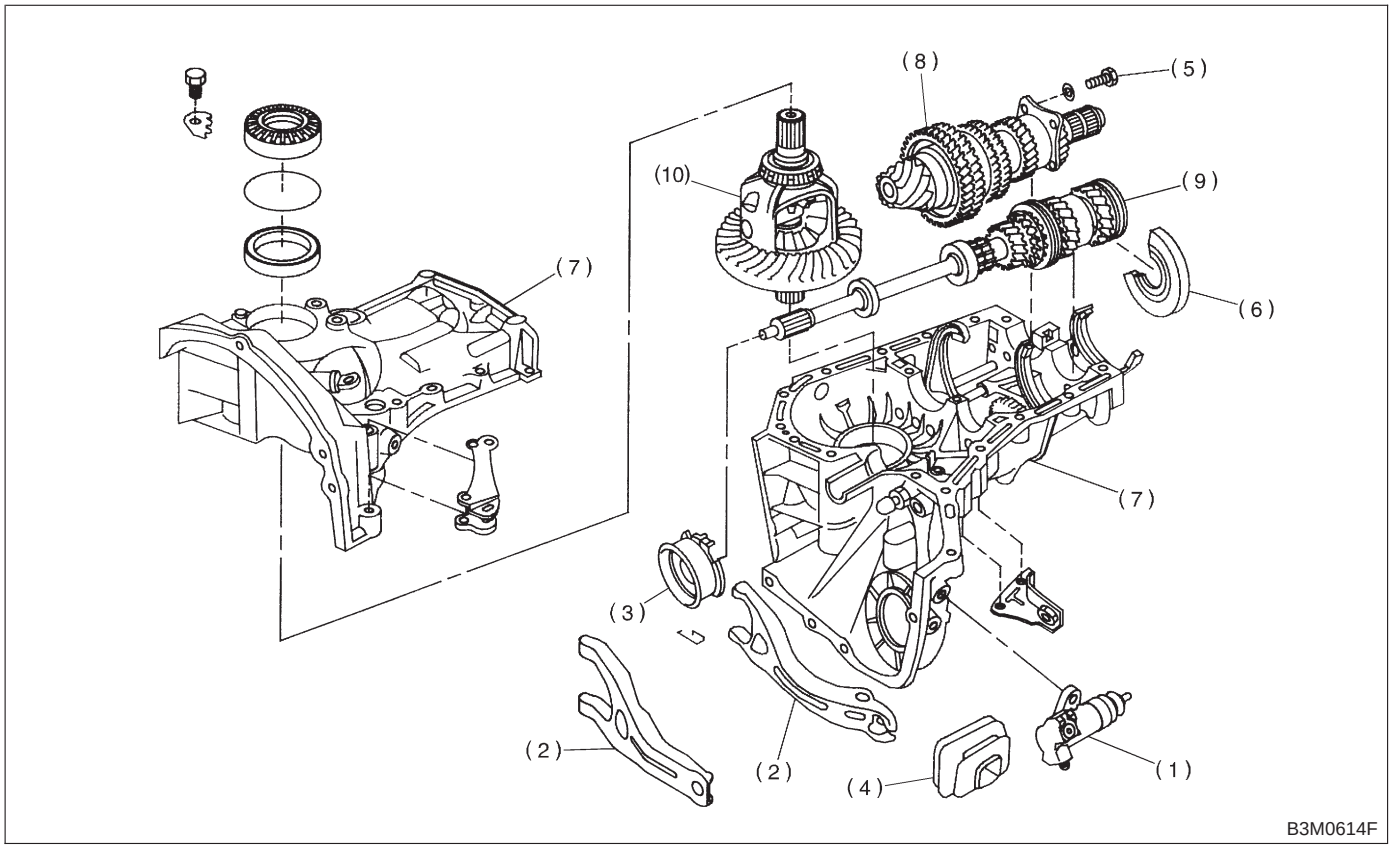


(A) Drive pinion shaft
(B) Hypoid driven gear
(C) Pinion shaft
(D) Straight pin
(E) Washer
(F) Differential bevel gear
(G) Differential bevel pinion
(H) Snap ring
(I) Roller bearing
(J) Differential case

2. Transmission Case

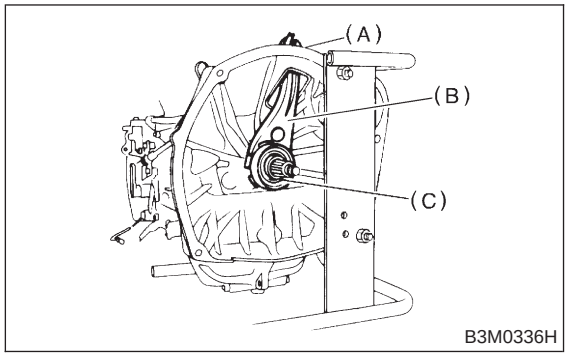
A: DISASSEMBLY

1. SEPARATION OF TRANSMISSION



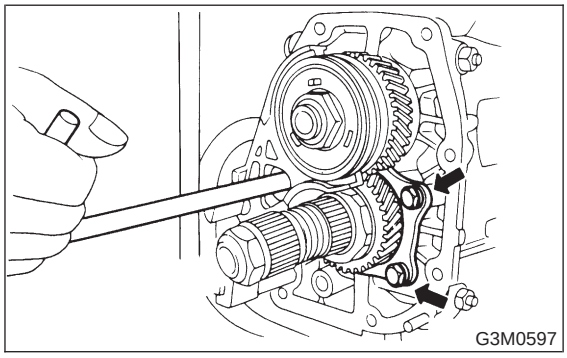
(1) Operating cylinder
(2) Release lever
(3) Release bearing
(4) Release lever sealing
(5) Bolt
(6) Main shaft rear plate
(7) Transmission case
(8) Drive pinion ASSY
(9) Main shaft ASSY
(10) Front differential

1) Remove operating cylinder (hydraulic application type) and clutch release lever. <Ref. to 2-10 [W3A0].> and <Ref. to 2-10 [W5A0].>
2) Remove transfer case assembly. <Ref. to 3-1 [W5A0].>

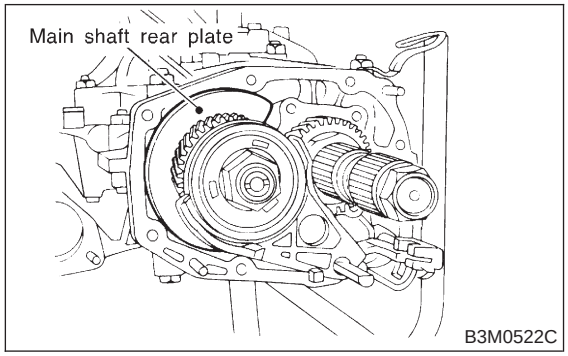


(A) Operating cylinder
(B) Clutch release lever
(C) Release bearing

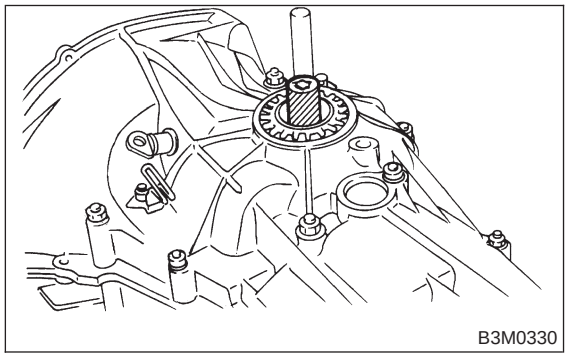
3) Remove bearing mounting bolts.



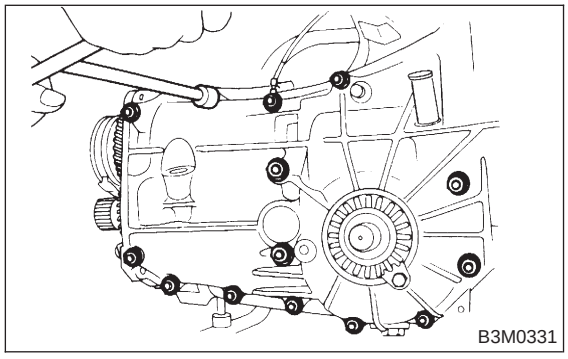
4) Remove main shaft rear plate.



5) Put vinyl tape around splines of right and left axle drive shafts to prevent damage to oil seals.

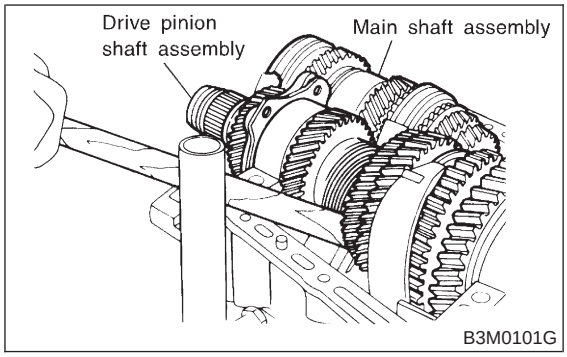


6) Separate transmission case into right and left cases by loosening seventeen coupling bolts and nuts.



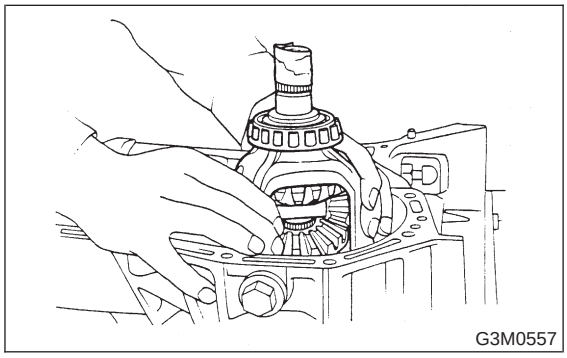
7) Remove drive pinion shaft assembly from left side transmission case.

NOTE:
Use a hammer handle, etc. to remove if too tight.

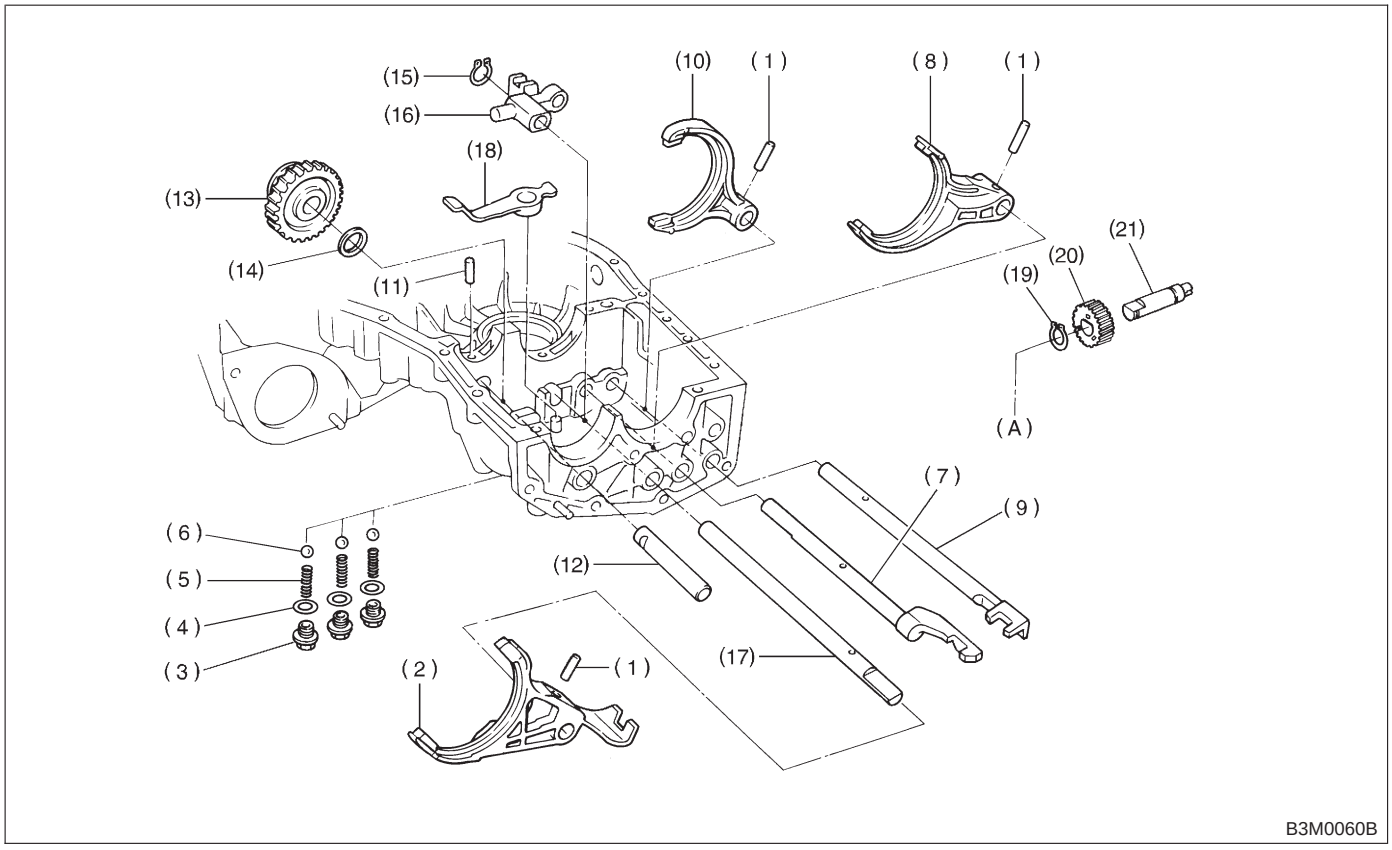


8) Remove main shaft assembly.
9) Remove differential assembly.

CAUTION:
- **Be careful not to confuse right and left roller bearing outer races.**
- **Be careful not to damage retainer oil seal.**

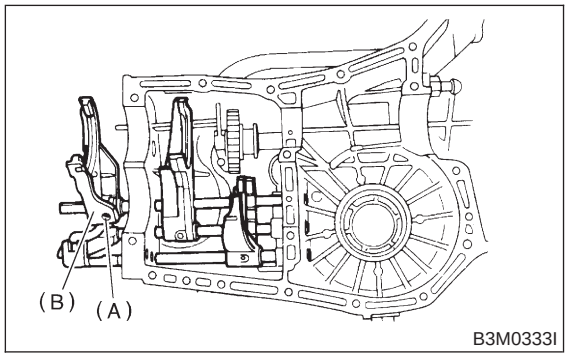


2. TRANSMISSION CASE



(1) Straight pin
(2) 5th shifter fork
(3) Checking ball plug
(4) Gasket
(5) Checking ball spring
(6) Ball
(7) 3rd-4th fork rod
(8) 3rd-4th shifter fork
(9) 1st-2nd fork rod
(10) 1st-2nd shifter fork
(11) Straight pin
(12) Reverse idler gear shaft
(13) Reverse idler gear
(14) Washer
(15) Snap ring
(16) Reverse fork rod arm
(17) Reverse fork rod
(18) Reverse shifter lever
(19) Snap ring (RH side)
(20) Speedometer driven gear (RH side)
(21) Speedometer shaft (RH side)
(A) Front right hand transmission case

1) Drive out straight pin with ST, and remove 5th shifter fork.
ST 398791700 STRAIGHT PIN REMOVER

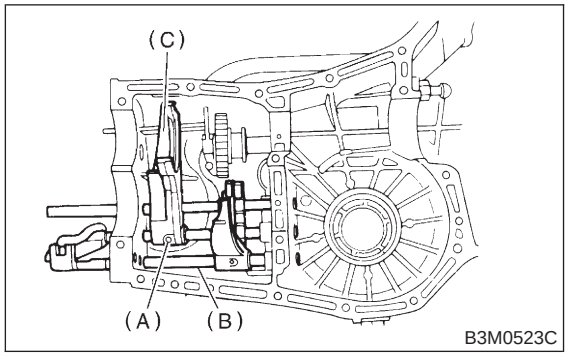


(A) Straight pin
(B) 5th shifter fork

2) Remove plugs, springs and checking balls.

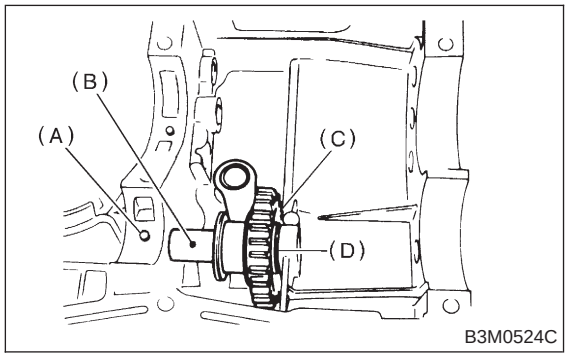
3) Drive out straight pin, and pull out 3-4 fork rod and shifter fork.

NOTE:
When removing rod, keep other rods in neutral. Also, when pulling out straight pin, remove it toward inside of case so that it may not hit against case.



(A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

4) Drive out straight pin, and pull out 1-2 fork rod and shifter fork.
5) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.

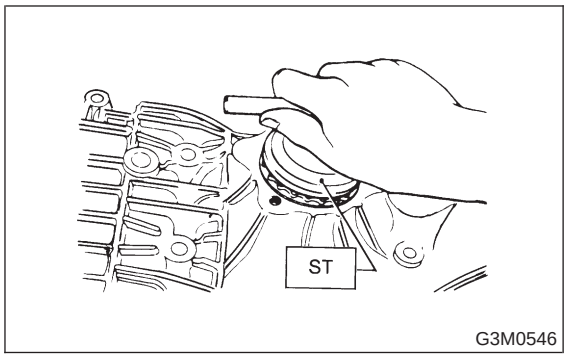


(A) Straight pin
(B) Idler gear shaft
(C) Idler gear
(D) Washer

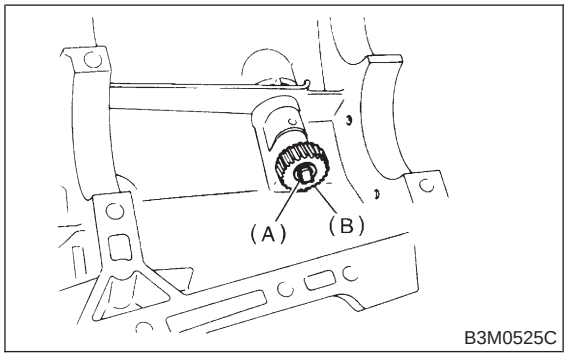
6) Remove outer snap ring, and pull out reverse shifter rod arm from reverse fork rod. Then take out ball, spring and interlock plunger from rod.
And then remove rod.

NOTE:
When pulling out reverse shifter rod arm, be careful not to let ball pop out of arm.

7) Remove reverse shifter lever.
8) Remove differential side retainers using ST.
ST 499787000 WRENCH ASSY



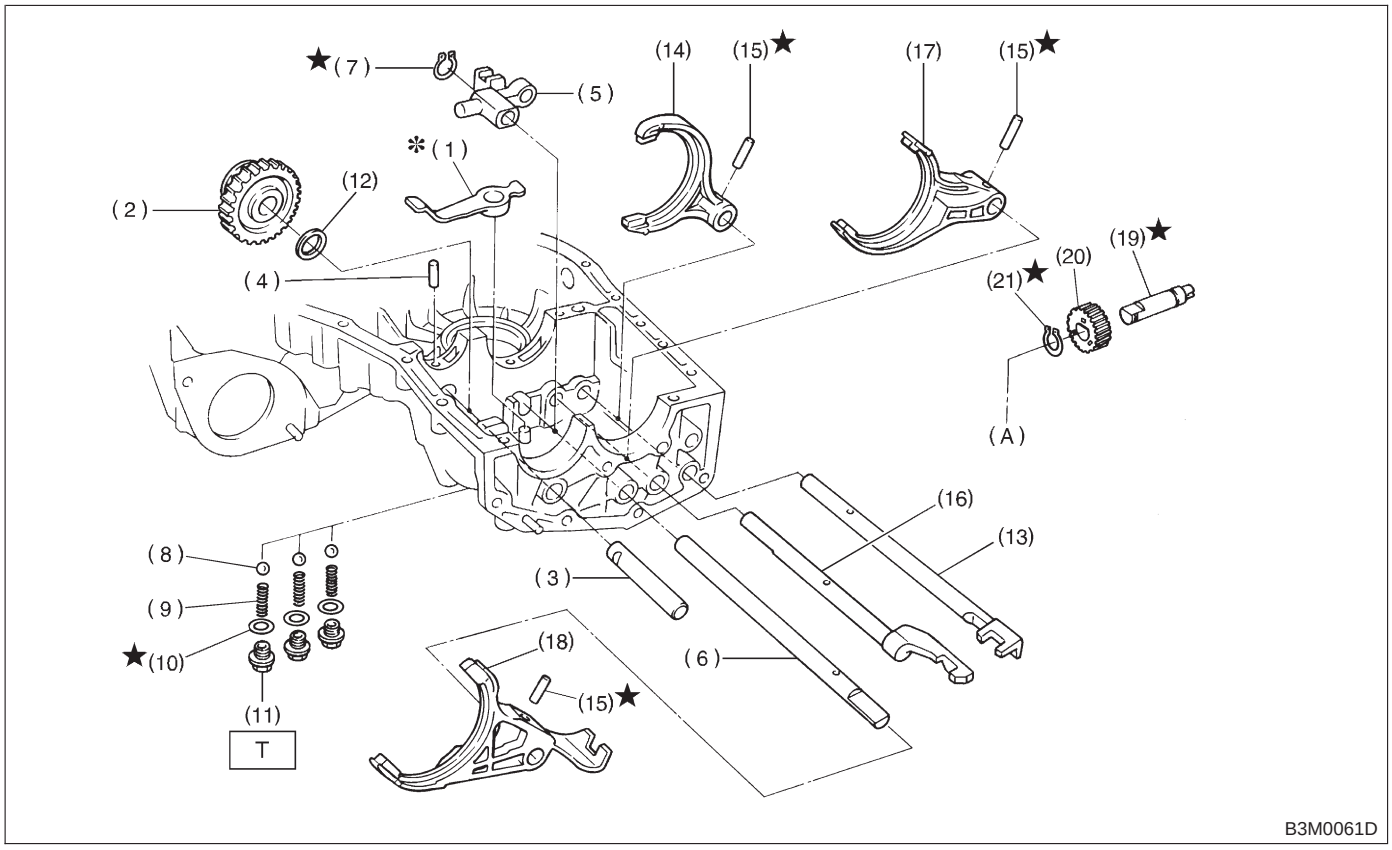
9) Remove outer snap ring and pull out speedometer driven gear. Next, remove vehicle speed sensor 2, oil seal, speedometer shaft and washer.



(A) Outer snap ring
(B) Speedometer driven gear

B: ASSEMBLY

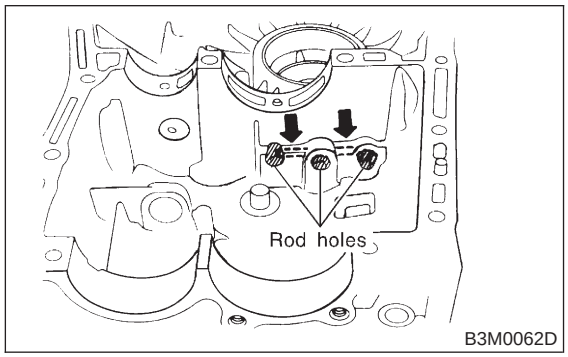
1. TRANSMISSION CASE



(1) Reverse shifter lever
(2) Reverse idler gear
(3) Reverse idler gear shaft
(4) Straight pin
(5) Reverse fork rod arm
(6) Reverse fork rod
(7) Snap ring
(8) Ball
(9) Checking ball spring
(10) Washer
(11) Checking ball plug
(12) Washer
(13) 1st-2nd fork rod
(14) 1st-2nd shifter fork
(15) Straight pin
(16) 3rd-4th fork rod
(17) 3rd-4th shifter fork
(18) 5th shifter fork
(19) Ball
(20) Checking ball spring
(21) Washer
(22) Checking ball plug
(23) Speedometer shaft
(24) Speedometer driven gear
(25) Snap ring
(A) To right hand transmission case

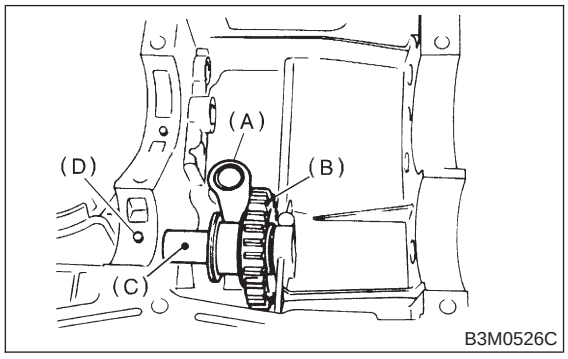
Tightening torque: N·m (kg-m, ft-lb)
T: 19.6±0.1
(2.00±0.015, 14.5±0.1)

1) Position interlock plungers (5.56 × 19.6), one plunger in hole between 1-2 and 3-4 fork rod holes, and one plunger in hole between 3-4 and reverse fork rod holes.



2) Install reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure with straight pin.

NOTE:
Be sure to install reverse idler shaft from the rear side.



(A) Reverse shifter lever
(B) Reverse idler gear
(C) Reverse idler gear shaft
(D) Straight pin

3) Install reverse arm fork spring, ball and interlock plunger (5.56 × 19.6) to reverse fork rod arm. Insert reverse fork rod into hole in reverse fork rod arm, and hold it with outer snap ring using ST.

CAUTION:
Apply grease to plunger to prevent it from falling.

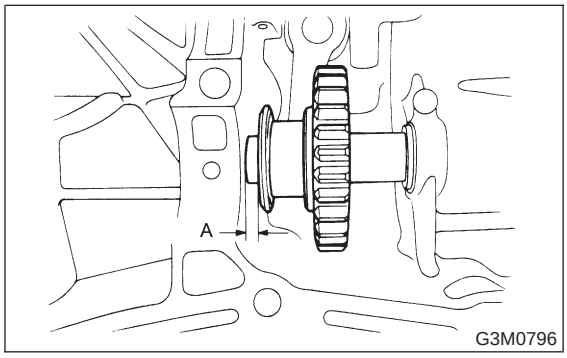
ST 399411700 ACCENT BALL INSTALLER

4) Position ball (7.1438), spring and gasket in reverse shifter rod hole, on left side transmission case, and tighten checking ball plug.

CAUTION:
Replace gasket with a new one.

5) Move reverse shifter rod toward REV side. Adjust clearance between reverse idler gear and transmission case wall, using reverse shifter lever.

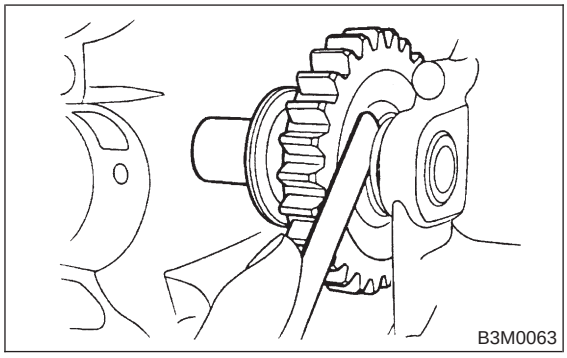
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



Reverse shifter lever		
Part No.	No.	Remarks
32820AA000	0	Further from case wall
32820AA010	No mark	Standard
32820AA020	2	Closer to case wall

6) After installing a suitable reverse shifter lever, shift into neutral. Using a thickness gauge, measure clearance between reverse idler gear and transmission case wall and adjust with washer(s).

Clearance:
0 — 0.5 mm (0 — 0.020 in)



Washer (20.5 × 26 × t)	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

7) Install 1-2 fork rod into 1-2 shifter fork via the hole on the rear of transmission case.
8) Align the holes in rod and fork, and drive straight pin (6 × 22) into these holes using ST.
ST 398791700 STRAIGHT PIN REMOVER

CAUTION:
Replace straight pin with a new one.

NOTE:
- Set other rods to neutral.
- Make sure interlock plunger (5.56 × 19.6) is on the 3-4 fork rod side.

9) Install interlock plunger (3 × 11.9) onto 3-4 fork rod.

CAUTION:
Apply a coat of grease to plunger to prevent it from falling.

10) Install 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.
11) Align the holes in rod and fork, and drive straight pin (6 × 22) into these holes.
ST 398791700 STRAIGHT PIN REMOVER

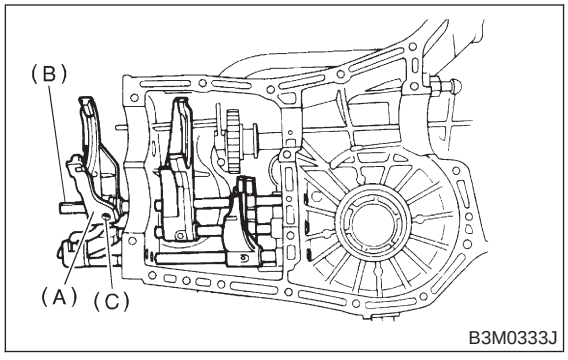
CAUTION:
Replace straight pin with a new one.

NOTE:
- Set reverse fork rod to neutral.
- Make sure interlock plunger (installed before) is on the reverse fork rod side.

12) Install 5th shifter fork onto the rear of reverse fork rod. Align holes in the two parts and drive straight pin into place.

CAUTION:
Replace straight pin with a new one.

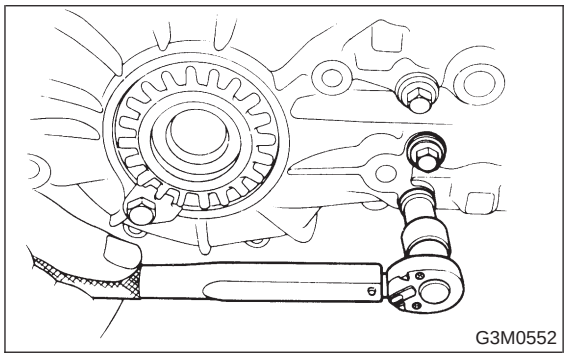
ST 398791700 STRAIGHT PIN REMOVER



(A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

13) Position balls, checking ball springs and gaskets into 3-4 and 1-2 rod holes, and install plugs.

CAUTION:
Replace gasket with a new one.



14) Install washer and speedometer shaft, and press fit oil seal with ST.

CAUTION:
Use new oil seal, if it has been removed.

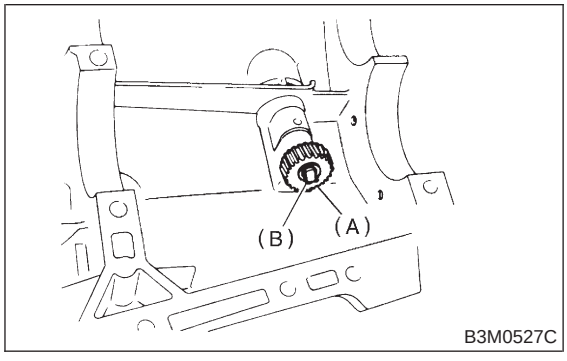
ST 899824100 or 499827000 PRESS
15) Install vehicle speed sensor 2.

CAUTION:
Use new vehicle speed sensor 2, if it has been removed.

Tightening torque:
5.9±1.5 N·m (60±15 kg-cm, 52±13 in-lb)

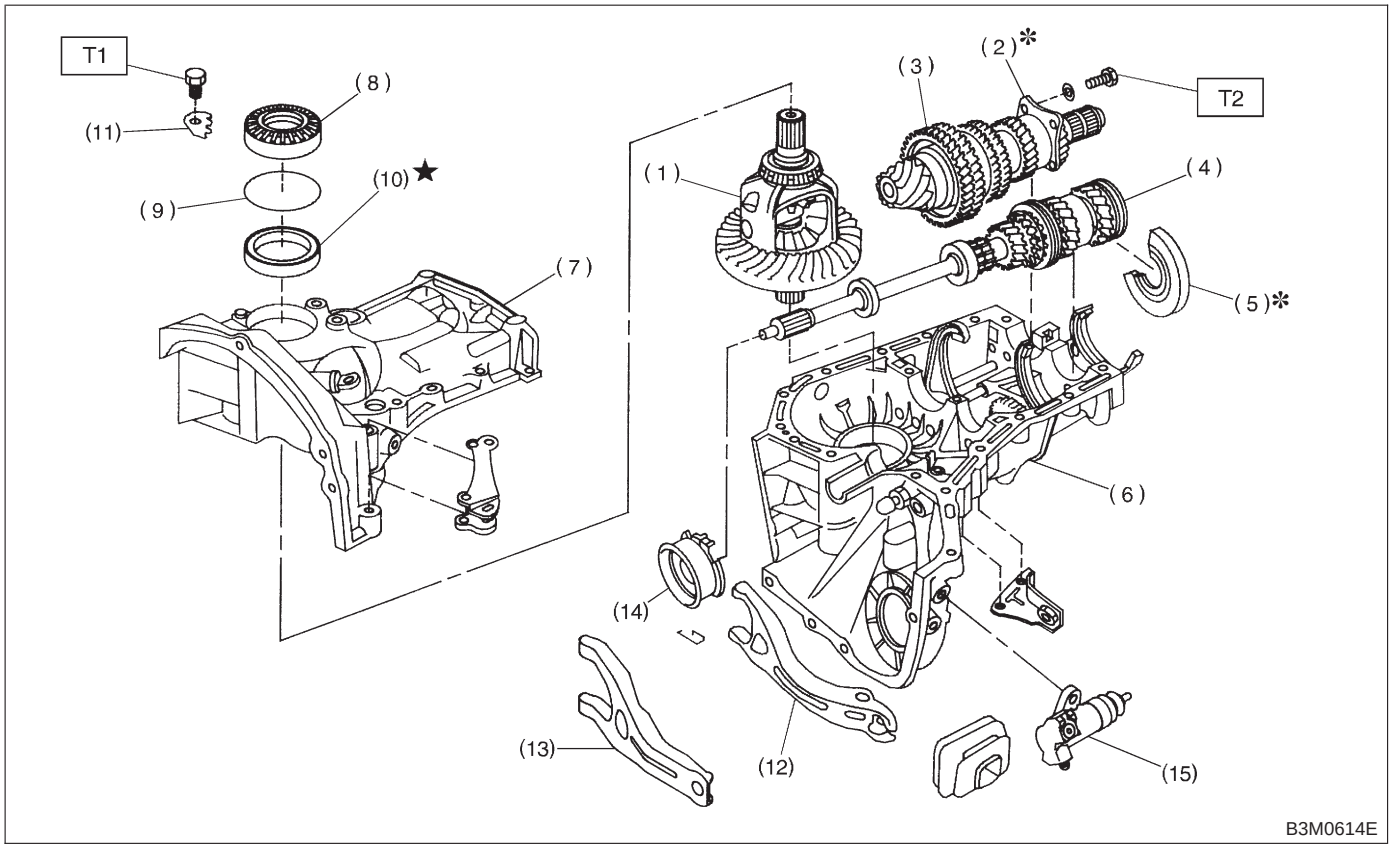
16) Install speedometer driven gear and snap ring.

CAUTION:
Use a new snap ring, if it has been removed.



(A) Speedometer driven gear
(B) Snap ring

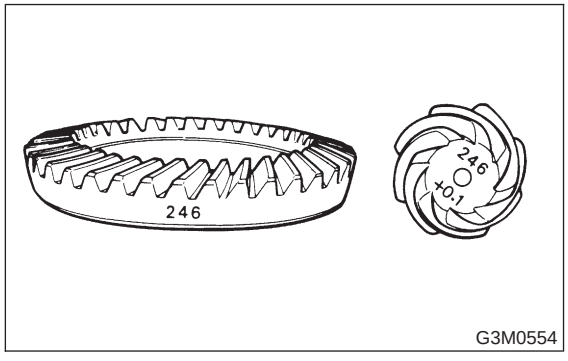
2. COMBINATION OF TRANSMISSION CASE



(1) Differential ASSY
(2) Drive pinion shim
(3) Drive pinion ASSY
(4) Main shaft ASSY
(5) Main shaft rear plate
(6) Transmission case (LH)
(7) Transmission case (RH)
(8) Differential side retainer
(9) O-ring
(10) Oil seal
(11) Retainer lock plate
(12) Release lever (2200 cc model)
(13) Release lever (2500 cc model)
(14) Release bearing
(15) Operating cylinder

Tightening torque: N·m (kg-m, ft-lb)
T1: 25 (2.5, 18)
T2: 29±3 (3.0±0.3, 21.7±2.2)

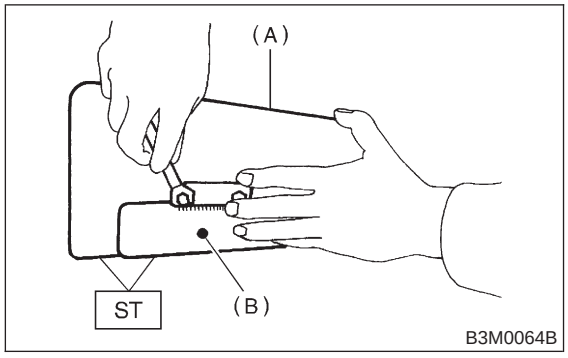
1) Alignment marks/numbers on hypoid gear set
The upper number on driven pinion is the match number for combining it with hypoid driven gear. The lower number is for shim adjustment. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.



2) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.

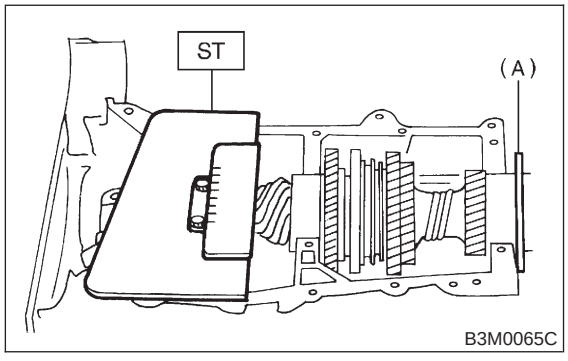
3) Inspection and adjustment of ST

NOTE:
● Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
● Tighten the two bolts.
ST 499917500 DRIVE PINION GAUGE ASSY



(A) Plate
(B) Scale

4) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.
ST 499917500 DRIVE PINION GAUGE ASSY
5) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.
ST 499917500 DRIVE PINION GAUGE ASSY



(A) Adjust clearance to zero without shim.

6) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by −.)
ST 499917500 DRIVE PINION GAUGE ASSY

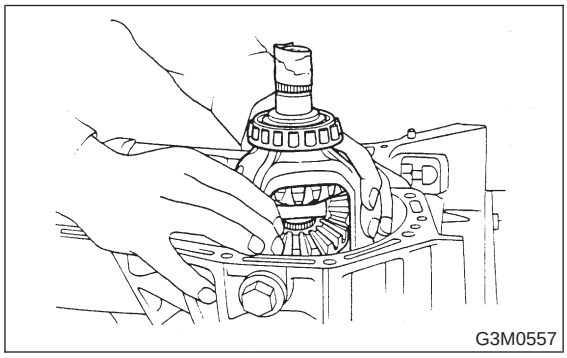
7) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

8) Install differential assembly on left hand transmission case.

CAUTION:
Be careful not to fold the sealing lip of oil seal.

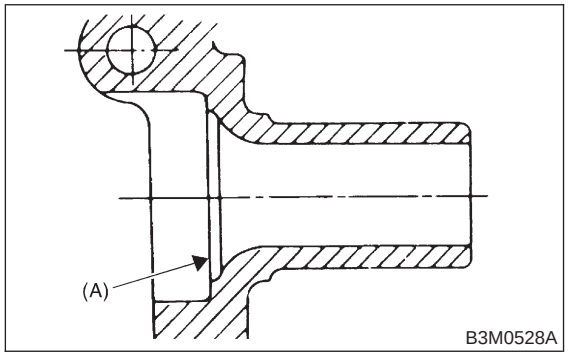
NOTE:
Wrap the left and right splined sections of axle shaft with vinyl tape to prevent scratches.



9) Install needle bearing and oil seal onto the front of transmission main shaft assembly, and position in left side transmission case.

CAUTION:
● Wrap clutch splined section with vinyl tape to prevent damage to oil seal.
● Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.
● Use a new oil seal.

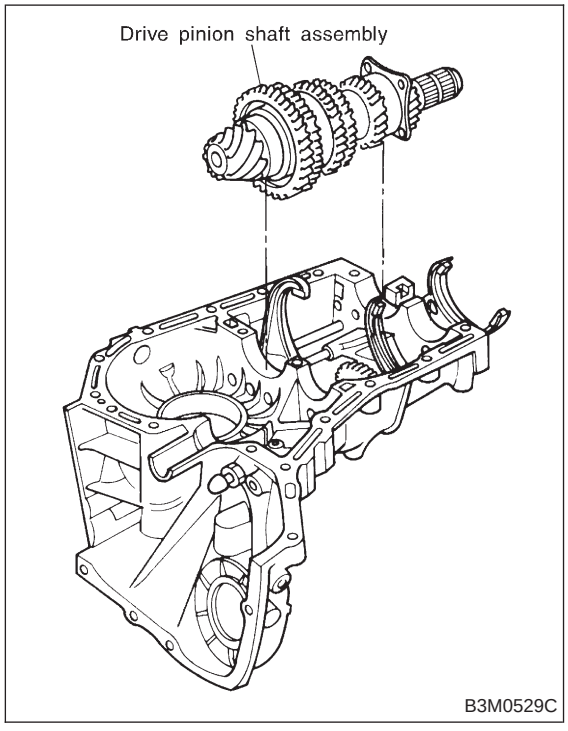
NOTE:
● Align the end face of seal with surface A of left side transmission main case when installing oil seal.



● Be careful not to drop oil seal when installing right side transmission main case.
● Make sure straight pin is positioned in hole in needle bearing's outer race.

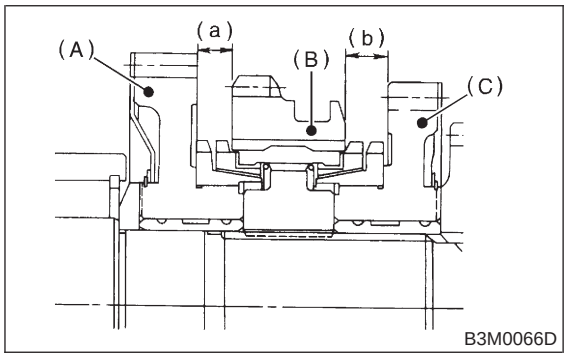
10) Install drive pinion shaft assembly with shims selected before into transmission case.

NOTE:
Ensure that the knock pin of the case is fitted into the hole in the bearing outer race.



11) Set transmission main shaft assembly and drive pinion shaft assembly in position (so there is no clearance between the two when moved all the way to the front). Select suitable 1st-2nd, 3rd-4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms.

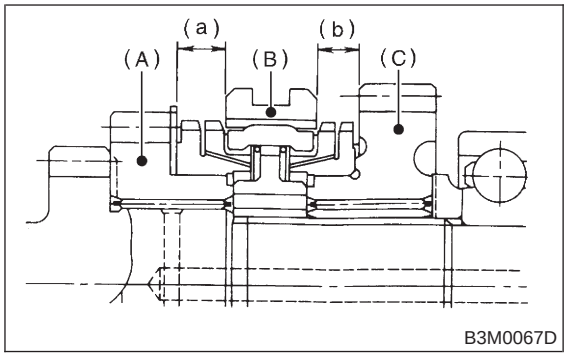
1st driven gear to reverse driven gear
Clearance (a): 9.5 mm (0.374 in)
Reverse driven gear to 2nd driven gear
Clearance (b): 9.5 mm (0.374 in)



(A) 1st driven gear
(B) Reverse driven gear
(C) 2nd driven gear

1st-2nd shifter fork		
Part No.	No.	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)

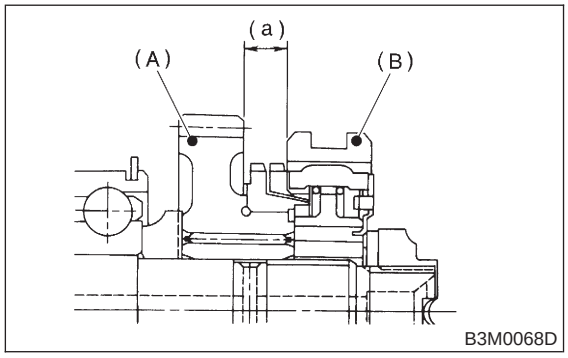
3rd-4th gear to coupling sleeve
Clearance (a): 9.3 mm (0.366 in)
Coupling sleeve to 4th driven gear
Clearance (b): 9.3 mm (0.366 in)



(A) 3rd-4th
(B) Coupling sleeve
(C) 4th driven gear

3rd-4th shifter fork		
Part No.	No.	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th driven gear to coupling sleeve
Clearance (a): 9.3 mm (0.366 in)

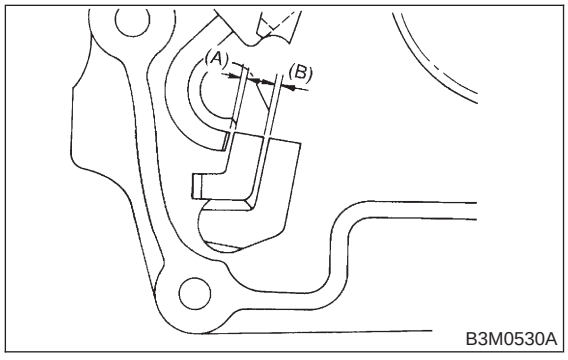


(A) 5th driven gear
(B) Coupling sleeve

5th shifter fork		
Part No.	No.	Remarks
32812AA200	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA210	No mark	Standard
32812AA220	6	Become distant from 5th gear by 0.2 mm (0.008 in)

12) Measure rod end clearances (A) and (B). If any clearance is not within specifications, replace rod or fork as required.

(A): 1st-2nd to 3rd-4th	0.4 — 1.4 mm (0.016 — 0.055 in)
(B): 3rd-4th to 5th	0.5 — 1.3 mm (0.020 — 0.051 in)



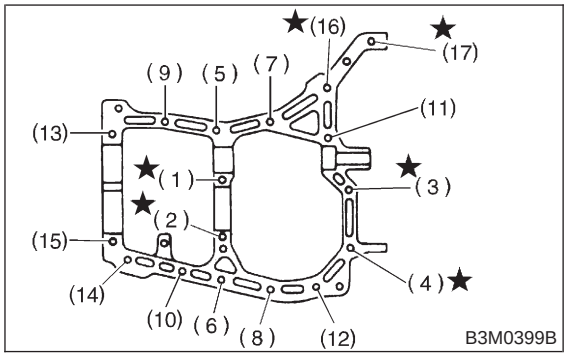
13) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline, and apply liquid gasket, and then put case right side and left side together.

Liquid gasket:
THREE BOND 1215 or equivalent

14) Tighten 17 bolts with bracket, clip, etc. as shown in the figure.

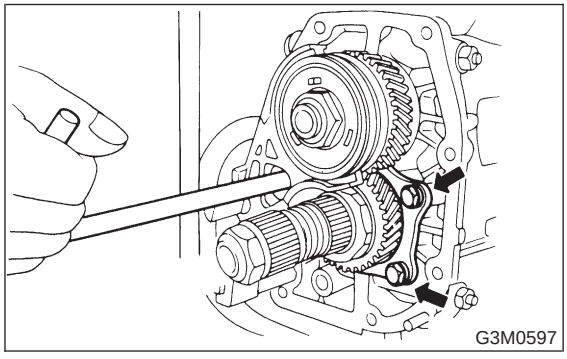
NOTE:
- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

Tightening torque:
8 mm bolt
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
★ ***10 mm bolt***
39±3 N·m (4.0±0.3 kg-m, 28.9±2.2 ft-lb)



15) Tighten ball bearing attachment bolts.

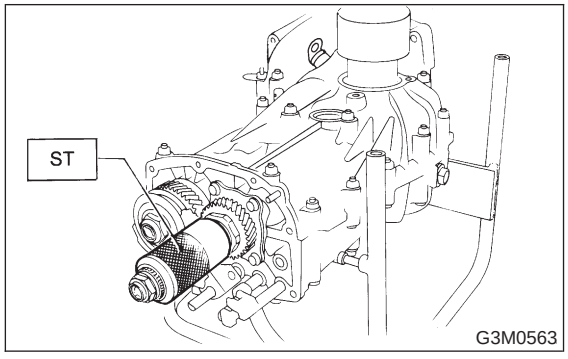
Tightening torque:
29±3 N·m (3.0±0.3 kg-m, 21.7±2.2 ft-lb)



16) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

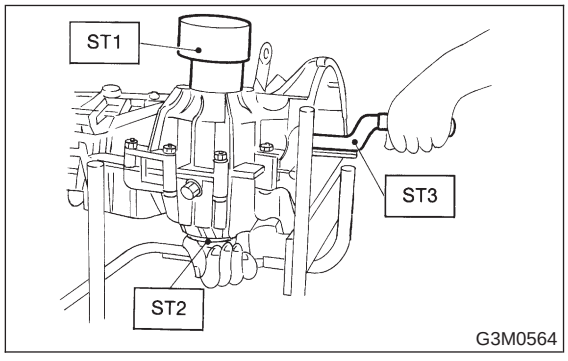
NOTE:
Support drive pinion assembly with ST.

ST 498427100 STOPPER



17) Place the transmission with case left side facing downward and put ST1 on bearing cup.
18) Screw retainer assembly into left case from the bottom with ST2. Fit ST3 on the transmission main shaft. Shift gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

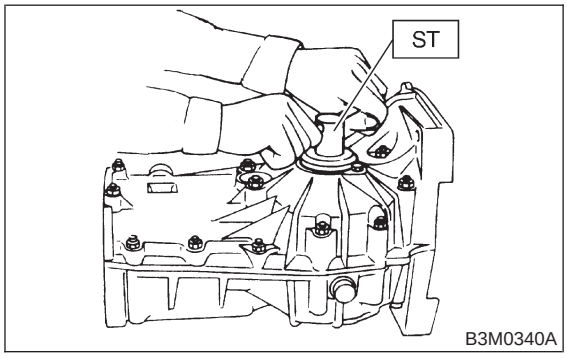
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



19) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:
At this point, the backlash between the hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



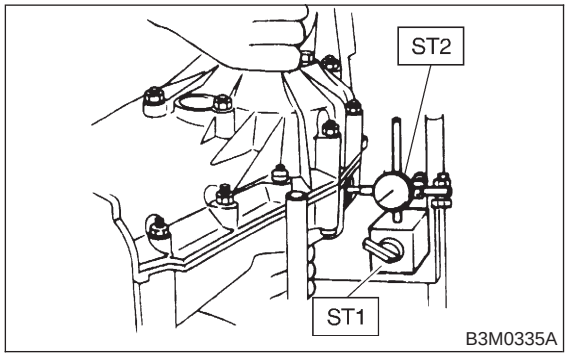
20) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

NOTE:
The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

21) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.
22) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.
23) Turn transmission main shaft several times while tapping around retainer lightly with plastic hammer.

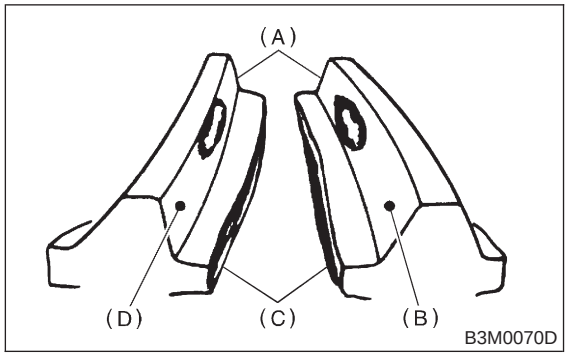
24) Set ST1 and ST2. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



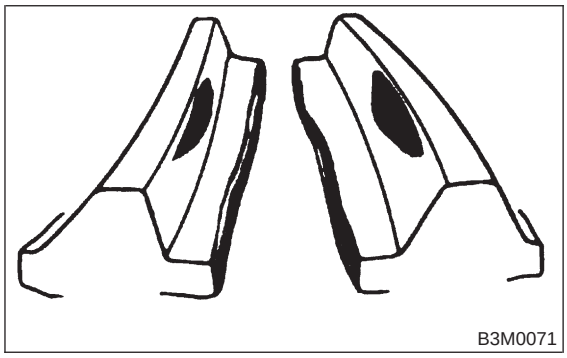
NOTE:
● If backlash is outside specified range, adjust it by turning holder in right side case.
● Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).

25) Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is incorrect, make the following correction.
● Tooth contact is correct.

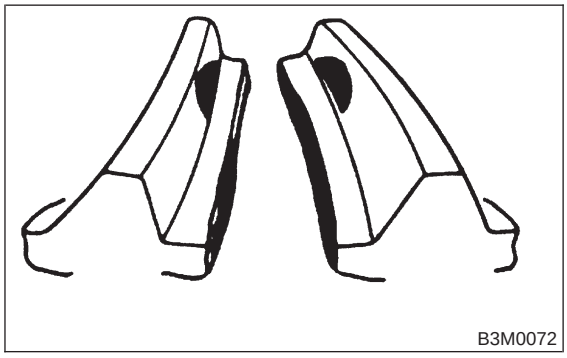


(A) Toe
(B) Coast side
(C) Heel
(D) Drive side

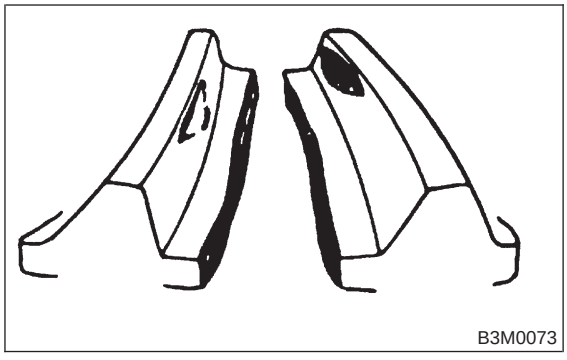
● Backlash is excessive.
To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.



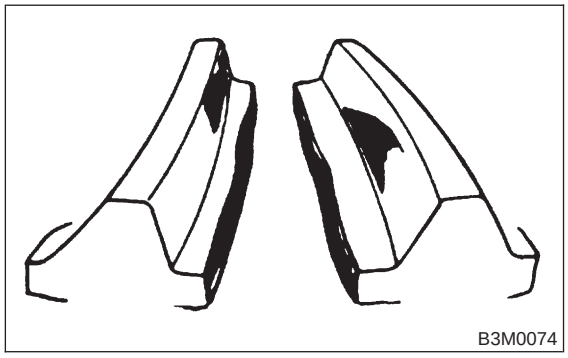
● Backlash is insufficient.
To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



● The drive pinion shim selected before is too thick. Reduce its thickness.



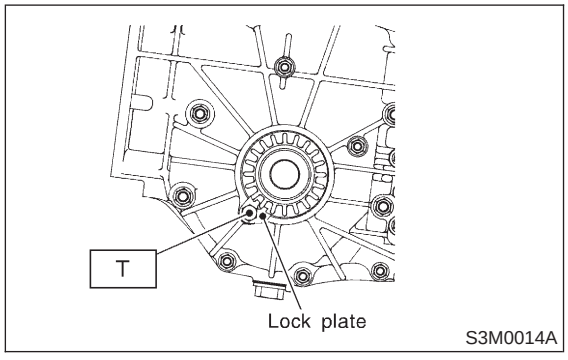
● The drive pinion shim selected before is too thin. Increase its thickness.


B3M0074

26) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen retainer until the O-ring groove appears. Fit O-ring into the groove and tighten retainer into the position where retainer has been tightened in.
Tighten lock plate.

NOTE:
Carry out this job on both upper and lower retainers.

Tightening torque:
T: 25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)

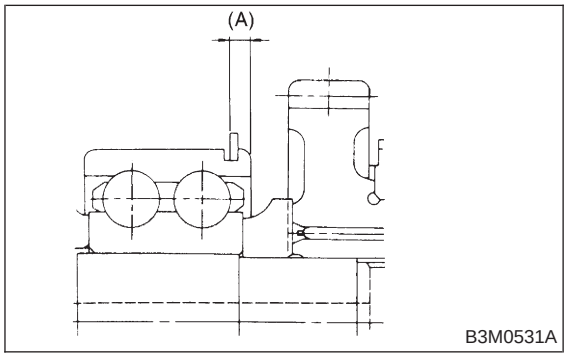


S3M0014A

27) Selecting of main shaft rear plate
Using ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:
ST 498147000 DEPTH GAUGE

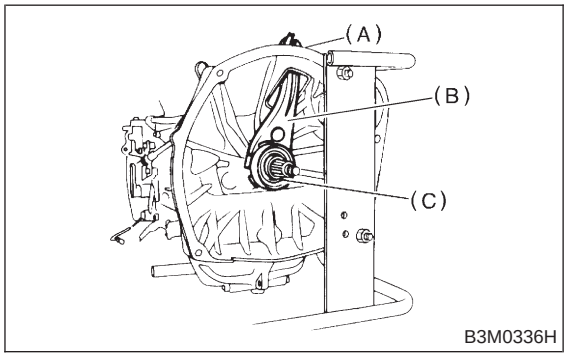
NOTE:
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.

Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2



B3M0531A

28) Install clutch release lever, bearing and operating cylinder. <Ref. to 2-10 [W3C0].> and <Ref. to 2-10 [W5A0].>



B3M0336H

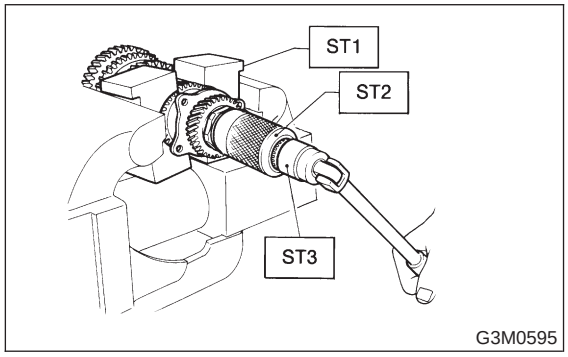
(A) Operating cylinder
(B) Clutch release lever
(C) Release bearing

3. Drive Pinion Assembly

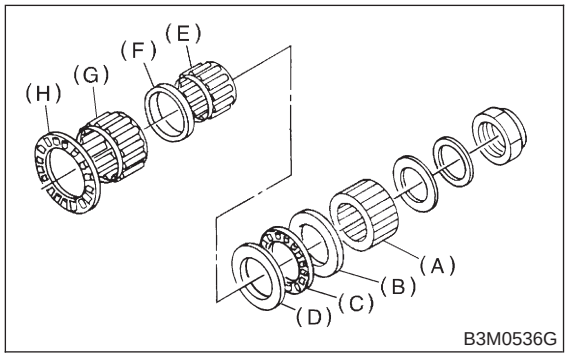
A: DISASSEMBLY

1. DRIVE PINION SHAFT

1) Straighten lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH



2) Withdraw drive pinion from driven shaft.
Remove differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.

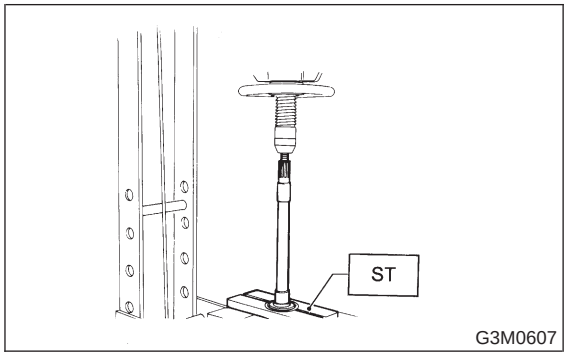


(A) Differential bevel gear sleeve
(B) Washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

3) Remove roller bearing and washer (33 × 50 × 5) using ST and press.

CAUTION:
Do not reuse roller bearing.

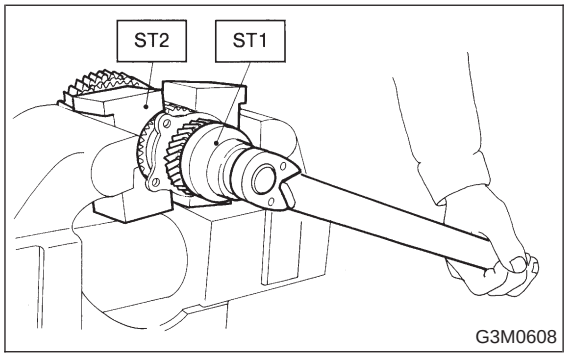
ST 498077000 REMOVER



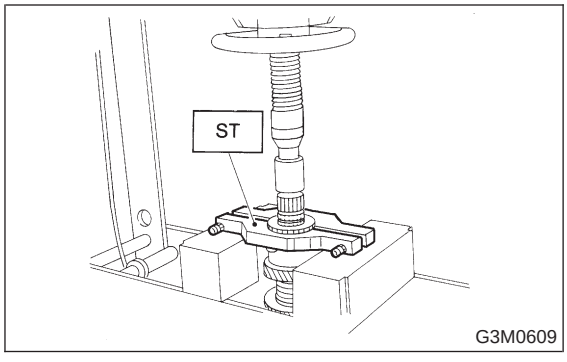
2. DRIVEN GEAR ASSEMBLY (2200 cc MODEL)

CAUTION:
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

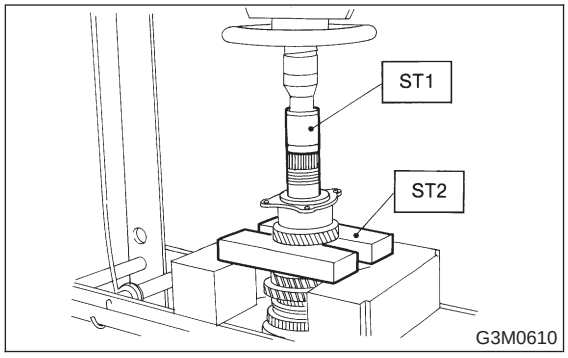
1) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER



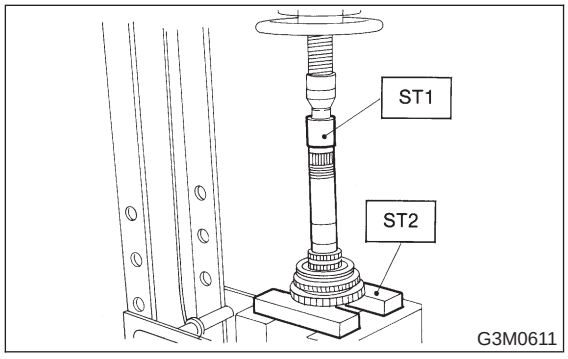
2) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER



3) Remove woodruff key.
4) Remove roller bearing (42 × 74 × 40), 3rd and 4th driven gear using ST1 and ST2.
ST1 499757002 SNAP RING PRESS
ST2 899714110 REMOVER



5) Remove the key.
6) Remove 2nd driven gear assembly.
7) Remove 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.
Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.
ST1 499757002 SNAP RING PRESS
ST2 899714110 REMOVER

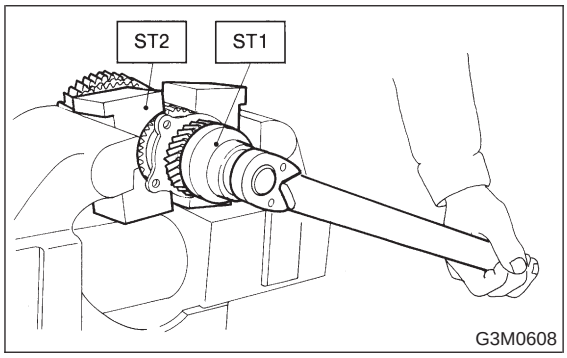


8) Remove sub gears for 1st and 2nd driven gear.

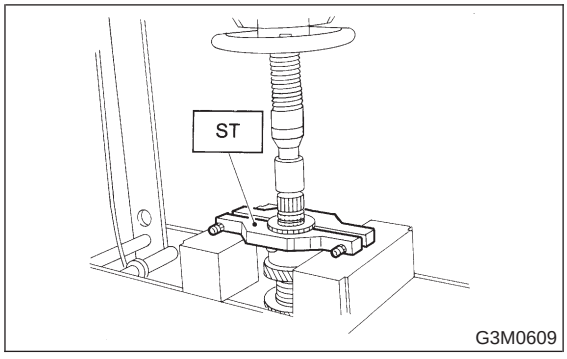
3. DRIVEN GEAR ASSEMBLY (2500 cc MODEL)

CAUTION:
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

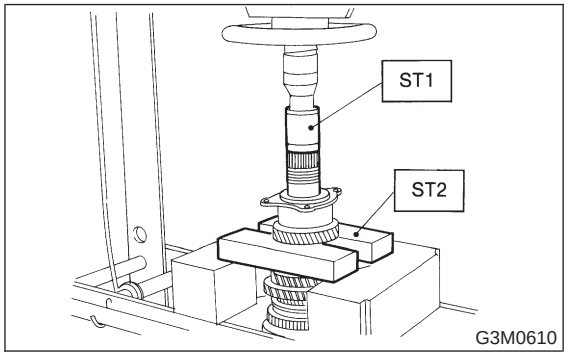
1) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER



2) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

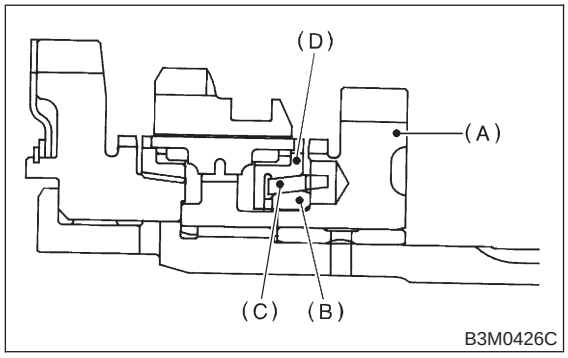


3) Remove woodruff key.
4) Remove roller bearing (42 × 74 × 40), 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 SNAP RING PRESS
ST2 899714110 REMOVER



5) Remove the key.

6) Remove 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.

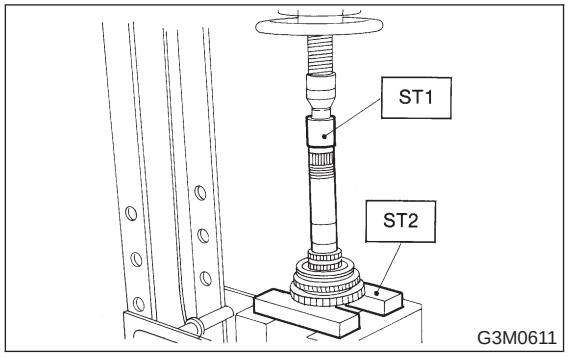


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

7) Remove 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

NOTE:
Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.

ST1 499757002 SNAP RING PRESS
ST2 899714110 REMOVER

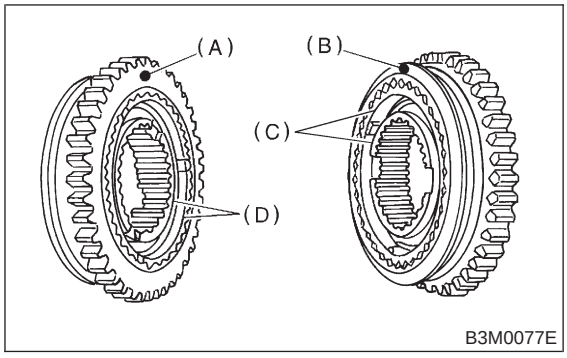


8) Remove sub gear for 1st driven gear.

B: ASSEMBLY

1. GEAR AND HUB ASSEMBLY (2200 cc MODEL)

NOTE:
Position open ends of springs 120° apart.

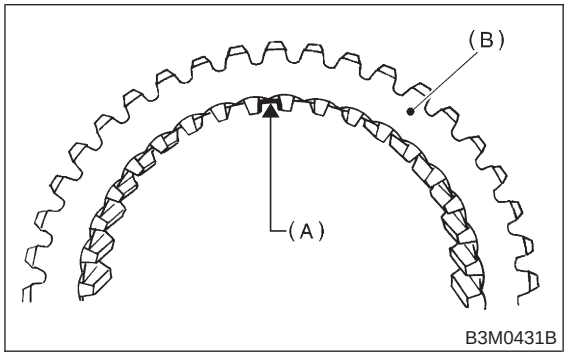


(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

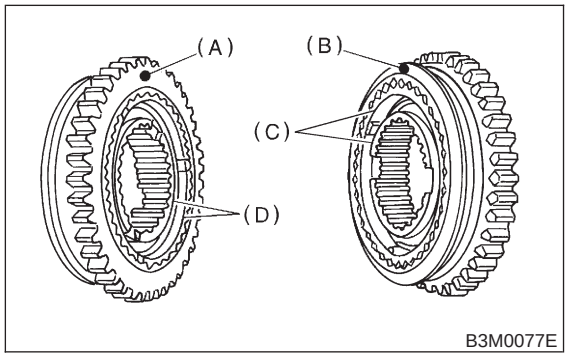
2. GEAR AND HUB ASSEMBLY (2500 cc MODEL)

Assemble gear and hub assembly.

NOTE:
- Use new gear and hub assembly, if gear or hub have been replaced.
- Be sure the insert keys are correctly located in the insert key grooves inside the reverse driven gear.



(A) Key grooves
(B) Reverse driven gear

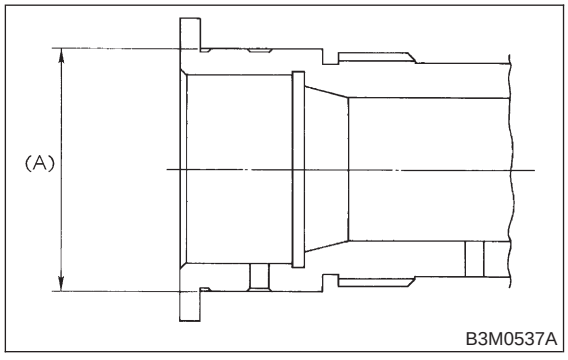


(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

3. DRIVEN GEAR ASSEMBLY (2200 cc MODEL)

Assemble a driven shaft and 1st driven gear that select for adjustment the proper radial clearance.

Driven shaft		1st driven gear
Part No.	Diameter (A) mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA290
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA280



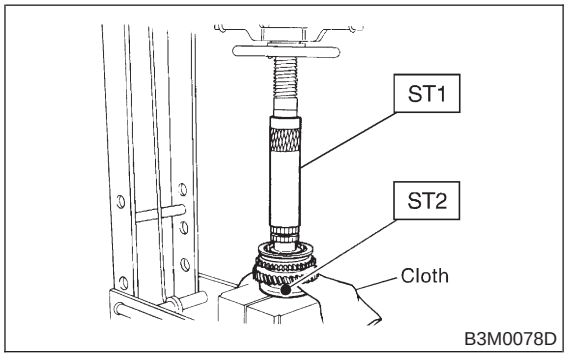
1) Install 1st driven gear, 1st-2nd baulk ring and gear and hub assembly onto driven shaft.

NOTE:
Take care to install gear hub in proper direction.

2) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

CAUTION:
Attach a cloth to the end of driven shaft to prevent damage.

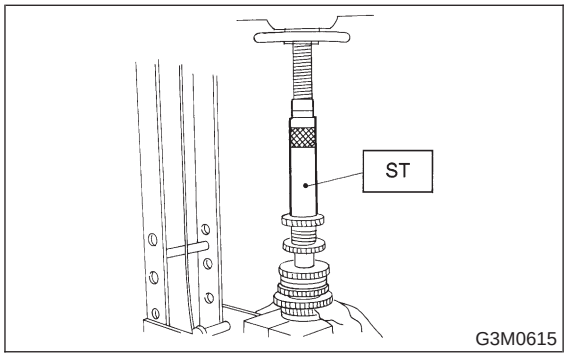
ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



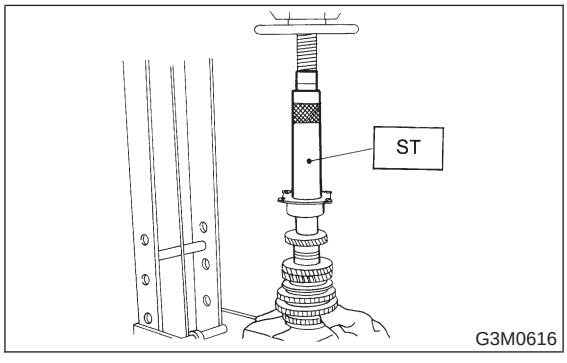
3) Install 2nd driven gear, 1st-2nd baulk ring and key onto driven shaft. After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

NOTE:
Align groove in baulk ring with shifting insert.

ST 499277200 INSTALLER



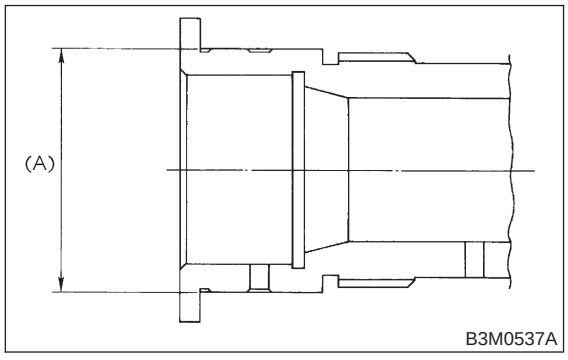
4) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.
ST 499277200 INSTALLER



4. DRIVEN GEAR ASSEMBLY (2500 cc MODEL)

Assemble a driven shaft and 1st driven gear that select for adjustment the proper radial clearance.

Driven shaft		1st driven gear
Part No.	Diameter A mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA290
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA280



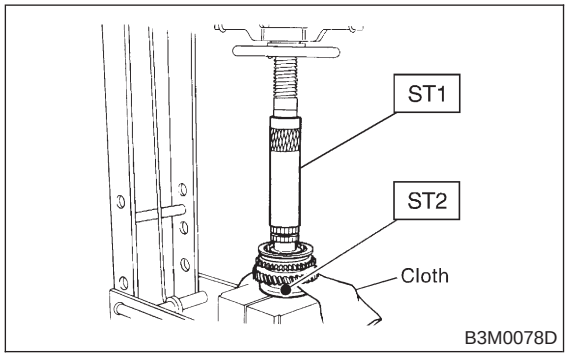
1) Install sub gear to 1st driven gear.
2) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:
Take care to install gear hub in proper direction.

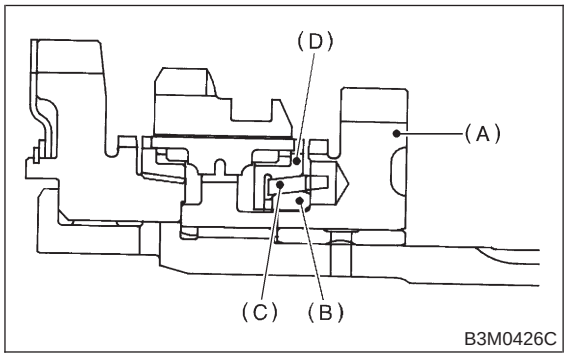
3) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.
ST1 499277200 INSTALLER
ST2 499587000 INSTALLER

CAUTION:
Attach a cloth to the end of driven shaft to prevent damage.

NOTE:
When press fitting, align oil holes of shaft and bush.



4) Install 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft.

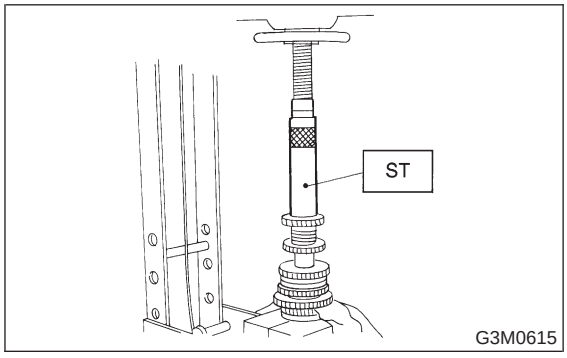


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

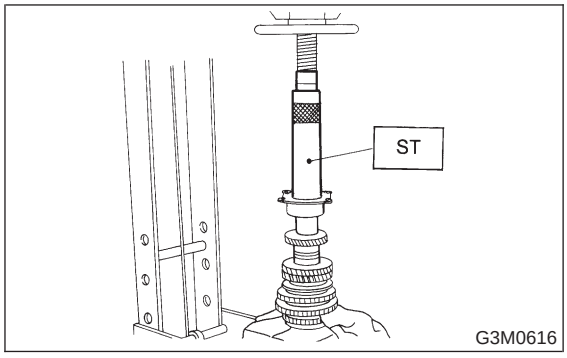
5) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

NOTE:
Align groove in baulk ring with insert.

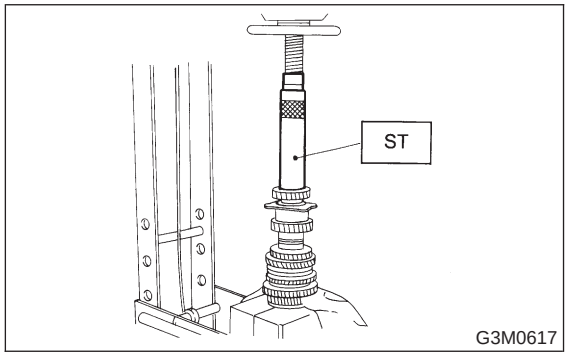
ST 499277200 INSTALLER



6) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.
ST 499277200 INSTALLER

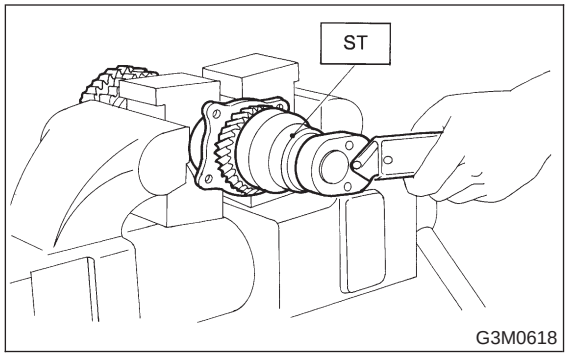


7) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.
ST 499277200 INSTALLER

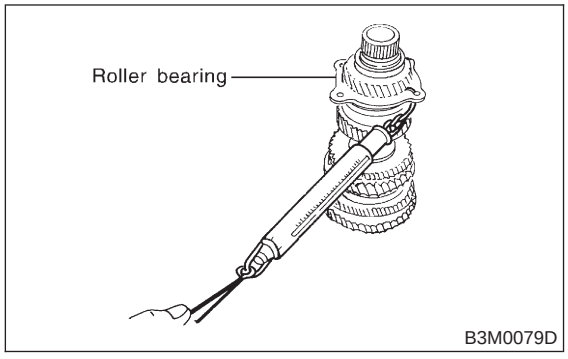


8) Install lock washer (42 × 53 × 2). Install lock nut (42 × 13) and tighten to the specified torque using ST.
ST 499987300 SOCKET WRENCH (50)

Tightening torque:
265±10 N·m (27±1 kg-m, 195±7 ft-lb)

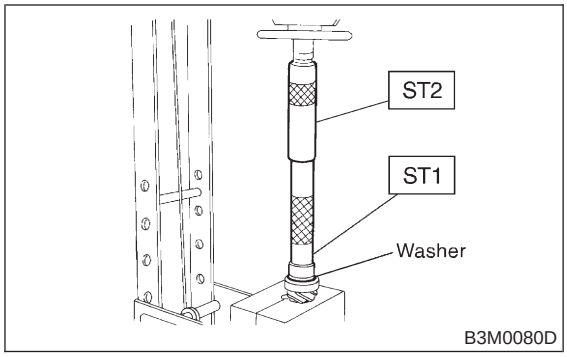


NOTE:
- Stake lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N·m (0.01 to 0.15 kg-m, 0.07 to 1.1 ft-lb).

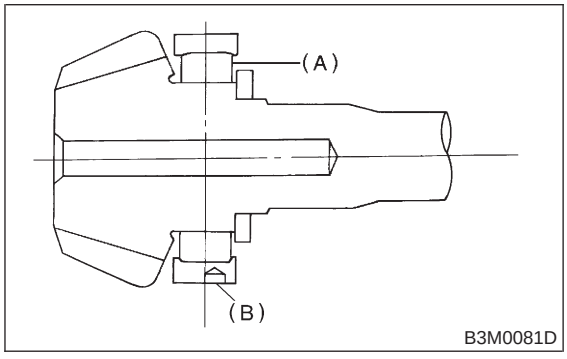


5. DRIVE PINION SHAFT

1) Install roller bearing onto drive pinion. Install washer (33 × 50 × 5) using ST1, ST2 and press.
ST1 499277100 BUSH 1-2 INSTALLER
ST2 499277200 INSTALLER

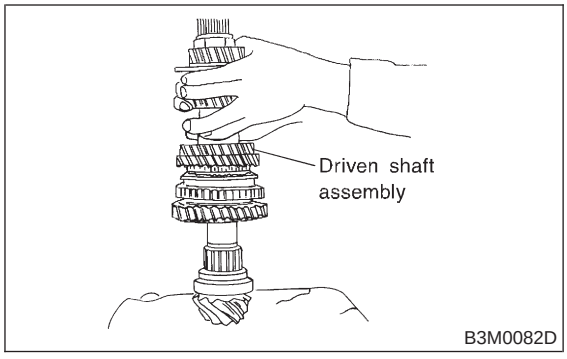


NOTE:
When installing roller bearing, note its directions (front and rear) because knock pin hole in outer race is offset.



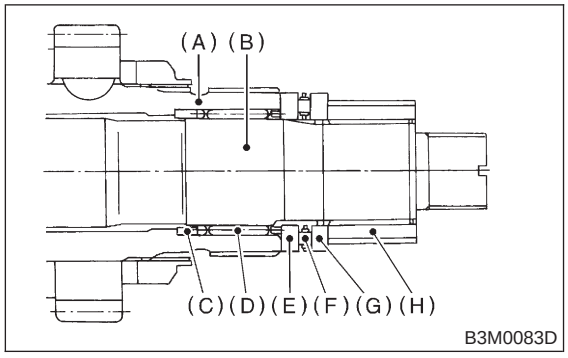
(A) Roller bearing
(B) Knock pin hole

2) Install thrust bearing (33 × 50 × 3) and needle bearing (30 × 37 × 23). Install driven shaft assembly.



3) Install drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

NOTE:
Be careful because spacer must be installed in proper direction.

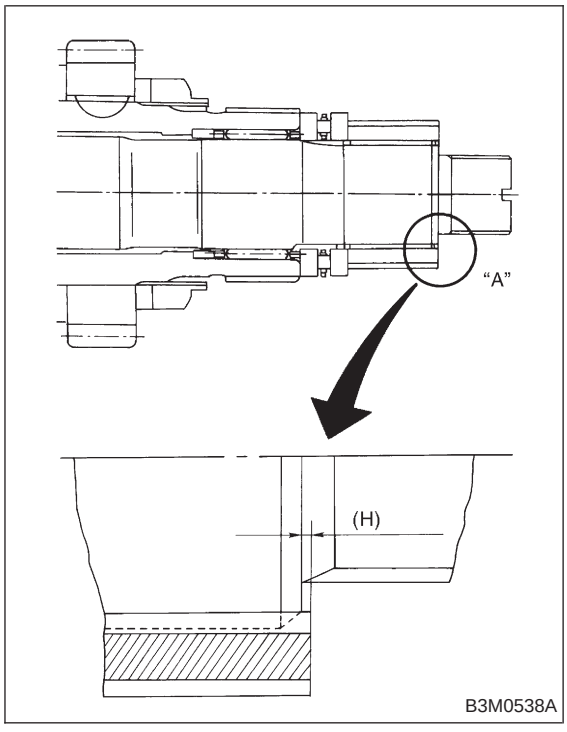


(A) Driven shaft
(B) Drive shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

C: ADJUSTMENT

1. THRUST BEARING PRELOAD

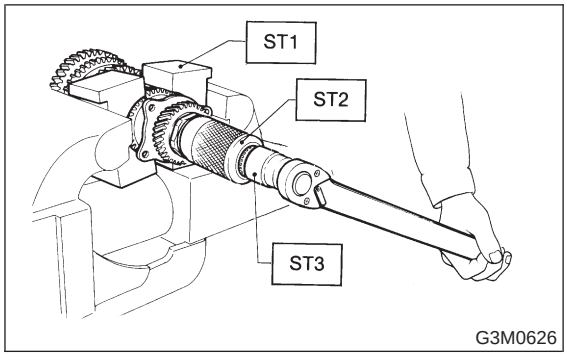
1) After completing the preceding steps 1) through 3), select adjusting washer No. 2 so that dimension (H) is zero through visual check. Position washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).



2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.

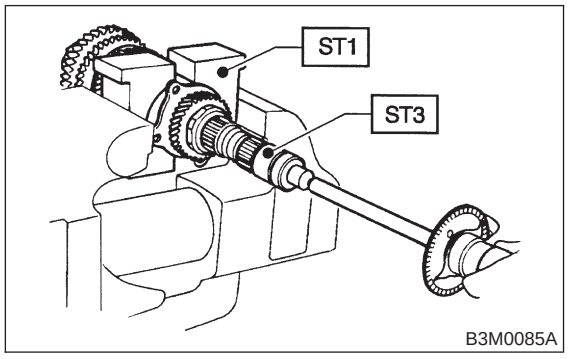
ST1	899884100	HOLDER
ST2	498427100	STOPPER
ST3	899988608	SOCKET WRENCH (27)

Tightening torque:
118±8 N·m (12±0.8 kg-m, 86.8±5.8 ft-lb)

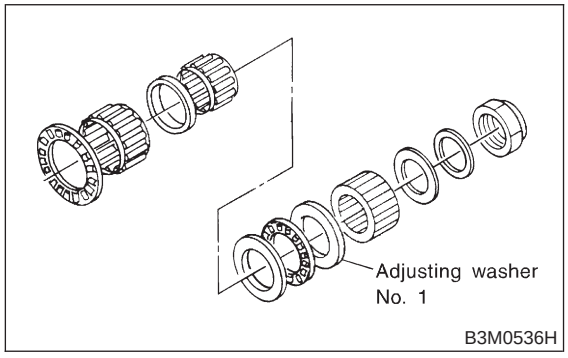


3) After removing ST2, measure starting torque using torque driver.
ST1 899884100 HOLDER
ST3 899988608 SOCKET WRENCH (27)

Starting torque:
54±25 N·m (5.5±2.5 kg-m, 40±18 ft-lb)

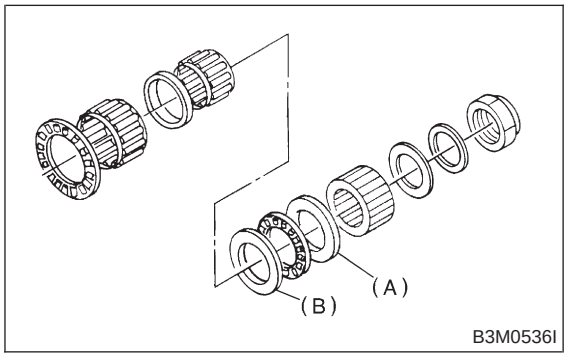


4) If starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.



Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

5) If specified starting torque range cannot be obtained when a No. 1 adjusting washer is used, then select a suitable No. 2 adjusting washer from those listed in the following table. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

6) Recheck that starting torque is within specified range, then clinch lock nut at four positions.

4. Main Shaft Assembly

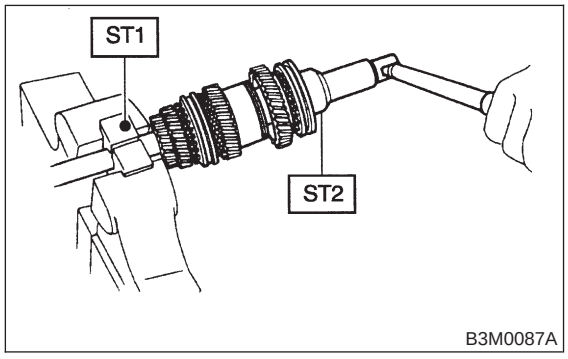
A: DISASSEMBLY

1. 2200 cc MODEL

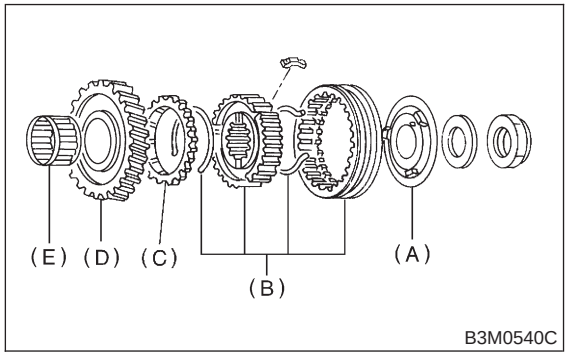
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
2) Remove lock nut from transmission main shaft assembly.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



3) Remove insert stopper plate, sleeve and hub assembly No. 2, baulk ring, 5th drive gear, and needle bearing.

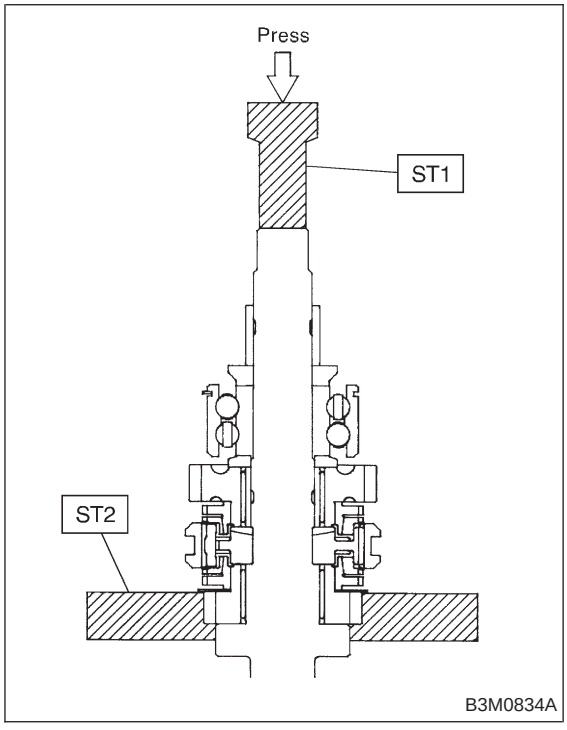


(A) Insert stopper plate
(B) Sleeve and hub assembly No. 2
(C) Baulk ring
(D) 5th drive gear
(E) Needle bearing (32 × 36 × 25.7)

4) Using ST1 and ST2, remove the rest of parts.

NOTE:
Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER

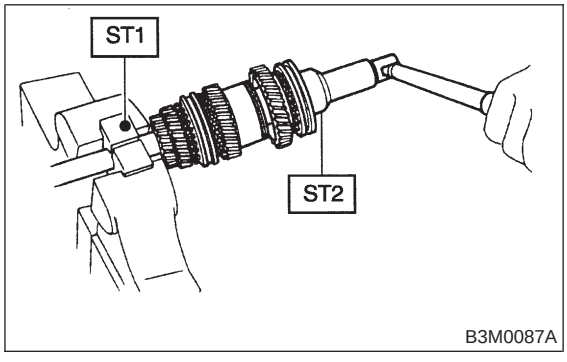


2. 2500 cc MODEL

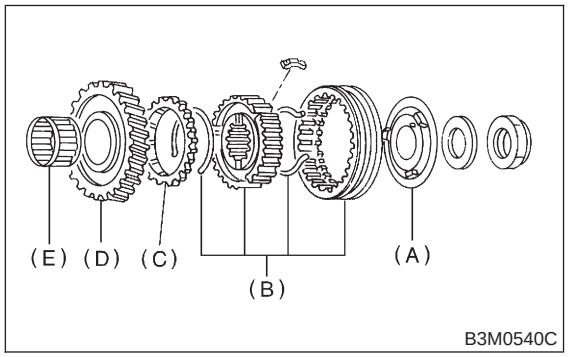
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
2) Remove lock nut from transmission main shaft assembly.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



3) Remove insert stopper plate, sleeve and hub assembly No. 2, baulk ring, 5th drive gear, and needle bearing.

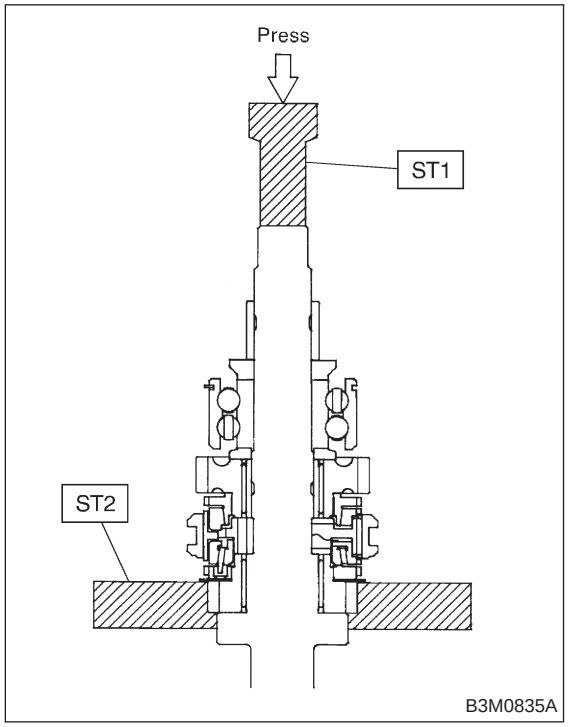


(A) Insert stopper plate
(B) Sleeve and hub assembly No. 2
(C) Baulk ring
(D) 5th drive gear
(E) Needle bearing (32 × 36 × 25.7)

4) Using ST1 and ST2, remove the rest of parts.

NOTE:
Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER

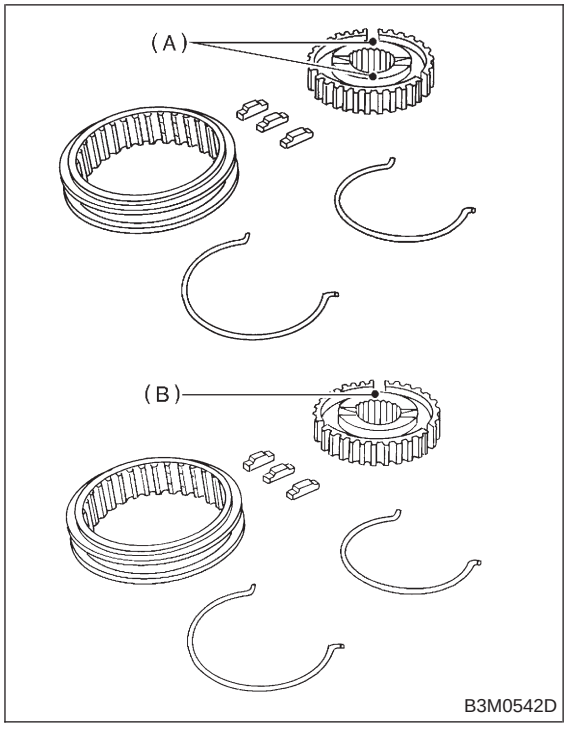


B: ASSEMBLY

1. 2200 cc MODEL

1) Assemble sleeve and hub assembly for 3rd-4th and, 5th synchronizing.

NOTE:
Position open ends of spring 120° apart.

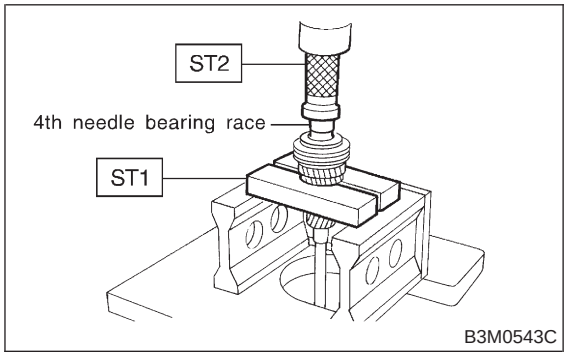


(A) Two holes for discrimination (3rd-4th hub)
(B) One hole for discrimination (5th hub)

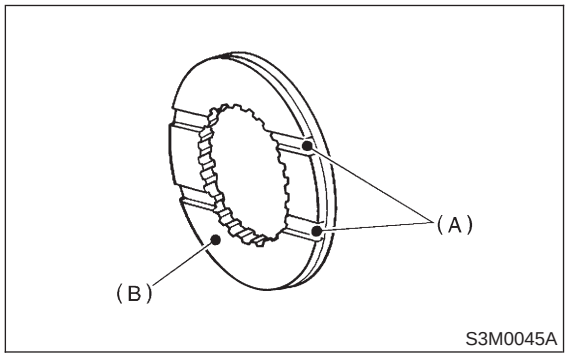
2) Install 3rd drive gear, baulk ring, and sleeve and hub assembly for 3rd-4th needle bearing (32 × 36 × 25.7) on transmission main shaft.

NOTE:
Align groove in baulk ring with shifting insert.

3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

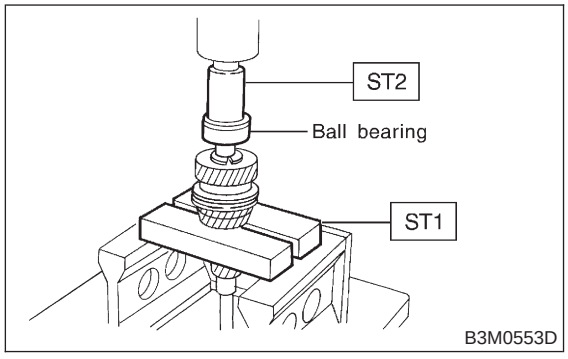


4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.



(A) Groove
(B) 4th gear side

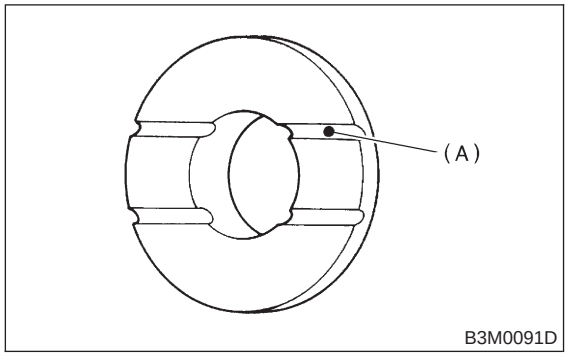
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
Face thrust washer in the correct direction.

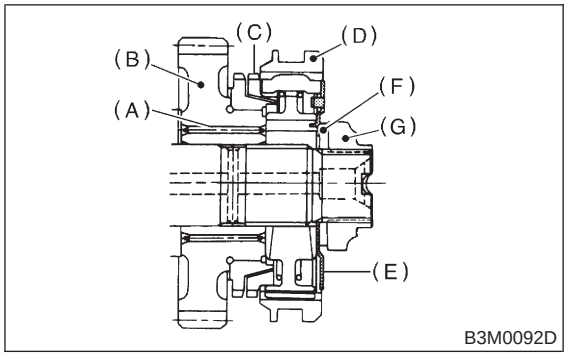
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

7) Install the following parts to the rear section of transmission main shaft.

NOTE:
- Align groove in baulk ring with shifting insert.
- Be sure to fit pawl of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.



(A) Needle bearing (32 × 36 × 25.7)
(B) 5th drive gear
(C) Baulk ring
(D) Sleeve and hub assembly
(E) Insert stopper plate
(F) Lock washer (22 × 38 × 2)
(G) Lock nut

8) Tighten lock nuts (22 × 13) to the specified torque using ST1 and ST2.

NOTE:
Secure lock nuts in two places after tightening.

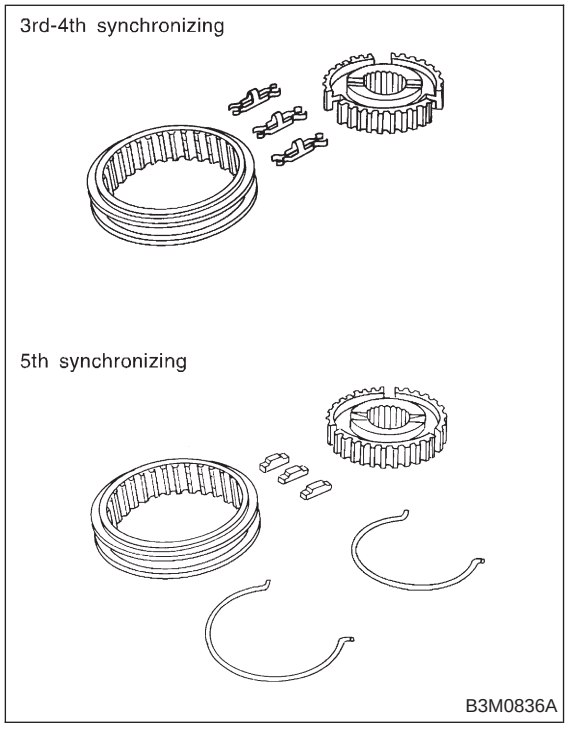
ST1 499987003 SOCKET WRENCH (35)
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
118±6 N·m (12.0±0.6 kg-m, 86.8±4.3 ft-lb)

2. 2500 cc MODEL

1) Assemble sleeve and hub assembly for 3rd-4th and, 5th synchronizing.

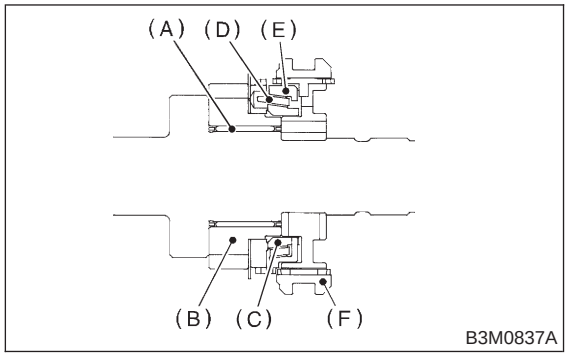
NOTE:
Position open ends of spring 120° apart.



(A) Two holes for discrimination (3rd-4th hub)
(B) One hole for discrimination (5th hub)

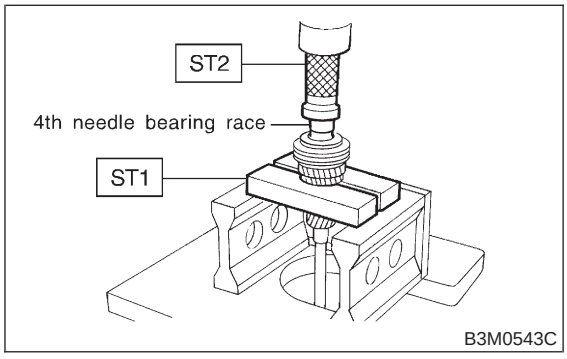
2) Install 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

NOTE:
Align groove in baulk ring with insert key.

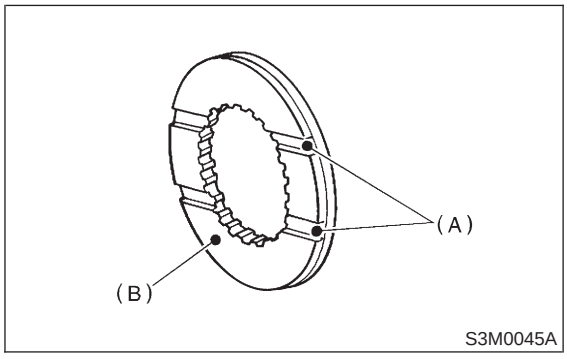


(A) 3rd needle bearing (32 × 36 × 25.7)
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve and hub ASSY

3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

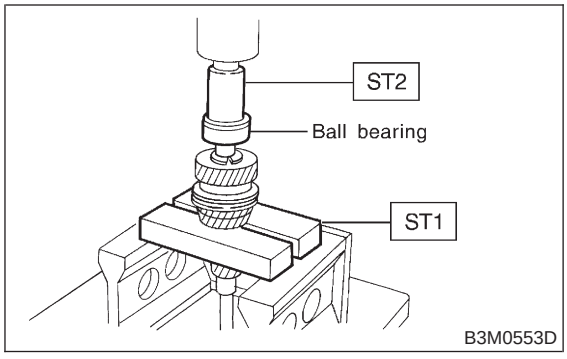


4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.



(A) Groove
(B) 4th gear side

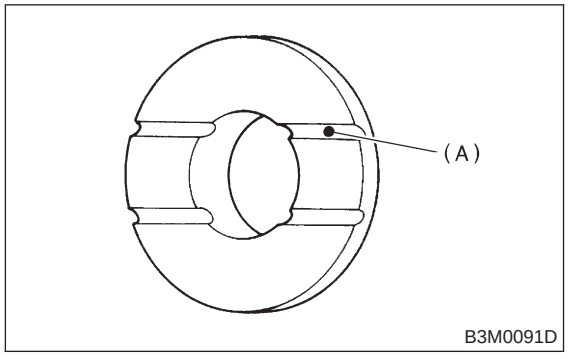
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
Face thrust washer in the correct direction.

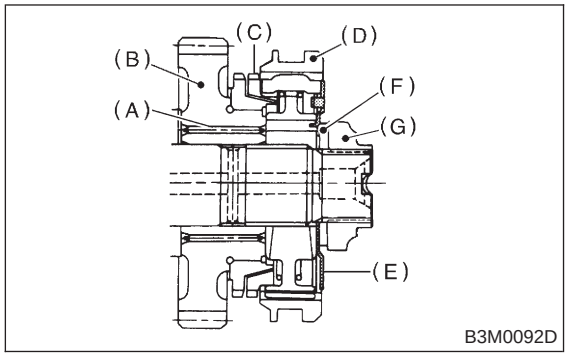
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

7) Install the following parts to the rear section of transmission main shaft.

NOTE:
- Align groove in baulk ring with shifting insert.
- Be sure to fit pawl of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.



(A) Needle bearing (32 × 36 × 25.7)
(B) 5th drive gear
(C) Baulk ring
(D) Sleeve and hub assembly
(E) Insert stopper plate
(F) Lock washer (22 × 38 × 2)
(G) Lock nut

8) Tighten lock nuts (22 × 13) to the specified torque using ST1 and ST2.

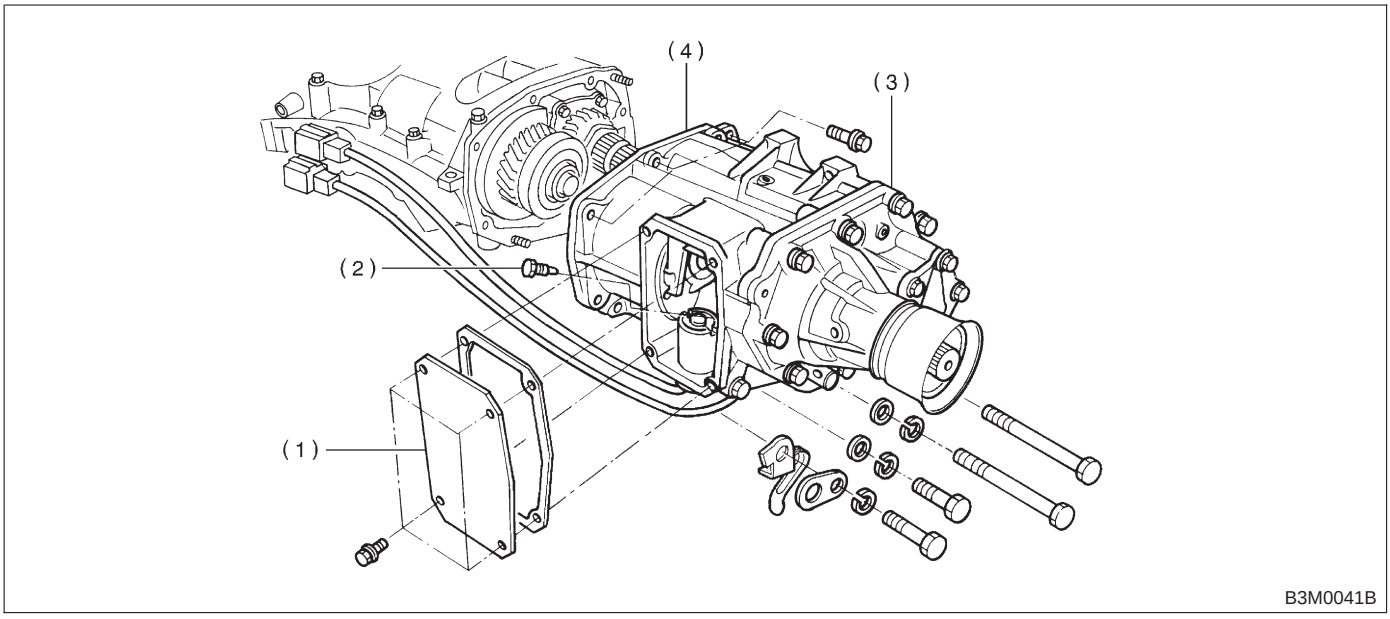
NOTE:
Secure lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH (35)
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
118±6 N·m (12.0±0.6 kg-m, 86.8±4.3 ft-lb)

5. Transfer Case and Extension

A: REMOVAL

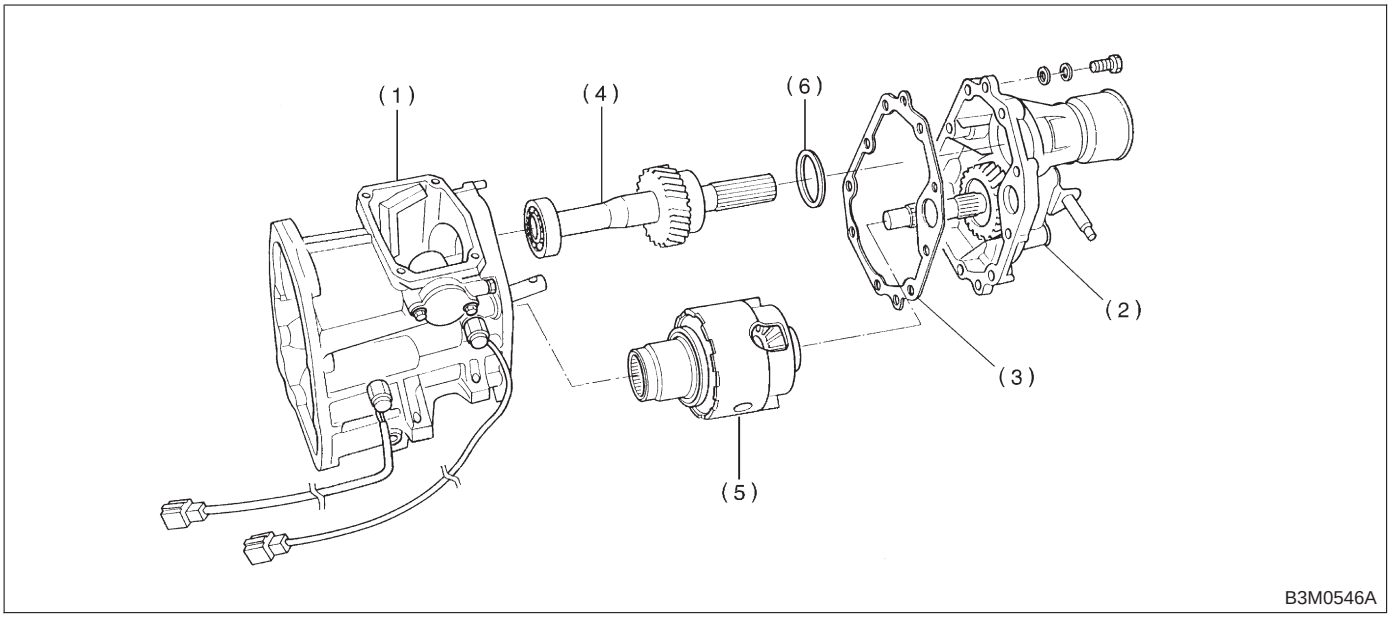


(1) Transfer cover
(2) Shifter fork screw
(3) Extension ASSY
(4) Transfer case ASSY

1) Remove transfer cover.
2) Remove shifter fork screw which secures selector arm to shifter arm.
3) Remove transfer case with extension assembly.

B: DISASSEMBLY

1. SEPARATION OF TRANSFER CASE AND EXTENSION ASSEMBLY



(1) Transfer case ASSY
(2) Extension ASSY
(3) Gasket
(4) Transfer driven gear
(5) Center differential
(6) Thrust washer

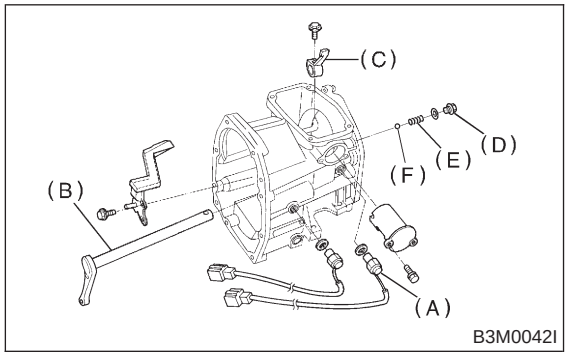
1) Separate transfer case and extension assembly.
2) Remove transfer driven gear and center differential as a set.
3) Remove thrust washer.

2. TRANSFER CASE

1) Remove neutral switch.

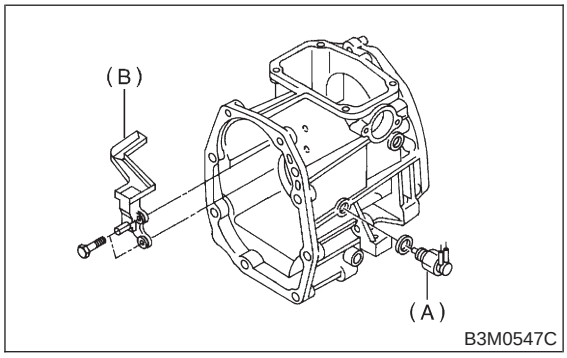
NOTE:
Before removing shifter arm, disconnect neutral switch.

2) Draw out shifter arm and remove selector arm.
3) Remove plug, spring and reverse check ball.



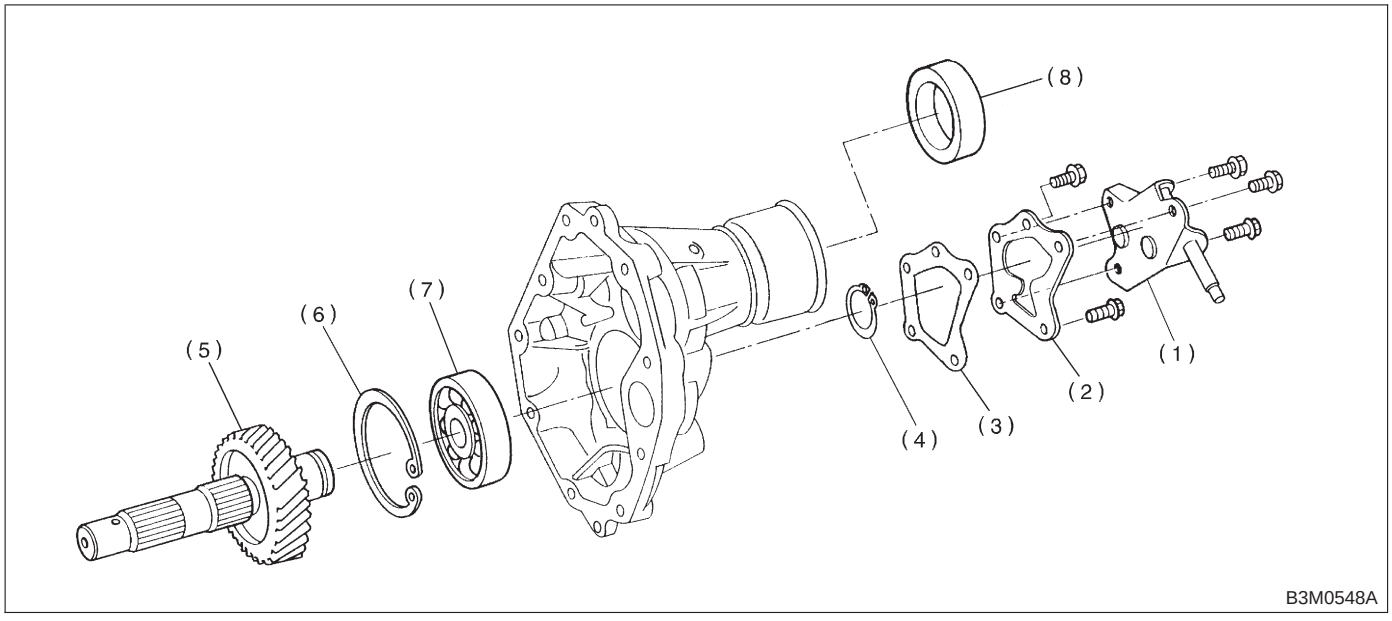
(A) Neutral switch
(B) Shifter arm
(C) Selector arm
(D) Plug
(E) Reverse accent spring
(F) Reverse check ball

4) Remove reverse check sleeve.
5) Remove back-up light switch and oil guide.



(A) Back-up light switch
(B) Oil guide

3. EXTENSION



(1) Shift bracket
(2) Extension cover
(3) Gasket
(4) Snap ring
(5) Transfer driven gear
(6) Snap ring
(7) Ball bearing
(8) Oil seal

1) Remove extension cover and shift bracket.
2) Remove snap ring.
3) Remove transfer drive gear.

CAUTION:
Do not remove ball bearing unless replacing.

4) Remove snap ring.
5) Remove ball bearing.

CAUTION:
Do not reuse ball bearing.

6) Remove oil seal.

CAUTION:
Do not reuse oil seal.

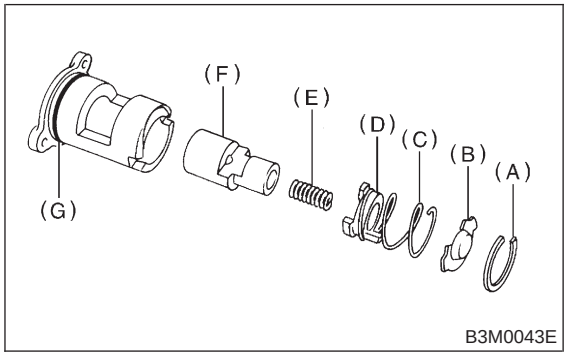
4. REVERSE CHECK SLEEVE

1) Using a standard screwdriver, remove snap ring.

NOTE:
Replace snap ring with a new one if deformed or weakened.

2) Remove reverse check plate.
3) Remove reverse check spring with cam.
4) Remove reverse return spring.
5) Remove reverse accent shaft.
6) Remove O-ring.

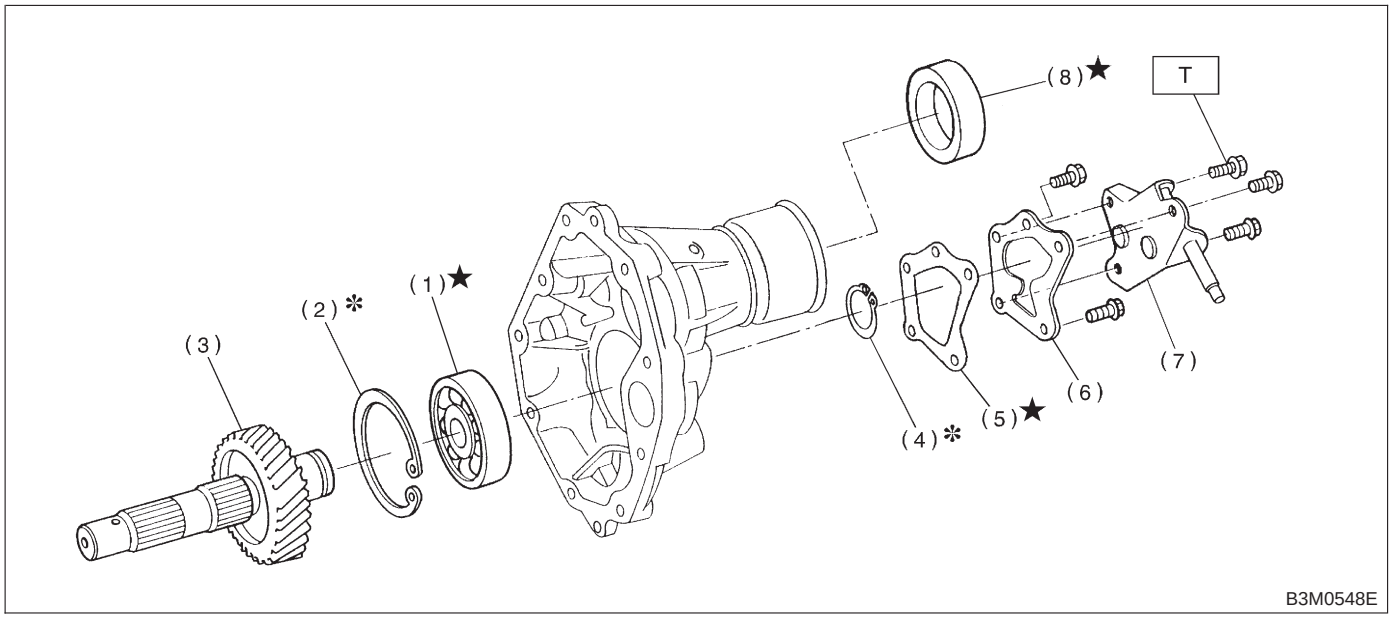
NOTE:
● Reverse check sleeve assembly uses an O-ring which should not be scratched.
● Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.



(A) Snap ring
(B) Reverse check plate
(C) Reverse check spring
(D) Reverse check cam
(E) Reverse return spring
(F) Reverse accent shaft
(G) O-ring

C: ASSEMBLY

1. EXTENSION



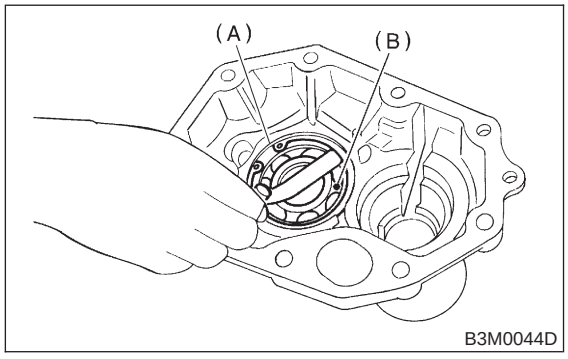
(1) Ball bearing
(2) Snap ring
(3) Transfer driven shaft
(4) Snap ring
(5) Gasket
(6) Extension cover
(7) Shift bracket
(8) Oil seal

Tightening torque: N·m (kg-m, ft-lb)
T: 25±2 (2.5±0.2, 18.1±1.4)

1) Attach ball bearing to extension and install snap ring.
2) Measure clearance between snap ring and outer race of ball bearing with a thickness gauge.

CAUTION:
Replace ball bearing with a new one.

Clearance:
0 — 0.15 mm (0 — 0.0059 in)

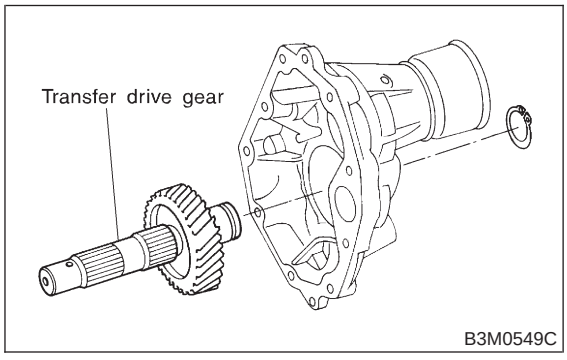


(A) Snap ring
(B) Ball bearing

3) If the measurement is not within the specification, select suitable snap ring.

Snap ring (Inner-72)	
Part No.	Thickness mm (in)
805172071	1.78 (0.0701)
805172072	1.90 (0.0748)
805172073	2.02 (0.0795)

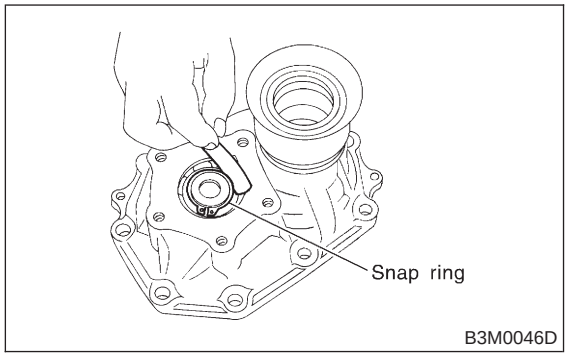
4) Press transfer drive gear into inner race of ball bearing.



5) Install snap ring on transfer drive shaft.

6) Measure clearance between snap ring and inner race of ball bearing with a thickness gauge.

Clearance:
0 — 0.15 mm (0 — 0.0059 in)



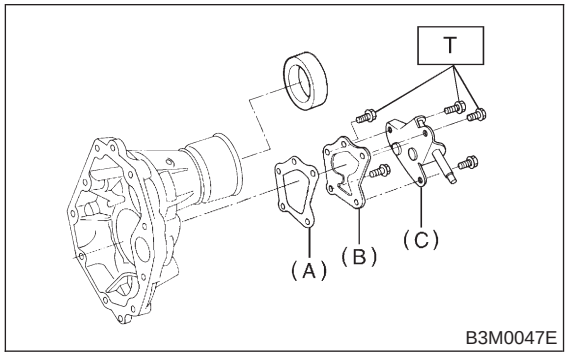
7) If the measurement is not within the specification, select suitable snap ring.

Snap Ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

8) Install extension cover, gasket and shift bracket.

CAUTION:
Use new gasket.

Tightening torque:
T: 25±2 N·m (2.5±0.3 kg-m, 18.1±1.4 ft-lb)



(A) Gasket
(B) Extension cover
(C) Shift bracket

9) Install oil seal with ST.

CAUTION:
Use new oil seal.

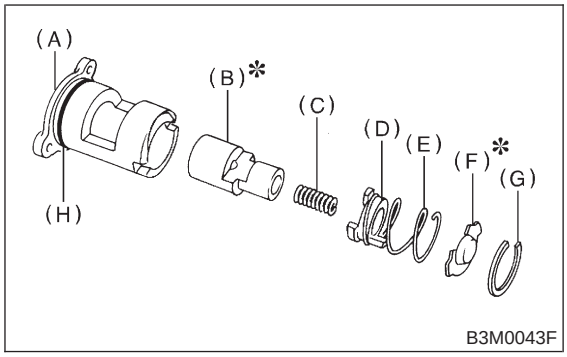
ST 498057300 INSTALLER

2. REVERSE CHECK SLEEVE

1) Install reverse accent shaft, check cam, return spring and check spring onto reverse check sleeve.

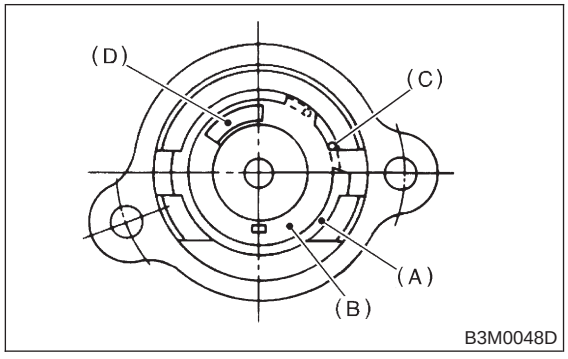
NOTE:
Be sure the bent section of reverse check spring is positioned in the groove in check cam.

2) Hook the bent section of reverse check spring over reverse check plate.
3) Rotate cam so that the protrusion of reverse check cam is at the opening in plate.
4) With cam held in that position, install plate onto reverse check sleeve and hold with snap ring.
5) Position O-ring in groove in sleeve.



(A) Reverse check sleeve
(B) Reverse accent shaft
(C) Return spring
(D) Check cam
(E) Check spring
(F) Reverse check plate
(G) Snap ring
(H) O-ring

CAUTION:
● Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
● Spin cam by hand for smooth rotation.
● Move cam and shaft all the way toward plate and release.
If cam does not return properly, replace reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace spring.



(A) Snap ring
(B) Reverse check plate
(C) Check spring
(D) Check cam

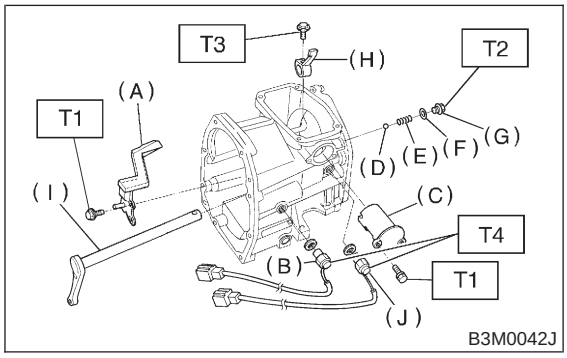
● Select a suitable reverse accent shaft and reverse check plate. <Ref. to 3-1 [W5E0].>

3. TRANSFER CASE

1) Assembly of transfer case is in the reverse order of disassembly.
2) Installation of shifter arm and selector arm
Install shifter arm into the partition from the front while inserting selector arm into the opening in reverse check sleeve. Pass shaft through hole in selector arm until its end comes out of the rear of transfer case.

NOTE:
Apply a coat of gear oil to shifter arm. Also make sure oil seal is positioned properly.

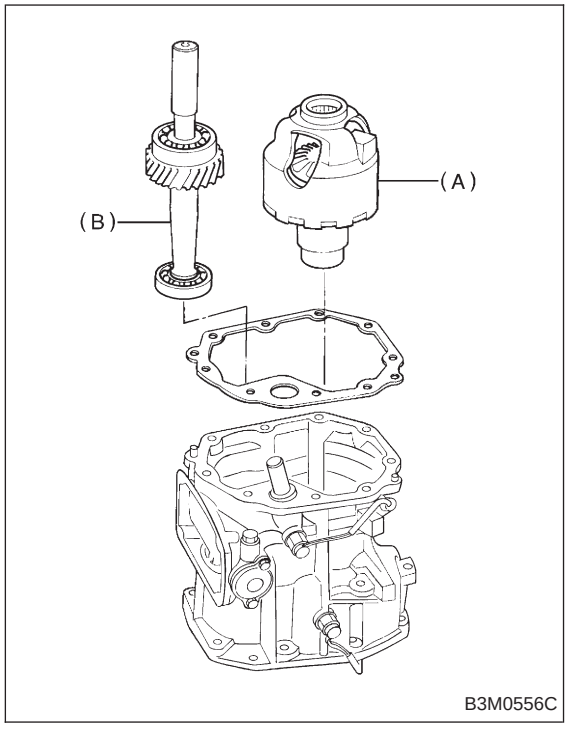
Tightening torque:
T1: 6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)
T2: 10±1 N·m (1.0±0.1 kg-m, 7.2±0.7 ft-lb)
T3: 19.6±1.5 N·m (2.00±0.15 kg-m, 14.5±1.1 ft-lb)
T4: 25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



(A) Oil guide
(B) Back-up light switch
(C) Reverse check sleeve
(D) Ball
(E) Reverse accent spring
(F) Washer
(G) Plug
(H) Selector arm
(I) Shifter arm
(J) Neutral switch

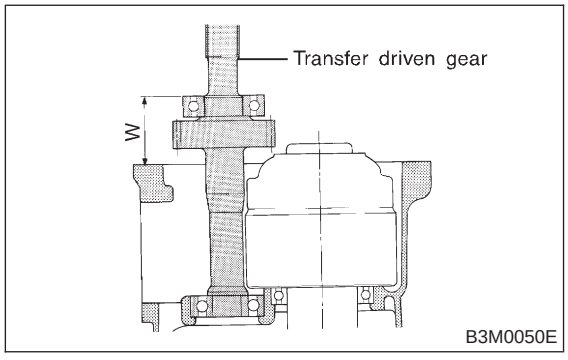
4. COMBINATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

1) Install center differential and transfer driven gear into transfer case.

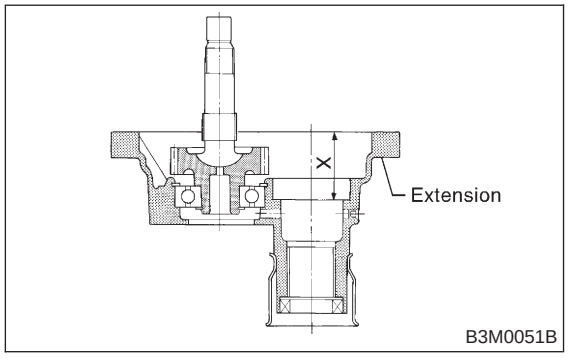


(A) Center differential
(B) Transfer driven gear

2) Measure height “W” between transfer case and ball bearing on the transfer driven gear.



3) Measure depth “X”.



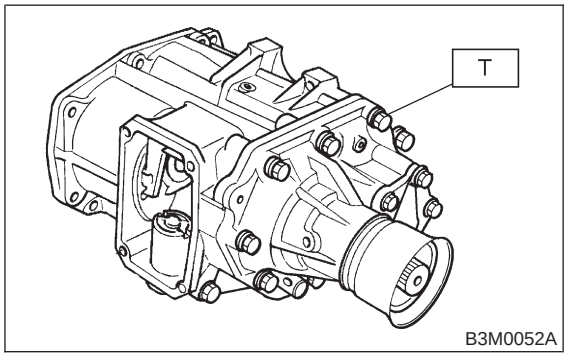
4) Calculate space “Y” using the following equation: Y = X − W + 0.24 mm (0.0094 in) [Thickness of gasket]
5) Select suitable washer in the following table:

Space “Y” mm (in)	Thrust washer (52 × 61 × t)	
	Part No.	Thickness mm (in)
0.55 — 0.79 (0.0217 — 0.0311)	803052021	0.50 (0.0197)
0.80 — 1.04 (0.0315 — 0.0409)	803052022	0.75 (0.0295)
1.05 — 1.30 (0.0413 — 0.0512)	803052023	1.00 (0.0394)

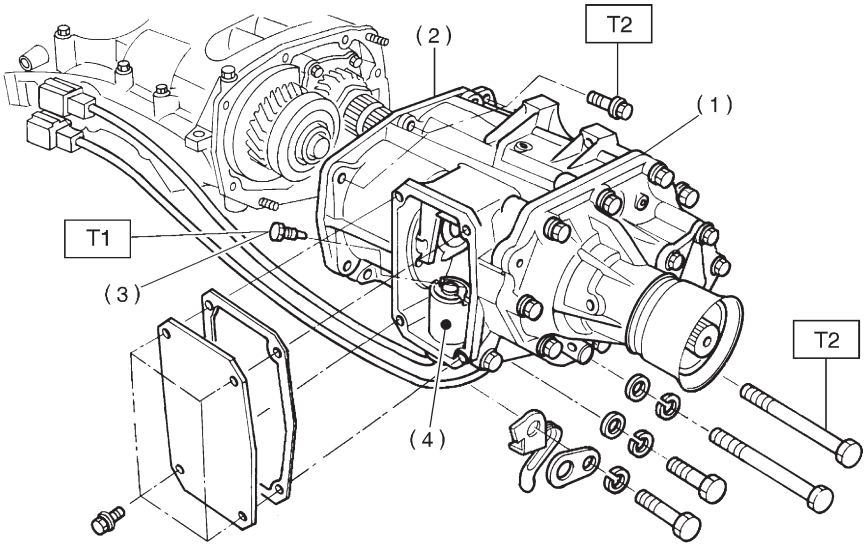
Standard clearance between thrust washer and ball bearing:
0.05 — 0.30 mm (0.0020 — 0.0118 in)

6) Fit thrust washers on transfer drive shaft.
7) Install extension assembly into transfer case.

Tightening torque:
T: 37±3 N·m (3.8±0.3 kg-m, 27.5±2.2 ft-lb)



D: INSTALLATION



B3M0053E

(1) Extension case
(2) Transfer case
(3) Shifter fork screw
(4) Reverse check sleeve

Tightening torque: N·m (kg-m, ft-lb)
T1: 19.6±1.5 (2.00±0.15, 14.5±1.1)
T2: 24.5±2.0 (2.50±0.20, 18.1±1.4)

1) Install transfer case with extension assembly.
2) Secure selector arm to shifter arm with shifter fork screw. Shifter arm should be caught by pawl of rod. Selector arm must be engaged with reverse check sleeve assembly.

E: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

1) Shift gear into 3rd gear position.
2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of the return spring, until arm contacts the stopper.
3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
4) To adjust, remove bolts holding reverse check sleeve assembly to the case, move sleeve assembly outward, and place adjustment shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

CAUTION:
Be careful not to break O-ring when placing shim(s).

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

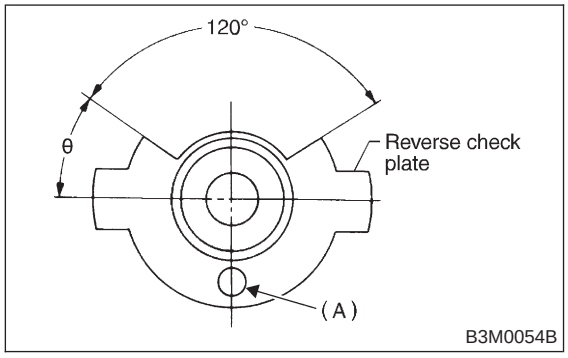
- When shim is removed, the neutral position will move closer to reverse; when shim is added, the neutral position will move closer to 1st gear.
- If shims alone cannot adjust the clearance, replace reverse accent shaft and re-adjust.

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA040	1	Neutral position is closer to 1st gear.
32188AA011	No mark or 2	Standard
32188AA050	3	Neutral position is closer to reverse gear.

2. REVERSE CHECK PLATE ADJUSTMENT

1) Shift shifter arm to “5th” and then to reverse to see if reverse check mechanism operates properly.
2) Also check to see if arm returns to neutral when released from the reverse position. If arm does not return properly, replace reverse check plate.

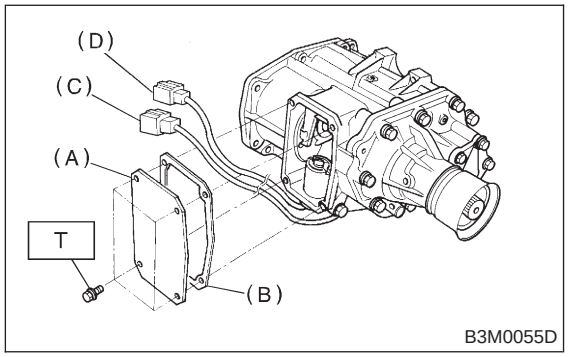
Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



3) Install transfer cover and gasket, and then connect each connector.

CAUTION:
Use new gasket.

Tightening torque:
T: 15.7 ± 1.5 N·m (1.6 ± 0.15 kg-m, 11.6 ± 1.1 ft-lb)



(A) Transfer cover
(B) Gasket
(C) Neutral position switch connector
(D) Back-up light switch connector

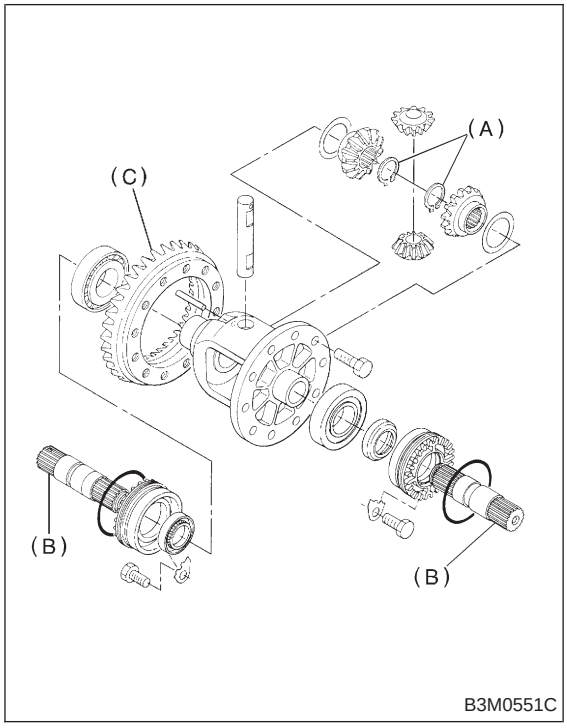
6. Front Differential

A: DISASSEMBLY

1) Remove right and left snap rings from differential, and then remove two axle drive shafts.

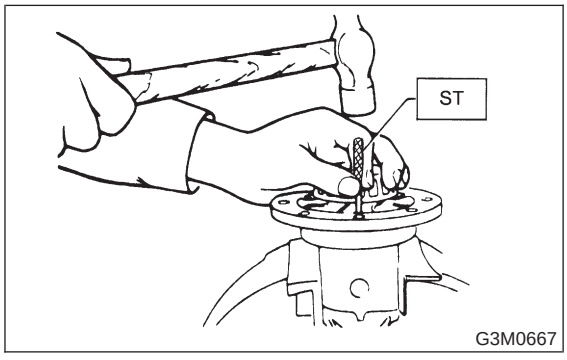
NOTE:
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen twelve bolts and remove hypoid drive gear.

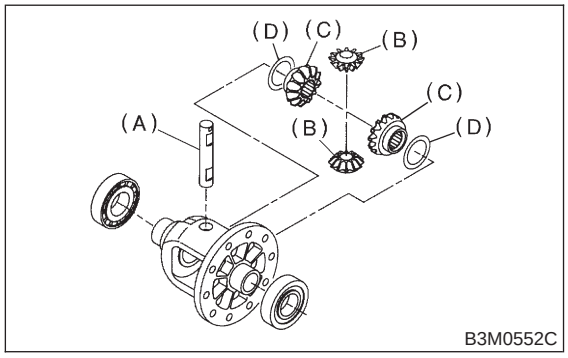


(A) Snap ring
(B) Axle drive shaft
(C) Hypoid drive gear

3) Drive out straight pin from differential assembly toward hypoid driven gear.
ST 899904100 REMOVER

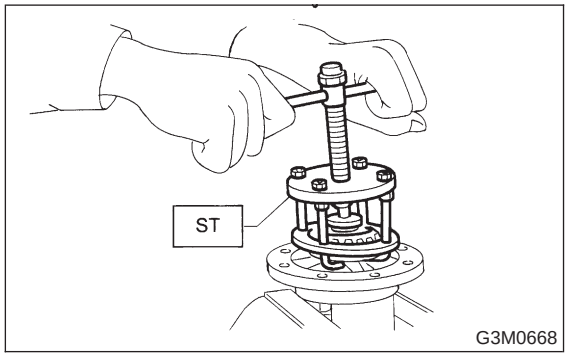


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



(A) Pinion shaft
(B) Bevel pinion
(C) Bevel gear
(D) Washer

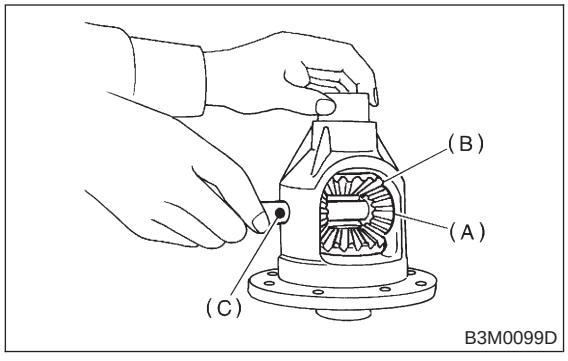
5) Remove roller bearing using ST.
ST 399527700 PULLER SET



B: ASSEMBLY

1) Install bevel gear and bevel pinion together with washers, and insert pinion shaft.

NOTE:
Face the chamfered side of washer toward gear.



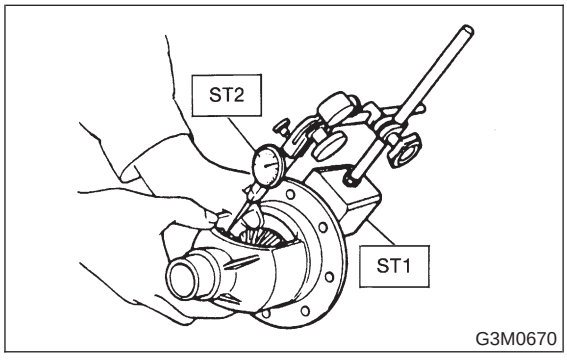
(A) Bevel pinion
(B) Bevel gear
(C) Pinion shaft

2) Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

NOTE:
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

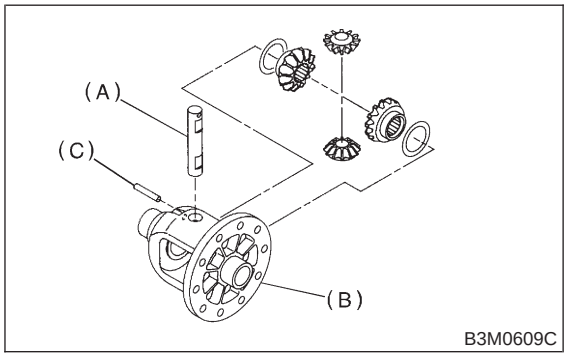


Washer (38.1 × 50 × t)	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Align pinion shaft and differential case at their holes, and drive straight pin into holes from the hypoid driven gear side, using ST.

NOTE:
Lock straight pin after installing.

ST 899904100 REMOVER

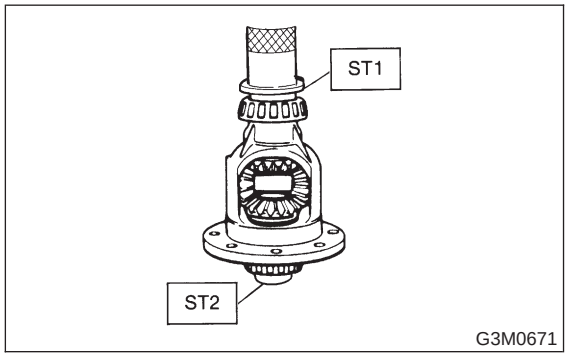


(A) Pinion shaft
(B) Differential case
(C) Straight pin

4) Install roller bearing (40 × 80 × 19.75) to differential case.

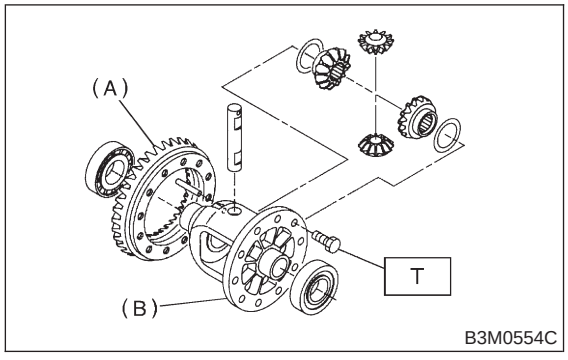
NOTE:
Be careful because roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER
ST2 398497701 ADAPTER



5) Install hypoid driven gear to differential case using twelve bolts.

Tightening torque:
T: 62±5 N·m (6.3±0.5 kg-m, 45.6±3.6 ft-lb)

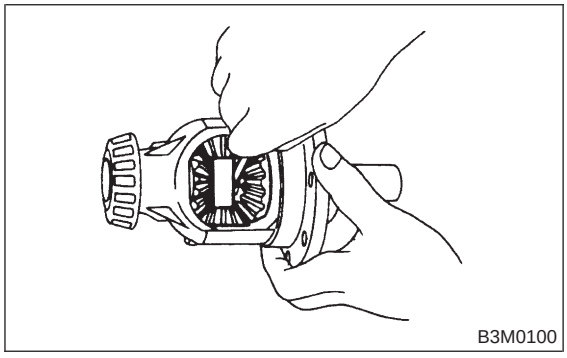


(A) Hypoid driven gear
(B) Differential case

6) Position drive axle shaft in differential case and hold it with outer snap ring (28). Using a thickness gauge, measure clearance between the shaft and case is within specifications.

NOTE:
If it is not within specifications, replace snap ring with a suitable one.

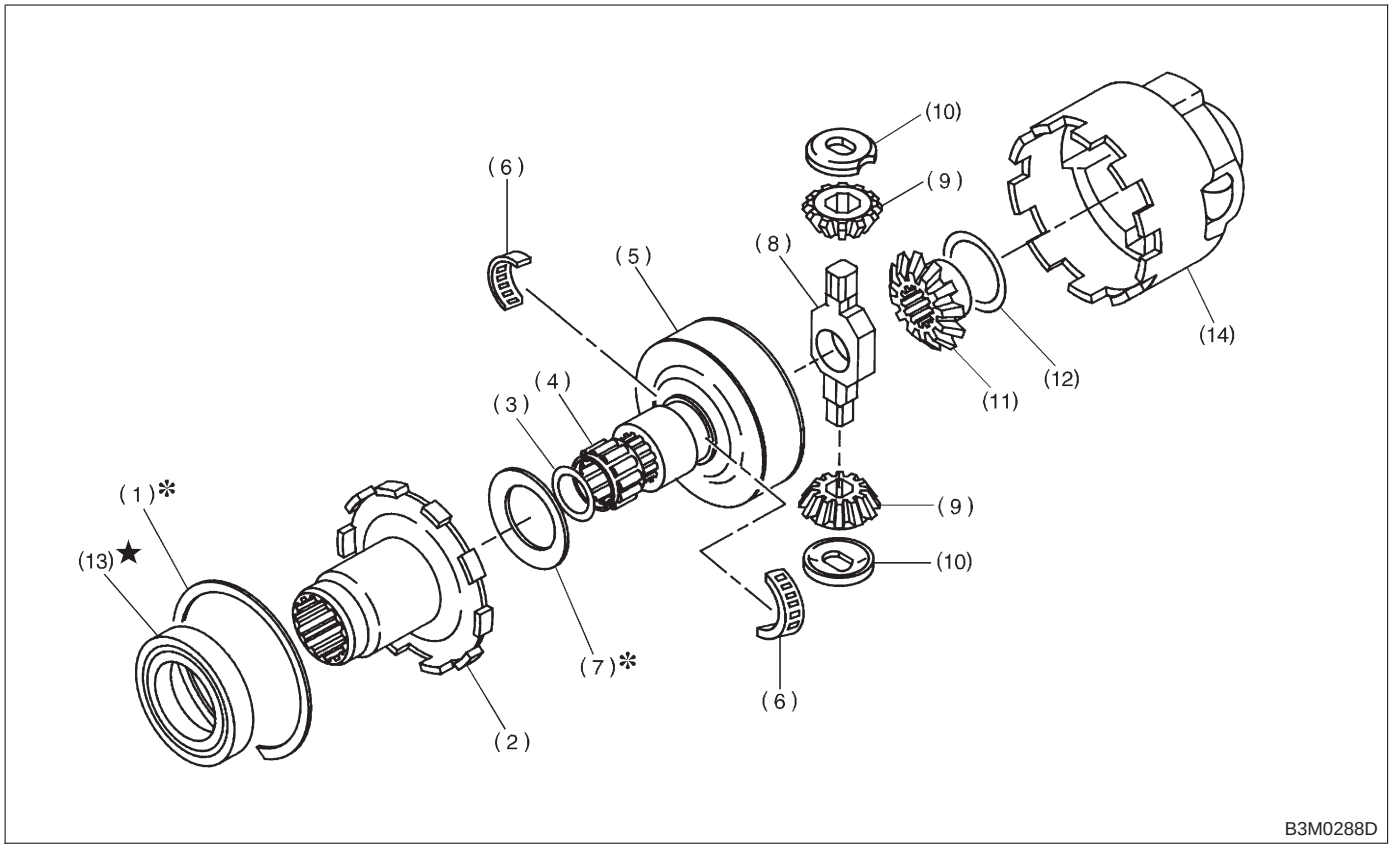
Clearance:
0 — 0.2 mmm (0 — 0.008 in)



Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028011	1.05 (0.0413)
805028012	1.20 (0.0472)

7. Center Differential

A: DISASSEMBLY

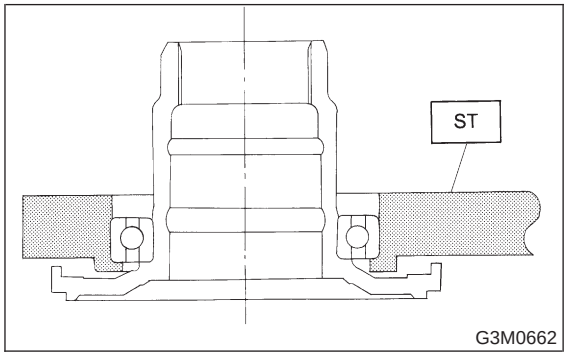


(1) Snap ring
(2) Center differential cover
(3) Snap ring
(4) Needle bearing
(5) Viscous coupling
(6) Needle bearing
(7) Adjusting washer
(8) Pinion shaft
(9) Bevel pinion
(10) Retainer
(11) Side gear
(12) Thrust washer
(13) Ball bearing
(14) Center differential case

1) Remove snap ring (Inner-110) using flat bladed screwdriver.
2) Remove center differential cover.
3) Remove snap ring and roller bearing.
4) Remove viscous coupling.
5) Remove needle bearings.
6) Remove adjusting washer (45 × 62 × t).
7) Remove pinion shaft, bevel pinions and retainers.
8) Remove side gear.
9) Remove thrust washer.
10) Remove ball bearing using ST.

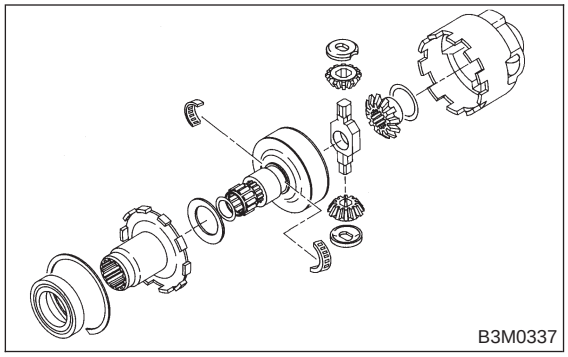
CAUTION:
Do not reuse ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



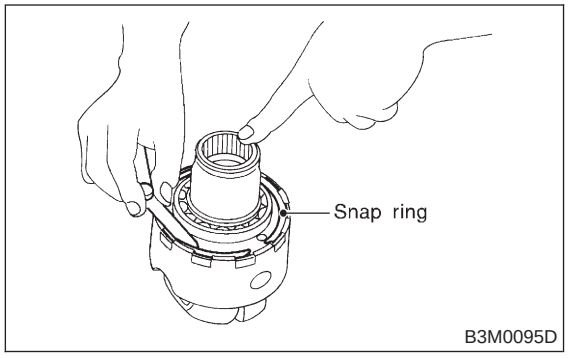
B: ASSEMBLY

1) Assembly is in the reverse order of disassembly.
Do the following:
● Install thrust washer with chamfered side of inner perimeter facing the side gear.
● Install adjusting washer with chamfered side of inner perimeter facing the viscous coupling using ST.
ST 499547300 INSTALLER SET



2) After assembling, using a thickness gauge measure clearance between snap ring and center differential case.

Clearance:
0 — 0.15 mm (0 — 0.0059 in)

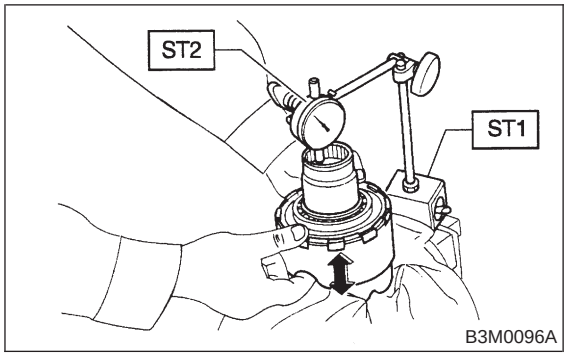


3) If the measurement is not within the specification, select suitable snap ring.

Snap ring (Inner-110)	
Part No.	Thickness mm (in)
805100061	2.10 (0.0827)
805100062	2.21 (0.0870)
805100063	2.32 (0.0913)

4) After assembling, set up a ST1 and ST2 to end of viscous coupling shaft. Move viscous coupling up and down, and measure backlash in the axial direction.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Backlash:
0.62 — 0.86 mm (0.0244 — 0.0339 in)



5) If the measurement is not within the specification, select suitable washer.

Adjusting washer (45 × 62 × t)	
Part No.	Thickness mm (in)
803045041	1.60 (0.0630)
803045042	1.80 (0.0709)
803045043	2.00 (0.0787)
803045044	2.20 (0.0866)
803045045	2.40 (0.0945)

1. Manual Transmission

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out. ● Gear slips out when coasting on rough road. ● Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip- out of 3rd gear)	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

2. Differential

Symptom	Possible cause	Remedy
1. Broken differential (case, gear, bearing, etc.) NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble differential and replace broken components and at the same time check other components for any trouble, and replace if necessary
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion vehicle under severe operating conditions.	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. ● Gear noise when driving: If noise increases as vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. ● Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment ● Bearing noise when driving or when coasting: Cracked, broken or damaged bearings ● Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
	(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

MEMO:

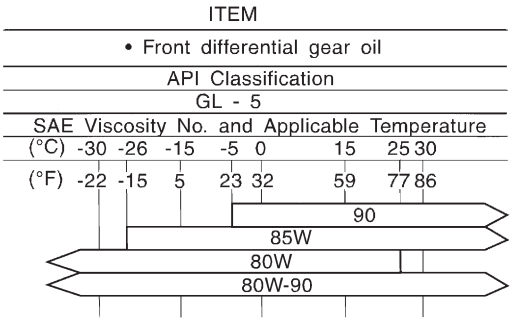
AUTOMATIC TRANSMISSION AND DIFFERENTIAL 3-2

1. Automatic Transmission and Differential

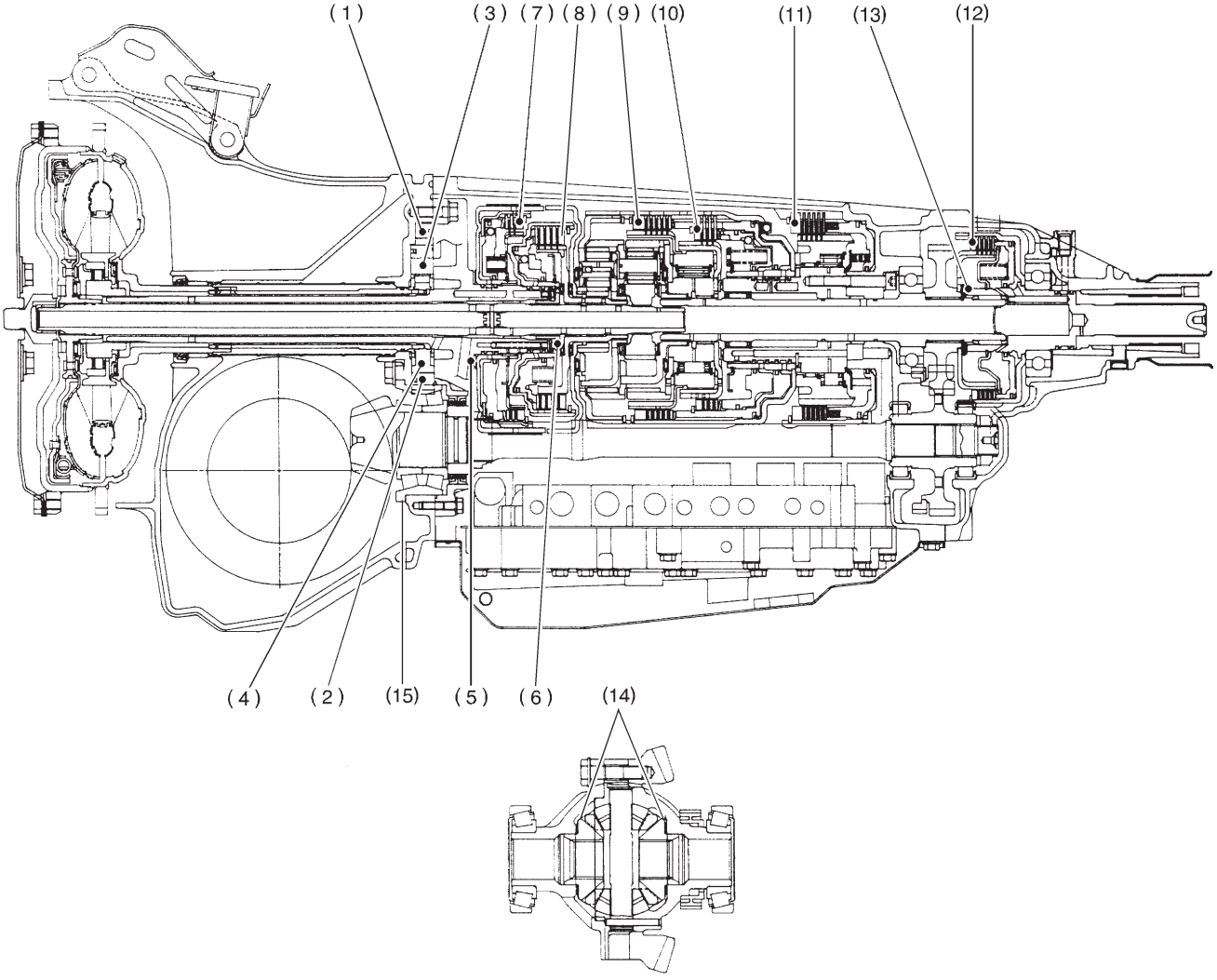
A: SPECIFICATIONS

Torque converter clutch	Type		Symmetric, 3 element, single stage, 2 phase torque converter		
	Stall torque ratio	2200 cc	2.1 — 2.3		
		2500 cc	1.8 — 2.0		
		OUTBACK	2.2 — 2.4		
	Nominal diameter	2200 cc	236 mm (9.29 in)		
		2500 cc	246 mm (9.69 in)		
	Stall speed (at sea level)	2200 cc	2,200 — 2,600 rpm		
		2500 cc	2,200 — 2,600 rpm		
		OUTBACK	2,300 — 2,700 rpm		
	One-way clutch		Sprague type one-way clutch		
Automatic transmission	Transmission	Type	4-forward, 1-reverse, double-row planetary gears		
		Control element	Multi-plate clutch		4 sets
			Multi-plate brake		1 set
			Band brake		1 set
			One-way clutch (sprague type)		2 sets
		Gear ratio	1st	2200 cc	2.785
				2500 cc	3.027
			2nd	2200 cc	1.545
				2500 cc	1.619
			3rd		1.000
			4th		0.694
			Reverse		2.272
		Tooth number of planetary gear	Front sun gear		33
			Front pinion		21
			Front internal gear		75
			Rear sun gear	2200 cc	42
				2200 cc	37
			Rear pinion	2200 cc	17
				2500 cc	19
			Rear internal gear		75
		Clutch number of reverse clutch	Drive plate & driven plate		2
		Clutch number of high clutch	Drive plate & driven plate		2200 cc ... 4 2500 cc ... 5
		Clutch number of forward clutch	Drive plate & driven plate		5
		Clutch number of overrunning clutch	Drive plate & driven plate		3
		Clutch number of low & reverse brake	Drive plate & driven plate		Except OUTBACK ... 5 OUTBACK ... 6

Automatic transmission	Transmission	Selector position		P (Park)	Transmission in neutral, output member immovable, and engine start possible
				R (Reverse)	Transmission in reverse for backing
				N (Neutral)	Transmission in neutral, and engine start possible
				D (Drive)	Automatic gear change 1st ←→ 2nd ←→ 3rd ←→ 4th
				3 (3rd)	Automatic gear change 1st ←→ 2nd ←→ 3rd ← 4th
				2 (2nd)	2nd gear locked (Deceleration possible 4th → 3rd → 2nd)
				1 (1st)	1st gear locked (Deceleration possible 4th → 3rd → 2nd → 1st)
		Control method		Hydraulic remote control	
	Oil pump	Type		Variable-capacity type vane pump	
		Driving method		Driven by engine	
		Number of vanes		9 pieces	
	Hydraulic control	Type		Electronic/hydraulic control [Four forward speed changes by electrical signals of car speed and accelerator (throttle) opening]	
		Fluid		Dexron II or Dexron III type Automatic transmission fluid	
		Fluid capacity	2200 cc	7.9 ℓ (8.4 US qt, 7.0 Imp qt)	
			2500 cc	9.5 ℓ (10.0 US qt, 8.4 Imp qt)	
	Lubrication	Lubrication system		Forced feed lubrication with oil pump	
		Oil		Automatic transmission fluid (above mentioned.)	
	Cooling	Cooling system		Liquid-cooled cooler incorporated in radiator	
	Harness	Inhibitor switch		12 poles	
		Transmission harness		FWD ... 11 poles AWD ... 13 poles	
	Transfer	Transfer clutch		Hydraulic multi-plate clutch	
		Clutch number of transfer clutch		Drive plate & driven plate	5
		Control method		Electronic, hydraulic type	
		Lubricant		The same Automatic Transmission Fluid used in automatic transmission.	
		1st reduction gear ratio		1.000 (53/53)	

Final reduction	Final gear ratio	Front drive	FWD		3.900 (39/10)
			AWD	2200 cc	4.111 (37/9)
				2500 cc	4.444 (40/9)
	Speedometer gear ratio		2200 cc & LSi		0.83 (19/23)
			GT		0.80 (20/25)
			OUTBACK		0.76 (19/25)
	Lubrication oil				 H3M1235A
	Oil capacity		Front drive		1.2 ℓ (1.3 US qt, 1.1 Imp qt)
	ATF cooling system		Radiation capacity		1.651 kW (1,420 kcal/h, 5,635 BTU/h)

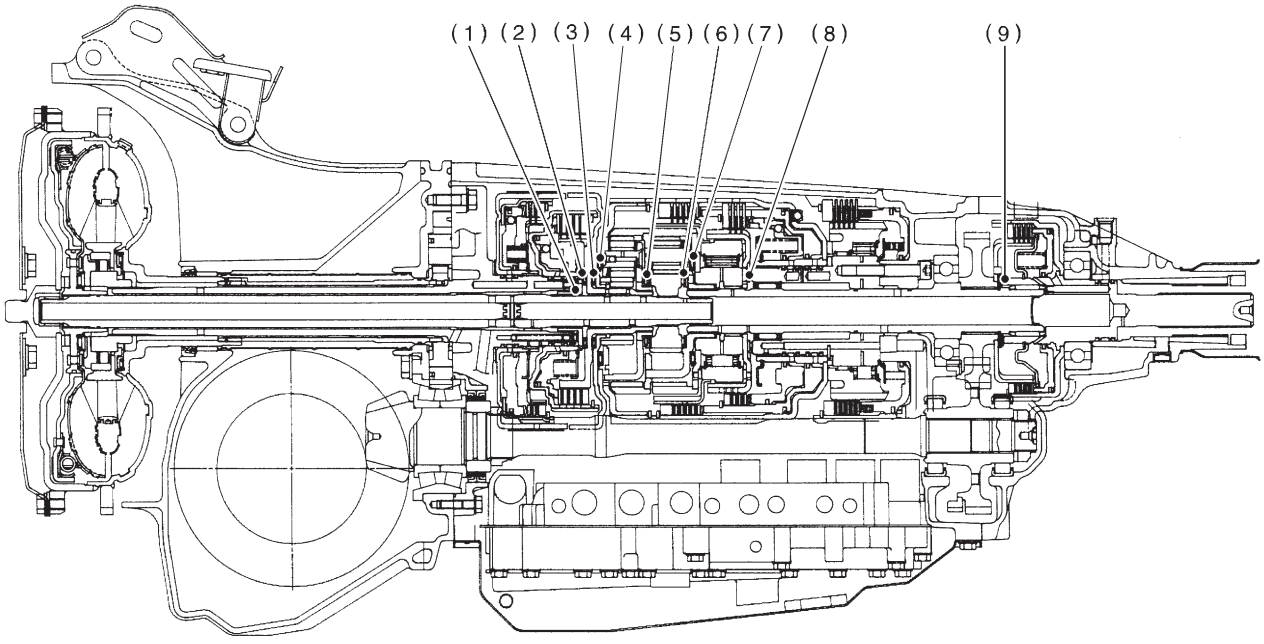
B: ADJUSTING PARTS

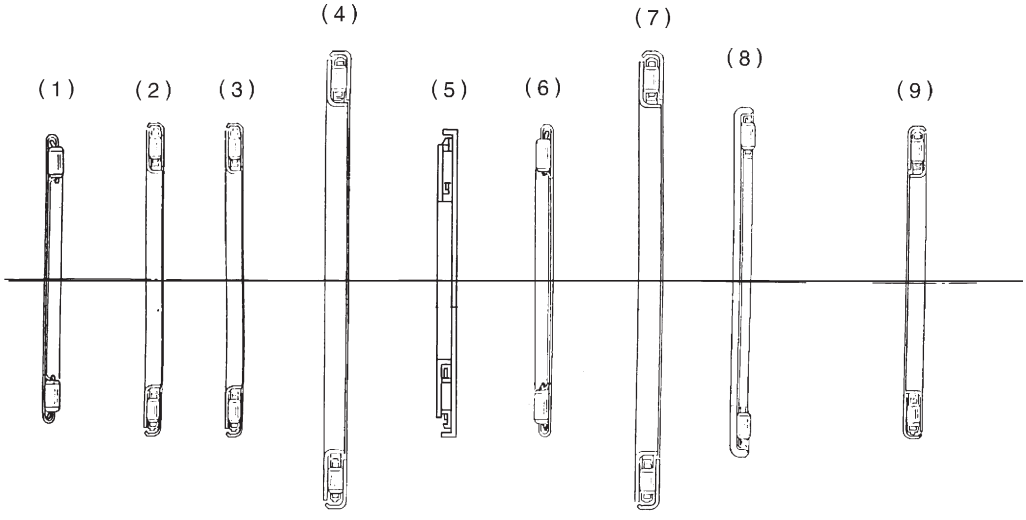


H3M1236B

No.	Part Name		Part Number	Dimension mm (in)	Application
1	Control piston	2500 cc	31235AA000 — 030	$13.5^{-0.030}_{-0.037}$ ($0.5315^{-0.0012}_{-0.0015}$), $13.5^{-0.023}_{-0.030}$ ($0.5315^{-0.0009}_{-0.0012}$), $13.5^{-0.016}_{-0.023}$ ($0.5315^{-0.0006}_{-0.0009}$), $13.5^{-0.009}_{-0.016}$ ($0.5315^{-0.0004}_{-0.0006}$)	Adjusting side clearance of oil pump
		2200 cc	31235AA040 — 070		
2	Cam ring		31241AA001 — 031	$17^{-0.010}_{-0.017}$ ($0.6693^{-0.0004}_{-0.0007}$), $17^{-0.003}_{-0.010}$ ($0.6693^{-0.0001}_{-0.0004}$), $17^{+0.004}_{-0.003}$ ($0.6693^{+0.0002}_{-0.0001}$), $17^{+0.011}_{+0.004}$ ($0.6693^{+0.0004}_{+0.0002}$)	Adjusting side clearance of oil pump
3	Vane (Oil pump)		31243AA000 — 030	$17^{-0.030}_{-0.037}$ ($0.6693^{-0.0012}_{-0.0015}$), $17^{-0.023}_{-0.030}$ ($0.6693^{-0.0009}_{-0.0012}$), $17^{-0.016}_{-0.023}$ ($0.6693^{-0.0006}_{-0.0009}$), $17^{+0.009}_{+0.016}$ ($0.6693^{+0.0004}_{+0.0006}$)	Adjusting side clearance of oil pump
4	Rotor (Oil pump)		31240AA000 — 030	$17^{-0.030}_{-0.037}$ ($0.6693^{-0.0012}_{-0.0015}$), $17^{-0.023}_{-0.030}$ ($0.6693^{-0.0009}_{-0.0012}$), $17^{-0.016}_{-0.023}$ ($0.6693^{-0.0006}_{-0.0009}$), $17^{+0.009}_{+0.016}$ ($0.6693^{+0.0004}_{+0.0006}$)	Adjusting side clearance of oil pump
5	Thrust washer (Reverse clutch)		31299AA000 — 060	0.7, 0.9, 1.1, 1.3, 1.5, 1.7, 1.9 (0.028, 0.035, 0.043, 0.051, 0.059, 0.067, 0.075)	Adjusting end play of reverse clutch drum
6	Bearing race		803031021 — 027	0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0 (0.031, 0.039, 0.047, 0.055, 0.063, 0.071, 0.079)	Adjusting total end play
7	Retaining plate		31567AA350 — 400	4.6, 4.8, 5.0, 5.2, 5.4, 5.6 (0.181, 0.189, 0.197, 0.205, 0.213, 0.220)	Adjusting clearance of reverse clutch
8	Retaining plate		31567AA340, 31567AA190 — 260	3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0 (0.134, 0.142, 0.150, 0.157, 0.165, 0.173, 0.181, 0.189, 0.197)	Adjusting clearance of high clutch
9	Retaining plate		31567AA010, 31567AA060 — 110	4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2 (0.157, 0.165, 0.173, 0.181, 0.189, 0.197, 0.205)	Adjusting clearance of forward clutch
10	Retaining plate		31567AA410 — 470	8.0, 8.2, 8.4, 8.6, 8.8, 9.0, 9.2 (0.315, 0.323, 0.331, 0.339, 0.346, 0.354, 0.362)	Adjusting clearance of overrunning clutch
11	Retaining plate No. 2		31667AA180 — 250, 31667AA310	6.5, 6.8, 7.1, 7.4, 7.7, 8.0, 8.2, 8.4, 8.6 (0.256, 0.268, 0.280, 0.291, 0.303, 0.315, 0.323, 0.331, 0.339)	Adjusting clearance of low and reverse brake
12	Pressure plate (Front)		31593AA151 — 181	3.3, 3.7, 4.1, 4.5 (0.130, 0.146, 0.161, 0.177)	Adjusting clearance of transfer clutch
13	Thrust bearing ($35 \times 53 \times T$)		806536020, 806535030 — 070, 090	3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0 (0.150, 0.157, 0.165, 0.173, 0.181, 0.189, 0.197)	Adjusting end play of transfer clutch
14	Washer ($38.1 \times 50 \times T$)		803038021 — 023	0.95, 1.00, 1.05 (0.0374, 0.0394, 0.0413)	Adjusting backlash of differential bevel gear
15	Drive pinion shim		31451AA050 — 100	0.150, 0.175, 0.200, 0.225, 0.250, 0.275 (0.0059, 0.0069, 0.0079, 0.0089, 0.0098, 0.0108)	Adjusting drive pinion height

C: LOCATION AND INSTALLING DIRECTION OF THRUST NEEDLE BEARING

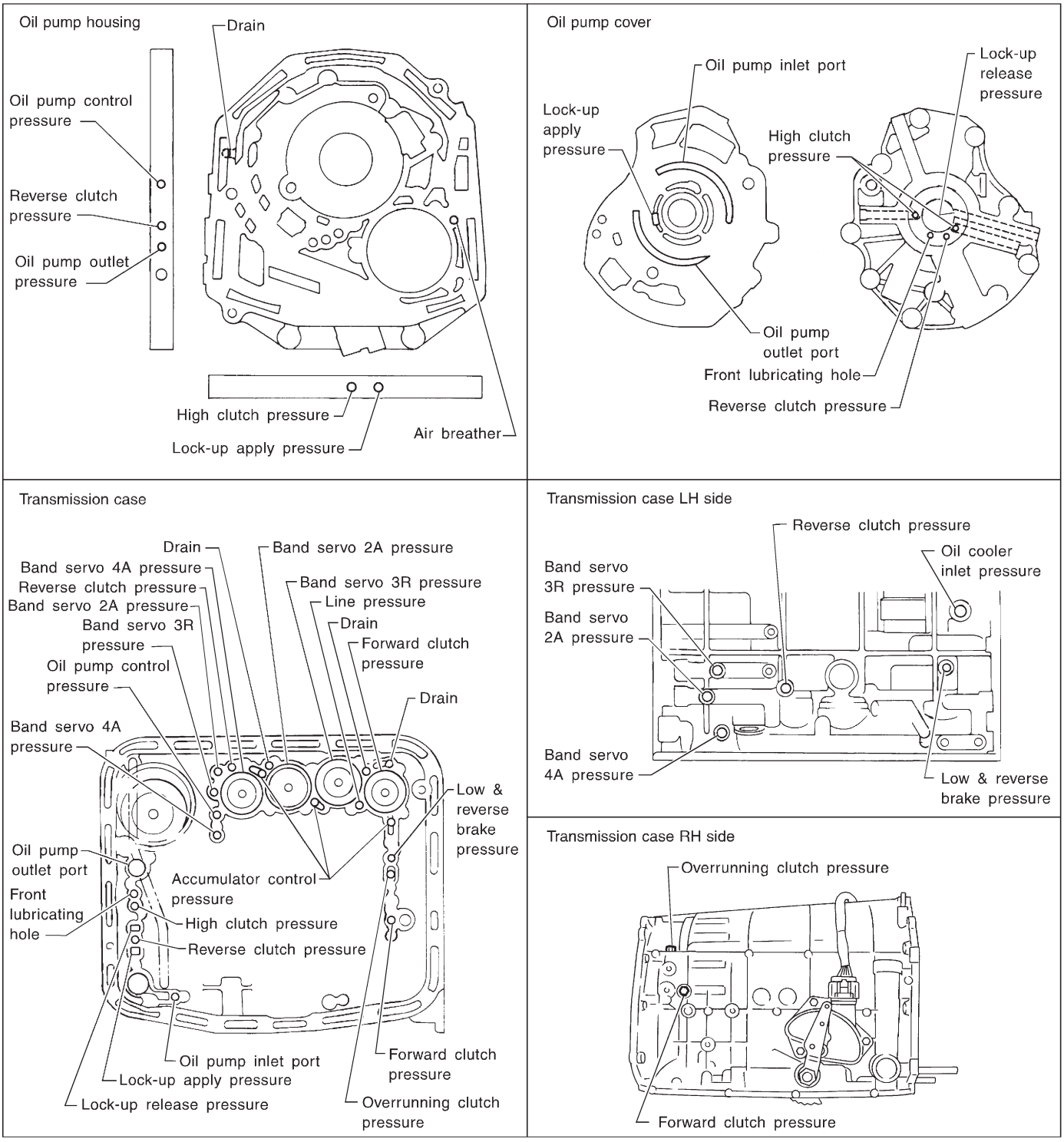




H3M1237B

No.	Part Name	Part Number	Inside diameter mm (in)	Outside diameter mm (in)	Dimension mm (in)	Application
(1)	Thrust needle bearing	806530020	30 (1.18)	47 (1.85)	3.3 (0.130)	A place of high clutch
(2)	Thrust needle bearing	806537010	38 (1.50)	53 (2.09)	3.2 (0.126)	A place of high clutch hub
(3)	Thrust needle bearing	806537010	38 (1.50)	53 (2.09)	3.2 (0.126)	A place of front sun gear
(4)	Thrust needle bearing	806558020	58 (2.28)	78 (3.07)	4.0 (0.157)	A place of front planetary carrier
(5)	Thrust needle bearing	806535120	35 (1.38)	53 (2.09)	4.8 (0.189)	A place of rear sun gear
(6)	Thrust needle bearing	806534010	34 (1.34)	53 (2.09)	3.37 (0.1327)	A place of rear internal gear
(7)	Thrust needle bearing	806558020	58 (2.28)	78 (3.07)	4.0 (0.157)	A place of over-running clutch hub
(8)	Thrust needle bearing	806542010	42 (1.65)	59 (2.32)	3.6 (0.142)	A place of low & reverse brake
(9)	Thrust needle bearing	806536020	36 (1.42)	53 (2.09)	3.8 (0.150)	Adjusting end play of transfer clutch
		806535030			4.0 (0.157)	
		806535040			4.2 (0.165)	
		806535050			4.4 (0.173)	
		806535060			4.6 (0.181)	
		806535070			4.8 (0.189)	
		806535090			5.0 (0.197)	

D: FLUID PASSAGES



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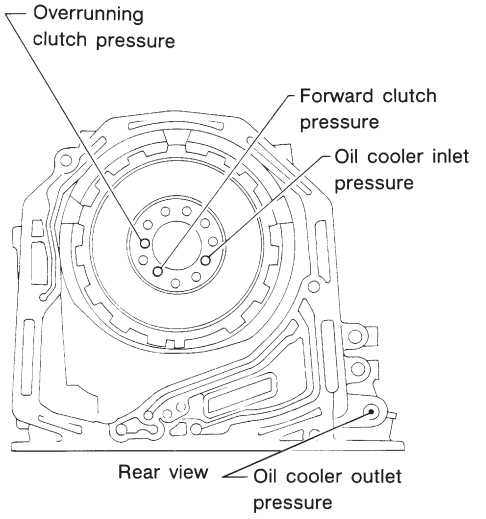
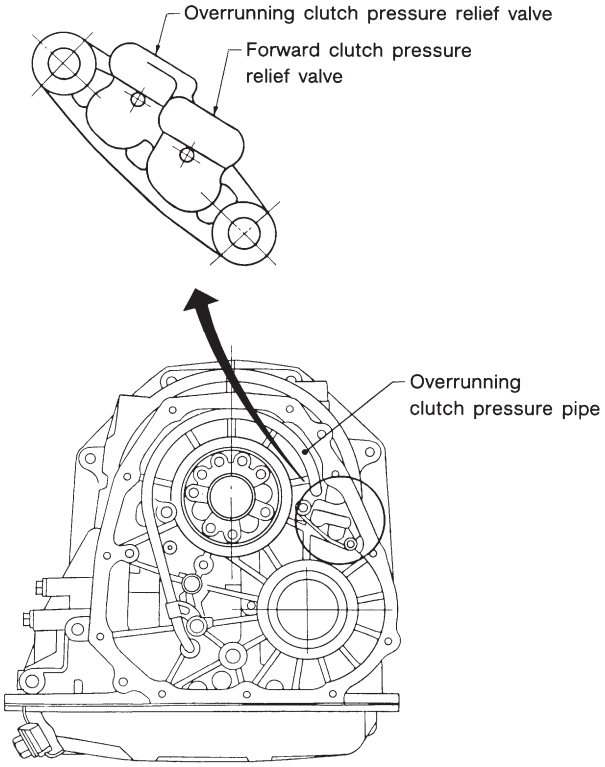
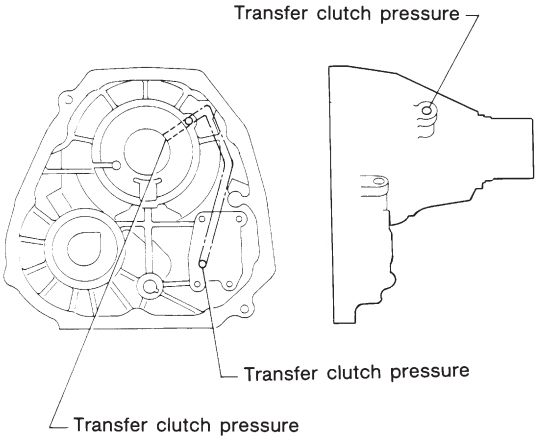
Transmission case



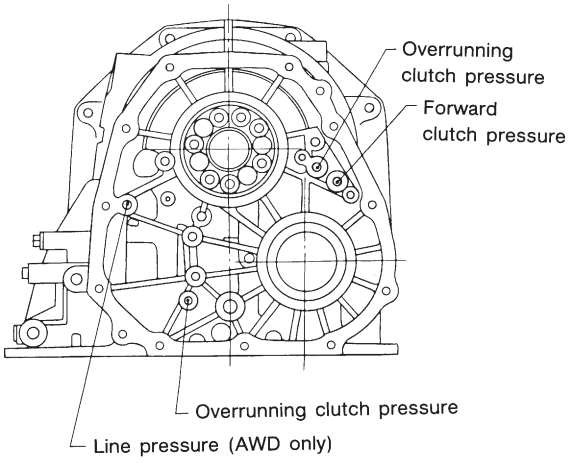
Transmission case



Extension case

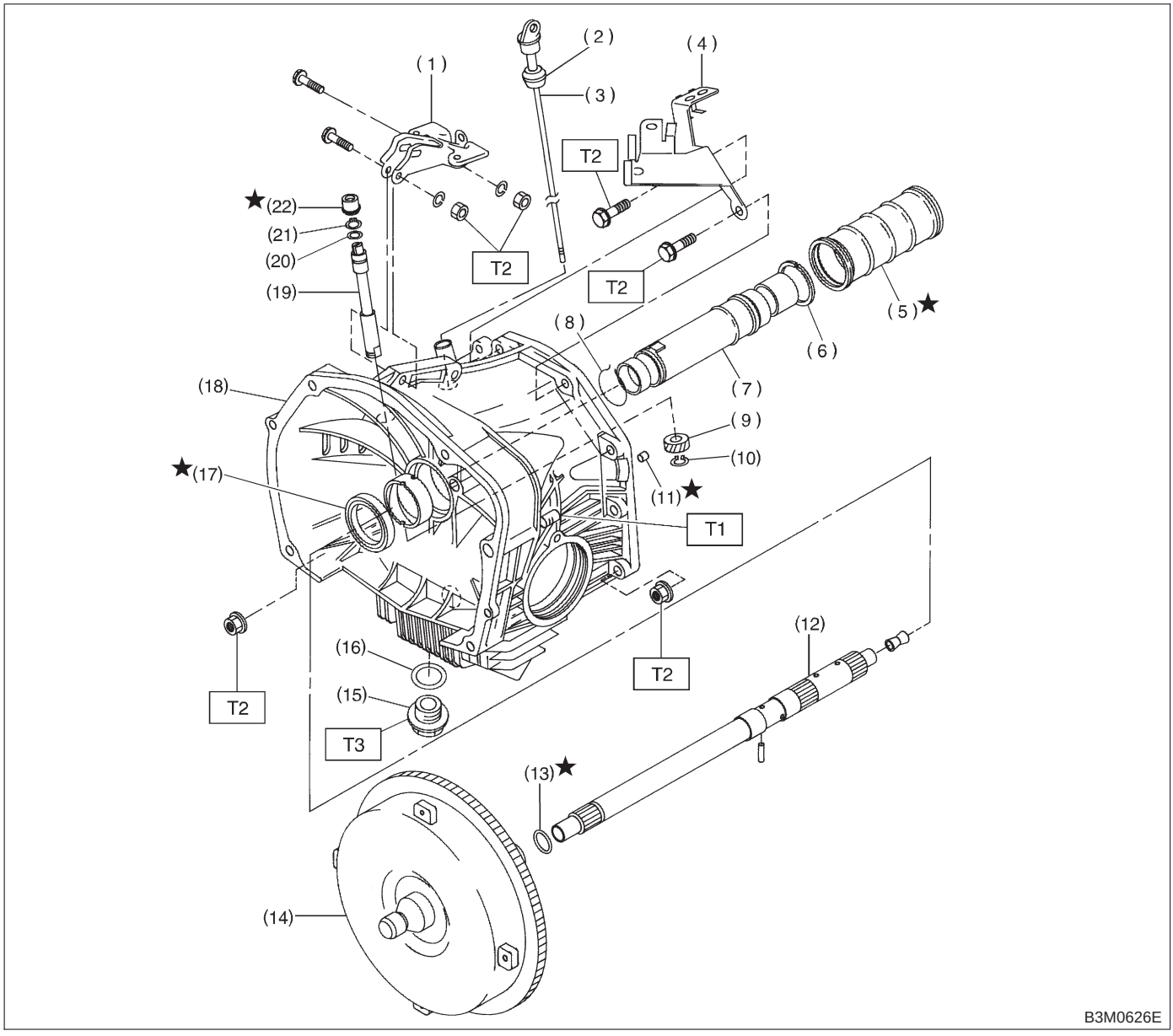


Transmission case



G3M0777

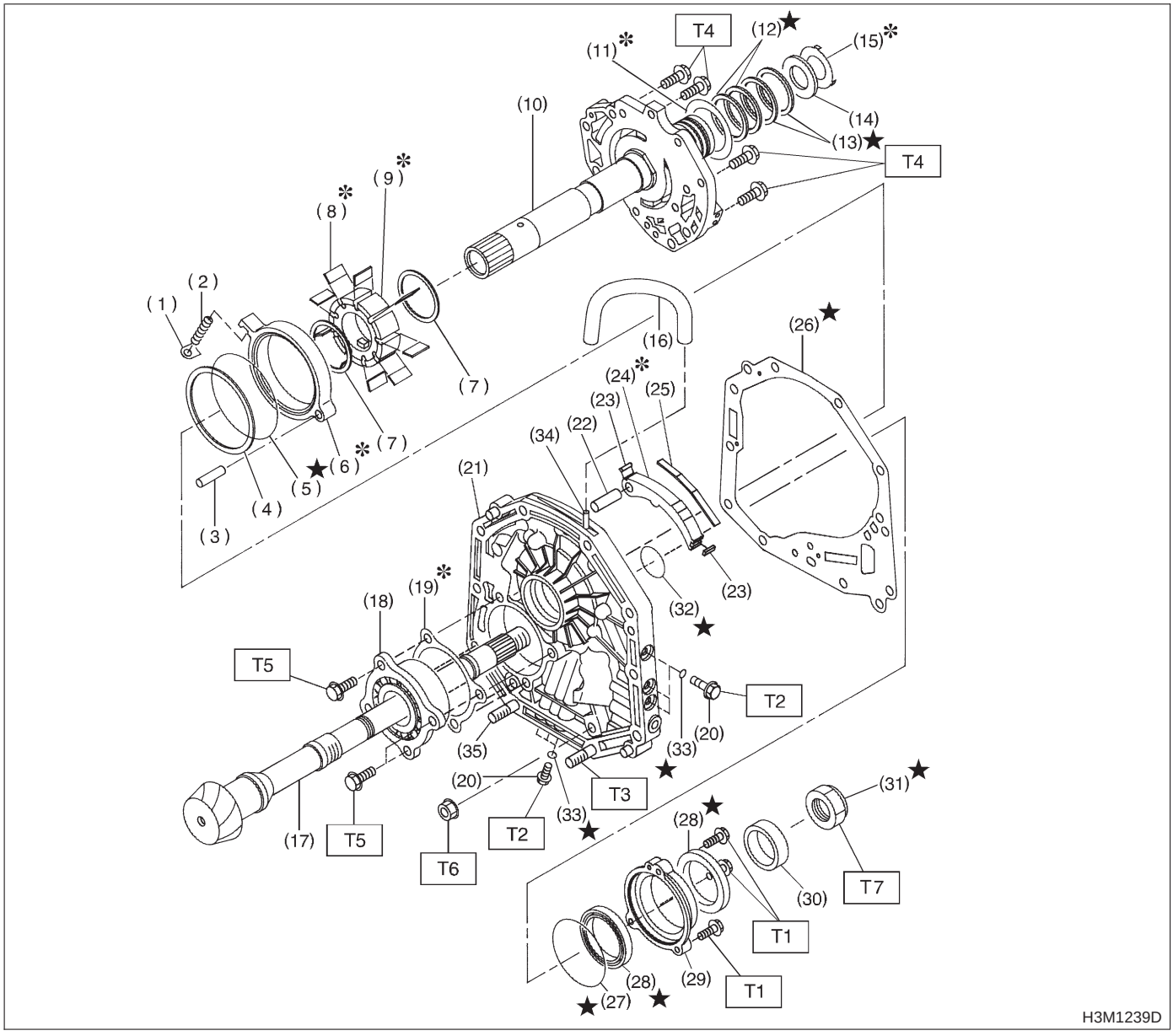
1. Torque Converter Clutch and Case



(1) Pitching stopper bracket
(2) O-ring
(3) Oil level gauge
(4) Stay
(5) Seal pipe
(6) Seal ring
(7) Oil pump shaft
(8) Clip
(9) Speedometer driven gear
(10) Snap ring
(11) Oil drain pipe
(12) Input shaft
(13) O-ring
(14) Torque converter clutch
(15) Drain plug
(16) Gasket
(17) Oil seal
(18) Torque converter clutch case
(19) Speedometer shaft
(20) Washer
(21) Snap ring
(22) Oil seal

Tightening torque: N·m (kg-m, ft-lb)
T1: 18±5 (1.8±0.5, 13.0±3.6)
T2: 41±3 (4.2±0.3, 30.4±2.2)
T3: 44±3 (4.5±0.3, 32.5±2.2)

2. Oil Pump

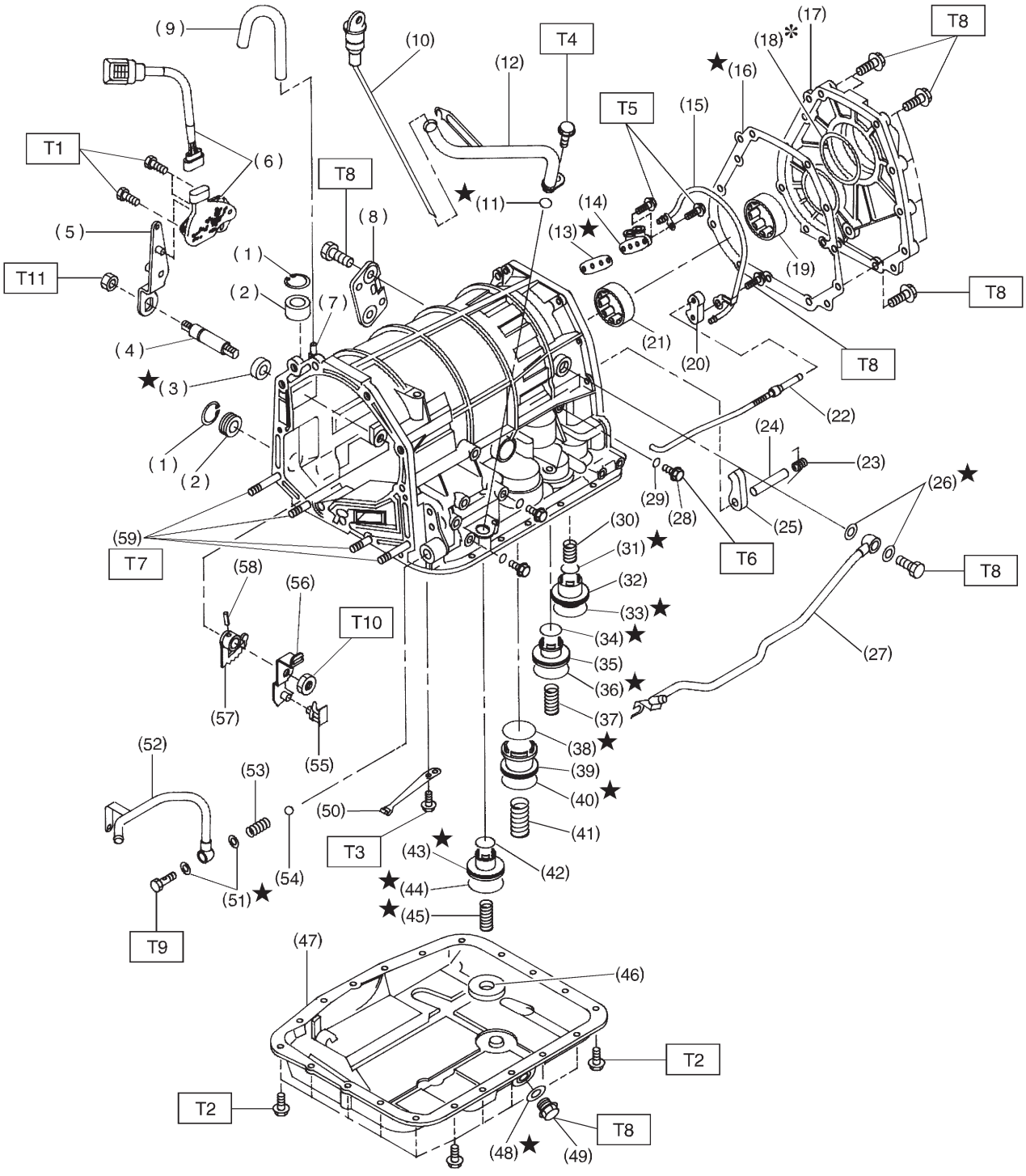


H3M1239D

(1) Retainer
(2) Return spring
(3) Pin
(4) Friction ring
(5) O-ring
(6) Cam ring
(7) Vane ring
(8) Vane
(9) Rotor
(10) Oil pump cover
(11) Thrust washer
(12) Seal ring (R)
(13) Seal ring (H)
(14) Thrust needle bearing
(15) Thrust washer
(16) Air breather hose
(17) Drive pinion shaft
(18) Roller bearing
(19) Shim
(20) Test plug
(21) Oil pump housing
(22) Pin
(23) Side seal
(24) Control piston
(25) Plane seal
(26) Gasket
(27) O-ring
(28) Oil seal
(29) Oil seal retainer
(30) Drive pinion collar
(31) Lock nut
(32) O-ring
(33) O-ring
(34) Nipple
(35) Stud bolt

Tightening torque: N·m (kg-m, ft-lb)
T1: 7±1 (0.7±0.1, 5.1±0.7)
T2: 13±1 (1.3±0.1, 9.4±0.7)
T3: 18±5 (1.8±0.5, 13.0±3.6)
T4: 25±2 (2.5±0.2, 18.1±1.4)
T5: 39±3 (4.0±0.3, 28.9±2.2)
T6: 41±3 (4.2±0.3, 30.4±2.2)
T7: 113±5 (11.5±0.5, 83.2±3.6)

3. Transmission Case, Transmission Cover and Control Device

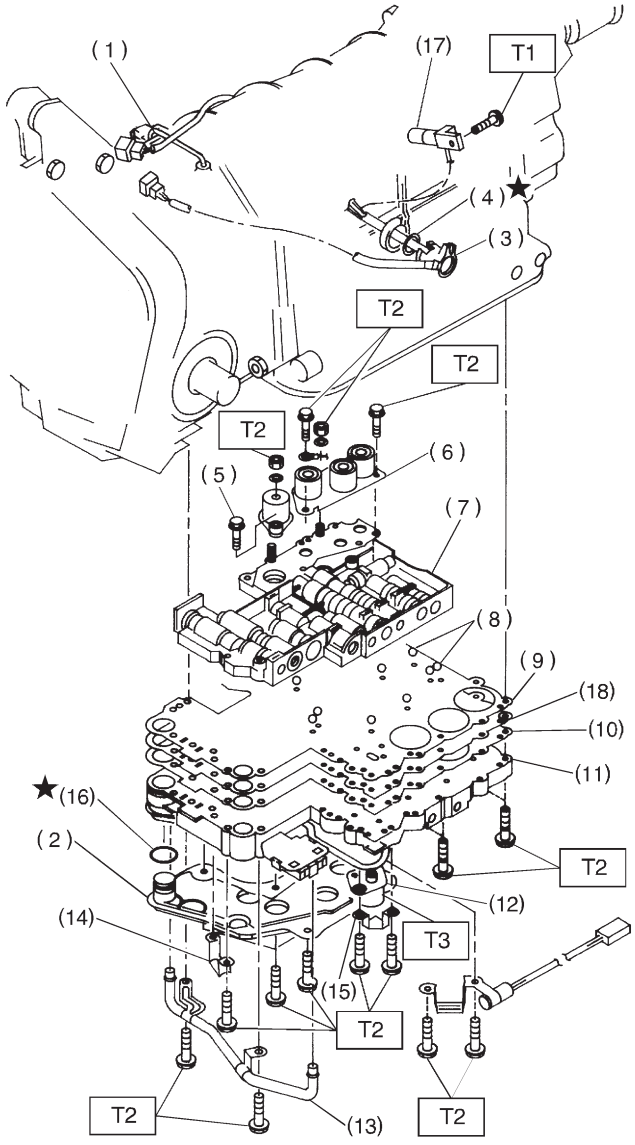


H3M1483C

(1) Snap ring
(2) Plug
(3) Oil seal
(4) Manual shaft
(5) Range select lever
(6) Inhibitor switch ASSY
(7) Nipple
(8) Plate ASSY
(9) Air breather hose
(10) Oil level gauge
(11) O-ring
(12) Oil charger pipe
(13) Gasket
(14) Relief valve
(15) Pipe
(16) Gasket
(17) Transmission cover (FWD model)
(18) Shim
(19) Roller bearing
(20) Parking support
(21) Ball bearing
(22) Parking rod
(23) Return spring
(24) Shaft
(25) Parking pawl
(26) Gasket
(27) Inlet pipe
(28) Test plug
(29) O-ring
(30) Spring
(31) O-ring
(32) Accumulator piston (N-D)
(33) O-ring
(34) O-ring
(35) Accumulator piston (2-3)
(36) O-ring
(37) Spring
(38) O-ring
(39) Accumulator piston (1-2)
(40) O-ring
(41) Spring
(42) O-ring
(43) Accumulator piston (3-4)
(44) O-ring
(45) Spring
(46) Magnet
(47) Oil pan
(48) Gasket
(49) Drain plug
(50) Detention spring
(51) Gasket
(52) Outlet pipe
(53) Spring
(54) Ball
(55) Stopper
(56) Manual lever
(57) Manual plate
(58) Spring pin
(59) Stud bolt

Tightening torque: N·m (kg-m, ft-lb)
T1: 3.4±0.5 (0.35±0.05, 2.5±0.4)
T2: 4.9±0.5 (0.50±0.05, 3.6±0.4)
T3: 5.9±1.0 (0.60±0.10, 4.3±0.7)
T4: 6.4±0.5 (0.65±0.05, 4.7±0.4)
T5: 7.8±1.0 (0.80±0.10, 5.8±0.7)
T6: 12.7±1.0 (1.30±0.10, 9.4±0.7)
T7: 17.7±2.9 (1.80±0.30, 13.0±2.2
T8: 24.5±2.0 (2.50±0.20, 18.1±1.4)
T9: 34.3±2.9 (3.50±0.30, 25.3±2.2)
T10: 47.1±2.0 (4.80±0.20, 34.7±1.4)
T11: 47.1±4.9 (4.80±0.50, 34.7±3.6)

4. Control Valve and Harness Routing

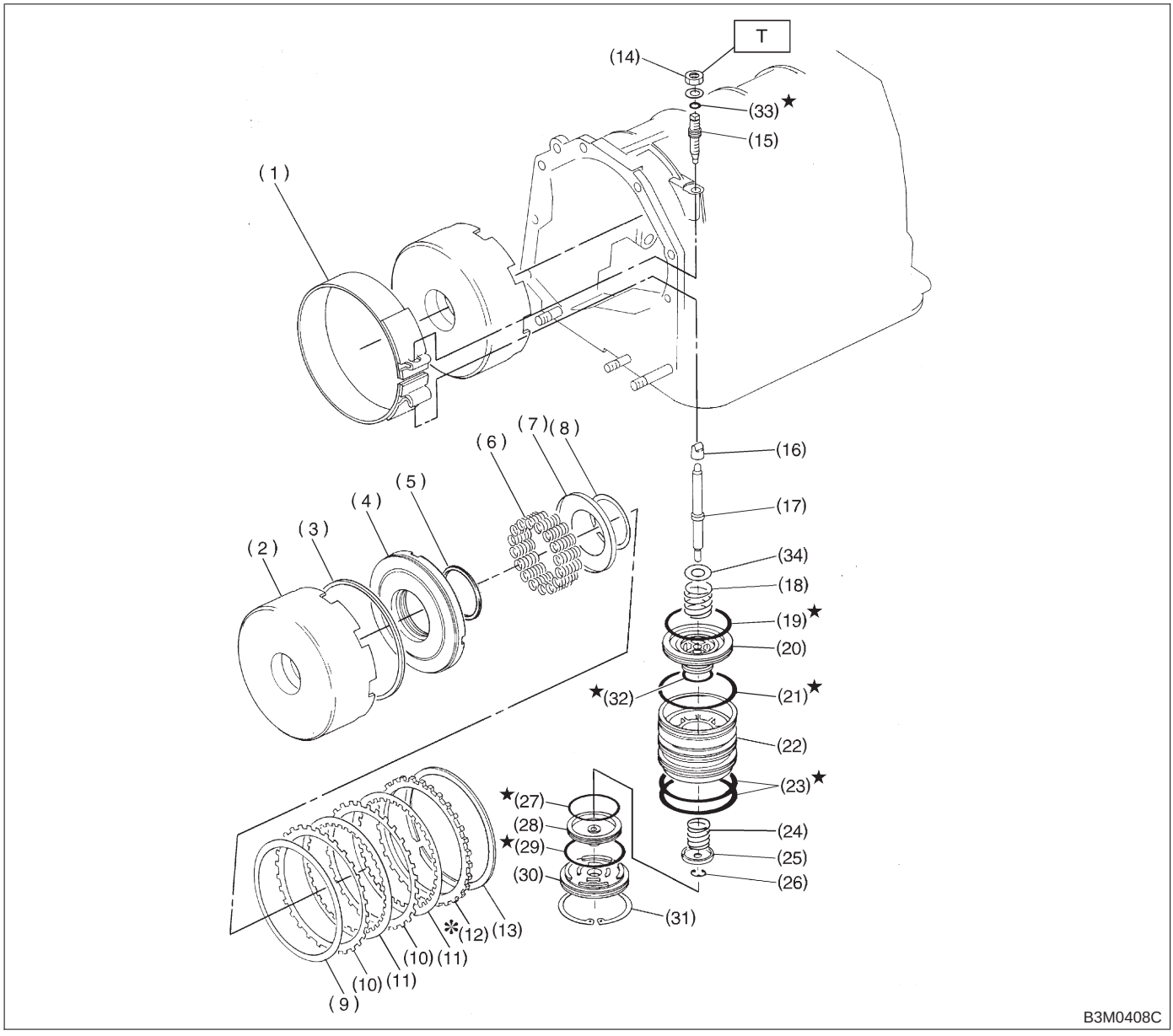


B3M0106C

(1) Stay
(2) Oil strainer
(3) Transmission harness
(4) O-ring
(5) Duty solenoid A (Line pressure)
(6) Shift solenoid ASSY
(7) Upper valve body
(8) Ball
(9) Upper separator gasket
(10) Lower separator gasket
(11) Lower valve body
(12) Duty solenoid B (Lock-up)
(13) Pipe
(14) Bracket
(15) Bracket
(16) O-ring
(17) Vehicle speed sensor 1 (FWD only)
(18) Separator plate

Tightening torque: N·m (kg-m, ft-lb)
T1: 7±1 (0.7±0.1, 5.1±0.7)
T2: 8±1 (0.8±0.1, 5.8±0.7)
T3: 11.3±1.5 (1.15±0.15, 8.3±1.1)

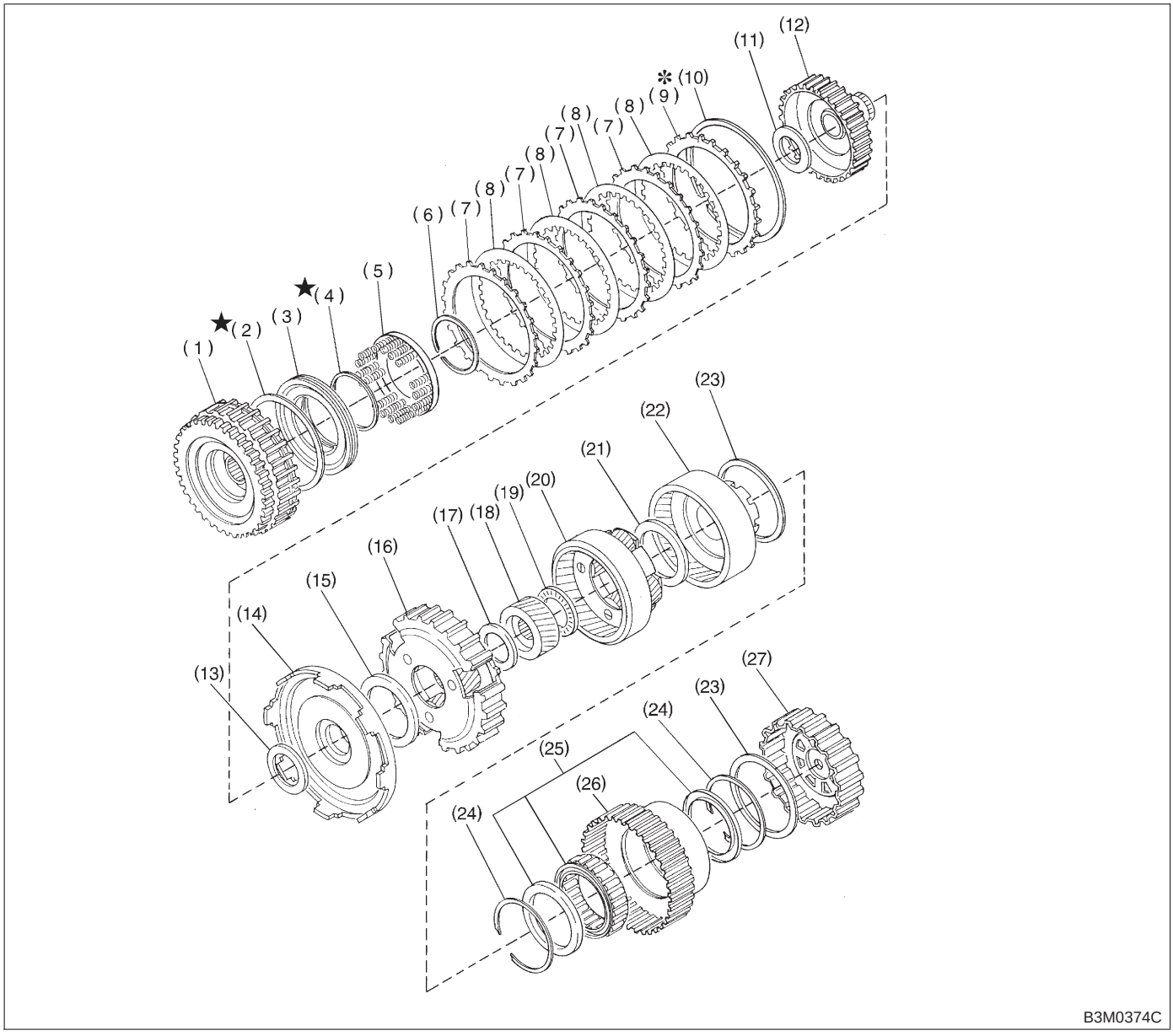
5. Reverse Clutch and Band Brake



(1) Brake band
(2) Reverse clutch drum
(3) Lip seal
(4) Piston
(5) Lathe cut seal ring
(6) Spring
(7) Spring retainer
(8) Snap ring
(9) Dish plate
(10) Driven plate
(11) Drive plate
(12) Retaining plate
(13) Snap ring
(14) Lock nut
(15) Brake band adjusting screw
(16) Strut
(17) Band servo piston stem
(18) Spring
(19) Lathe cut seal ring
(20) Band servo piston (1-2)
(21) O-ring
(22) Retainer
(23) O-ring
(24) Spring
(25) Retainer
(26) Circlip
(27) Lathe cut seal ring
(28) Band servo piston (3-4)
(29) O-ring
(30) O.D. servo retainer
(31) Snap ring
(32) Lathe cut seal ring
(33) O-ring
(34) Washer

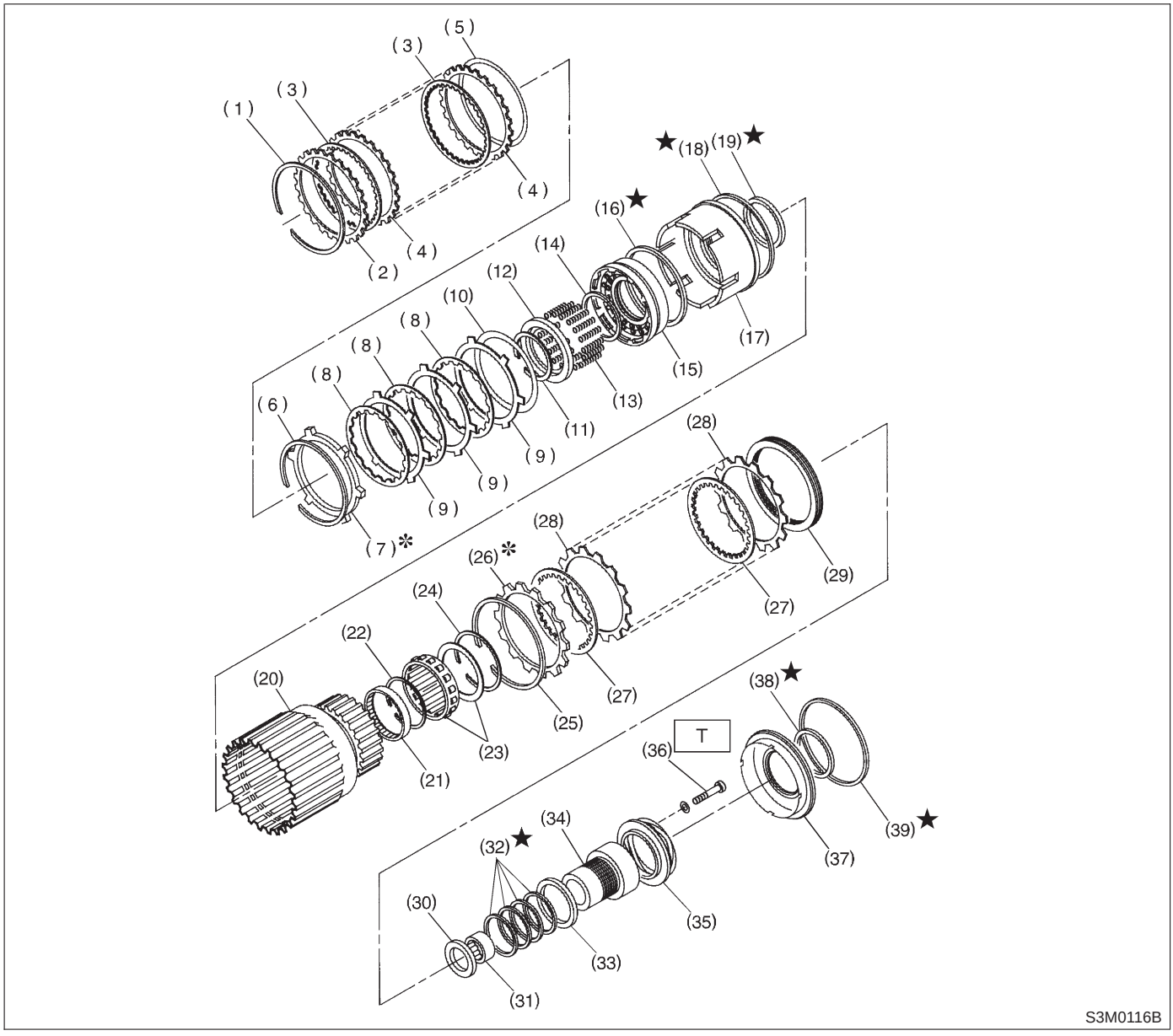
Tightening torque: N·m (kg-m, ft-lb)
T: 26±2 (2.7±0.2, 19.5±1.4)

6. High Clutch and Planetary Gear



(1) High clutch drum
(2) Lathe cut seal ring
(3) Piston
(4) Lathe cut seal ring
(5) Spring retainer
(6) Snap ring
(7) Driven plate
(8) Drive plate
(9) Retaining plate
(10) Snap ring
(11) Thrust needle bearing
(12) High clutch hub
(13) Thrust needle bearing
(14) Front sun gear
(15) Thrust needle bearing
(16) Front planetary carrier
(17) Thrust needle bearing
(18) Rear sun gear
(19) Thrust needle bearing
(20) Rear planetary carrier
(21) Thrust needle bearing
(22) Rear internal gear
(23) Thrust washer
(24) Snap ring
(25) One-way clutch (3-4)
(26) One-way clutch outer race (3-4)
(27) Overrunning clutch hub

7. Forward Clutch and Low & Reverse Brake

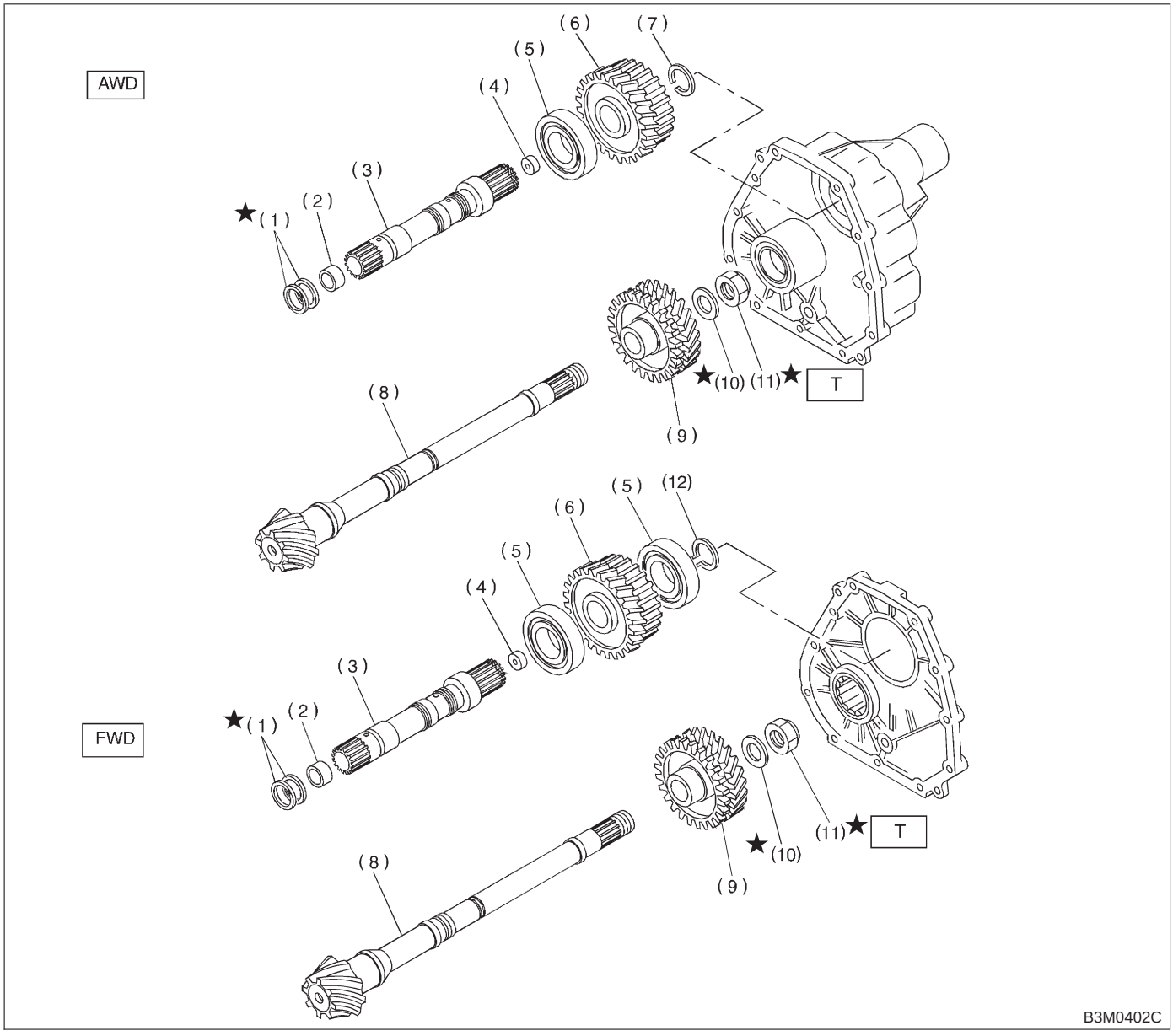


S3M0116B

(1) Snap ring
(2) Retaining plate
(3) Drive plate
(4) Driven plate
(5) Dish plate
(6) Snap ring
(7) Retaining plate
(8) Drive plate
(9) Driven plate
(10) Dish plate
(11) Snap ring
(12) Spring retainer
(13) Spring
(14) Lathe cut seal ring
(15) Overrunning piston
(16) Lathe cut seal ring
(17) Forward piston
(18) Lip seal
(19) Lathe cut seal ring
(20) Forward clutch drum
(21) Needle bearing
(22) Snap ring
(23) One-way clutch (1-2)
(24) Snap ring
(25) Snap ring
(26) Retaining plate
(27) Drive plate
(28) Driven plate
(29) Wave spring
(30) Thrust needle bearing
(31) Needle bearing
(32) Seal ring
(33) Thrust washer
(34) One-way clutch inner race (1-2)
(35) Spring retainer
(36) Socket bolt
(37) Low & reverse piston
(38) Lathe cut seal ring
(39) Lathe cut seal ring

Tightening torque: N·m (kg-m, ft-lb)
T: 25±2 (2.5±0.2, 18.1±1.4)

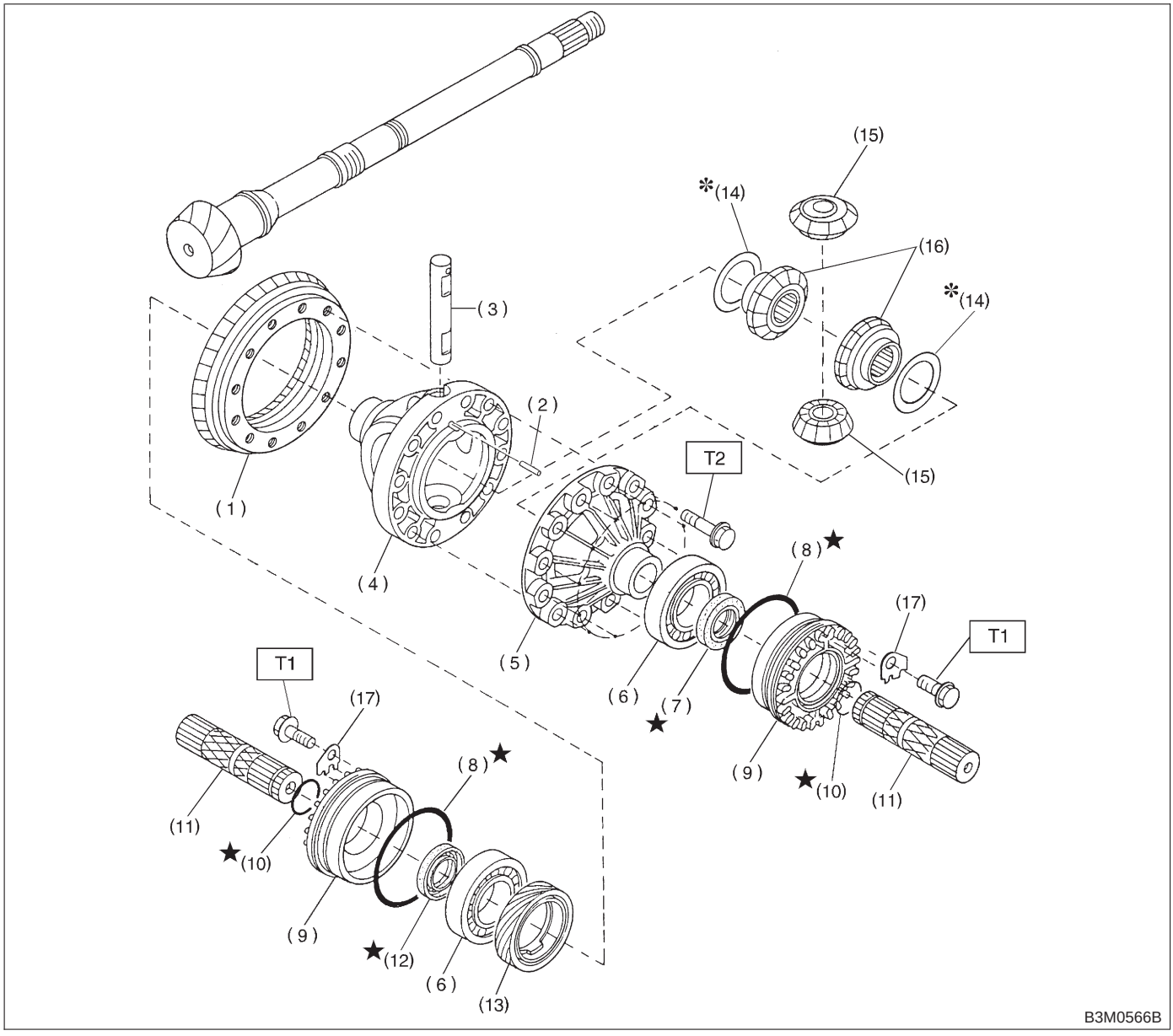
8. Reduction Gear



(1) Seal ring
(2) Bushing
(3) Reduction drive shaft
(4) Plug
(5) Ball bearing
(6) Reduction drive gear
(7) Snap ring
(8) Drive pinion shaft
(9) Reduction driven gear
(10) Washer
(11) Lock nut
(12) Snap ring

Tightening torque: N·m (kg-m, ft-lb)
T: 98±5 (10.0±0.5, 72.3±3.6)

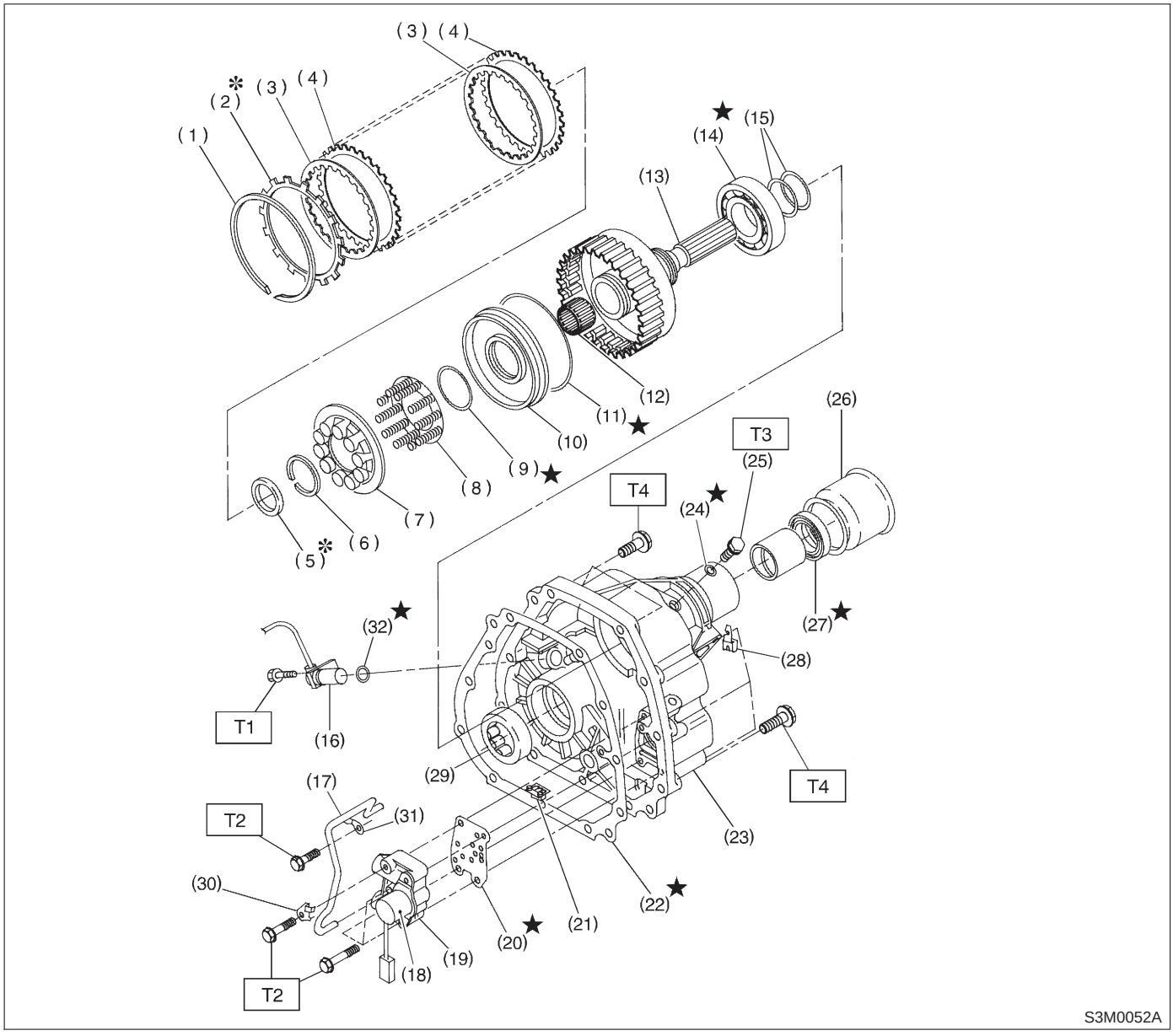
9. Differential Case



(1) Crown gear
(2) Straight pin
(3) Pinion shaft
(4) Differential case (RH)
(5) Differential case (LH)
(6) Taper roller bearing
(7) Oil seal (LH)
(8) O-ring
(9) Differential side retainer
(10) Circlip
(11) Axle shaft
(12) Oil seal (RH)
(13) Speedometer drive gear
(14) Washer
(15) Differential bevel pinion
(16) Differential bevel gear
(17) Lock plate

Tightening torque: N·m (kg-m, ft-lb)
T1: 25±2 (2.5±0.2, 18.1±1.4)
T2: 62±5 (6.3±0.5, 45.6±3.6)

10. Transfer and Extension



(1) Snap ring
(2) Pressure plate
(3) Drive plate
(4) Driven plate
(5) Thrust needle bearing
(6) Snap ring
(7) Seal transfer piston
(8) Spring retainer
(9) Lathe cut seal ring
(10) Transfer clutch piston
(11) Lathe cut seal ring
(12) Needle bearing
(13) Rear drive shaft
(14) Ball bearing
(15) Seal ring
(16) Vehicle speed sensor 1 (AWD only)
(17) Transfer clutch pipe
(18) Duty solenoid C (Transfer clutch)
(19) Transfer valve body
(20) Transfer valve plate
(21) Filter
(22) Gasket
(23) Extension case
(24) O-ring
(25) Test plug
(26) Dust seal
(27) Oil seal
(28) Clip
(29) Roller bearing
(30) Clip
(31) Stay
(32) O-ring

Tightening torque: N·m (kg-m, ft-lb)
T1: 7±1 (0.7±0.1, 5.1±0.7)
T2: 8±1 (0.8±0.1, 5.8±0.7)
T3: 13±1 (1.3±0.1, 9.4±0.7)
T4: 25±2 (2.5±0.2, 18.1±1.4)

1. General

A: PRECAUTION

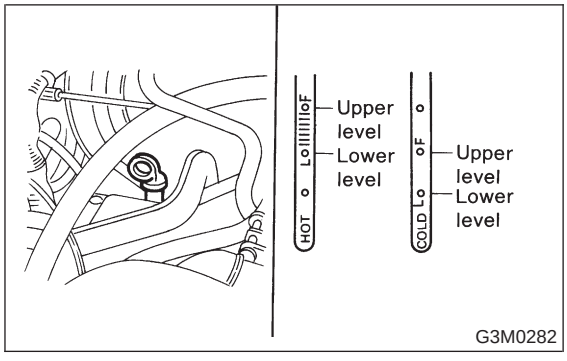
When disassembling or assembling the automatic transmission, observe the following instructions.
1) Workshop
Provide a place that is clean and free from dust. Principally the conventional workshop is suitable except for a dusty place. In a workshop where grinding work, etc. which produces fine particles is done, make independent place divided by the vinyl curtain or the equivalent.
2) Work table
The size of 1 x 1.5 m (40 x 60 in) is large enough to work, and it is more desirable that its surface be covered with flat plate like iron plate which is not rusted too much.
3) Cleaning of exterior
(1) Clean the exterior surface of transmission with steam and/or kerosene prior to disassembly, however it should be noted that vinyl tape be placed on the air breather or oil level gauge to prevent infiltration of the steam into the transmission and also the cleaning job be done away from the place of disassembly and assembly.
(2) Partial cleaning will do, depending on the extent of disassembly (such as when disassembly is limited to some certain parts).
4) Disassembly, assembly and cleaning
(1) Disassemble and assemble the transmission while inspecting the parts in accordance with the Diagnostics.
(2) During job, don't use gloves. Don't clean the parts with rags: Use chamois or nylon cloth.
(3) Pay special attention to the air to be used for cleaning. Get the moisture and the dust rid of the air as much as possible. Be careful not to scratch or dent any part while checking for proper operation with an air gun.
(4) Complete the job from cleaning to completion of assembly as continuously and speedily as possible in order to avoid occurrence of secondary troubles caused by dust. When stopping the job unavoidably cover the parts with clean chamois or nylon cloth to keep them away from any dust.
(5) Use kerosene, white gasoline or the equivalent as washing fluid. Use always new fluid for cleaning the automatic transmission parts and never reuse. The used fluid is usable in disassemble and assemble work of engine and manual transmission.
(6) Although the cleaning should be done by dipping into the washing fluid or blowing of the pressurized washing fluid, the dipping is more desirable. (Do not rub with a brush.) Assemble the parts immediately after the cleaning without exposure to the air for a while. Besides in case of washing rubber parts, perform the job quickly not to dip them into the washing fluid for long time.
(7) Apply the automatic transmission fluid (ATF) onto the parts immediately prior to assembly, and the specified tightening torque should be observed carefully.
(8) Use vaseline if it is necessary to hold parts in the position when assembling.
(9) Drain ATF and differential gear oil into a saucer so that the conditions of fluid and oil can be inspected.
(10) Do not support axle drive shaft, stator shaft, input shaft or various pipes when moving transmission from one place to another.
(11) Always discard old oil seals and O-ring, and install new ones.
(12) Always discard old oil seals and O-ring, and install new ones.
(13) Be sure to replace parts which are damaged, worn, scratched, discolored, etc.

B: INSPECTION

1. ATF LEVEL

1) Raise ATF temperature to 60 to 80°C (140 to 176°F) from 40 to 60°C (104 to 140°F) (when cold) by driving a distance of 5 to 10 km (3 to 6 miles).

NOTE:
The level of ATF varies with fluid temperature. Pay attention to the fluid temperature when checking oil level.



2) Make sure the vehicle is level. After selecting all positions (P, R, N, D, 3, 2, 1), set the selector leveler in "P" range. Measure fluid level with the engine idling.

NOTE:
After running, idle the engine for one or two minutes before measurement.

3) If the fluid level is below the center between upper and lower marks, add the recommended ATF until the fluid level is found within the specified

range (above the center between upper and lower marks). When the transmission is hot, the level should be above the center of upper and lower marks, and when it is cold, the level should be found below the center of these two marks.

CAUTION:
- **Use care not to exceed the upper limit level.**
- **ATF level varies with temperature. Remember that the addition of fluid to the upper limit mark when the transmission is cold will result in the overfilling of fluid.**

4) Fluid temperature rising speed
- By idling the engine

Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 25 minutes
<Reference>
Time for temperature rise to 30°C (86°F) with atmospheric temperature of 0°C (32°F): Approx. 8 minutes
- By running the vehicle

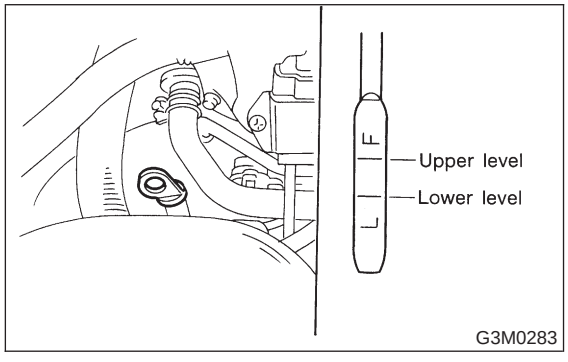
Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 10 minutes
5) Method for checking fluid level upon delivery or at periodic inspection
Check fluid level after a warm-up run of approx. 10 minutes. During the warm-up period, the automatic transmission functions can also be checked.

2. DIFFERENTIAL GEAR OIL LEVEL

1) Ensure the vehicle is in safe condition.

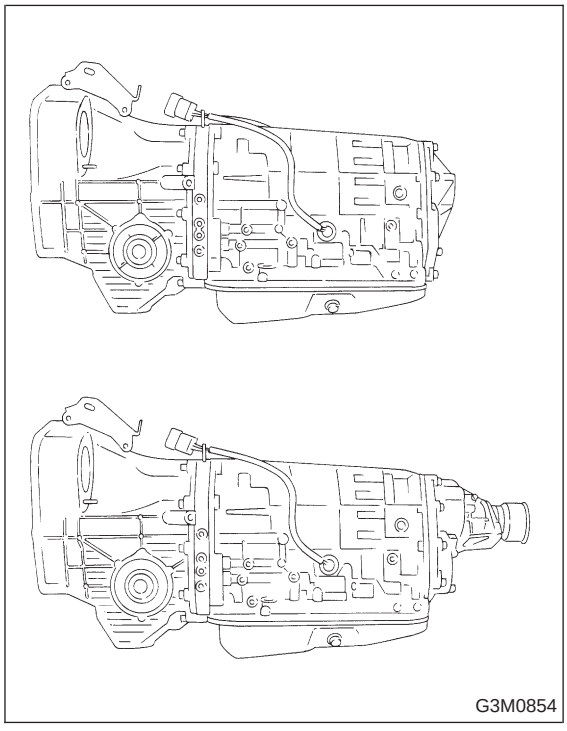
NOTE:
Do not check the oil level nor add oil to the case with the front end of the vehicle jacked-up; this will result in an incorrect reading of the oil level.

2) Check whether the oil level is between the upper (F) and lower (L) marks. If it is below the lower limit mark, add oil until the level reaches the upper mark.

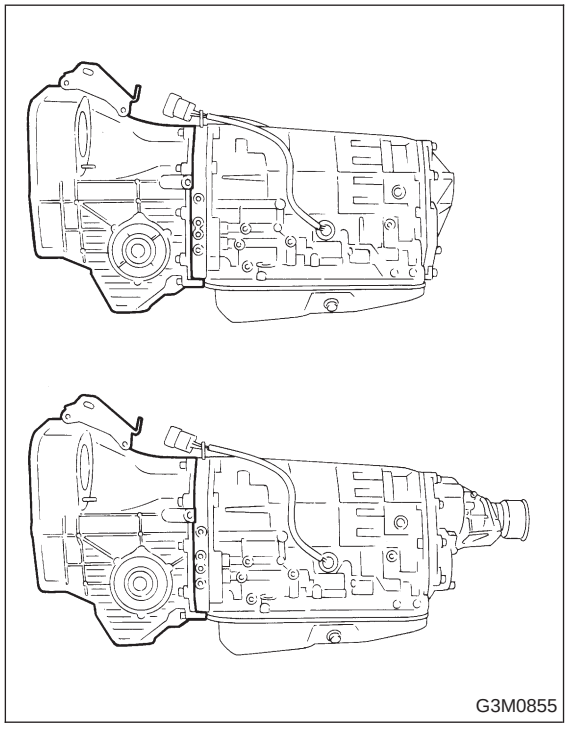


3. OIL LEAKAGE

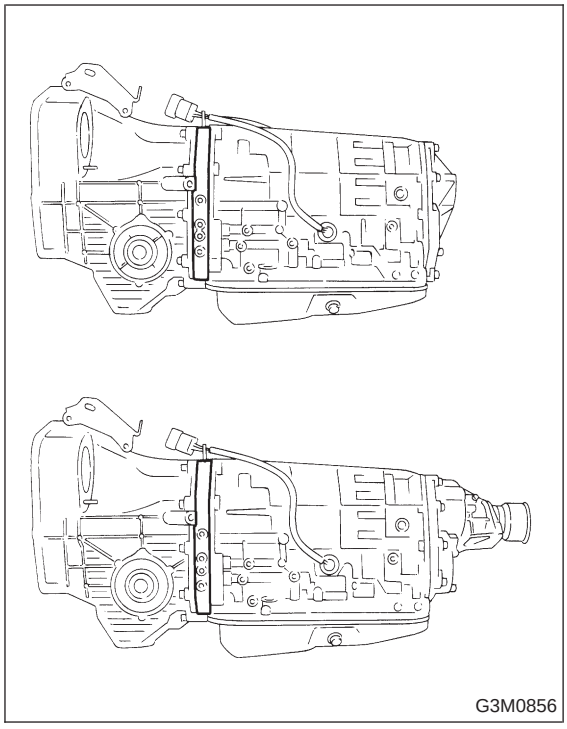
It is difficult to accurately determine the precise position of a oil leak, since the surrounding area also becomes wet with oil. The places where oil seals and gaskets are used are as follows:
1) Jointing portion of the case
- Transmission case and oil pump housing jointing portion
- Torque converter clutch case and oil pump housing jointing portion
- Transmission case and transmission cover jointing portion (FWD)
- Transmission case and extension case jointing portion (AWD)



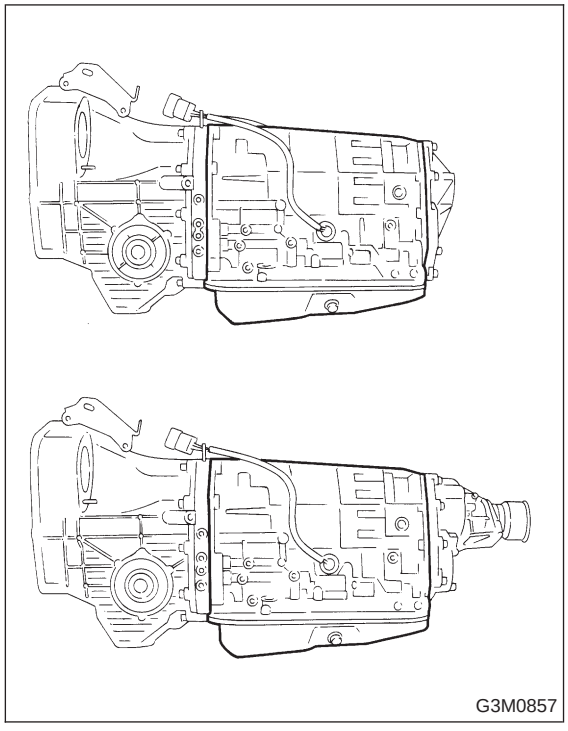
2) Torque converter clutch case
- Engine crankshaft oil seal
- Torque converter clutch impeller sleeve oil seal
- ATF cooler pipe connector
- Torque converter clutch
- Torque converter clutch case
- Axle shaft oil seal
- O-ring on the outside diameter of axle shaft oil seal holder
- O-ring on the differential oil gauge
- Differential oil drain plug
- Speedometer cable mounting portion
- Location of steel balls



3) Oil pump housing
- Oil pump housing (Defective casting)
- O-ring on the test plugs
- Checking blind plugs
- Differential gear breather

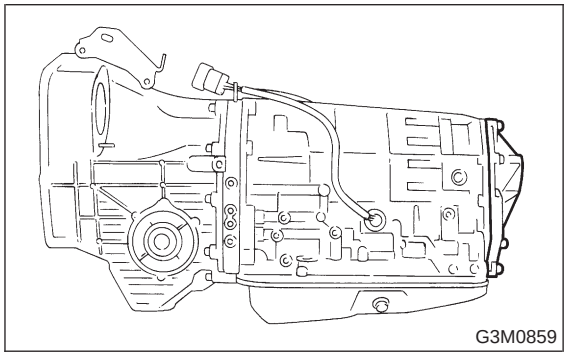


4) Automatic transmission case
- Transmission case (Defective casting)
- Mating surface of oil pan
- O-ring on the test plugs
- Checking blind plugs (Steel balls)
- Oil supply pipe connector
- ATF cooler pipe connector and gasket
- Oil pan drain plug
- O-ring on the transmission harness holder
- Oil pump plugs
- ATF breather
- Shift lever oil seal

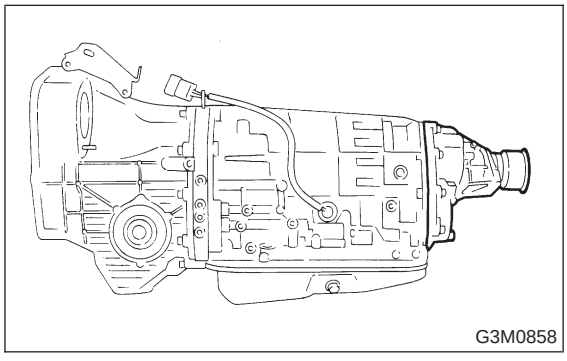

G3M0857

5) Transmission cover
- Transmission cover (Defective casting)

The point listed above should be checked for fluid leak. Checking method is as follows:
- Place the vehicle in the pit, and check whether the leaking oil is ATF or not. The ATF is wine red in color, and can be discriminated easily from engine oil and gear oil.
- Wipe clean the leaking oil and dust from a suspectable area, using a non-inflammable organic solvent such as carbon tetrachloride.
- Run the engine to raise the fluid temperature, and set the selector lever to “D” in order to increase the fluid pressure and quickly detect a leaking point. Also check for fluid leaks while shifting select lever to “R”, “2”, and “1”.


G3M0859

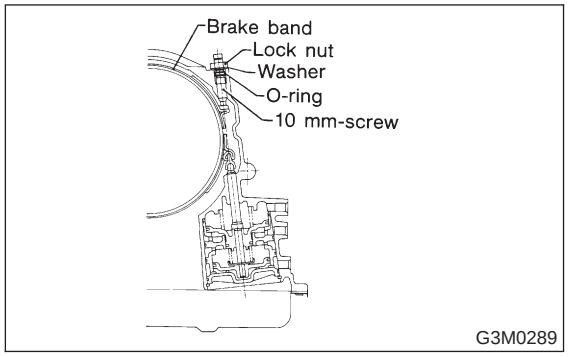
6) Extension case
- Extension case (Defective casting)
- O-ring on the vehicle speed sensor
- Rear drive shaft oil seal
- Checking blind plugs (Steel ball)
- O-ring on the test plugs


G3M0858

2. Band Brake

A: INSPECTION

If the following abnormal shifting conditions are noted in a road test, the brake band must be adjusted.

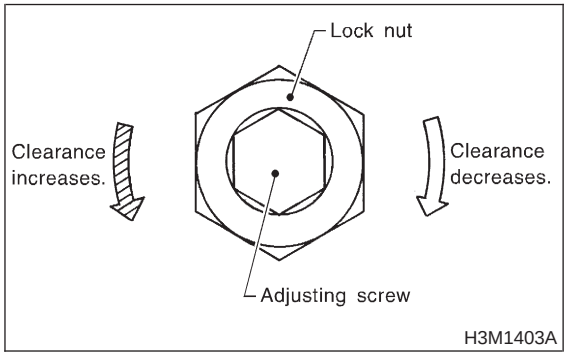


Improper brake band clearances and their symptoms	
Clearance	Problem
1. Too wide	Upshift from 1st directly to 3rd gear occurs.
2. Wide	● Engine rpm increases abruptly while upshifting from 1st to 2nd gear or 3rd to 4th gear. ● Time lag of at least one second occurs during kickdown operation from 3rd to 2nd gear.
3. Small	"Braking" symptom occurs while upshifting from 2nd to 3rd gear.
4. Too small	Upshifts from 2nd to 4th gear and downshifts from 4th to 2nd gear occur repeatedly.

B: ADJUSTMENT

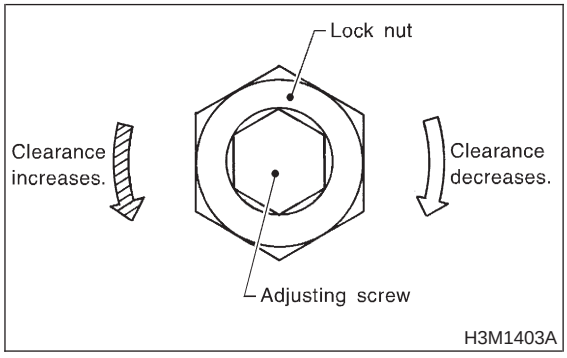
1) Using a ST, immobilize the end of the 10 mm-screw projecting on the left side of the transmission case, and loosen the nut with a double-end wrench.
In the case of occurrence of problems 2. and 3. mentioned previously, perform the adjustment by loosening or tightening the nut within a range of 3/4 turn from this state.

CAUTION:
Do not loosen excessively; otherwise, the band strut on the servo piston will drop off.



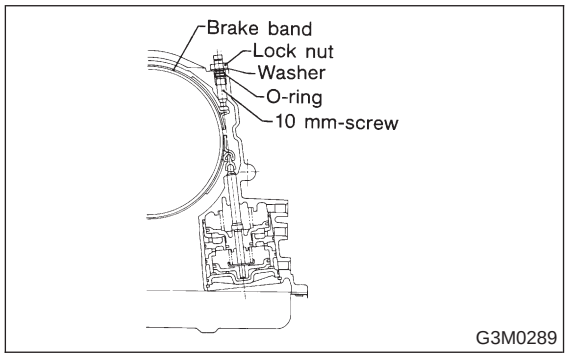
2) In case of the occurrence of problems 1. and 4. mentioned previously, perform the adjustment as follows:
Adjusting procedure: Tighten adjust screw to 9 N·m (0.9 kg-m, 6.5 ft-lb) torque, then back off three turns.

CAUTION:
Do not tighten the adjusting screw with an excessively large torque.



3) With the adjusting screw immobilized, tighten the lock nut.

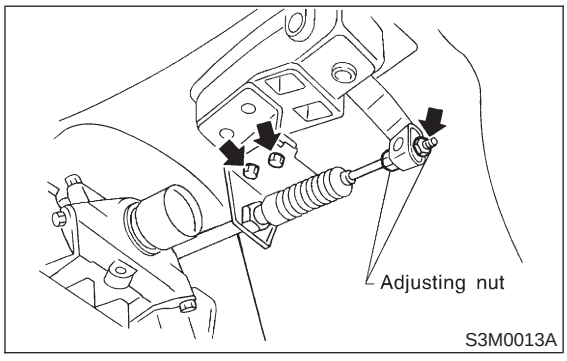
Tightening torque:
26±2 N·m (2.7±0.2 kg-m, 19.5±1.4 ft-lb)



3. Inhibitor Switch

A: INSPECTION

When driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

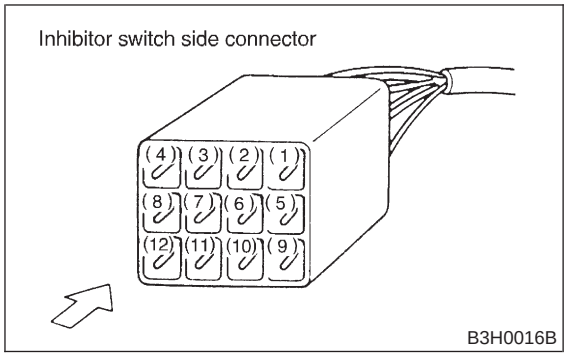


1) Disconnect cable end from select lever.
2) Disconnect inhibitor switch connector.
3) Check continuity in inhibitor switch circuits with select lever moved to each position.

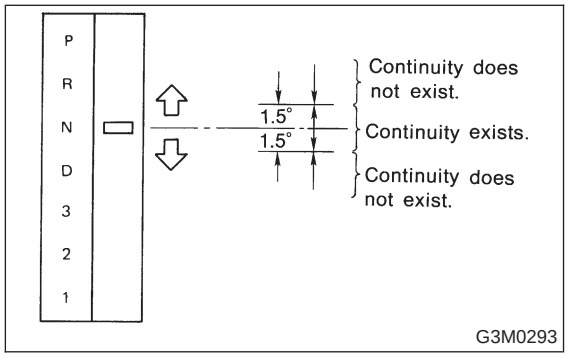
CAUTION:
Also check that continuity in ignition circuit does not exist when selector lever is in R, D, 3, 2 and 1 ranges.

NOTE:
If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Position	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9

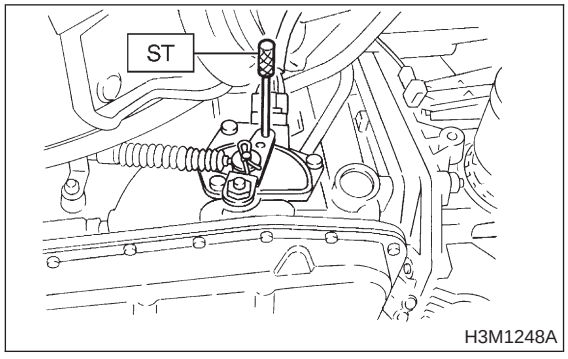


4) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from the N range.
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch.



B: ADJUSTMENT

1) Loosen the three inhibitor switch securing bolts.
2) Shift the select lever to the N range.
3) Insert ST as vertical as possible into the holes in the inhibitor switch lever and switch body.
ST 499267300 STOPPER PIN



4) Tighten the three inhibitor switch bolts.

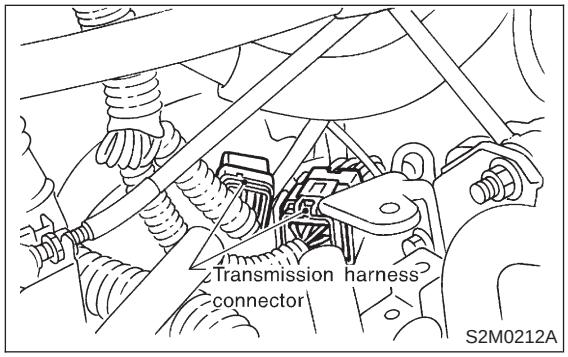
Tightening torque:
3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

5) Repeat the above checks. If the inhibitor switch is determined to be “faulty”, replace it.

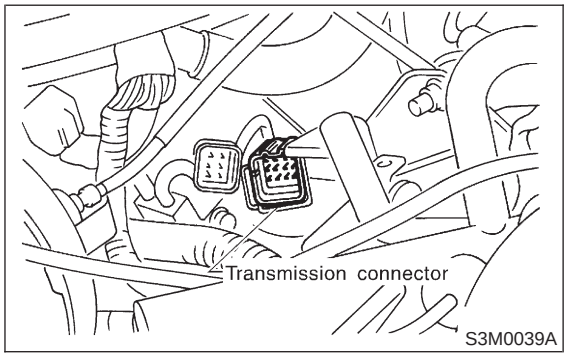
4. Sensor (in transmission)

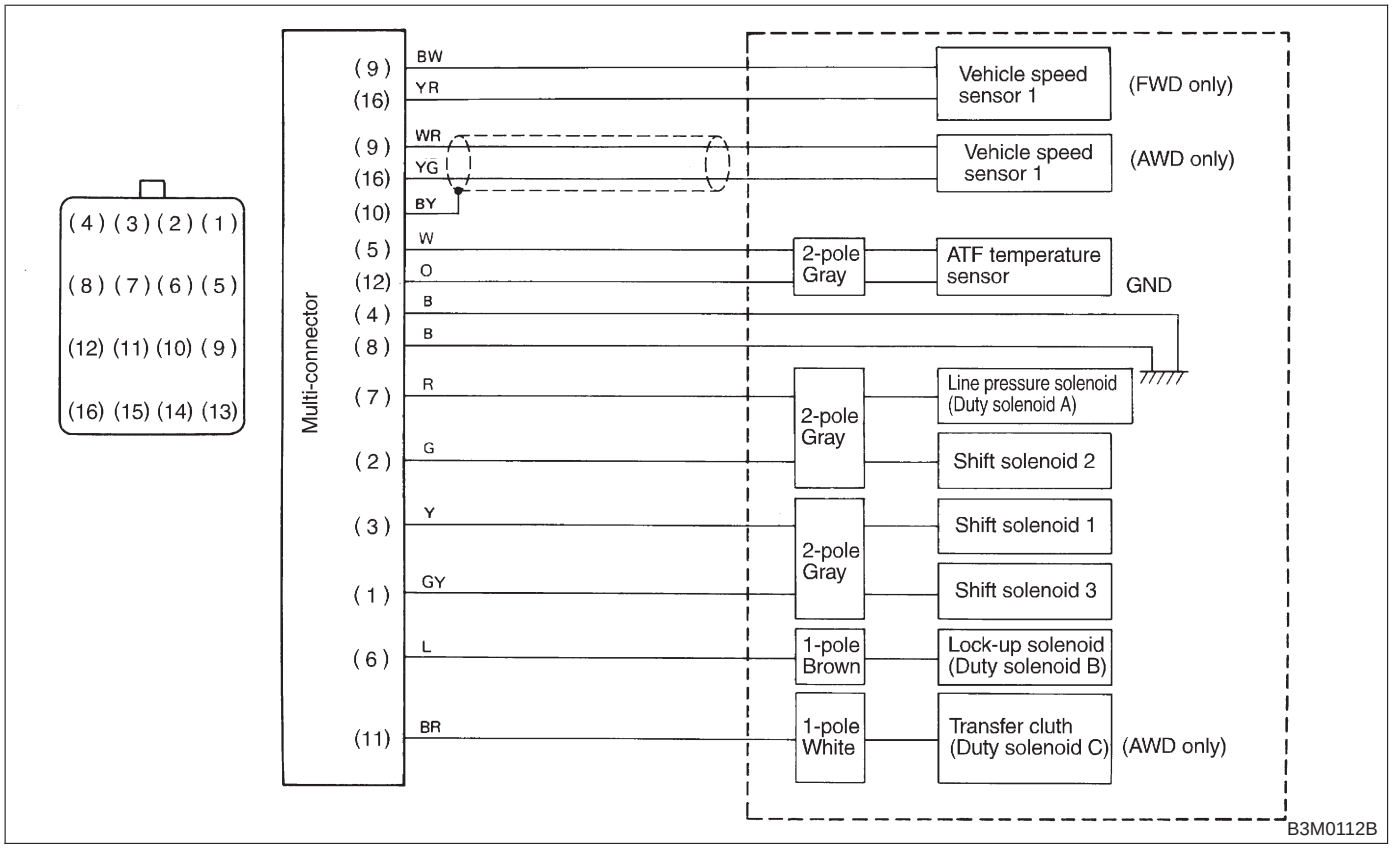
A: INSPECTION

1) Remove air intake chamber and duct.
2) Disconnect transmission connector.



3) Check each sensor, solenoid and ground system for short circuits.





1. EVALUATION

NOTE:
If part is faulty, its resistance value will be different from the standard value indicated above.

Part name	Terminal	Resistance (Ω)
Vehicle speed sensor 1	9 — 16	450 — 720
ATF temperature sensor	5 — 12	[2,100 — 2,900/20°C (68°F) 275 — 375/80°C (176°F)]
Duty solenoid A (Line pressure solenoid)	7 — 4, 8	1.5 — 4.5
Duty solenoid B (Lock-up solenoid)	6 — 4, 8	9 — 17
Shift solenoid 1	3 — 4, 8	20 — 32
Shift solenoid 2	2 — 4, 8	20 — 32
Shift solenoid 3	1 — 4, 8	20 — 32
Duty solenoid C (AWD only) (Transfer clutch solenoid)	11 — 4, 8	9 — 17

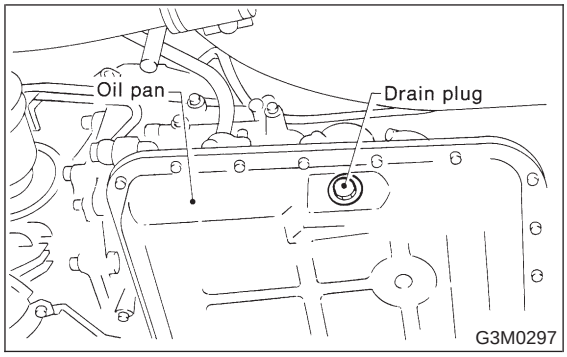
5. Shift Solenoid, Duty Solenoid and Valve

A: REMOVAL

1) Clean transmission exterior.
2) Drain ATF completely.

NOTE:
Tighten ATF drain plug after draining ATF.

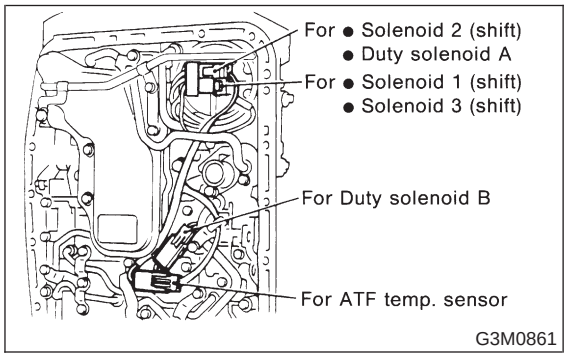
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



3) Remove oil pan and gasket.

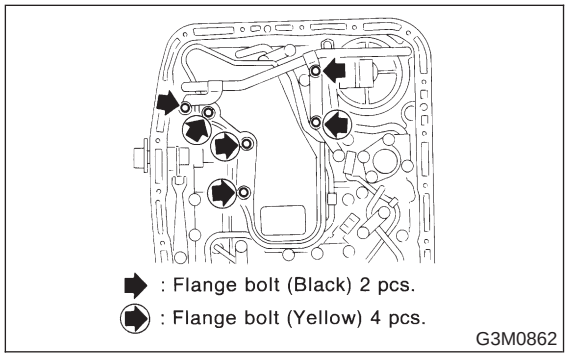
NOTE:
Drain oil into a container.

4) Disconnect solenoid valve connectors.
Remove connectors from clips and disconnect connectors at 4 places.



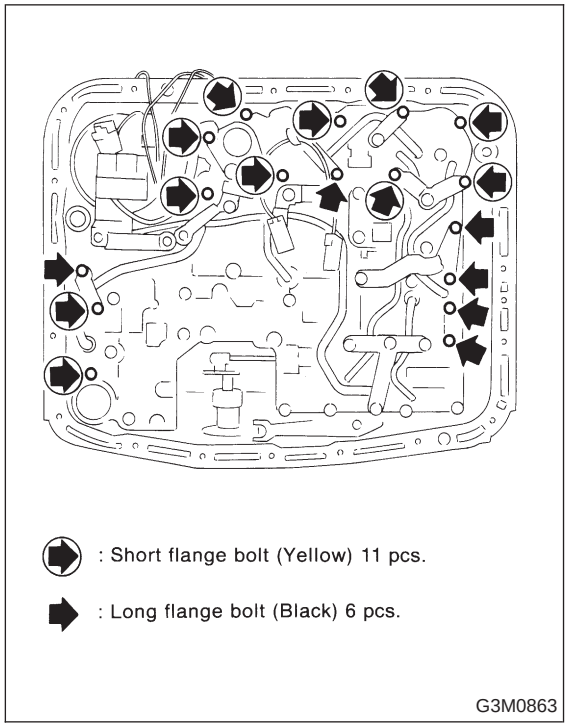
5) Remove oil strainer.
Disconnect oil pipe by removing the two bolts, and remove four bolts and oil strainer.

NOTE:
Be careful because oil flows from oil strainer.

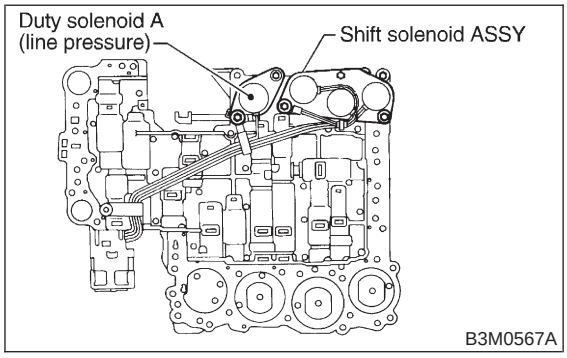


6) Remove control valve body and two brackets.
Remove 6 long bolts (Black) and 11 short bolts (Yellow).

NOTE:
- Be careful because oil flows from valve body.
- Be careful not to damage accumulator spring at rear of control valve.



7) Remove shift solenoid assembly, and duty solenoid A.

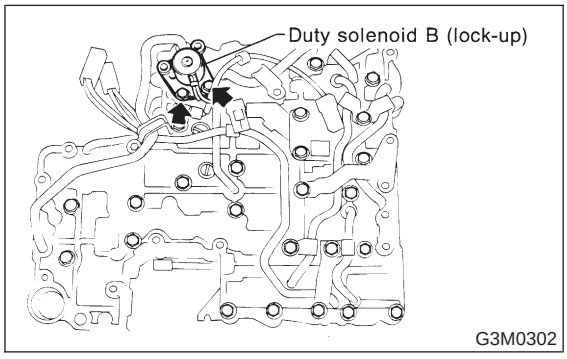


8) Remove duty solenoid B.

B: INSTALLATION

1) Install duty solenoid B (lock-up).

Tightening torque:
11.3±1.5 N·m (1.15±0.15 kg-m, 8.3±1.1 ft-lb)

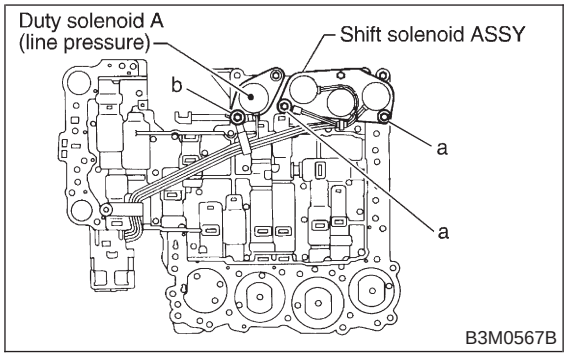


2) Install solenoid valves.
Shift solenoid assembly, and duty solenoid A (line pressure).

a length:
16 mm (0.63 in)

b length:
27 mm (1.06 in)

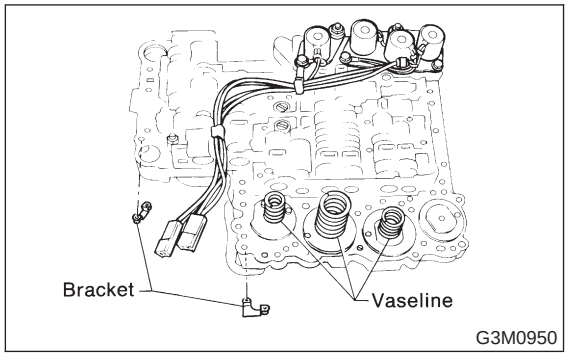
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



3) Install valve body and two brackets.

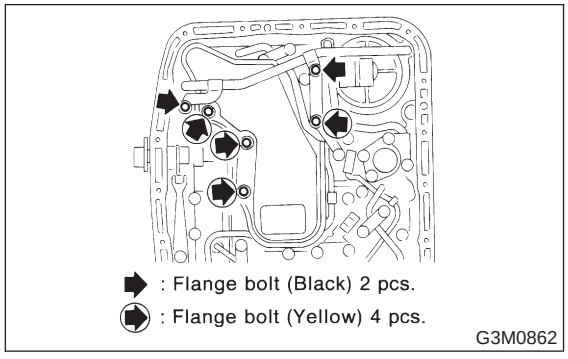
NOTE:
- Secure accumulator springs using vaseline.
- Align manual valve connections.

Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

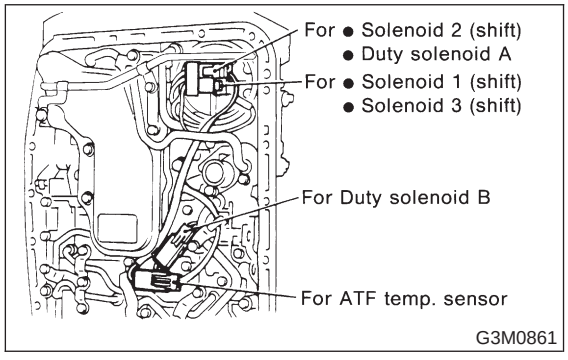


4) Install oil strainer.
Also install oil pipe and harness connector bracket.

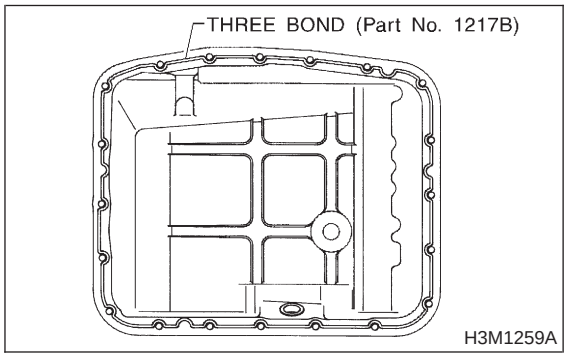
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



5) Connect harness connectors at 4 places.
Connect connectors of same color, and secure connectors to valve body using clips.

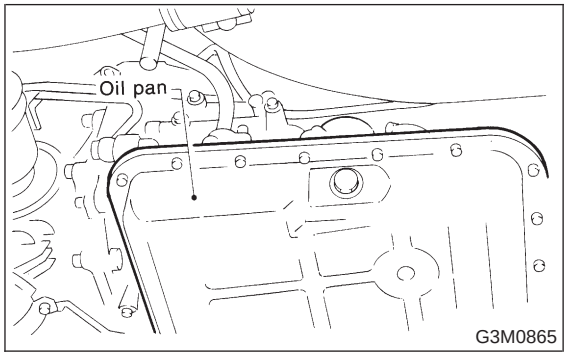


6) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.

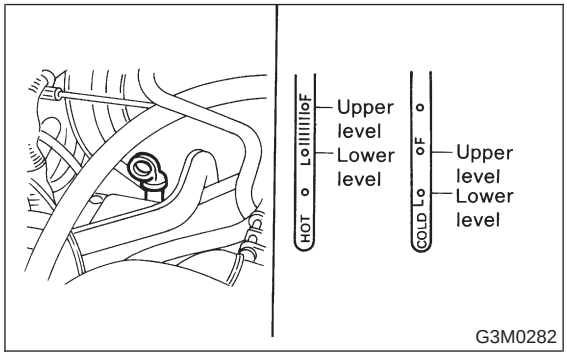


7) Install oil pan.

Tightening torque:
4.9±0.5 N·m (0.50±0.05 kg-m, 3.6±0.4 ft-lb)



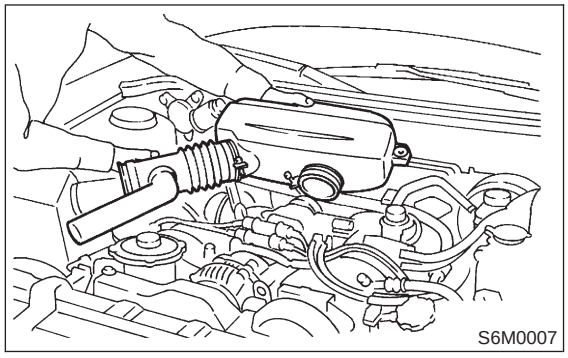
8) Add ATF and check level.



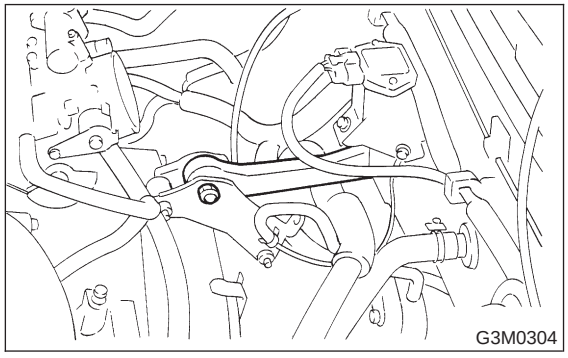
6. Duty Solenoid C and Transfer Valve Body

A: REMOVAL

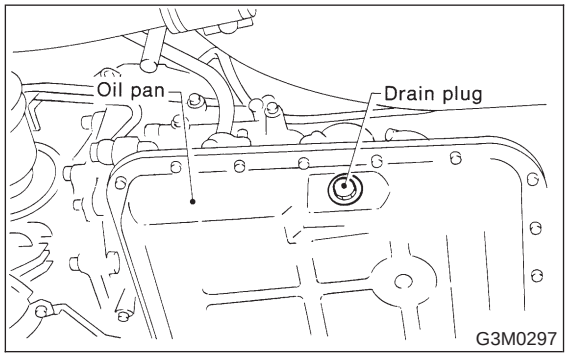
1) Remove air intake duct and chamber.



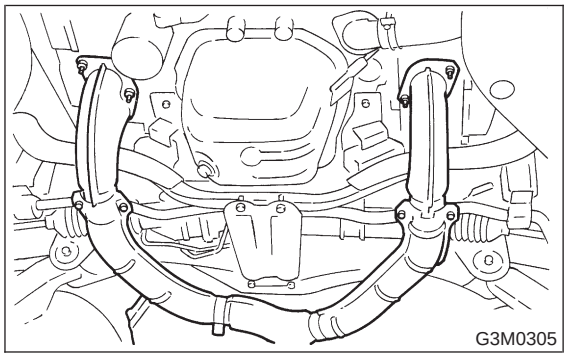
2) Remove pitching stopper.



3) Raise vehicle and drain ATF.

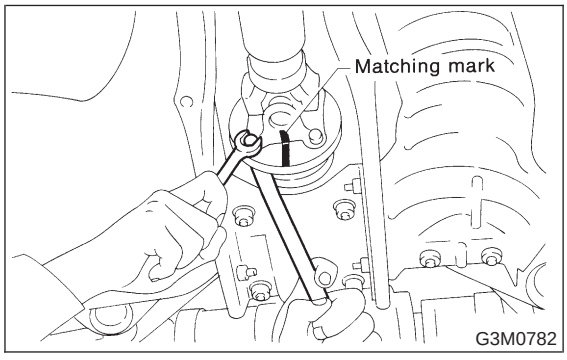


4) Remove front exhaust pipe.
Disconnect oxygen sensor connector, and remove exhaust pipe.

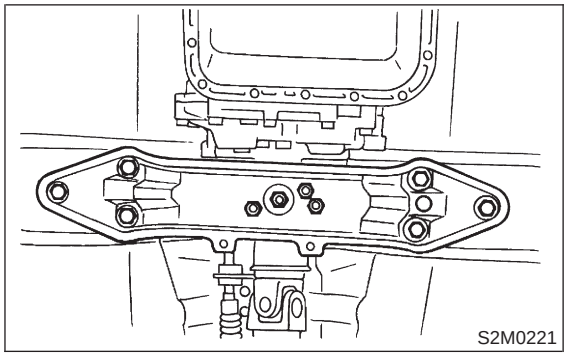


5) Remove propeller shaft.

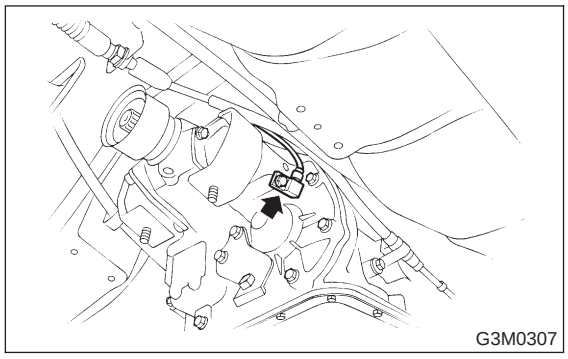
NOTE:
Before removing propeller shaft, scribe matching marks on propeller shaft and rear differential coupling.



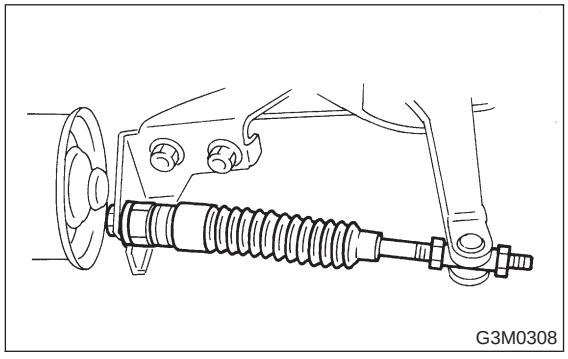
6) Remove rear crossmember.
(1) Support transmission using a transmission jack and raise slightly.
(2) Remove bolts and nuts as shown in Figure.



7) Remove vehicle speed sensor 1.


G3M0307

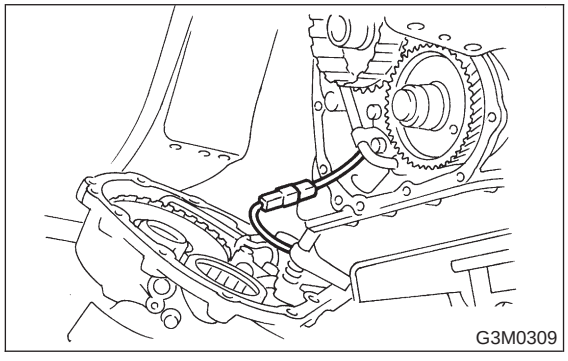
8) Remove extension and gasket.
(1) Remove gear select cable nut.


G3M0308

(2) Move gear select cable so that extension bolts can be removed.
(3) Remove bolts.
(4) Remove extension and disconnect duty solenoid C connector.

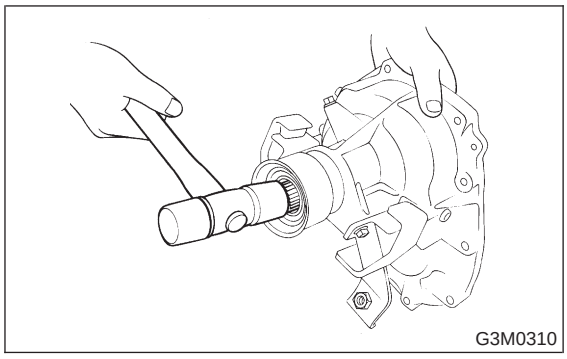
CAUTION:
Do not force extension back before disconnecting solenoid connector. Otherwise, harness may be damaged.

NOTE:
Use a container to catch oil flowing from extension.

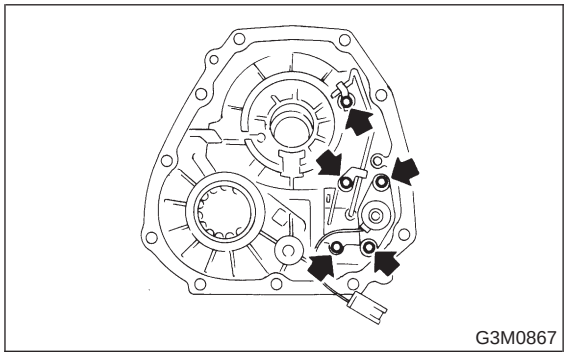

G3M0309

9) Remove duty solenoid C and transfer valve body from extension.

(1) Remove transfer clutch drum.


G3M0310

(2) Remove clamp which secures pipe.
(3) Remove bolts.


G3M0867

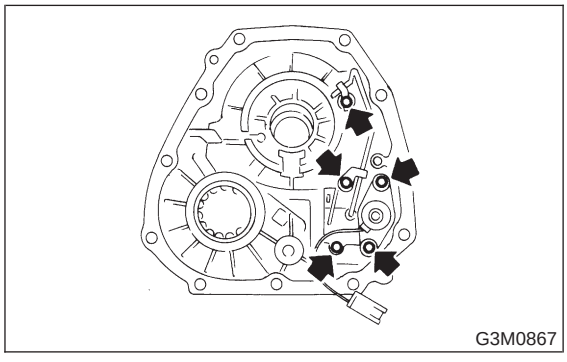
B: INSTALLATION

1) Install duty solenoid C and transfer valve body.
(1) Install duty solenoid C and transfer valve body.

Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

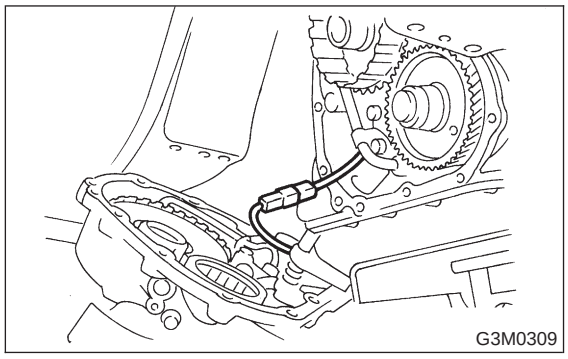
(2) Install pipe and clamp.

Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)


G3M0867

(3) Install clutch drum.
2) Install extension.

(1) Connect connector.

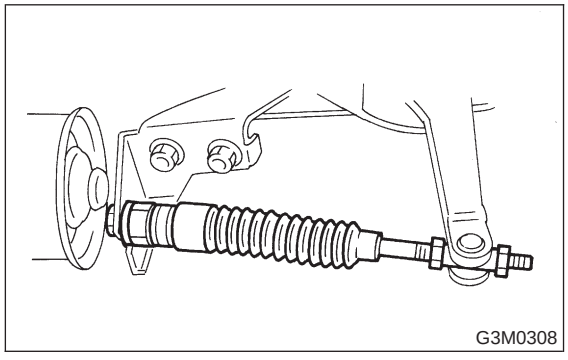

G3M0309

(2) Tighten 11 bolts.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)

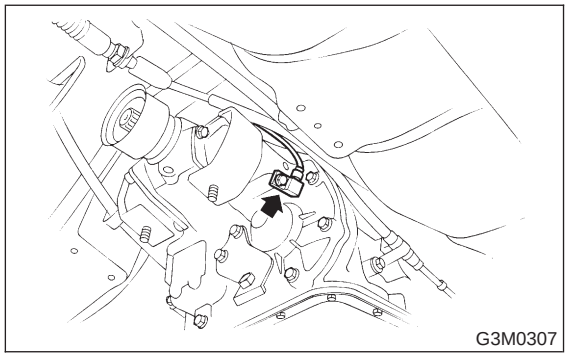
(3) Install gear select cable.

Tightening torque:
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)


G3M0308

3) Install vehicle speed sensor 1.

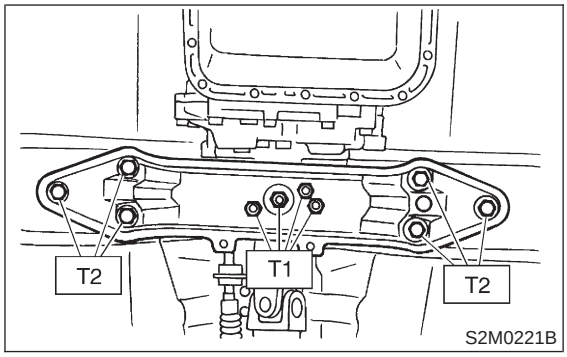
Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)


G3M0307

4) Install rear crossmember.

(1) Tighten bolts.

Tightening torque:
T1: 37±10 N·m (3.8±1.0 kg-m, 27±7 ft-lb)
T2: 69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)



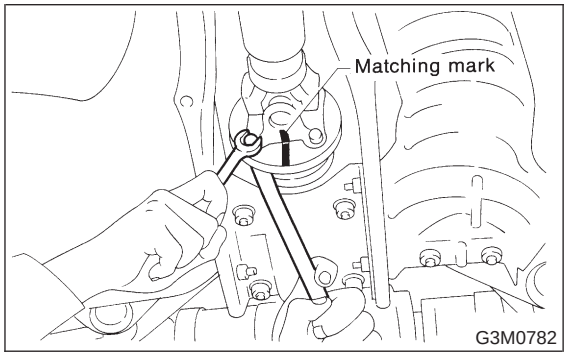
S2M0221B

(2) Lower and remove transmission jack.

5) Install propeller shaft.

NOTE:
Align matching marks on propeller shaft and rear differential coupling.

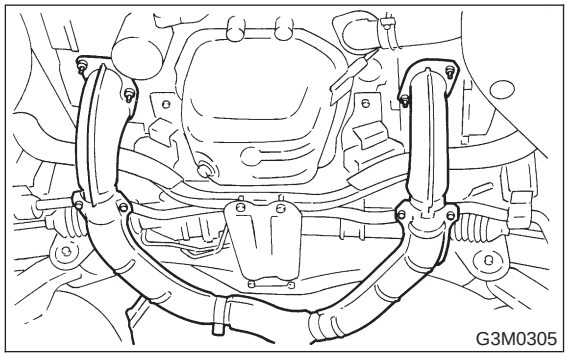
Tightening torque:
At rear differential
31±8 N·m (3.2±0.8 kg-m, 23.1±5.8 ft-lb)
At center bearing
52±5 N·m (5.3±0.5 kg-m, 38.3±3.6 ft-lb)



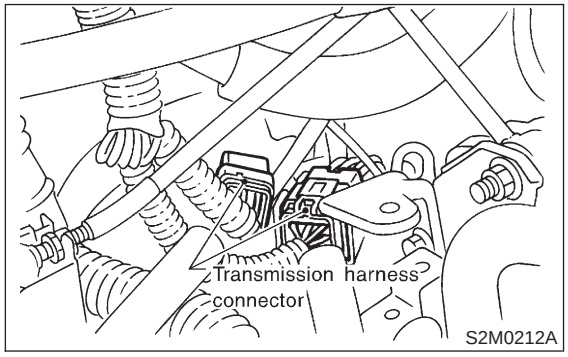
G3M0782

6) Install front exhaust pipe.

Tightening torque:
At engine
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)
At hanger
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)
At front and rear connections
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)


G3M0305

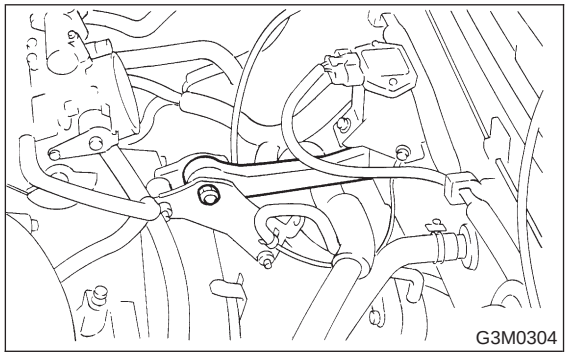
7) Lower and remove jack.
8) Connect the following parts:
(1) Oxygen sensor connector
(2) Transmission harness connector



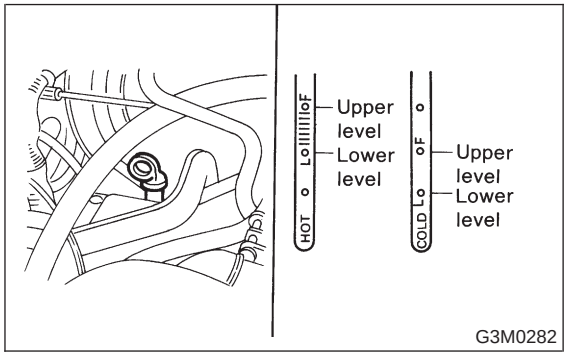
S2M0212A

9) Install pitching stopper.

Tightening torque:
Body side
57±10 N·m (5.8±1.0 kg-m, 42±7 ft-lb)
Engine side
49±5 N·m (5.0±0.5 kg-m, 36.2±3.6 ft-lb)


G3M0304

10) Replenish ATF and check oil level. Check for leaks.



G3M0282

7. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

Road tests should be conducted to properly diagnose the condition of the automatic transmission.

CAUTION:
When performing test, do not exceed posted speed limit.

2. SHIFT PATTERNS

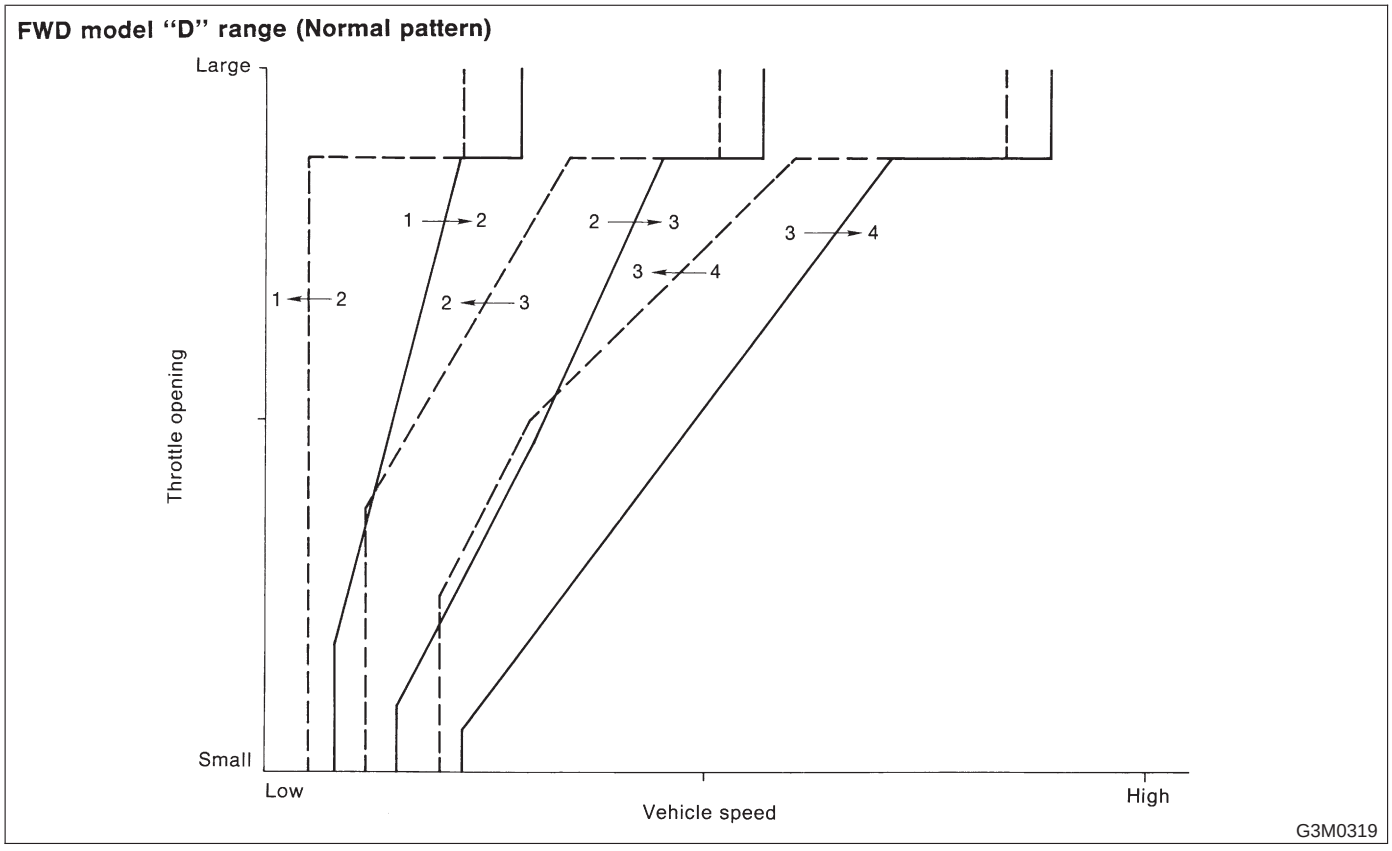
Check “kick-down”.

D range: 1st ←→ 2nd ←→ 3rd ←→ 4th

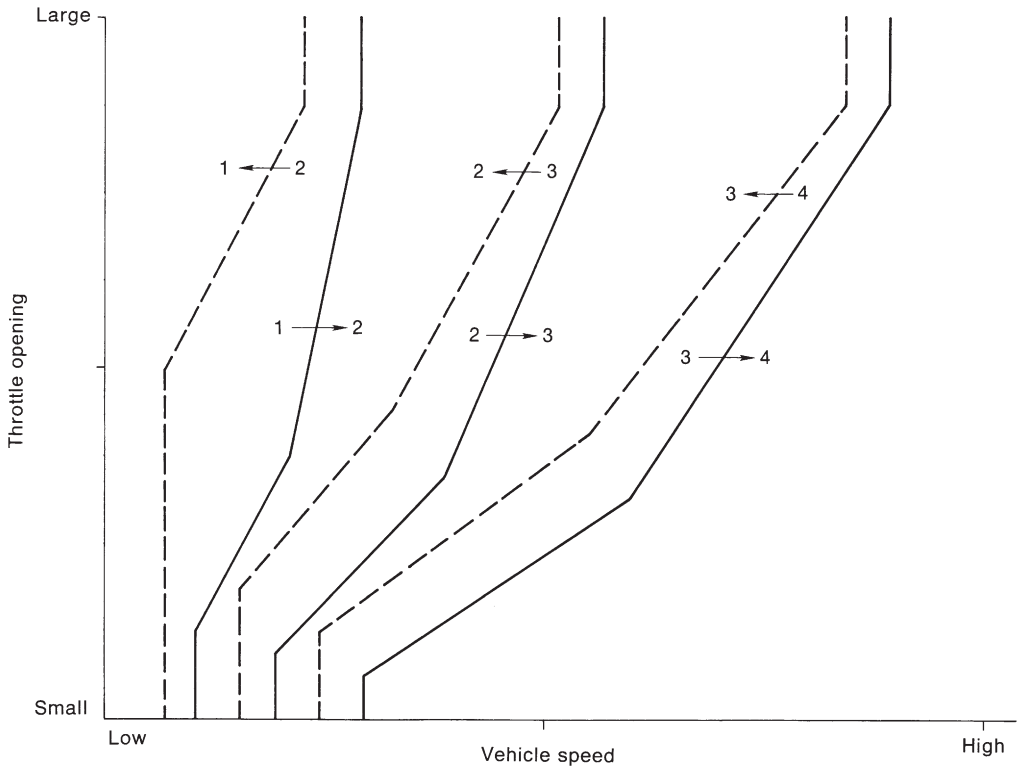
3 range: 1st ←→2nd ←→ 3rd ← 4th

2 range: 2nd ← 3rd ← 4th

1 range: 1st ← 2nd ← 3rd ← 4th

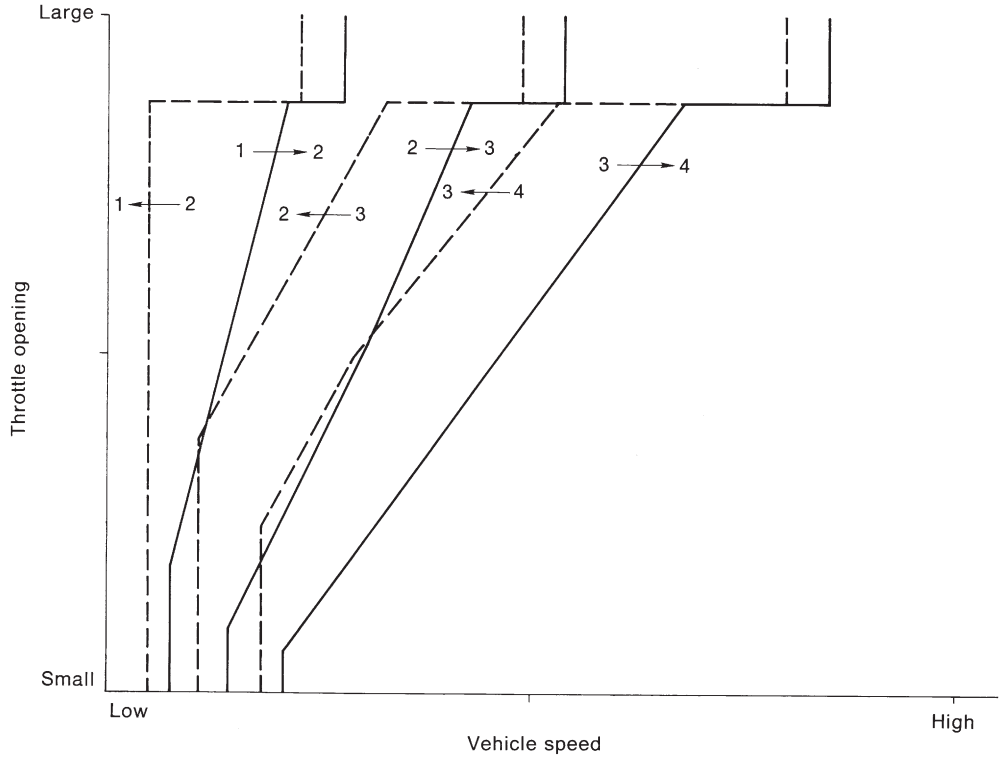


FWD model "D" range (Power pattern)



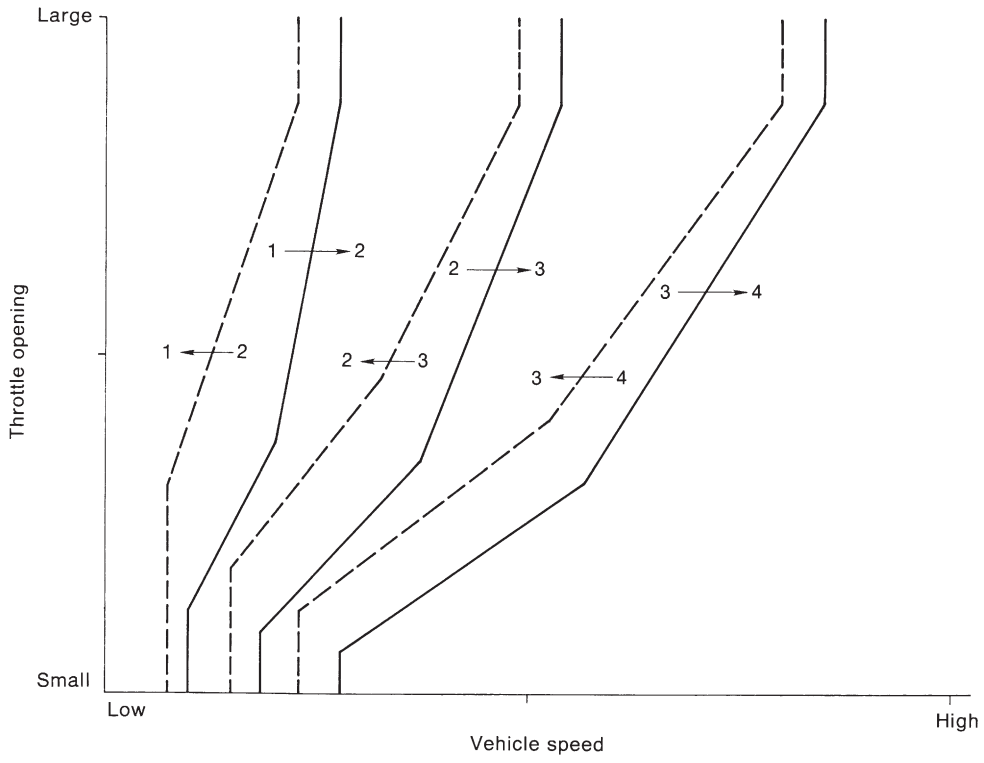
G3M0320

AWD model "D" range (Normal pattern)



G3M0321

AWD model "D" range (Power pattern)



G3M0322

3. ENGINE BRAKE OPERATION

Engine brake operation:
D range → 4th gear
3 range → 3rd gear
2 range → 2nd gear
1 range → 1st gear

4. AWD FUNCTION

If "tight-corner braking" occurs when the steering wheel is fully turned at low speed:
1) Determine the applicable trouble code and check the corresponding duty solenoid C (transfer) for improper operation.
2) If the solenoid is operating properly, check transfer clutch pressure.
3) If oil pressure is normal but "tight-corner braking" occurs:
Check the transfer control valve for sticking, and the transfer clutch facing for wear. <Ref. to 3-2 [W23A0].> and <Ref. to 3-2 [W24A0].>

8. Stall Test

A: MEASUREMENT

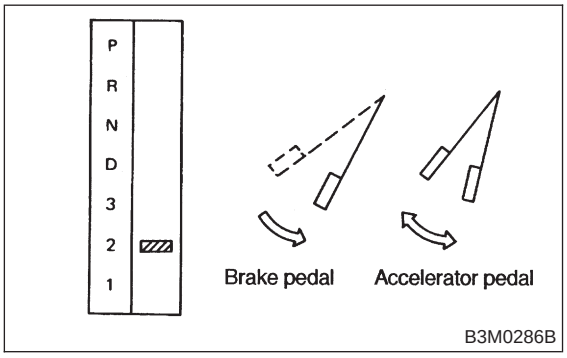
1. GENERAL INFORMATION

The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in R and 2 ranges.
Purposes of the stall test:
1) To check the operation of the automatic transmission clutch.
2) To check the operation of the torque converter clutch.
3) To check engine performance.

2. TEST METHODS

1) Preparations before test:
   (1) Check that throttle valve opens fully.
   (2) Check that engine oil level is correct.
   (3) Check that coolant level is correct.
   (4) Check that ATF level is correct.
   (5) Check that differential gear oil level is correct.
   (6) Increase ATF temperature to 50 to 80°C (122 to 176°F) by idling the engine for approximately 30 minutes (with select lever set to "N" or "P").
2) Install an engine tachometer at a location visible from the driver's compartment and mark the

stall speed range on the tachometer scale.
3) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
4) Move the manual linkage to ensure it operates properly, and shift the select lever to the 2 range.
5) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



6) When the engine speed is stabilized, read that speed quickly and release the accelerator pedal.
7) Shift the select lever to Neutral, and cool down the engine by idling it for more than one minute.
8) Record the stall speed.
9) If stall speed in 2 range is higher than specifications, forward clutch slipping on brake band slipping may occur. To identify it, conduct the same test as above in D range.
10) Perform the stall tests with the select lever in the R range.

NOTE:
● Do not continue the stall test for MORE THAN FIVE SECONDS at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake band to be adversely affected.
Be sure to cool down the engine for at least one minute after each stall test with the select lever set in the P or N range and with the idle speed lower than 1,200 rpm.
● If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):
2200 cc 2,200 — 2,600 rpm
2500 cc 2,200 — 2,600 rpm
OUTBACK 2,300 — 2,700 rpm

3. EVALUATION

Stall speed (at sea level)	Position	Cause
Less than specifications	2 R	● Throttle valve not fully open ● Erroneous engine operation ● Torque converter clutch's one-way clutch slipping
Greater than specifications	D	● Forward clutch slipping ● One-way clutch (1-2) malfunctioning
	R	● Line pressure too low ● Reverse clutch slipping ● Low & reverse brake slipping
	2	● Line pressure too low ● Forward clutch slipping ● Brake band slipping ● One-way clutch (3-4) malfunctioning

9. Time Lag Test

A: INSPECTION

1. GENERAL INFORMATION

If the shift lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. This is used for checking the condition of the forward clutch, reverse clutch, low & reverse brake, forward one-way clutch and low one-way clutch.

CAUTION:
● Perform the test at normal operation fluid temperature 60 to 80°C (140 to 176°F).
● Be sure to allow a one minute interval between tests.
● Make three measurements and take the average value.

2. TEST METHODS

1) Fully apply the parking brake.
2) Start the engine.
Check idling speed (A/C OFF).
"N" range: 800±100 rpm
3) Shift the shift lever from "N" to "D" range.
Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.
Time lag: Less than 1.2 seconds
4) In same manner, measure the time lag for "N" → "R".
Time lag: Less than 1.5 seconds

3. EVALUATION

1) If "N" → "D" time lag is longer than specified:
● Line pressure too low
● Forward clutch worn
● Low one-way clutch not operating properly
2) If "N" → "R" time lag is longer than specified:
● Line pressure too low
● Reverse clutch worn
● Low & reverse brake worn
● Forward one-way clutch not operating properly

10. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

If the clutch or the brake band shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.
● Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
● Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake band or control valve.
1) Line pressure measurement (under no load)

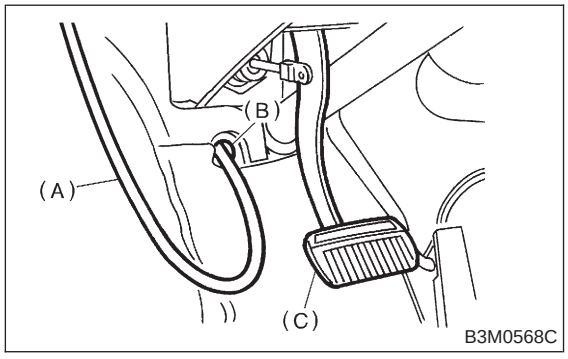
CAUTION:
● Before measuring line pressure, jack-up front wheels (front-wheel-drive model) or all wheels (4-wheel drive model).
● Maintain temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in "N" or "P".)

2) Line pressure measurement (under heavy load)

CAUTION:
● Before measuring line pressure, apply both foot and parking brakes with all wheels chocked (Same as for "stall" test conditions).
● Measure line pressure when select lever is in "R", "2" with engine under stall conditions.
● Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)
● Maintain the temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with the select lever in "N" or "P".)

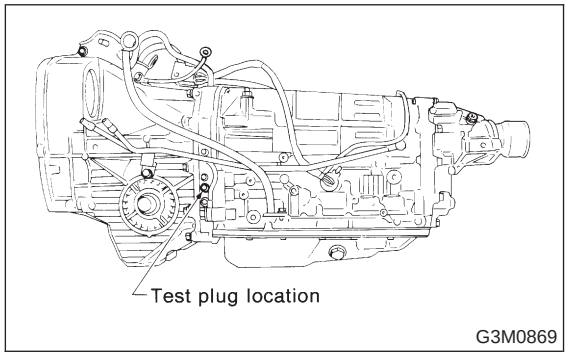
2. TEST METHODS

1) Temporarily attach the ST to a suitable place in the driver's compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to the engine compartment.
ST 498575400 OIL PRESSURE GAUGE ASSY



(A) Pressure gauge hose
(B) Hole in toe board (blank cap hole)
(C) Brake pedal

2) Remove the test plug and install ST instead.
ST 498897200 OIL PRESSURE GAUGE ADAPTER



3) Connect ST1 with ST2.
ST1 498897200 OIL PRESSURE GAUGE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY
4) Check for duty ratio changes by opening and closing throttle valve using select monitor.
5) Check line pressure in accordance with the following chart.

3. EVALUATION

NOTE:
- Under no load: "D"
- Under full load: "R", "2"

(With engine running at stall speed)

Standard line pressure kPa (kg/cm^2, psi)				
Duty ratio (%)	"2" range	"R" range	"D" range	
			2200 cc	2500 cc
5	1,147 — 1,344 (11.7 — 13.1, 166 — 195)	1,275 — 1,569 (13.0 — 16.0, 185 — 228)	—	
22	—	—	765 — 902 (7.8 — 9.2, 111 — 131)	
100	—	—	235 — 481 (2.4 — 4.9, 34 — 70)	392 — 490 (4.0 — 5.0, 57 — 71)

11. Transfer Clutch Pressure Test

A: MEASUREMENT

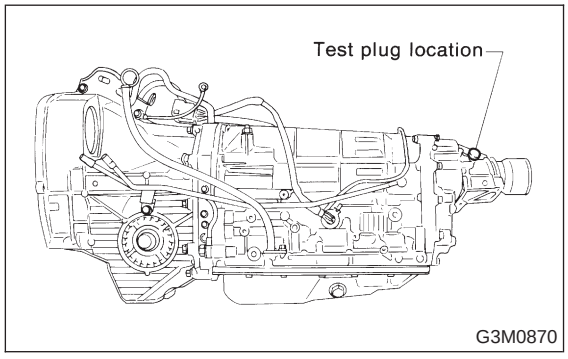
1. TEST METHODS

Check transfer clutch pressure in accordance with the following chart in the same manner as with line pressure.

ST 499897700 OIL PRESSURE ADAPTER SET
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: “D” range
FWD mode: “P” range, engine speed 2000 rpm

CAUTION:
Before setting in FWD mode, install spare fuse on FWD mode switch.



2. EVALUATION

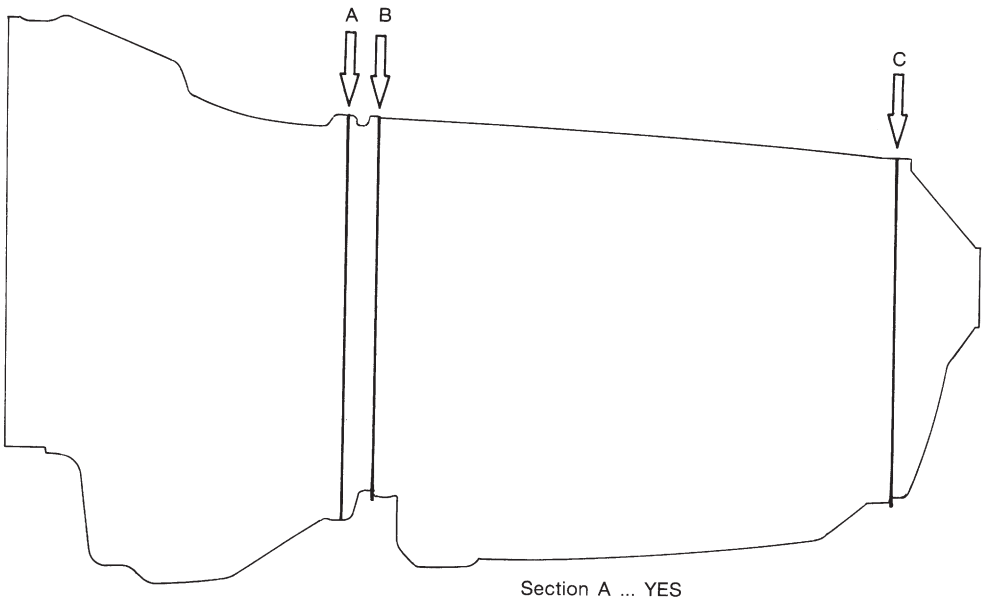
NOTE:
If oil pressure is not produced or if it does not change in the AWD mode, the duty solenoid C or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

Standard transfer clutch pressure kPa (kg/cm^2, psi)		
Duty ratio (%)	AWD mode	FWD mode
5	667 — 804 (6.8 — 8.2, 97 — 117)	667 — 804 (6.8 — 8.2, 97 — 117)
40	137 — 226 (1.4 — 2.3, 20 — 33)	—
95	0 (0, 0)	—

12. Overall Transmission

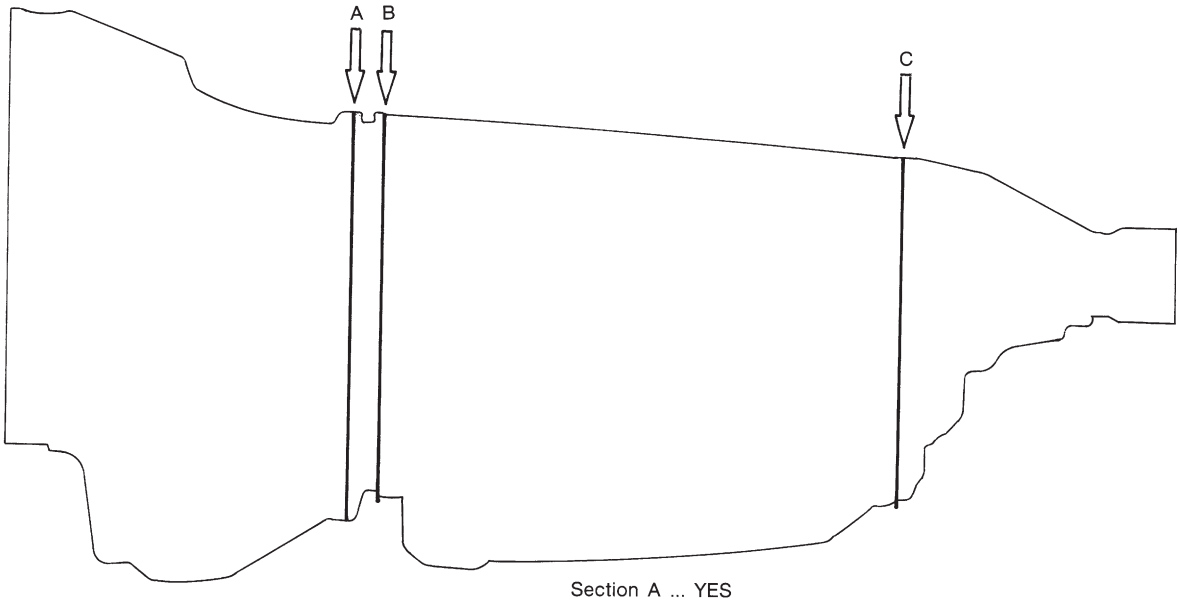
A: SECTIONS THAT CAN BE DETACHED/ASSEMBLED

FWD



Section A ... YES
Section B ... YES
Section C ... YES

AWD



Section A ... YES
Section B ... YES
Section C ... YES

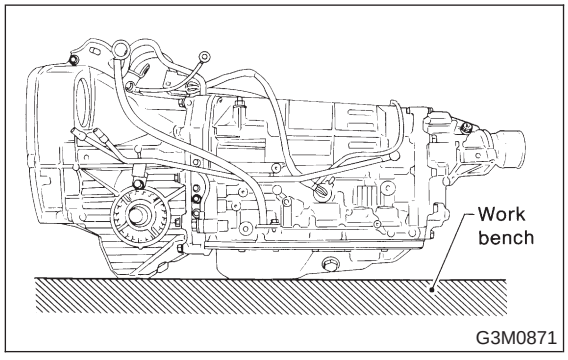
G3M0323

B: DISASSEMBLY

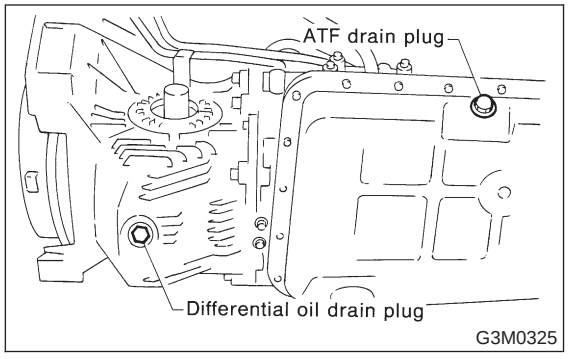
1. EXTERNAL PARTS

1) Place the transmission unit on a work bench, with the oil pan facing down.

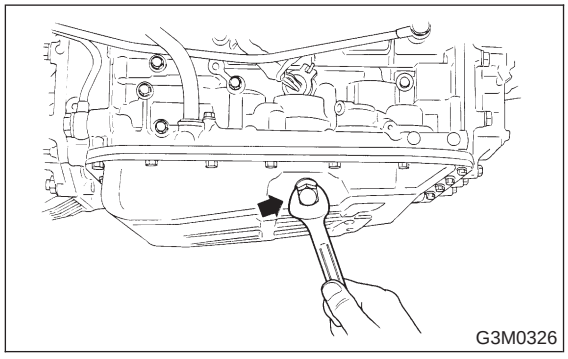
CAUTION:
Be careful not to bend or damage external parts.



2) Remove the drain plug, and drain differential oil. Tighten the plug temporarily after draining.

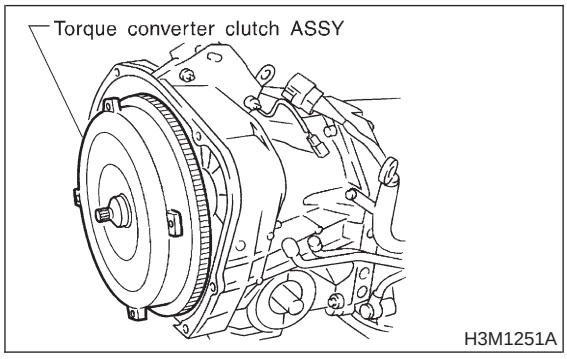


3) Remove the drain plug, and drain automatic transmission fluid (ATF). Tighten the plug temporarily after draining.

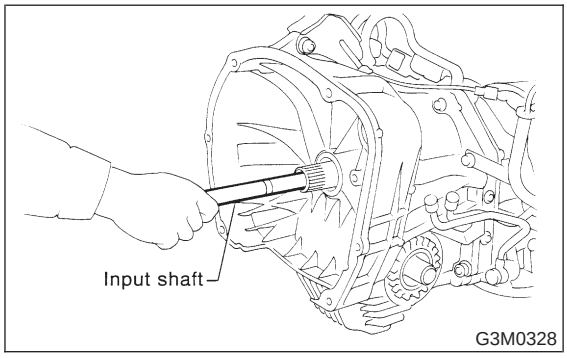


4) Extract the torque converter clutch assembly.

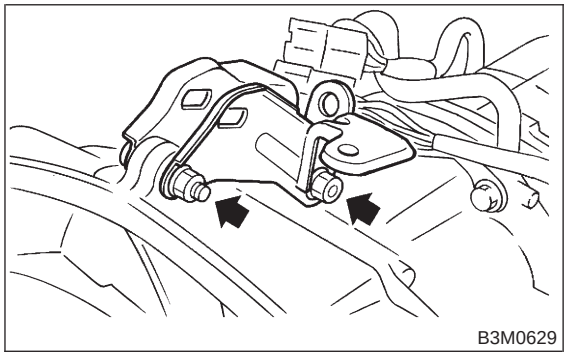
NOTE:
- Extract the torque converter clutch horizontally. Be careful not to scratch the bushing inside the oil pump shaft.
- Note that oil pump shaft also comes out.



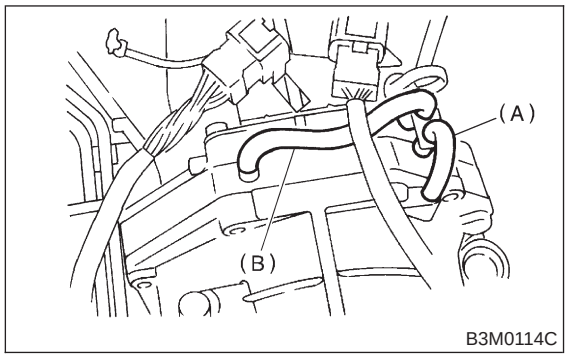
5) Remove the input shaft.



6) Remove the pitching stopper bracket.

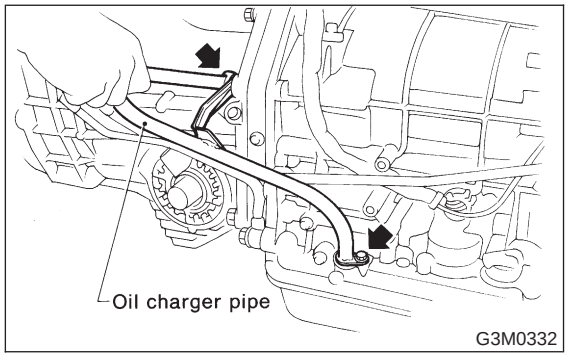


7) Disconnect the air breather hose.



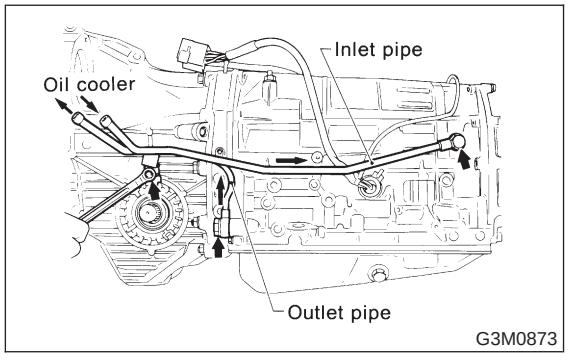
(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

8) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe.

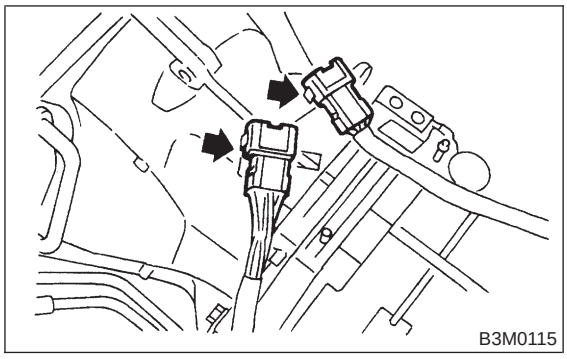


9) Remove the oil cooler inlet and outlet pipes.

CAUTION:
When removing outlet pipes, be careful not to lose balls and springs used with retaining screws.



10) Remove harnesses from bracket.

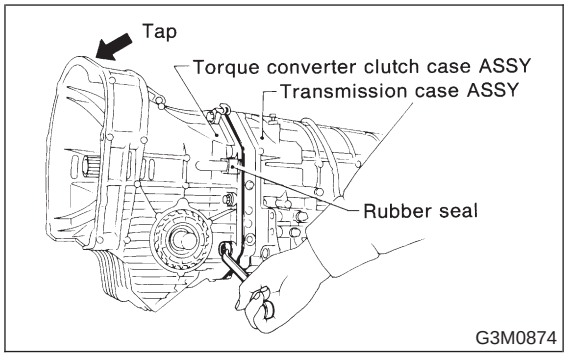


2. SEPARATION OF EACH SECTION (FWD)

1) Separation of torque converter clutch case and transmission case sections

CAUTION:
- **Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.**
- **Be careful not to lose the rubber seal.**

NOTE:
Separate these cases while tapping lightly on the housing.



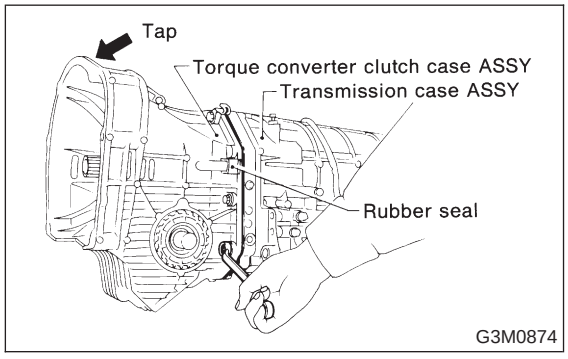
2) Separation of transmission case and transmission cover

3. SEPARATION OF EACH SECTION (AWD)

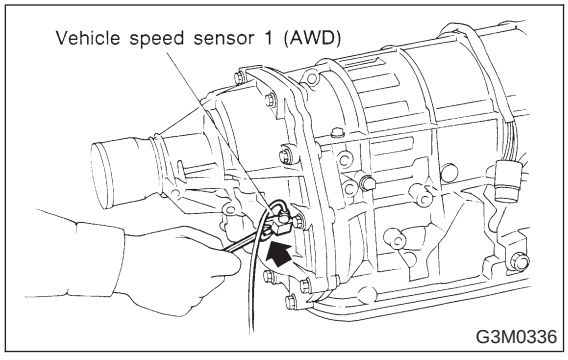
1) Separation of torque converter clutch case and transmission case sections

CAUTION:
● Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.
● Be careful not to lose the rubber seal.

NOTE:
Separate these cases while tapping lightly on the housing.

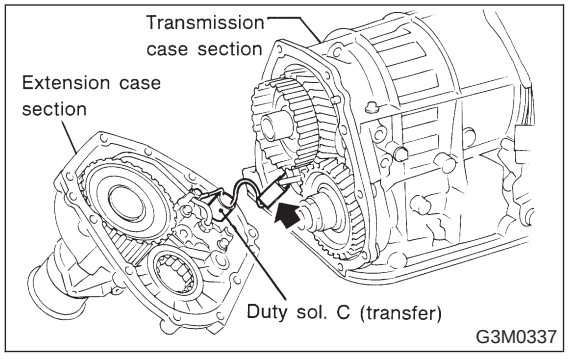


2) Separation of transmission case and extension sections
(1) Remove vehicle speed sensor 1.



(2) While pulling the extension slightly, disconnect the connector for the duty solenoid C (transfer).

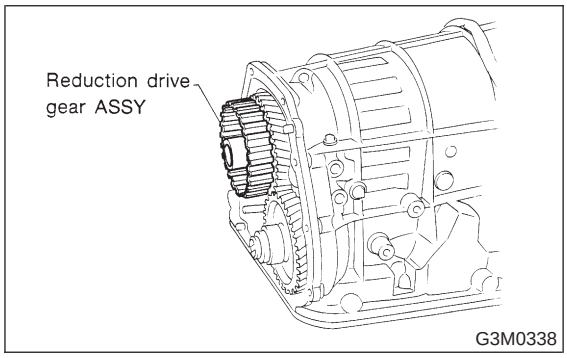
CAUTION:
Be careful not to cut the harness.



3) Separate both sections.

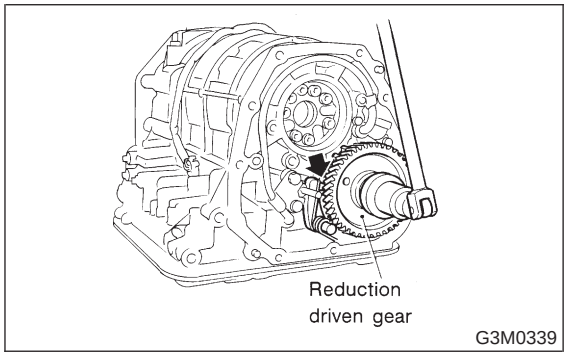
4. TRANSMISSION CASE SECTION

1) Remove the reduction drive gear assembly.



2) Remove the reduction driven gear.
(1) Straighten the staked portion, and remove the lock nut.

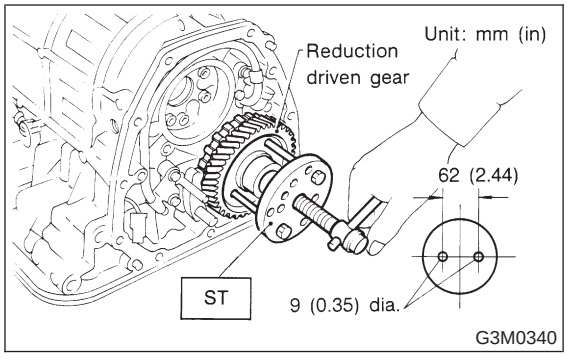
NOTE:
Set the range selector lever to “P”.



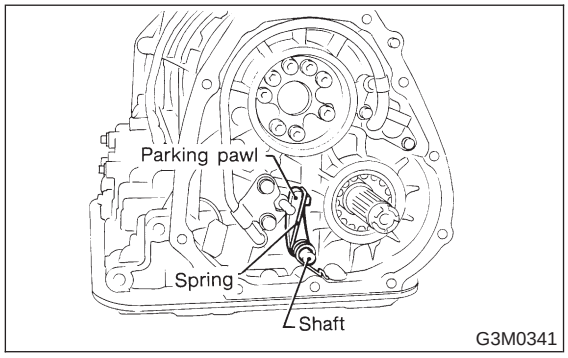
(2) Using the ST, extract the reduction driven gear.

NOTE:
Drill two holes in the puller.

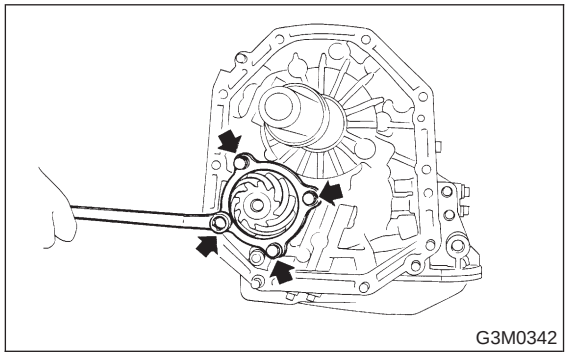
ST 899524100 PULLER SET



3) Remove the parking pawl, return spring and shaft.

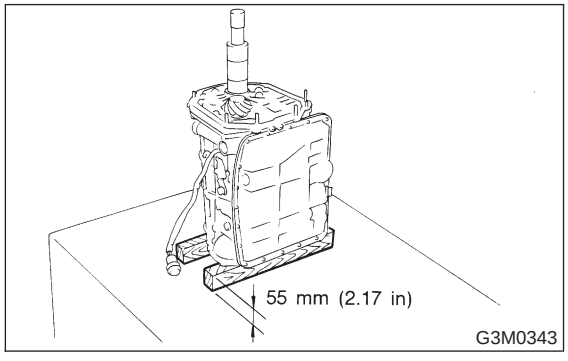


4) Loosen the taper roller bearing mounting bolts.



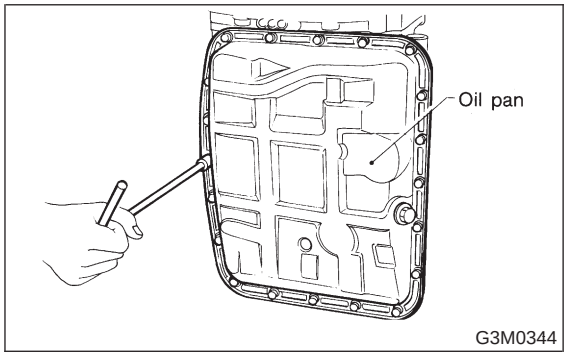
5) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

CAUTION:
● Be careful not to scratch the rear mating surface of the transmission case.
● Note that the parking rod and drive pinion protrude from the mating surface.



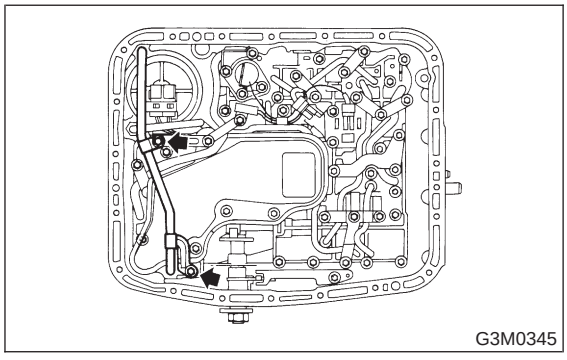
6) Remove the oil pan and gasket.

NOTE:
Tap the corners of the oil pan when removing.

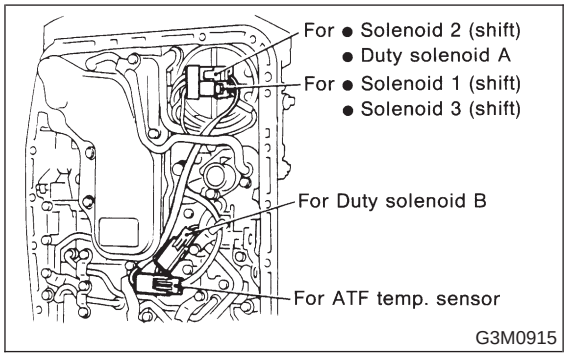


7) Remove the oil cooler outlet pipe.

CAUTION:
Be careful not to twist the pipe.

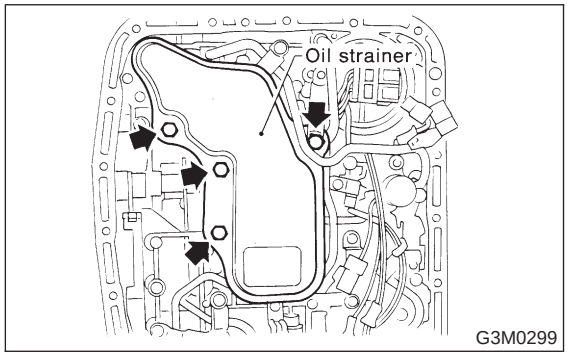


8) Disconnect the harness connectors for the solenoids and duty solenoids and the ground cord.

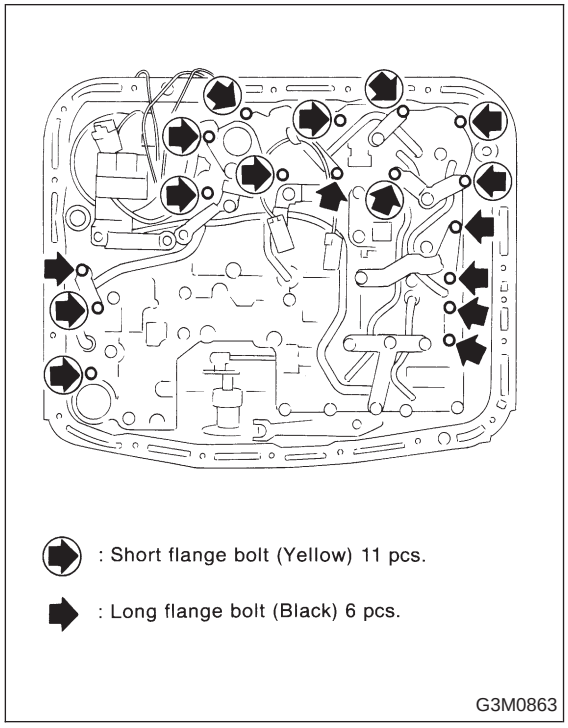


9) Remove the oil strainer.

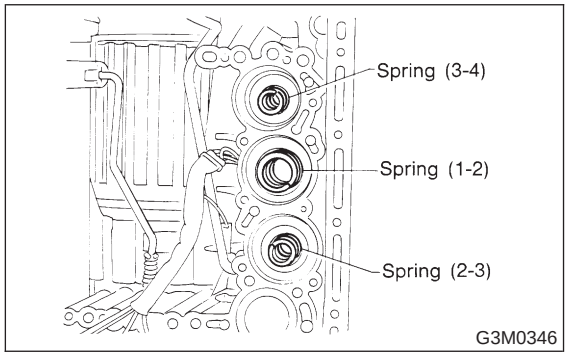
CAUTION:
Be careful not to damage O-ring on oil strainer.



10) Remove the control valve body and the two brackets.

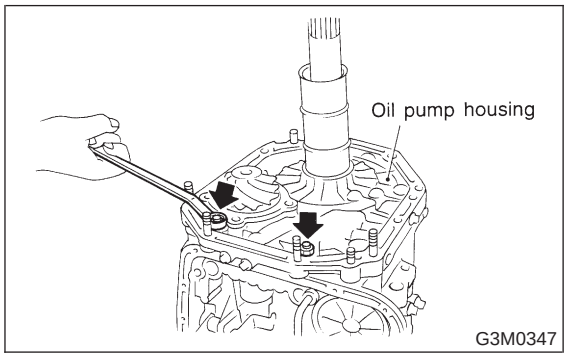


11) Remove the three accumulator springs.

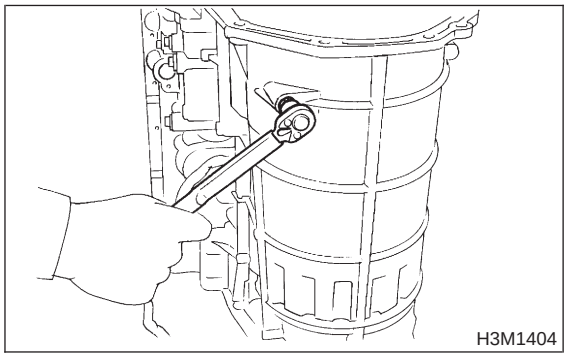


12) Loosen the reverse clutch drum lightly by turning the adjusting screw. Then remove the oil pump housing.

CAUTION:
Be careful not to lose the total end play adjusting thrust washer.

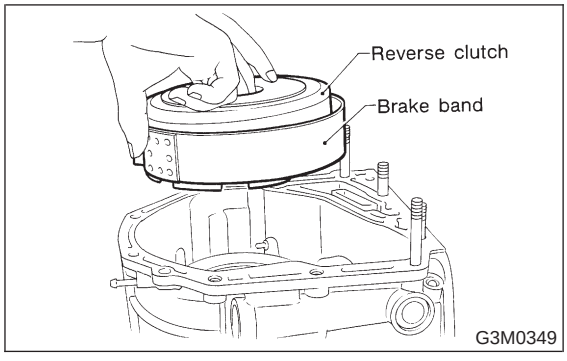


13) Loosen the brake band adjusting screw, and take out the strut.



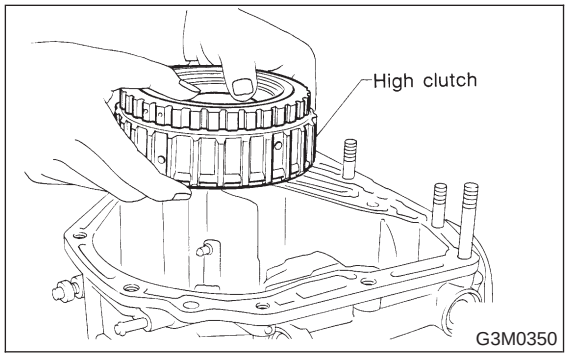
14) Remove the brake band and reverse clutch.

NOTE:
Contract the brake band with a clip.

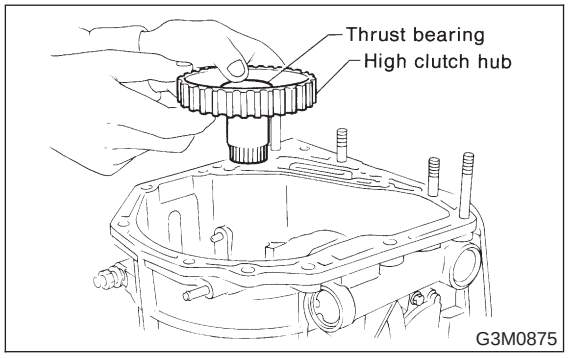


15) Take out the high clutch.

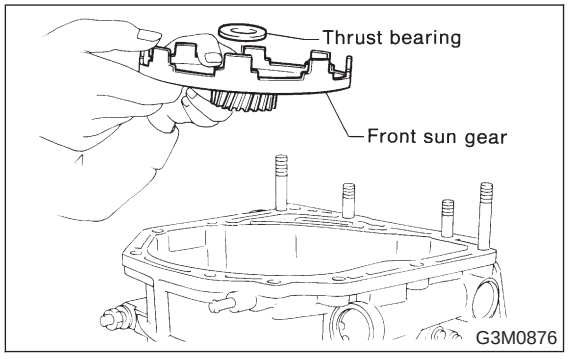
CAUTION:
Thrust needle bearing and bearing race are removed together with high clutch. Be careful not to lose them.



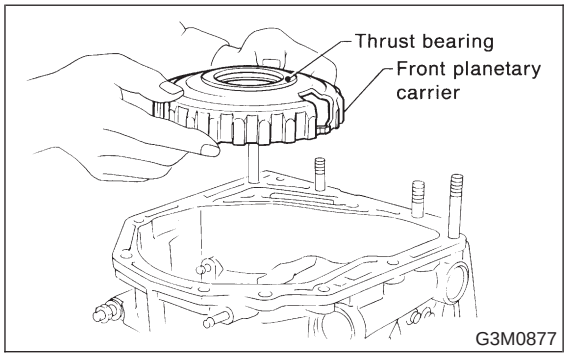
16) Take out the high clutch hub and the thrust bearing.



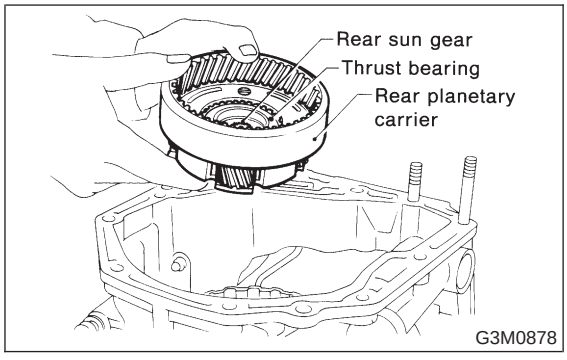
17) Take out the front sun gear and the thrust bearing.



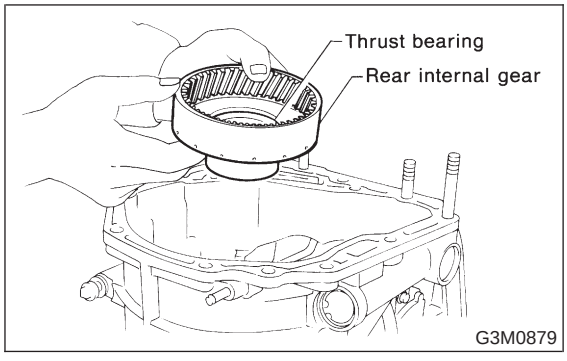
18) Take out the front planetary carrier and the thrust bearing.



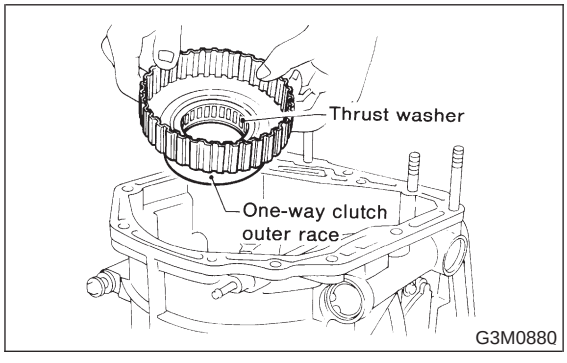
19) Take out the rear planetary carrier, rear sun gear and the thrust bearing.



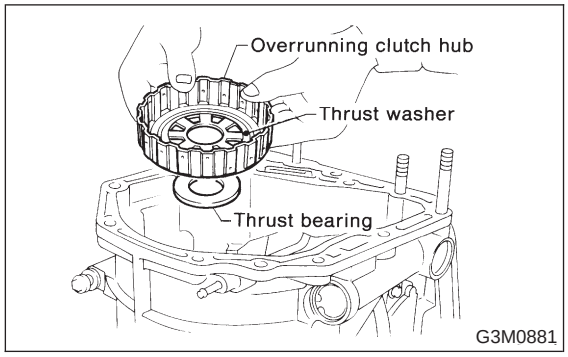
20) Take out the rear internal gear and the thrust bearing.



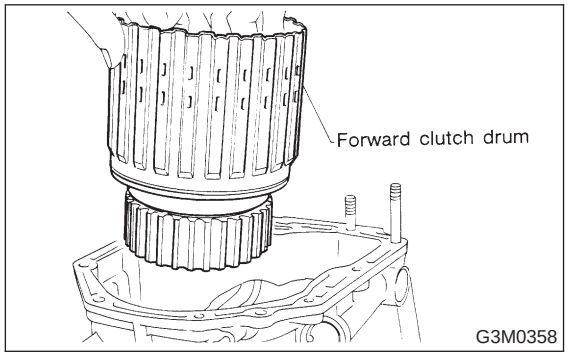
21) Take out the one-way clutch outer race and the thrust washer.



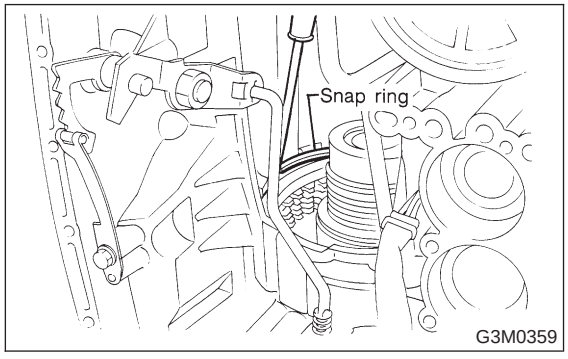
22) Take out the overrunning clutch hub, the thrust washer and the thrust bearing.



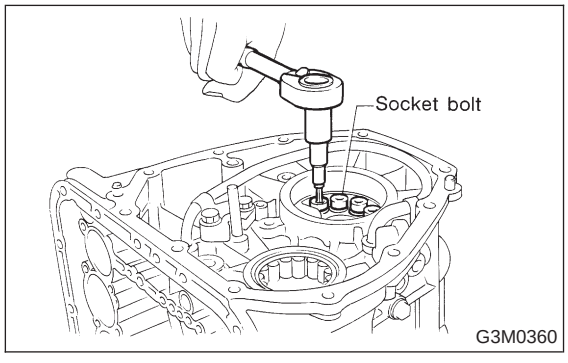
23) Take out the forward clutch drum.



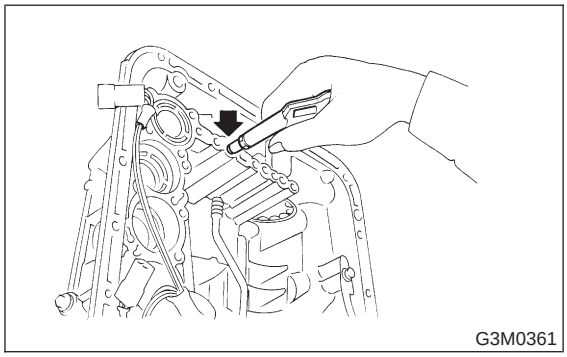
24) Take out the low & reverse brake section.
(1) Remove the snap ring. Then remove the retaining plate, drive plates, driven plates, and wave spring as a unit.



(2) Turning the case upside down, take out the one-way clutch inner race and wave spring retainer.



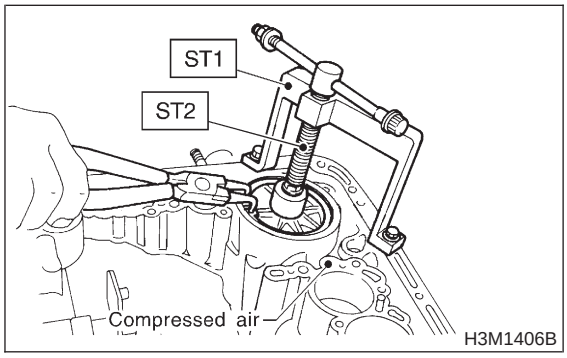
(3) Take out the low & reverse piston by applying compressed air.



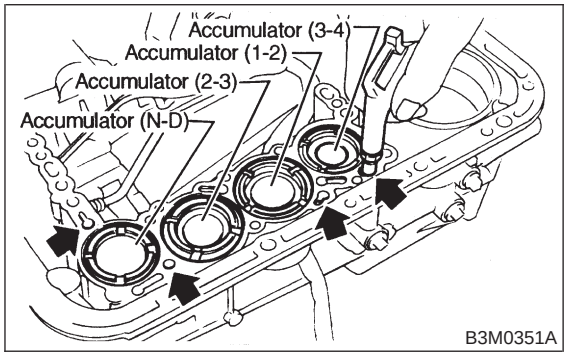
25) After removing the snap ring (inner) using ST1 and ST2, take out the servo piston by applying compressed air from the release pressure side.

CAUTION:
Hold the servo piston with a rag so that it will not be ejected with the air pressure.

ST1 498677010 COMPRESSOR
ST2 399703600 PULLER ASSY

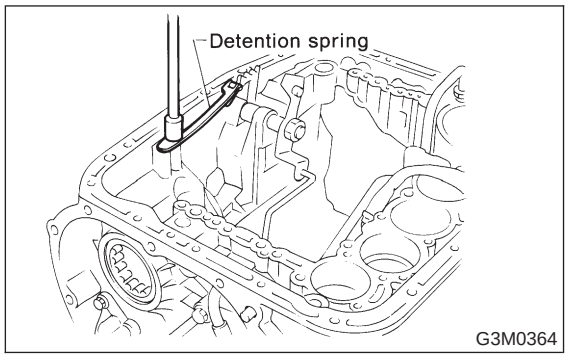


26) Apply compressed air from the operating pressure side, and take out accumulator (3-4), accumulator (1-2), accumulator (2-3), accumulator and spring (N-D).



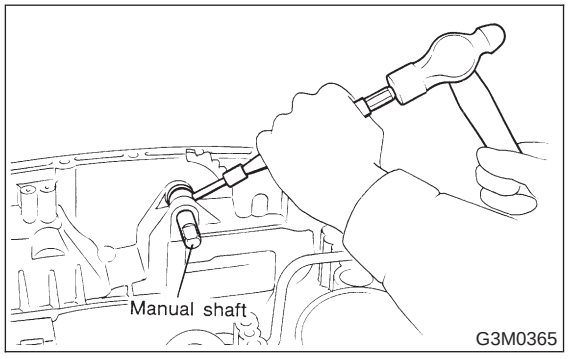
27) Remove the range select lever.

28) Remove the detention spring.

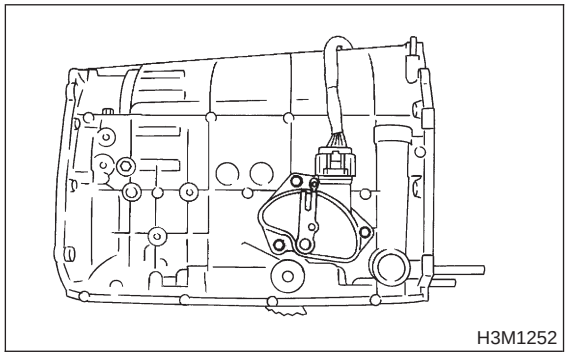


29) Remove the parking rod together with the manual lever. Then remove the manual shaft by pulling off the straight pin.

CAUTION:
Be careful not to damage the lips of the press-fitted oil seal in the case.

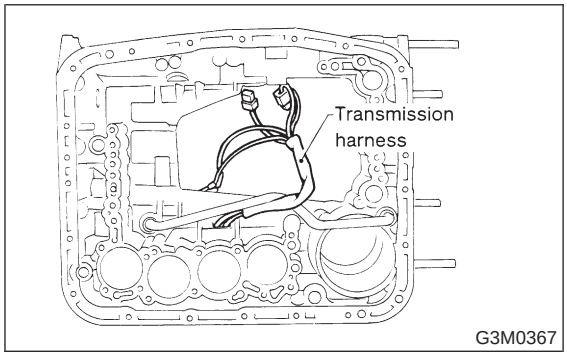


30) Remove the inhibitor switch.



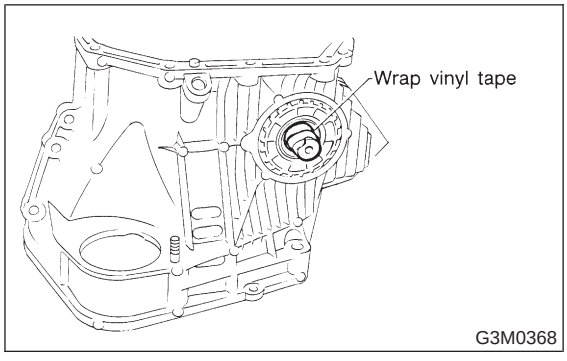
31) Remove the transmission harness.

CAUTION:
Be careful not to damag the cord insulation.



5. TORQUE CONVERTER CLUTCH CASE SECTION

1) Wrap the axle shaft serration with vinyl tape.



2) Remove the differential side retainer with ST.

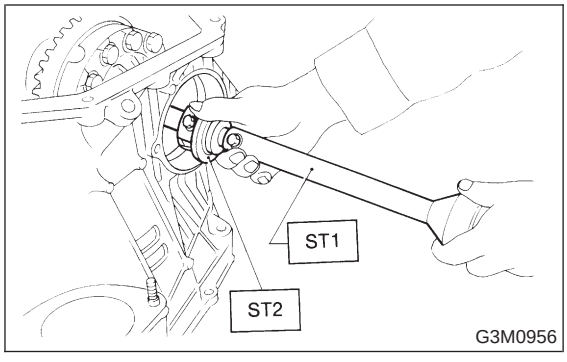
CAUTION:
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case and speedometer gears.

ST 499787000 WRENCH ASSY

3) Extract the axle shaft with ST1 and ST2.

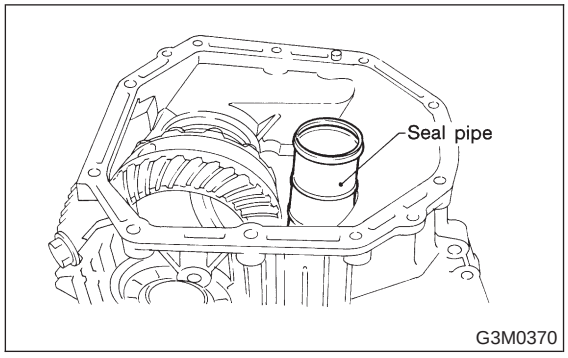
CAUTION:
Do not reuse the circlip.

ST1 499095500 REMOVER
ST2 499247300 INSTALLER

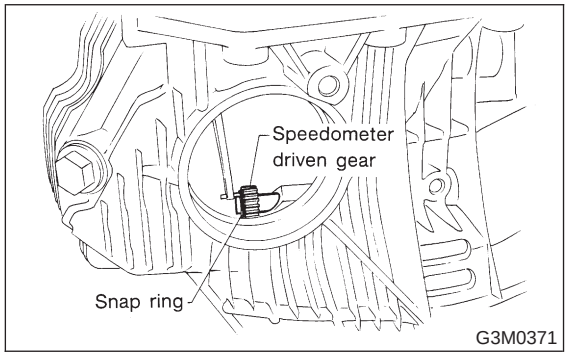


4) Remove the differential case assembly.

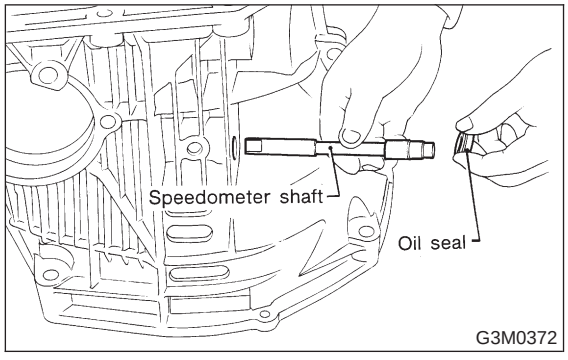
CAUTION:
- **Remove the seal pipe if it is attached. (Reusing is not allowed.)**
- **Be careful not to damage the retainer mounting hole of the torque converter clutch case and the speedometer gears.**



5) Remove the snap ring. Then remove the speedometer driven gear.



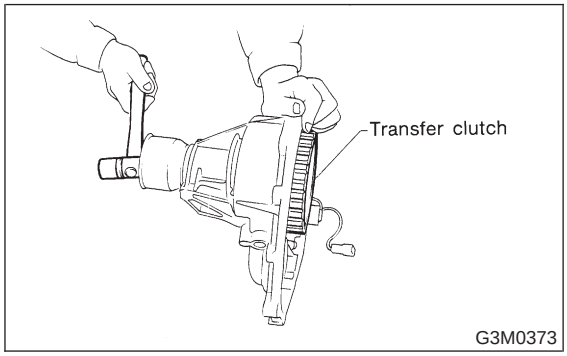
6) Remove vehicle speed sensor 2.
7) Tap out the speedometer shaft to the outside of the case, and remove the oil seal.



6. EXTENSION SECTION

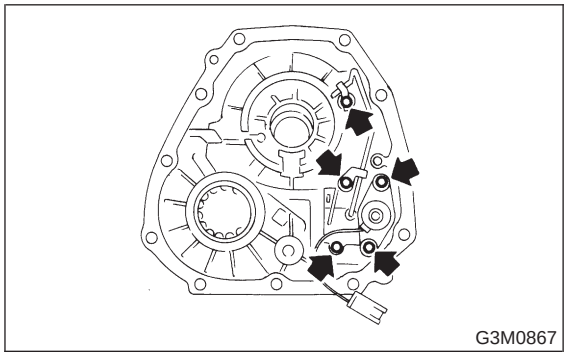
1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

CAUTION:
Be careful not to damage the oil seal in the extension.

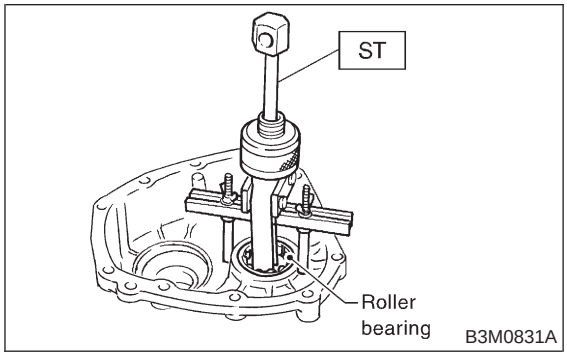


2) Remove duty solenoid C, transfer valve body and the transfer pipe.

CAUTION:
- **Take out the inlet filter.**
- **Do not damage the O-ring.**
- **Be careful not to bend the pipe.**



3) Take out the roller bearing inner race with ST.
ST 398527700 PULLER



4) Take out the roller bearing outer race with ST.

NOTE:
Hook ST in the inner side of the roller bearing outer race.

ST 398527700 PULLER

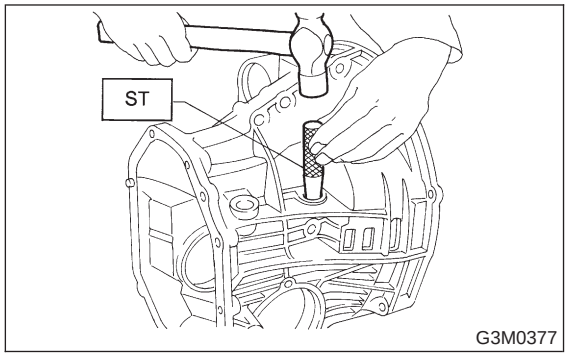
C: ASSEMBLY OF OVERALL TRANSMISSION

1. TORQUE CONVERTER CLUTCH CASE SECTION

1) Check the appearance of each component and clean.

CAUTION:
Make sure each part is free of harmful cuts, damage and other faults.

2) Install the washer and snap ring to the speedometer shaft with ST, and set the oil seal. Then force-fit the shaft to the torque converter clutch case.
ST 499827000 PRESS

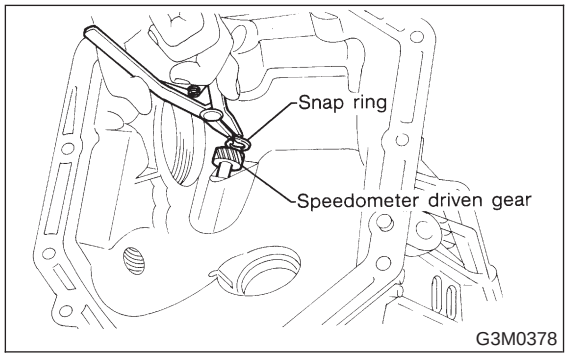


3) Install vehicle speed sensor 2.

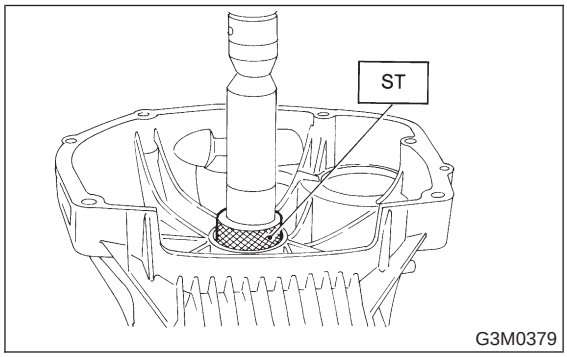
CAUTION:
Use new vehicle speed sensor 2, if it has been removed.

Tightening torque:
5.9±1.5 N·m (60±15 kg-cm, 52±13 in-lb)

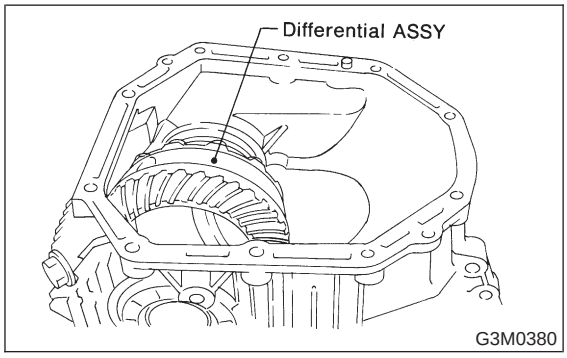
4) Install the speedometer driven gear to the speedometer shaft, and secure with a snap ring.



5) Force-fit the oil seal to the torque converter clutch case with ST.
ST 398437700 DRIFT



6) Install the differential assembly to the case, paying special attention not to damage the speedometer gears (drive and driven) and the inside of the case (particularly, the differential side retainer contact surface).

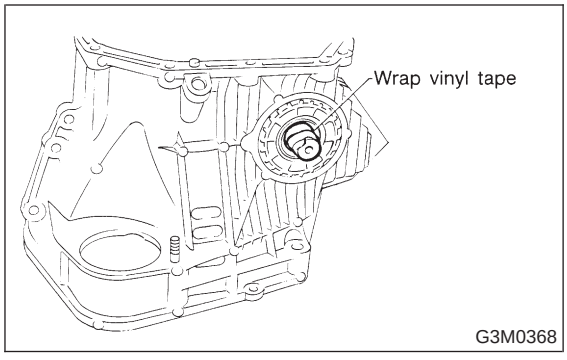


7) Install the circlip to the axle shaft, insert the shaft into the differential assembly, and tap it into position with a plastic hammer.

CAUTION:
- **If no play is felt, check whether the shaft is fully inserted. If shaft insertion is correct, replace the axle shaft.**
- **Be sure to use a new circlip.**

Thrust play:
Approx. 0.3 — 0.5 mm (0.012 — 0.020 in)

8) Wrap vinyl tape around the splined portion of the axle shaft.



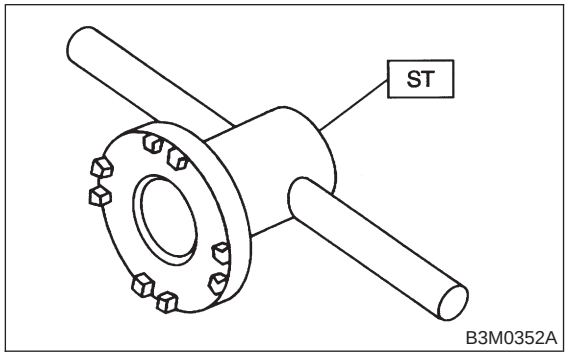
9) Install the oil seal and outer race (taper roller bearing) to the differential side retainer. Then screw in the retainer and the O-ring after coating the threads with oil.

CAUTION:
- **Pay attention not to damage the oil seal lips.**
- **Do not confuse the RH and LH oil seals.**
- **Keep the O-ring removed from the retainer.**

10) Using the ST, screw in the retainer until light contact is felt.

NOTE:
Screw in the RH side slightly deeper than the LH side.

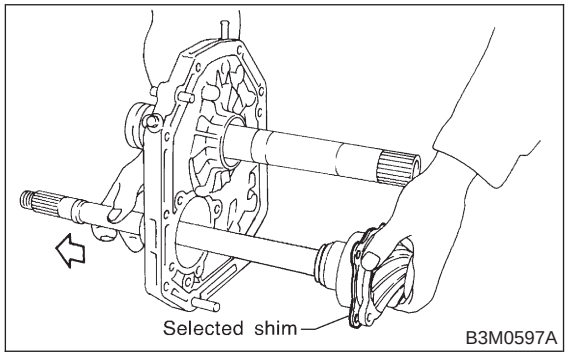
ST 499787000 WRENCH ASSY



11) Hypoid gear backlash adjustment and tooth contact check

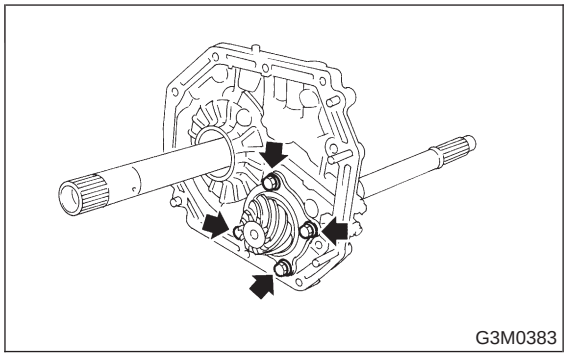
(1) Assemble the drive pinion assembly to the oil pump housing.

CAUTION:
- **Be careful not to bend the shims. <Ref. to 3-2 [W16C0].>**
- **Be careful not to force the pinion against the housing bore.**



(2) Tighten four bolts to secure the roller bearing.

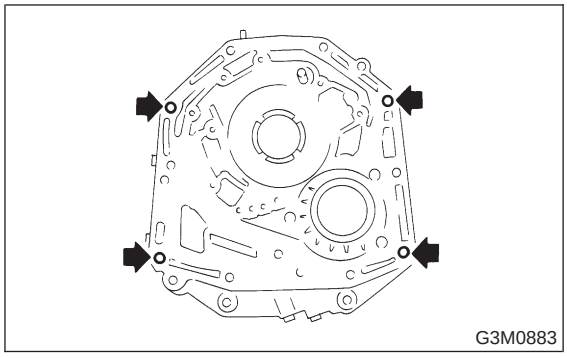
Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



(3) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

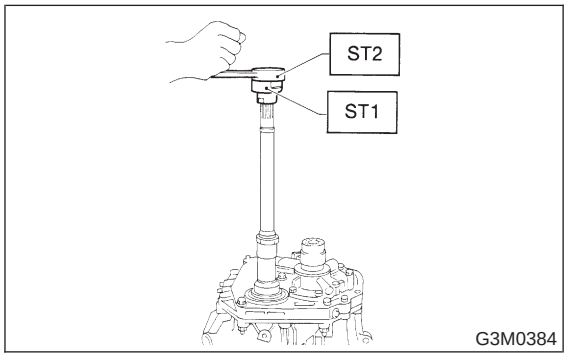
CAUTION:
- **Thoroughly remove the liquid gasket from the case mating surface beforehand.**
- **Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.**

Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)

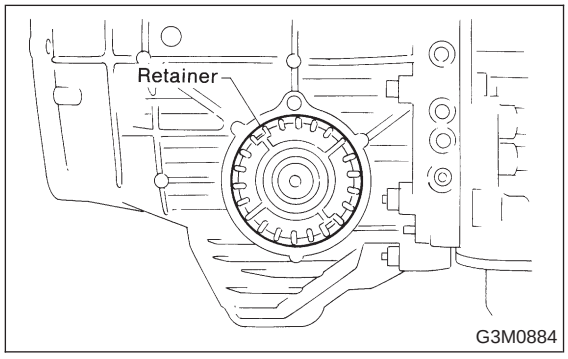


(4) Rotate the drive pinion several times with ST1 and ST2.

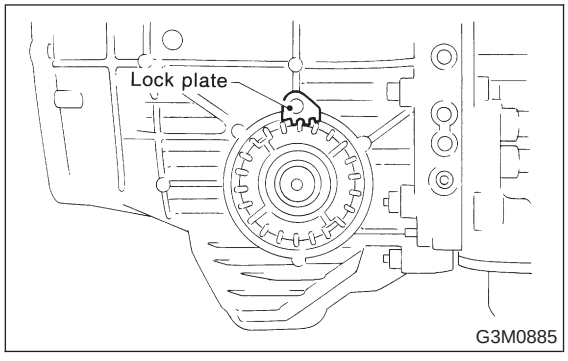
ST1 498937100 HOLDER
ST2 499787100 WRENCH



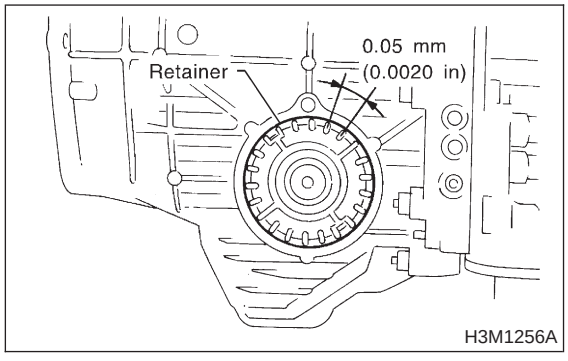
(5) Tighten the LH retainer until contact is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the “zero” state.



(6) After the “zero” state is established, back off the LH retainer 3 notches and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Repeat this procedure several times. Tighten the RH retainer 1-3/4 notches further. This sets the preload. Finally, secure the retainer with its lock plate.



NOTE:
Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).

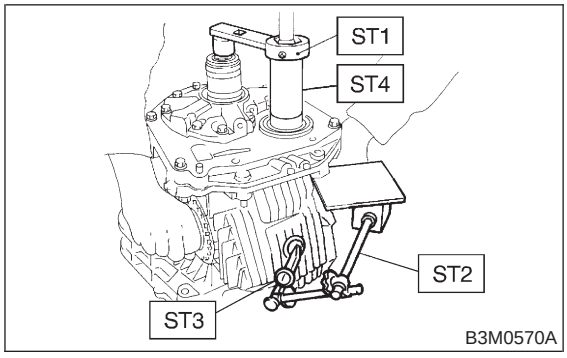


(7) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3 and ST4.

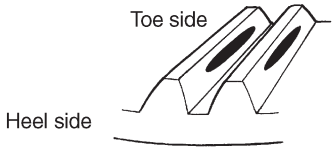
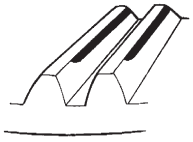
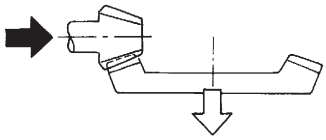
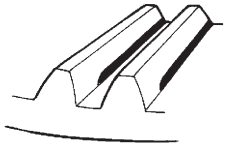
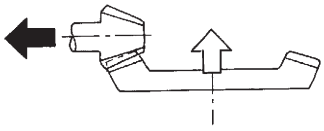
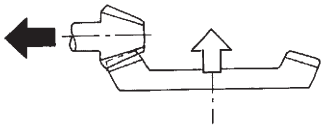
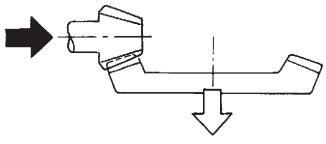
NOTE:
After confirming that the backlash is correct, check the tooth contact.

ST1	499787100	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499757800	ADAPTER WRENCH

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



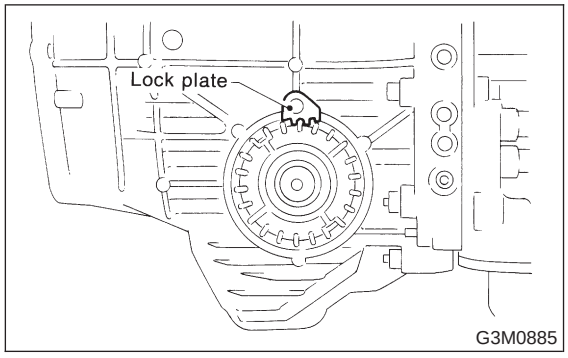
(8) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.
If tooth contact is improper, readjust the backlash or shim thickness.

Checking item	Contact pattern	Corrective action
Tooth contact Tooth contact pattern is slightly shifted toward to under no-load rotation. [When loaded, contact pattern moves toward heel.]	 B3M0317A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  B3M0319	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.  B3M0323
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  B3M0320	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  B3M0324
Toe contact (Inside end contact) Contact areas is small.	This may cause chipping at toe.  B3M0321	Adjust as for flank contact.  B3M0324
Heel contact (Outside end contact) Contact area is small.	This may cause chipping at heel ends.  B3M0322	Adjust as for face contact.  B3M0323

➡ : Adjusting direction of drive pinion
⇨ : Adjusting direction of crown gear

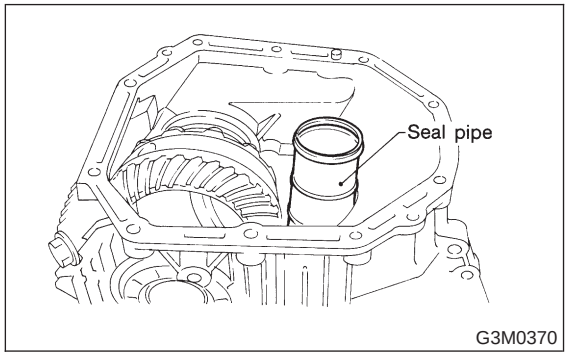
(9) If tooth contact is correct, mark the retainer position and loosen it. After fitting the O-ring, screw in the retainer to the marked position. Then tighten the lock plate to the specified torque.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



12) Install the seal pipe to the torque converter clutch case.

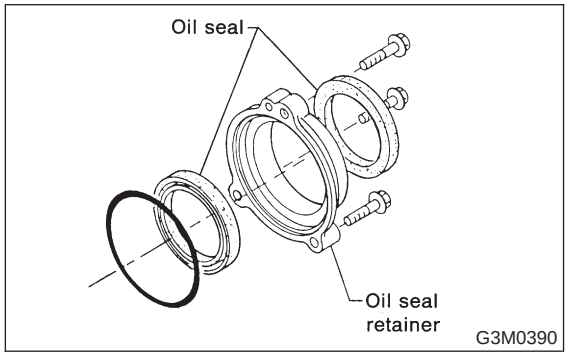
CAUTION:
Be sure to use a new seal pipe.



13) Install two oil seals to the oil seal retainer with ST.

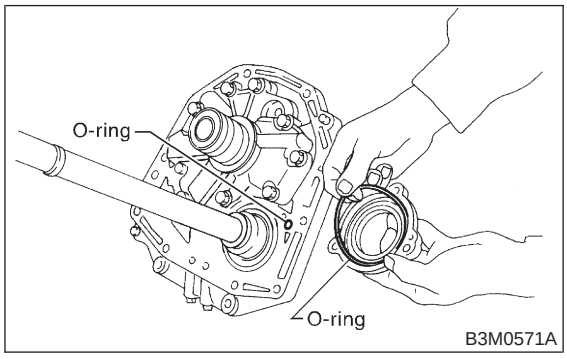
CAUTION:
● Always discard old oil seals, and install new ones.
● Pay attention to the orientation of the oil seals.

ST 499247300 INSTALLER



14) Attach the O-ring to the oil seal retainer with vaseline. Install the seal to the oil pump housing bore.

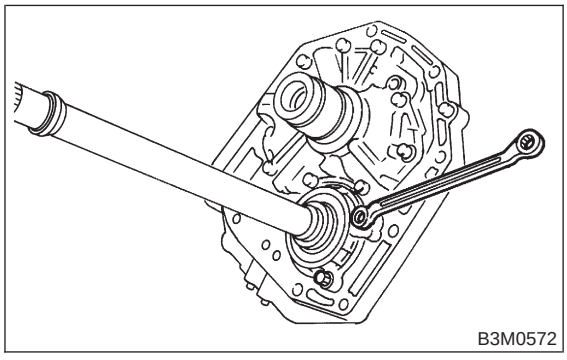
CAUTION:
Always discard old O-rings and install new ones.



15) Install the oil seal retainer taking care not to damage the oil seal lips. Then secure with three bolts.

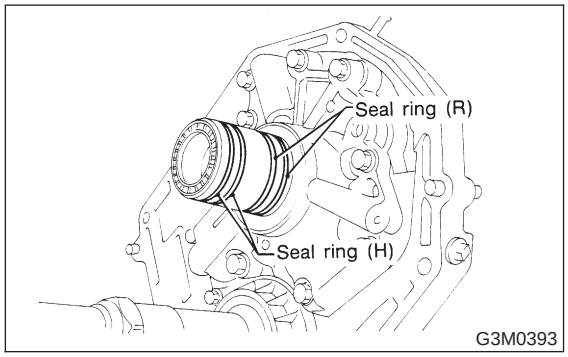
NOTE:
Make sure the O-ring is fitted correctly in position.

Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)



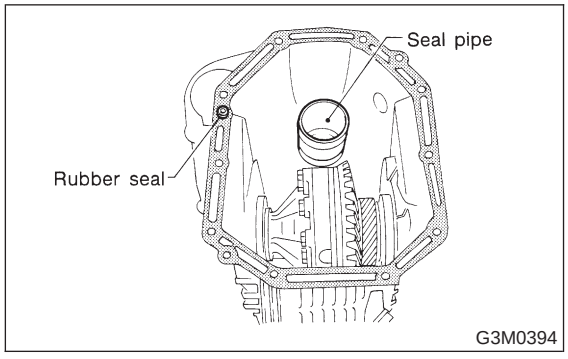
16) Apply vaseline to the groove on the oil pump cover, and install two (R) seal rings and two (H) seal rings.

NOTE:
● Fit the seal ring after compressing, and rub vaseline into the seal ring to avoid expansion.
● The “R” seal ring has a large diameter, while “H” has small diameter.



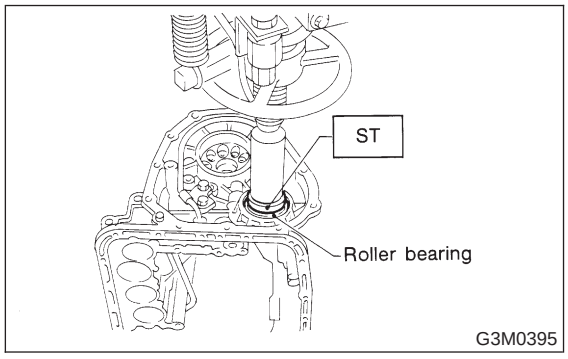
17) Install the rubber seal to the torque converter clutch case.

CAUTION:
Be careful not to lose the rubber seal.

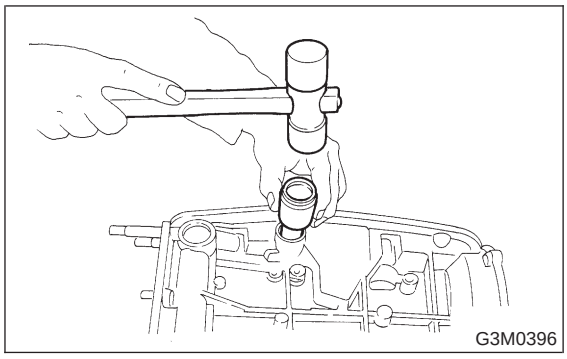


2. TRANSMISSION CASE SECTION

1) Press-fit the roller bearing to the transmission case with ST.
ST 398487700 DRIFT



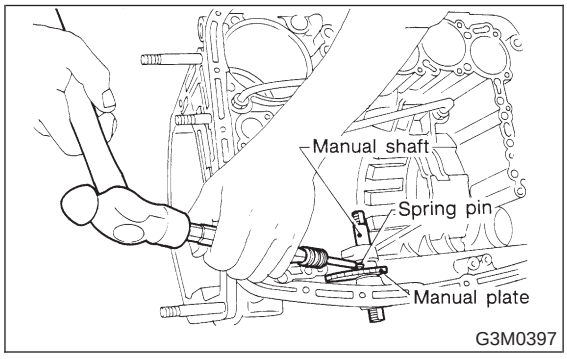
2) Using a plastic hammer, force-fit the oil seal.



3) Install the manual plate and shaft, and secure with a spring pin.

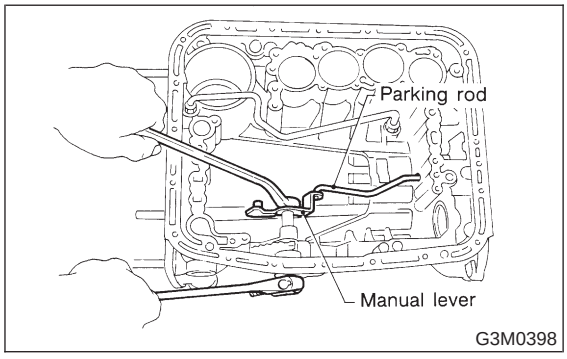
CAUTION:
Be careful not to damage the oil seal lip.

NOTE:
After installation, make sure of smooth movement.



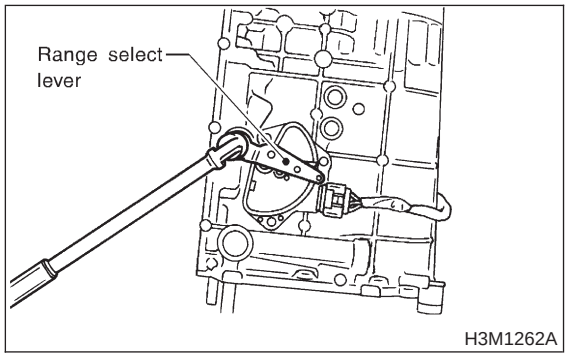
4) Assemble the manual lever and parking rod to the inside shaft, and secure with a nut.

Tightening torque:
47±2 N·m (4.8±0.2 kg-m, 34.7±1.4 ft-lb)



5) Installation of inhibitor switch
(1) Install the inhibitor switch to the transmission case. Fit the projecting portion of the switch in the recessed portion of the case, and tighten three bolts temporarily.
(2) Insert the range select lever into the shaft, and tighten the nut.

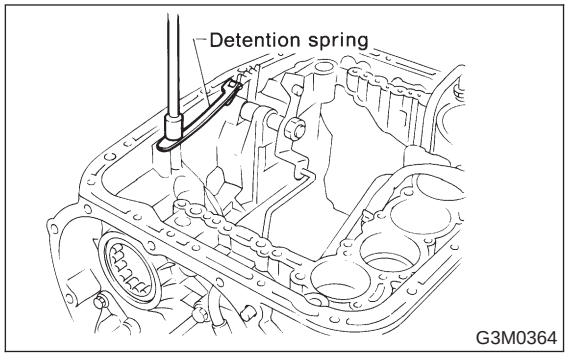
Tightening torque:
47±5 N·m (4.8±0.5 kg-m, 34.7±3.6 ft-lb)



6) Install the detention spring.

NOTE:
Position the spring so that its center is aligned with the center of the manual plate.

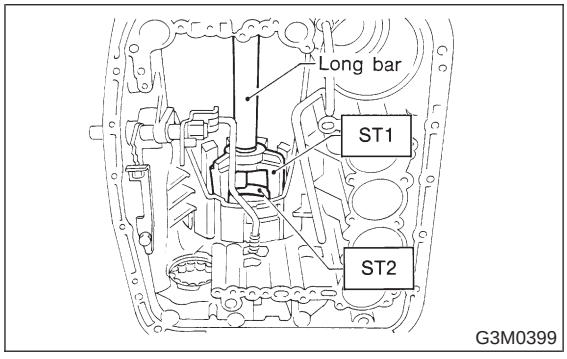
Tightening torque:
6±1 N·m (0.6±0.1 kg-m, 4.3±0.7 ft-lb)



7) Install the lathe cut seal rings to the I.D./O.D. of the low and reverse piston. Then install the piston into the case with a press, ST1 and ST2.

CAUTION:
- **Be careful not to tilt the piston when installing.**
- **Be careful not to damage the lip seal.**

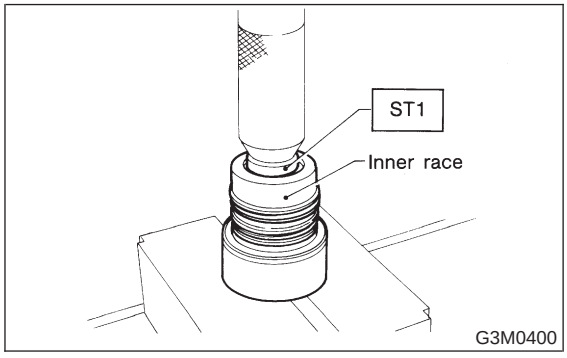
ST1 398673600 COMPRESSOR
ST2 498627000 SEAT



8) Install the one-way clutch inner race.
(1) Using a press and ST1, install the needle bearing to the inner race.
ST1 398497701 INSTALLER

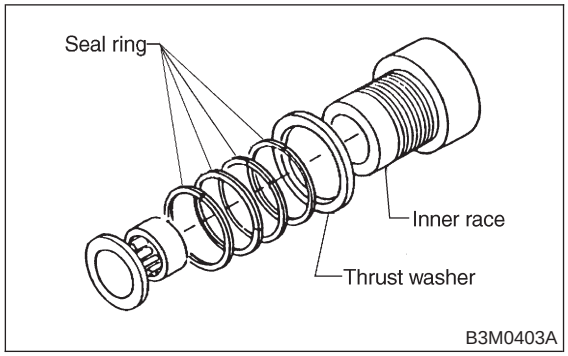
NOTE:
Use the following ST when removing.

ST 398527700 PULLER ASSY



(2) Install four seal rings and thrust washer.

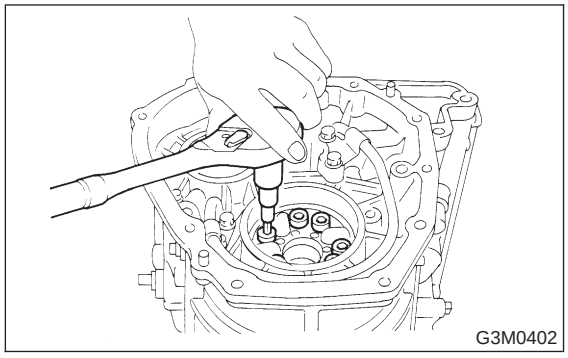
NOTE:
● Apply vaseline to the groove of the inner race and to the seal ring after installation, so that the seal ring will not expand.
● Align the cutout portion of the thrust washer with the inner race pin.



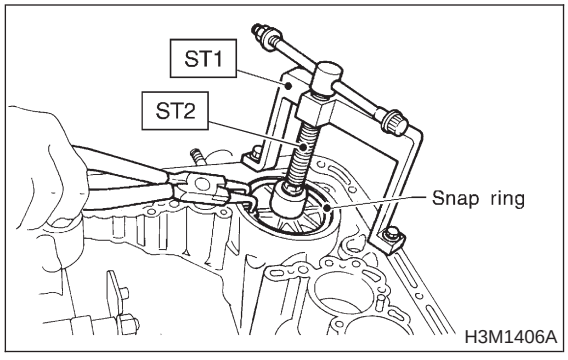
(3) Place the spring retainer on the inner race. Install the spring to the recessed portion of the piston. Then tighten eight socket head bolts from the rear side of the transmission case.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)

CAUTION:
Be sure to tighten evenly.



9) Install the band servo sub assembly.
10) Press the O.D. servo retainer into position with ST1 and ST2, and secure with a snap ring.
ST1 498677010 COMPRESSOR
ST2 399703600 PULLER ASSY



CAUTION:
Perform the following operations with the transmission case set vertically on wooden blocks.

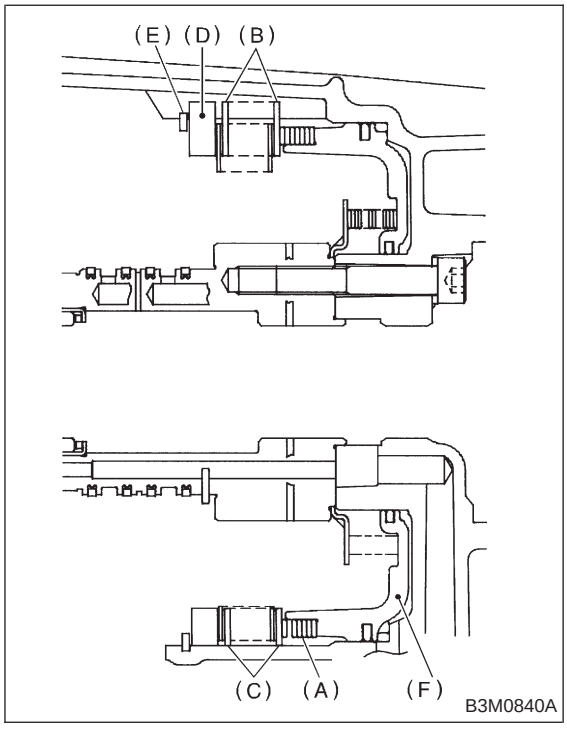
11) Measure thickness of each drive plate.

Standard value:
1.8 mm (0.071 in)

Wear limit:
1.6 mm (0.063 in)

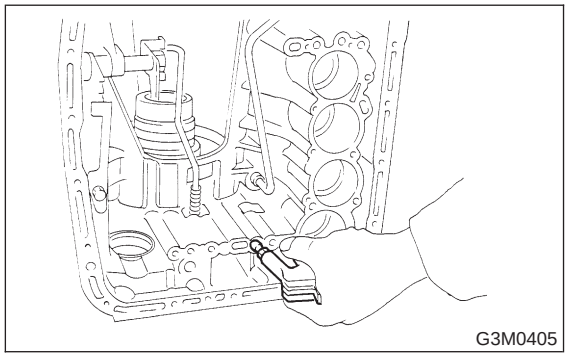
12) Installation of the low & reverse brake:
(1) Install wave spring, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

NOTE:
Pay attention to the orientation of the wave spring.



(A) Wave spring
(B) Driven plate
(C) Drive plate
(D) Retaining plate
(E) Snap ring
(F) Piston

(2) Apply compressed air intermittently to check for operation.

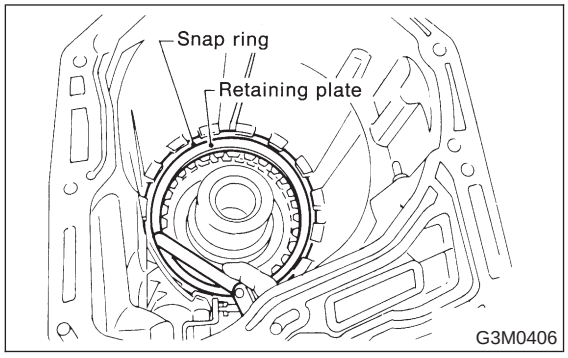


(3) Check the clearance. (Selection of retaining plate)

NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

Standard value:
0.7 — 1.0 mm (0.028 — 0.039 in)

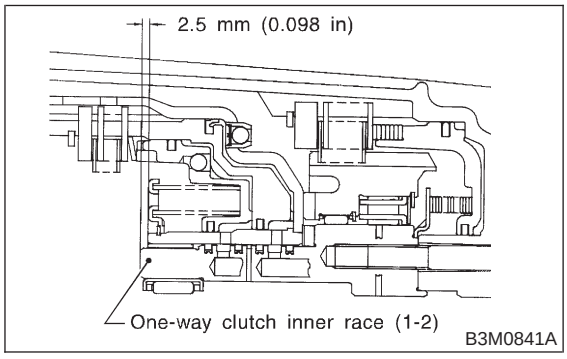
Allowable limit:
Except OUTBACK;
2.0 mm (0.079 in)
OUTBACK;
2.2 mm (0.087 in)



Available retaining plates	
Part No.	Thickness mm (in)
31667AA180	6.5 (0.256)
31667AA190	6.8 (0.268)
31667AA200	7.1 (0.280)
31667AA210	7.4 (0.291)
31667AA220	7.7 (0.303)
31667AA230	8.0 (0.315)
31667AA240	8.2 (0.323)
31667AA250	8.4 (0.331)

13) Install the forward clutch drum.
(1) Install carefully while rotating the forward clutch drum slowly paying special attention not to damage the seal ring.

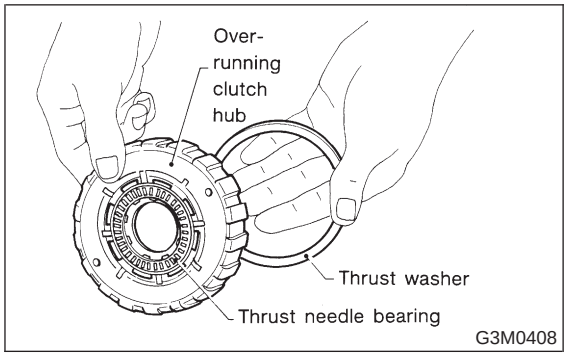
(2) Installation is completed when the forward clutch drum recedes 2.5 mm (0.098 in) from the inner race surface.



14) Assemble the overrunning clutch hub.

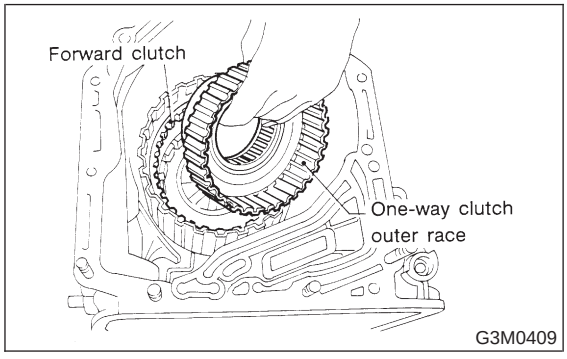
CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>

NOTE:
● Join the thrust needle bearing and thrust washer with vaseline, and then install them together.
● Make sure that the splines are engaged correctly.



15) Install the one-way clutch outer race.

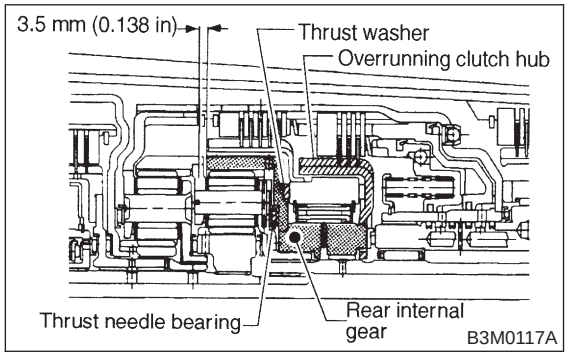
NOTE:
Make sure the forward clutch splines are engaged correctly.



16) Assemble the rear internal gear.
(1) Join the thrust needle bearing and thrust washer to the internal gear with vaseline, and install the iternal gear while rotating it.
(2) Securely engage the bearing with the dog of the overrunning clutch hub.

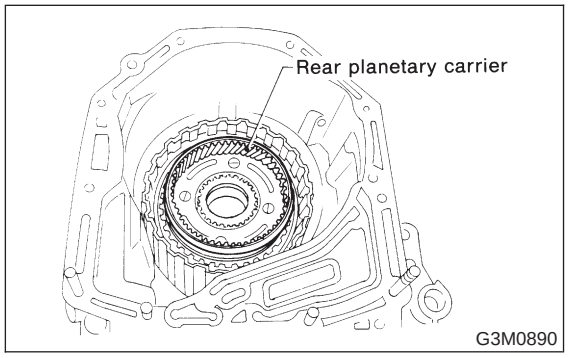
CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>

NOTE:
Installation is complete when the snap ring top surface of the forward clutch drum recedes approximately 3.5 mm (0.138 in).



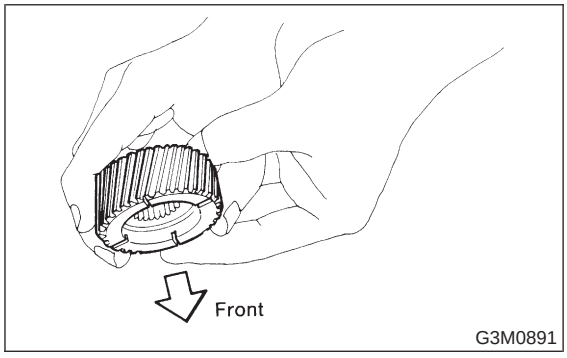
17) Install the rear planetary carrier.
Attach the thrust needle bearing to the inside of the carrier with vaseline. Then install the carrier while rotating slowly.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>



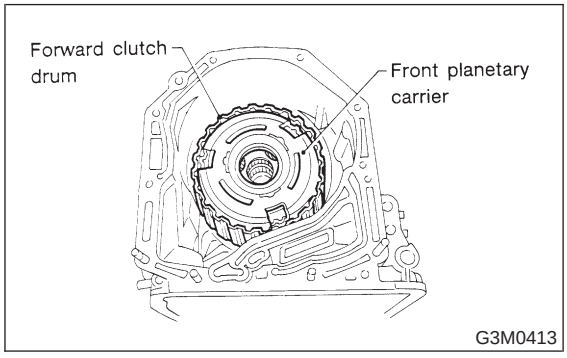
18) Install the rear sun gear.

NOTE:
Install the gear with the oil groove facing up.



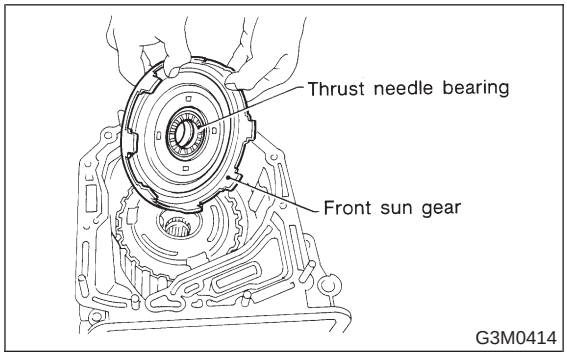
19) Install the front planetary carrier.
Attach the thrust needle bearings to both sides of the carrier with vaseline. Install the carrier carefully, while aligning with the splines of the forward clutch drum, and while rotating the pinion.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>



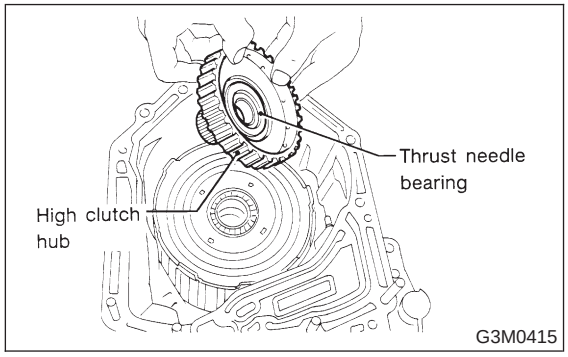
20) Install the front sun gear.
Attach the thrust needle bearing to the gear, and install the gear while turning slowly.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>



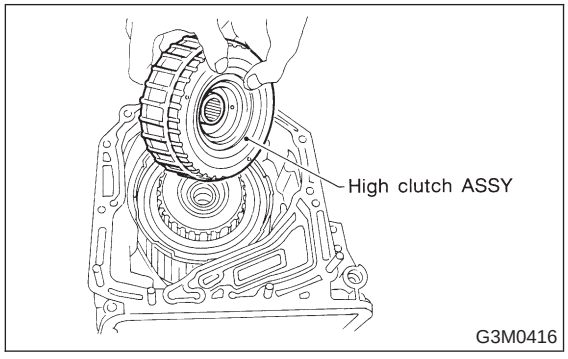
21) Install the high clutch hub.
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1C0].>



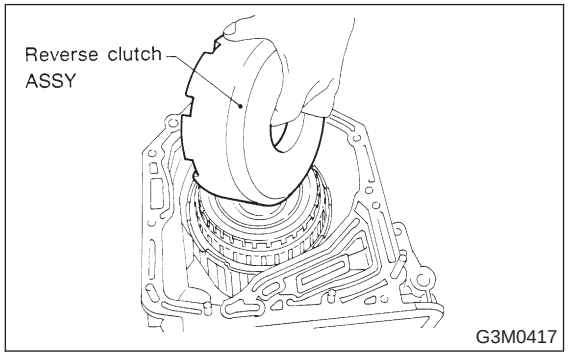
22) Install the high clutch assembly.

NOTE:
Correctly engage the high clutch hub and clutch splines.



23) Install the reverse clutch assembly.

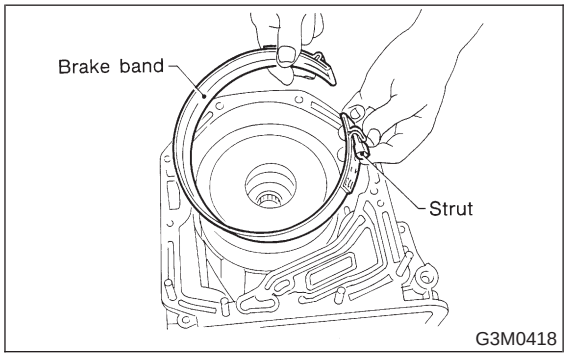
NOTE:
Engage the high clutch outer spline with the reverse clutch spline and the front sun gear with the cut-out portion of the reverse clutch drum correctly when installing.



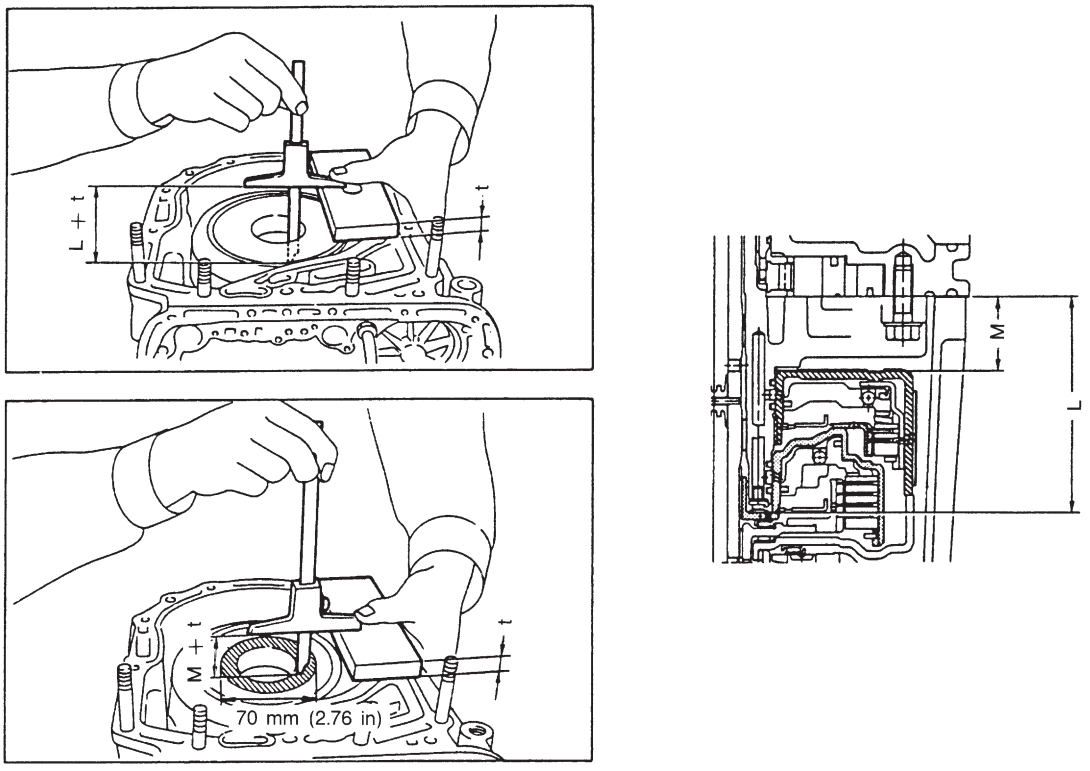
24) Install the brake band.

CAUTION:
Be careful not to damage the brake band when installing.

NOTE:
Install the strut to the band servo piston stem. Then tighten it temporarily to avoid tilting the band.

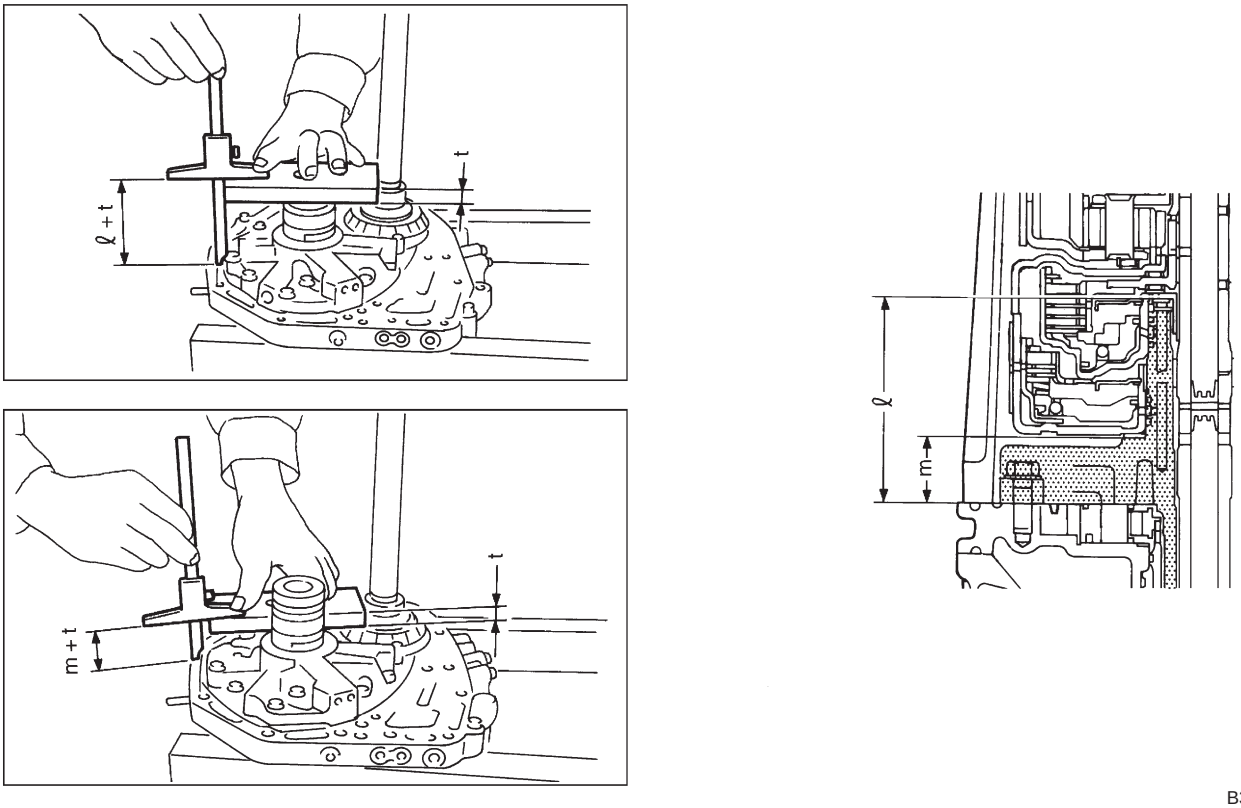


25) Adjustment of total end play and reverse clutch end play
(1) Measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum “L”, and the distance to the top surface of the reverse clutch drum “M”.



G3M0419

(2) Measure the distance from the oil pump housing mating surface to the top surface of the oil pump cover with needle bearing, and to the thrust surface of the reverse clutch.



B3M0573A

(3) Equation for calculation

● Total end play

Select suitable bearing race from among those listed in this table so that clearance C is in the 0.25 — 0.55 mm (0.0098 — 0.0217 in) range.

C = (L + 0.4 mm) − ℓ

C	Clearance between concave portion of high clutch and end of clutch drum support
L	Length from case mating surface to concave portion of high clutch
0.4	Gasket thickness
ℓ	Height from housing mating surface to upper surface of clutch drum support

Bearing race	
Part No.	Thickness mm (in)
803031021	0.8 (0.031)
803031022	1.0 (0.039)
803031023	1.2 (0.047)
803031024	1.4 (0.055)
803031025	1.6 (0.063)
803031026	1.8 (0.071)
803031027	2.0 (0.079)

● Reverse clutch end play

Select suitable thrust washer from among those listed in this table so that clearance C is in the 0.55 — 0.90 mm (0.0217 — 0.0354 in) range.

C = (M + 0.4 mm) − m

C	Clearance between oil pump housing hose and end of reverse clutch
M	Distance from case mating surface to upper surface of reverse clutch
0.4	Gasket thickness
m	Height from housing mating surface to thrust-receiving area of reverse clutch

Thrust washers	
Part No.	Thickness mm (in)
31299AA000	0.7 (0.028)
31299AA010	0.9 (0.035)
31299AA020	1.1 (0.043)
31299AA030	1.3 (0.051)
31299AA040	1.5 (0.059)
31299AA050	1.7 (0.067)
31299AA060	1.9 (0.075)

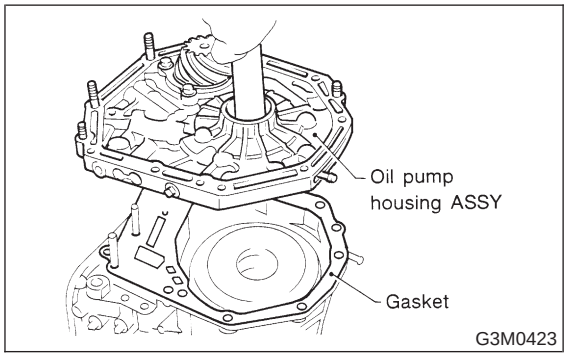
26) Install the oil pump housing assembly.

(1) After completing end play adjustment, insert the bearing race in the recess of the high clutch. Attach the thrust washer and thrust needle bearing to the oil pump cover with vaseline.

(2) After correctly installing the gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

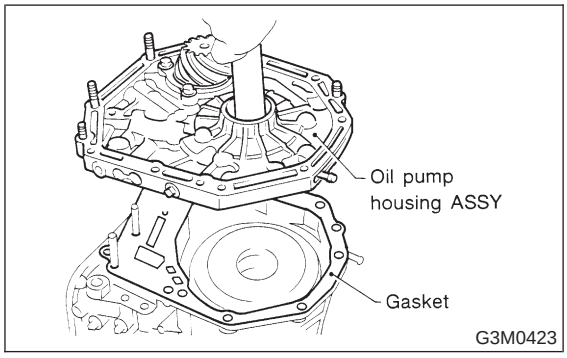
CAUTION:

- **Be careful not to damage the seal ring.**
- **Be sure to use a new gasket.**



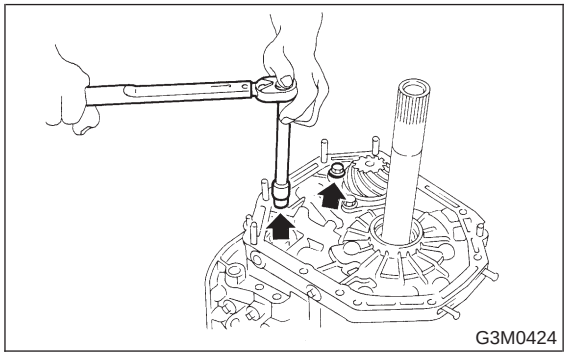
(3) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

NOTE:
Any clearance suggests a damaged seal ring.



(4) Secure the housing with two nuts.

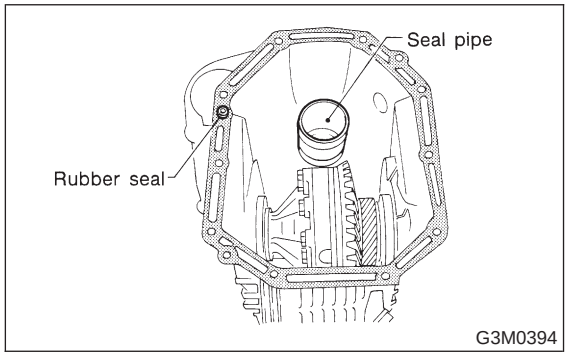
Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



3. TORQUE CONVERTER CLUTCH CASE AND TRANSMISSION CASE

1) Apply proper amount of liquid gasket (THREE BOND Part No. 1215) to the entire torque converter clutch case mating surface.

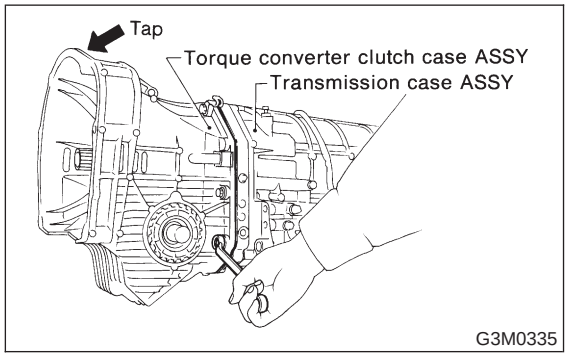
NOTE:
Make sure that the rubber seal and seal pipe are fitted in position.



2) Install the torque converter clutch case assembly to the transmission case assembly, and secure with six bolts and four nuts.

CAUTION:
When installing, be careful not to damage the torque converter clutch case bushing and oil seal.

Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)

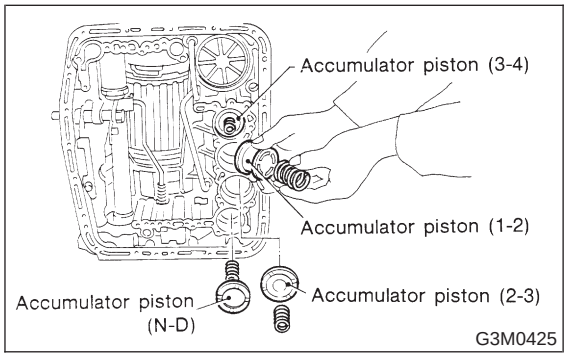


4. CONTROL VALVE AND OIL PAN

1) Install four accumulators with oil pans facing upward.

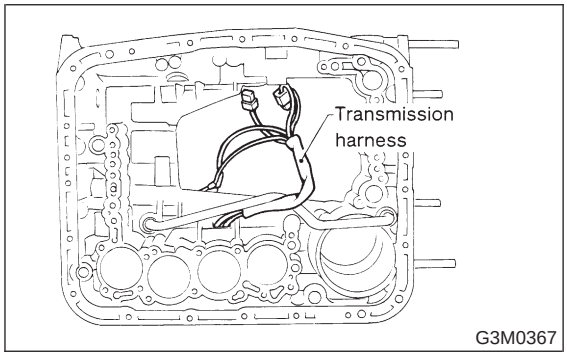
CAUTION:
Be careful not to confuse the springs and installation positions.

Spring specification		
Accumulator spring	Outer diameter mm (in)	Free length mm (in)
1 — 2	28.5 (1.122)	44.5 (1.752)
2 — 3	20.5 (0.807)	31.0 (1.220)
3 — 4	17.3 (0.681)	43.7 (1.720)
N — D	17.8 (0.701)	36.5 (1.437)



2) Install and route the transmission harness.

CAUTION:
Be careful not to damage the harness.

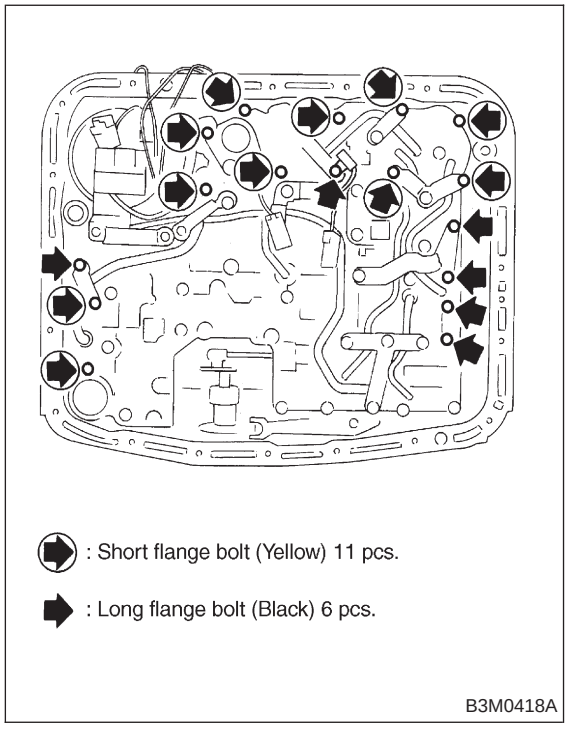


3) Install the control valve assembly.
(1) Set the select lever in range “2”.

(2) Install the two brackets, ATF temperature sensor and the control valve by engaging the manual valve and manual lever, then tighten the 17 bolts.

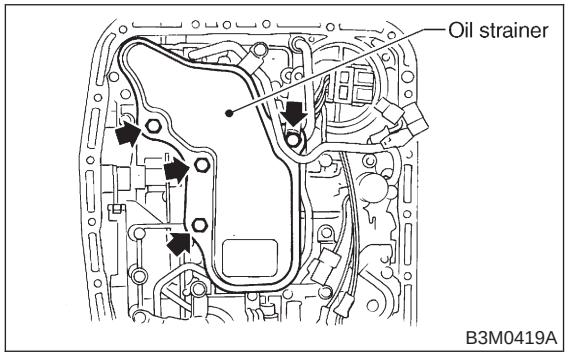
CAUTION:
• Be careful not to pinch the harness roll the gasket.
• Tighten the control valve mounting bolts evenly.

Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

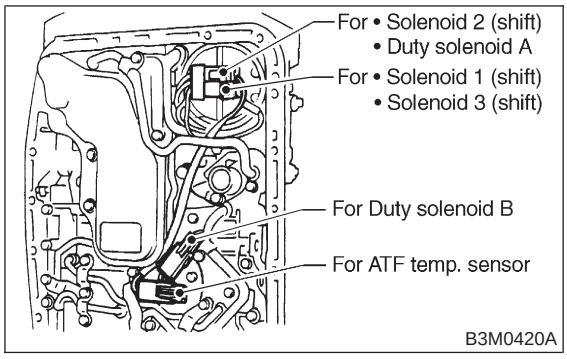


4) Install the oil strainer to the control valve. Be careful not to cut or break the O-ring. Then tighten four bolts.

Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



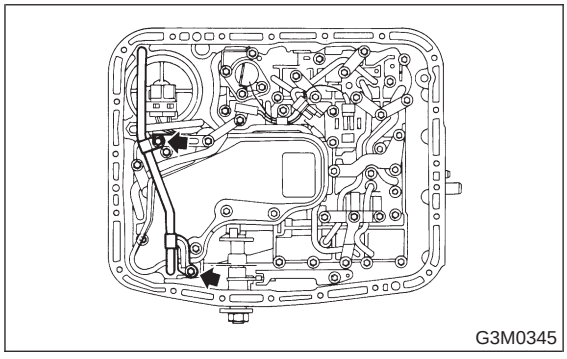
5) Secure four connectors.



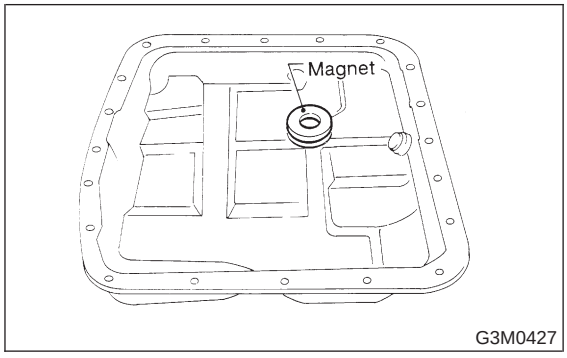
6) Install the oil cooler outlet pipe, and secure with two bolts.

CAUTION:
Fit the pipe into position. Be careful to avoid twisting.

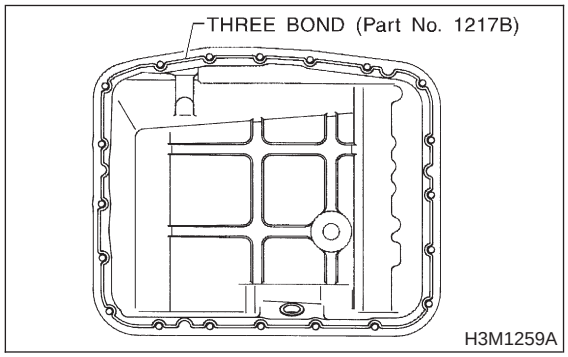
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



7) Install the oil pan.
(1) Attach the magnet at the specified position.



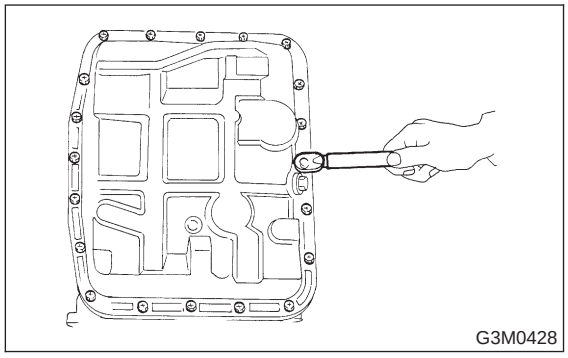
(2) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surace.



(3) Install the oil pan to the transmission case assembly, and secure with 20 bolts.

NOTE:
Tighten the bolts evenly.

Tightening torque:
4.9±0.5 N·m (0.50±0.05 kg-m, 3.6±0.4 ft-lb)



5. EXTENSION SECTION

NOTE:
When installing new oil seal into extension case, press it with ST.

ST 498057300 INSTALLER

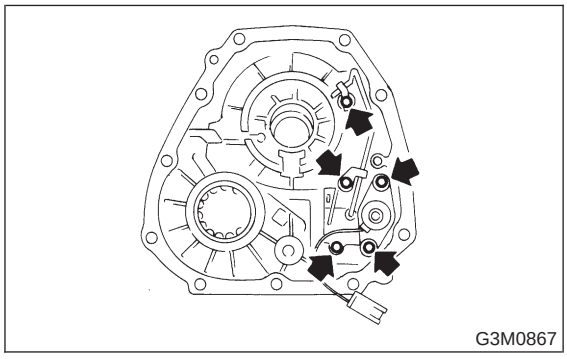
1) Install the filter in the extension case.

NOTE:
Pay attention to the orientation of the filter.

2) Install the transfer clutch valve assembly, transfer pipe, and the stay then secure with five bolts.

CAUTION:
- **Be sure to tighten the going lead with one of these bolts.**
- **Be sure to use a new gasket.**

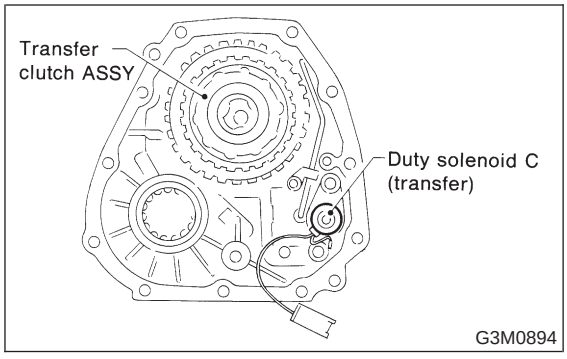
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



3) Install the transfer clutch assembly to the case.

CAUTION:
Be careful not to damage the seal rings.

NOTE:
Insert the clutch assembly fully into position until the bearing shoulder bottoms.



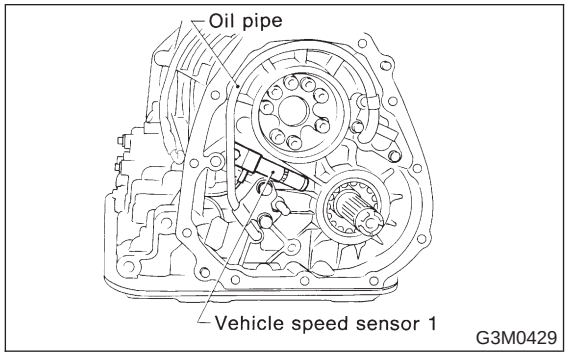
6. CONNECTION OF EACH SECTION (FWD)

1) Install vehicle speed sensor 1 on transmission case.

Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)

2) Install oil pipe.

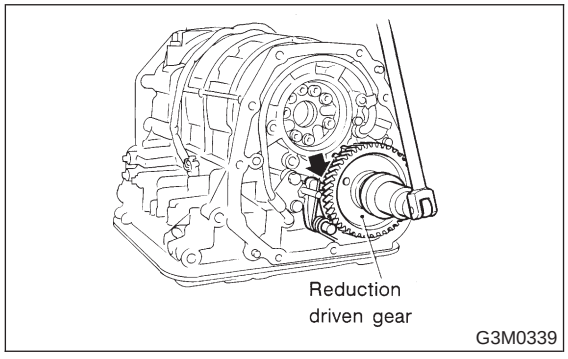
Tightening torque:
7.8±1.0 N·m (0.80±0.10 kg-m, 5.8±0.7 ft-lb)



3) Install the reduction driven gear.
4) Install the parking pawl and shaft, set the select lever in the “P” range and tighten the drive pinion lock nut.

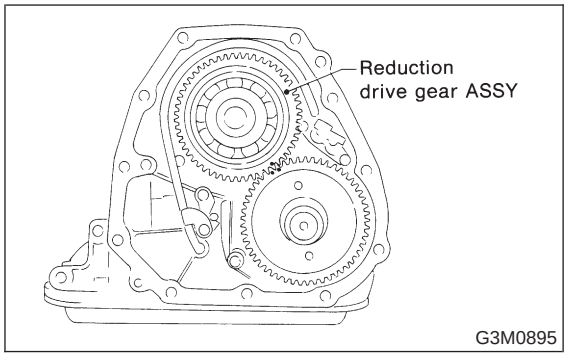
NOTE:
After tightening, stake the lock nut securely.

Tightening torque:
98±5 N·m (10.0±0.5 kg-m, 72.3±3.6 ft-lb)

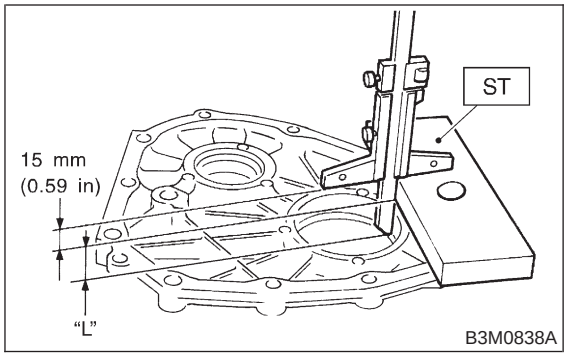


5) Install the reduction drive gear assembly.

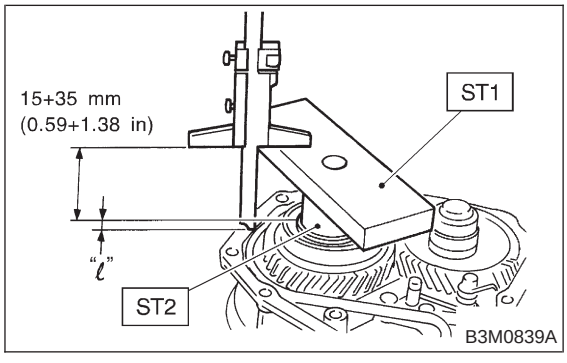
NOTE:
Insert it fully into position until the bearing shoulder bottoms.



6) Measurement and adjustment of extension end play
(1) Measure distance L from end of rear case to point at bearing location with ST.
ST 398643600 GAUGE
L = Measured value − 15 mm



(2) Measure distance ℓ from end of transmission case to end of bearing.
ℓ = Measured value − 50 mm
ST1 398643600 GAUGE
ST2 499577000 GAUGE



(3) Calculation equation:
T = (L + 0.4 mm) − ℓ
T : Clearance between end of reduction drive gear and end of bearing
L : Distance from end of case to point at bearing location

0.4: Gasket thickness
ℓ : Height from end of case to end of bearing
Select suitable thrust needle bearing from among those listed in the following table to adjust clearance in the 0.05 — 0.20 mm (0.0020 — 0.0079 in) range.

Reduction gear shim	
Part No.	31288AA000
Thickness mm (in)	0.15 (0.0059)

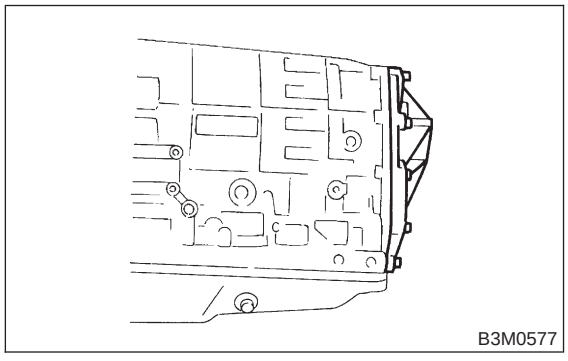
Select from one to five shims so that clearance is within specifications.

7) Installation of transmission cover and transmission case
(1) Attach selected shim to transmission cover using vaseline.
(2) Set the parking return spring.
(3) After positioning gasket, assemble transmission cover and

NOTE:
While aligning bearings, parking shaft, reduction driven gear, etc. assemble the two cases.

(4) Tighten bolts.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)


B3M0577

7. CONNECTION OF EACH SECTION (AWD)

1) Install oil pipe.

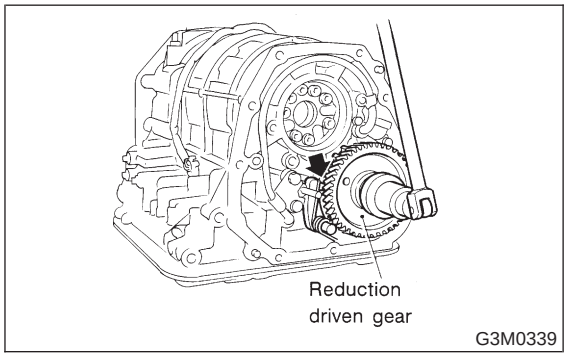
Tightening torque:
7.8±1.0 N·m (0.8±0.10 kg-m, 5.8±0.7 ft-lb)

2) Install the reduction driven gear.

3) Install the parking pawl and shaft, set the select lever in the “P” range and tighten the drive pinion lock nut.

NOTE:
After tightening, stake the lock nut securely.

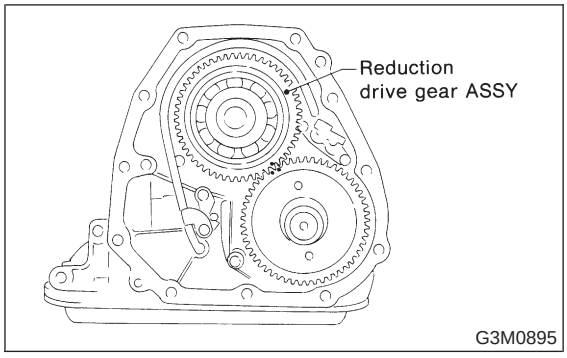
Tightening torque:
98±5 N·m (10.0±0.5 kg-m, 72.3±3.6 ft-lb)



G3M0339

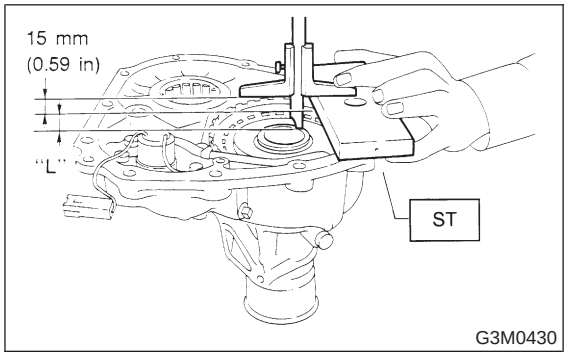
4) Install the reduction drive gear assembly.

NOTE:
Insert it fully into position until the bearing shoulder bottoms.



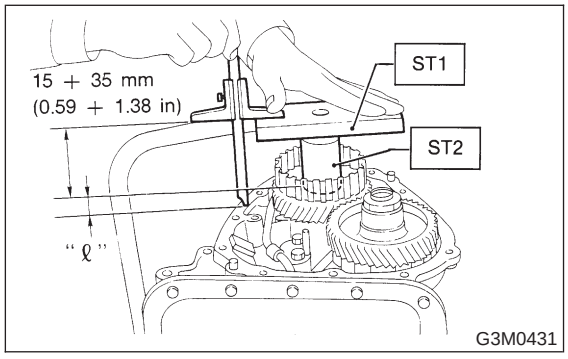
G3M0895

5) Measurement and adjustment of extension end play
(1) Measure distance L from end of extension case and rear drive shaft with ST.
ST 398643600 GAUGE
L = Measured value − 15 mm



G3M0430

(2) Measure the distance "ℓ" from the transmission case mating surface to the reduction drive gear end surface with ST1 and ST2.
ℓ = Measured value − 50 mm
ST1 398643600 GAUGE
ST2 499577000 GAUGE



(3) Calculation equation:
T = (L + 0.4 mm) − ℓ
T : Clearance between end of reduction drive gear and end of rear drive shaft
L : Distance from end of extension case to end of rear drive shaft
0.4: Gasket thickness
ℓ : Height from end of transmission case to end of reduction drive gear
Select suitable thrust needle bearing from among those listed in the following table to adjust clearance in the 0.05 — 0.20 mm (0.0020 — 0.0079 in) range.

Thrust needle bearing	
Part No.	Thickness mm (in)
806536020	3.8 (0.150)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806535090	5.0 (0.197)

Select from one to five shims so that clearance is within specifications.

6) Installation of extension case and transmission case
(1) Attach the selected thrust needle bearing to the end surface of reduction drive gear with vaseline.
(2) Set the parking return spring.
(3) Remove the transfer clutch from the extension case.
Set the needle bearing on the reduction drive shaft and then install transfer clutch to the transfer clutch hub.

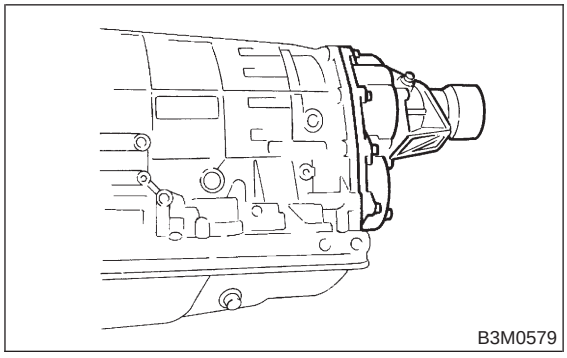
NOTE:
Be sure to engage the spline teeth correctly.

(4) With gasket inserted between them, install the extension case to the transmission case.

CAUTION:
- **Be sure to use a new gasket.**
- **After inserting the extension case halfway, connect the connector for duty solenoid C. Be careful not to jam the cord in the case.**
- **Be careful not to damage the rear drive shaft seal ring.**

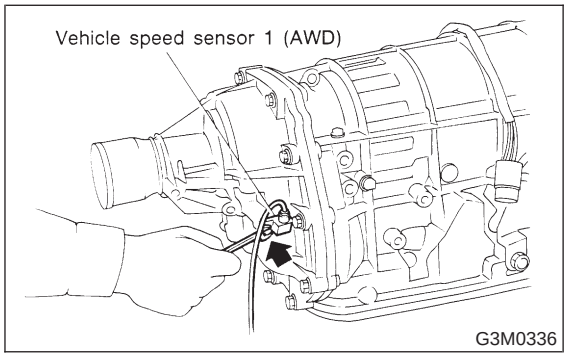
(5) Tighten bolts to secure the case.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



7) Install the vehicle speed sensor 1.

Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)



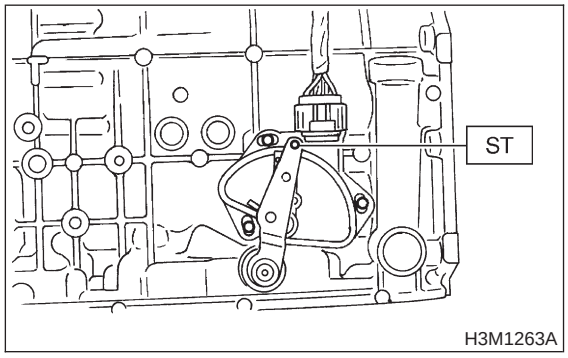
8. EXTERNAL PARTS

1) Adjustment of inhibitor switch

(1) With the selector lever set to “N” adjust the inhibitor switch so that the hole of range select lever is aligned with the inhibitor switch hole with ST.

NOTE:
Ensure that gauge moves properly.

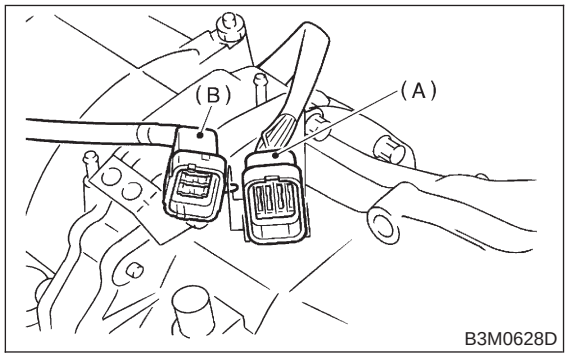
ST1 499267300 STOPPER PIN



(2) With hole aligned, tighten three bolts to secure the inhibitor switch.

Tightening torque:
3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

2) Clip the following cords and harness.



(A) Transmission harness
(B) Inhibitor switch cord

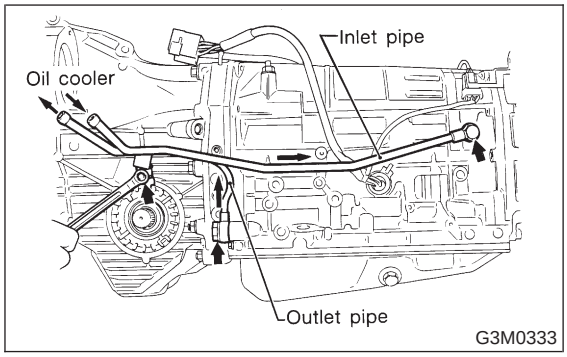
3) Install the oil cooler outlet pipe.

Tightening torque:
34±3 N·m (3.5±0.3 kg-m, 25.3±2.2 ft-lb)

4) Install the oil cooler inlet pipe.

CAUTION:
Be sure to use a new aluminum washer.

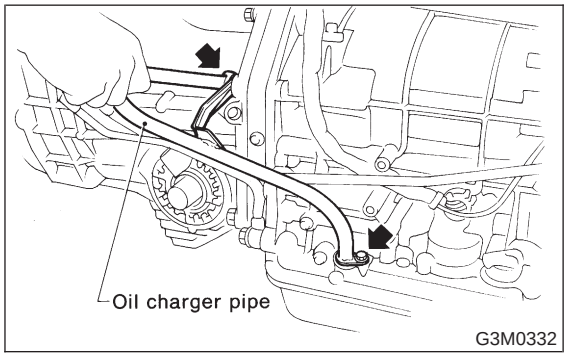
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



5) Install the oil charge pipe.

CAUTION:
Be careful not to damage the O-ring.

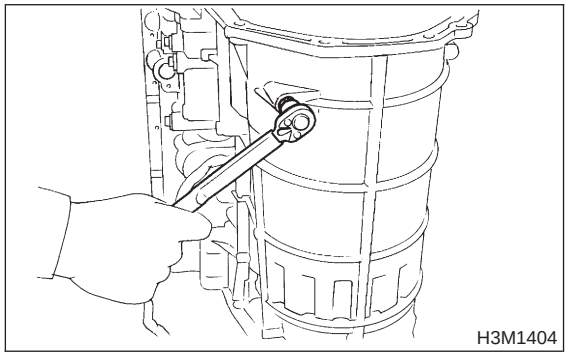
Tightening torque:
Upper
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)
Lower
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)



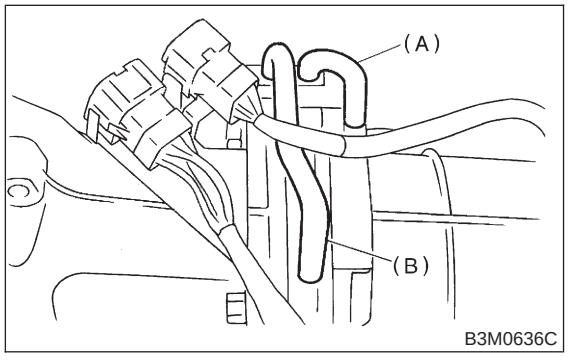
6) Adjustment of brake band
After tightening the brake band adjusting screw with ST to 9 N·m (0.9 kg-m, 6.5 ft-lb) torque, back it off three turns. Then secure with a lock nut.

NOTE:
When tightening the lock nut, be careful not to turn the adjusting screw.

Tightening torque:
26±2 N·m (2.7±0.2 kg-m, 19.5±1.4 ft-lb)


H3M1404

7) Install the air breather hose.

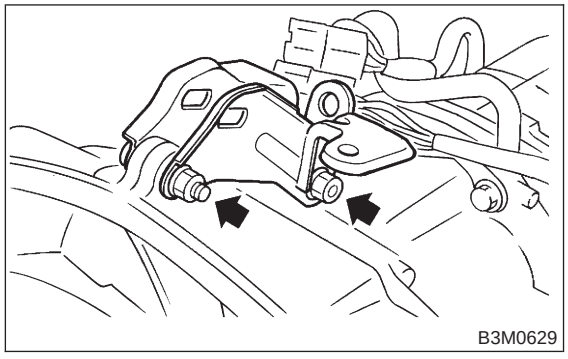


B3M0636C

(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

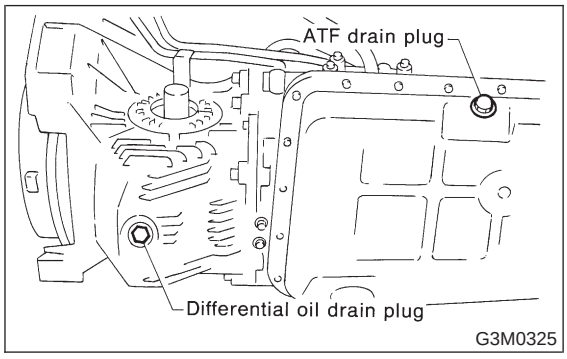
8) Install the pitching stopper bracket.

Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)


B3M0629

9) Tighten the drain plugs.

Tightening torque:
Diff.
44±3 N·m (4.5±0.3 kg-m, 32.5±2.2 ft-lb)
ATF
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)

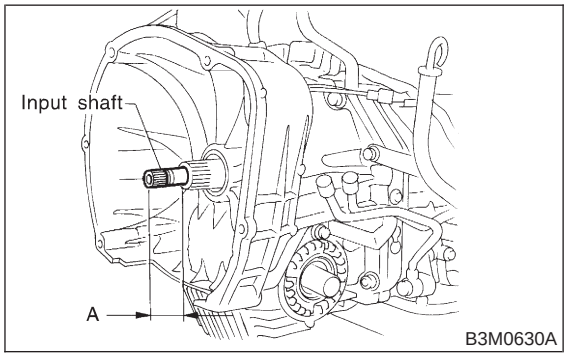


G3M0325

10) Insert the input shaft while turning lightly by hand.

CAUTION:
Be careful not to damage the bushing.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



B3M0630A

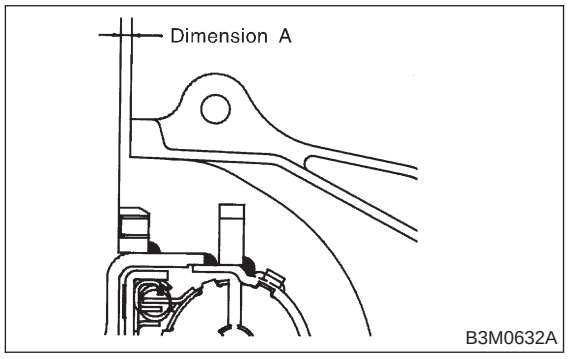
11) Install the torque converter clutch assembly.
(1) Install the oil pump shaft to the torque converter clutch.

NOTE:
Make sure the clip fits securely in its groove.

(2) Holding the torque converter clutch assembly by hand, carefully install it to the torque converter clutch case. Be careful not to damage the bushing. Also avoid undue contact between the oil pump shaft bushing and stator shaft portion of the oil pump cover.

(3) Rotate the shaft lightly by hand to engage the splines securely.

Dimension A:
3.9 — 4.1 mm (0.154 — 0.161 in)



12) Fill ATF and differential gear oil.

NOTE:
After filling oil, insert the oil level gauge into the oil inlet.

Differential gear oil capacity:
1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

Automatic transmission fluid capacity:
2200 cc:
7.9 — 8.2 ℓ (8.4 — 8.7 US qt, 7.0 — 7.2 Imp qt)
2500 cc:
9.5 — 9.8 ℓ (10.0 — 10.3 US qt, 8.4 — 8.6 Imp qt)

Recommended fluid:
Dexron II or Dexron III type automatic transmission

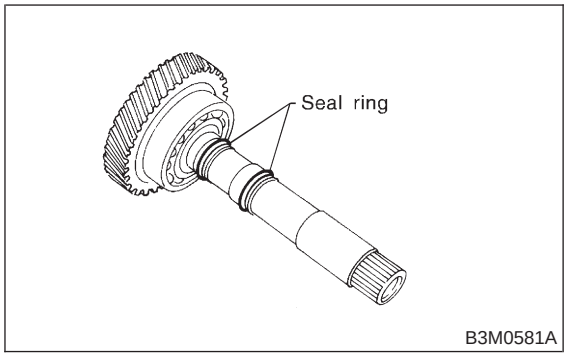
13. Reduction Drive Gear Assembly

A: DISASSEMBLY

1. FWD MODEL

1) Take out the seal rings.

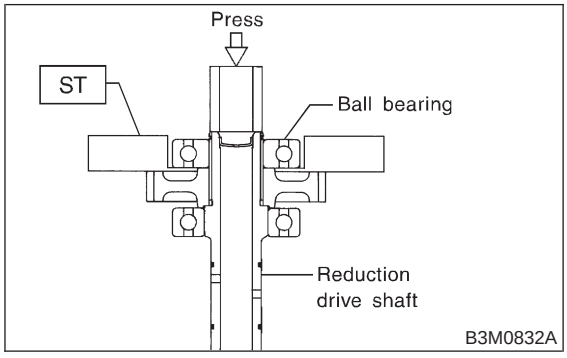
CAUTION:
Be careful not to damage the seal rings.



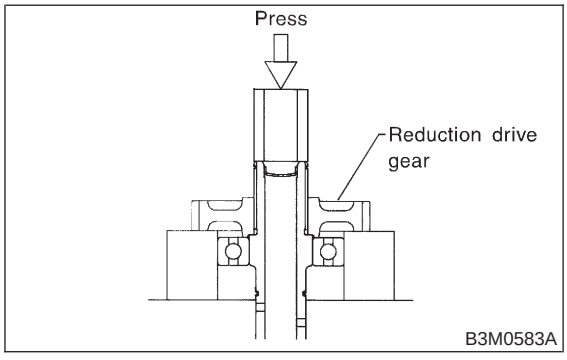
2) Take out the snap ring.

CAUTION:
Be careful not to damage the splines.

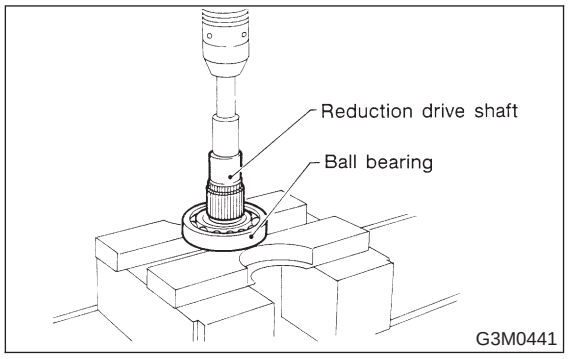
3) Using a press and ST, remove the ball bearing from shaft.
ST 49971700 REMOVER



4) Using a press, remove the reduction drive gear.



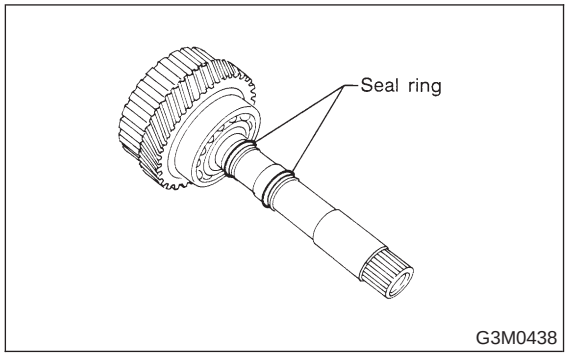
5) Using a press, remove the ball bearing.



2. AWD MODEL

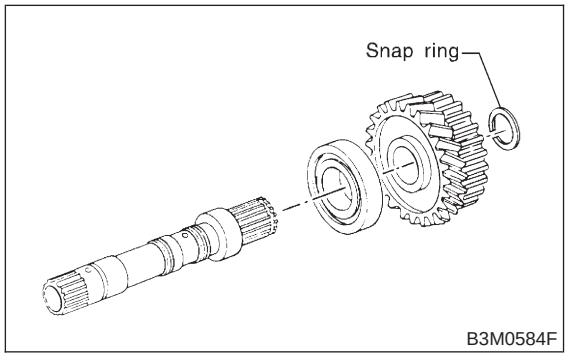
1) Take out the seal rings.

CAUTION:
Be careful not to damage the seal rings.

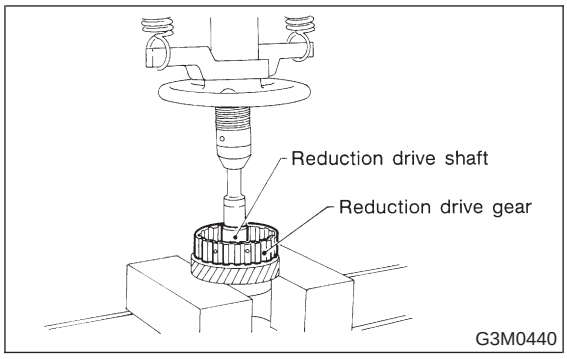


2) Take out the snap ring.

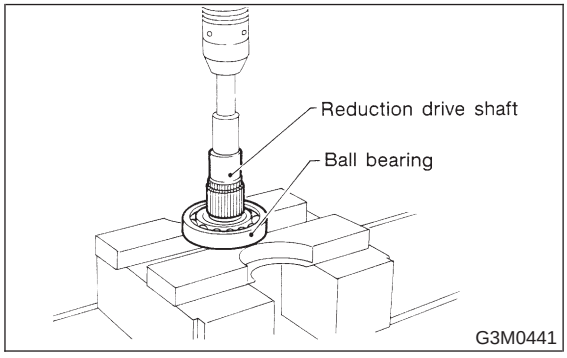
CAUTION:
Be careful not to damage the splines.



3) Using a press, remove the reduction drive gear.



4) Using a press, remove the ball bearing.



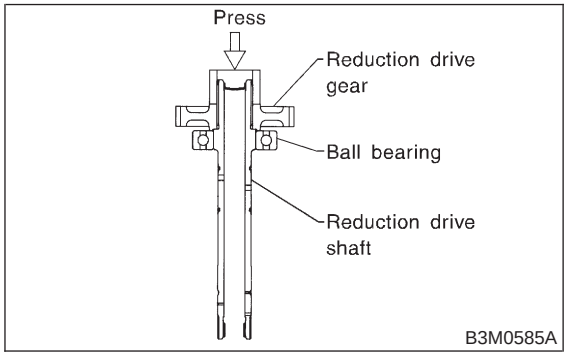
B: INSPECTION

Make sure that each component is free of harmful gouges, cuts, or dust.

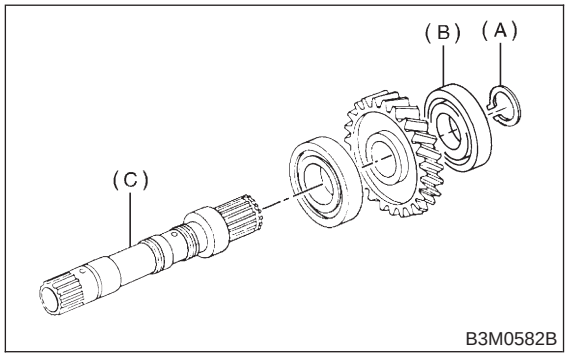
C: ASSEMBLY

1. FWD MODEL

1) Press-fit the ball bearing and reduction drive gear to the shaft.



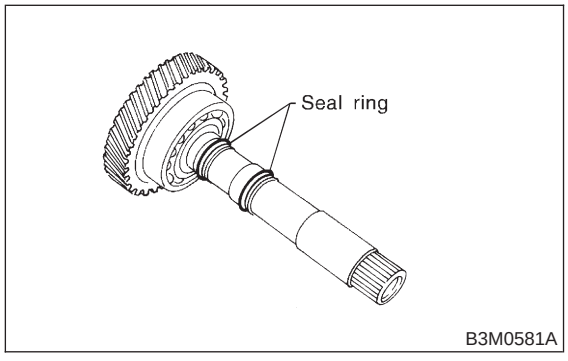
2) Press ball bearing into place and secure snap ring to groove in shaft.



(A) Snap ring
(B) Ball bearing
(C) Reduction drive shaft

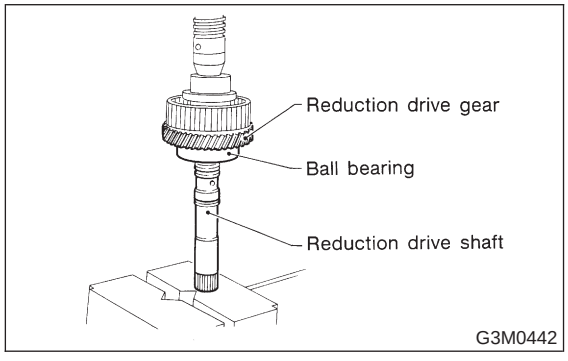
3) Attach two seal rings.

NOTE:
To make subsequent assembly easier, apply vaseline to the grooves of the shaft and to the exterior of the seal ring.

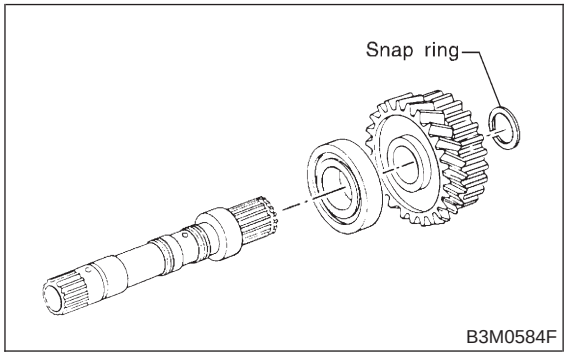


2. AWD MODEL

1) Press-fit the ball bearing and reduction drive gear to the shaft.

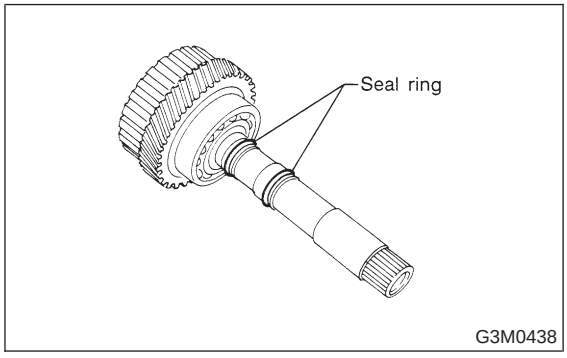


2) Fit the snap ring securely in the snap ring groove on the shaft.



3) Attach two seal rings.

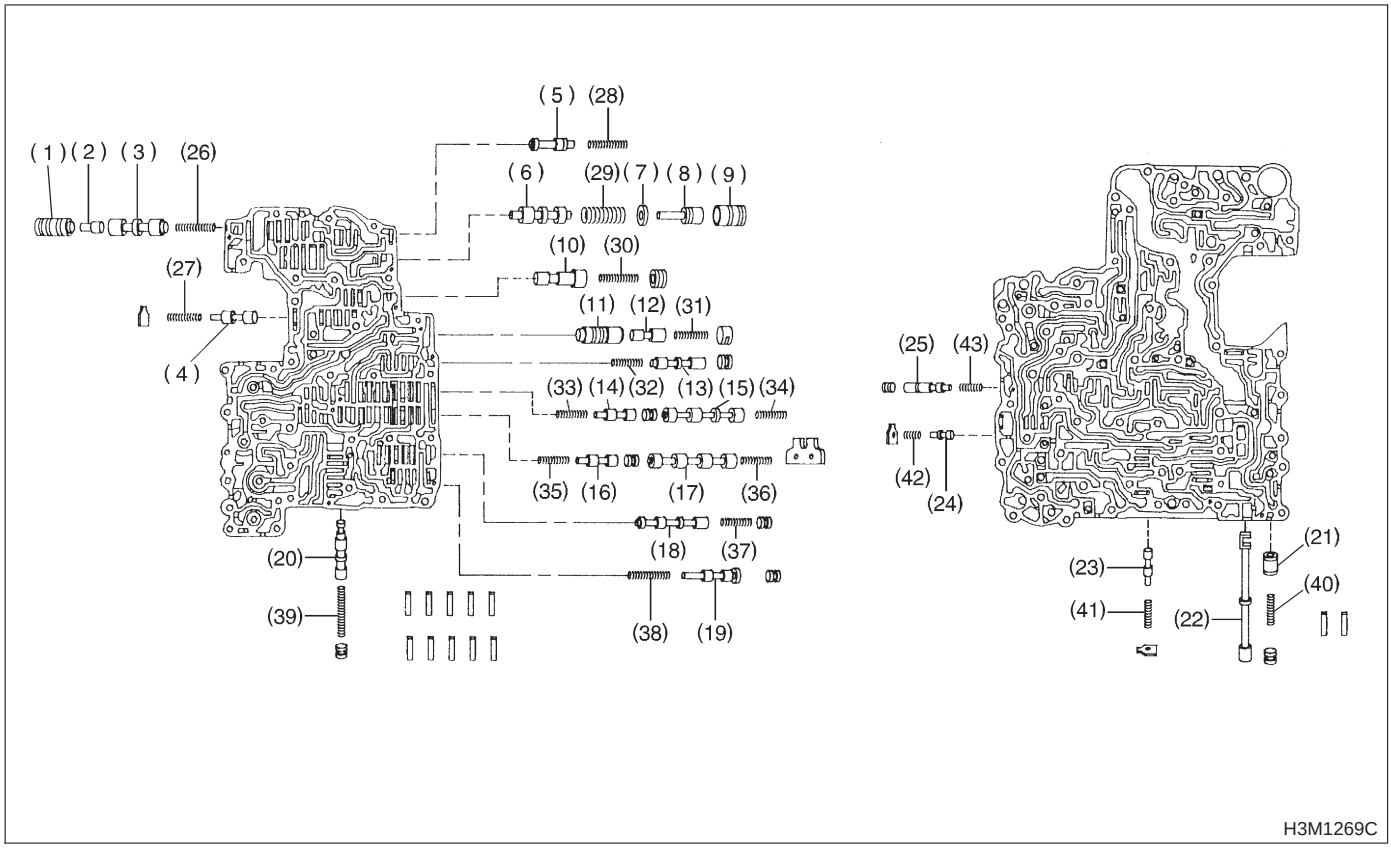
NOTE:
To make subsequent assembly easier, apply vaseline to the grooves of the shaft and to the exterior of the seal ring.



14. Control Valve Body

A: PRECAUTION

The control valve is composed of parts which are accurately machined to a high degree and should be handled carefully during disassembly and assembly. As these parts are similar in shape, they should be arranged in neat order on a table after disassembly so that they can be easily installed to their original positions. Spring loaded parts should be also handled carefully, as springs may jump out of place when the parts are disassembled or removed. Extreme care should be taken so as not to drop valves on the floor. Before assembling, the parts and valves should be dipped in a container filled with the ATF. Make sure that the valves are clean and free from any foreign material before assembly. Torque specifications should also be observed.

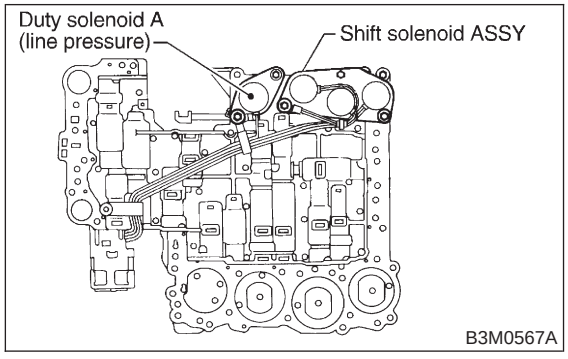


(1) Lock-up control sleeve
(2) Lock-up control plug
(3) Lock-up control valve
(4) Pilot valve
(5) Torque converter regulation valve
(6) Pressure regulator valve
(7) Washer
(8) Pressure regulator plug
(9) Pressure regulator sleeve
(10) Pressure modifier valve
(11) Accumulator control sleeve valve
(12) Accumulator control plug valve
(13) Shuttle duty shift valve
(14) 4-2 sequence valve
(15) Shift valve B
(16) 4-2 relay valve
(17) Shift valve A
(18) Overrunning clutch control valve
(19) Overrunning clutch reducing valve
(20) Shuttle shift valve
(21) Accumulator modifier piston
(22) Manual valve
(23) 1st reducing valve
(24) 3-2 timing valve
(25) Servo charger valve
(26) Lock-up control spring
(27) Pilot spring
(28) Torque converter regulator spring
(29) Pressure regulator spring
(30) Pressure modifier spring
(31) Accumulator control spring
(32) Shuttle shift spring
(33) 4-2 sequence spring
(34) Shift B spring
(35) 4-2 relay spring
(36) Shift A spring
(37) Overrunning clutch control spring
(38) Overrunning clutch reducing spring
(39) Shuttle duty shift spring
(40) Modifier accumulator spring
(41) 1st reducing spring
(42) 3-2 timing spring
(43) Servo charger spring

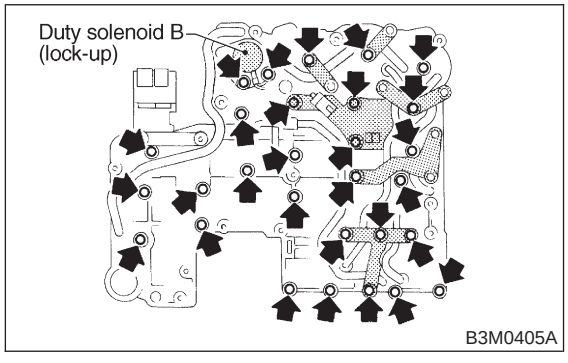
No.	Part name	Wire dia. mm (in)	Outer dia. mm (in)	Effective turn mm (in)	Free length mm (in)
26	Pressure regulator spring	1.6 (0.063)	14.0 (0.551)	5.6	31.5 (1.240)
27	Pressure modifier spring	0.8 (0.031)	6.8 (0.268)	10.0	31.95 (1.2579)
28	Modifier accumulator spring	1.3 (0.051)	9.8 (0.386)	8.8	30.5 (1.201)
29	Pilot spring	1.1 (0.043)	9.1 (0.358)	8.3	25.7 (1.012)
30	Accumulator control spring	0.4 (0.016)	6.6 (0.260)	11.0	27.5 (1.083)
31	Shift B spring	0.65 (0.0256)	7.0 (0.276)	9.5	25.0 (0.984)
32	Shift A spring	0.5 (0.020)	7.0 (0.276)	9.5	25.0 (0.984)
33	Shuttle shift spring	0.65 (0.0256)	5.65 (0.2224)	27.6	51.0 (2.008)
34	Overrunning clutch control spring	0.7 (0.028)	6.0 (0.236)	12.0	26.5 (1.043)
35	4-2 sequence spring	0.55 (0.0217)	6.95 (0.2736)	11.0	29.1 (1.146)
36	4-2 relay spring	0.55 (0.0217)	6.95 (0.2736)	11.0	29.1 (1.146)
37	Servo charger spring	0.7 (0.028)	6.7 (0.264)	9.0	23.0 (0.906)
38	3-2 timing spring	0.75 (0.0295)	6.75 (0.2657)	7.5	20.55 (0.8091)
39	1st reducing spring	0.75 (0.0295)	6.75 (0.2657)	12.5	25.4 (1.000)
40	Overrunning clutch reducing spring	1.05 (0.0413)	7.05 (0.2776)	15.21	34.7 (1.366)
41	Torque converter regulator spring	1.3 (0.051)	9.0 (0.354)	11.7	38.0 (1.496)
42	Lock-up control spring	0.75 (0.0295)	13.0 (0.512)	3.5	18.5 (0.728)
43	Shuttle duty shift spring	0.75 (0.0295)	5.65 (0.2224)	27.6	51.0 (2.008)

B: DISASSEMBLY

1) Remove the duty solenoid A and shift solenoid assembly from the upper valve body.

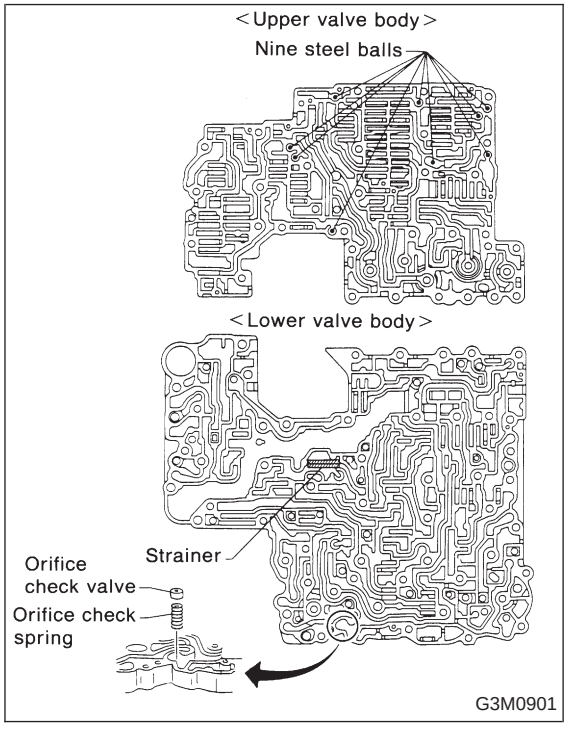


2) Remove the duty solenoid B and brackets from the lower valve body. Remove the upper-lower valve body tightening bolts.



3) Separate the upper valve body and lower valve body.

CAUTION:
● Do not lose the nine (9) steel balls contained in the upper valve body.
● Do not lose an orifice and a strainer contained in the lower valve body.



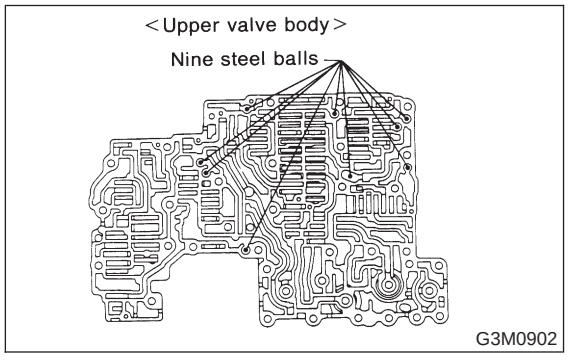
NOTE:
During ordinary servicing, clean the control valve bodies in this condition, without further disassembly. In the event of a seized clutch or other problem, disassemble the control valve bodies further, and clean the component parts.

C: INSPECTION

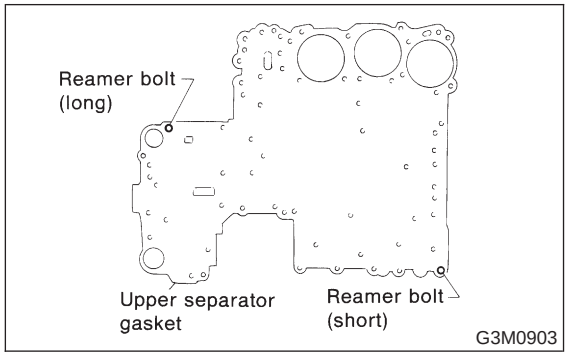
Make sure that each component is free of harmful gouges, cuts, or dust.

D: ASSEMBLY

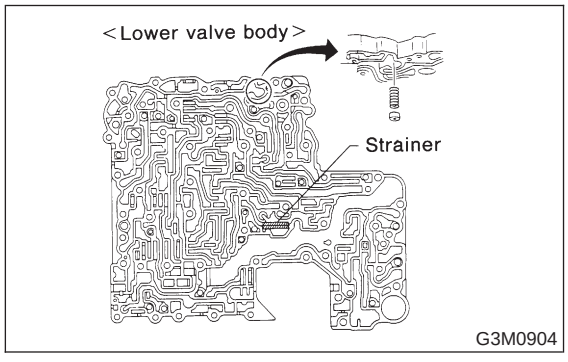
1) Install the nine steel balls to the upper valve body.



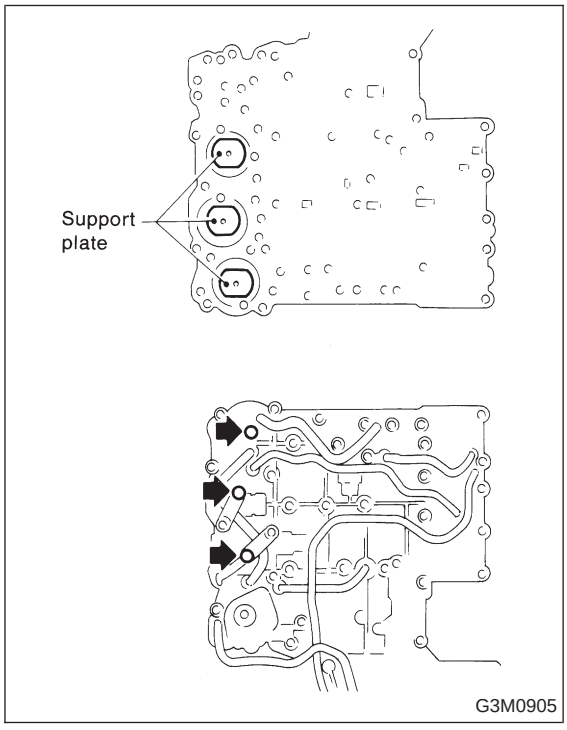
2) From under upper valve body, install two bolts using washers and position upper separator gasket.



3) Install the orifice check valve, orifice check spring and filter to the lower valve body.

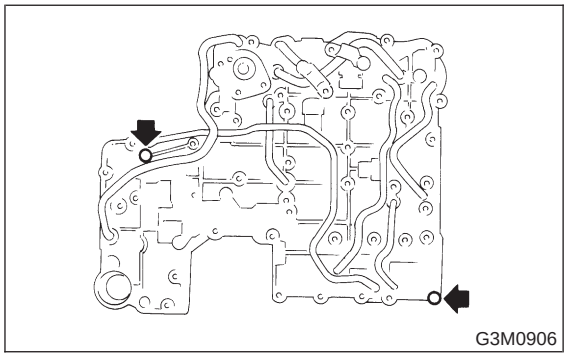


4) Install lower separate gasket and separate plate on lower body in that order, then temporarily tighten three support plates and two brackets.



5) Temporarily assemble lower valve body to upper valve body.

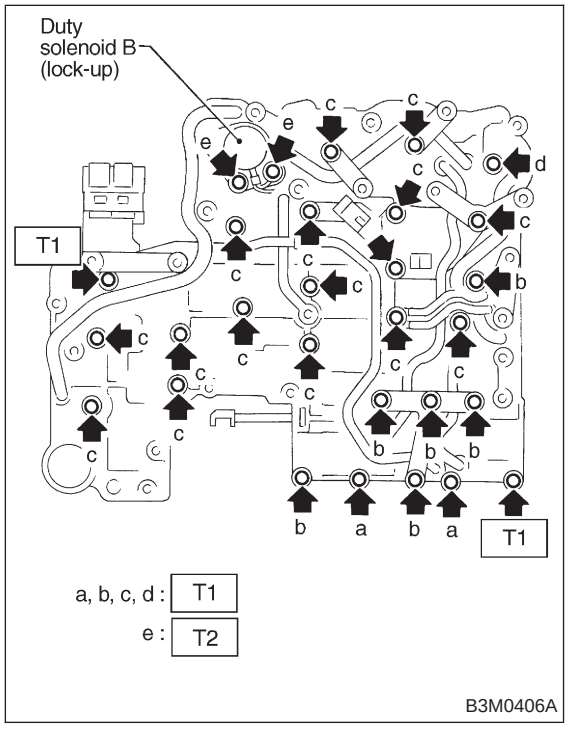
CAUTION:
Be careful not to drop the upper body interior steel ball, or the lower body interior filter, orifice check spring, or orifice check valve.



6) Install the duty solenoid B and the four brackets.
7) Tighten twenty seven bolts & washers and two reamer bolts.

Tightening torque:
T1: 8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)
T2: 11.3±1.5 N·m (1.15±0.15 kg-m, 8.3±1.1 ft-lb)

	a	b	c	d	e
Length mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)	28 (1.10)
Numbers	2	6	16	1	2

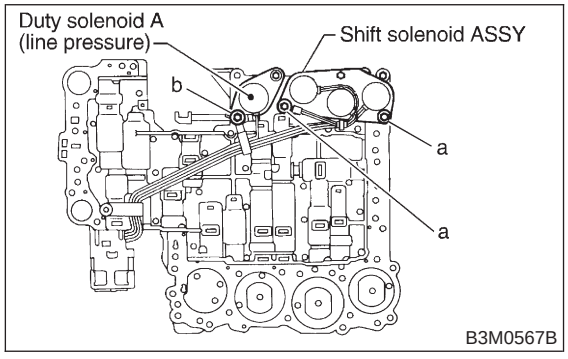


8) Install the shift solenoid assembly and duty solenoid A.

a length: 16 mm (0.63 in)

b length: 27 mm (1.06 in)

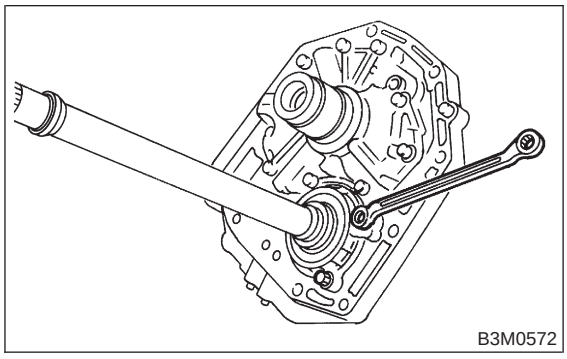
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



15. Oil Pump Assembly

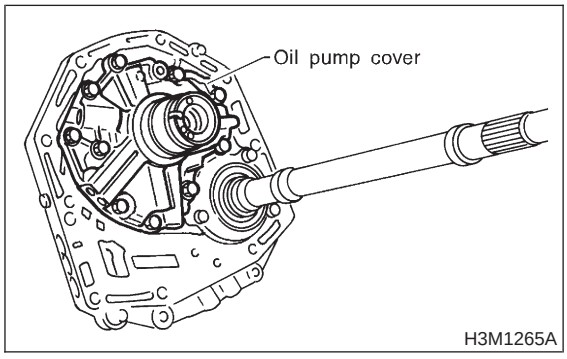
A: DISASSEMBLY

1) Remove the oil seal retainer.
Also remove the O-ring and oil seal (air breather).

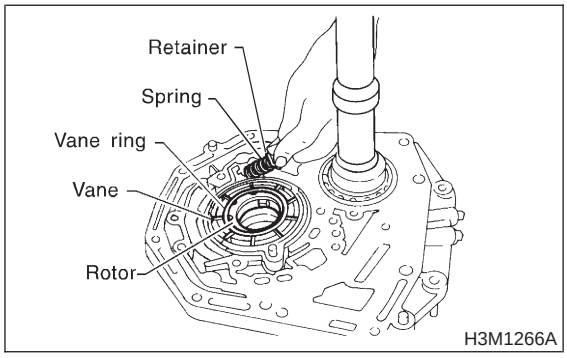


2) Remove the oil pump cover.

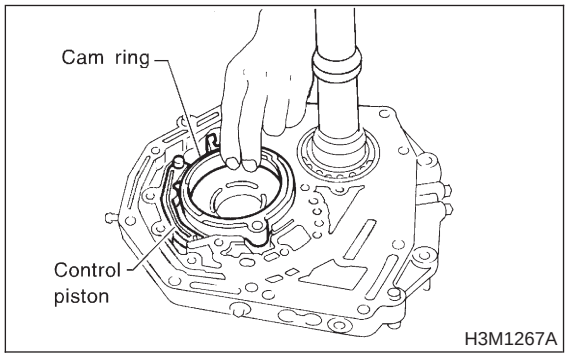
NOTE:
Lightly tap the end of the stator shaft to remove the cover.



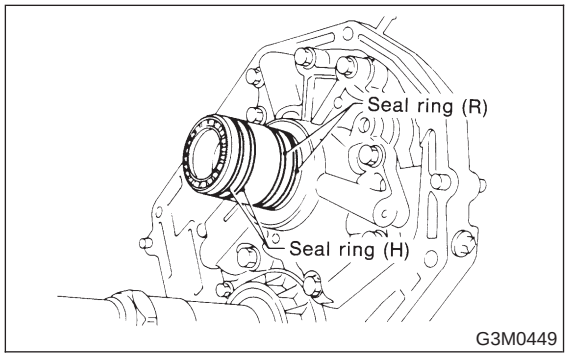
3) Remove the retainer and return spring. Then remove the rotor, two vane rings and nine vanes.



4) Remove the cam ring and control piston.
Also remove the O-ring, friction ring, two side seals, and plain seal.



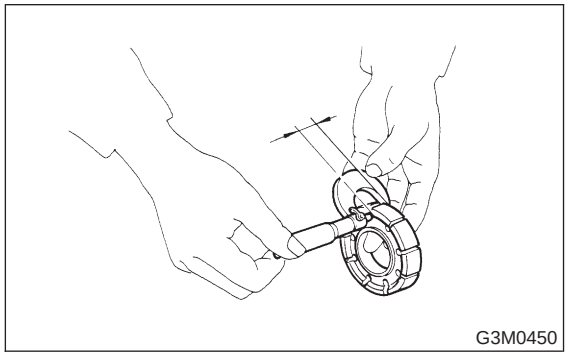
5) Remove two seal rings (R: Reverse clutch side) and two seal rings (H: High clutch side).



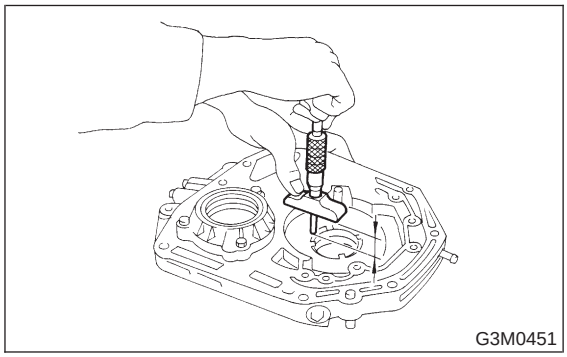
B: INSPECTION

1) Make sure that each component is free of harmful gouges, cuts, and dust.
2) Selection of oil pump components (rotor, vanes, control piston and cam ring)
(1) Using a micrometer, measure the height of the rotor, vanes, control piston and cam ring in at least four positions. (Measure the height at one place for each of the nine vanes.)

NOTE:
● Remove the control piston seals when measuring.
● Remove the friction ring from the cam ring when measuring.



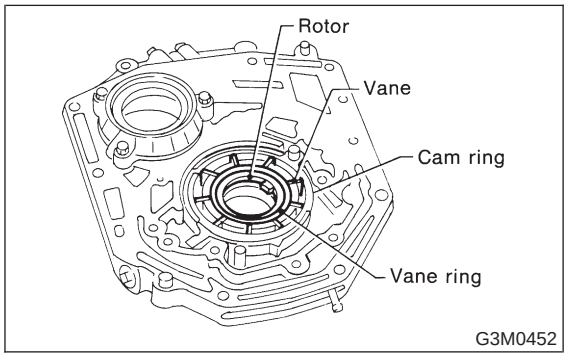
(2) Using a depth gauge, measure the depth of the oil pump housing contact and friction surfaces.



(3) Make sure that the clearances are within the specified wear limits. If the wear limit is exceeded, select pump components so that the standard clearance can be obtained.

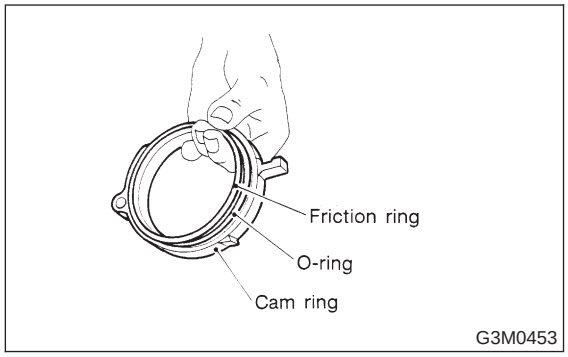
NOTE:
Select vanes which are the same height as the rotor.

Part name	Wear limit mm (in)	Standard value mm (in)
Rotor, control piston, vanes	0.054 (0.0021)	0.030 — 0.044 (0.0012 — 0.0017)
Cam ring	0.034 (0.0013)	0.010 — 0.024 (0.0004 — 0.0009)

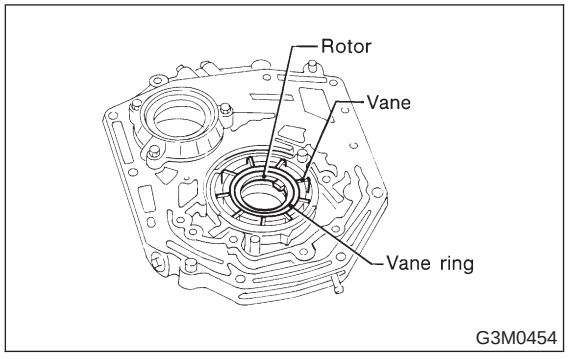


C: ASSEMBLY

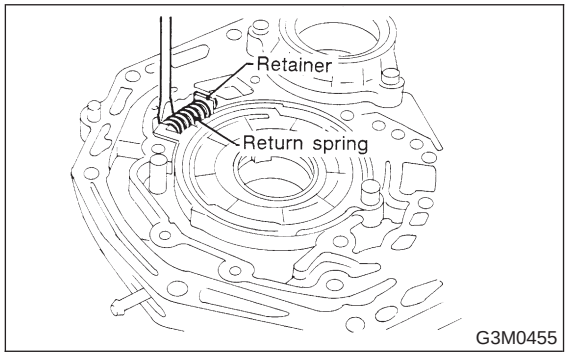
1) Coat both the O-ring and friction ring with vaseline and attach to the cam ring. Then fit them into the oil pump housing.



2) Install the vane ring, rotor and vanes into the housing in this sequence.

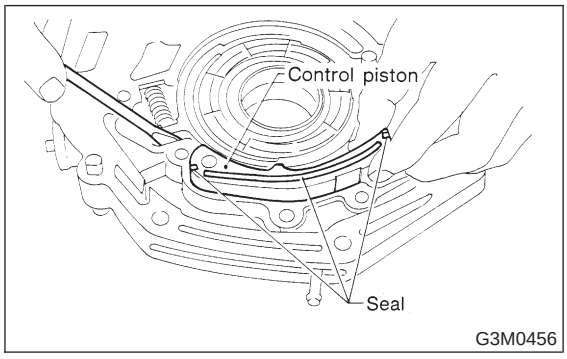


3) Install the return spring and retainer between the housing and cam ring.



4) Install the control piston to the oil pump housing.

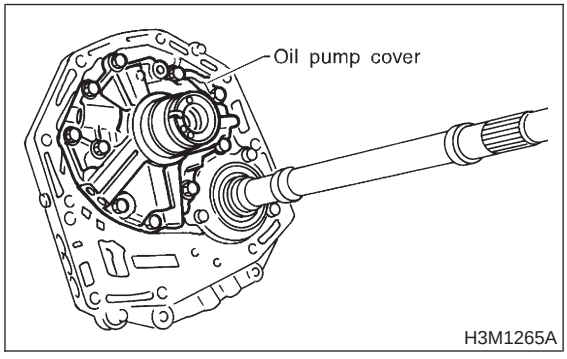
NOTE:
Fit the seal in the piston groove, with the red seals facing the top side. (Two side seals and one plain seal are attached.)



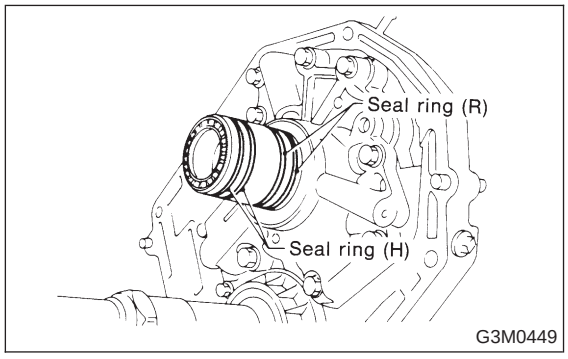
5) Set the rotor at the center of the housing bore. Apply ATF abundantly to each rotary portion.
6) Install the oil pump cover.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)

NOTE:
● Align both pivots with the pivot holes of the cover, and install the cover being careful not to apply undue force to the pivots.
● After assembling, turn the oil pump shaft to check for smooth rotation of the rotor.



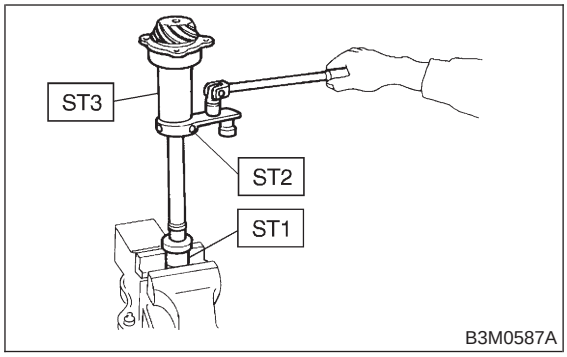
● Install the oil seal retainer and seal rings (R: Reverse clutch side) and (H: High clutch side) after adjusting the drive pinion backlash and tooth contact.



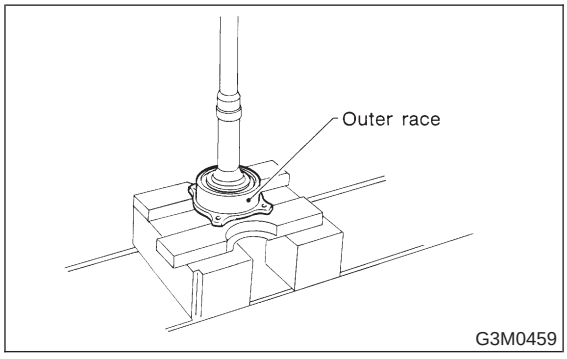
16. Drive Pinion Shaft

A: DISASSEMBLY

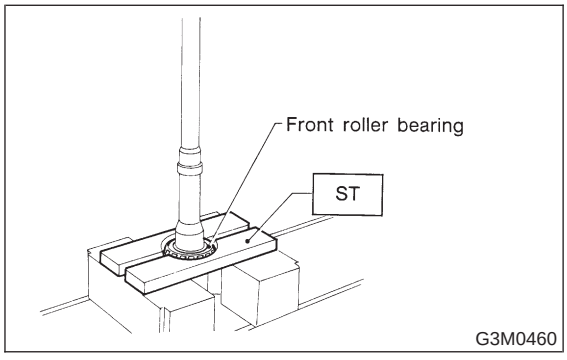
1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1 and ST2. Then pull off the drive pinion collar.
ST1 498937100 HOLDER
ST2 499787100 WRENCH
ST3 499757800 ADAPTER



2) Remove the O-ring
3) Using a press, separate the rear roller bearing and outer race from the shaft.



4) Using a press and ST, separate the front roller bearing from the shaft.
ST 498517000 REPLACER

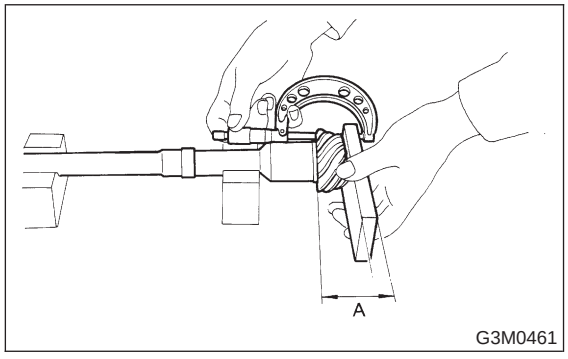


B: INSPECTION

Make sure that all component parts are free of harmful cuts, gouges, and other faults.

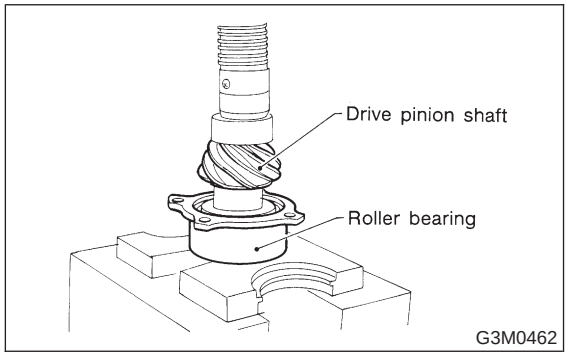
C: ASSEMBLY

1) Measure dimension “A” of the drive pinion shaft.



2) Using a press, force-fit the roller bearing in position.

CAUTION:
Do not change the relative positions of the outer race and bearing cone.



3) After fitting the O-ring to the shaft, attach the drive pinion collar to the shaft.

CAUTION:
Be careful not to damage the O-ring.

4) Tighten the lock washer and lock nut with ST1, ST2 and ST3.
ST1 498937100 HOLDER
ST2 499787100 WRENCH
ST3 499787500 ADAPTER

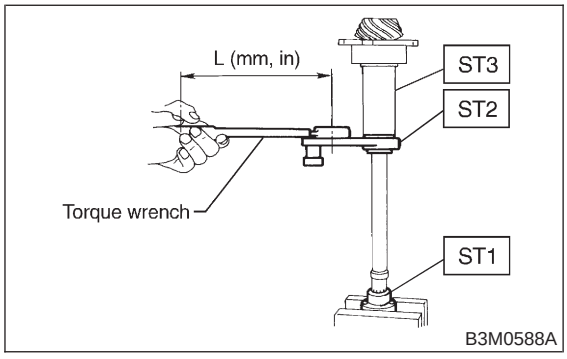
Actual tightening torque:
113±5 N·m (11.5±0.5 kg-m, 83.2±3.6 ft-lb)

NOTE:
- Pay attention to the orientation of lock washer.
- Tightening torque using torque wrench is determined by the following equation.

$$T_1 = {}^{72.2}/_{L + 72.2} \times T$$

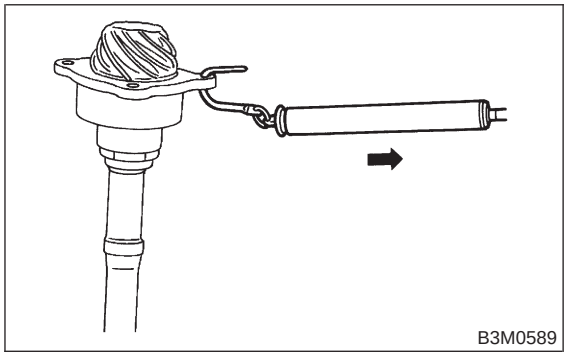
T: Actual tightening torque

- Install ST2 to torque wrench as straight as possible.



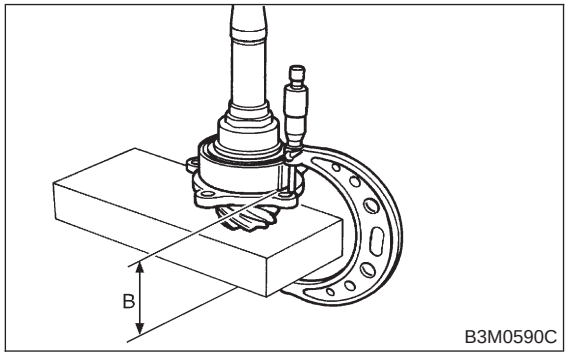
5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

Starting torque:
0.3 — 2.0 N·m (0.03 — 0.2 kg-cm, 0.2 — 1.4 ft-lb)



6) Stake the lock nut securely at two places.

7) Measure dimension “B” of the drive pinion shaft.



8) Determine the thickness “t” (mm) of the drive pinion shim.

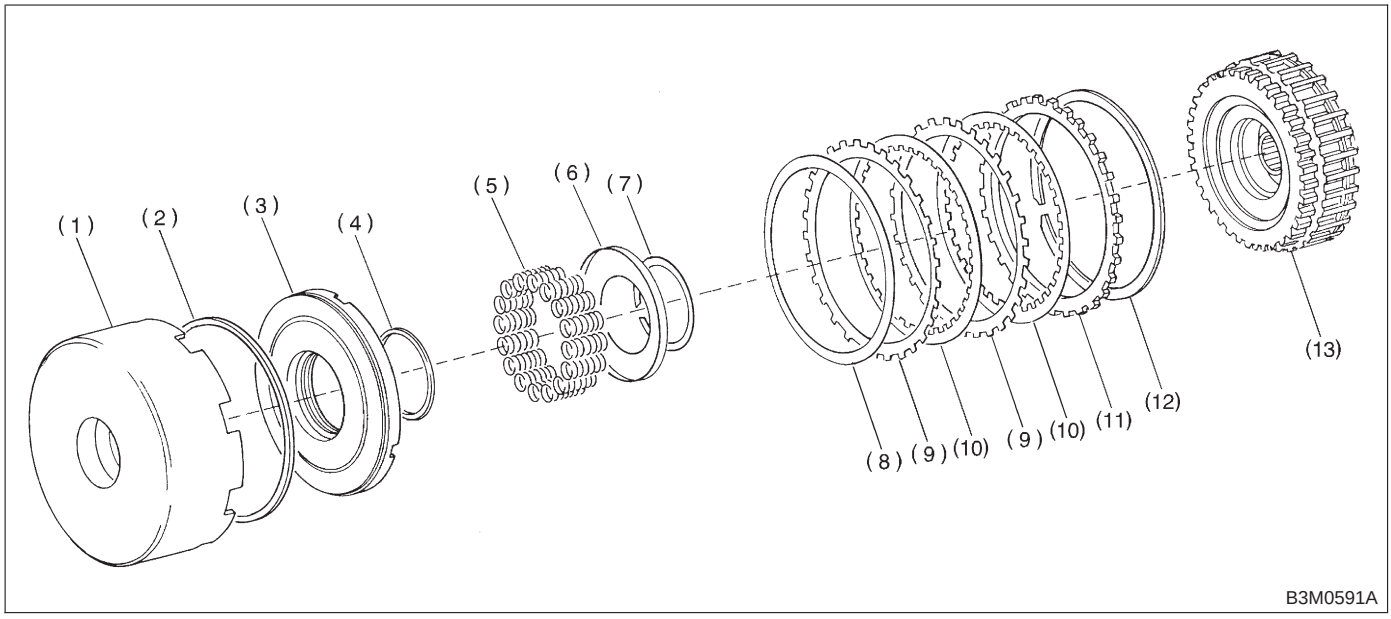
NOTE:
The number of shims must be three or less.

t = 6.5±0.0625 − (B − A)

Available drive pinion shims	
Part No.	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)

17. Reverse Clutch

A: DISASSEMBLY



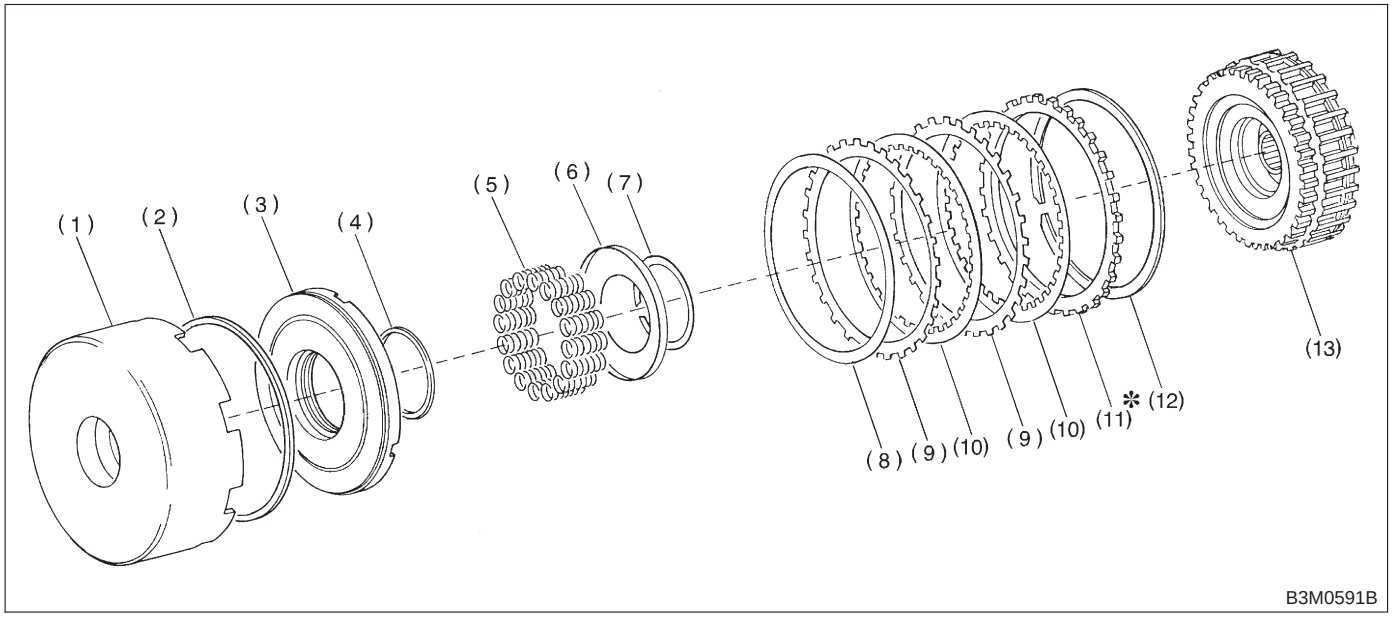
(1) Reverse clutch drum
(2) Lip seal
(3) Reverse clutch piston
(4) Lathe cut seal ring
(5) Spring
(6) Spring retainer
(7) Snap ring
(8) Dish plate
(9) Driven plate
(10) Drive plate
(11) Retaining plate
(12) Snap ring
(13) High clutch drum

1) Remove the snap ring, and take out the retaining plate, drive plates, driven plates, and dish plate.
2) Using the ST1, ST2 and ST3, remove the snap ring and take out the spring retainer and springs.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
3) Take out the piston by applying compressed air.

B: INSPECTION

1) Drive plate facing for wear and damage
2) Snap ring for wear, return spring for breakage or setting, and spring retainer for deformation
3) Lip seal and lathe cut seal ring for damage
4) Piston check ball for operation

C: ASSEMBLY



(1) Reverse clutch drum
(2) Lip seal
(3) Reverse clutch piston
(4) Lathe cut seal ring
(5) Spring
(6) Spring retainer
(7) Snap ring
(8) Dish plate
(9) Driven plate
(10) Drive plate
(11) Retaining plate
(12) Snap ring
(13) High clutch drum

1) Using the ST1, ST2 and ST3 as those used in disassembling, assemble piston the springs, spring retainer and snap ring.
ST1 398673600] COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
2) Assemble the dish plate, driven plates, drive plates and retaining plate in that order and attach the snap ring.

NOTE:
Pay attention to the orientation of the dish plate.

3) Checking operation:
Apply compressed air intermittently to the oil hole, and check the reverse clutch for smooth operation.
4) Measuring clearance (Retaining plate selection):

NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

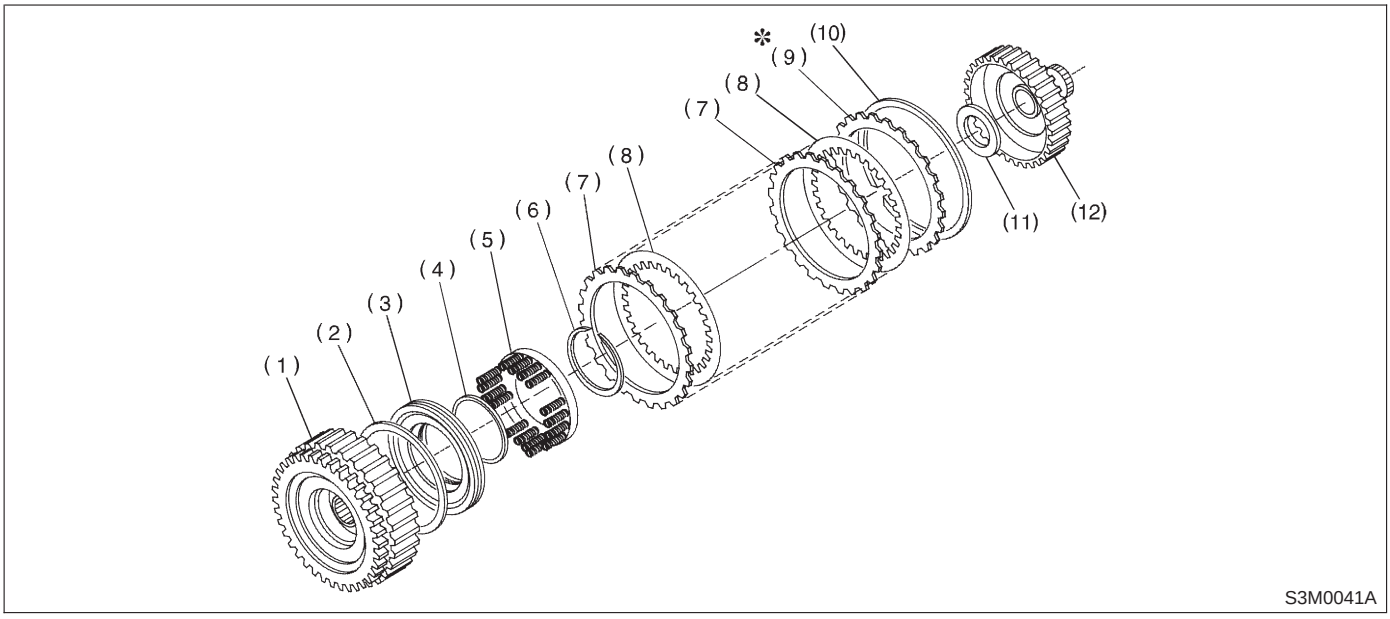
Standard value:
0.5 — 0.8 mm (0.020 — 0.031 in)

Allowable limit:
1.2 mm (0.047 in)

Available retaining plates	
Part No.	Thickness mm (in)
31567AA350	4.6 (0.181)
31567AA360	4.8 (0.189)
31567AA370	5.0 (0.197)
31567AA380	5.2 (0.205)
31567AA390	5.4 (0.213)
31567AA400	5.6 (0.220)

18. High Clutch

A: DISASSEMBLY



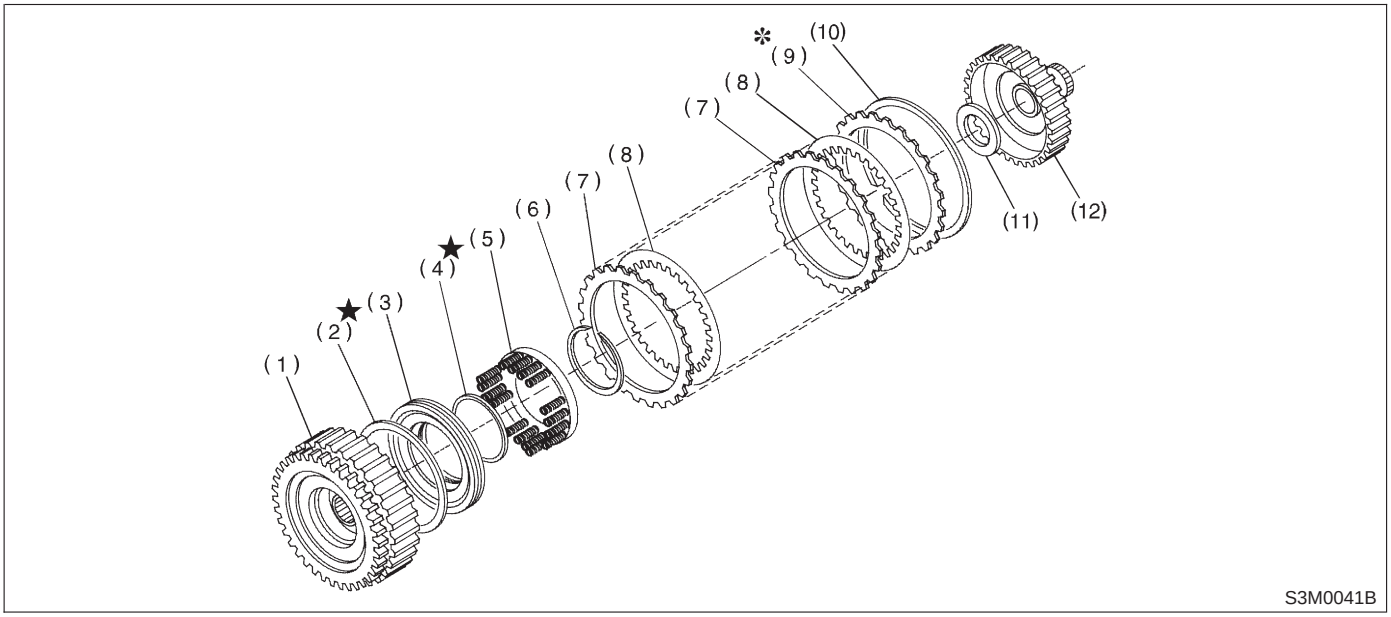
(1) High clutch drum
(2) Lathe cut seal ring
(3) High clutch piston
(4) Lathe cut seal ring
(5) Spring retainer
(6) Snap ring
(7) Driven plate
(8) Drive plate
(9) Retaining plate
(10) Snap ring
(11) Thrust needle bearing
(12) High clutch hub

1) Remove the snap ring, and take out the retaining plate, drive plates, and driven plates.
2) Using the ST1, ST2 and ST3, remove the snap ring and take out the spring retainer.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
3) Apply compressed air to the clutch drum to remove the piston.

B: INSPECTION

1) Drive plate facing for wear and damage
2) Snap ring for wear, return spring for setting and breakage, and spring retainer for deformation
3) Lathe cut seal rings (large) (small) for damage
4) Piston check ball for smooth operation

C: ASSEMBLY



(1) High clutch drum
(2) Lathe cut seal ring
(3) High clutch piston
(4) Lathe cut seal ring
(5) Spring retainer
(6) Snap ring
(7) Driven plate
(8) Drive plate
(9) Retaining plate
(10) Snap ring
(11) Thrust needle bearing
(12) High clutch hub

1) Using the ST1, ST2 and ST3 as those used in disassembling, assemble the piston, spring retainer, and snap ring.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
2) Install the driven plate (thinner), drive plates, driven plates (thicker), and retaining plate in that order. Then attach the snap ring.
3) Checking operation:
Apply compressed air intermittently to the oil hole, and check the high clutch for smooth operation.
4) Measuring clearance (Retaining plate selection):

NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

Standard value:
1.8 — 2.2 mm (0.071 — 0.087 in)

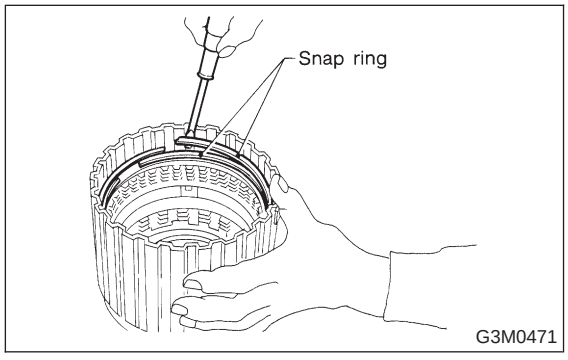
Allowable limit:
2.6 mm (0.102 in)

Available retaining plates	
Part No.	Thickness mm (in)
31567AA190	3.6 (0.142)
31567AA200	3.8 (0.150)
31567AA210	4.0 (0.157)
31567AA220	4.2 (0.165)
31567AA230	4.4 (0.173)
31567AA240	4.6 (0.181)
31567AA250	4.8 (0.189)
31567AA260	5.0 (0.197)

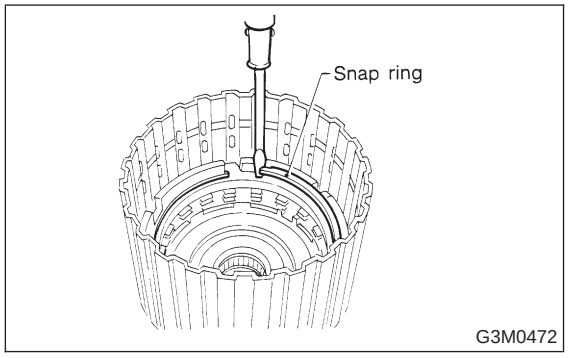
19. Forward Clutch Drum

A: DISASSEMBLY

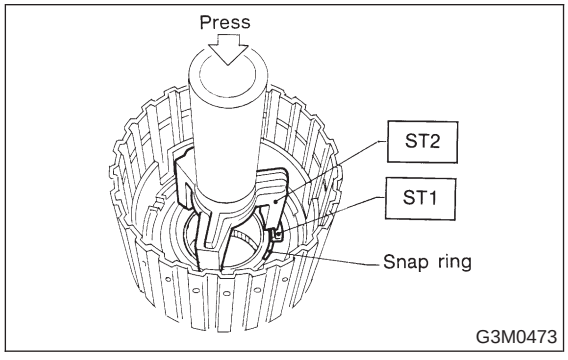
1) Remove two snap rings from the forward clutch drum.



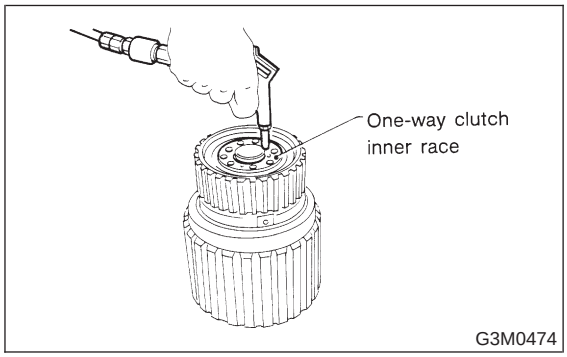
2) Remove the retaining plate, drive plates, driven plates and dish plate. (Forward clutch)
3) Remove the snap ring from the forward clutch drum.



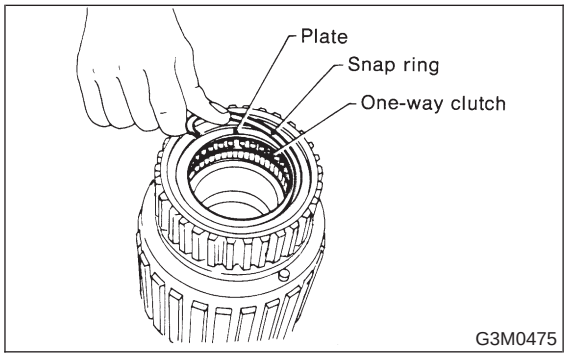
4) Remove the retaining plate, drive plates, driven plates and dish plate. (Overrunning clutch)
5) Compress the spring retainer, and remove the snap ring from the forward clutch, by using ST1 and ST2.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



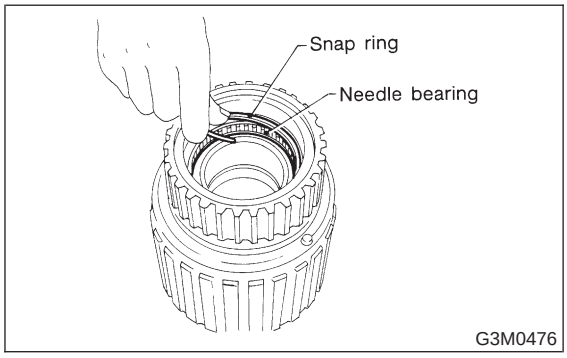
6) Install the one-way clutch inner race to the forward clutch drum, and apply compressed air to remove the overrunning piston and forward piston.



7) Remove the one-way clutch after taking out the snap ring.



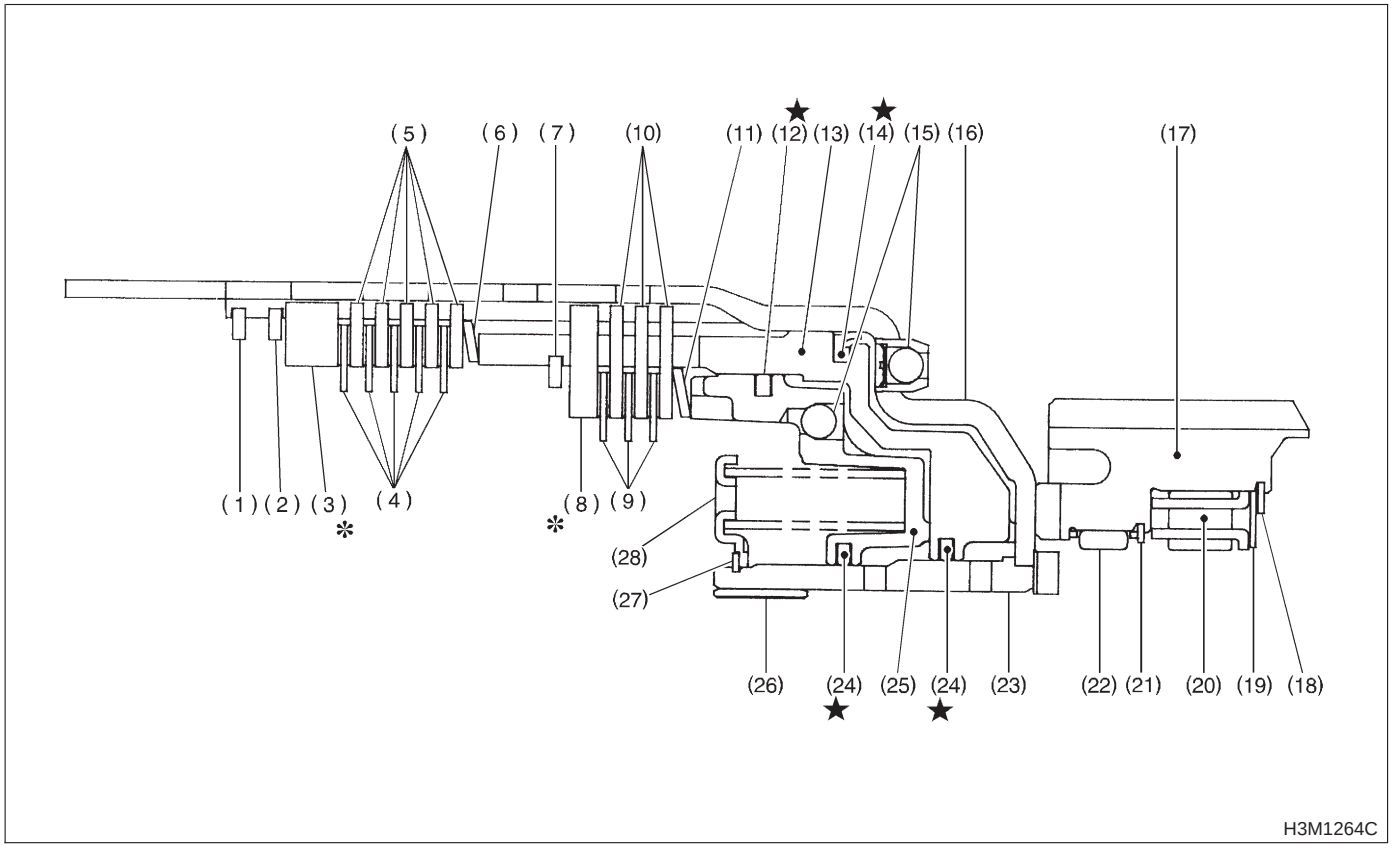
8) Remove the needle bearing after taking out the snap ring.



B: INSPECTION

1) Drive plate facing for wear and damage
2) Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
3) Lip seal and lathe cut ring for damage
4) Piston and drum check ball for operation

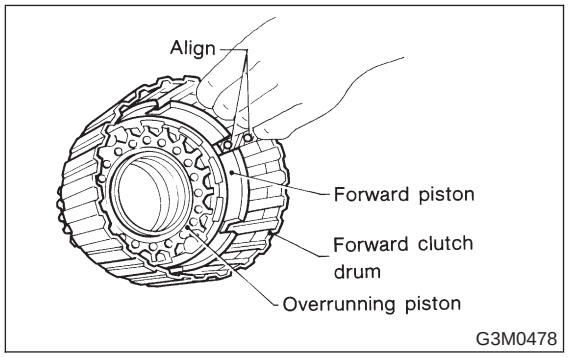
C: ASSEMBLY



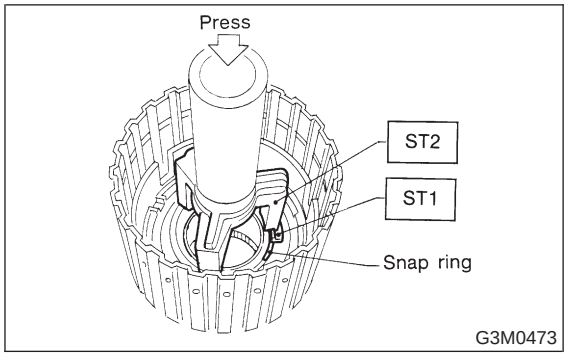
(1) Snap ring
(2) Snap ring
(3) Retaining plate
(4) Driven plate (Thicker)
(5) Driven plate (Thinner)
(6) Dish plate
(7) Snap ring
(8) Retaining plate
(9) Drive plate
(10) Driven plate
(11) Dish plate
(12) Lathe cut seal ring
(13) Forward clutch piston
(14) Lathe cut seal ring
(15) Drift ball
(16) Forward clutch drum
(17) Outer race
(18) Snap ring
(19) Plate
(20) O.W.C. (1-2)
(21) Snap ring
(22) Needle bearing
(23) Sleeve
(24) Lathe cut seal ring
(25) Overrunning clutch piston
(26) Bushing
(27) Snap ring
(28) Retainer

1) Fit the forward piston and overrunning piston to the forward clutch drum.

NOTE:
Align the forward piston cut-out portion with the spline of the drum.

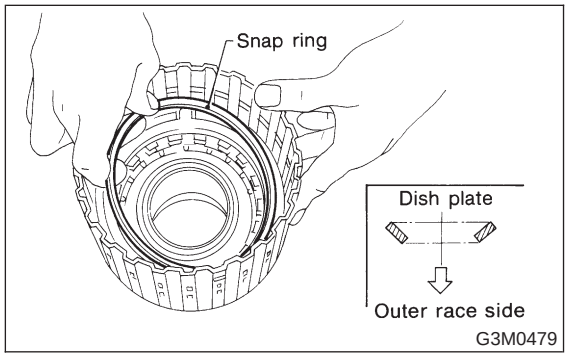


2) Set the retainer on the piston with a press using ST1 and ST2, and attach the snap ring.
ST1 498627000 SEAT
ST2 398673600 COMPRESSOR



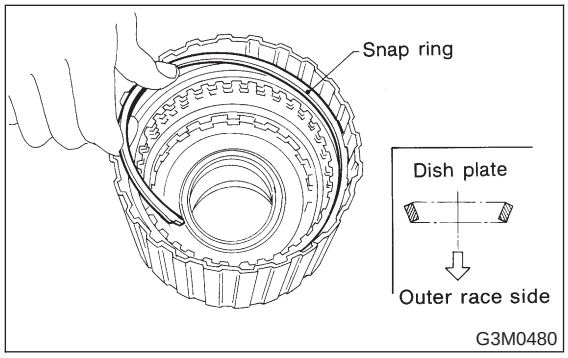
3) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Overrunning clutch)

NOTE:
Pay attention to the orientation of the dish plate.

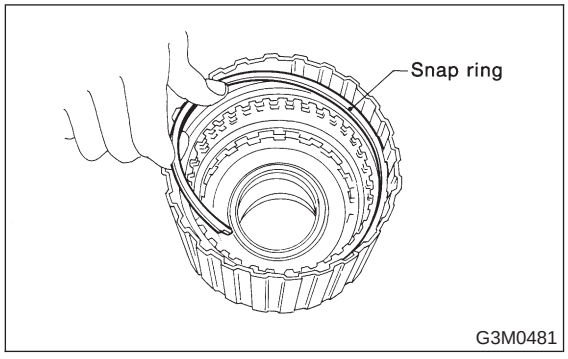


4) Install the dish plates, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Forward clutch)

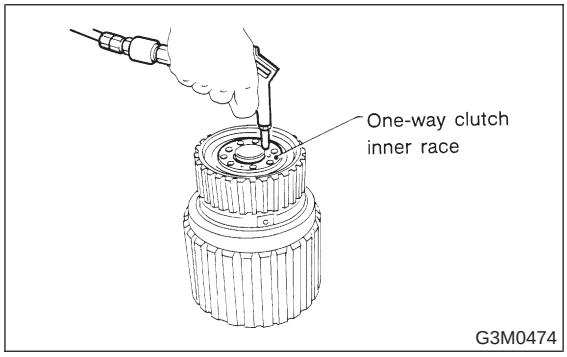
NOTE:
Pay attention to the orientation of the dish plate.



5) Install the snap ring (for front planetary carrier).



6) Check the forward clutch and overrunning clutch for operation.
Set the one-way clutch inner race, and apply compressed air for checking.

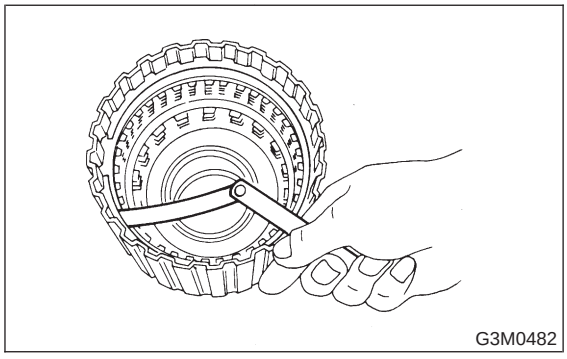


7) Checking forward clutch clearance.

NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.
If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Standard value:
0.45 — 0.85 mm (0.0177 — 0.0335 in)

Allowable limit:
1.6 mm (0.063 in)



Available retaining plates (Forward clutch)	
Part No.	Thickness mm (in)
31567AA270	4.0 (0.157)
31567AA280	4.2 (0.165)
31567AA290	4.4 (0.173)
31567AA300	4.6 (0.181)
31567AA310	4.8 (0.189)
31567AA320	5.0 (0.197)
31567AA330	5.2 (0.205)

8) Checking overrunning clutch clearance

NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

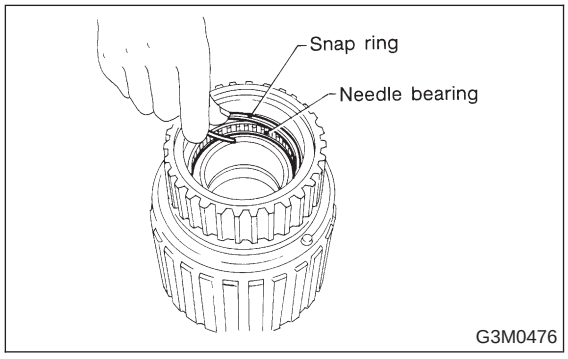
If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Standard value:
1.0 — 1.4 mm (0.039 — 0.055 in)

Allowable limit:
2.0 mm (0.079 in)

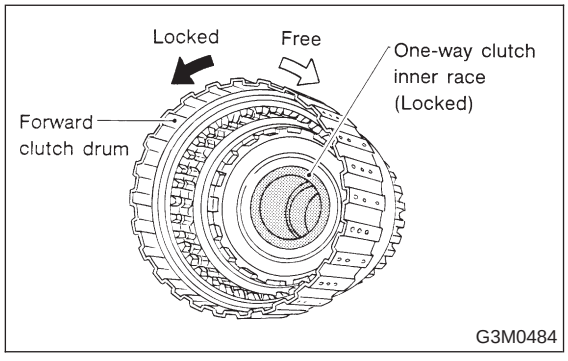
Available retaining plates (Overrunning clutch)	
Part No.	Thickness mm (in)
31567AA120	8.0 (0.315)
31567AA130	8.2 (0.323)
31567AA140	8.4 (0.331)
31567AA150	8.6 (0.339)
31567AA160	8.8 (0.346)
31567AA170	9.0 (0.354)
31567AA180	9.2 (0.362)

9) Install the needle bearing, and secure with the snap ring.



10) Install the one-way clutch (1-2) and plate, and secure with the snap ring.

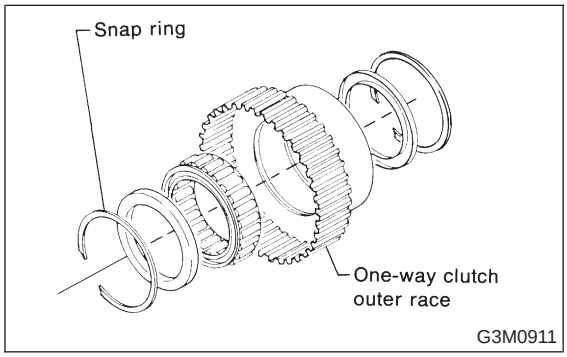
NOTE:
Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



20. One-way Clutch Outer Race

A: DISASSEMBLY

Remove the snap ring. Then remove the one-way clutch (3-4).



B: INSPECTION

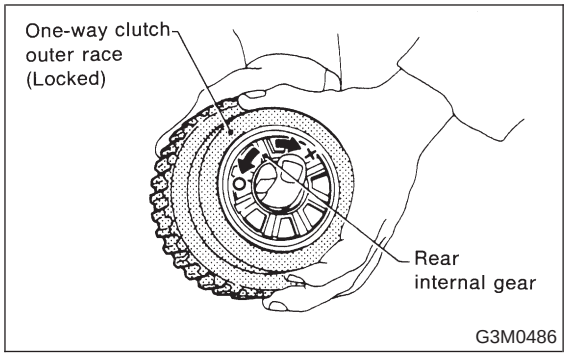
Check the sliding surface and one-way clutch (3-4) for any harmful cuts, damage, or other faults.

C: ASSEMBLY

1) Assemble the one-way clutch (3-4), and secure with the snap ring.

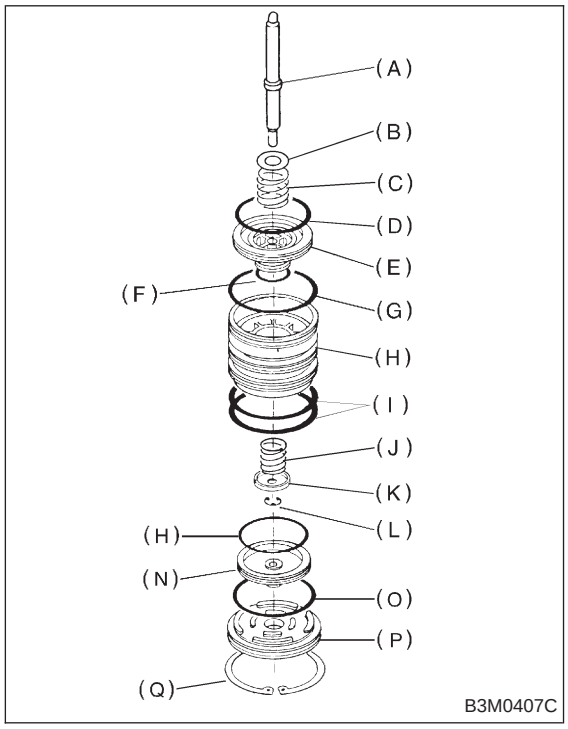
NOTE:
Pay attention to the orientation of the one-way clutch (3-4).

2) Assemble the rear internal gear, and secure the outer race. Make sure that the internal gear is locked in the clockwise direction, and free to rotate in the counterclockwise direction.



21. Servo Piston

A: DISASSEMBLY



(A) Band servo piston stem
(B) Washer
(C) Spring
(D) Lathe cut seal ring
(E) Band servo piston (1-2)
(F) Lathe cut seal ring
(G) O-ring
(H) Band servo retainer
(I) O-ring
(J) Spring
(K) Retainer
(L) Snap ring
(M) Lathe cut seal ring
(N) Band servo piston (3-4)
(O) O-ring
(P) O.D. servo retainer
(Q) Snap ring

1) Remove the spring.
2) Remove the band servo piston (3-4).
3) While compressing the retainer from above, remove the snap ring. Then remove the retainer, spring and stem.
4) Take out the band servo piston (1-2).

B: INSPECTION

1) Check each component for harmful cuts, damage, or other faults.
2) Check the O-ring and lathe cut ring for damage.

C: ASSEMBLY

1) Install the band servo piston (1-2) to the retainer, and insert the stem.
2) Put the spring and retainer on the piston. Fit the snap ring securely while compressing the spring.
3) Install the band servo piston (3-4).
4) Install the spring securely to the band servo piston (1-2).

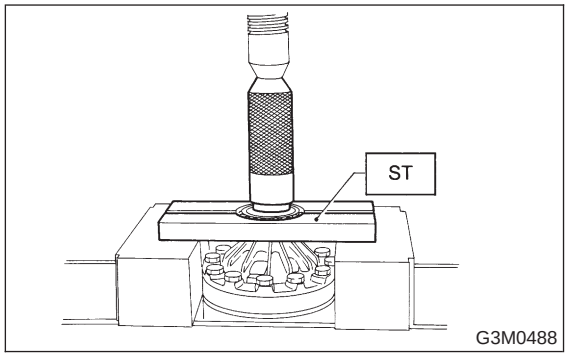
CAUTION:
● Many different O-rings and lathe cut rings are used. Be careful not to confuse them when installing.
● Be careful not to damage O-rings and lathe cut rings.

22. Differential Case Assembly

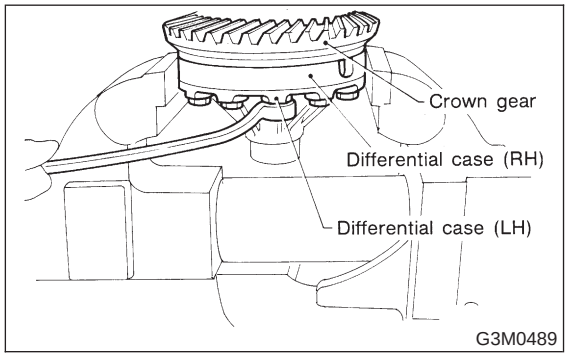
A: DISASSEMBLY

1) Using a press and ST, remove the taper roller bearing.
ST 498077000 REMOVER

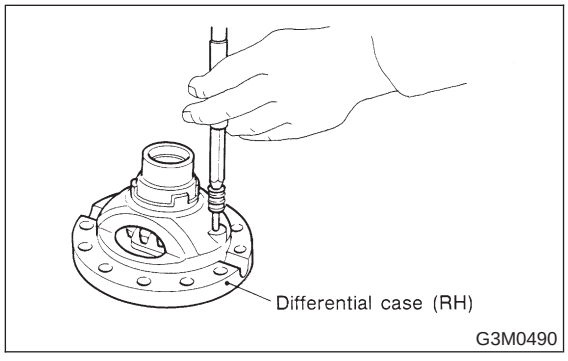
CAUTION:
Be careful not to damage the speedometer drive gear.



2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.



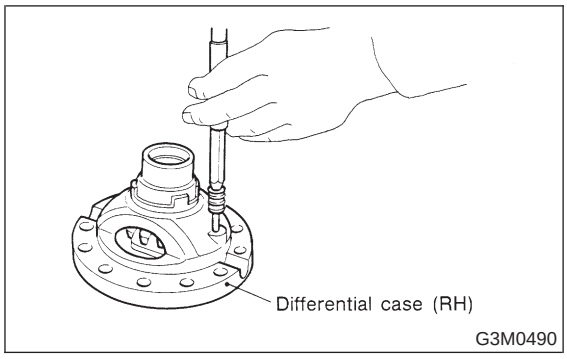
B: INSPECTION

Check each component for harmful cuts, damage and other faults.

C: ASSEMBLY

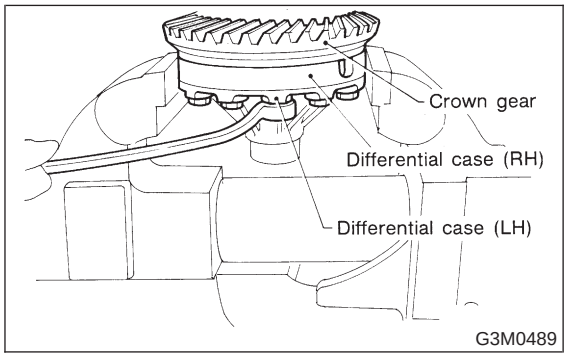
1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft, and fit the straight pin.

NOTE:
Install straight pin from reverse direction.



2) Install the washer and differential bevel gear to the differential case (LH). Then put the case over the differential case (RH), and connect both cases.
3) Install the crown gear and secure by tightening the bolt.

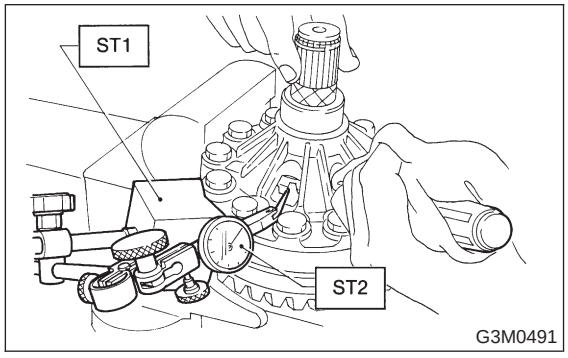
Standard tightening torque:
62±5 N·m (6.3±0.5 kg-m, 45.6±3.6 ft-lb)



4) Measurement of backlash (Selection of washer)
Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:
Measure the backlash by applying a pinion tooth between two bevel gear teeth.

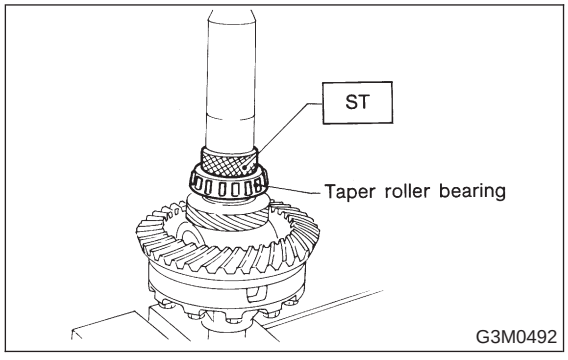
Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



5) Install the speedometer drive gear. Then force-fit the taper roller bearing with a press and ST.

CAUTION:
Be sure to position correctly the locking end of the speedometer drive gear.

ST 398487700 DRIFT

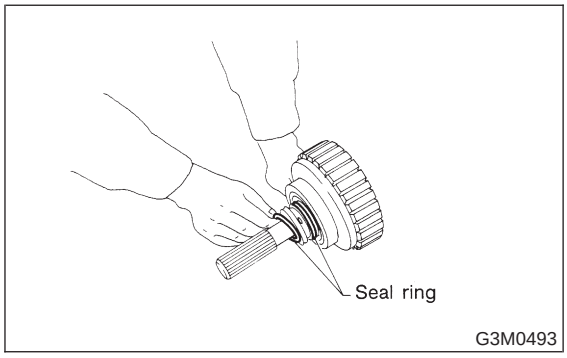


23. Transfer Clutch

A: DISASSEMBLY

1) Remove the seal ring.

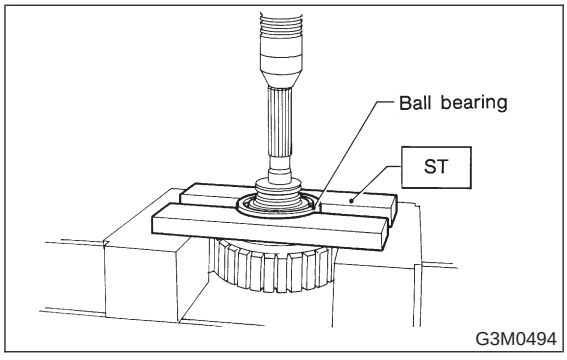
CAUTION:
Be careful not to damage the seal ring.



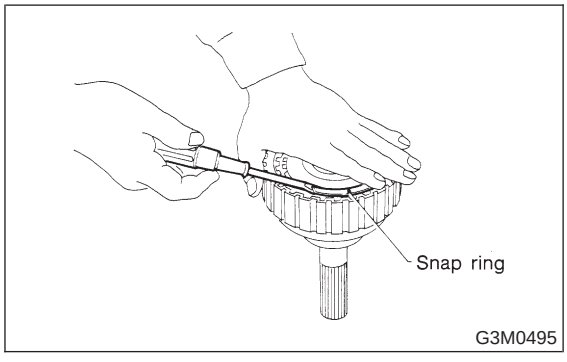
2) Using a press and ST, remove the ball bearing.

CAUTION:
Do not reuse the bearing.

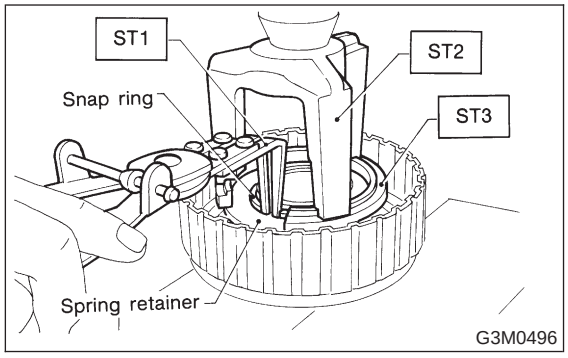
ST 498077000 REMOVER



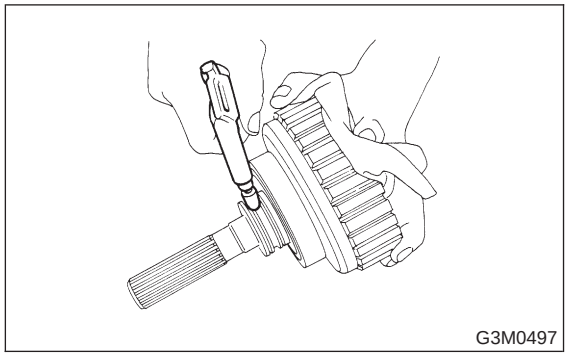
3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.



4) Remove the snap ring with ST1, ST2 and ST3, and take out the spring retainer.
ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 498627000 SEAT



5) Apply compressed air to the rear drive shaft to remove the piston.

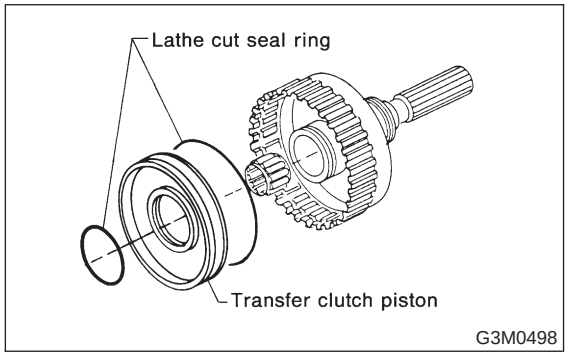


B: INSPECTION

1) Check the drive plate facing for wear and damage.
2) Check the snap ring for wear, return spring for permanent set and breakage, and spring retainer for deformation.
3) Check the lathe cut ring for damage.

C: ASSEMBLY

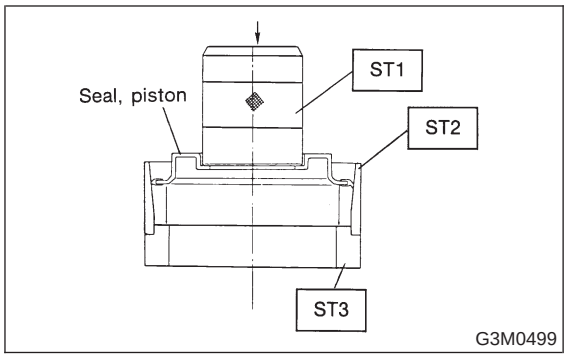
1) Install the lathe cut seal ring to the I.D./O.D. of the transfer clutch piston.



2) Install piston.
(1) Connect transfer piston to rear drive shaft (until it reaches hole in valve body).
(2) Install spring retainer to transfer piston.
(3) Using ST1, ST2 and ST3, attach transfer piston seal to ST2.

CAUTION:
Be careful not to tilt transfer piston seal.

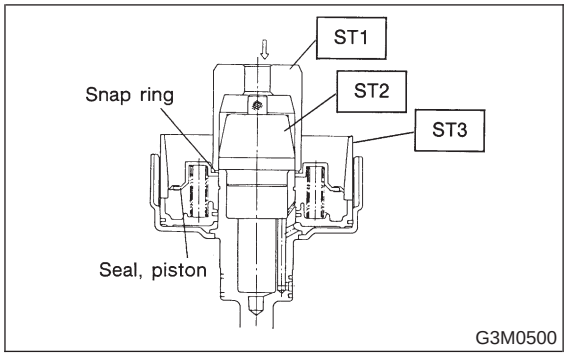
ST1 499247400 INSTALLER
ST2 499257400 PISTON GUIDE
ST3 498267400 TABLE



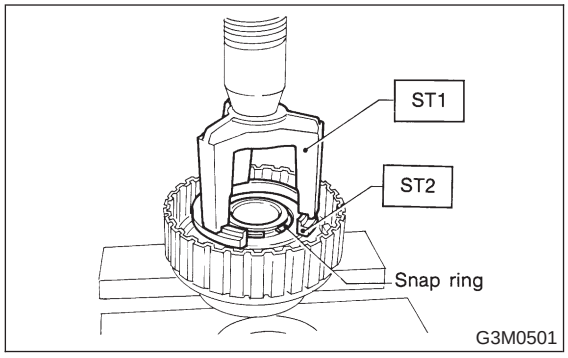
(4) Place ST3 onto rear drive shaft so that spring can be inserted into hole in transfer piston seal.
(5) Attach ST2 to rear drive shaft. Using ST1, press into place.

CAUTION:
Do not allow lip of transfer piston seal to fold back.

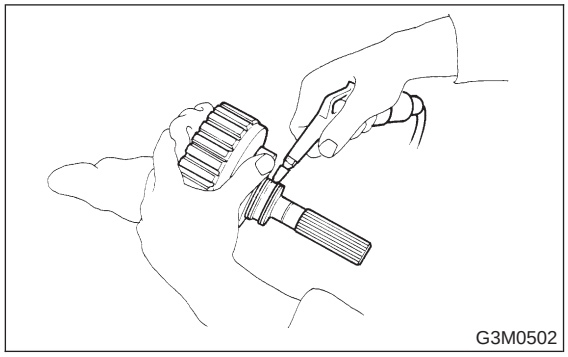
ST1 499247400 INSTALLER
ST2 499257300 SNAP RING OUTER GUIDE
ST3 499257400 PISTON GUIDE



3) Install the driven plates, drive plates, and pressure plate, and secure with a snap ring with ST1, ST2 and a press.
ST1 398673600 COMPRESSOR
ST2 498627000 SEAT



4) Apply compressed air to see if the assembled parts move smoothly.



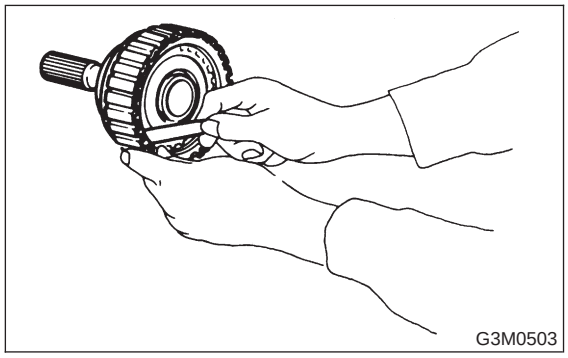
5) Check the clearance.

NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.

If the clearance is not within the specified range, select a proper pressure plate.

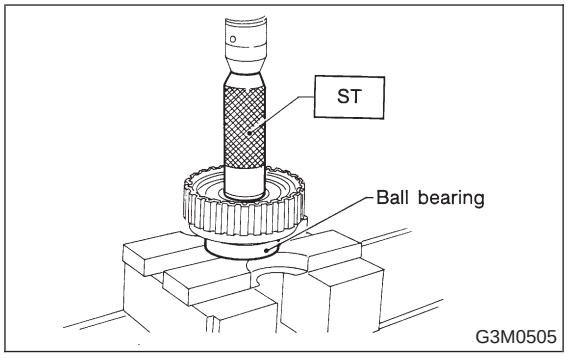
Standard value:
0.2 — 0.6 mm (0.008 — 0.024 in)

Allowable limit:
1.6 mm (0.063 in)



Available pressure plates	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

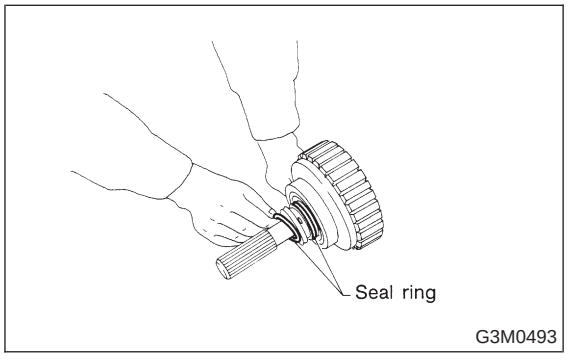
6) Press-fit the ball bearing with ST.
ST 899580100 INSTALLER



7) Coat the seal ring with vaseline, and install it in the seal ring groove of the shaft.

CAUTION:
Do not expand the seal ring excessively when installing.

ST 899580100 INSTALLER

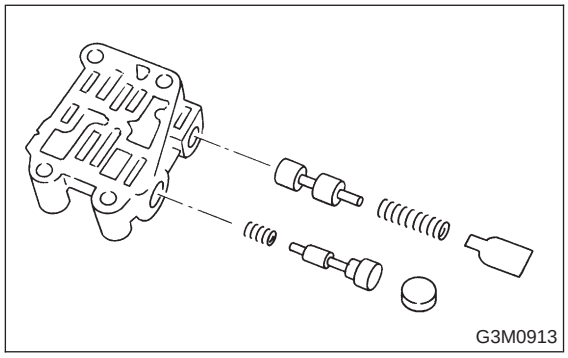


24. Transfer Valve Body

A: DISASSEMBLY

1) Remove the plate. Then remove the spring and pilot valve together.
2) Remove the straight pin and pry out the plug with a screwdriver. Then extract the spring and transfer clutch valve together.

CAUTION:
Be careful not to damage the valve and valve body.



B: INSPECTION

Check each component for harmful cuts, damage, or other faults.

C: ASSEMBLY

To assemble, reverse the removal sequence.

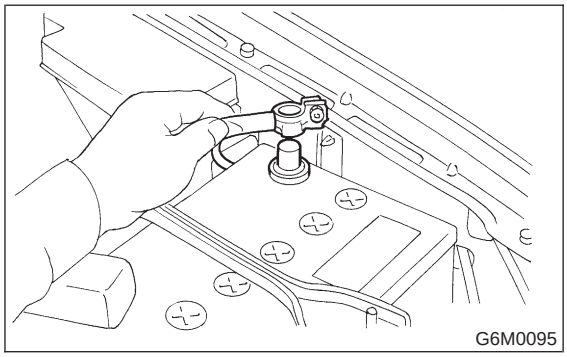
NOTE:
Make sure the valve slides smoothly after assembling.

25. Transmission Control Module

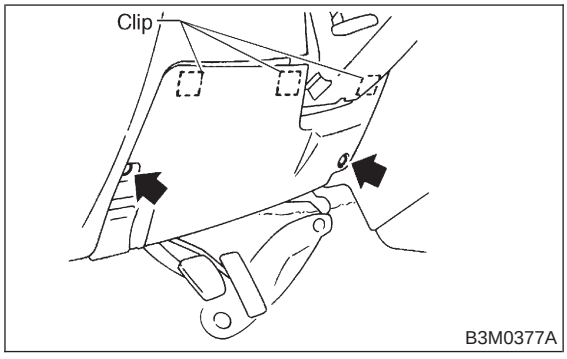
A: REMOVAL

1. LHD

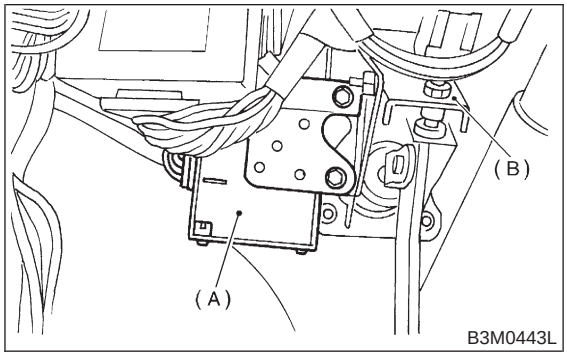
1) Disconnect battery ground cable.



2) Remove lower cover and then disconnect connector.



3) Remove transmission control module.

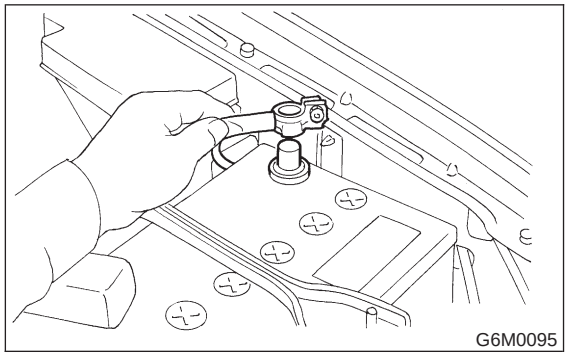


(A) Transmission control module
(B) Pedal bracket

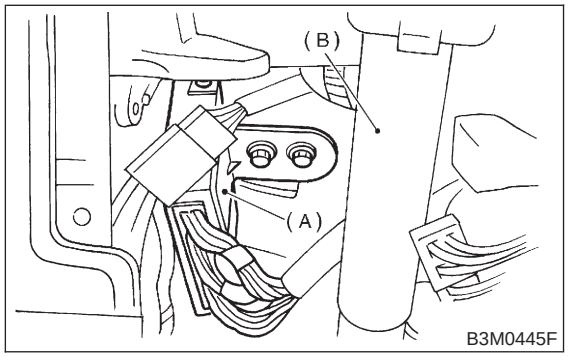
4) Disconnect connectors form TCM.

2. RHD

1) Disconnect battery ground cable.



2) Remove lower cover and then disconnect connector.
3) Remove transmission control module.



(A) Transmission control module
(B) Column shaft

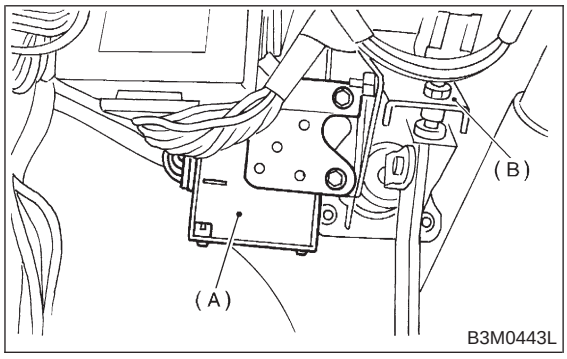
4) Disconnect connectors from transmission control module.

B: INSTALLATION

1. LHD

1) Connect connectors to TCM.
2) Install TCM to steering support beam.

Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)



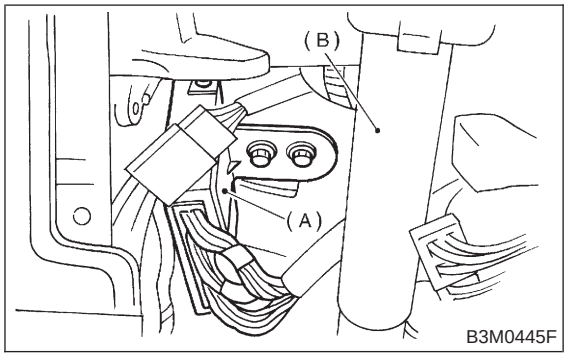
(A) Transmission control module
(B) Pedal bracket

3) Remove TCM from steering support beam.

2. RHD

1) Connect connectors to transmission control module.
2) Install transmission control module.

Tightening torque:
25±5 N·m (2.5±0.5 kg-m, 18.1±3.6 ft-lb)



(A) Transmission control module
(B) Column shaft

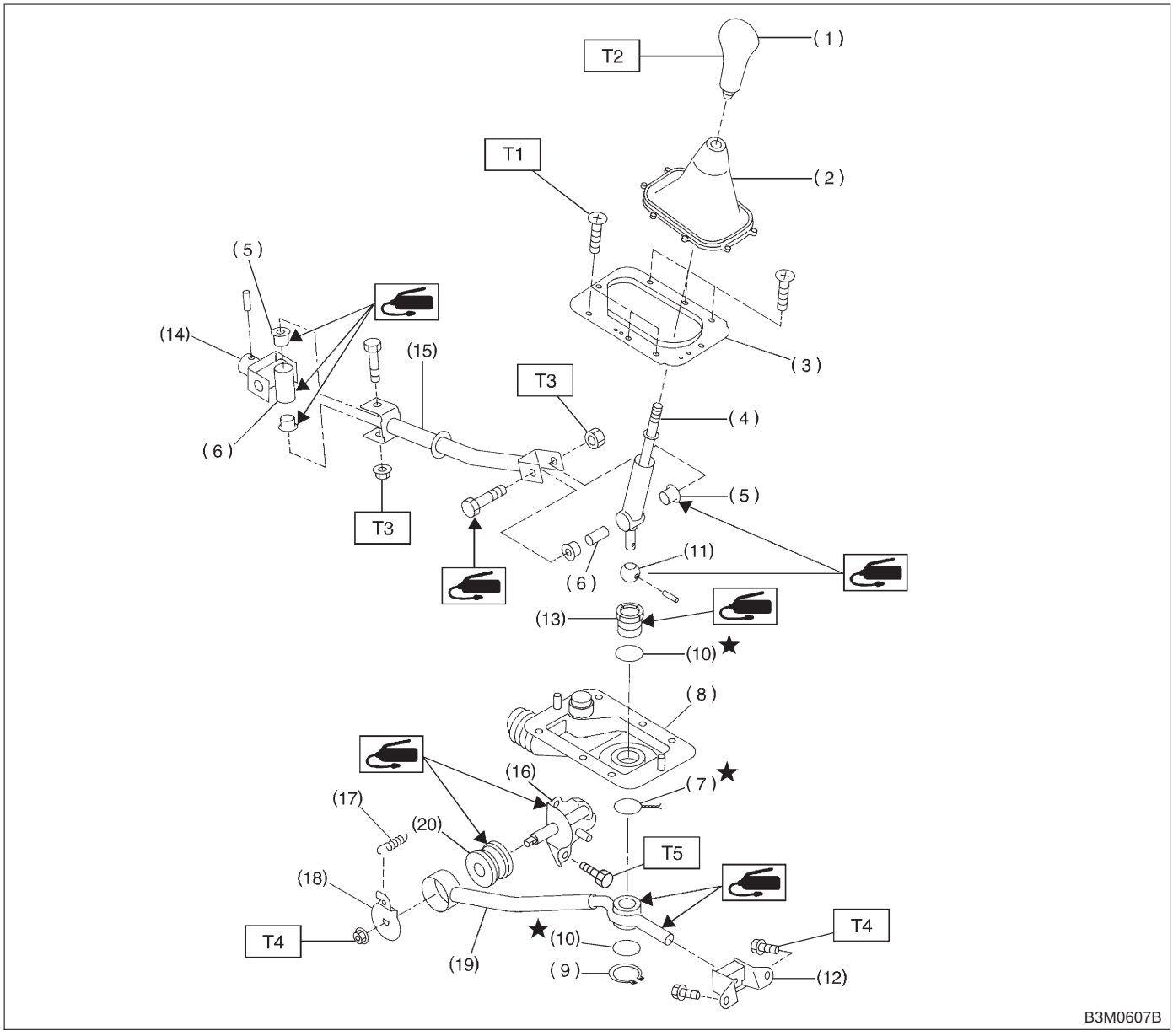
3) Installing procedure hereafter is in the reverse order of removal.

MEMO:

TRANSMISSION CONTROL SYSTEM 3-3

1. Manual Transmission

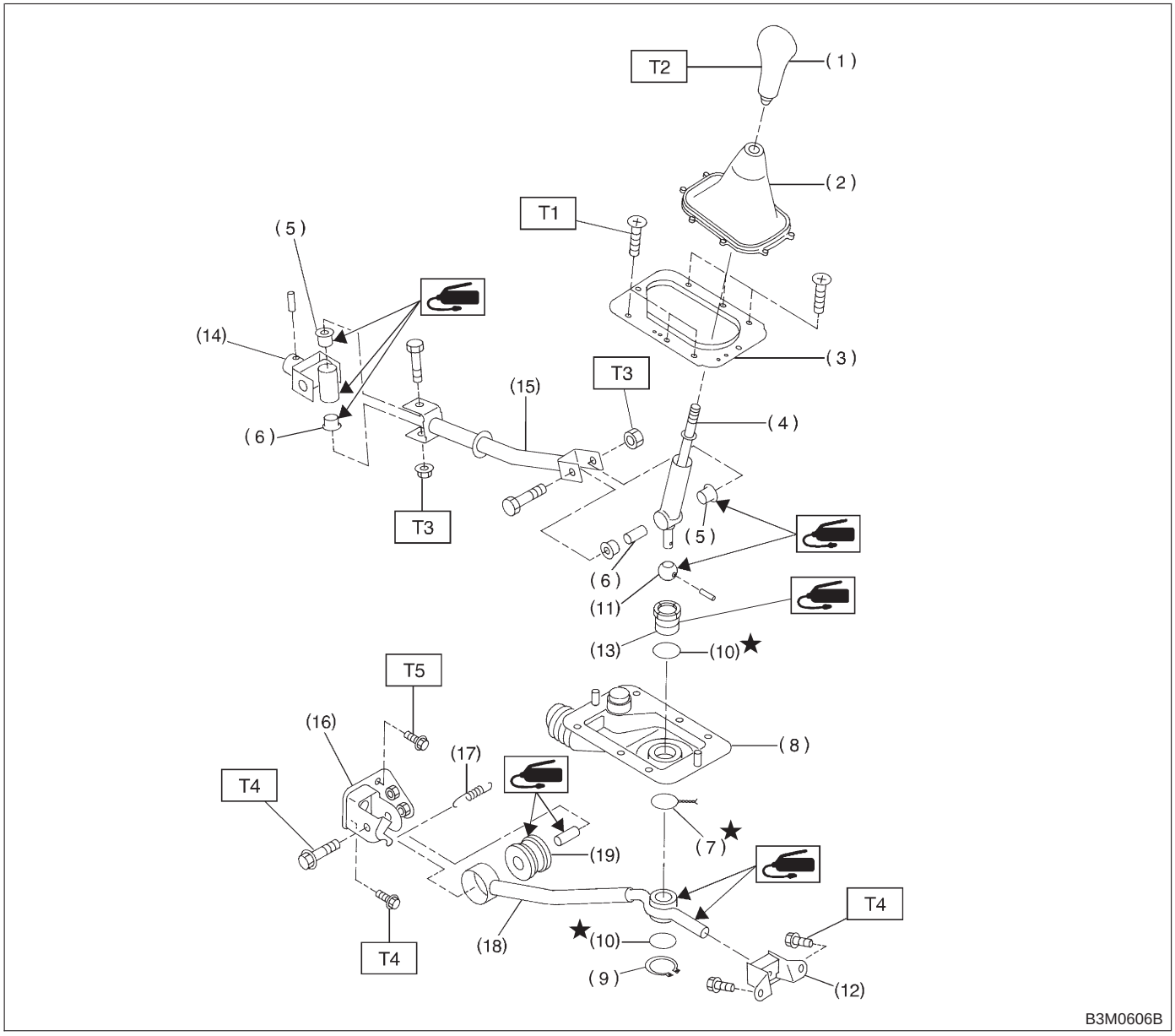
A: AWD MODEL



(1) Gear shift knob
(2) Console boot
(3) Boot plate
(4) Gear shift lever
(5) Bush
(6) Spacer
(7) Locking wire
(8) Boot
(9) Snap ring
(10) O-ring
(11) Bush (Shift lever)
(12) Cushion rubber
(13) Bush (Stay rear)
(14) Joint
(15) Rod
(16) Bracket
(17) Spring
(18) Washer
(19) Stay
(20) Bush (Stay front)

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 5 (0.51, 3.7)
T3: 12±3 (1.2±0.3, 8.7±2.2)
T4: 18±5 (1.8±0.5, 13.0±3.6)
T5: 24.5±2 (2.50±0.20, 18.07±1.48)

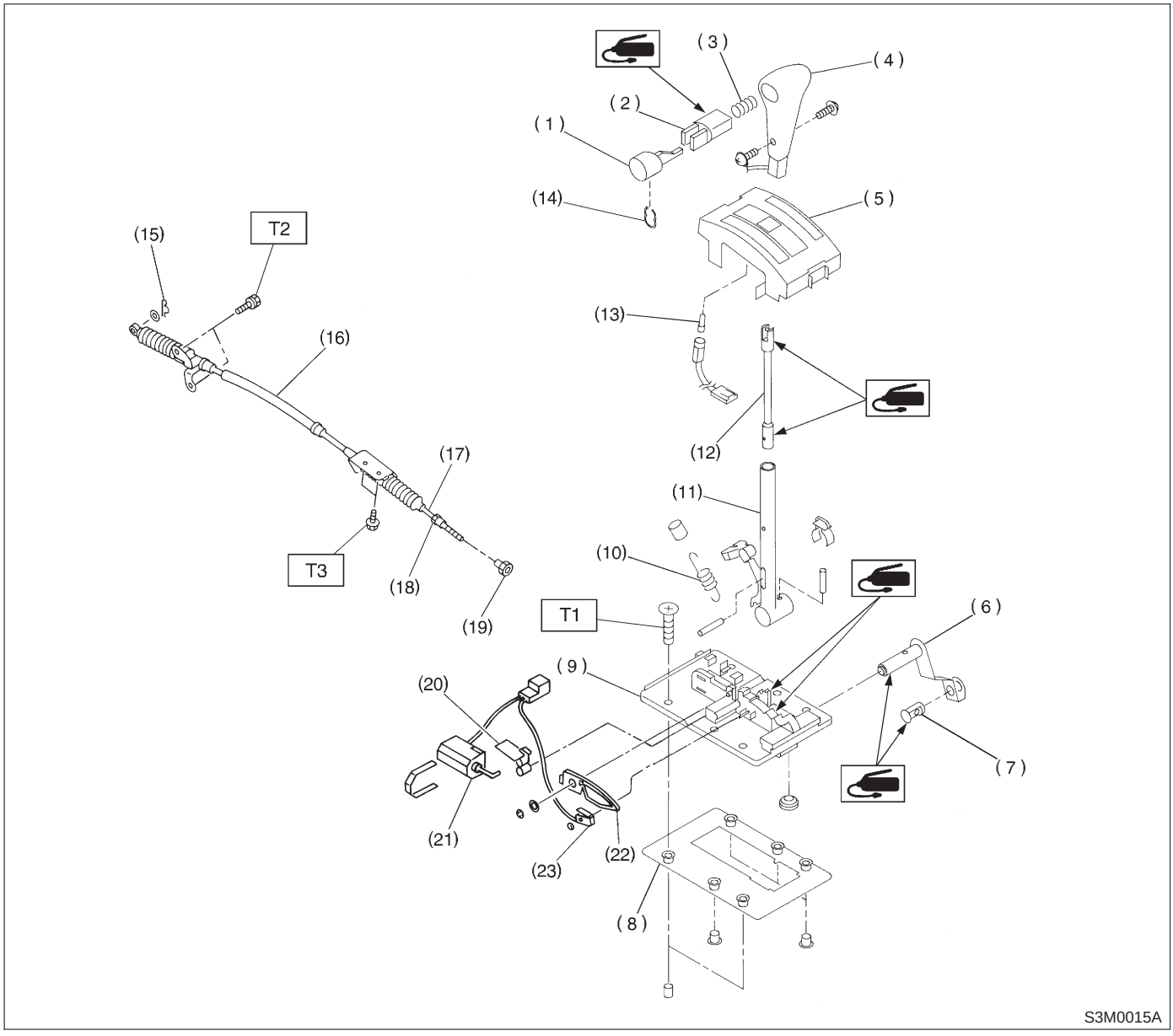
B: FWD MODEL



(1) Gear shift knob
(2) Console boot
(3) Boot plate
(4) Gear shift lever
(5) Bush
(6) Spacer
(7) Locking wire
(8) Boot
(9) Snap ring
(10) O-ring
(11) Bush (Shift lever)
(12) Cushion rubber
(13) Bush (Stay rear)
(14) Joint
(15) Rod
(16) Bracket
(17) Spring
(18) Stay
(19) Bush (Stay front)

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 5 (0.51, 3.7)
T3: 12±3 (1.2±0.3, 8.7±2.2)
T4: 18±5 (1.8±0.5, 13.0±3.6)
T5: 29±5 (3.0±0.5, 21.7±3.6)

2. Automatic Transmission



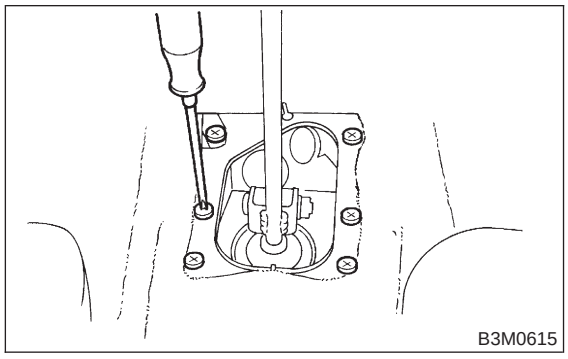
(1) Button A
(2) Button B
(3) Spring (button)
(4) Grip
(5) Indicator cover
(6) Selector lever lower
(7) Pin
(8) Packing
(9) Plate
(10) Detent spring
(11) Selector lever upper
(12) Rod
(13) Indicator light bulb
(14) Retainer spring
(15) Snap pin
(16) Outer cable
(17) Inner cable
(18) Nut (front)
(19) Nut (rear)
(20) Lock plate
(21) Shift-lock solenoid
(22) Lock arm
(23) "P" position switch

Tightening torque: N·m (kg-m, ft-lb)
T1: 5.9±1.5 (0.6±0.15, 4.3±1.1)
T2: 12±3 (1.2±0.3, 8.7±2.2)
T3: 25±7 (2.5±0.7, 18.1±5.1)

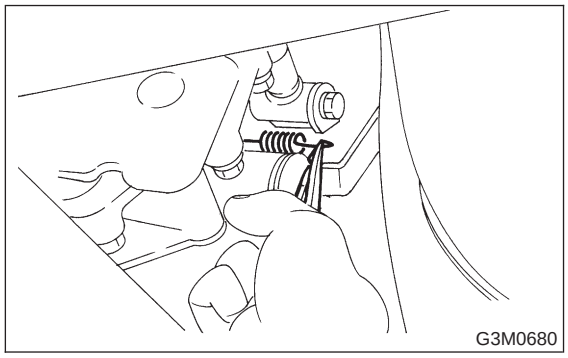
1. Manual Transmission

A: REMOVAL

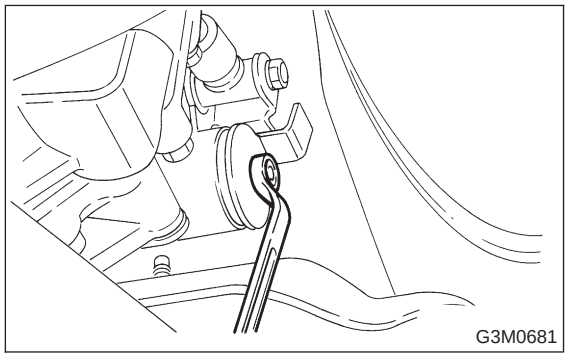
1) Remove console box. <Ref. to 5-4 [W1A0].>
2) Remove boot plate from the body.


B3M0615

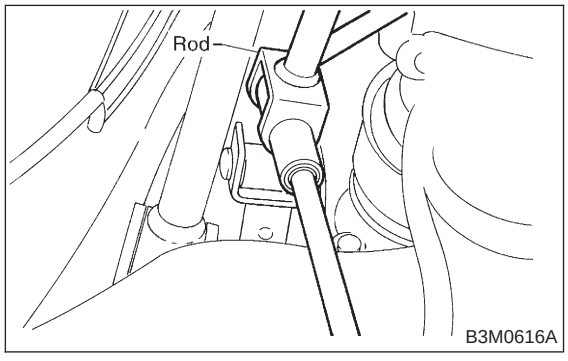
3) Remove the spring between the joint and bracket.


G3M0680

4) Remove stay from bracket.

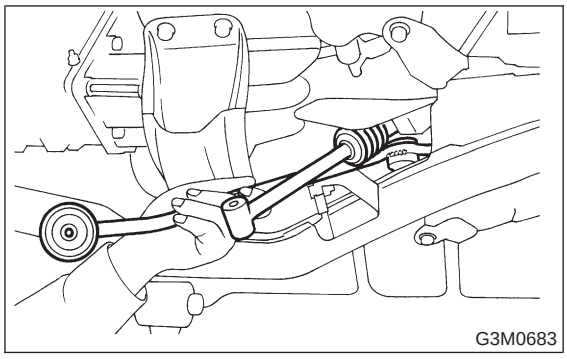

G3M0681

5) Remove rod from joint.

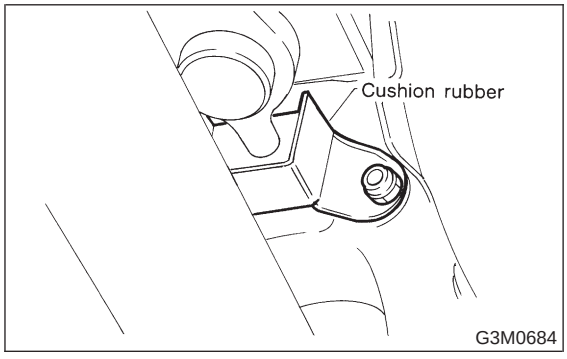


B3M0616A

6) Remove gearshift lever.


G3M0683

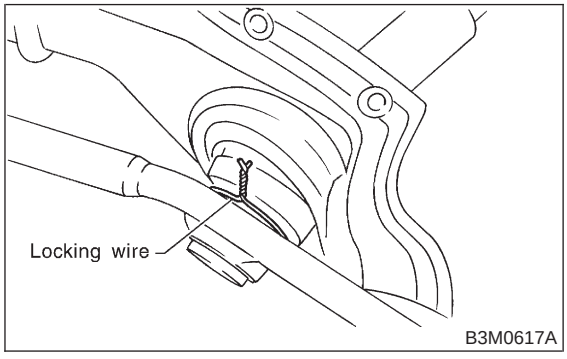
7) Remove the exhaust cover and remove cushion rubber from the body.



G3M0684

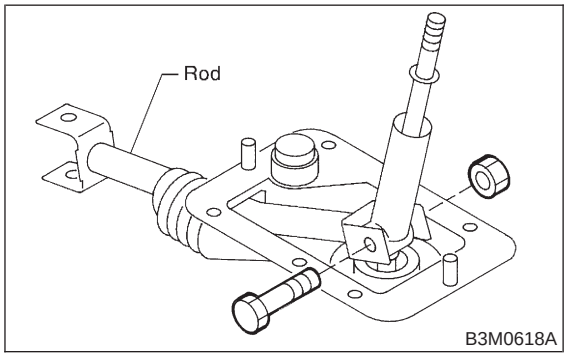
B: DISASSEMBLY

1) Disconnect locking wire.



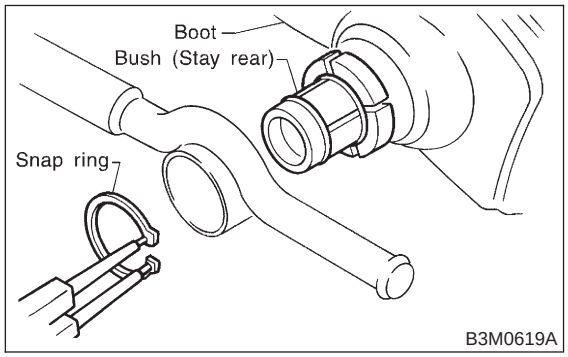
B3M0617A

2) Remove rod from gearshift lever.

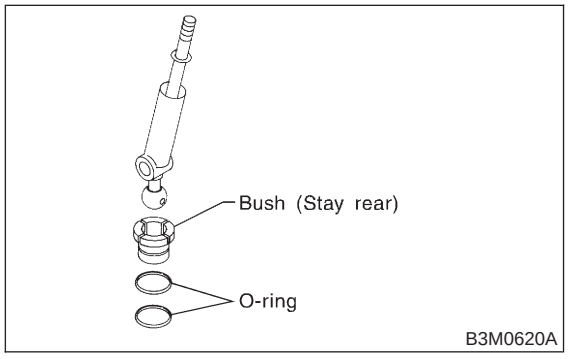


B3M0618A

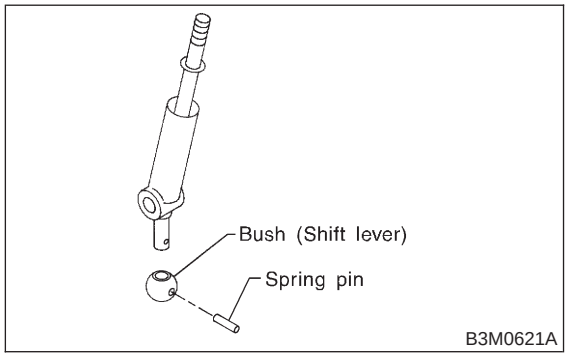
3) Remove snap ring, then disconnect gearshift lever from stay.
4) Remove boot from gearshift lever.



5) Remove O-ring, then disconnect bush (Stay rear).

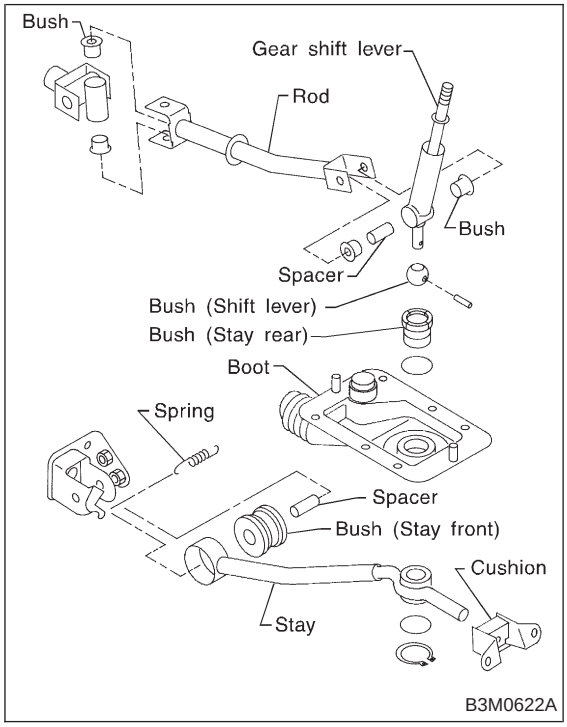


6) Draw out spring pin, then remove bush (Shift lever) from gearshift lever.



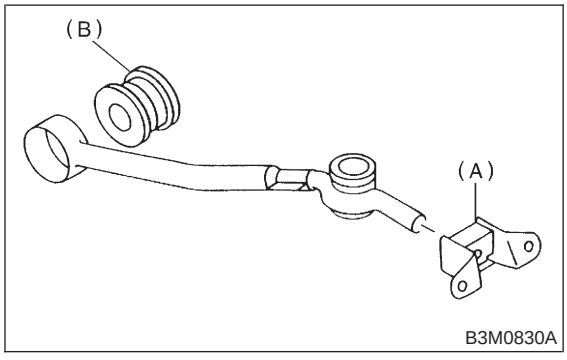
C: INSPECTION

Check each parts (Bush, cushion, spacer, boot, spring, stay and rod etc.) for deformation, damage and wear. Repair or replace any defective parts. Determine defective parts by comparing with new parts.



D: ASSEMBLY

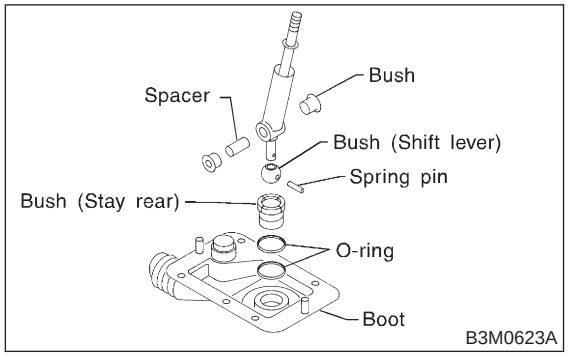
1) Clean all parts before assembly.
2) Mount the following parts on the stay.



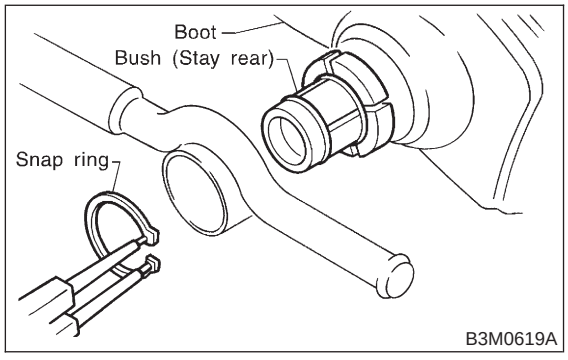
(A) Cushion rubber
(B) Bush (Stay front)

3) Mount each parts (Boot, O-ring, bush and spacer) on the gearshift lever.

CAUTION:
- **Always use new O-rings.**
- **Apply grease [NIGTIGHT LYW No.2 or equivalent] to the inner and side surfaces of the bush when installing spacer.**

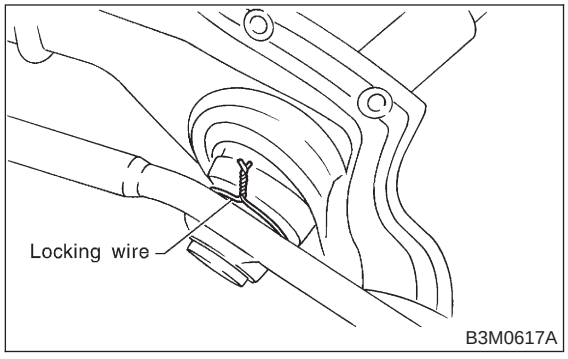


4) Insert the gearshift lever into the boot hole.
5) Mount gearshift lever on the stay.
6) Install snap ring to the bottom of the bush (Stay rear).



7) Tighten with locking wire to the extent that the boot will not come off.

CAUTION:
Always use new locking wire.

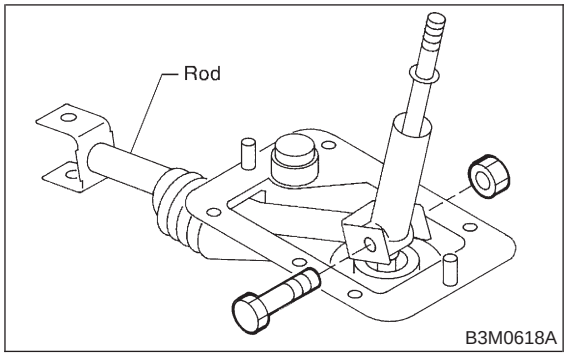


8) Insert the rod into the boot hole.

9) Connect rod to gearshift lever.

Tightening torque:
12±3 N·m (1.2±0.3 kg-m, 8.7±2.2 ft-lb)

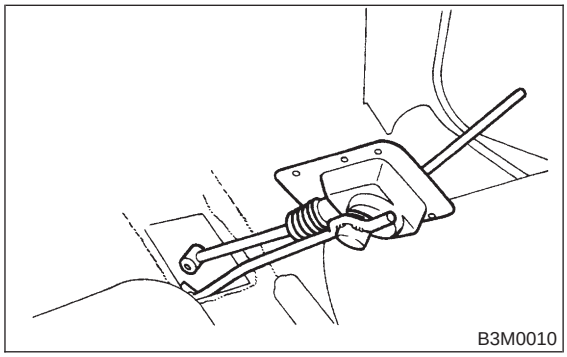
Rocking torque:
0.74±0.25 N·m (0.075±0.025 kg-m, 0.54±0.18 ft-lb) or less



10) Check that there is no excessive play and that parts move smoothly.

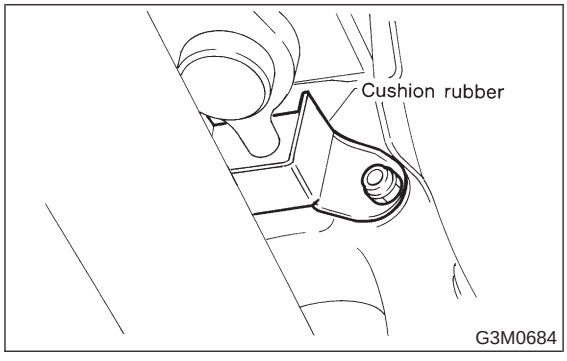
E: INSTALLATION

1) Put into gearshift lever from passenger compartment.
2) Mount boot plate on the body.
3) Install console box and gearshift knob. <Ref. to 5-4 [W1B0].>



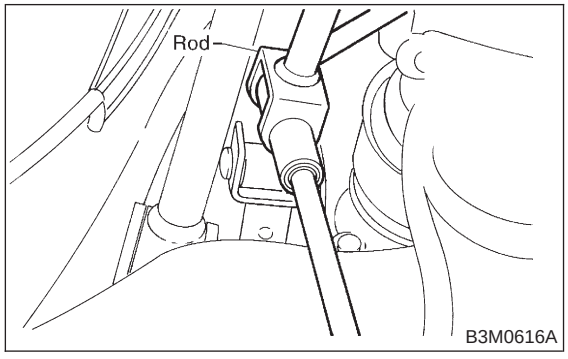
4) Mount cushion rubber on the body.

Tightening torque:
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)



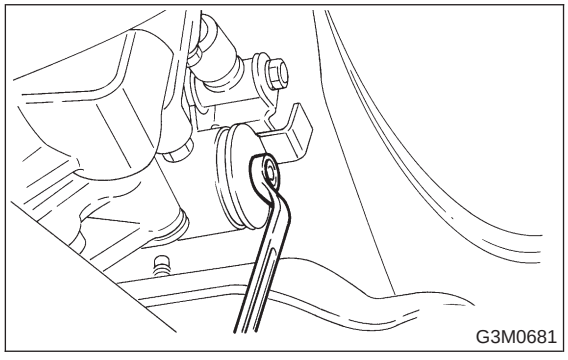
5) Connect rod to the joint.

Tightening torque:
FWD model
12±3 N·m (1.2±0.3 kg-m, 8.7±2.2 ft-lb)
AWD model
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)



6) Connect stay to the bracket.

Tightening torque:
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)

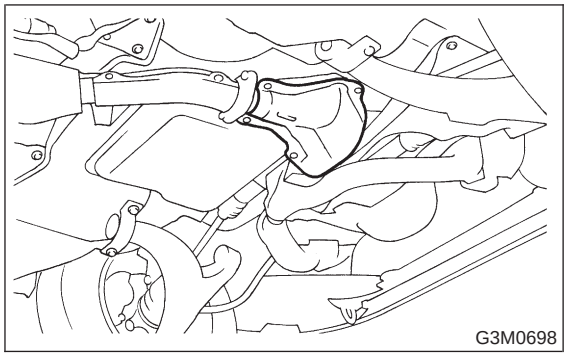


7) Install the exhaust cover.

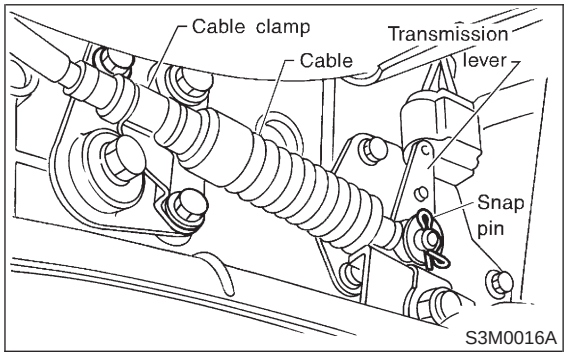
2. Automatic Transmission

A: REMOVAL

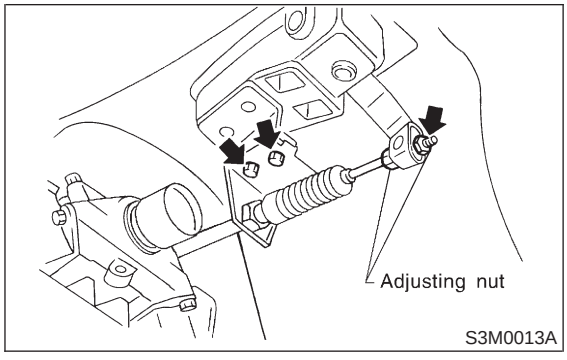
1) Remove the cable.
(1) Prior to removal, set lever to “N” position.
(2) Remove front exhaust pipe.



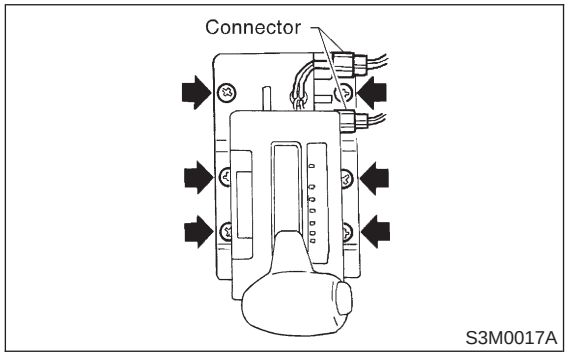
(3) Separate cable from transmission lever.
(4) Remove clamp from transmission case.



(5) Disconnect cable from selector lever and then remove cable bracket.

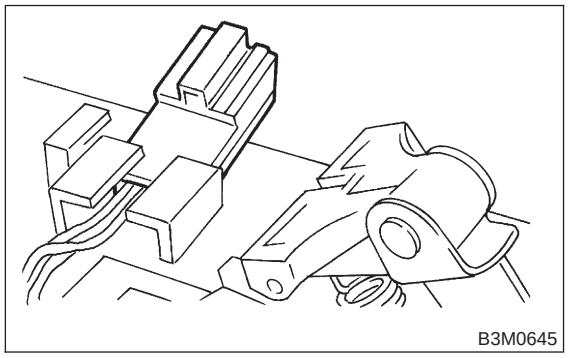


2) Remove console box. <Ref. to 5-4 [W1A0].>
3) Disconnect the connectors, then remove the six screws to take out the selector lever assembly from the body.



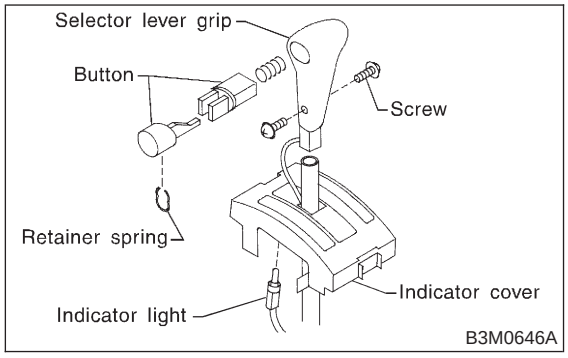
B: DISASSEMBLY

1) Remove connector from plate.

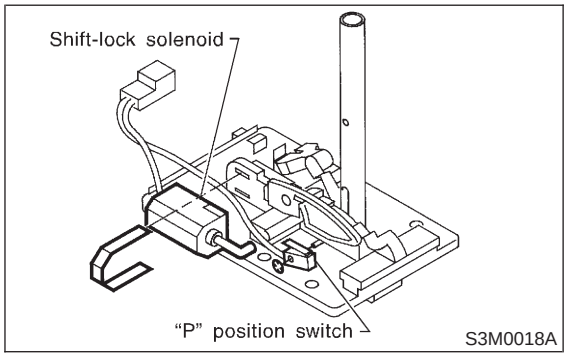


2) Remove indicator light and two screws.
3) Remove retainer spring, then pull up selector lever grip with indicator cover for holding selector lever button.

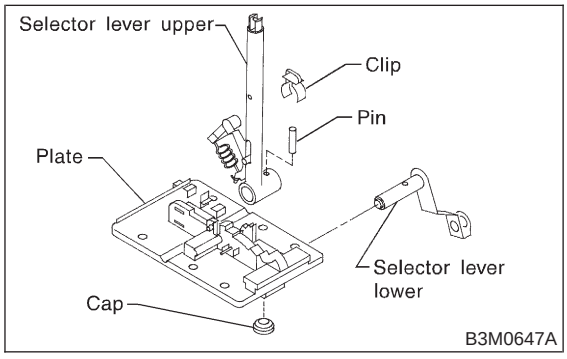
CAUTION:
Pull the selector lever grip carefully so that the selector lever button may not jump out.



4) Remove shift-lock solenoid and “P” position switch.



5) Remove cap and clip, then extract pin.
6) Remove selector lever lower then take away selector lever upper from plate.



C: INSPECTION

1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
2) Confirm the following parts for operating condition before assembly.
   (1) Sliding condition of the button in the grip ... it should move smoothly.
   (2) Insertion of the grip on the selector lever ... when pushing the grip on the selector lever by hand, screw holes should be aligned.
   (3) Operation of selector lever and rod ... they should move smoothly.

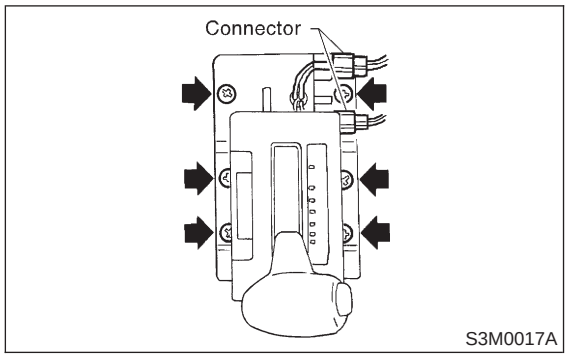
D: ASSEMBLY

1) Clean all parts before assembly.
2) Apply grease [NIGTIGHT LYW No. 2 or equivalent] to each parts. <Ref. to 3-3 [C200].>
3) Assembly is in the reverse order of disassembly.
4) After completion of fitting, transfer selector lever to range “P” — “1”, pressing the button of the grip; then check whether the indicator and selector lever agree, whether the pointer and position mark agree and what the operating force is.

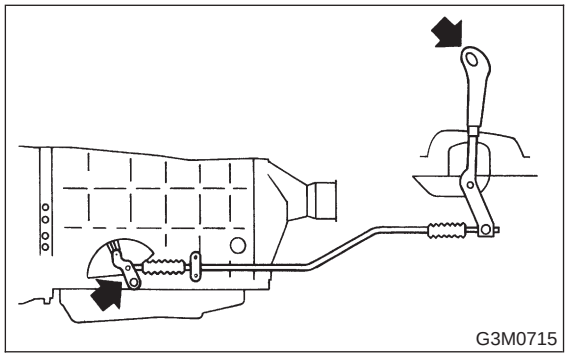
E: INSTALLATION

1) Mount the selector lever onto the vehicle body.
2) Tighten the six bolts to install the selector lever to the vehicle body, then connect connectors.

Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)

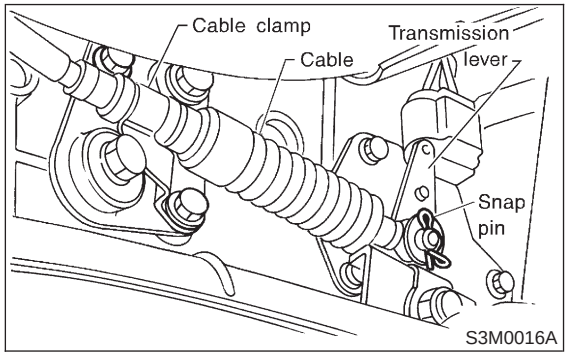


3) Install console box.
4) Set location of selector lever at “N” position.
5) Set location of selector arm installed on the transmission body at “N” position.



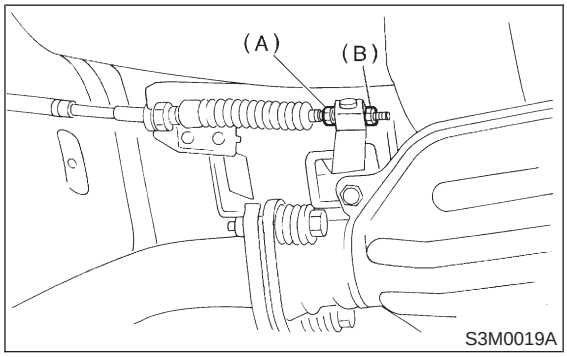
6) Pass inner cable through selector arm pin and then connect it using a washer and snap pin.
7) Attach outer cable to plate on transmission case with the bolts.

Tightening torque:
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)



8) Insert the thread portion of the other inner cable and into the connector hole of the selector lever, and fix the other outer cable end to the bracket.
9) Adjust the inner cable length.
(1) Put connector into contact with nut (A).
(2) Tighten nut (B).

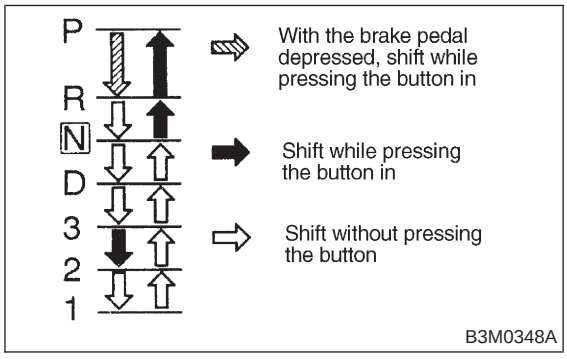
Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)



10) After completion of fitting, make sure that the selector lever operates smoothly all across the operating range.
11) Connect the harnesses and check the following items.
(1) The engine starts operating when selector lever is in position “P”, but not in other positions.
(2) The back-up light is lit when the selector lever is in position “R”, but not in other positions.
12) Check selector lever operation.

WARNING:
Stop the engine while checking operation of selector lever.

(1) Check that selector lever does not move from “N” to “R” without pushing the button.
(2) Check that selector lever does not move from “R” to “P” without pushing the button.
(3) Check that selector lever does not move from “P” to “R” without pushing the button.
(4) Check that selector lever does not move from “3” to “2” without pushing the button.



13) Check shift-lock system.
(1) Ensure ignition switch rotates from “ACC” to “LOCK” when the selector lever is set at “P”.

Also check that ignition key can be removed only from the “LOCK” position.
(2) Ensure selector lever moves from “P” to any other position when the brake pedal is depressed with ignition key set at “ON” or “START”.

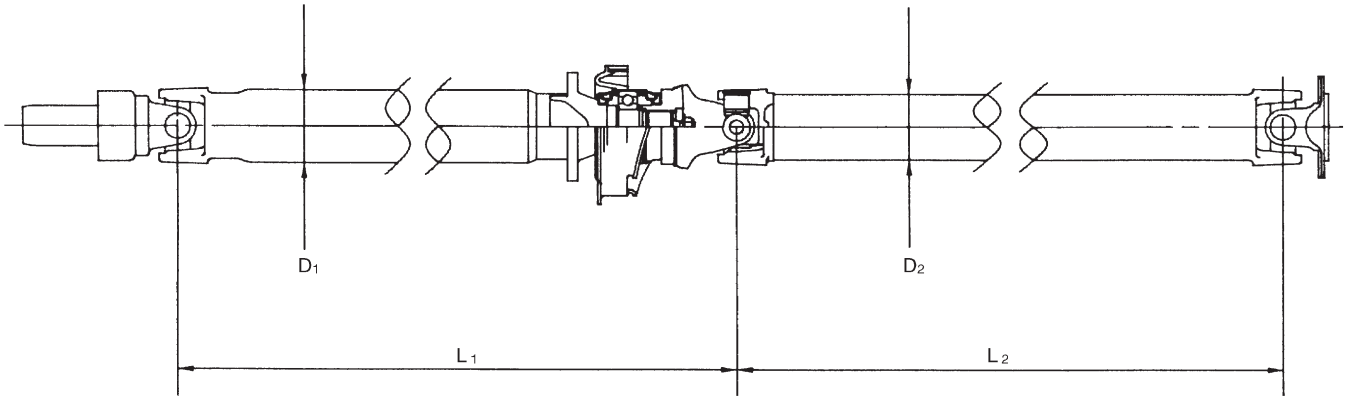
MEMO:

AWD SYSTEM 3-4

1. Propeller Shaft

A: SPECIFICATIONS

Front propeller shaft Joint-to-joint length: L_1 mm (in)	AT	693 (27.28)
	MT	634 (24.96)
Rear propeller shaft Joint-to-joint length: L_2 mm (in)		768 (30.24)
Outside dia. of tube mm (in)	D_1	63.5 (2.500)
	D_2	57.0 (2.244)



B3M0851A

2. Rear Differential

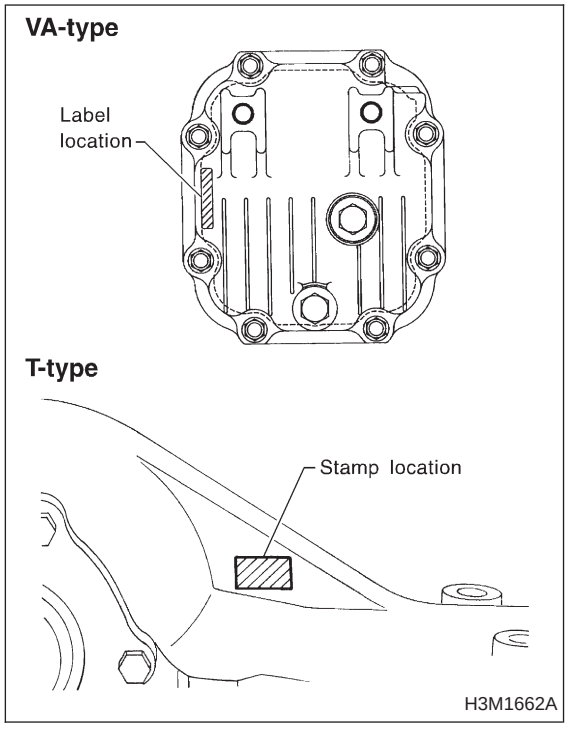
A: SPECIFICATIONS

Type of gear	Hypoid			
	MT		AT	
	2200 cc	2500 cc	2200 cc	2500 cc
Gear ratio (Number of gear teeth)	3.900 (39/10)	4.111 (37/9)	4.111 (37/9)	4.444 (40/9)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)			
Rear differential gear oil	GL-5			

B: IDENTIFICATION

When replacing a rear differential assembly, select the correct one according to the following table.

CAUTION:
Using the different rear differential assembly causes the drive line and tires to “drag” or emit abnormal noise when AWD is selected.



Gear ratio		Stamp or label on rear differential
2200 cc MT	3.900	 B3M0124
2200 cc AT	4.111	 H3M1159

Gear ratio		Stamp or label on rear differential
2500 cc MT	4.111	 B3M0127
2500 cc AT	4.444	 B3M0421

C: ADJUSTING PARTS

1. REAR DIFFERENTIAL (T-TYPE)

Front and rear bearing preload at companion flange bolt hole	New bearing	19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 —6.4 lb)
	Used bearing	8.34 — 16.67 N (0.85 — 1.70 kg, 1.87 — 3.75 lb)
Preload adjusting spacer	Part No.	Length
	383695201	56.2 mm (2.213 in)
	383695202	56.4 mm (2.220 in)
	383695203	56.6 mm (2.228 in)
	383695204	56.8 mm (2.236 in)
	383695205	57.0 mm (2.244 in)
	383695206	57.2 mm (2.252 in)
Preload adjusting washer	Part No.	Thickness
	383705200	2.59 mm (0.1020 in)
	383715200	2.57 mm (0.1012 in)
	383725200	2.55 mm (0.1004 in)
	383735200	2.53 mm (0.0996 in)
	383745200	2.51 mm (0.0988 in)
	383755200	2.49 mm (0.0980 in)
	383765200	2.47 mm (0.0972 in)
	383775200	2.45 mm (0.0965 in)
	383785200	2.43 mm (0.0957 in)
	383795200	2.41 mm (0.0949 in)
	383805200	2.39 mm (0.0941 in)
	383815200	2.37 mm (0.0933 in)
	383825200	2.35 mm (0.0925 in)
	383835200	2.33 mm (0.0917 in)
	383845200	2.31 mm (0.0909 in)

Pinion height adjusting shim	Part No.	Thickness
	383495200	3.09 mm (0.1217 in)
	383505200	3.12 mm (0.1228 in)
	383515200	3.15 mm (0.1240 in)
	383525200	3.18 mm (0.1252 in)
	383535200	3.21 mm (0.1264 in)
	383545200	3.24 mm (0.1276 in)
	383555200	3.27 mm (0.1287 in)
	383565200	3.30 mm (0.1299 in)
	383575200	3.33 mm (0.1311 in)
	383585200	3.36 mm (0.1323 in)
	383595200	3.39 mm (0.1335 in)
	383605200	3.42 mm (0.1346 in)
	383615200	3.45 mm (0.1358 in)
	383625200	3.48 mm (0.1370 in)
	383635200	3.51 mm (0.1382 in)
	383645200	3.54 mm (0.1394 in)
	383655200	3.57 mm (0.1406 in)
	383665200	3.60 mm (0.1417 in)
	383675200	3.63 mm (0.1429 in)
	383685200	3.66 mm (0.1441 in)
Side gear backlash	—	0.10 — 0.20 mm (0.0039 — 0.0079 in)
Side gear thrust washer	Part No.	Thickness
	383445201	0.75 — 0.80 mm (0.0295 — 0.0315 in)
	383445202	0.80 — 0.85 mm (0.0315 — 0.0335 in)
	383445203	0.85 — 0.90 mm (0.0335 — 0.0354 in)
Side bearing standard width	—	20.00 mm (0.7874 in)
Side bearing retainer shim	Part No.	Thickness
	383475201	0.20 mm (0.0079 in)
	383475202	0.25 mm (0.0098 in)
	383475203	0.30 mm (0.0118 in)
	383475204	0.40 mm (0.0157 in)
	383475205	0.50 mm (0.0197 in)
Crown gear to drive pinion backlash	Limit	0.10 — 0.20 mm (0.0039 — 0.0079 in)
Crown gear runout on its back surface		0.05 mm (0.0020 in)
Oil capacity		0.8 ℓ (0.8 US qt, 0.7 Imp qt)

2. REAR DIFFERENTIAL (VA-TYPE)

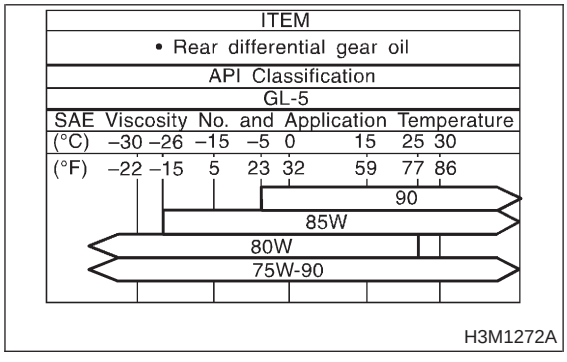
Front and rear bearing preload at companion flange bolt hole	New bearing	12.7 — 32.4 N (1.3 — 3.3 kg, 2.9 — 7.3 lb)
Preload adjusting spacer	Part No.	Length mm (in)
	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)

Preload adjusting washer	Part No.	Thickness mm (in)
	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)
Pinion height adjusting shim	Part No.	Thickness mm (in)
	32295AA200	0.150 (0.0059)
	32295AA210	0.175 (0.0069)
	32295AA220	0.200 (0.0079)
	32295AA230	0.225 (0.0089)
	32295AA240	0.250 (0.0098)
	32295AA250	0.275 (0.0108)
Side gear backlash	0.05 — 0.15 mm (0.0020 — 0.0059 in)	
Side gear thrust washer	Part No.	Thickness mm (in)
	803135011	0.925 — 0.950 (0.0364 — 0.0374)
	803135012	0.950 — 0.975 (0.0374 — 0.0384)
	803135013	0.975 — 1.000 (0.0384 — 0.0394)
	803135014	1.000 — 1.025 (0.0394 — 0.0404)
	803135015	1.025 — 1.050 (0.0404 — 0.0413)
Crown gear to drive pinion backlash	Limit	0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface		0.05 (0.0020)
Oil capacity		0.8 ℓ (0.8 US qt, 0.7 Imp qt)

D: REAR DIFFERENTIAL GEAR OIL

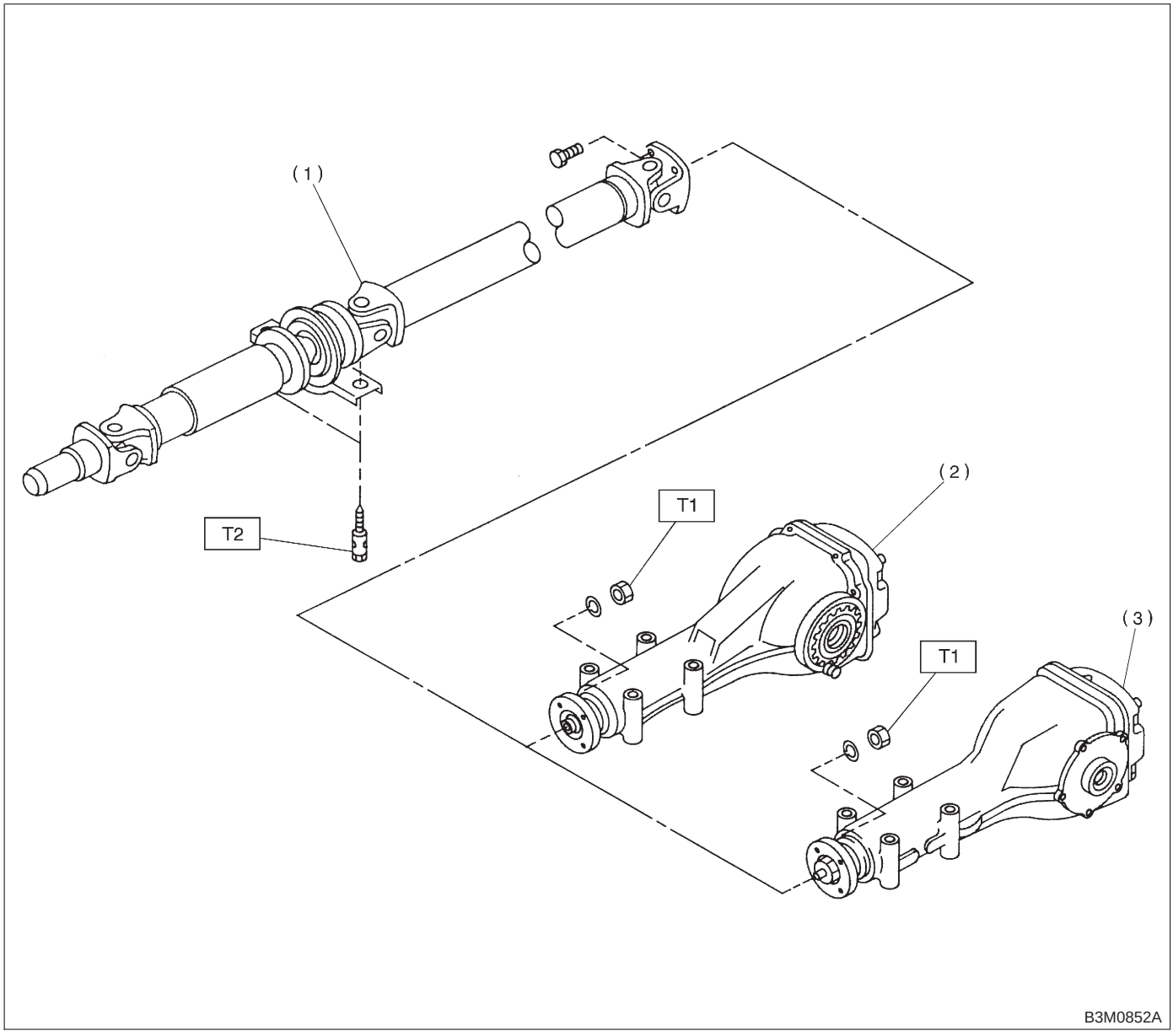
- **Recommended oil**

CAUTION:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.



MEMO:

1. Propeller Shaft

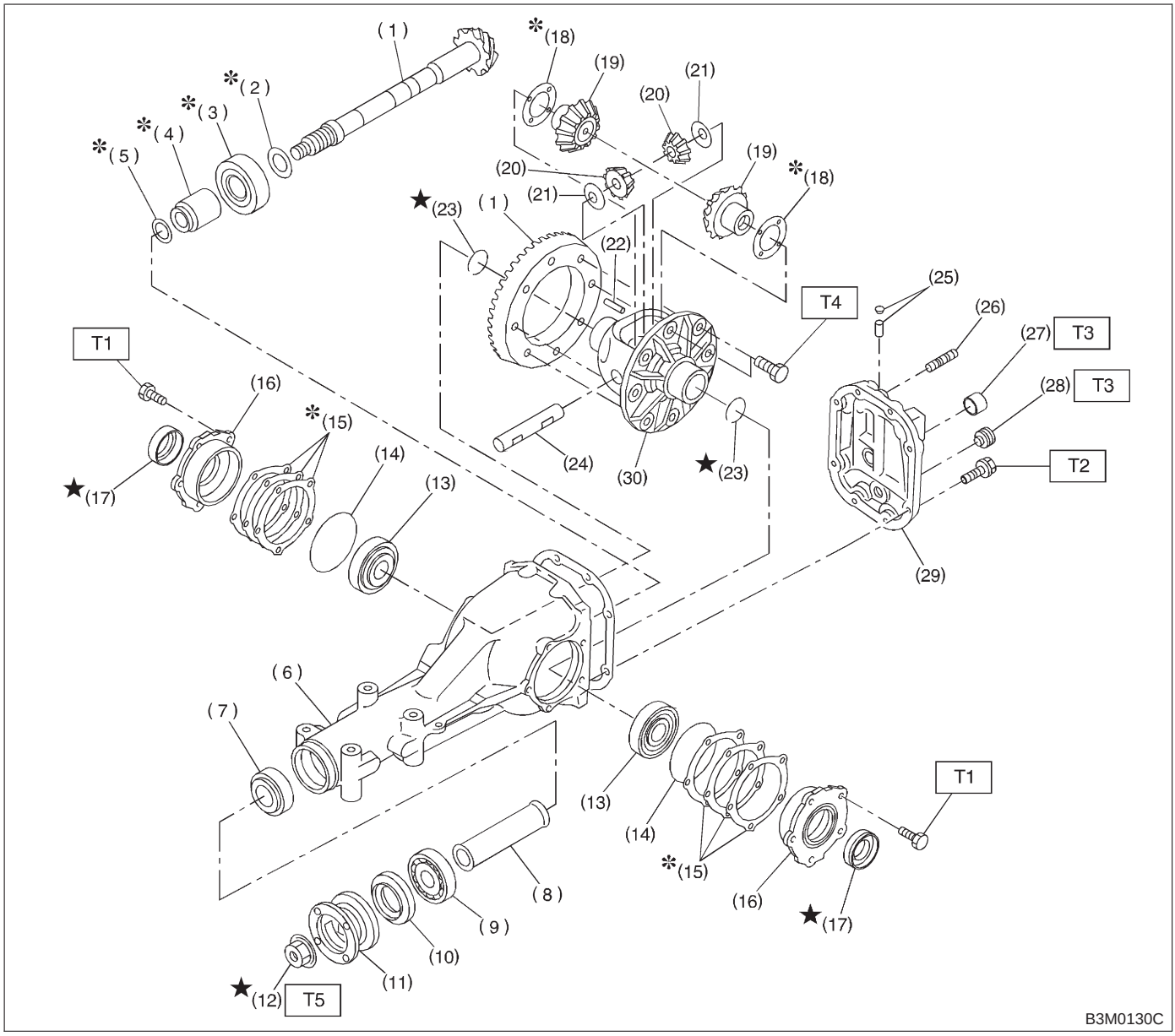


(1) Propeller shaft
(2) Rear differential (VA-type)
(3) Rear differential (T-type)

Tightening torque: N·m (kg-m, ft-lb)
T1: 31±8 (3.2±0.8, 23.1±5.8)
T2: 52±5 (5.3±0.5, 38.3±3.6)

2. Rear Differential Assembly

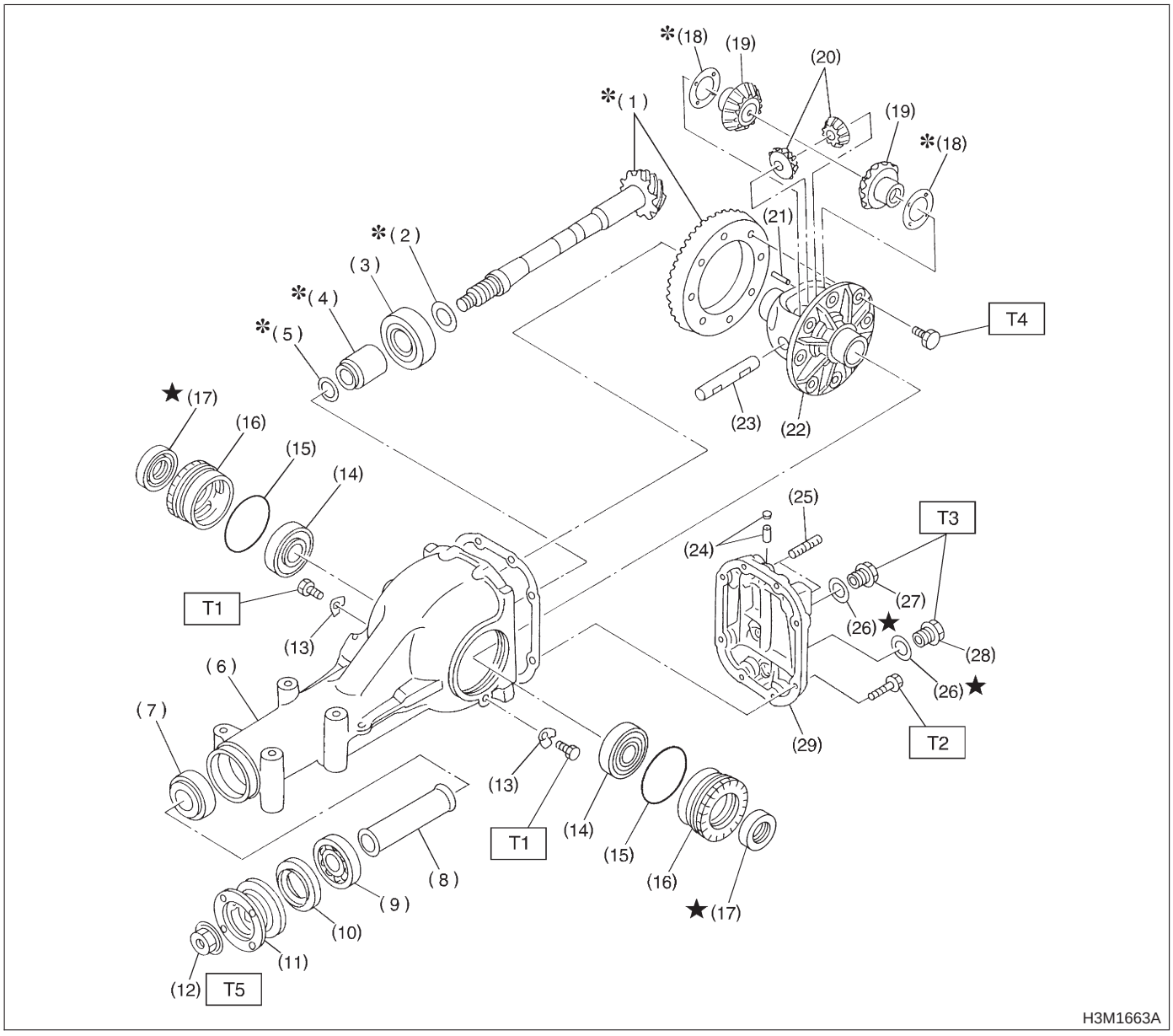
A: T-TYPE



(1) Pinion crown gear set
(2) Pinion height adjusting washer
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Spacer
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(14) O-ring
(15) Side bearing retainer shim
(16) Side bearing retainer
(17) Side oil seal
(18) Side gear thrust washer
(19) Side gear
(20) Pinion mate gear
(21) Pinion mate gear washer
(22) Pinion shaft lock pin
(23) Circlip
(24) Pinion mate shaft
(25) Air breather cap
(26) Stud bolt
(27) Oil filler plug
(28) Oil drain plug
(29) Rear cover
(30) Differential case

Tightening torque: N·m (kg-m, ft-lb)
T1: 10.3±1.5 (1.05±0.15, 7.6±1.1)
T2: 29.4±4.9 (3.00±0.50, 21.7±3.6)
T3: 44.1±3.9 (4.50±0.40, 32.5±2.9)
T4: 103.0±9.8 (10.50±1.00, 75.9±7.2)
T5: 181.4±14.7 (18.50±1.50, 133.8±10.8)

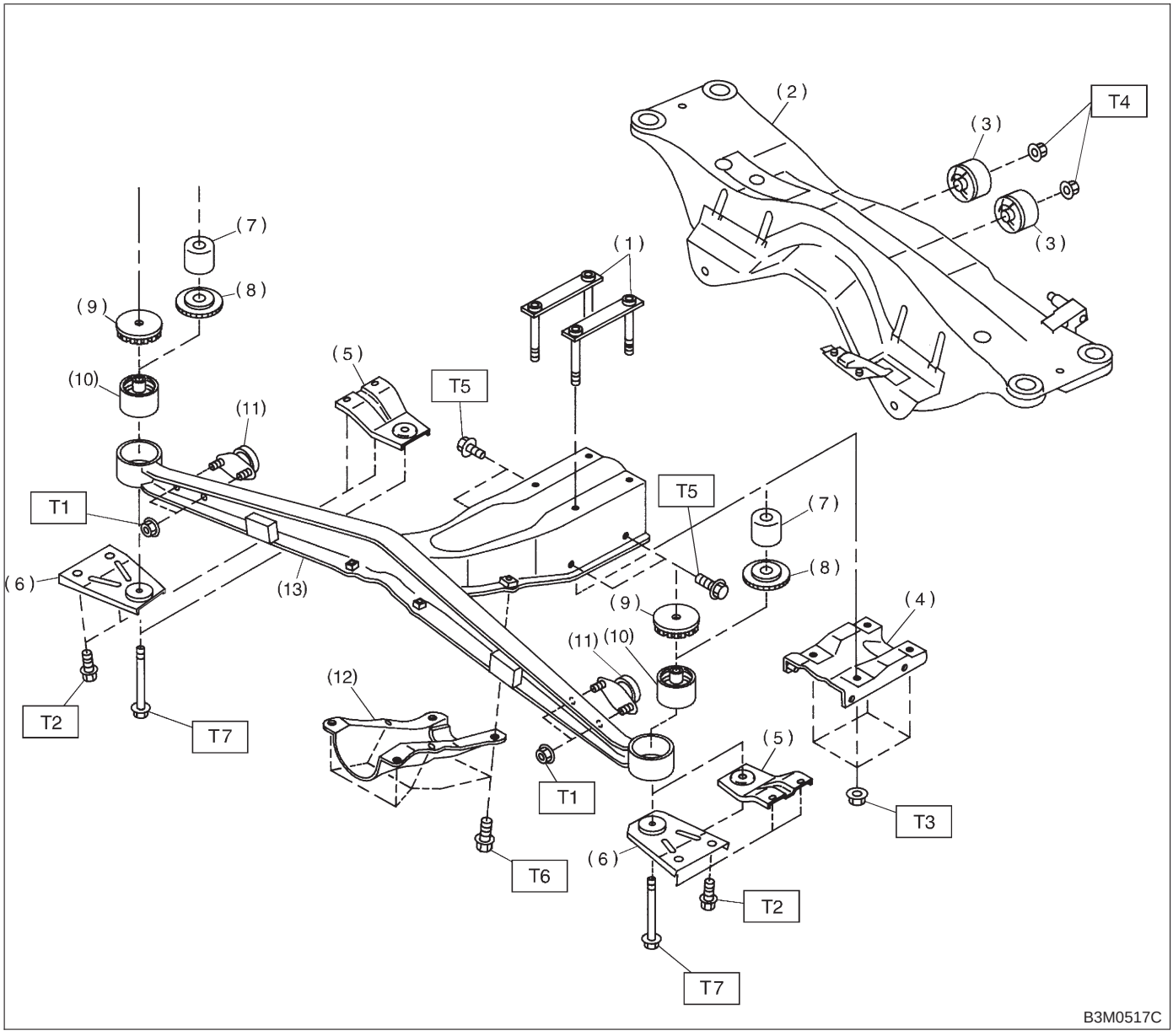
B: VA-TYPE



(1) Pinion crown gear set
(2) Pinion height adjusting shim
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Lock plate
(14) Side bearing
(15) O-ring
(16) Axle shaft holder
(17) Side oil seal
(18) Side gear thrust washer
(19) Side gear
(20) Pinion mate gear
(21) Pinion shaft lock pin
(22) Differential case
(23) Pinion mate shaft
(24) Air breather cap
(25) Stud bolt
(26) Gasket
(27) Oil filler plug
(28) Oil drain plug
(29) Rear cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 25±3 (2.5±0.3, 18.1±2.2)
T2: 25±2 (2.5±0.2, 18.1±1.4)
T3: 34±4 (3.5±0.4, 25.3±2.9)
T4: 62±5 (6.3±0.5, 45.6±3.6)
T5: 188±26 (19.2±2.7, 139±20)

3. Rear Differential Mounting System



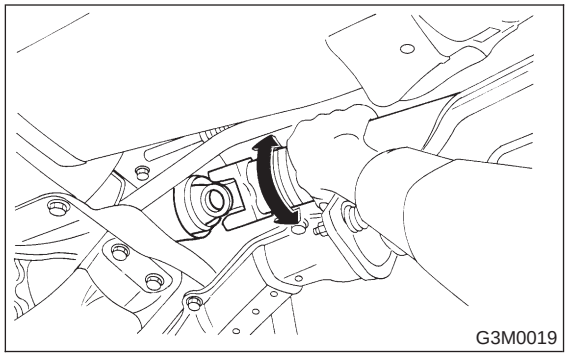
(1) Plate
(2) Crossmember
(3) Rear bushing
(4) Differential mount lower bracket
(5) Differential mount bracket (OUTBACK model)
(6) Differential mount bracket
(7) Boss (OUTBACK model)
(8) Stopper (OUTBACK model)
(9) Stopper
(10) Front bushing
(11) Dynamic damper (2500 cc MT model)
(12) Differential mount front cover
(13) Differential front member

Tightening torque: N·m (kg-m, ft-lb)
T1: 20±5 (2.0±0.5, 14.5±3.6)
T2: 32±8 (3.3±0.8, 23.9±5.8)
T3: 64±8 (6.5±0.8, 47.0±5.8)
T4: 69±8 (7.0±0.8, 50.6±5.8)
T5: 69±10 (7.0±1.0, 51.0±7.2)
T6: 88±10 (9.0±1.0, 65.0±7.2)
T7: 98±10 (10.0±1.0, 72.0±7.2)

1. Propeller Shaft

A: ON-CAR SERVICE

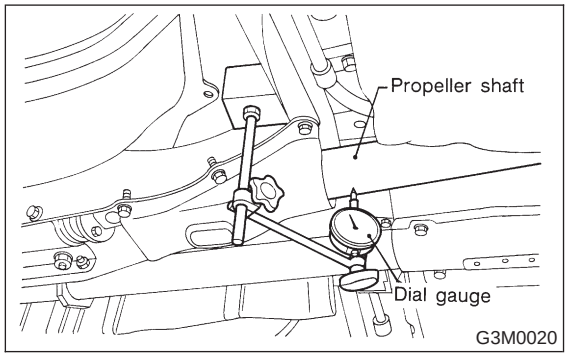
1) Joints and connections
Check for any looseness of yoke flange connecting bolts and center bearing retaining bolts.
2) Splines and bearing locations
Turn propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.



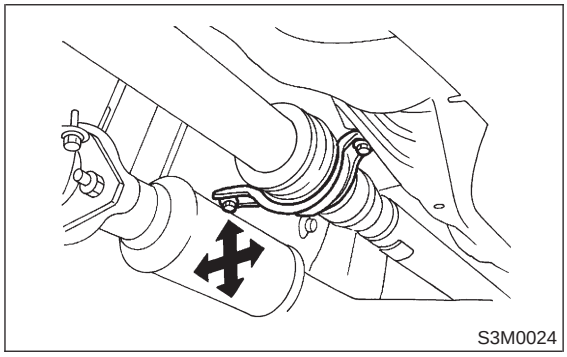
3) Runout of propeller shaft
Turn rear wheels by hand to check for “runout” of propeller shaft.

NOTE:
Measure runout with a dial gauge at the center of front and rear propeller shaft tubes.

Runout:
Limit 0.6 mm (0.024 in)



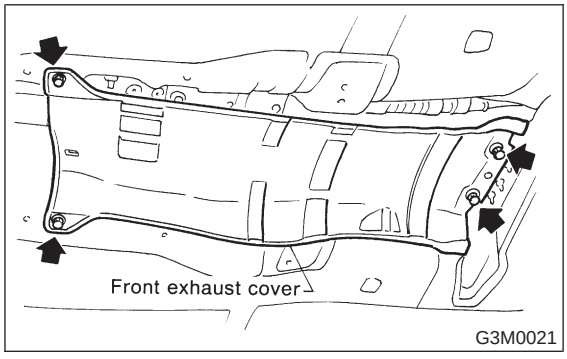
4) Center bearing free play
While holding propeller shaft near center bearing with your hand, move it up and down, and left and right to check for any abnormal bearing free play.



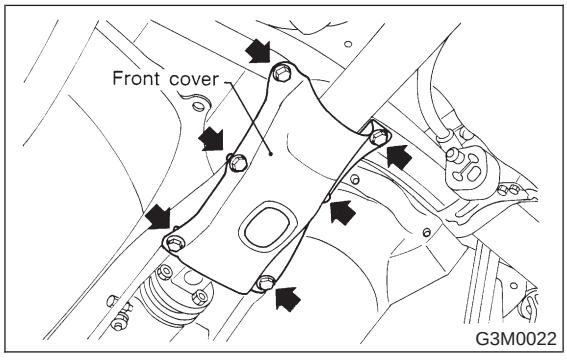
B: REMOVAL

NOTE:
Before removing propeller shaft, wrap metal parts with a cloth or rubber material.

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Jack-up vehicle and support it with sturdy racks.
5) Remove rear exhaust pipe. <Ref. to 2-9 [W3A0].>
6) Remove muffler. <Ref. to 2-9 [W4A0].>
7) Remove front exhaust cover.

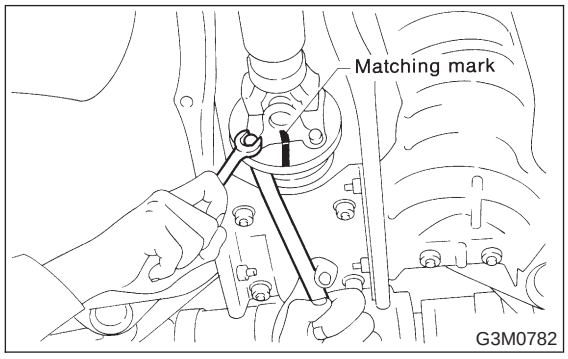


8) Remove differential mount front cover.

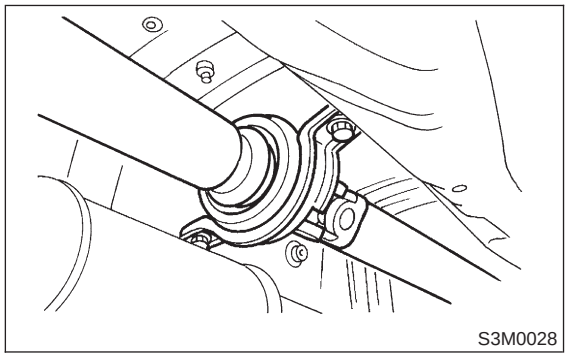


9) Remove the four bolts which hold propeller shaft to rear differential.

NOTE:
● Put matching mark on affected parts before removal.
● Remove all but one bolt.



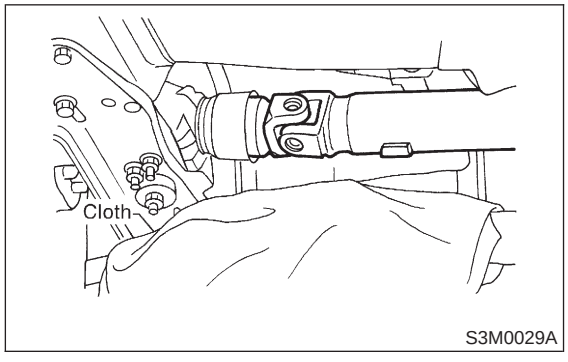
10) Remove the two bolts which hold center bearing to vehicle body.



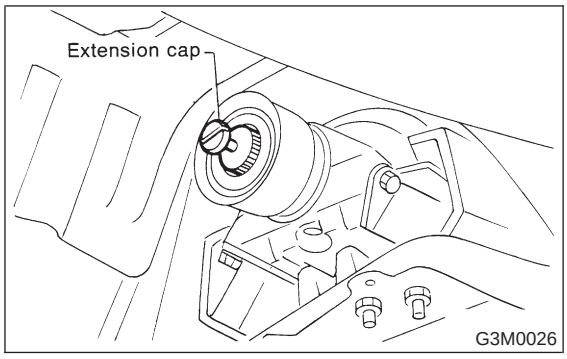
11) Remove propeller shaft from transmission.

CAUTION:
Be sure not to damage oil seals and the frictional surface of sleeve yoke.

NOTE:
● Be sure to use an empty oil can to catch oil flowing out when removing propeller shaft.
● Be sure to plug the opening in transmission after removal of propeller shaft.



12) Install the extension cap to transmission.



C: DISASSEMBLY AND ASSEMBLY

NOTE:
Do not disassemble propeller shaft. It is a single unit.

D: INSPECTION

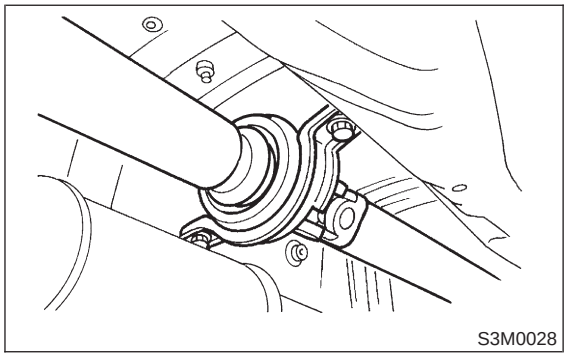
NOTE:
Do not disassemble propeller shaft. Check the following and replace if necessary.

1) Tube surfaces for dents or cracks
2) Splines for deformation or abnormal wear
3) Joints for non-smooth operation or abnormal noise
4) Center bearing for free play, noise or non-smooth operation
5) Oil seals for abnormal wear or damage
6) Center bearing for breakage or damage to rubber boot

E: INSTALLATION

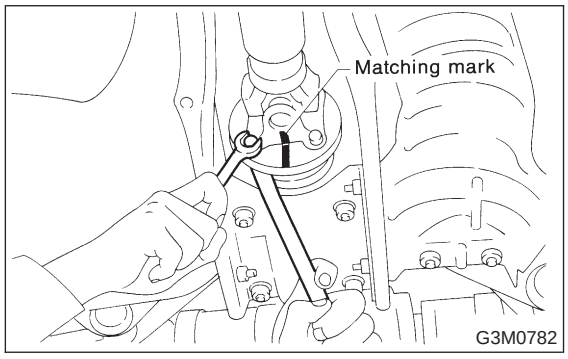
1) Insert sleeve yoke into transmission and attach center bearing to vehicle body.

Tightening torque:
52±5 N·m (5.3±0.5 kg-m, 38.3±3.6 ft-lb)



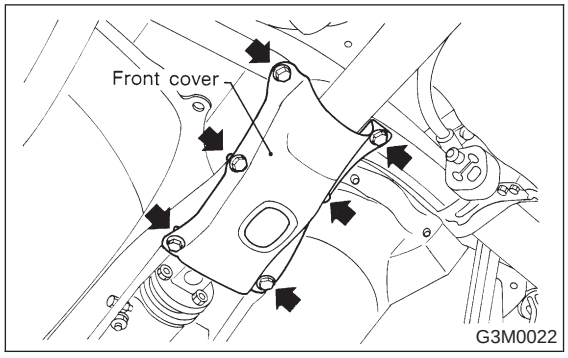
2) Align matching marks and connect flange yoke and rear differential.

Tightening torque:
31±8 N·m (3.2±0.8 kg-m, 23.1±5.8 ft-lb)

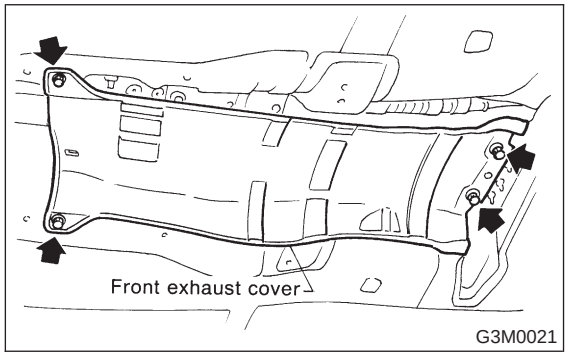


3) Install differential mount front cover.

Tightening torque:
88±10 N·m (9.0±1.0 kg-m, 65±7 ft-lb)



4) Install front exhaust cover.
5) Install rear exhaust pipe and muffler.

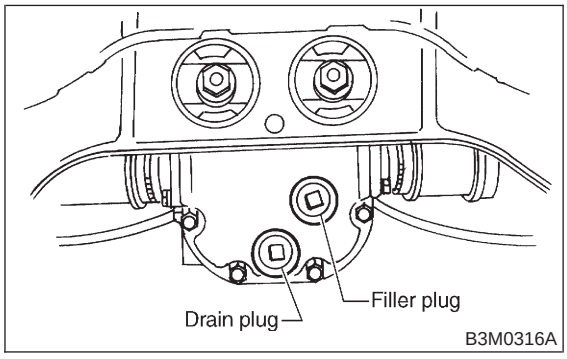


2. Rear Differential

A: ON-CAR SERVICE

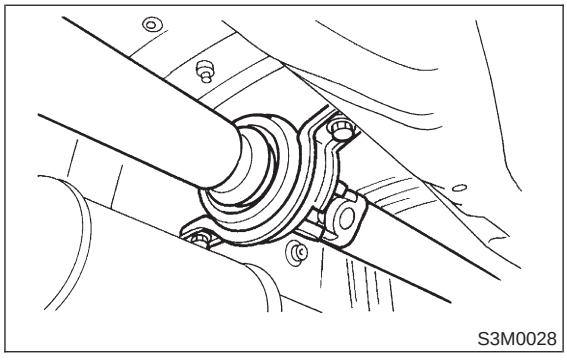
1. FRONT OIL SEAL

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Remove oil drain plug, and drain gear oil.

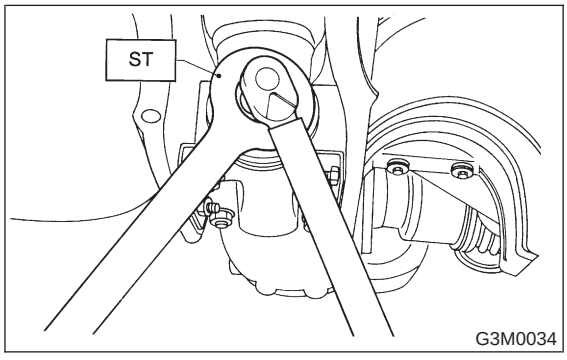


5) Jack-up rear wheels and support the vehicle body with sturdy racks.
6) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>

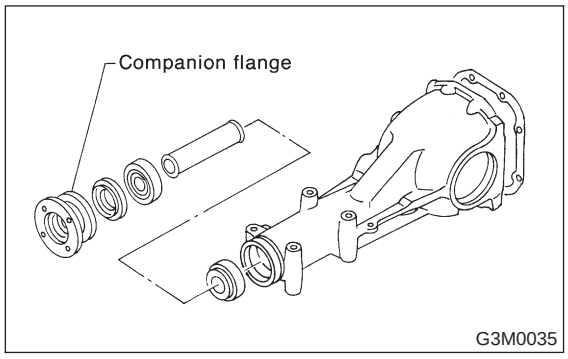
CAUTION:
Wrap metal parts with a cloth or rubber material to prevent damage from adjacent metal parts.



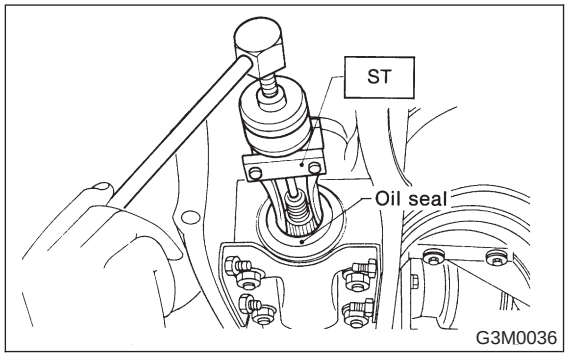
7) Remove self-locking nut while holding companion flange with ST.
ST 498427200 FLANGE WRENCH



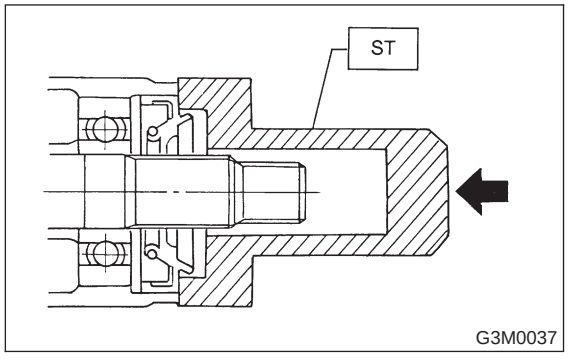
8) Extract companion flange with a puller.



9) Remove oil seal using ST.
ST 398527700 PULLER ASSY (T-type)
ST 499705401 PULLER ASSY (VA-type)



10) Fit a new oil seal using ST.
ST 498447120 OIL SEAL INSTALLER



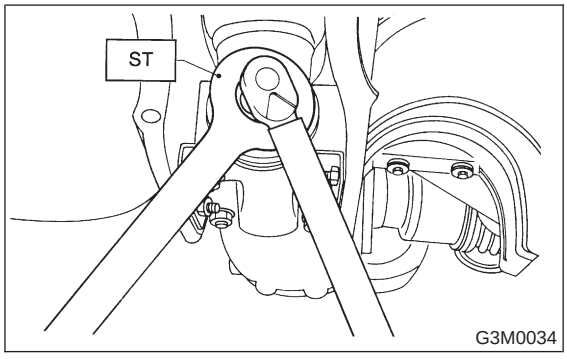
11) Install companion flange.

12) Tighten self-locking nut within the specified torque range so that the turning resistance of companion flange becomes the same as that before replacing oil seal.

CAUTION:
Use a new self-locking nut.

ST 498427200 FLANGE WRENCH

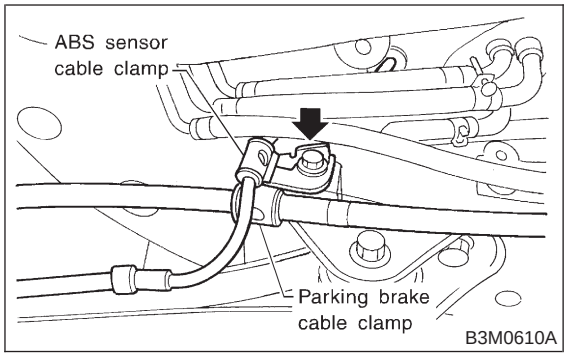
Tightening torque:
T-type;
181.4±14.7 N·m (18.50±1.50 kg-m, 133.8±10.8 ft-lb)
VA-type;
188±26 N·m (19.2±2.7 kg-m, 139±20 ft-lb)



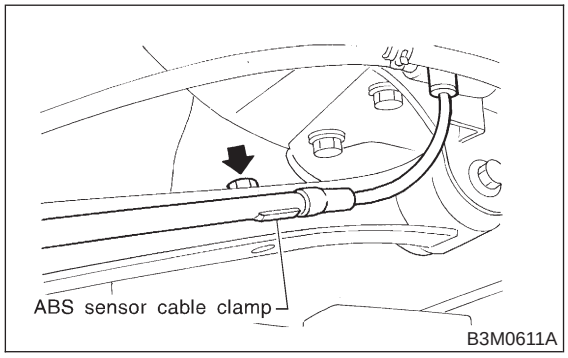
13) Reassembling procedure hereafter is the reverse of the disassembling.

2. SIDE OIL SEAL (T-TYPE)

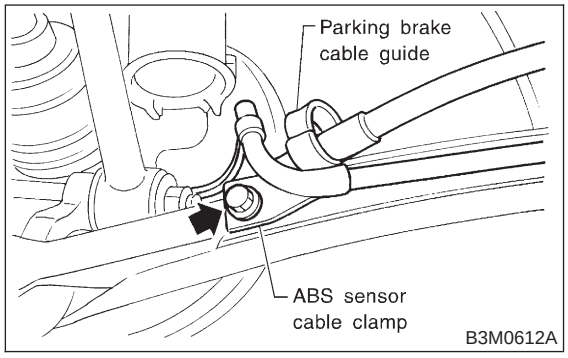
1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen both wheel nuts.
5) Jack-up the vehicle and support it with rigid racks.
6) Remove wheels.
7) Remove rear exhaust pipe.
<Ref. to 2-9 [W3A0].>
8) Remove muffler.
<Ref. to 2-9 [W4A0].>
9) Remove the ABS sensor cable clamp and parking brake cable clamp from bracket.



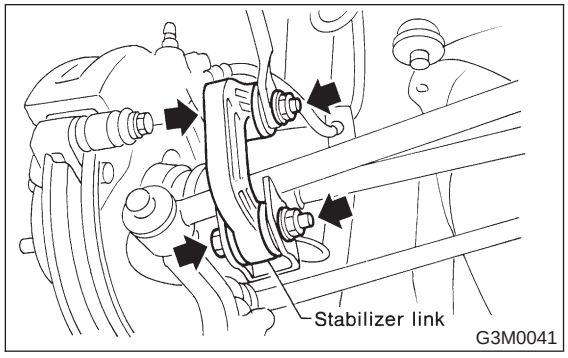
10) Remove the ABS sensor cable clamp from the trailing link.



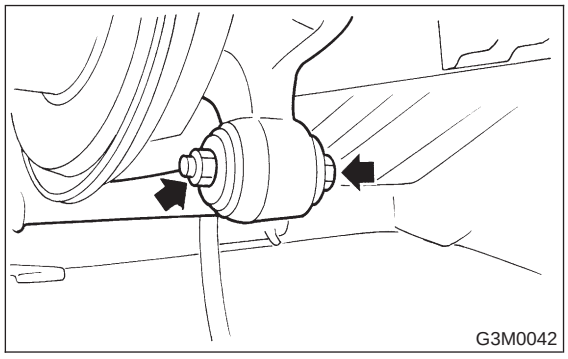
11) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.



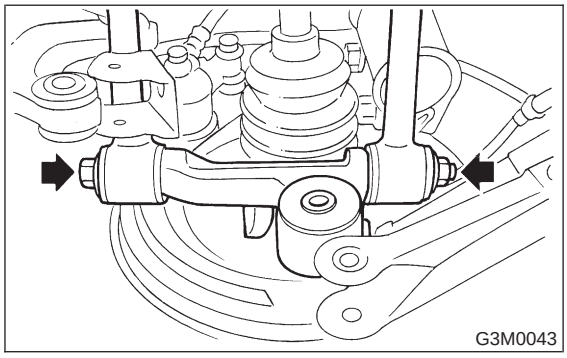
12) Remove the rear stabilizer link.



13) Remove the bolts which secure the trailing link to the rear housing.



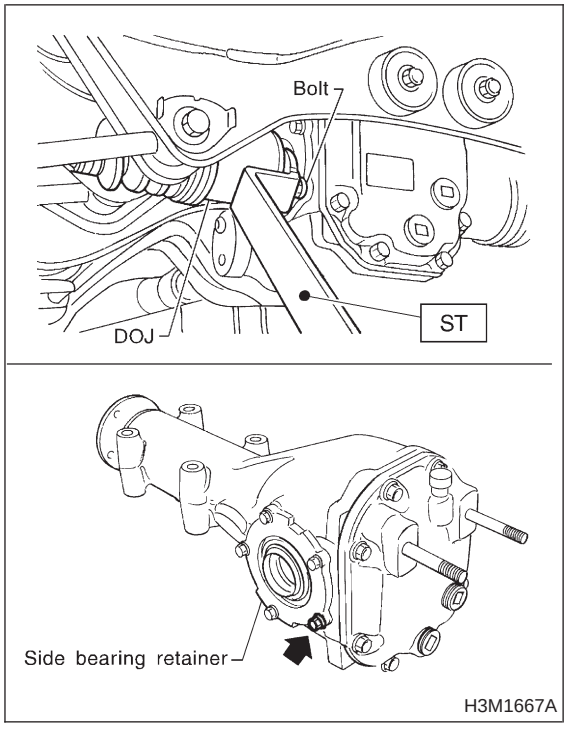
14) Remove the bolts which secure the front and rear lateral link to the rear housing.



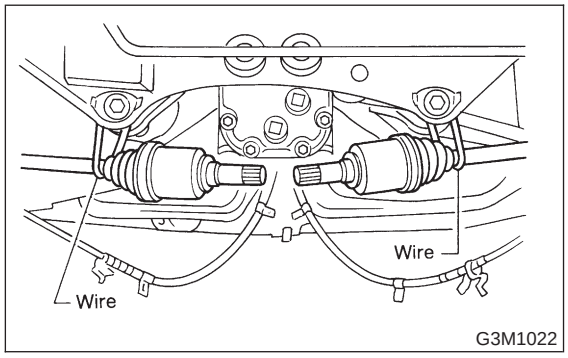
15) Remove crossmember reinforcement lower (Sedan only).
16) Remove the DOJ from the rear differential by using ST.

CAUTION:
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the side bearing retainer.

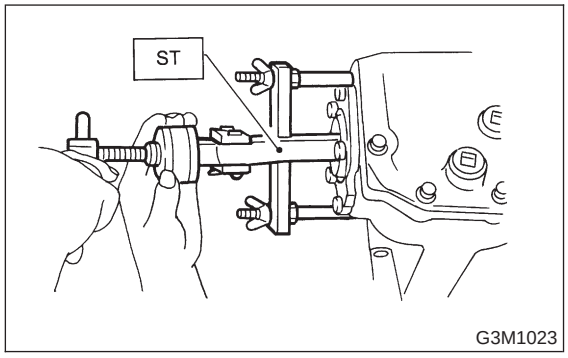
ST 208099PA100 DRIVE SHAFT REMOVER



17) Secure rear drive shaft to rear crossmember using wire.



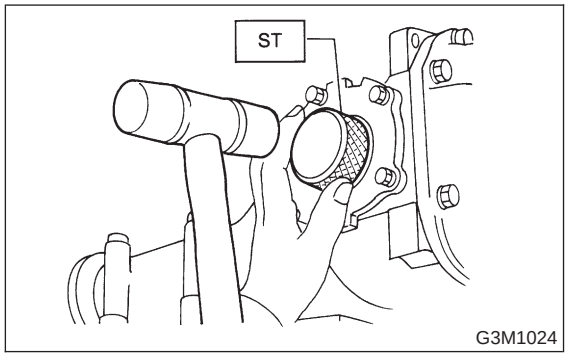
18) Remove side oil seal with ST.
ST 398527700 PULLER ASSY



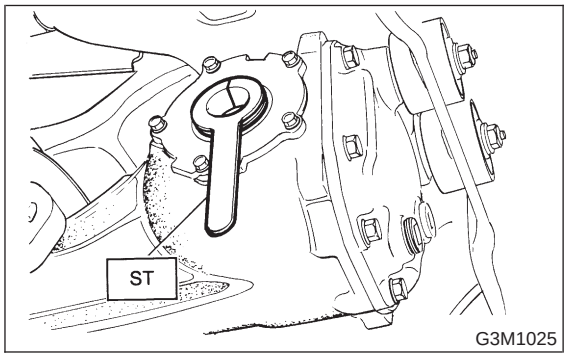
19) Drive in a new side oil seal with ST.

CAUTION:
Apply chassis grease between the oil seal lips.

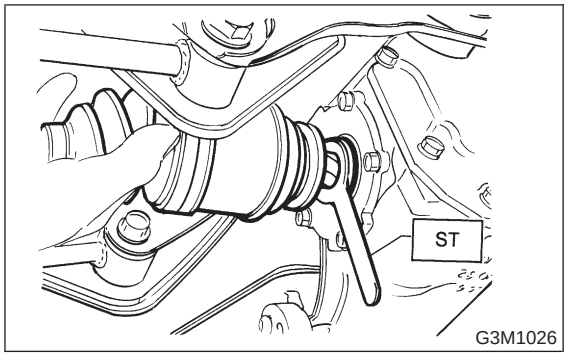
ST 398437700 DRIFT



20) Install ST to rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



21) Insert the spline shaft until the spline portion is inside the side oil seal.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



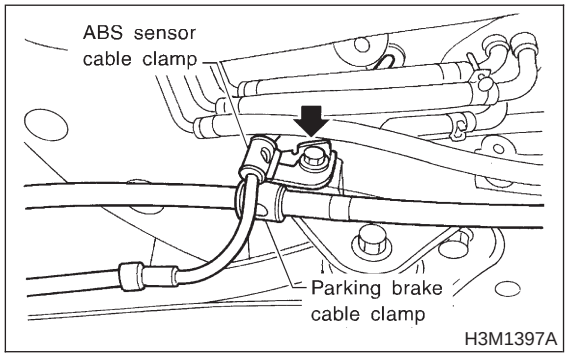
22) Remove ST.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

23) Hereafter, re-assemble in reverse order of disassembly.

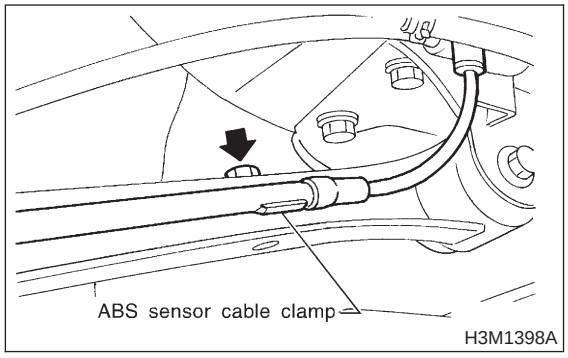
3. SIDE OIL SEAL (VA-TYPE)

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen both wheel nuts.
5) Jack-up the vehicle and support it with rigid racks.
6) Remove wheels.
7) Remove rear exhaust pipe.
<Ref. to 2-9 [W3A0].>
8) Remove muffler.
<Ref. to 2-9 [W4A0].>
9) Remove the DOJ of rear drive shaft from rear differential.

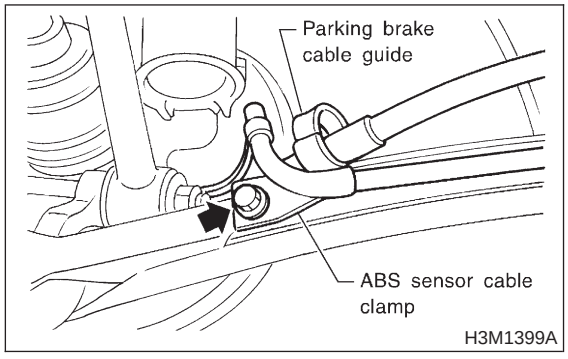
(1) Remove the ABS sensor cable clamp and parking brake cable clamp from bracket.



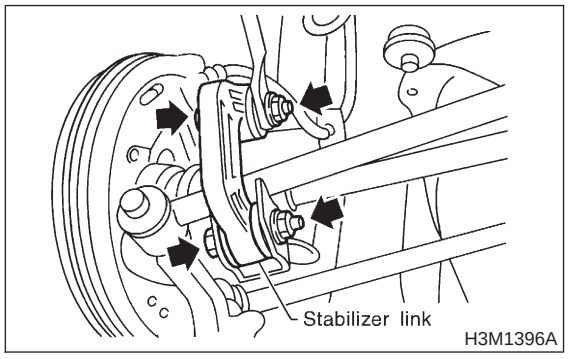
(2) Remove the ABS sensor cable clamp from the trailing link.



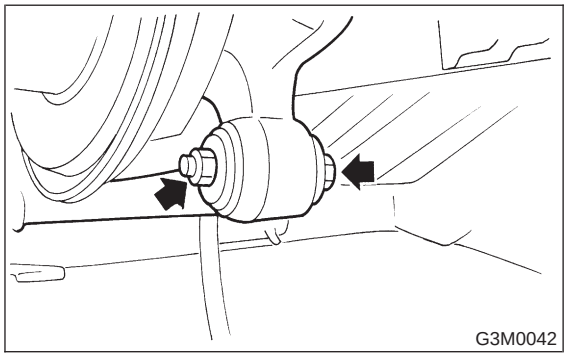
(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.



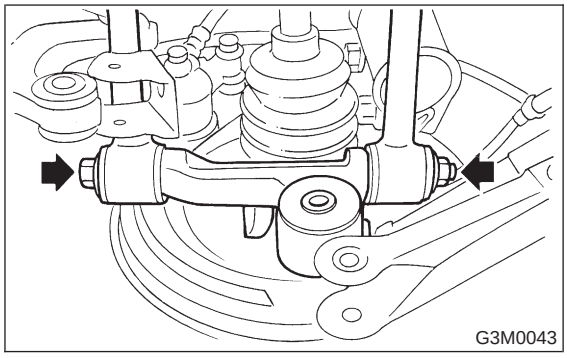
(4) Remove the rear stabilizer link.



(5) Remove the bolts which secure the trailing link to the rear housing.



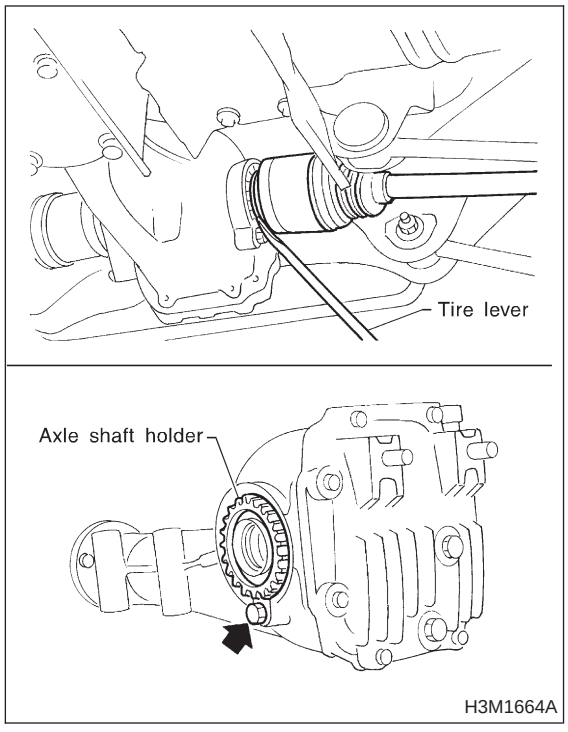
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.



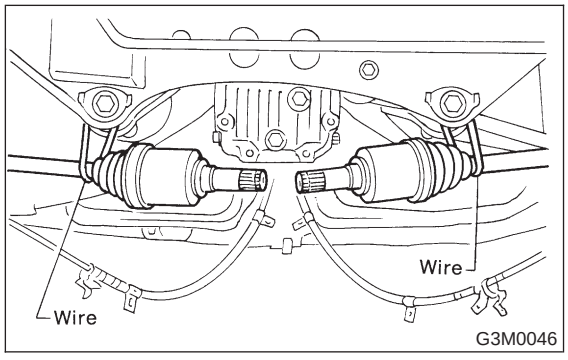
(7) Remove the DOJ from the rear differential with tire lever.

CAUTION:
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.

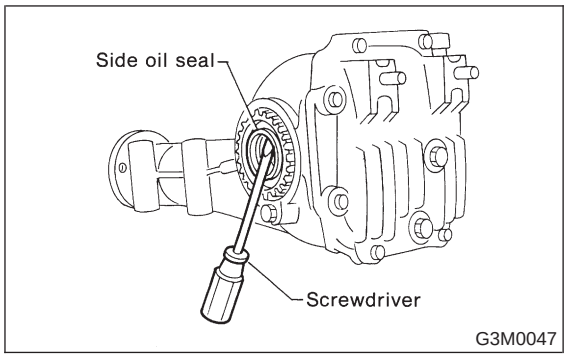
NOTE:
The side spline shaft circlip comes out together with the shaft.



10) Secure rear drive shaft to rear crossmember using wire.



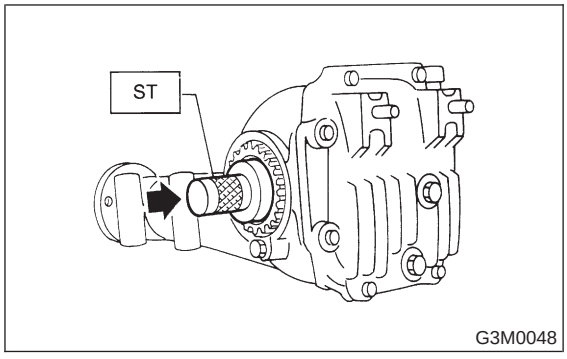
11) Remove oil seal with screwdriver.



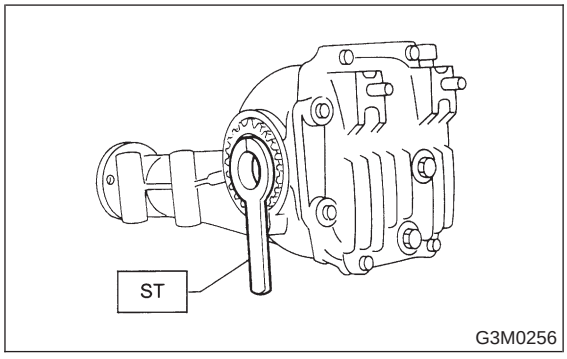
12) Drive in a new side oil seal with ST.

CAUTION:
Apply chassis grease between the oil seal lips.

ST 498447100 OIL SEAL INSTALLER

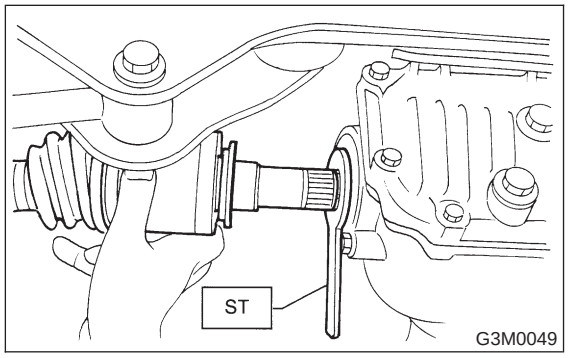


13) Install ST to rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



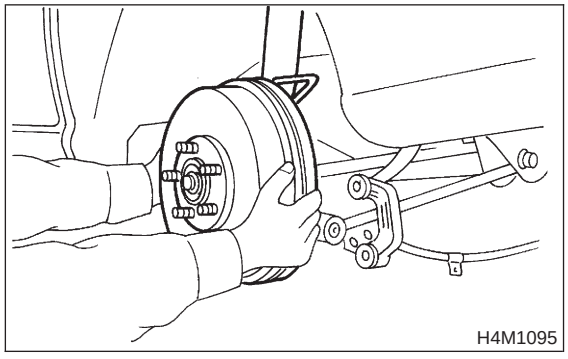
14) Insert the spline shaft until the spline portion is inside the side oil seal.

CAUTION:
Before inserting, replace the circlip at the end of the spline shaft with a new one.



15) Remove ST.
ST 28099PA090 SIDE OIL SEAL PROTECTOR
16) Completely insert DOJ into rear differential by pressing rear housing.

NOTE:
Make sure that oil seal lip is not folded over inward.



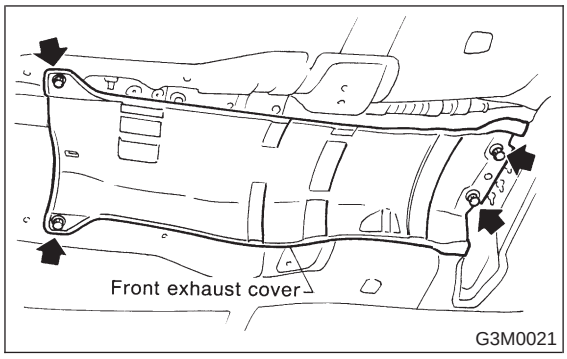
17) Hereafter, re-assemble in reverse order of disassembly.

B: REMOVAL

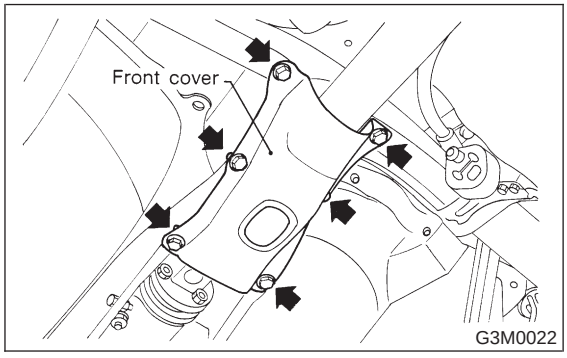
1. T-TYPE

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen wheel nuts.
5) Jack-up vehicle and support it with sturdy racks.
6) Remove wheels.
7) Remove rear exhaust pipe.
<Ref. to 2-9 [W3A0].>
8) Remove muffler.
<Ref. to 2-9 [W4A0].>

9) Remove front exhaust cover.



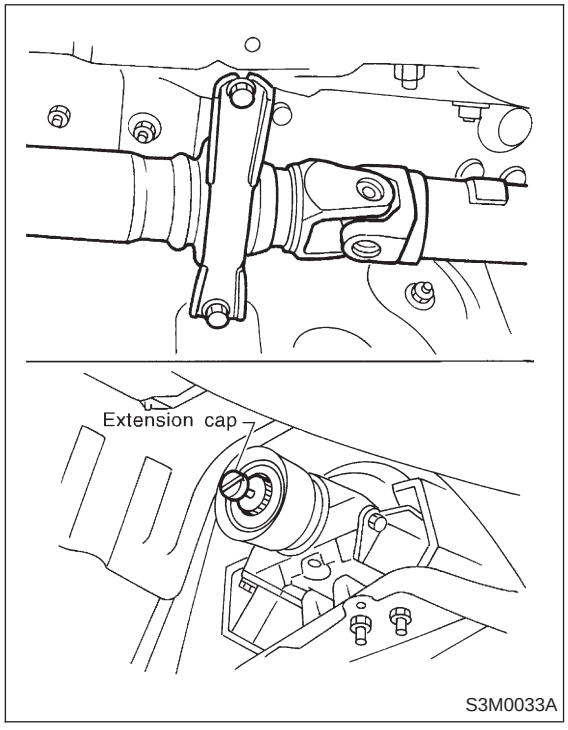
10) Remove front cover of rear differential mount.



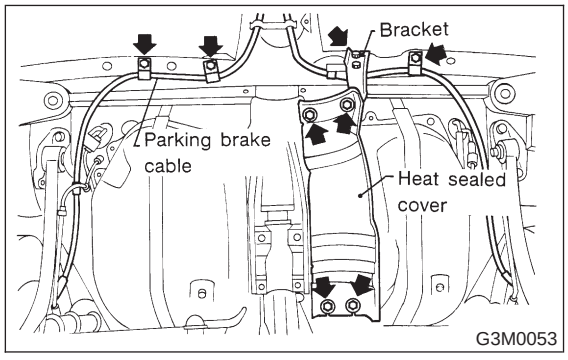
11) Remove propeller shaft.

CAUTION:
When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

NOTE:
● Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.
● Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.

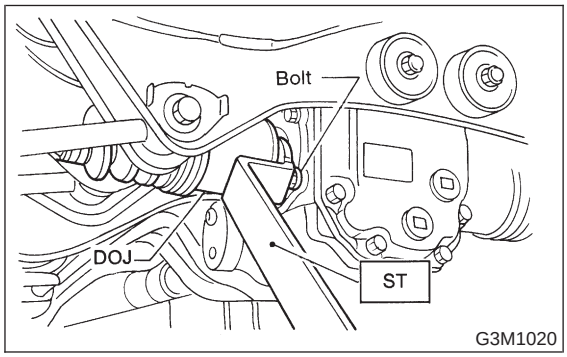


12) Remove heat sealed cover.
13) Remove clamps and bracket of parking brake cable.

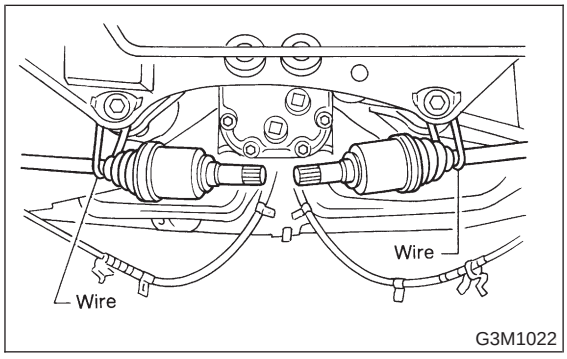


14) Remove crossmember reinforcement lower (Sedan only).

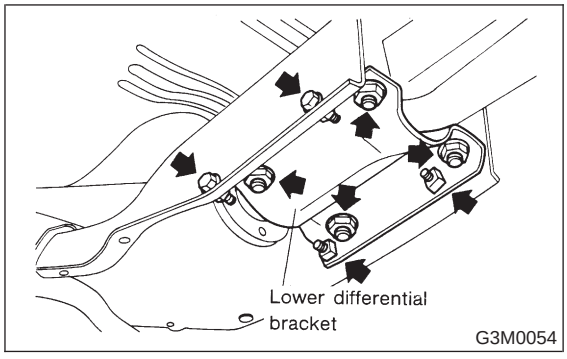
15) Remove DOJ of rear drive shaft from rear differential using ST. <Ref. to 3-4 [W2A2].>
ST 28099PA100 DRIVE SHAFT REMOVER



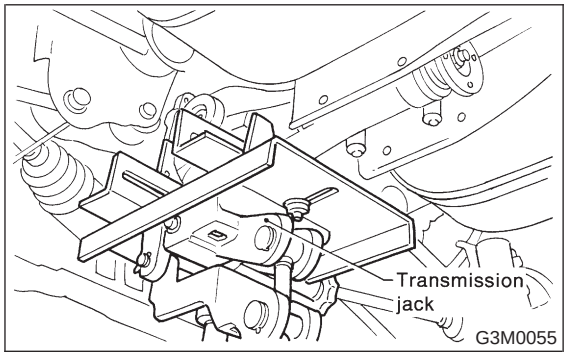
16) Secure rear drive shaft to rear crossmember using wire.



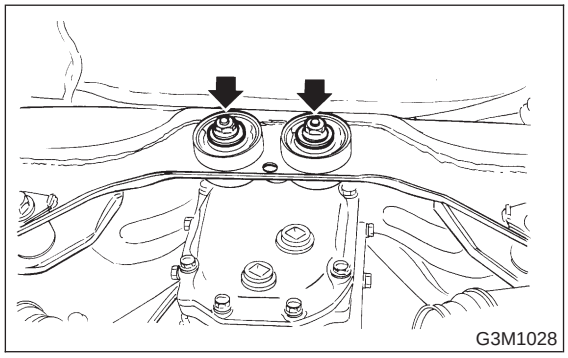
17) Remove lower differential bracket.



18) Support rear differential with transmission jack.

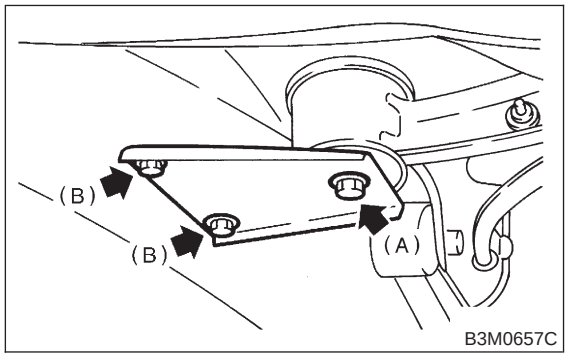


19) Remove self-locking nuts connecting rear differential to rear crossmember.


G3M1028

20) Remove bolts which secure rear differential front member to body. Loosen bolt (A) first, then remove bolts (B).

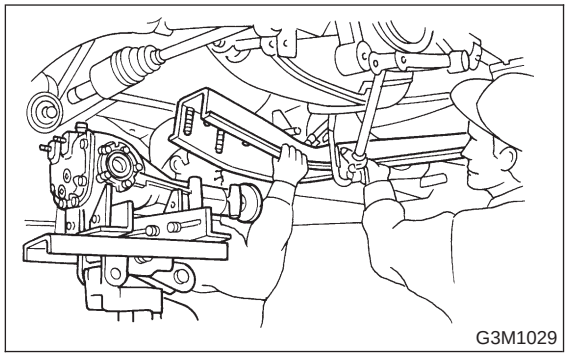
NOTE:
Support front member with the use of a helper to prevent it from dropping.



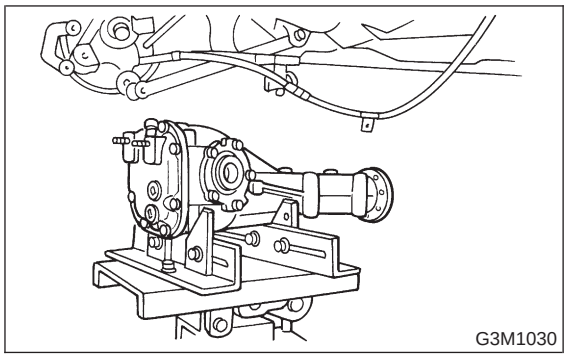
B3M0657C

(A) Bolt A
(B) Bolt B

21) Remove bolt A.
22) While slowly lowering transmission jack, move rear differential forward and remove front member and rear differential from body.

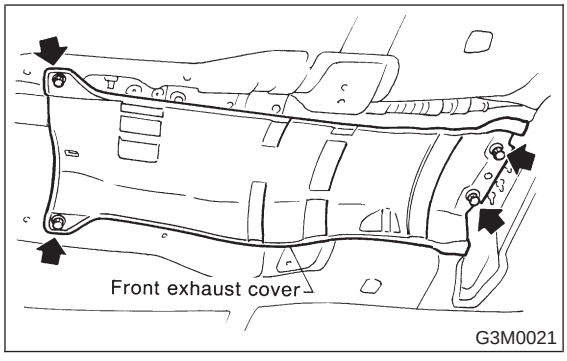

G3M1029

23) Remove rear differential from front member.


G3M1030

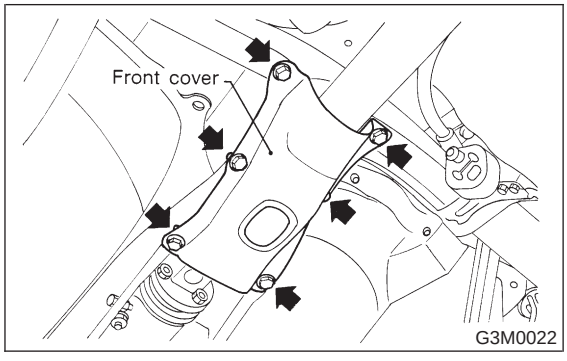
2. VA-TYPE

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen wheel nuts.
5) Jack-up vehicle and support it with sturdy racks.
6) Remove wheels.
7) Remove rear exhaust pipe.
<Ref. to 2-9 [W3A0].>
8) Remove muffler.
<Ref. to 2-9 [W4A0].>
9) Remove front exhaust cover.



G3M0021

10) Remove front cover of rear differential mount.

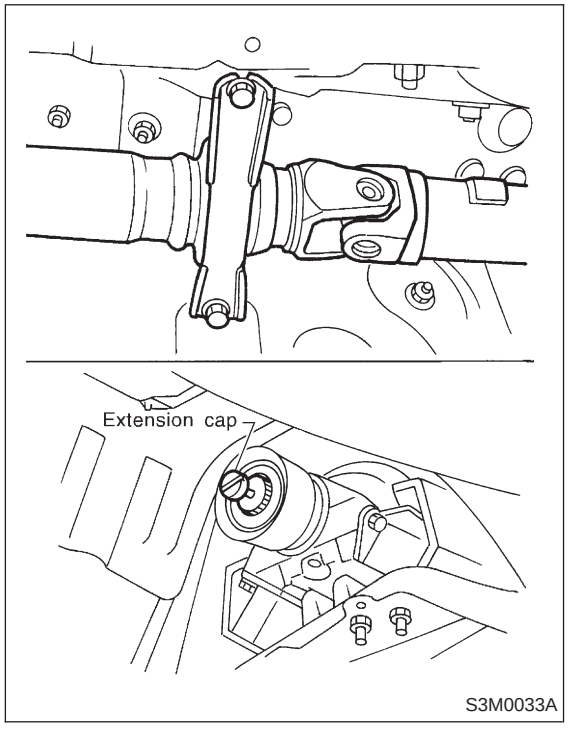


G3M0022

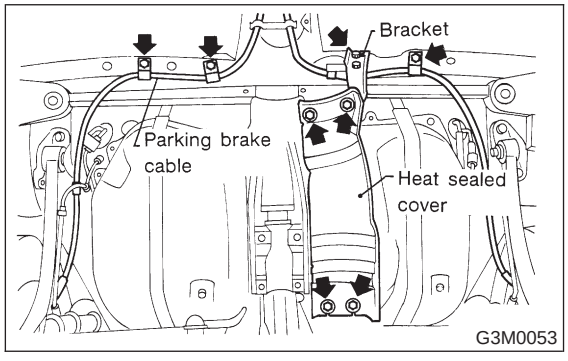
11) Remove propeller shaft.

CAUTION:
When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

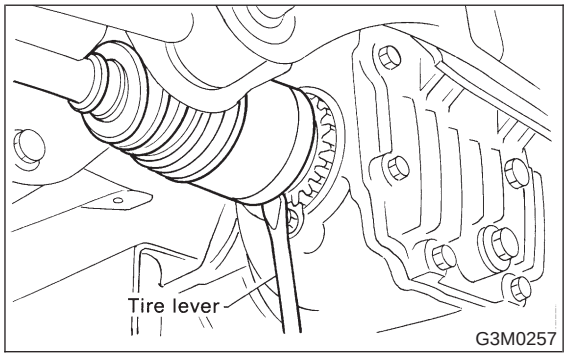
NOTE:
● Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.
● Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.



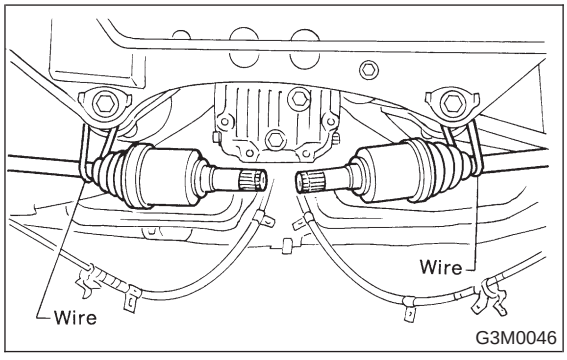
12) Remove heat sealed cover.
13) Remove clamps and bracket of parking brake cable.



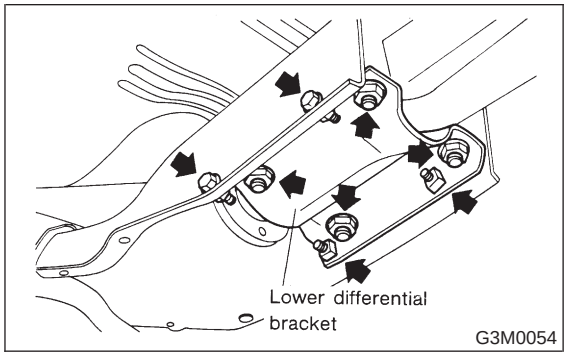
14) Remove DOJ of rear drive shaft from rear differential. <Ref. to 3-4 [W2A3].>



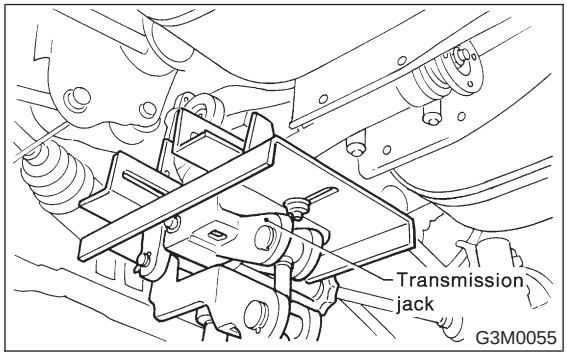
15) Secure rear drive shaft to rear crossmember using wire.



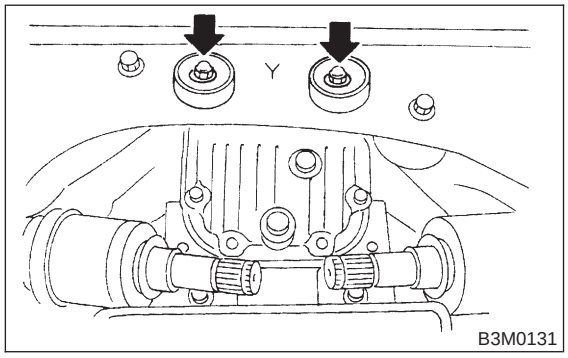
16) Remove lower differential bracket.



17) Support rear differential with transmission jack.

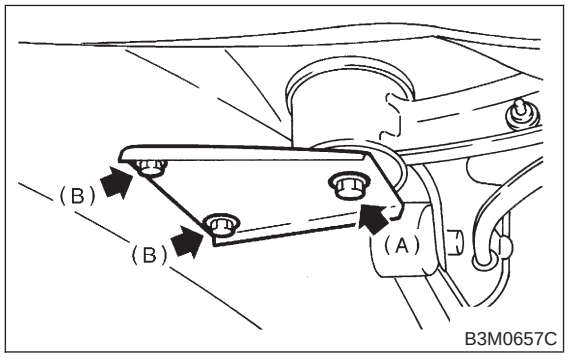


18) Remove self-locking nuts connecting rear differential to rear crossmember.



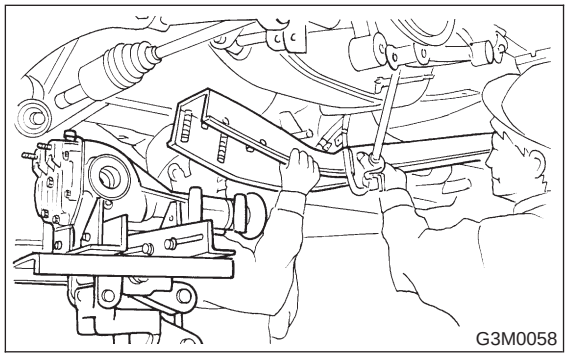
19) Remove bolts which secure rear differential front member to body. Loosen bolt A first, then removal bolts B .

NOTE:
Support front member with the use of a helper to prevent it from dropping.

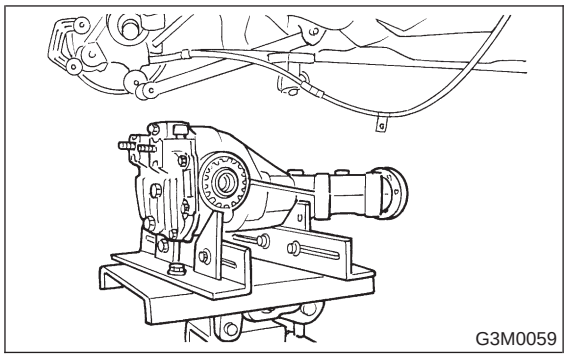


(A) Bolt A
(B) Bolt B

20) Remove bolt A.
21) While slowly lowering transmission jack, move rear differential forward and remove bolts from rear crossmember.
22) Remove front member from body.



23) Remove rear differential from body.

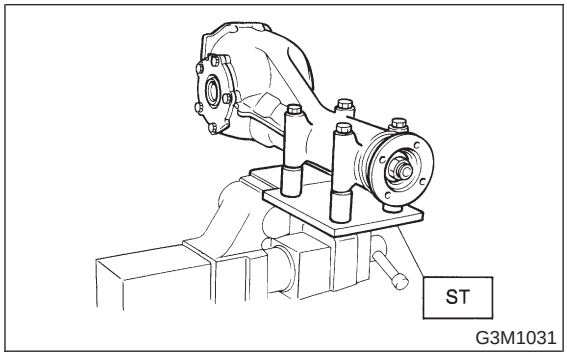


C: DISASSEMBLY

1. T-TYPE

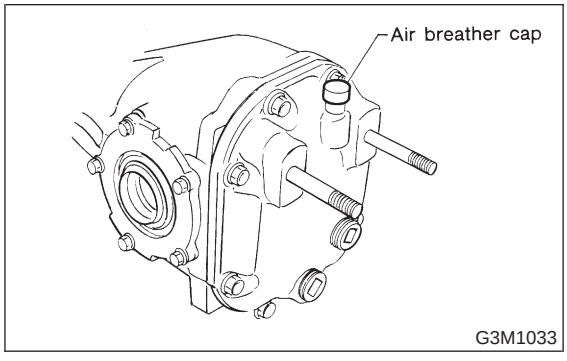
NOTE:
To detect real cause of trouble, inspect the following items before disassembling.
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

1) Set ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT

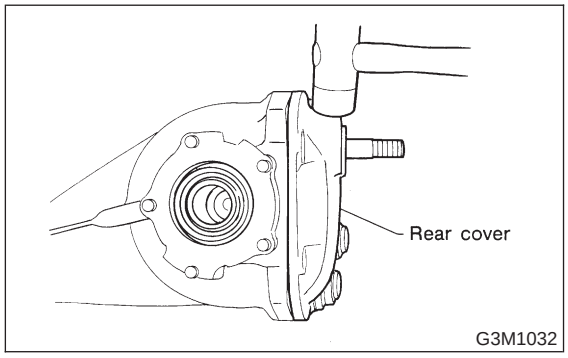


2) Drain gear oil by removing plug.
3) Remove the air breather cap.

NOTE:
Do not attempt to replace the air breather cap unless necessary.



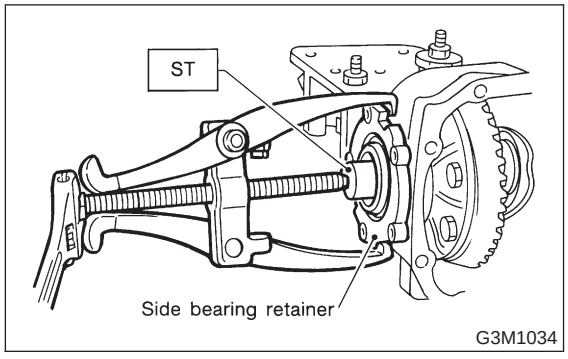
4) Remove rear cover by loosening retaining bolts.



5) Make right and left side bearing retainers in order to identify them at reassembly. Remove side bearing retainer attaching bolts, set ST to differential carrier, and extract right and left side bearing retainers with a puller.

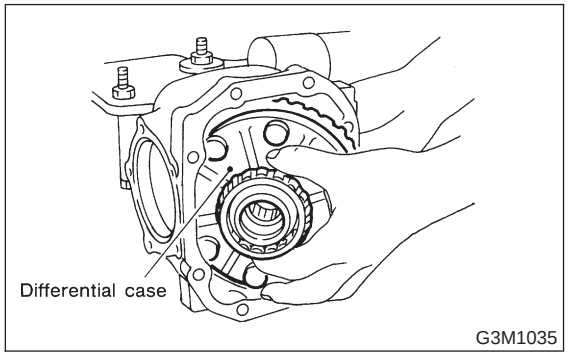
CAUTION:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT

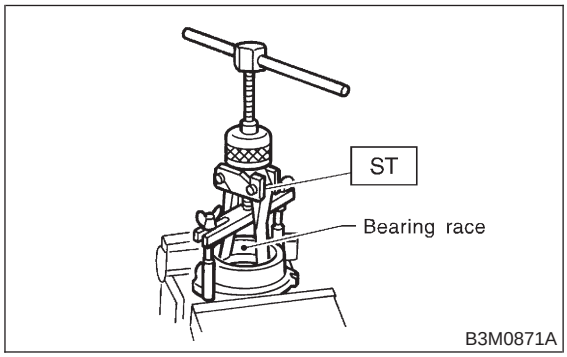


6) Pull out differential assembly from differential carrier.

CAUTION:
Be careful not to hit the teeth against the case.



7) When replacing side bearing, pull bearing race from side bearing retainer using ST.
ST 398527700 PULLER ASSY

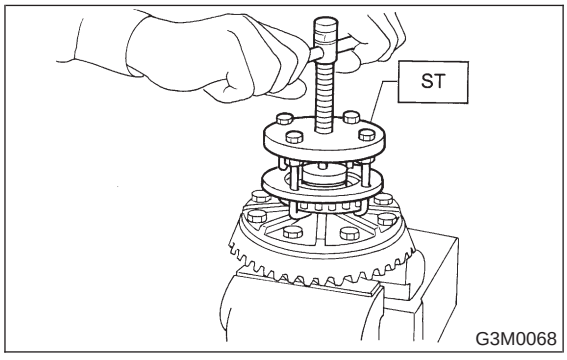


8) Extract bearing cone with ST.

CAUTION:
Do not attempt to disassemble the parts unless necessary.

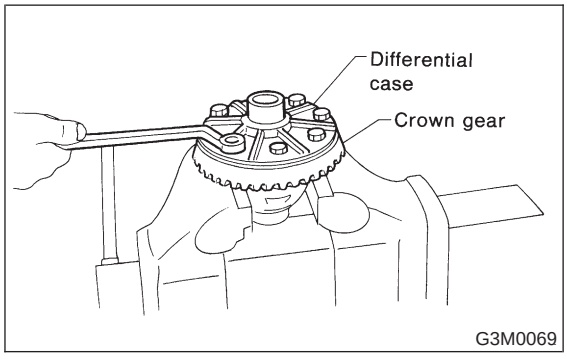
NOTE:
● Set puller so that its claw catch the edge of the bearing cone.
● Never mix up the right and left hand bearing races and cones.

ST 399527700 PULLER SET



9) Remove crown gear by loosening crown gear bolts.

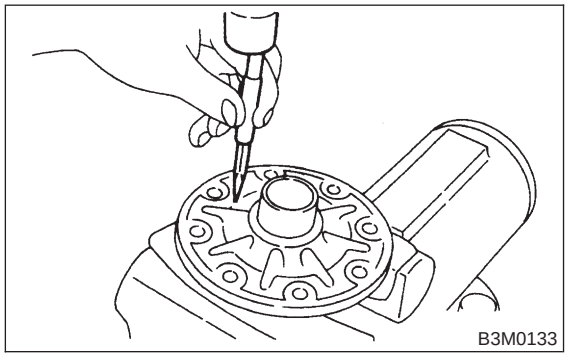
CAUTION:
Further disassembling is not allowed.



10) Drive out pinion shaft lock pin from crown gear side.

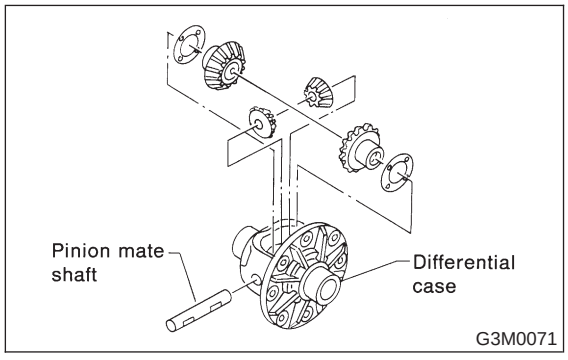
NOTE:
The lock pin is staked at the pin hole end on the differential case; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER

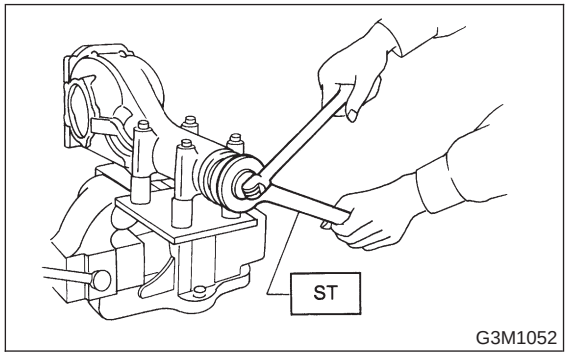


11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

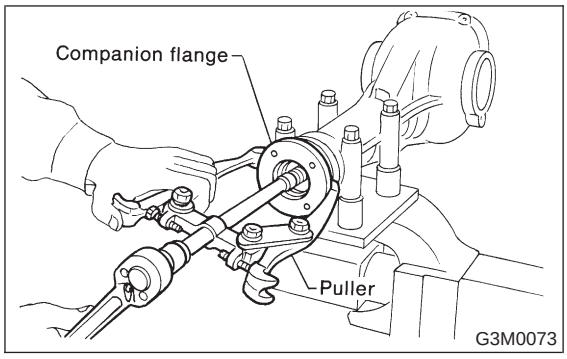
NOTE:
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.



12) Hold companion flange with ST and remove drive pinion nut.
ST 498427200 FLANGE WRENCH



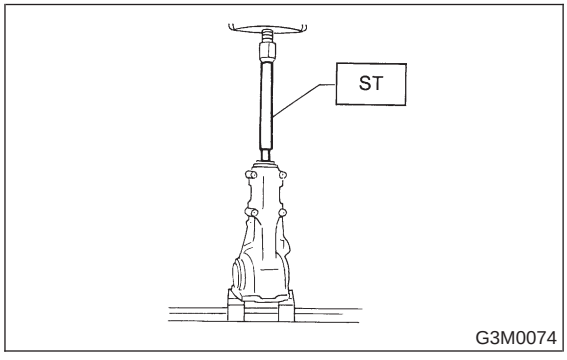
13) Extract the companion flange with a puller.



14) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:
Hold the drive pinion so as not to drop it.

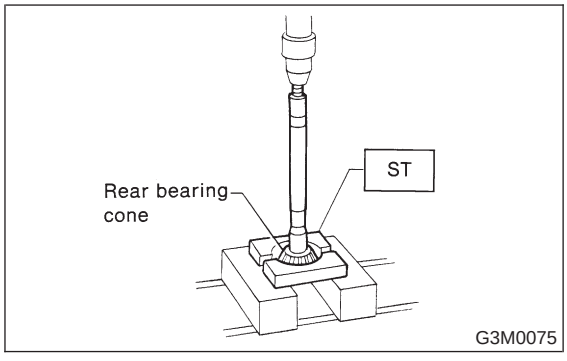
ST 398467700 DRIFT



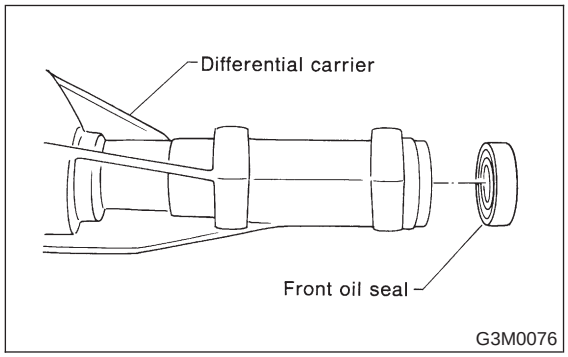
15) Remove rear bearing cone from drive pinion by supporting cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

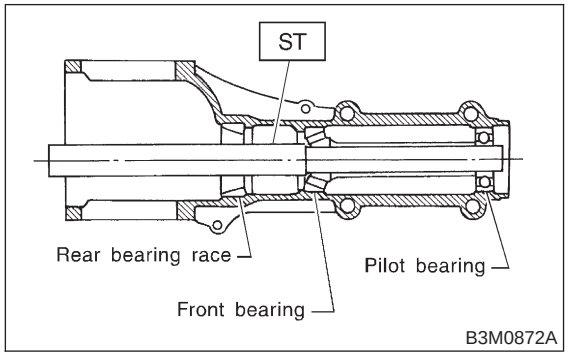
ST 498515500 REPLACER



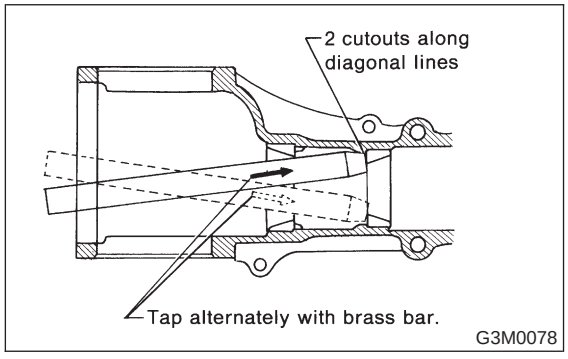
16) Remove front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY



17) Remove pilot bearing together with front bearing cone using ST.
ST 398467700 DRIFT



18) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.

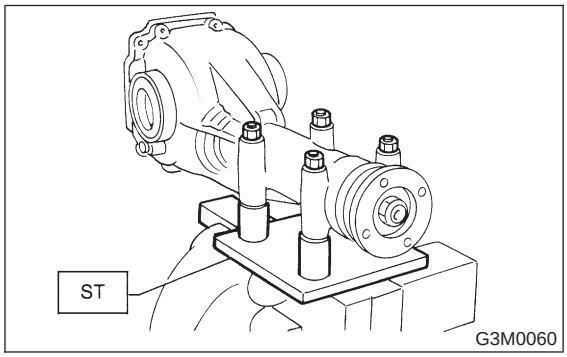


2. VA-TYPE

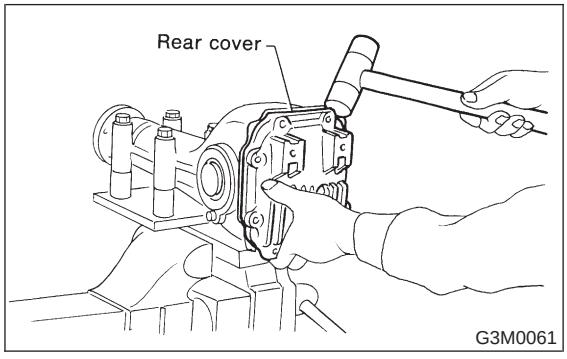
To detect real cause of trouble, inspect the following items before disassembling.

- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

1) Set ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT

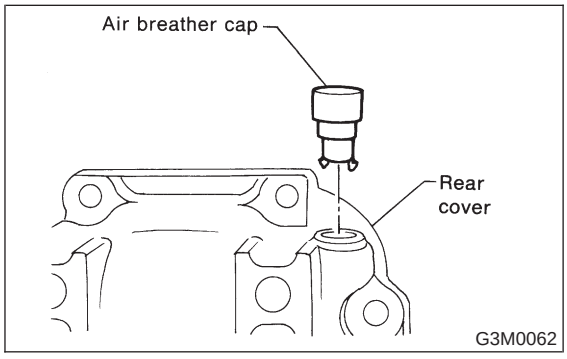


2) Drain gear oil by removing plug.
3) Remove rear cover by loosening retaining bolts.

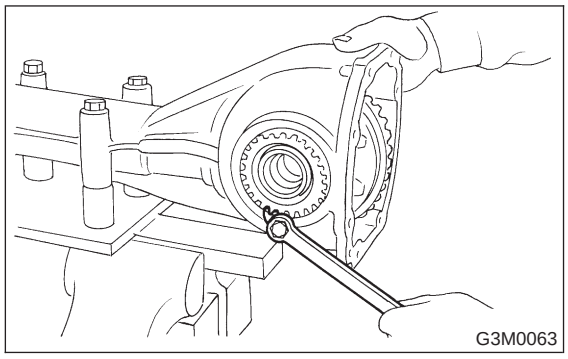


4) Replace air breather cap.

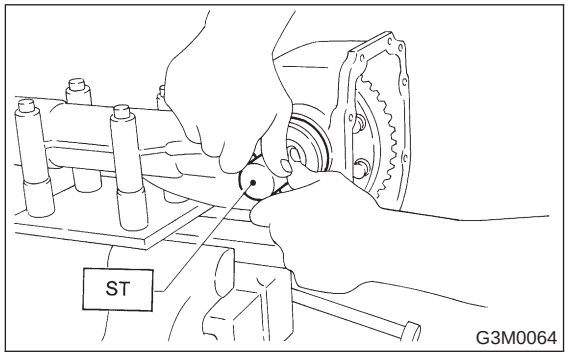
NOTE:
Do not attempt to replace the air breather cap unless necessary.



5) Remove right and left lock plates.

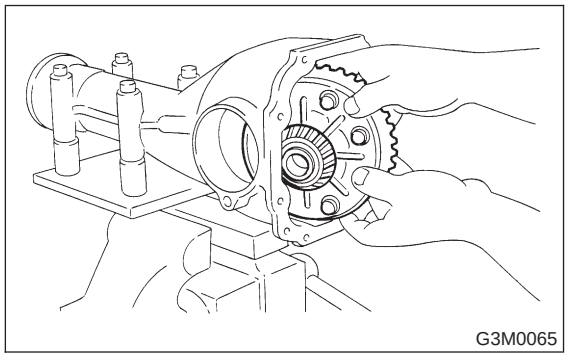


6) Remove right and left holders with ST.
ST 399780111 WRENCH

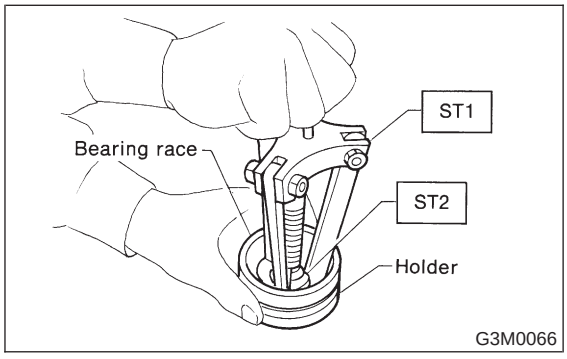


7) Pull out differential assembly from differential carrier.

CAUTION:
Be careful not to hit the teeth against the case.

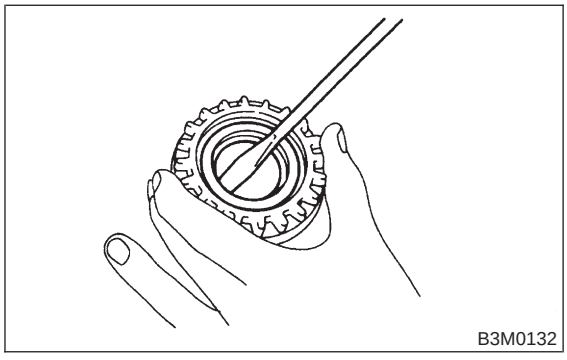


8) Remove bearing race from right and left holders with ST1 and ST2.
ST1 499705401 BEARING OUTER RACE PULLER ASSY
ST2 499705404 OUTER RACE PULLER SEAT



9) Remove oil seal from right and left holders with screwdriver.

CAUTION:
Perform this operation only when changing oil seal.

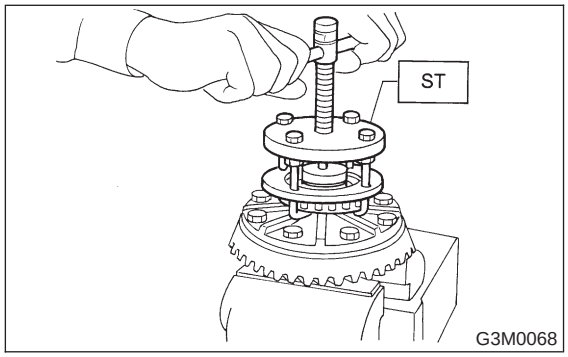


10) Extract bearing cone with ST.

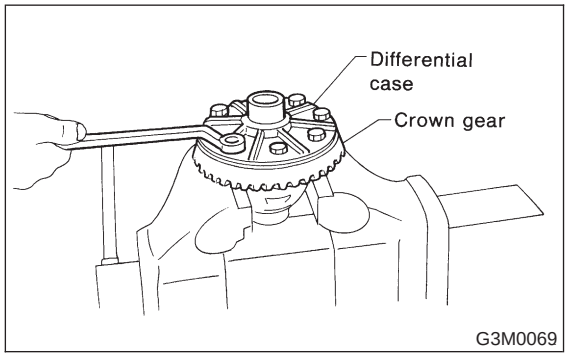
CAUTION:
Do not attempt to disassemble the parts unless necessary.

NOTE:
● Set Puller so that its claws catch the edge of the bearing cone.
● Never mix up the right and left hand bearing cones.

ST 899524100 PULLER SET



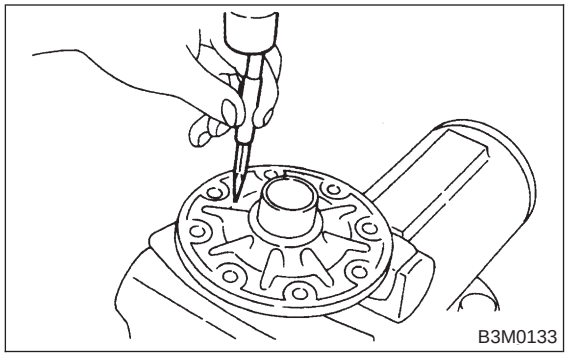
11) Remove crown gear by loosening crown gear bolts.



12) Drive out pinion shaft lock pin from crown gear side.

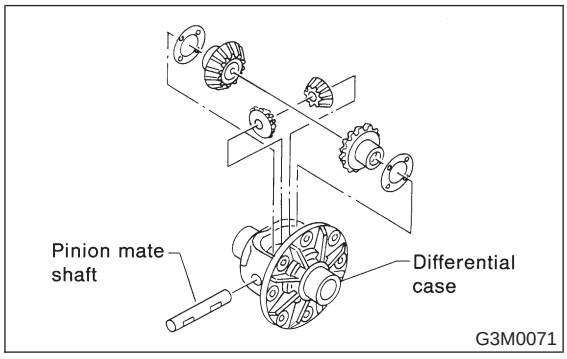
NOTE:
The lock pin is staked at the pin hole end on the differential case; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER

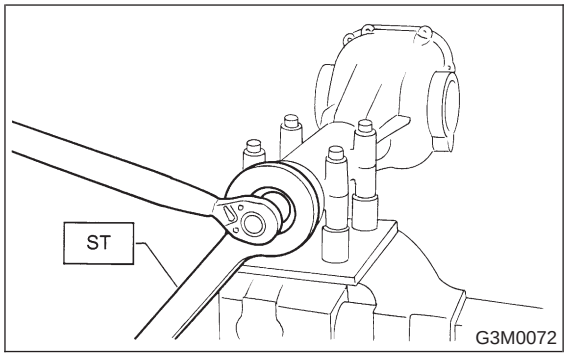


13) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

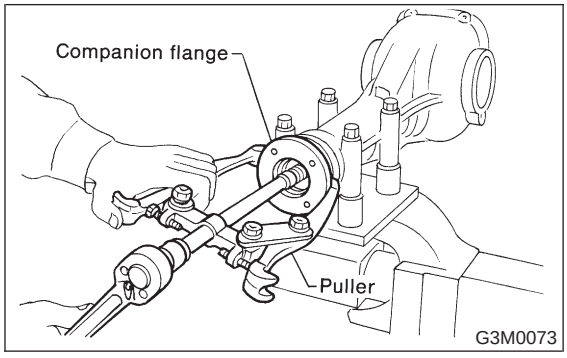
NOTE:
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.



14) Hold companion flange with ST and remove drive pinion nut.
ST 498427200 FLANGE WRENCH



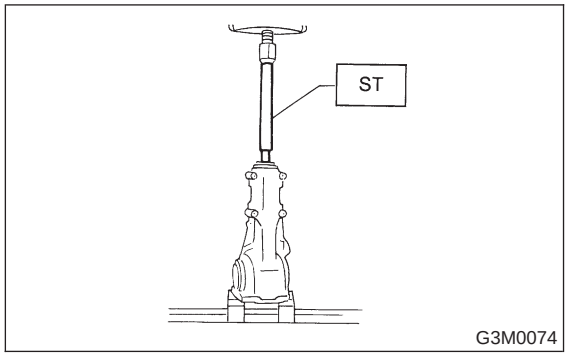
15) Extract the companion flange with a puller.



16) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:
Hold the drive pinion so as not to drop it.

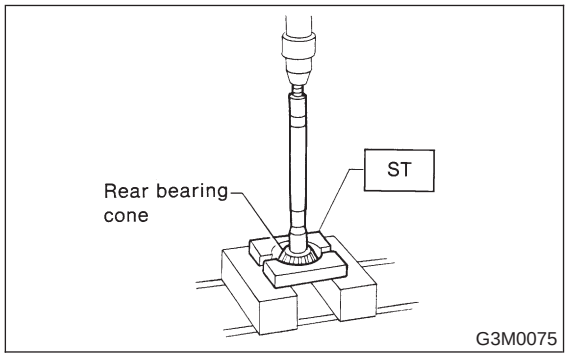
ST 398467700 DRIFT



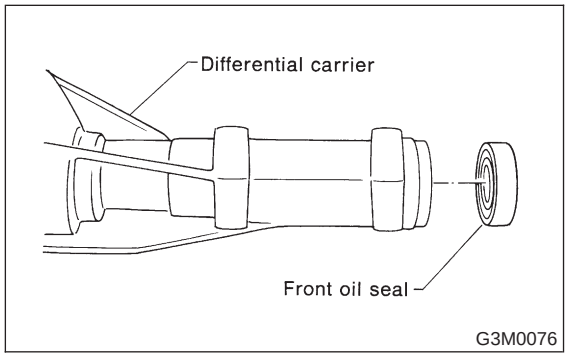
17) Remove rear bearing cone from drive pinion by supporting cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

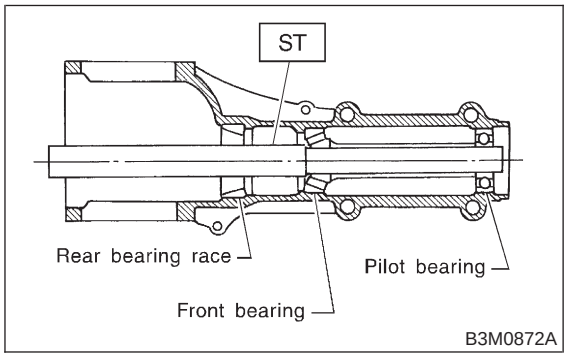
ST 498515500 REPLACER



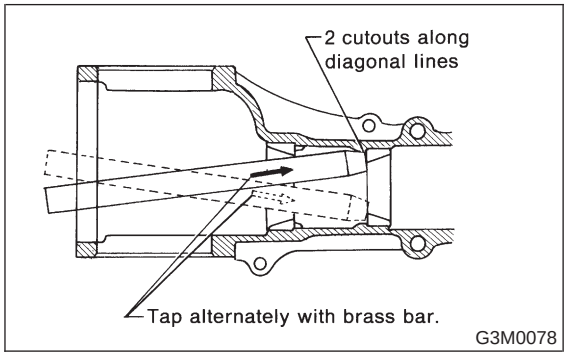
18) Remove front oil seal from differential carrier.
ST 499705401 PULLER ASSY



19) Remove pilot bearing together with front bearing cone using ST.
ST 398467700 DRIFT



20) When replacing bearings, tap front bearing race and rear bearing race in this order out of case by using a brass bar.



D: INSPECTION

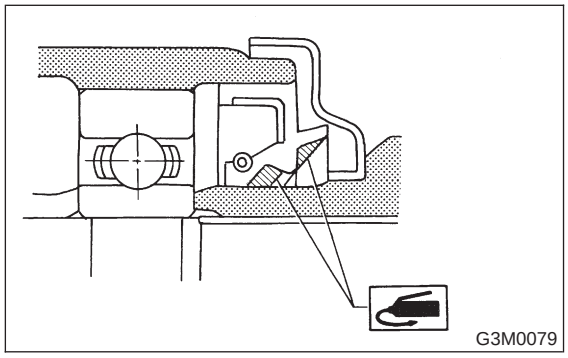
Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.
1) Crown gear and drive pinion
● If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.
● If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.
2) Side gear and pinion mate gear
● Replace if crack, score, or other defects are evident on tooth surface.
● Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.
3) Bearing
Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.
4) Thrust washers of side gear and pinion mate gear Replace if seizure, flaw, abnormal wear or other defect is evident.
5) Oil seal

Replace if deformed or damaged, and at every disassembling.
6) Differential carrier
Replace if the bearing bores are worn or damaged.
7) Differential case
Replace if its sliding surfaces are worn or cracked.
8) Companion flange
Replace if the oil seal lip contacting surfaces have flaws.

E: ASSEMBLY

1. T-TYPE

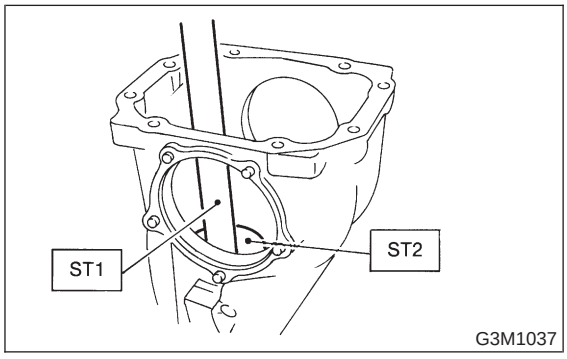
1) Precautions for assembling
- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- Keep the shims and washers in order, so that they are not misinstalled.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil when installing the bearings and thrust washers.
- Be careful not to mix up the right and left hand races of the bearings.
- Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.


G3M0079

2) Adjusting preload for front and rear bearings
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washers are not affected by this adjustment. The adjustment must be carried out without the oil seal inserted.

(1) Press rear bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 398427703 DRIFT 2



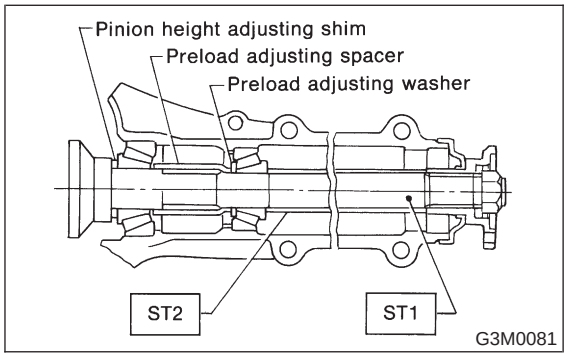
G3M1037

(2) Insert ST1 into carrier with pinion height adjusting washer and rear bearing cone fitted onto it.

CAUTION:
- **Re-use the used washer if not deformed.**
- **Use a new rear bearing cone.**

(3) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



G3M0081

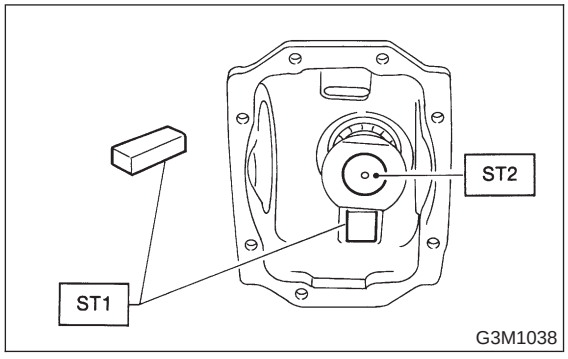
(4) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST2.

ST1 398507704 BLOCK
ST2 398507702 DUMMY SHAFT

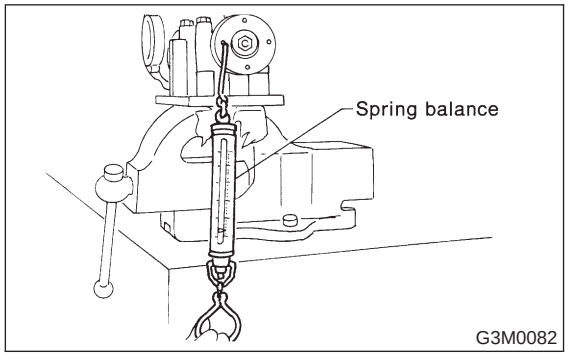
CAUTION:
Use a new lock nut.

NOTE:
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.

Tightening torque:
181±15 N·m (18.5±1.5 kg-m, 134±11 ft-lb)



Front and rear bearing preload
For new bearing: 17.7 — 25.5 N (1.8 — 2.6 kg, 4.0 — 5.7 lb) at companion flange bolt hole



	Part No.	Thickness mm (in)
Preload adjusting washer	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
	Part No.	Length mm (in)
Preload adjusting spacer	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

3) Adjusting drive pinion height
Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

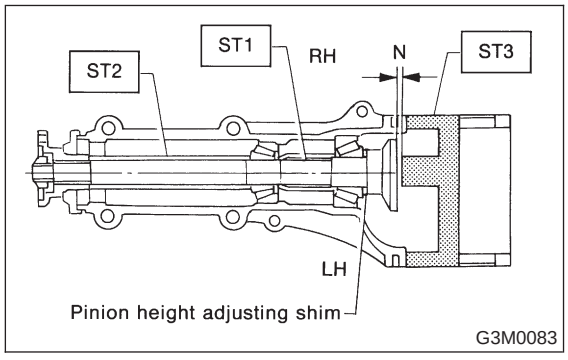
(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

Front and rear bearing preload
For new bearing: 17.7 — 25.5 N (1.8 — 2.6 kg, 4.0 — 5.7 lb) at companion flange bolt hole

Adjust preload for front and rear bearings.

NOTE:
At this time, install a pinion height adjusting shim which is temporarily selected or the same as that used before.

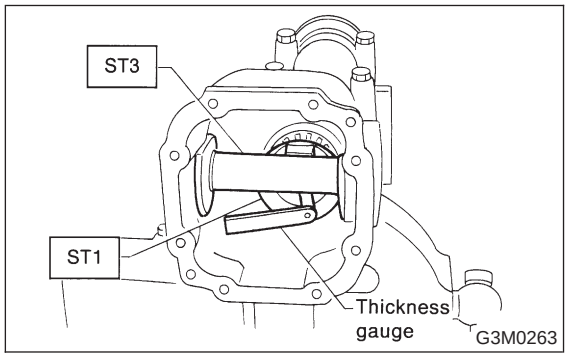
ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR
ST3 398507701 DIFFERENTIAL CARRIER GAUGE



(2) Measure the clearance “N” between the end of ST3 and the end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the carrier and ST3.

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR
ST3 398507701 DIFFERENTIAL CARRIER GAUGE



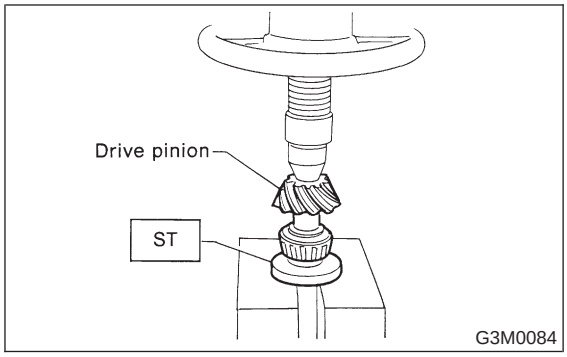
(3) Obtain the thickness of pinion height adjusting shim to be inserted from the following formula, and replace the temporarily installed shim with this one.

$T = To + N - (H \times 0.01) - 0.20$ (mm)

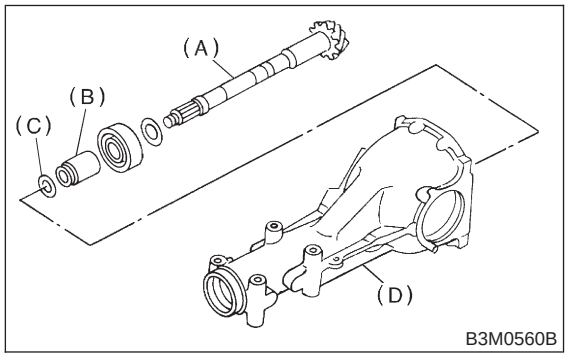
Where:
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim temporarily inserted (mm)
N = Reading of thickness gauge (mm)
H = Figure marked on drive pinion head
(Example of calculation)
To = 2.20 + 1.20 = 3.40 mm
N = 0.23 mm H = + 1,
T = 3.40 + 0.23 − 0.01 − 0.20 = 3.42
Result: Thickness = 3.42 mm
Therefore use the shim 383605200.

Pinion height adjusting shim	
Part No.	Thickness mm (in)
383495200	3.09 (0.1217)
383505200	3.12 (0.1228)
383515200	3.15 (0.1240)
383525200	3.18 (0.1252)
383535200	3.21 (0.1264)
383545200	3.24 (0.1276)
383555200	3.27 (0.1287)
383565200	3.30 (0.1299)
383575200	3.33 (0.1311)
383585200	3.36 (0.1323)
383595200	3.39 (0.1335)
383605200	3.42 (0.1346)
383615200	3.45 (0.1358)
383625200	3.48 (0.1370)
383635200	3.51 (0.1382)
383645200	3.54 (0.1394)
383655200	3.57 (0.1406)
383665200	3.60 (0.1417)
383675200	3.63 (0.1429)
383685200	3.66 (0.1441)

4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.
ST 398177700 INSTALLER

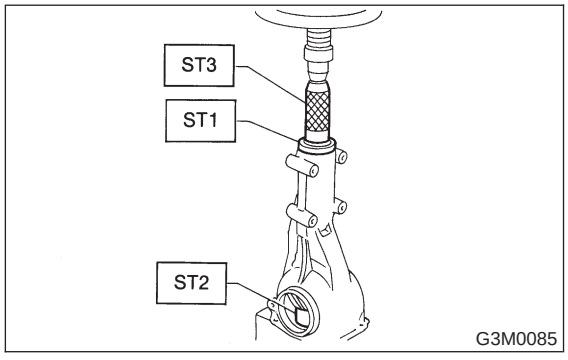


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

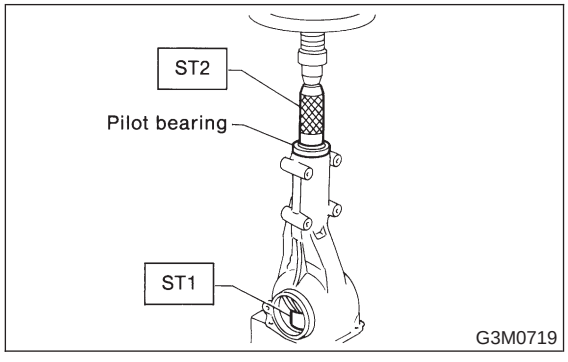


(A) Drive pinion
(B) Bearing preload adjusting spacer
(C) Washer
(D) Differential carrier

6) Press-fit front bearing cone into case with ST1, ST2 and ST3.
ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



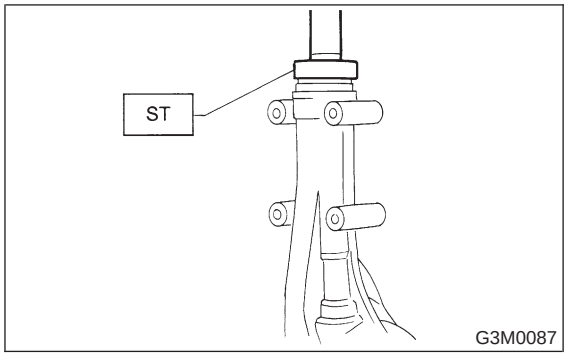
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



8) Fit a new oil seal with ST.

NOTE:
● Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
● Apply grease between the oil seal lips.

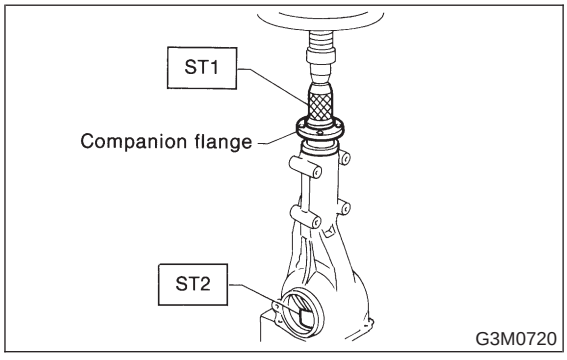
ST 498447120 OIL SEAL INSTALLER



9) Press-fit companion flange with ST1 and ST2.

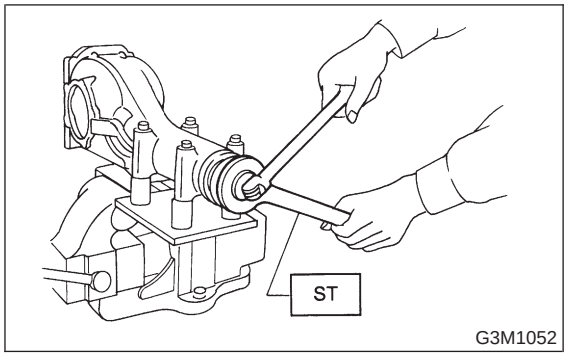
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



10) Install self-locking nut. Then tighten it with ST.
ST 498427200 FLANGE WRENCH

Tightening torque:
181±15 N·m (18.5±1.5 kg-m, 134±11 ft-lb)



11) Assembly of differential case
12) Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

CAUTION:
● Apply gear oil on both sides of the washer and on the side gear shaft before installing.
● Insert the pinion mate shaft into the differential case by aligning the lock pin holes.

(1) Measure the clearance between differential case and the back of side gear.
(2) Adjust the clearance as specified by selecting side gear thrust washer.

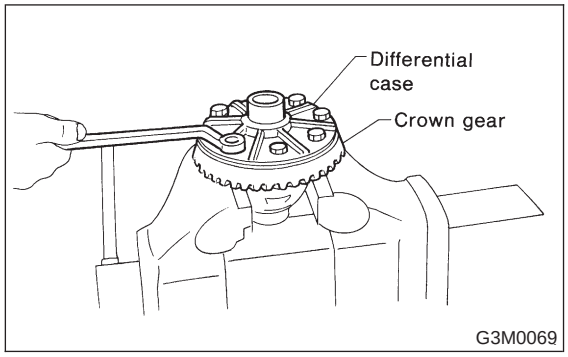
Side gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)

(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After driving in pinion shaft lock pin, stake the both sides of the hole to prevent pin from falling off.
(5) Install crown gear on differential case.

NOTE:
Tighten diagonally while tapping the bolt heads.

Tightening torque:
103±10 N·m (10.5±1.0 kg-m, 76±7 ft-lb)

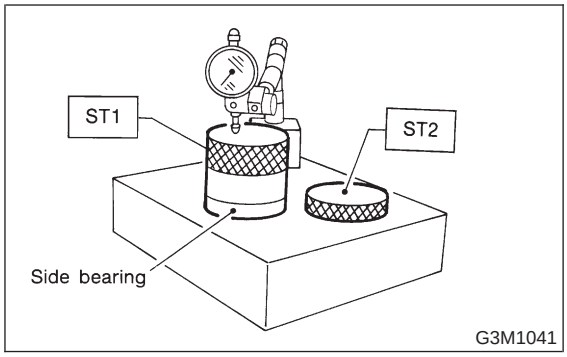


13) Before installing side bearing, measure the bearing width by using a dial gauge, ST1 and ST2.

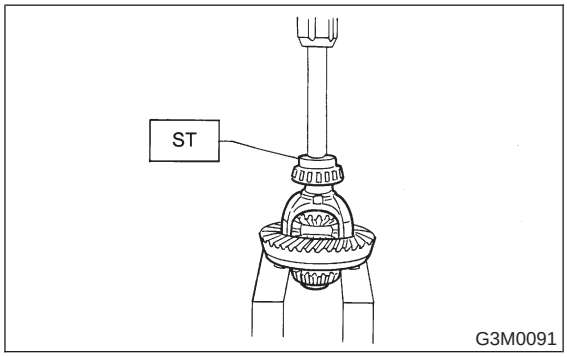
NOTE:
Set the dial gauge needle to zero, using a standard bearing or block of specified height in advance.

ST1 398227700 WEIGHT
ST2 398237700 GAUGE

Standard bearing width:
20.00 mm (0.7874 in)



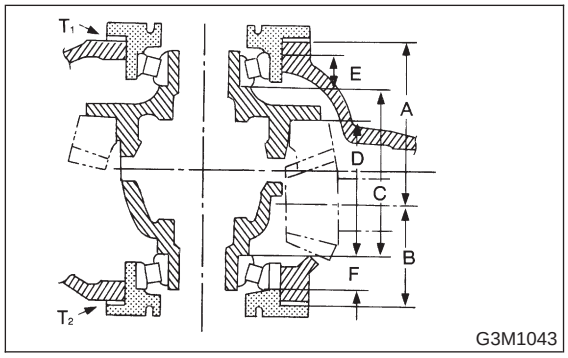
14) Press side bearing cone onto differential case with ST1.
ST1 398487700 DRIFT



15) Adjusting side bearing retainer shims
(1) The drive gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.
(2) When replacing differential case, differential carrier, side bearing and side bearing retainer, obtain the right and left retainer shim thickness from the following formulas.
When replacing differential case, differential carrier, side bearing and side bearing retainer, obtain the right and left retainer shim thickness from the following formulas.

T_1 (Left) = (A + C + G_1 − D) × 0.01 + 0.76 − E (mm)

T_2 (Right) = (B + D + G_2) × 0.01 + 0.76 − F (mm)



T_1 & T_2: Thickness of left and right side bearing retainer shim (mm)

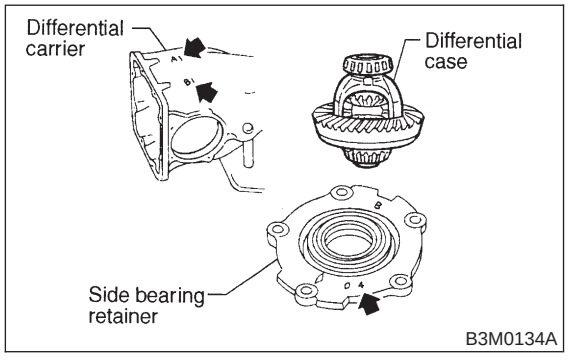
A & B: Number marked on differential carrier

C & D: Number marked on differential case

E & F: Difference of width of left and right side bearing from standard width 20.0 mm, expressed in a unit of 0.01 mm. For example, if the bearing measured width is 19.89 mm, value of E or F is as follows. 20.00 −19.89 = 0.11 (E or F)

G_1 & G_2: Number marked on side bearing retainer

If a number is not marked, regard it as zero.



NOTE:
Use several shims to obtain the calculated thickness.

Side bearing retainer shim	
Part No.	Thickness mm (in)
383475201	0.20 (0.0079)
383475202	0.25 (0.0098)
383475203	0.30 (0.0118)
383475204	0.40 (0.0157)
383475205	0.50 (0.0197)

Example of calculation

Ex. 1

A = 5, B = 5, C = 3, D = 3, G_1 = 4, G_2 = 1, E = 0.10 mm, F = 0.15 mm

Left side

$T_1 = (A + C + G_1 - D) \times 0.01 + 0.76 - E$
$= (5 + 3 + 4 - 3) \times 0.01 + 0.76 - 0.10$
$= 0.09 + 0.76 - 0.10 = 0.75$ mm

The correct shims are as follows:

Thickness		Q'ty		
0.25	×	1	=	0.25
0.50	×	1	=	0.50
Total shim thickness			=	0.75 mm

Right side

$T_2 = (B + D + G_2) \times 0.01 + 0.76 - F$
$= (5 + 3 + 1) \times 0.01 + 0.76 - 0.15$
$= 0.09 + 0.76 - 0.15$
$= 0.70$ mm

The correct shims are as follows:

Thickness		Q'ty		
0.20	×	1	=	0.20
0.50	×	1	=	0.50
Total shim thickness			=	0.70 mm

Ex. 2

A = 2, B = 3, C = 0, D = 3, G_1 = 2, G_2 = 3, E = 0.22 mm, F = 0.10 mm

Left side

$T_1 = (A + C + G_1 - D) \times 0.01 + 0.76 - E$
$= (2 + 0 + 2 - 3) \times 0.01 + 0.76 - 0.22$
$= 0.01 + 0.76 - 0.22$
$= 0.55$ mm

The correct shims are as follows:

Thickness		Q'ty		
0.25	×	1	=	0.25
0.30	×	1	=	0.30
Total shim thickness			=	0.55 mm

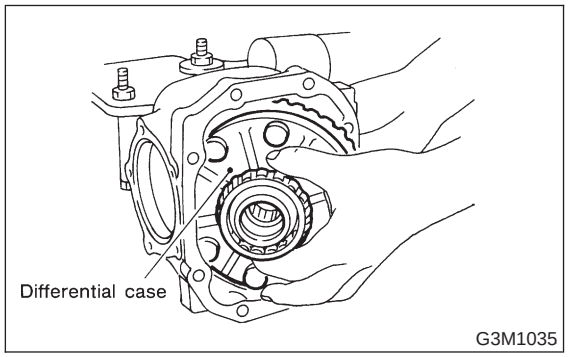
Right side

$T_2 = (B + D + G_2) \times 0.01 + 0.76 - F$
$= (3 + 3 + 3) \times 0.01 + 0.76 - 0.10$
$= 0.09 + 0.76 - 0.10$
$= 0.75$ mm

The correct shims are as follows:

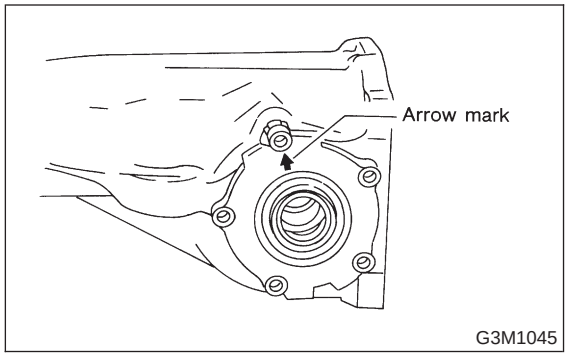
Thickness		Q'ty		
0.25	×	1	=	0.25
0.50	×	1	=	0.50
Total shim thickness			=	0.75 mm

(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.



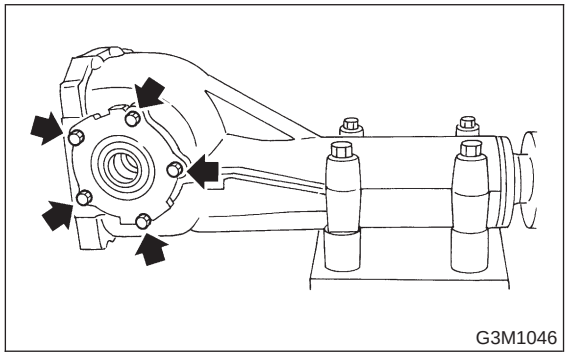
(4) Fit the selected shims and O-ring on side bearing retainer and install them on differential carrier with the arrow mark on the retainer directed as shown in figure.

CAUTION:
Be careful that side bearing cup is not damaged by bearing roller.



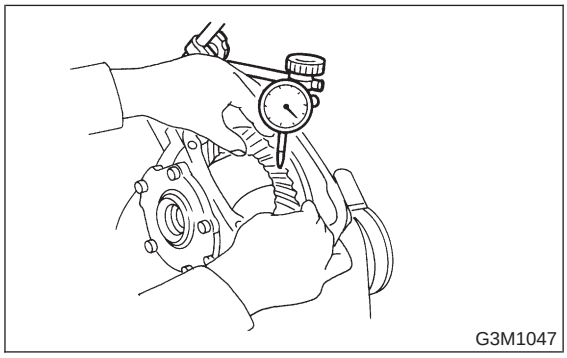
(5) Tighten side bearing retainer bolts.

Tightening torque:
10.3±1.5 N·m (1.05±0.15 kg-m, 7.6±1.1 ft-lb)



(6) Measure the crown gear-to-drive pinion backlash.
Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



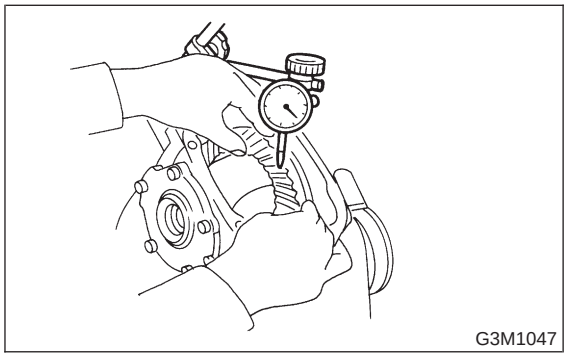
(7) At the same time, measure the turning resistance of drive pinion. Compared with the resistance when differential case is not installed, if the increase of the resistance is not within the specified range, readjust side bearing retainer shims.

NOTE:
If measured backlash is not within specified range, repeat procedure for adjustment of side bearing retainer shims.

Turning resistance increase:
0.1 — 0.6 N·m (1 — 6 kg-cm, 0.9 — 5.2 in-lb)

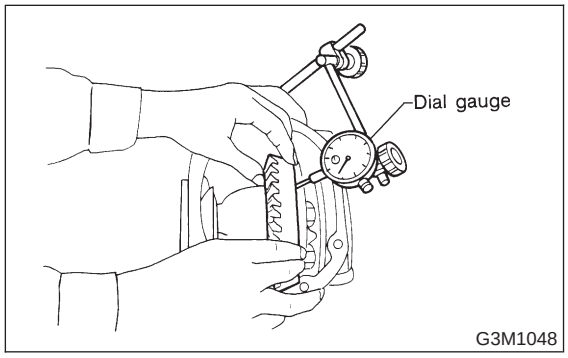
16) Re-check crown gear-to-pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



17) Check the crown gear runout on its back surface, and make sure pinion and crown gear rotate smoothly.

Limit of runout:
0.05 mm (0.0020 in)

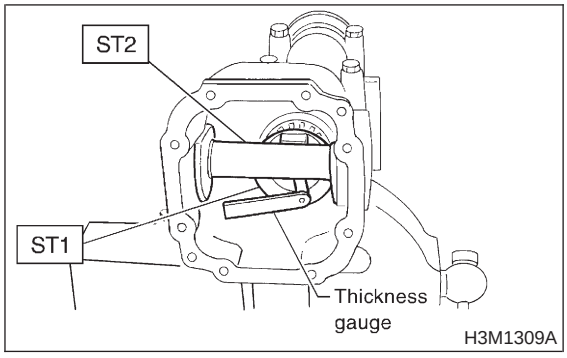


18) Checking and adjusting tooth contact of crown gear
(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.
(2) When the contact pattern is incorrect, readjust according to the instructions given in "TOOTH CONTACT PATTERN".

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

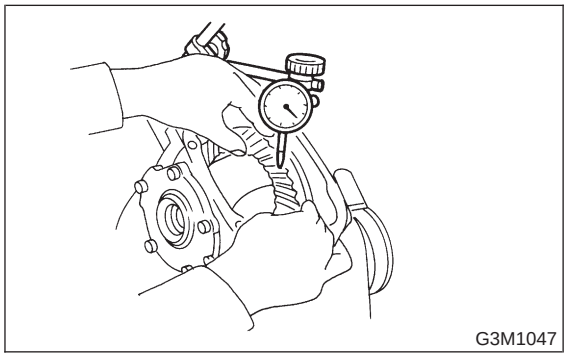
19) If proper tooth contact is not obtained, once again adjust the drive pinion height, changing RH and LH side bearing retainer shims and the hypoid gear backlash.

(1) Drive pinion height
ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE
T = To + N − (H x 0.01) − 0.20 (mm)
Where:
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim temporarily inserted (mm)
N = Reading of thickness gauge (mm)
H = Figure marked on drive pinion head

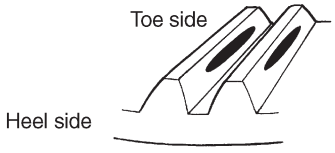
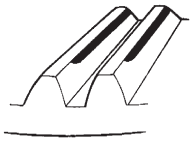
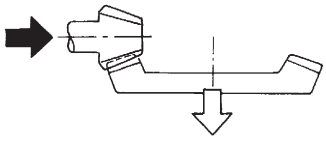
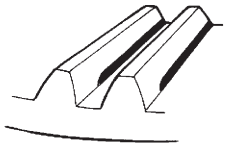
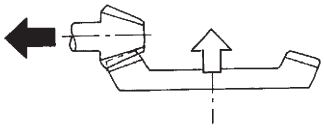
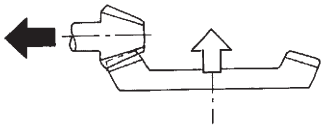
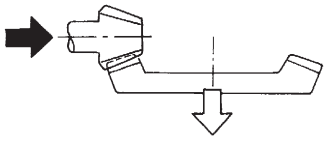


(2) Hypoid gear backlash

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)

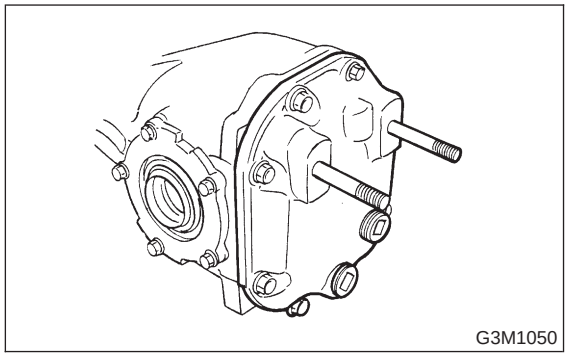


➡ : Adjusting direction of drive pinion
⇨ : Adjusting direction of crown gear

TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 B3M0317A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  B3M0319	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion closer to crown gear center.  B3M0323
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  B3M0320	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  B3M0324
Toe contact Contact area is small.	This may cause chipping at toe ends.  B3M0321	Adjust as for flank contact.  B3M0324
Heel contact Contact area is small.	This may cause chipping at heel ends.  B3M0322	Adjust as for face contact.  B3M0323

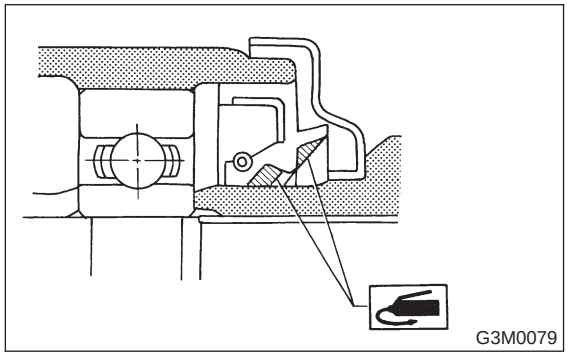
20) Install rear cover and tighten bolts to specified torque.

Tightening torque:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)



2. VA-TYPE

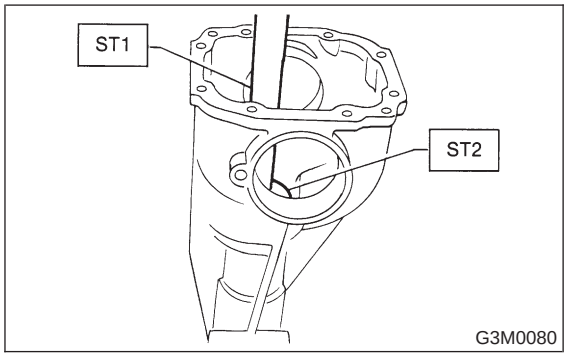
1) Precautions for assembling
- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- Keep the shims and washers in order, so that they are not misinstalled.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil when installing the bearings and thrust washers.
- Be careful not to mix up the right and left hand races of the bearings.
- Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.



2) Adjust preload for front and rear bearings.
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

(1) Press rear bearing race into differential carrier with ST1 and ST2.
ST1 398477701 HANDLE
ST2 398477702 DRIFT

(2) Press front bearing race into differential carrier with ST1 and ST2.
ST1 398477701 HANDLE
ST2 498447110 BEARING OUTER RACE DRIFT



(3) Insert front bearing cone.

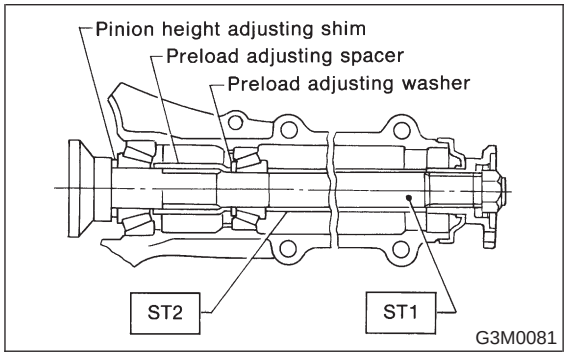
CAUTION:
Use a new front bearing cone.

(4) Insert ST into carrier with pinion height adjusting shim and rear bearing cone fitted onto it.

CAUTION:
- **Re-use the used washer if not deformed.**
- **Use a new rear bearing cone.**

ST 498447150 DUMMY SHAFT

(5) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.
ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR



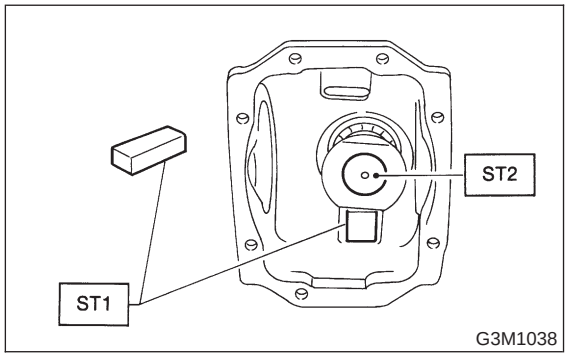
(6) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST2.

CAUTION:
Use a new lock nut.

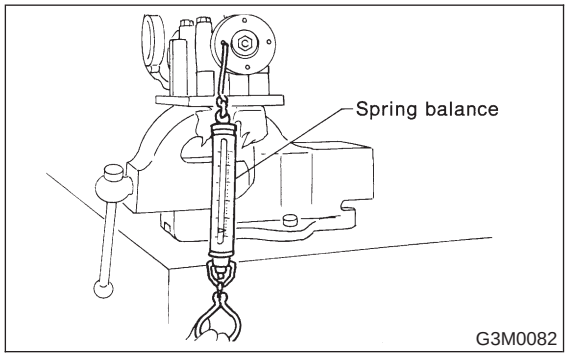
NOTE:
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2.

ST1 398507704 BLOCK
ST2 498447150 DUMMY SHAFT

Tightening torque:
188±26 N·m (19.2±2.7 kg-m, 139±20 ft-lb)



Front and rear bearing preload
For new bearing: 12.7 — 32.4 N (1.3 — 3.3 kg, 2.9 — 7.3 lb) at companion flange bolt hole



	Part No.	Thickness mm (in)
Preload adjusting washer	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)
	Part No.	Length mm (in)
Preload adjusting spacer	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)

3) Adjusting drive pinion height Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

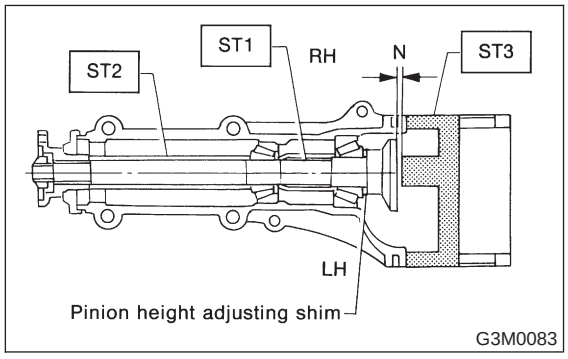
(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

Front and rear bearing preload
For new bearing: 12.7 — 32.4 N (1.3 — 3.3 kg, 2.9 — 7.3 lb) at companion flange bolt hole

Adjust preload for front and rear bearings.

NOTE:
At this time, install an original pinion height adjusting shim.

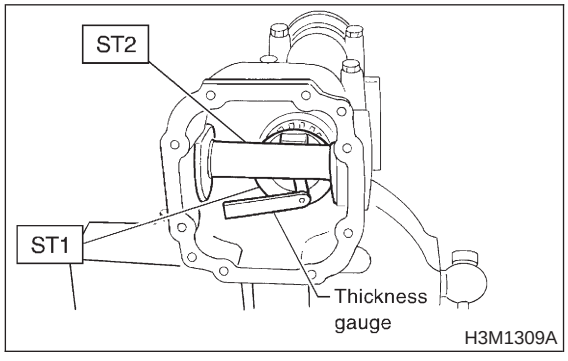
ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR
ST3 498505501 DIFFERENTIAL CARRIER GAUGE



(2) Measure the clearance “N” between the end of ST2 and the end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between ST2 and ST1.

ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL CARRIER GAUGE



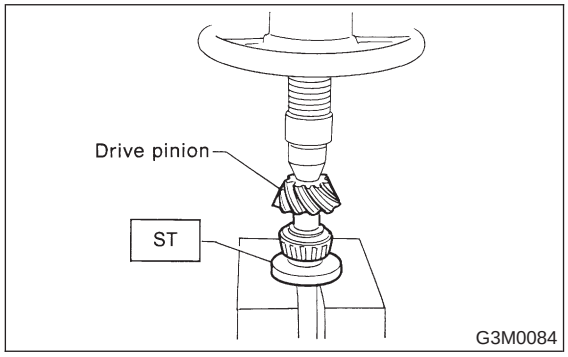
(3) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed shim with this one.

NOTE:

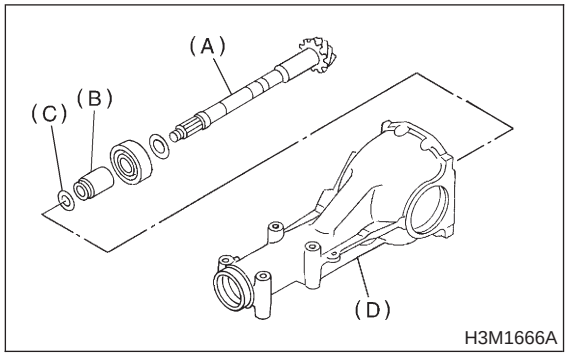
Use 1 to 3 shims as required for adjustment.
T = To + N − 0.05 (mm)
where
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim originally installed (mm)
N = Reading of thickness gauge (mm)
(Example of calculation)
To = 0.15 mm
N = 0.1 mm
T = 0.15 + 0.1 − 0.05 = 0.2 mm
Result: Thickness = 0.2 mm
Therefore use the 32295AA220.

Pinion height adjusting shim	
Part No.	Thikness mm (in)
32295AA200	0.150 (0.0059)
32295AA210	0.175 (0.0069)
32295AA220	0.200 (0.0079)
32295AA230	0.225 (0.0089)
32295AA240	0.250 (0.0098)
32295AA250	0.275 (0.0108)

4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.
ST 498175500 INSTALLER

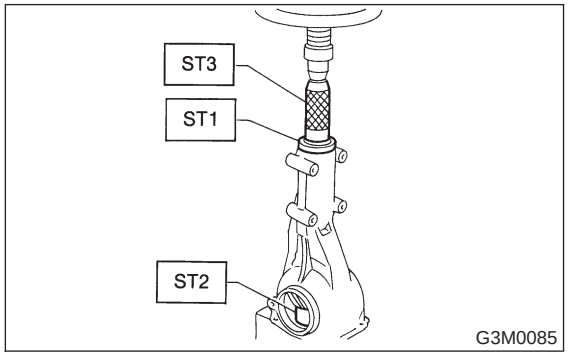


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

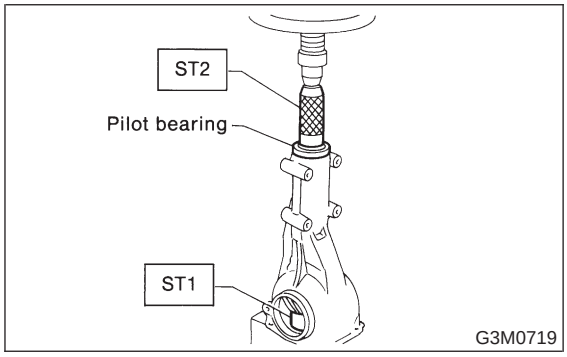


(A) Drive pinion
(B) Adjusting spacer
(C) Washer
(D) Differential carrier

6) Press-fit front bearing cone into case with ST1, ST2 and ST3.
ST1 32285AA000 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



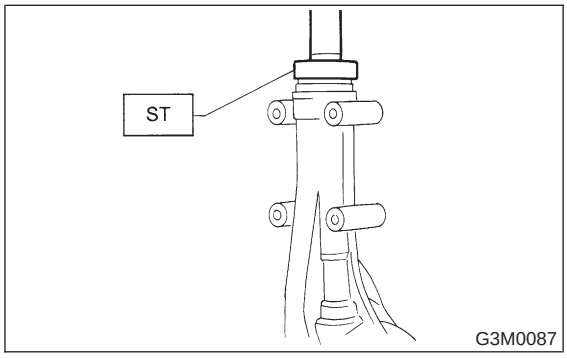
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



8) Fit a new oil seal with ST.

NOTE:
● Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
● Apply grease between the oil seal lips.

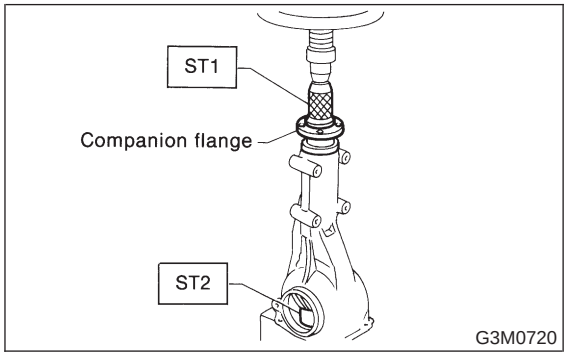
ST 498447120 OIL SEAL INSTALLER



9) Press-fit companion flange with ST1 and ST2.

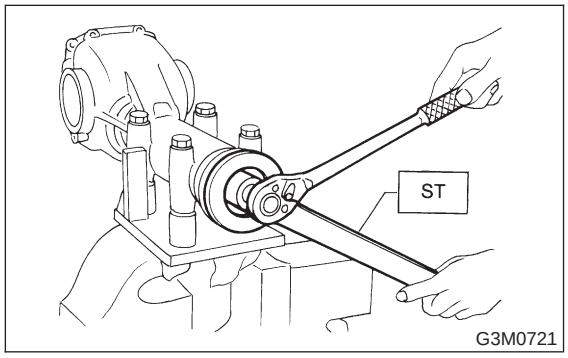
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



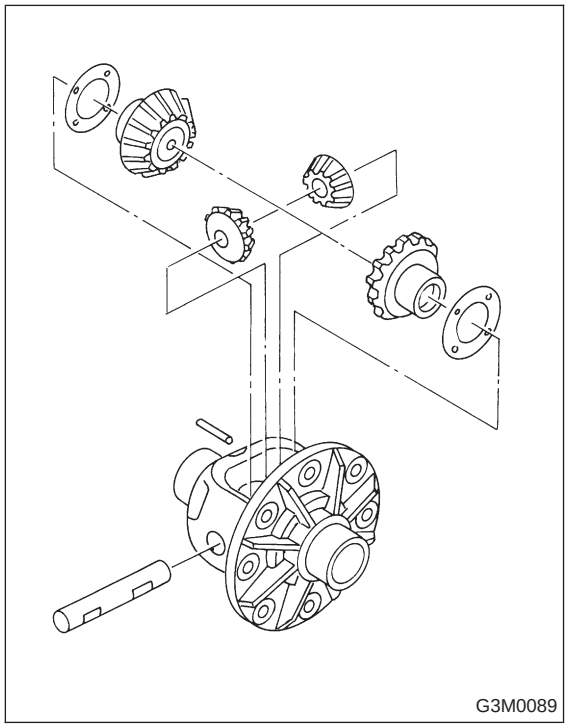
10) Install self-locking nut. Then tighten self-locking nut with ST.
ST 398427700 FLANGE WRENCH

Tightening torque:
188±26 N·m (19.2±2.7 kg-m, 139±20 ft-lb)



11) Assembling differential case
(1) Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

NOTE:
● Apply gear oil on both sides of the washer and on the side gear shaft before installing.
● Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(2) Measure the clearance between differential case and the back of side gear.
(3) Adjust the clearance as specified by selecting side gear thrust washer.

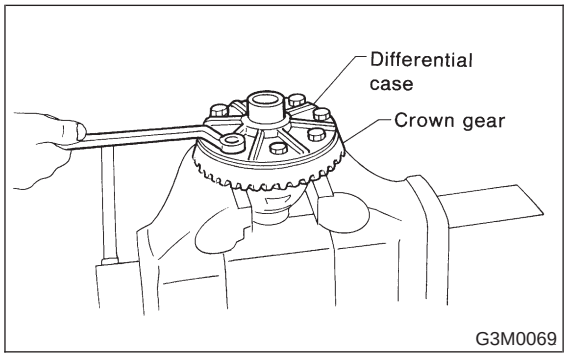
Side gear backlash:
0.05 — 0.15 mm (0.0020 — 0.0059 in)

Side gear thrust washer	
Part No.	Thickness mm (in)
803135011	0.925 — 0.950 (0.0364 — 0.0374)
803135012	0.950 — 0.975 (0.0374 — 0.0384)
803135013	0.975 — 1.000 (0.0384 — 0.0394)
803135014	1.000 — 1.025 (0.0394 — 0.0404)
803135015	1.025 — 1.050 (0.0404 — 0.0413)

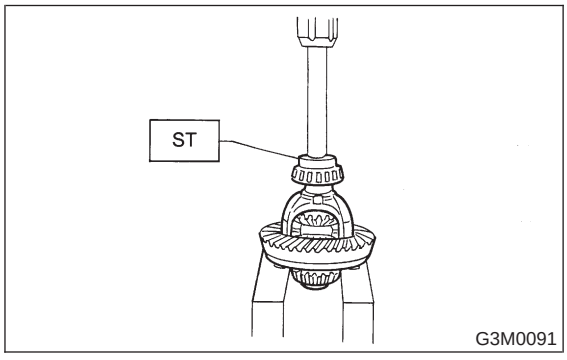
(4) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(5) After driving in pinion shaft lock pin, stake the both sides of the hole to prevent pin from falling off.
(6) nstall crown gear on differential case.

NOTE:
Tighten diagonally while tapping the bolt heads.

Tightening torque:
62±5 N·m (6.3±0.5 kg-m, 45.6±3.6 ft-lb)

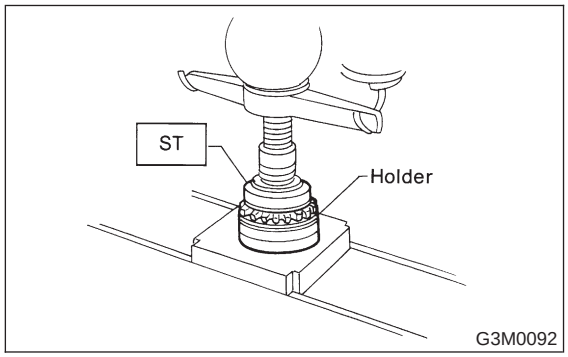


12) Press side bearing cone onto differential case with ST.
ST 498485400 DRIFT

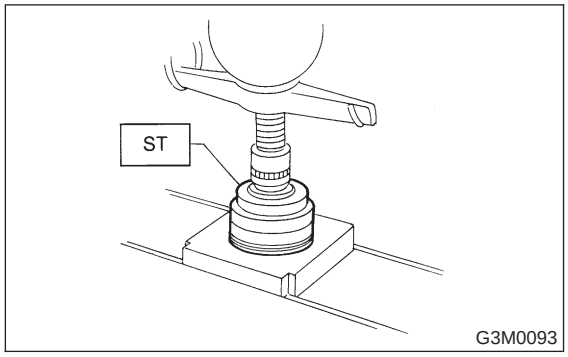


13) Assemble holders.

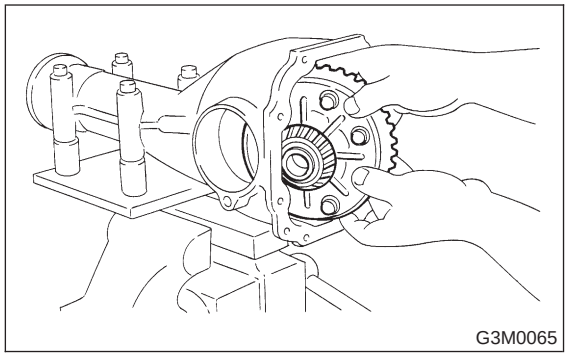
(1) Install oil seal into right and left holders.
ST 498447100 AXLE SHAFT OIL SEAL INSTALLER



(2) Install bearing race into right and left holders.
ST 398477702 BEARING OUTER RACE DRIFT

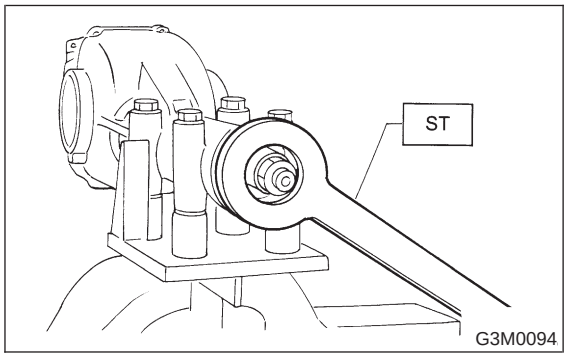


(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.

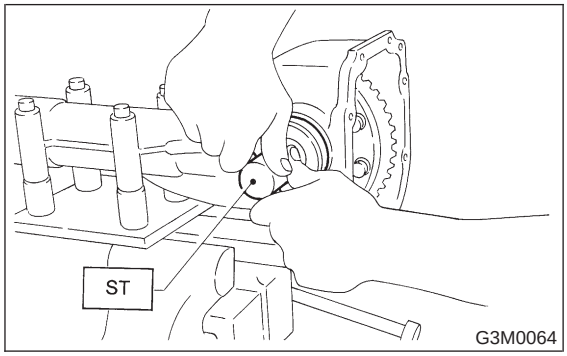


14) Perform adjustment of backlash of pinion crown gear set and adjustment of preload of differential side bearing.

(1) Turn drive pinion with ST for better fitting of differential side bearing.
ST 498427200 FLANGE WRENCH

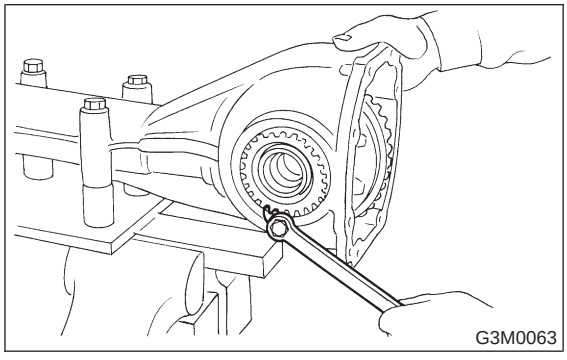


(2) Screw in left-side holder until light contact is made with ST.
ST 399780111 WRENCH



(3) Back off side (left-side) holder approximately 1 1/2 teeth of holder, and tighten left-side holder by approximately 2 teeth (approximately 1 1/2 + 1/2 teeth). [Back off amount of side (left-side) holder + 1/2 tooth].
This + 1/2 tooth gives preload.
(4) Temporarily tighten lock plate.

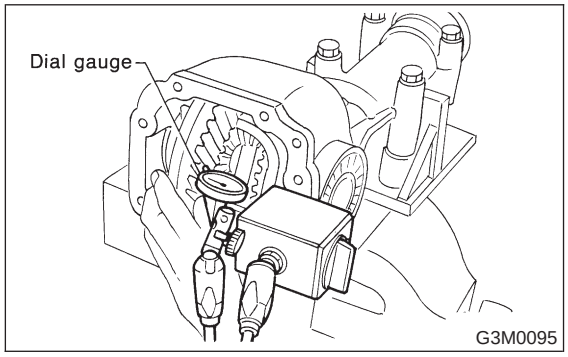
NOTE:
Turn over lock plate to displace holder 1/2 tooth.



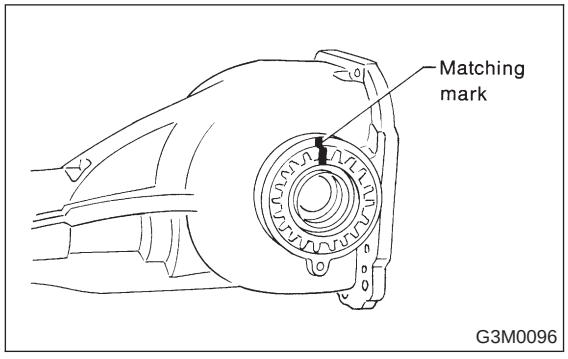
(5) Measure the crown gear-to-drive pinion backlash. Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

NOTE:
If measured backlash is not within specified range, repeat procedures for pinion crown gear set backlash adjustment and differential side bearing preload adjustment.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

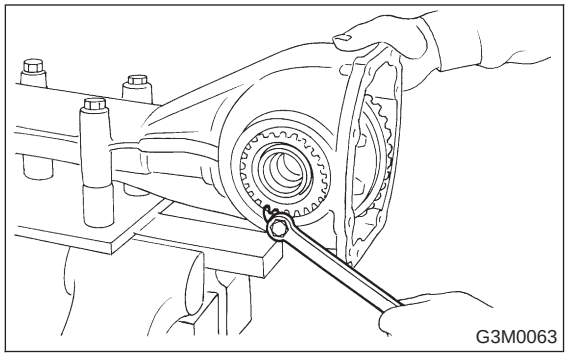


15) Draw a matching mark on both differential carrier and holder. Remove holder one side at a time. Replace in the original position after inserting an O-ring and applying grease to threaded portion.



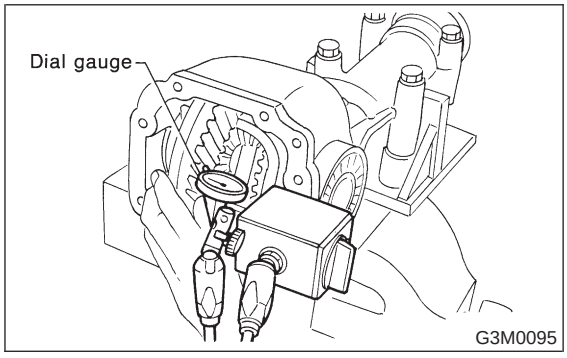
16) Tighten bolt of lock plate to specified torque.

Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)



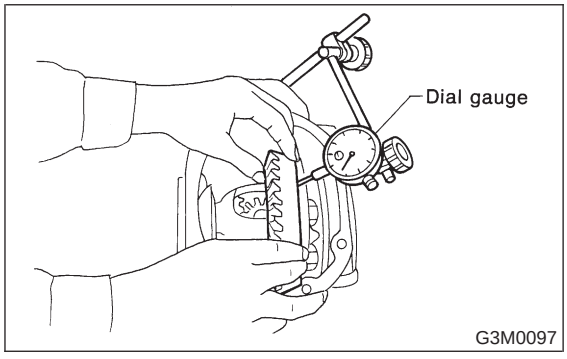
17) Re-check crown gear-to-pinion backlash.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)



18) Check the crown gear runout on its back surface, and make sure pinion and crown gear rotate smoothly.

Limit of runout:
0.05 mm (0.0020 in)



19) Checking and adjusting tooth contact of crown gear.

(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.

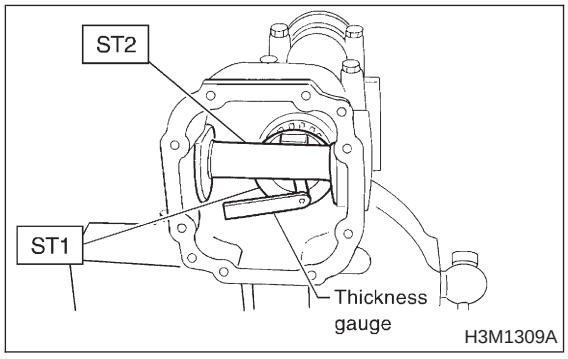
(2) When the contact pattern is incorrect, readjust according to the instructions given in “Tooth contact pattern”.

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

20) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (mentioned above) and the hypoid gear backlash.

(1) Drive pinion height

ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL CARRIER GAUGE



T = To + N − 0.35 (mm)

where

T = Thickness of pinion height adjusting shim (mm)

To = Thickness of shim temporarily inserted (mm)

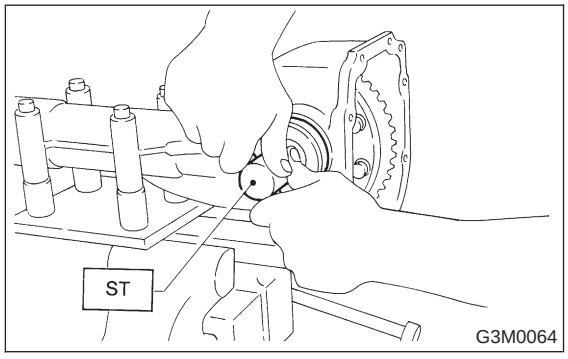
N = Reading of thickness gauge (mm)

(2) Differential side bearing preload

Back off side (left-side) holder approximately 1 1/2 teeth of holder, and tighten left-side holder by approximately 2 teeth (approximately 1 1/2 + 1/2 teeth). [Back off amount of side (left-side) holder + 1/2 tooth].

This + 1/2 tooth gives preload.

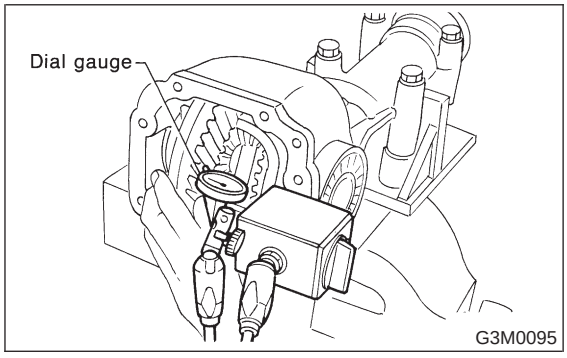
ST 399780111 WRENCH



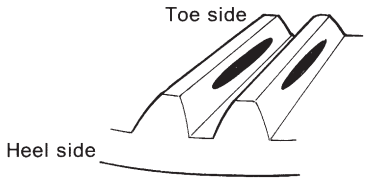
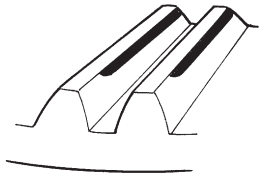
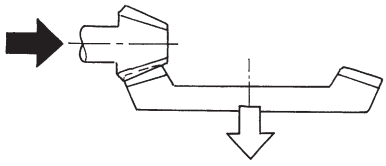
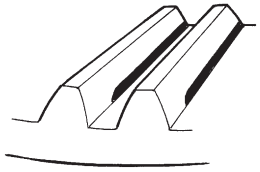
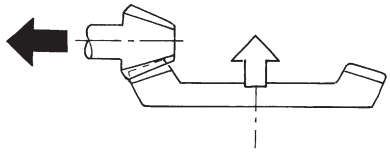
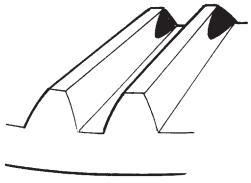
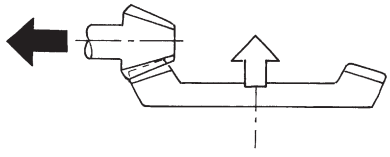
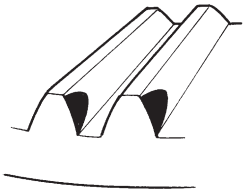
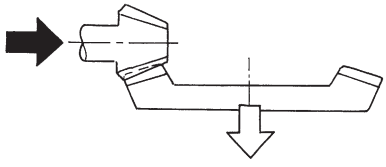
(3) Hypoid gear backlash

Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)



➡ Adjusting direction of drive pinion
⇨ Adjusting direction of crown gear

TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 G3M0098A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  G3M0098B	Increase thickness of drive pinion height adjusting washer in order to bring drive pinion closer to crown gear center.  G3M0098F
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  G3M0098C	Reduce thickness of drive pinion height adjusting washer in order to move drive pinion away from crown gear.  G3M0098G
Toe contact	Contact area is small. This may cause chipping at toe ends.  G3M0098D	Adjust as for flank contact.  G3M0098G
Heel contact	Contact area is small. This may cause chipping at heel ends.  G3M0098E	Adjust as for face contact  G3M0098F

F: INSTALLATION

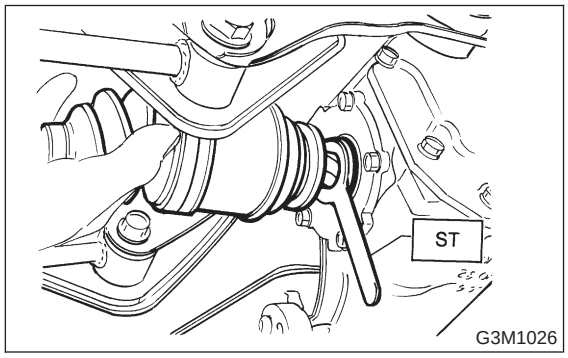
To install, reverse the removal sequence.
1) Install the air breather cap tapping with a plastic hammer.

CAUTION:
Be sure to install new air breather cap.

2) Position front member on body by passing it under parking brake cable and securing to rear differential.

NOTE:
When installing rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

3) Install DOJ of rear drive shaft into rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



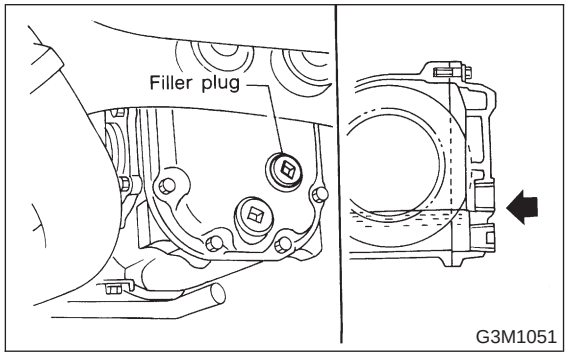
4) Installing procedure hereafter is in the reverse order of removal.
5) After installation, fill differential carrier with gear oil to the upper plug level.

CAUTION:
- **Apply fluid packing to plug (T-type).**
- **Use a new aluminum gasket when installing the plug (VA-type).**

Fluid packing:
THREE BOND 1105 or equivalent

Oil capacity:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)

Tightening torque:
T-type;
44±4 N·m (4.5±0.4 kg-m, 32.5±2.9 ft-lb)
VA-type;
34±4 N·m (3.5±0.4 kg-m, 25.3±2.9 ft-lb)



3. Rear Differential Front Member

A: REMOVAL

1. T-TYPE

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen wheel nuts.
5) Jack-up vehicle and support it with sturdy racks.
6) Remove wheels.
7) Remove rear exhaust pipe.
<Ref. to 2-9 [W3A0].>
8) Remove muffler.
<Ref. to 2-9 [W4A0].>
9) Remove rear differential front member.

NOTE:
When removing rear differential front member, work the removal procedure as rear differential.
<Ref. to 3-4 [W2B1].>

2. VA-TYPE

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen wheel nuts.
5) Jack-up vehicle and support it with sturdy racks.
6) Remove wheels.
7) Remove rear exhaust pipe.
<Ref. to 2-9 [W3A0].>
8) Remove muffler.
<Ref. to 2-9 [W4A0].>
9) Remove rear differential front member.

NOTE:
When removing rear differential front member, work the removal procedure as rear differential.
<Ref. to 3-4 [W2B2].>

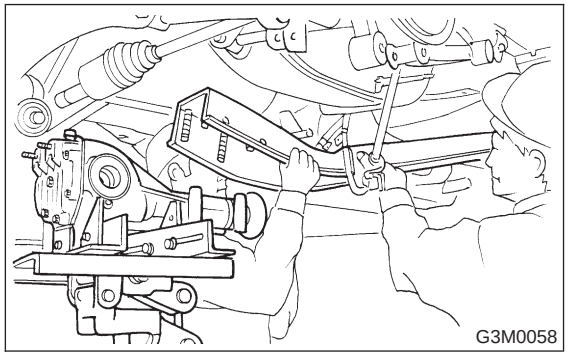
B: INSTALLATION

1. T-TYPE

To install, reverse the removal sequence.

1) Position front member on body by passing it under parking brake cable and securing to rear differential.

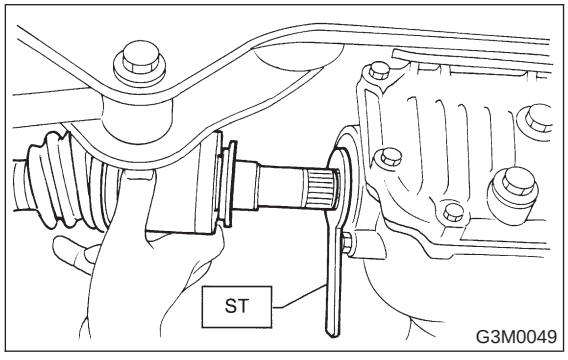
NOTE:
When installing rear differential front member, do not confuse the installation sequence of the stopper.



2) Insert DOJ of rear drive shaft into rear differential.
<Ref. to 3-4 [W2C1].>

CAUTION:
Before inserting, replace the differential side oil seal with a new one.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



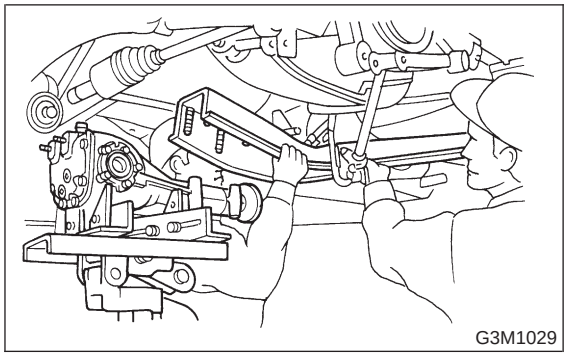
3) Installing procedure hereafter is in the reverse order of removal.

2. VA-TYPE

To install, reverse the removal sequence.

1) Position front member on body by passing it under parking brake cable and securing to rear differential.

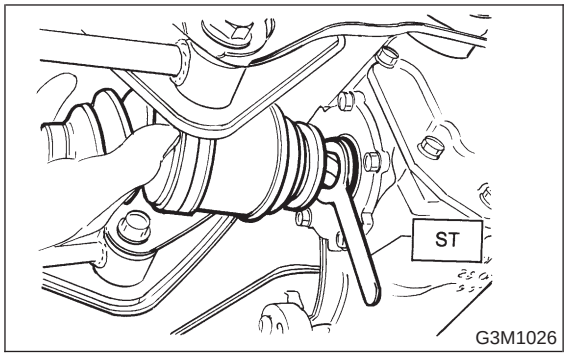
NOTE:
When installing rear differential front member, do not confuse the installation sequence of the stopper.



2) Insert DOJ of rear drive shaft into rear differential.
<Ref. to 3-4 [W2C2].>

CAUTION:
Before inserting, replace the differential side oil seal with a new one.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



3) Installing procedure hereafter is in the reverse order of removal.

MEMO:

1. Propeller Shaft

NOTE:
Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptom	Possible cause	Remedy
1. Vibration of propeller shaft NOTE: Vibration is caused by propeller shaft during operation and is transferred to vehicle body. Generally vibration increases in proportion to vehicle speed.	(1) Worn or damaged universal joint.	Replace.
	(2) Unbalanced propeller shaft due to bend or dent.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Worn or damaged center bearing and damaged center mounting rubber.	Replace.
2. Tapping when starting and noise while cruising, caused by propeller shaft.	(1) Worn or damaged universal joint.	Replace.
	(2) Worn spline of sleeve yoke.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Loose installation of joint.	Replace.
	(5) Worn or damaged center bearing and damaged center mounting rubber.	Replace.

2. Rear Differential

Symptom	Possible cause	Remedy
1. Oil leakage	(1) Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered, or excessively worn sliding surface of companion flange.	Repair or replace.
	(2) Clogged or damaged air breather.	Clean, repair or replace.
	(3) Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten bolts to specified torque. Replace O-ring.
	(4) Loose rear cover attaching bolts or damaged gasket.	Tighten bolts to specified torque. Replace gasket and apply liquid packing.
	(5) Loose oil filler or drain plug.	Retighten and apply liquid packing.
	(6) Wear, damage or incorrectly fitting for spindle, side retainer and oil seal.	Repair or replace.
2. Seizure NOTE: Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Insufficient backlash for hypoid gear.	Readjust or replace.
	(2) Excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Insufficient or improper oil used.	Replace seized part and fill with specified oil to specified level.
3. Damage NOTE: Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Improper backlash for hypoid gear.	Replace.
	(2) Insufficient or excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(4) Loose bolts and nuts such as crown gear bolt.	Retighten.
	(5) Damage due to overloading.	Replace.
4. Noises when starting or shifting gears NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembly.	(1) Excessive backlash for hypoid gear.	Readjust.
	(2) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(3) Insufficient preload for front or rear bearing.	Readjust.
	(4) Loose drive pinion nut.	Tighten to specified torque.
	(5) Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
5. Noises when cornering	(1) Damaged differential gear.	Replace.
	(2) Excessive wear or damage of thrust washer.	Replace.
	(3) Broken pinion mate shaft.	Replace.
	(4) Seized or damaged side bearing.	Replace.
6. Gear noises NOTE: Since noises from engine, muffler, transmission, propeller shaft, wheel bearings, tires, and body are sometimes mistaken for noises from differential assembly, be careful in checking them. Inspection methods to locate noises include coasting, accelerating, cruising, and jacking-up all four wheels. Perform these inspections according to condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	(1) Improper tooth contact of hypoid gear.	Readjust or replace hypoid gear set.
	(2) Improper backlash for hypoid gear.	Readjust.
	(3) Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
	(4) Seized hypoid gear.	Replace hypoid gear set.
	(5) Improper preload for front or rear bearings.	Readjust.
	(6) Seized, scored, or chipped front or rear bearing.	Replace.
	(7) Seized, scored, or chipped side bearing.	Replace.
	(8) Vibrating differential carrier.	Replace.

MEMO:

SUSPENSION 4-1

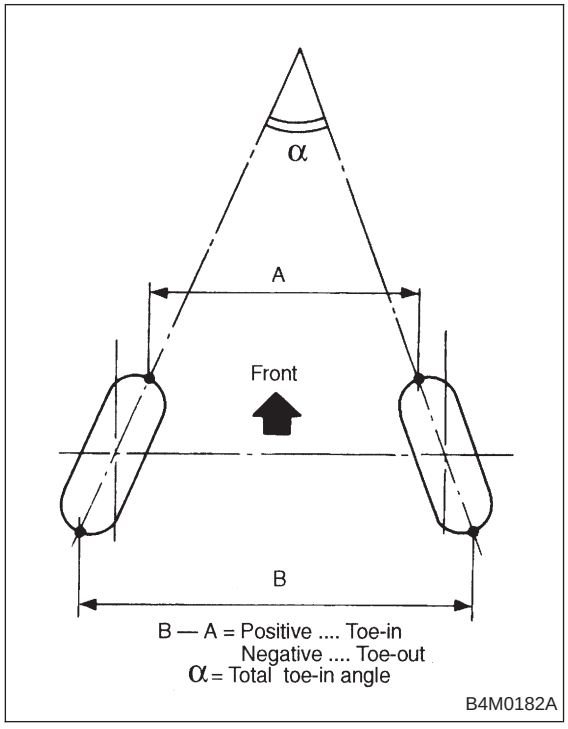
1. Stabilizer

Model		Bar dia. mm (in)	
		Front	Rear
Sedan	2200 cc	19 (0.75)	15 (0.59)
	2500 cc	20 (0.79)	16 (0.63)
Wagon	2200 cc	19 (0.75)	15 (0.59)
	2500 cc	20 (0.79)	16 (0.63)
SUS & OUTBACK	2200 cc	20 (0.79)	18 (0.71)
	2500 cc	20 (0.79)	18 (0.71)

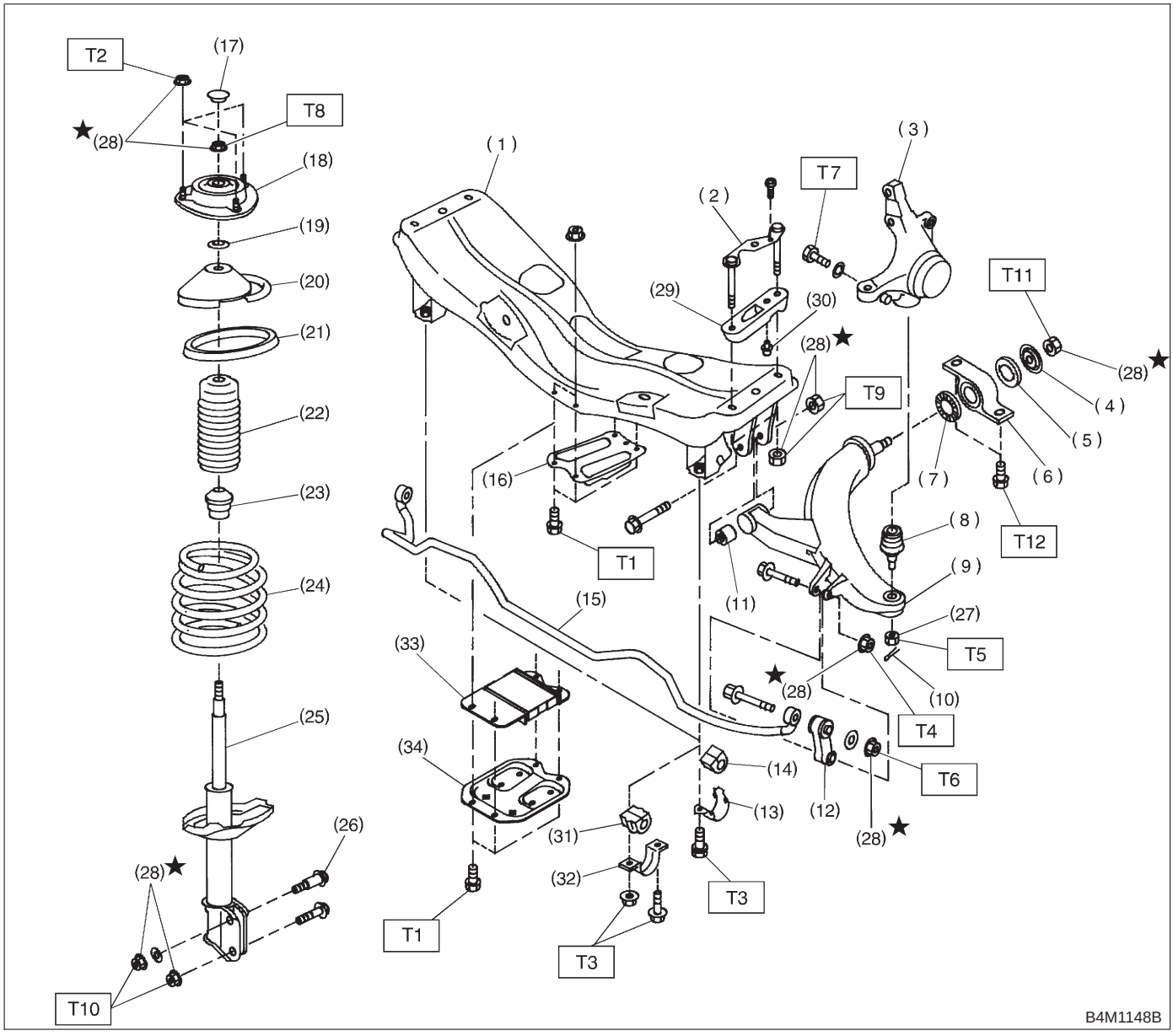
2. Wheel Alignment

		Sedan		Wagon		SUS & OUT-BACK
		FWD	AWD	FWD	AWD	AWD
Front	Camber (tolerance: ±0°30′)	−0°05′	−0°05′	−0°05′	−0°05′	0°20′
	Caster (tolerance: ±1°)	3°05′	3°05′	3°05′	3°05′	2°50′
	Toe-in mm (in)	0±3 (0±0.12) Total toe angle: 0°±20′				
	Kingpin angle (tolerance: ±1°)	14°15′	14°15′	14°15′	14°15′	13°30′
	Wheel arch height [tolerance: $^{+12}/_{-24}$ mm ($^{+0.47}/_{-0.94}$ in)] mm (in)	385 (15.16)	385 (15.16)	385 (15.16)	385 (15.16)	420 (16.54)
Rear	Camber (tolerance: ±0°45′)	−0°55′	−1°	−0°45′	−0°55′	−0°35′
	Toe-in mm (in)	0±3 (0±0.12) Total toe angle: 0°±20′				
	Wheel arch height [tolerance: $^{+12}/_{-24}$ mm ($^{+0.47}/_{-0.94}$ in)] mm (in)	369 (14.53)	369 (14.53)	379 (14.92)	379 (14.92)	419 (16.50)
	Thrust angle	0°±20′				

NOTE:
- Front and rear toe-ins and front camber can be adjusted. If toe-in or front camber tolerance exceeds specifications, adjust toe-in and camber to the specification.
- The other items indicated in the specification table cannot be adjusted. If the other items exceeds specifications, check suspension parts and joint portions of body suspension parts for deformities; and replace with new ones as required.



1. Front Suspension

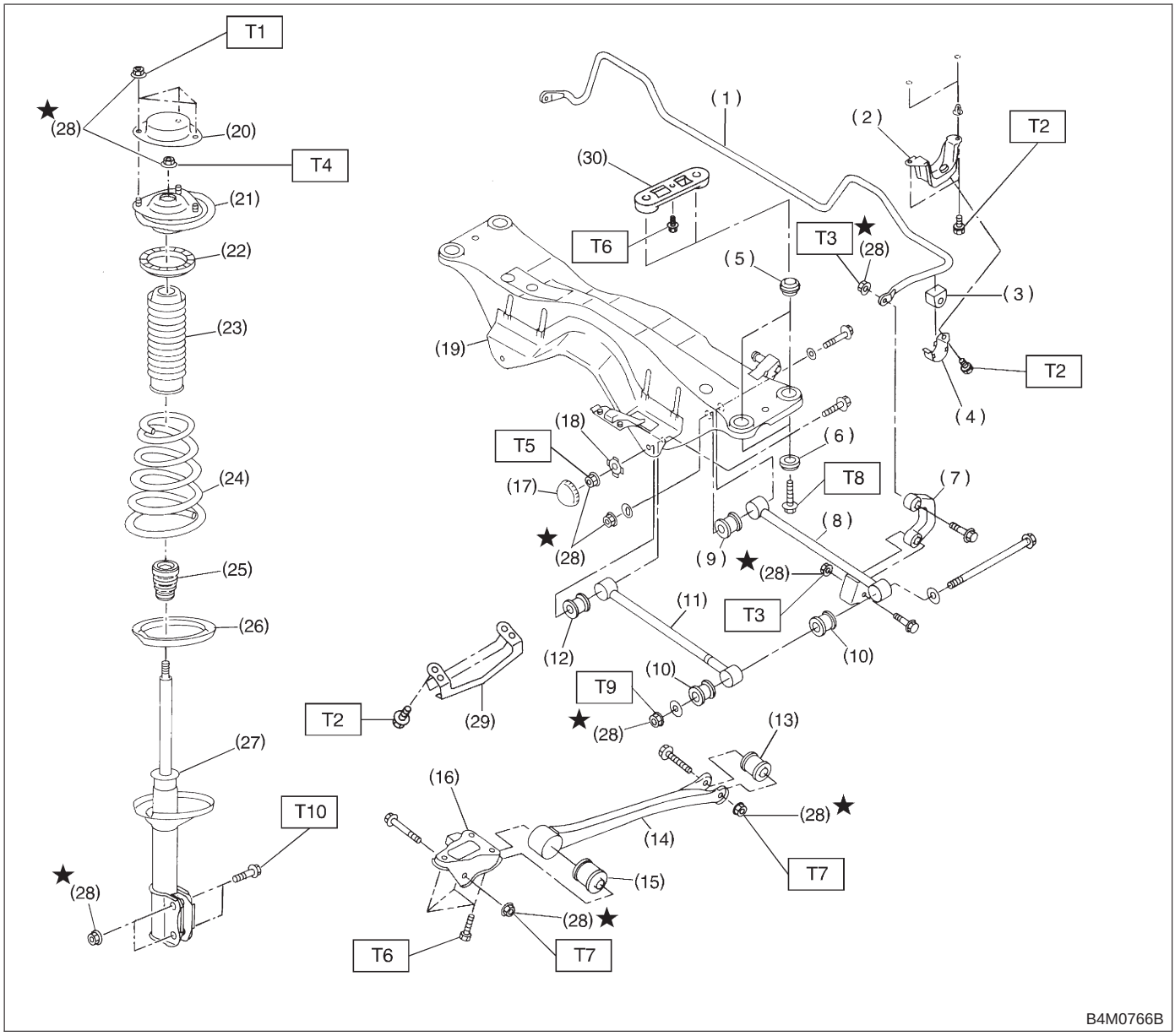


(1) Front crossmember
(2) Bolt ASSY
(3) Housing
(4) Washer
(5) Stopper rubber (Rear)
(6) Rear bushing
(7) Stopper rubber (Front)
(8) Ball joint
(9) Transverse link
(10) Cotter pin
(11) Front bushing
(12) Stabilizer link
(13) Clamp (2200 cc model)
(14) Bushing (2200 cc model)
(15) Stabilizer
(16) Jack-up plate (Except 2500 cc MT model)
(17) Dust seal
(18) Strut mount
(19) Spacer
(20) Upper spring seat
(21) Rubber seat
(22) Dust cover
(23) Helper
(24) Coil spring
(25) Damper strut
(26) Adjusting bolt
(27) Castle nut
(28) Self-locking nut
(29) Adapter front crossmember (SUS & OUTBACK model)
(30) Clip (SUS & OUTBACK model)
(31) Bushing (2500 cc model)
(32) Clamp (2500 cc model)
(33) Dynamic damper (2500 cc MT model)
(34) Jack-up plate (2500 cc MT model)

Tightening torque: N·m (kg-m, ft-lb)
T1: 18±5 (1.8±0.5, 13.0±3.6)
T2: 20±6 (2.0±0.6, 14.5±4.3)
T3: 25±4 (2.5±0.4, 18.1±2.9)
T4: 29±5 (3.0±0.5, 21.7±3.6)
T5: 39 (4, 29)
T6: 44±6 (4.5±0.6, 32.5±4.3)
T7: 49±10 (5.0±1.0, 36±7)
T8: 54±5 (5.5±0.5, 39.8±3.6)
T9: 98±15 (10.0±1.5, 72±11)
T10: 152±20 (15.5±2.0, 112±14)
T11: 186±10 (19.0±1.0, 137±7)
T12: 245±49 (25.0±5.0, 181±36)

2. Rear Suspension

A: AWD MODEL

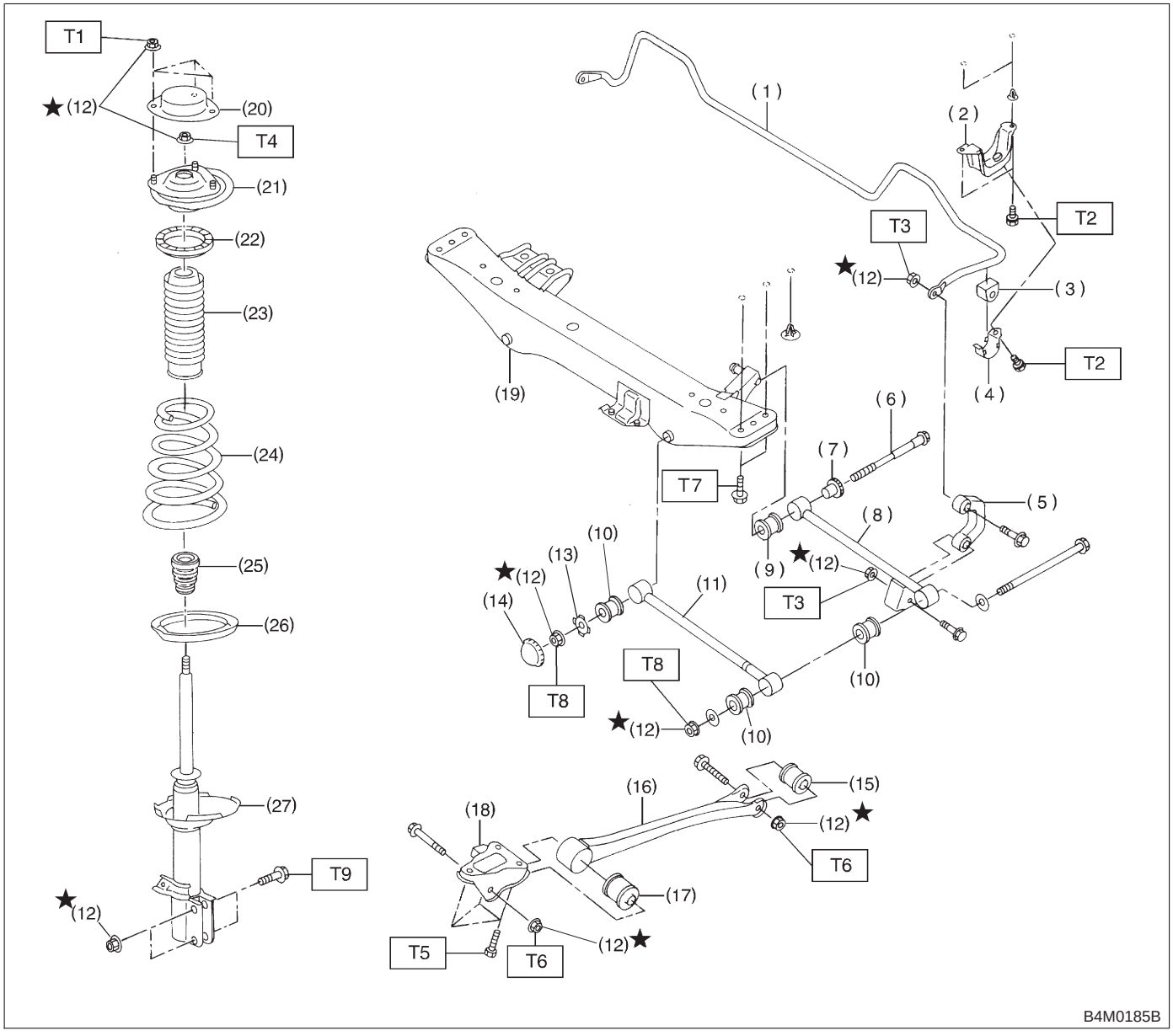


(1) Stabilizer
(2) Stabilizer bracket
(3) Stabilizer bushing
(4) Clamp
(5) Floating bushing
(6) Stopper
(7) Stabilizer link
(8) Rear lateral link
(9) Bushing (C)
(10) Bushing (A)
(11) Front lateral link
(12) Bushing (B)
(13) Trailing link rear bushing
(14) Trailing link
(15) Trailing link front bushing
(16) Trailing link bracket
(17) Cap (Protection)
(18) Washer
(19) Rear crossmember
(20) Strut mount cap
(21) Strut mount
(22) Rubber seat upper
(23) Dust cover
(24) Coil spring
(25) Helper
(26) Rubber seat lower
(27) Damper strut
(28) Self-locking nut
(29) Crossmember reinforcement lower (Sedan model and except SUS model)
(30) Adapter rear crossmember (SUS & OUTBACK model)

Tightening torque: N·m (kg-m, ft-lb)

T1: 20±6 (2.0±0.6, 14.5±4.3)
T2: 25±7 (2.5±0.7, 18.1±5.1)
T3: 44±6 (4.5±0.6, 32.5±4.3)
T4: 59±10 (6.0±1.0, 43±7)
T5: 98±15 (10.0±1.5, 72±11)
T6: 98±20 (10.0±2.0, 72±14)
T7: 113±15 (11.5±1.5, 83±11)
T8: 127±20 (13.0±2.0, 94±14)
T9: 137±20 (14.0±2.0, 101±14)
T10: $196^{+39}/_{-10}$ ($20.0^{+4.0}/_{-1.0}$, 145 $^{+29}/_{-7}$)

B: FWD MODEL



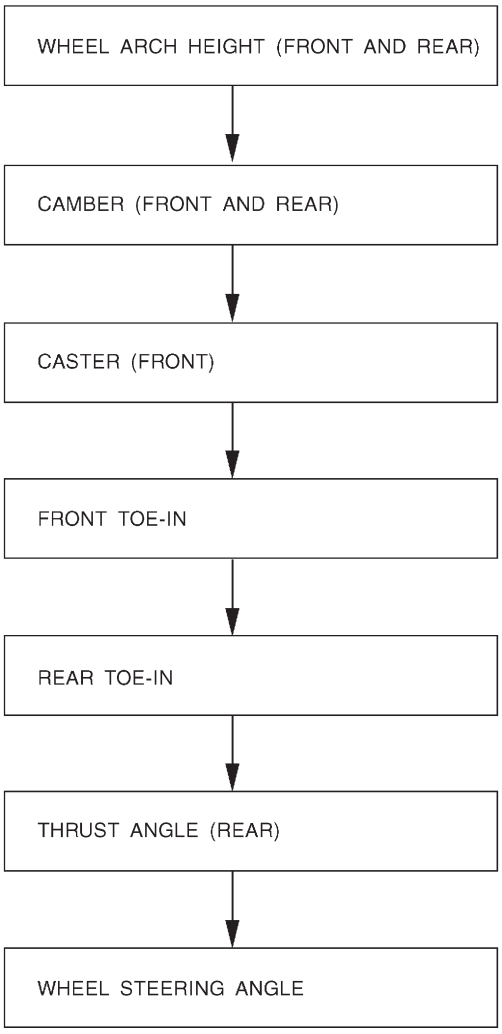
(1) Stabilizer
(2) Stabilizer bracket
(3) Stabilizer bushing
(4) Clamp
(5) Stabilizer link
(6) Adjusting bolt
(7) Adjusting wheel
(8) Rear lateral link
(9) Bushing (D)
(10) Bushing (A)
(11) Front lateral link
(12) Self-locking nut
(13) Washer
(14) Cap (Protection)
(15) Trailing link rear bushing
(16) Trailing link
(17) Trailing link front bushing
(18) Trailing link bracket
(19) Crossmember
(20) Strut mount cap
(21) Strut mount
(22) Rubber seat upper
(23) Dust cover
(24) Coil spring
(25) Helper
(26) Rubber seat lower
(27) Damper strut

Tightening torque: N·m (kg-m, ft-lb)
T1: 20±6 (2.0±0.6, 14.5±4.3)
T2: 25±7 (2.5±0.7, 18.1±5.1)
T3: 44±6 (4.5±0.6, 32.5±4.3)
T4: 59±10 (6.0±1.0, 43±7)
T5: 98±20 (10.0±2.0, 72±14)
T6: 113±15 (11.5±1.5, 83±11)
T7: 127±20 (13.0±2.0, 94±14)
T8: 137±20 (14.0±2.0, 101±14)
T9: 196^{+39}_{-10} ($20.0^{+4.0}_{-1.0}$, 145^{+29}_{-7})

1. On-car Services

A: WHEEL ALIGNMENT PROCEDURES

Check, adjust and/or measure wheel alignment in accordance with procedures indicated in figure:



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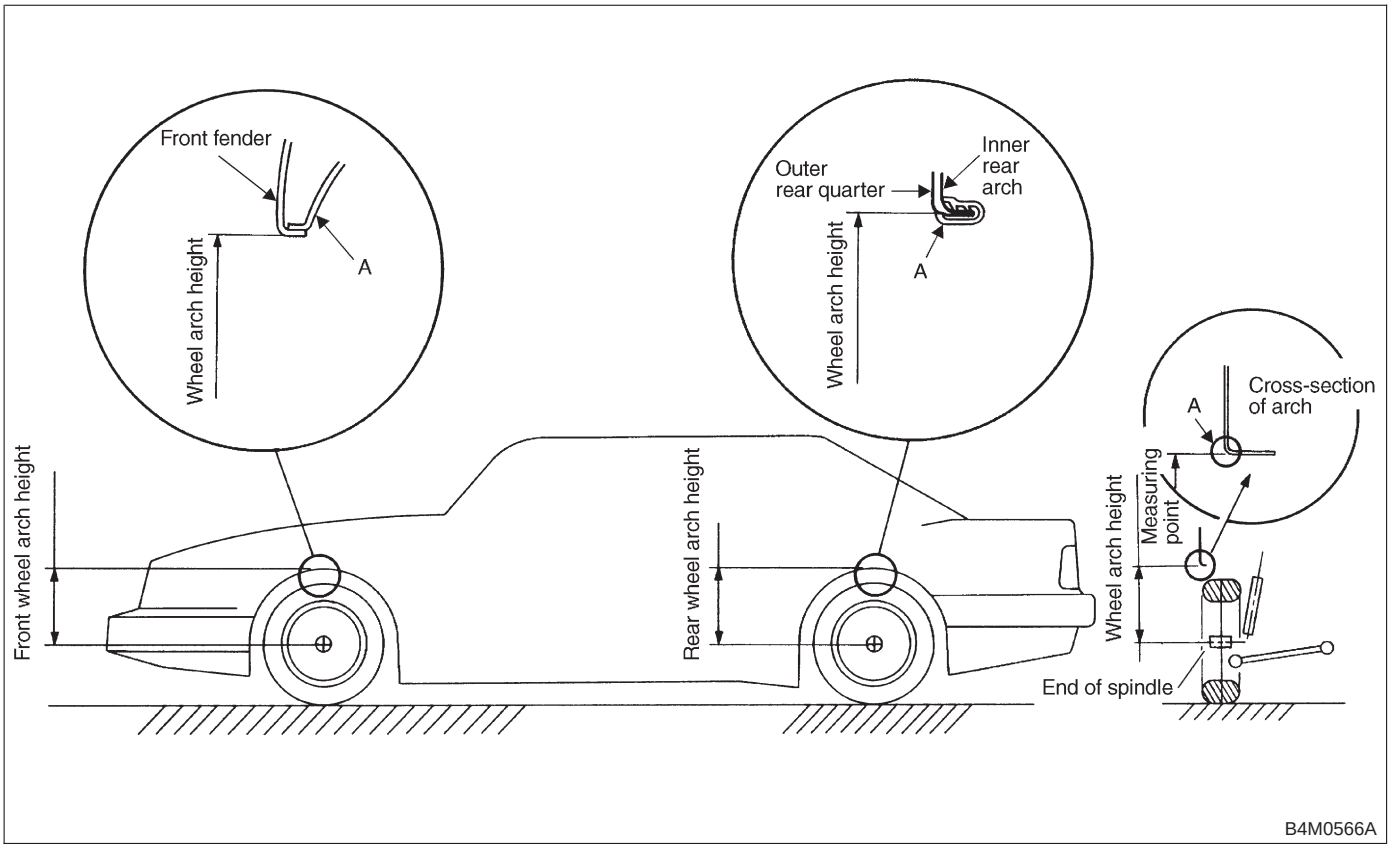
B: INSPECTION AND ADJUSTMENT

1. WHEEL ARCH HEIGHT (FRONT AND REAR)

1) Adjust tire pressure to specifications.
2) Set vehicle under “curb weight” conditions. (Empty luggage compartment, install spare tire, jack, service tools, and top up fuel tank.)
3) Set steering wheel in a wheel-forward position.
4) Suspend thread from wheel arch (point “A” in figure below) to determine a point directly above center of spindle.
5) Measure distance between measuring point and center of spindle.

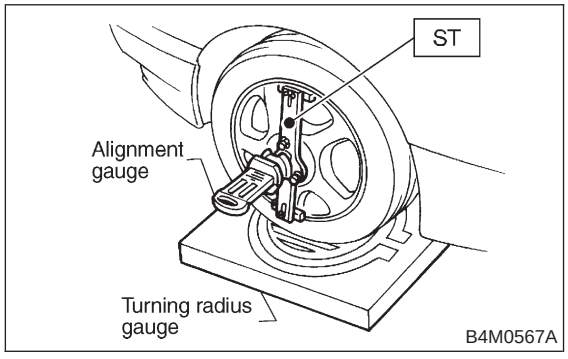


Vehicles		Specified wheel arch height mm (in)	
		Front	Rear
Sedan	FWD	$385^{+12}/_{-24}$ ($15.16^{+0.47}/_{-0.94}$)	$369^{+12}/_{-24}$ ($14.53^{+0.47}/_{-0.94}$)
	AWD	$385^{+12}/_{-24}$ ($15.16^{+0.47}/_{-0.94}$)	$369^{+12}/_{-24}$ ($14.53^{+0.47}/_{-0.94}$)
Wagon	FWD	$385^{+12}/_{-24}$ ($15.16^{+0.47}/_{-0.94}$)	$379^{+12}/_{-24}$ ($14.92^{+0.47}/_{-0.94}$)
	AWD	$385^{+12}/_{-24}$ ($15.16^{+0.47}/_{-0.94}$)	$379^{+12}/_{-24}$ ($14.92^{+0.47}/_{-0.94}$)
SUS & OUTBACK	AWD	$420^{+12}/_{-24}$ ($16.54^{+0.47}/_{-0.94}$)	$419^{+12}/_{-24}$ ($16.50^{+0.47}/_{-0.94}$)

2. CAMBER (FRONT AND REAR)

● Inspection

1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.
2) Set ST into the center of the wheel, and then install the wheel alignment gauge.
ST 927380000 ADAPTER



NOTE:
Refer to the “SPECIFICATIONS AND SERVICE DATA” for the camber values. <Ref. to 4-1 [S200].>

● Front Camber Adjustment

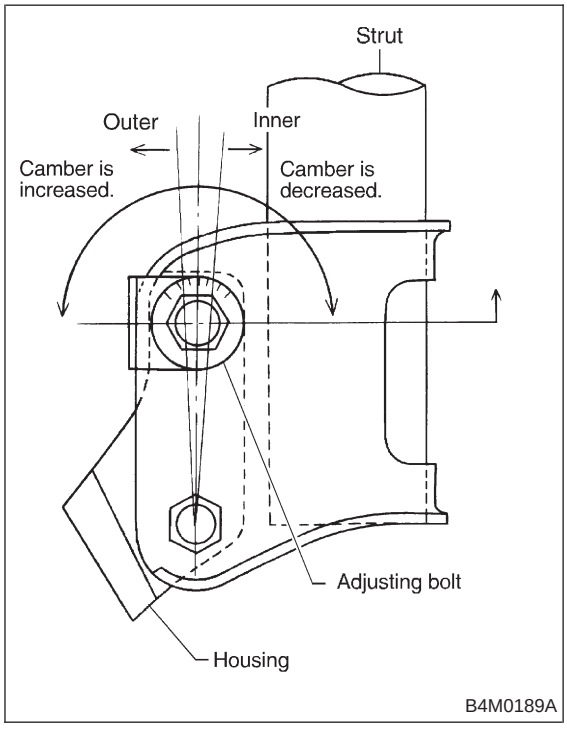
1) Loosen two self-locking nuts located at lower front portion of strut.

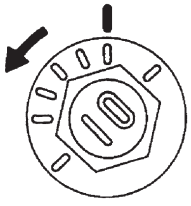
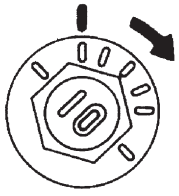
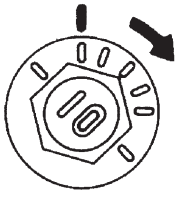
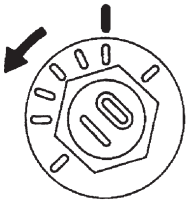
CAUTION:
● When adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn self-locking nut.

● Discard loosened self-locking nut and replace with a new one.

2) Turn camber adjusting bolt so that camber is set at the specification.

NOTE:
Moving the adjusting bolt by one scale graduation changes camber by approximately 0°10′.



	Left side	Right side
Camber is increased.	 Rotate counterclockwise. B4M0190	 Rotate clockwise. B4M0350
Camber is decreased.	 Rotate clockwise. B4M0350	 Rotate counterclockwise. B4M0190

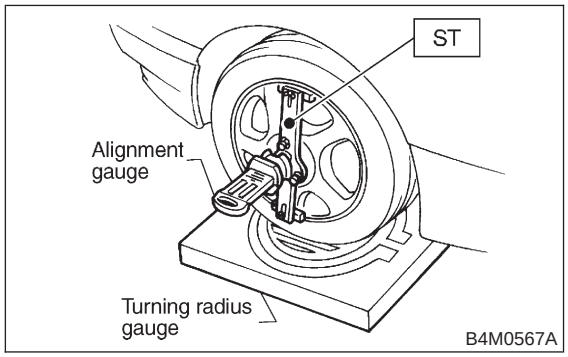
3) Tighten the two self-locking nuts.

Tightening torque:
152±20 N·m (15.5±2.0 kg-m, 112±14 ft-lb)

3. CASTER (FRONT)

● Inspection

1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.
2) Set ST into the center of the wheel, and then install the wheel alignment gauge.
ST 927380000 ADAPTER



NOTE:
Refer to the “SPECIFICATIONS AND SERVICE DATA” for the caster value. <Ref. to 4-1 [S200].>

4. FRONT WHEEL TOE-IN

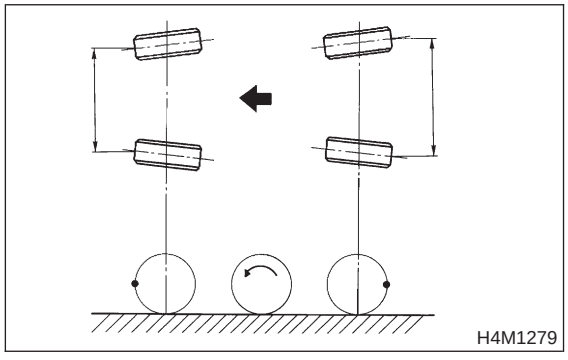
● Inspection

1) Using a toe gauge, measure front wheel toe-in.

Toe-in:
0±3 mm (±0.12 in)

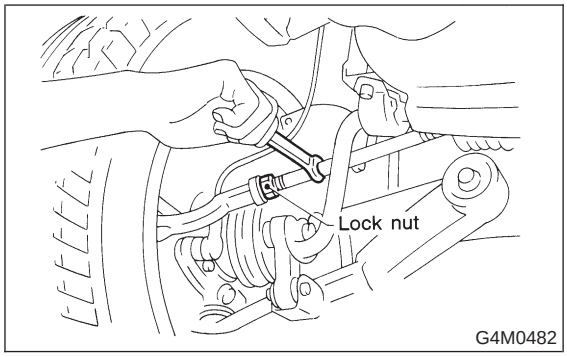
2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance “B” between marks.
3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.
4) Measure distance “A” between left and right marks. Toe-in can then be obtained by the following equation:

B − A = Toe-in



● Adjustment

1) Loosen the left and right side steering tie-rods lock nuts.
2) Turn the left and right tie rods equal amounts until the toe-in is at the specification.
Both the left and right tie-rods are right-hand threaded. To increase toe-in, turn both tie-rods clockwise equal amounts (as viewed from the inside of the vehicle).



3) Tighten tie-rod lock nut.

Tightening torque:
83±5 N·m (8.5±0.5 kg-m, 61.5±3.6 ft-lb)

CAUTION:
Correct tie-rod boot, if it is twisted.

NOTE:
Check the left and right wheel steering angle is within specifications.

5. REAR WHEEL TOE-IN

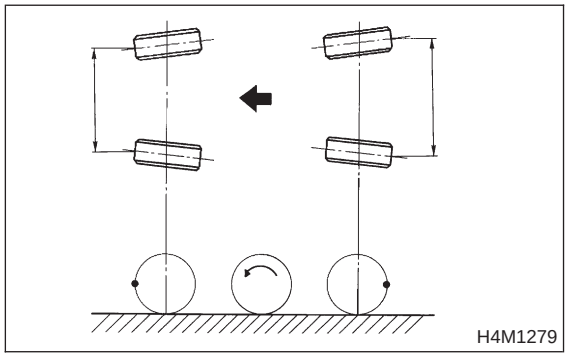
● Inspection

1) Using a toe-in gauge, measure rear wheel toe-in.

Toe-in:
0±3 mm (±0.12 in)

2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance “B” between marks.
3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.
4) Measure distance “A” between left and right marks. Toe-in can then be obtained by the following equation:

B − A = Toe-in

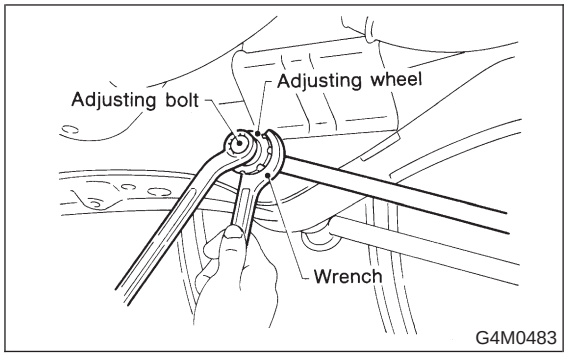


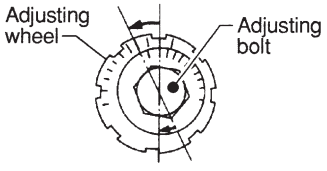
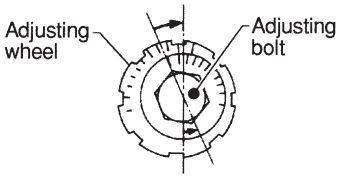
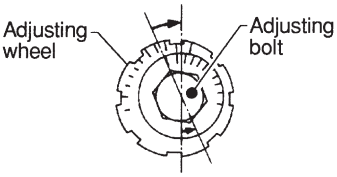
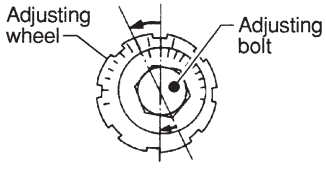
● Adjustment (FWD Model)

1) Remove cap from lateral link and loosen self-locking nut.

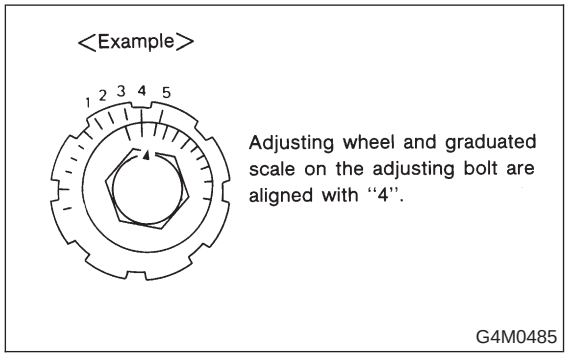
CAUTION:
● When loosening or tightening adjusting bolt, hold the bolt head and loosen self-locking nut.
● Replace self-locking nut with a new one.

2) Using two wrenches, turn adjusting wheel and adjusting bolt equally in opposite directions so that toe-in is at the specification.



	Left side	Right side
Toe-in is increased.	 B4M0191A Turn adjusting wheel counterclockwise and adjusting bolt clockwise.	 B4M0351A Turn adjusting wheel clockwise and adjusting bolt counterclockwise.
Toe-in is decreased.	 B4M0351A Turn adjusting wheel clockwise and adjusting bolt counterclockwise.	 B4M0191A Turn adjusting wheel counterclockwise and adjusting bolt clockwise.

NOTE:
● When left and right wheels are adjusted for toe-in at the same time, moving one scale graduation changes toe-in by approximately 4 mm (0.16 in).
● Turn adjusting wheel and adjusting bolt equally in opposite directions so that same scale graduations are positioned directly above center of the adjusting bolt.



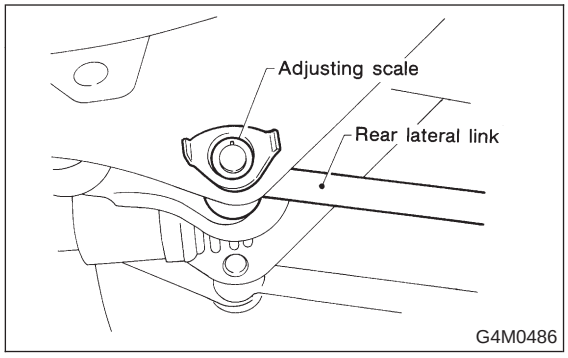
3) Tighten self-locking nut.

Tightening torque:
137±20 N·m (14±2 kg-m, 101±14 ft-lb)

● Adjustment (AWD Model)

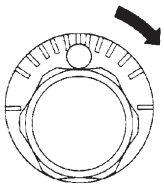
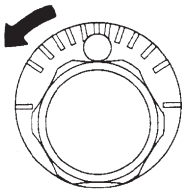
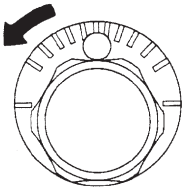
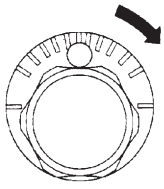
1) Loosen self-locking nut on inner side of rear lateral link.

CAUTION:
● When loosening or tightening adjusting bolt, hold bolt head and turn self-locking nut.
● Discard loosened self-locking nut and replace with a new one.



2) Turn adjusting bolt head until toe-in is at the specification.

NOTE:
When left and right wheels are adjusted for toe-in at the same time, the movement of one scale graduation changes toe-in by approximately 3 mm (0.12 in).

	Left side	Right side
Toe-in is increased.	 B4M0192 Rotate clockwise.	 B4M0352 Rotate counterclockwise.
Toe-in is decreased.	 B4M0352 Rotate counterclockwise.	 B4M0192 Rotate clockwise.

3) Tighten self-locking nut.

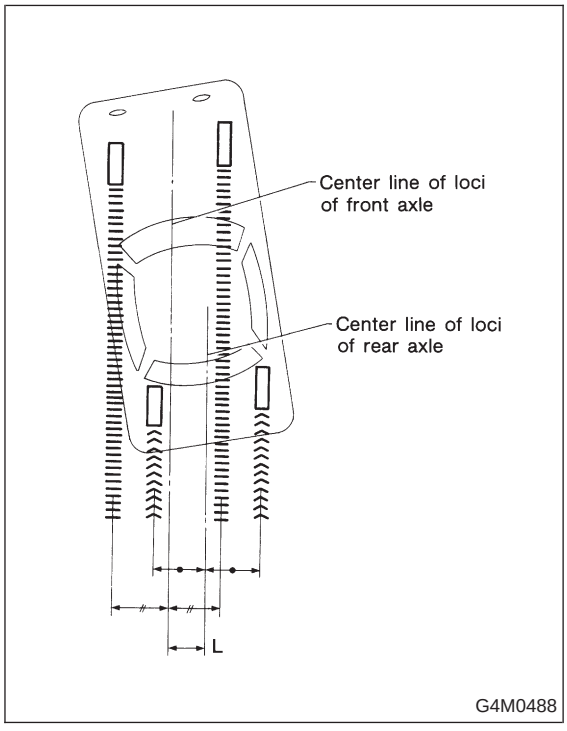
Tightening torque:
98±15 N·m (10±1.5 kg-m, 72±11 ft-lb)

6. THRUST ANGLE

● Inspection

1) Position vehicle on a level surface.
2) Move vehicle 3 to 4 meters directly forward.
3) Determine locus of both front and rear axles.
4) Measure distance “L” between center line of loci of the axles.

Thrust angle:
Less than 20′ when “L” is equal to or less than 15 mm (0.59 in).



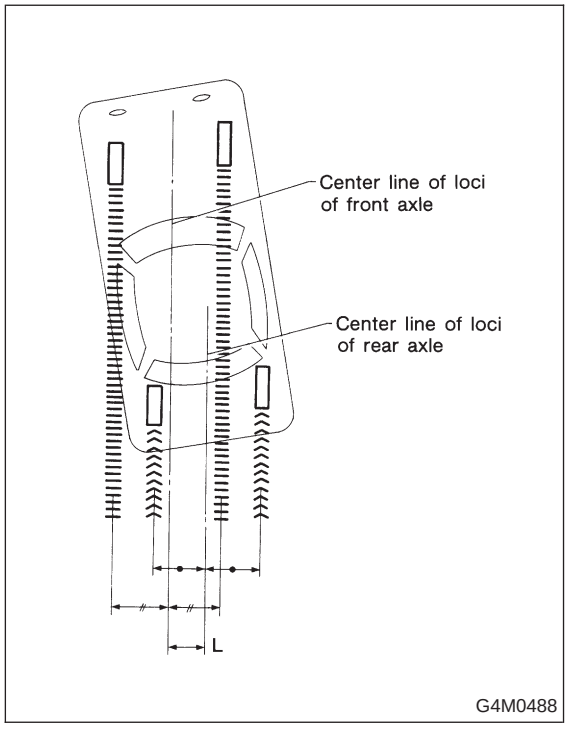
● Adjustment

1) Make thrust angle adjustments by turning toe-in adjusting bolts of rear suspension equally in the same direction.

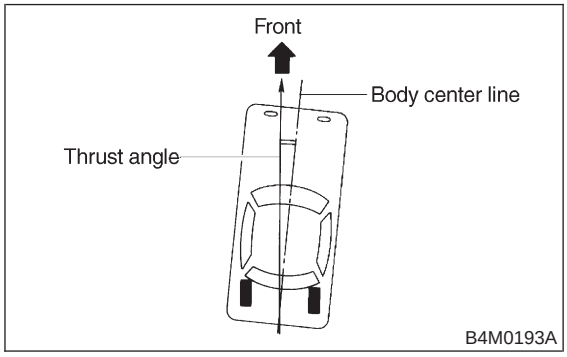
NOTE:
On FWD models, turn adjusting wheels one by one, by the some amount in the opposite direction of the adjusting bolts.

2) When one rear wheel is adjusted in a toe-in direction, adjust the other rear wheel equally in toe-out direction, in order to make thrust angle adjustment.
3) When left and right adjusting bolts are turned incrementally by one graduation in the same direction, the thrust angle of the AWD model will change approximately 10' ["L" is almost equal to 7.5 mm (0.295 in)] and the thrust angle of the FWD model will change approximately 12' ["L" is almost equal to 9 mm (0.35 in)].

Thrust angle:
0°±20'

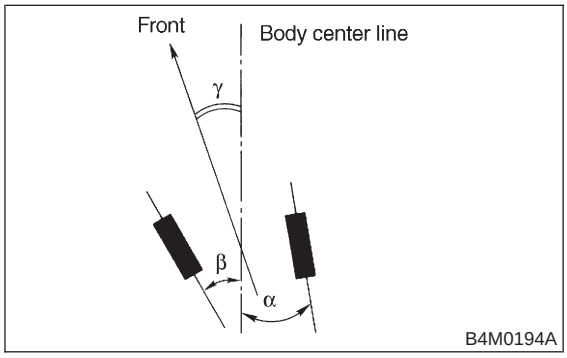


NOTE:
Thrust angle refers to a mean value of left and right rear wheel toe angles in relation to vehicle body center line. Vehicle is driven straight in the thrust angle direction while swinging in the oblique direction depending on the degree of the mean thrust angle.



Thrust angle: r = (α − β)/2

α: Right rear wheel toe angle
β: Left rear wheel toe angle



NOTE:
Here, use only positive toe-in values from each wheel to substitute for α and β in the equation.

7. STEERING ANGLE

● Inspection

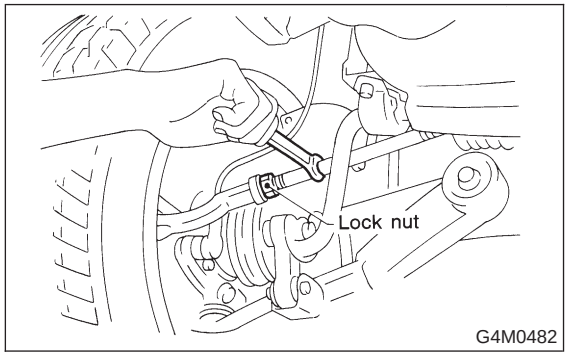
1) Place vehicle on a turning radius gauge.
2) While depressing brake pedal, turn steering wheel fully to the left and right. With steering wheel held at each fully turned position, measure both the inner and outer wheel steering angle.

Model	Steering angle	
	Inner wheel	Outer wheel
Except both SUS & OUTBACK	37.6°±1.5°	32.6°±1.5°
SUS & OUTBACK	34.4°±1.5°	30.2°±1.5°

● Adjustment

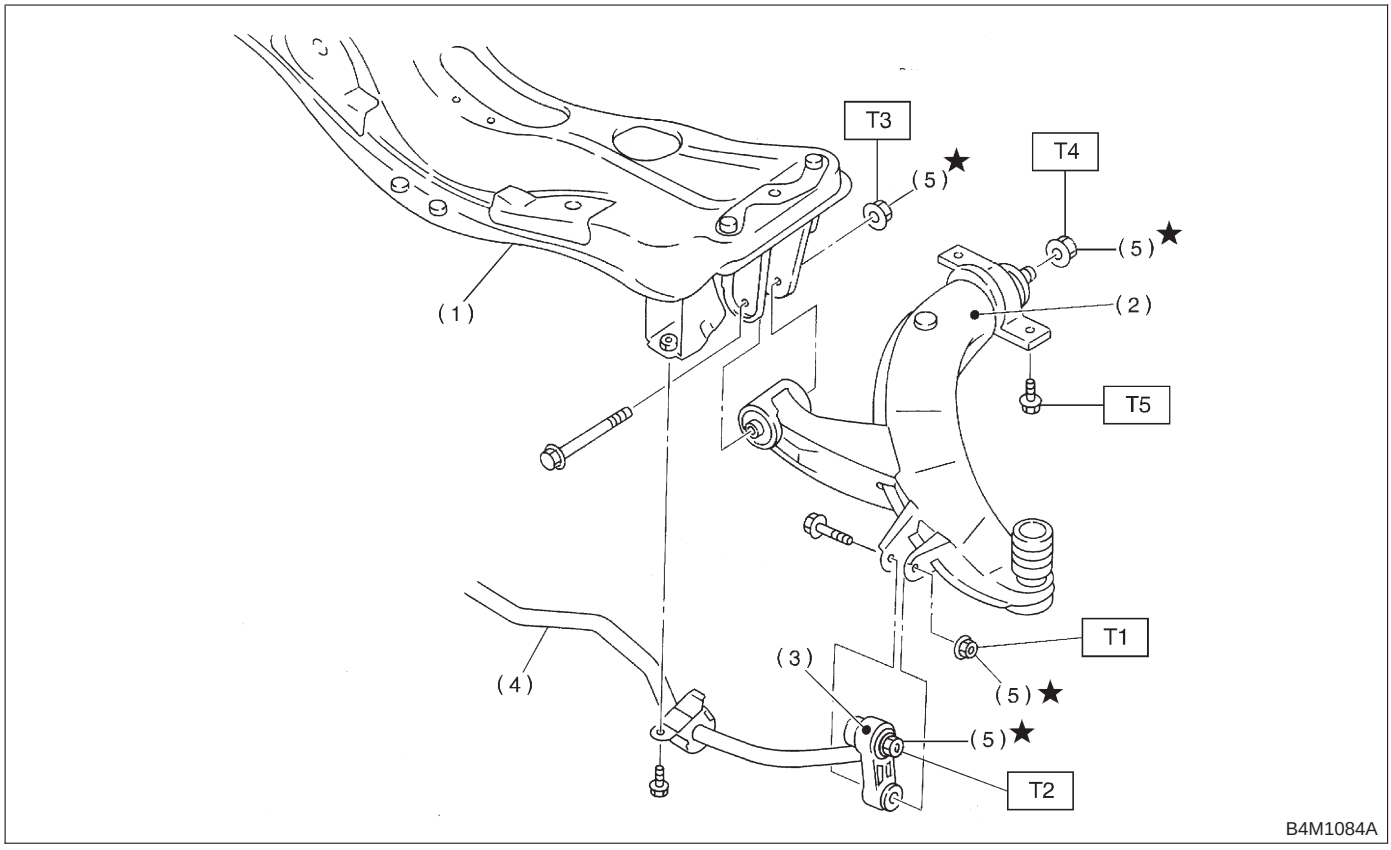
Turn tie-rod to adjust steering angle of both inner and outer wheels.

CAUTION:
- **Check toe-in.**
- **Correct boot if it is twisted.**



2. Front Transverse Link

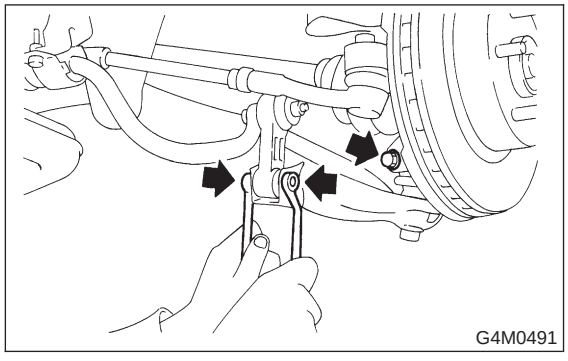
A: REMOVAL



(1) Front crossmember
(2) Transverse link
(3) Stabilizer link
(4) Front stabilizer
(5) Self-locking nut

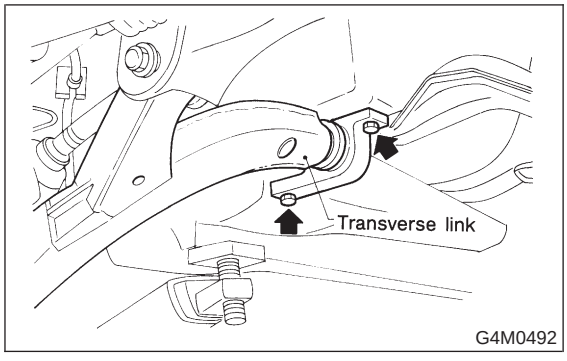
Tightening torque: N·m (kg-m, ft-lb)
T1: 29±5 (3.0±0.5, 21.7±3.6)
T2: 44±6 (4.5±0.6, 32.5±4.3)
T3: 98±15 (10.0±1.5, 72±11)
T4: 186±10 (19.0±1.0, 137±7)
T5: 245±49 (25.0±5.0, 181±36)

1) Disconnect stabilizer link from transverse link.
2) Remove bolt securing ball joint of transverse link to housing.



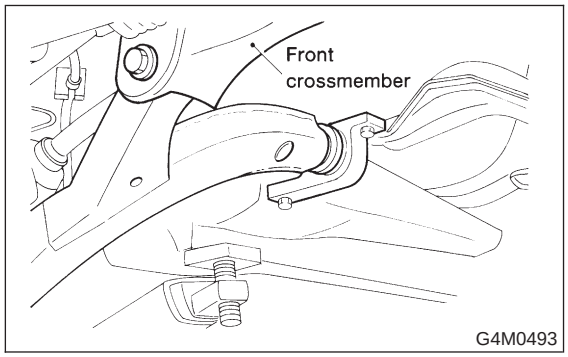
3) Remove nut (do not remove bolt.) securing transverse link to crossmember.

4) Remove two bolts securing bushing bracket of transverse link to vehicle body at rear bushing location.



5) Extract ball joint from housing.

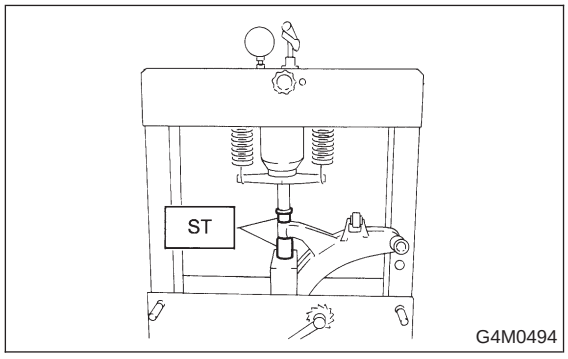
6) Remove bolt securing transverse link to crossmember and extract transverse link from crossmember.



B: DISASSEMBLY

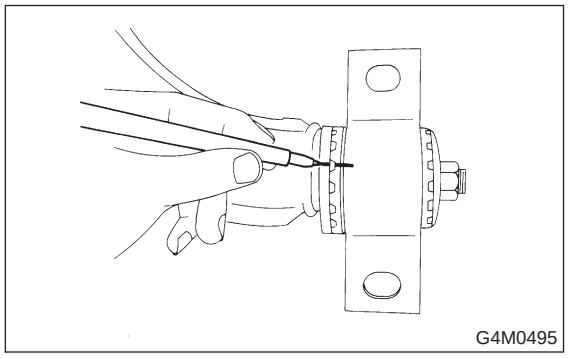
1. FRONT BUSHING

Using ST, press front bushing out of place.
ST 927680000 INSTALLER & REMOVER SET



2. REAR BUSHING

1) Scribe an aligning mark on transverse link and rear bushing.



2) Loosen nut and remove rear bushing.

C: INSPECTION

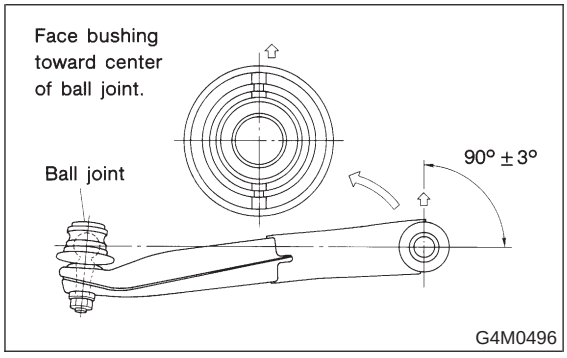
1) Check transverse link for wear, damage and cracks, and correct or replace if defective.
2) Check bushings for cracks, wear, damage and creeping.
3) Check rear bushing for oil leaks.
4) If defective, replace with new one.

D: ASSEMBLY

1. FRONT BUSHING

To reassemble, reverse disassembly procedures.

CAUTION:
Install front bushing in correct direction, as shown in figure.



2. REAR BUSHING

1) Install rear bushing to transverse link and align aligning marks scribed on the two.
2) Tighten self-locking nut.

CAUTION:
● Discard loosened self-locking nut and replace with a new one.
● While holding rear bushing so as not to change position of aligning marks, tighten self-locking nut.

Tightening torque:
186±10 N·m (19.0±1.0 kg-m, 137±7 ft-lb)

E: INSTALLATION

1) Temporarily tighten the two bolts used to secure rear bushing of the transverse link to body.

NOTE:
These bolts should be tightened to such an extent that they can still move back and forth in the oblong shaped hole in the bracket (which holds the bushing).

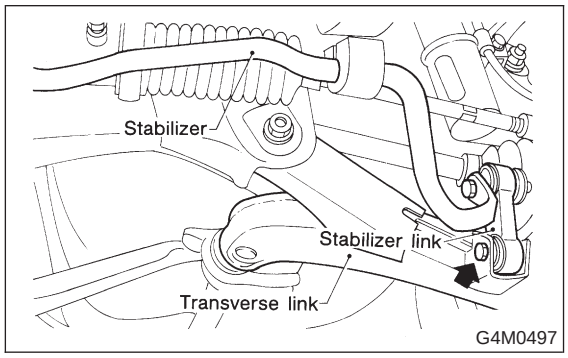
2) Install bolts used to connect transverse link to crossmember and temporarily tighten with nut.

CAUTION:
Discard loosened self-locking nut and replace with a new one.

3) Insert ball joint into housing.

4) Connect stabilizer link to transverse link, and temporarily tighten bolts.

CAUTION:
Discard loosened self-locking nut and replace with a new one.



5) Tighten the following points in the order shown below when wheels are in full contact with the ground and vehicle is at curb weight condition.
(1) Transverse link and stabilizer link

Tightening torque:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)

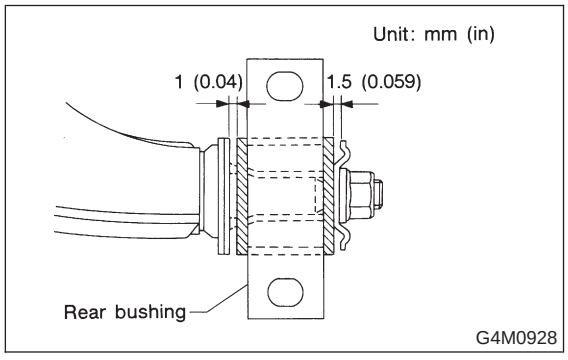
(2) Transverse link and crossmember

Tightening torque:
98±15N·m (10.0±1.5 kg-m, 72±11 ft-lb)

(3) Transverse link rear bushing and body

Tightening torque:
245±49 N·m (25±5 kg-m, 181±36 ft-lb)

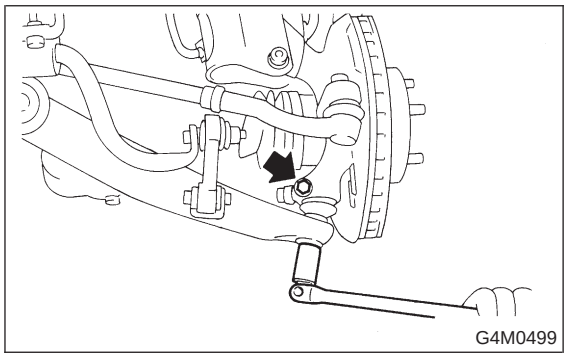
NOTE:
● Move rear bushing back and forth until transverse link-to-rear bushing clearance is established (as indicated in figure.) before tightening.
● Check wheel alignment and adjust if necessary.



3. Front Ball Joint

A: REMOVAL

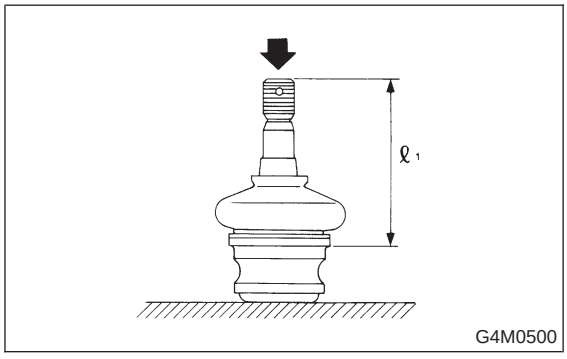
1) Remove the wheel.
2) Pull out the cotter pin from the ball stud, remove the castle nut, and extract the ball stud from the transverse link.
3) Remove the bolt securing the ball joint to the housing.



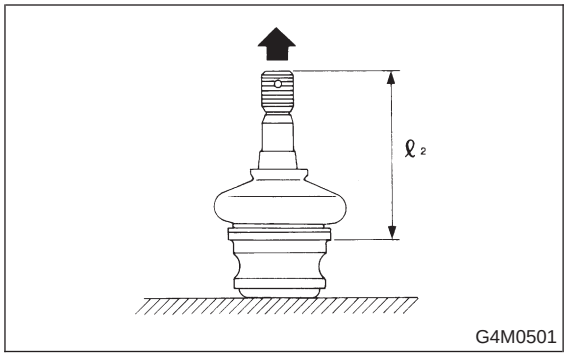
4) Extract the ball joint from the housing.

B: INSPECTION

1) Measure play of ball joint by the following procedures. Replace with a new one when the play exceeds the specified value.
(1) With 686 N (70 kg, 154 lb) loaded in the direction shown in the figure, measure dimension ℓ_1.



(2) With 686 N (70 kg, 154 lb) loaded in the opposite direction shown in the figure, measure dimension ℓ_2.



(3) Calculate plays from the following formula.
S= $\ell_2 - \ell_1$
(4) When plays are larger than the following value, replace with a new one.

FRONT BALL JOINT
Specified play for replacement:
Less than 0.3 mm (0.012 in)

2) When play is smaller than the specified value, visually inspect the dust cover.
3) If the dust cover is damaged, replace with the new ball joint.
4) Check ball joint for damage and cracks. If defective, replace with new one.

C: INSTALLATION

1) Install ball joint onto housing.

Torque (Bolt):
49±10 N·m (5.0±1.0 kg-m, 36±7 ft-lb)

CAUTION:
Do not apply grease to tapered portion of ball stud.

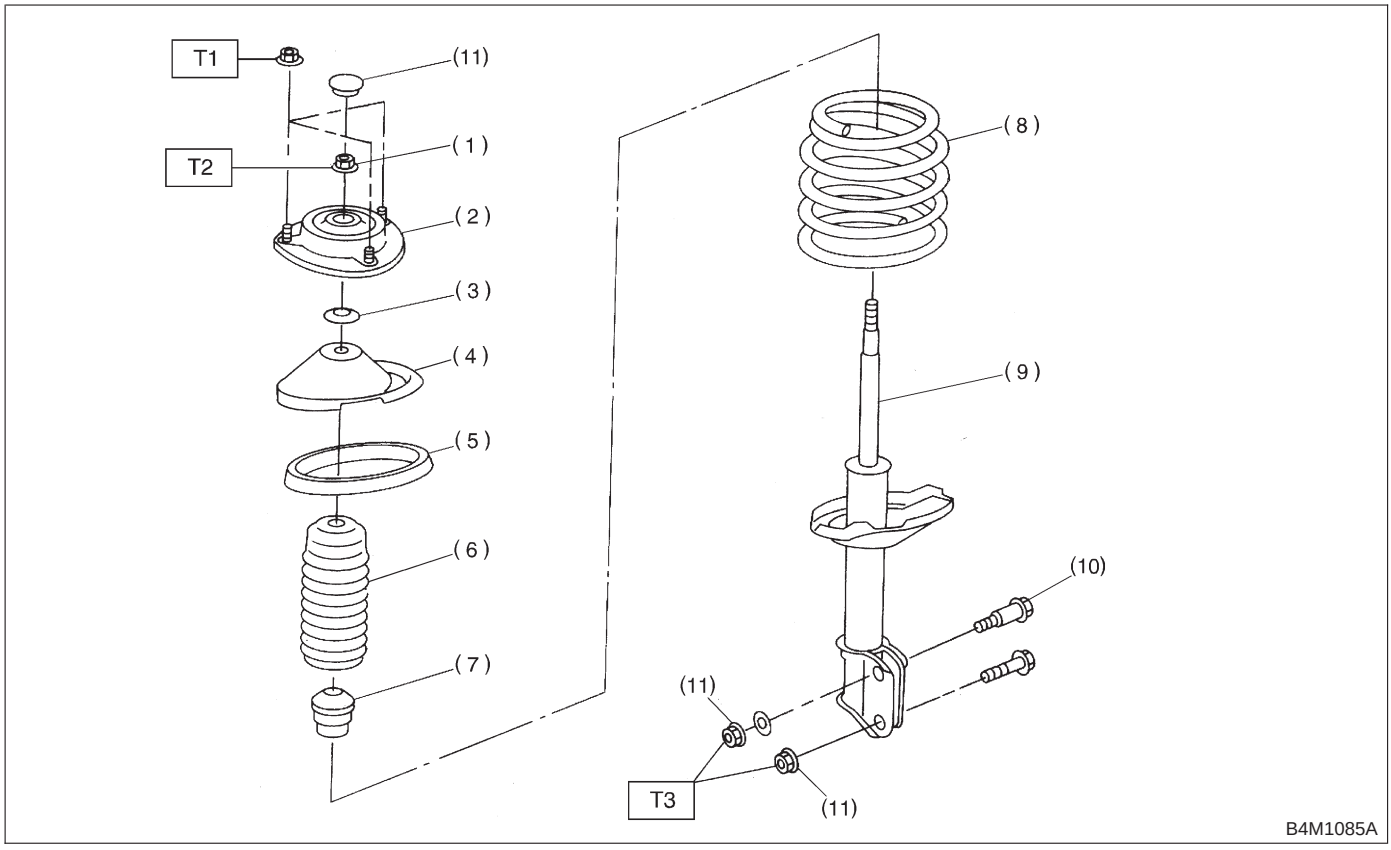
2) Connect ball joint to transverse link.

Torque (Castle nut):
39 N·m (4.0 kg-m, 29 ft-lb)

3) Retighten castle nut further within 60° until a slot in castle nut is aligned with the hole of ball stud end, then insert new cotter pin and bend it around castle nut.
4) Install front wheel.

4. Front Strut

A: REMOVAL

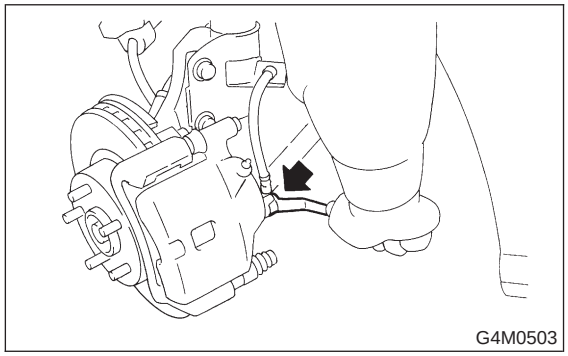


(1) Dust seal
(2) Strut mount
(3) Spacer
(4) Upper spring seat
(5) Rubber seat
(6) Dust cover
(7) Helper
(8) Coil spring
(9) Damper strut
(10) Adjusting bolt
(11) Self-locking nut

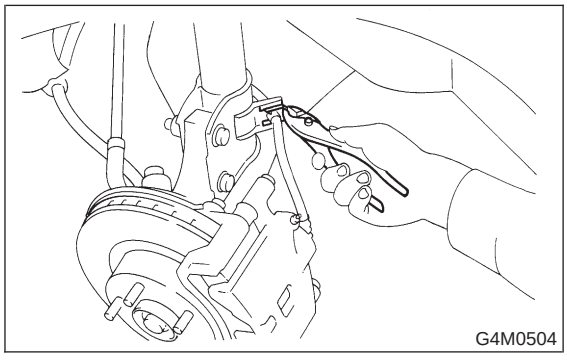
Tightening torque: N·m (kg-m, ft-lb)
T1: 20±6 (2.0±0.6, 14.5±4.3)
T2: 54±5 (5.5±0.5, 39.8±3.6)
T3: 152±20 (15.5±2.0, 112±14)

1) Remove wheel.
2) Depress brake pedal and hold it down using a wooden block etc.
3) Remove union bolts from caliper.

CAUTION:
Use brake hose cap to prevent brake fluid from escaping.



4) Remove brake hose clamp and disconnect brake hose from strut. Attach brake hose to body using gum tape.

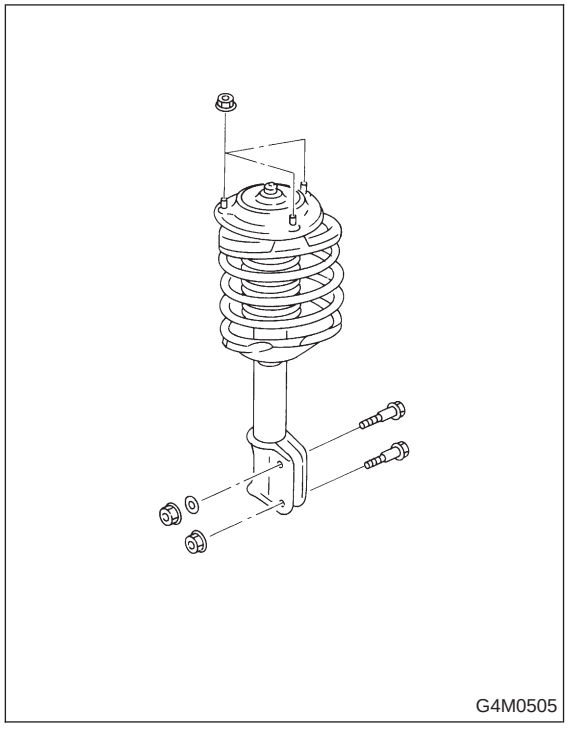


5) Scribe an alignment mark on the camber adjusting bolt which secures strut to housing.
6) Remove bolt securing the ABS sensor harness. (ABS equipped models.)

7) Remove two bolts securing housing to strut.

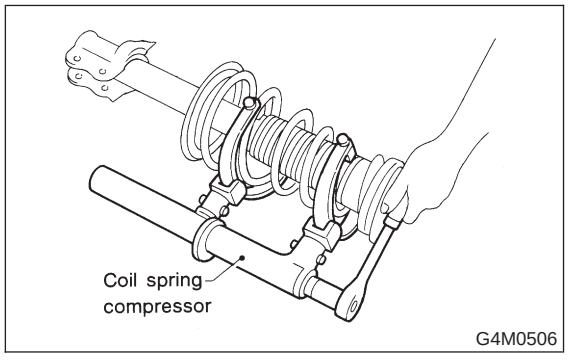
CAUTION:
While holding head of adjusting bolt, loosen self-locking nut.

8) Remove the three nuts securing strut mount to body.


G4M0505

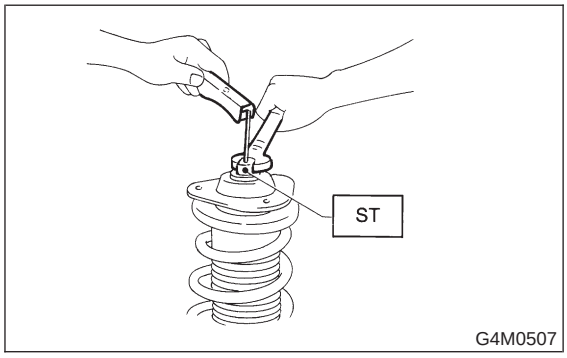
B: DISASSEMBLY

1) Using a coil spring compressor, compress coil spring.



G4M0506

2) Using ST, remove self-locking nut.
ST 927760000 STRUT MOUNT SOCKET



G4M0507

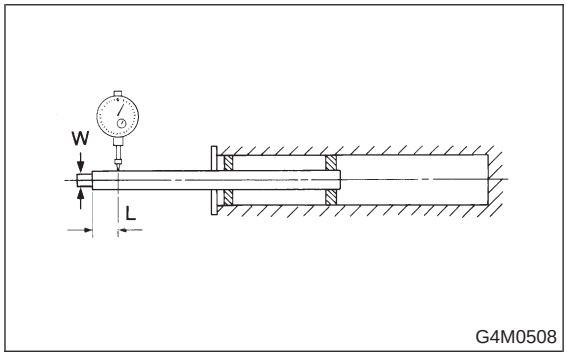
3) Remove strut mount, upper spring seat and rubber seat from strut.
4) Gradually decreasing compression force of spring compressor, and remove coil spring.
5) Remove dust cover and helper.

C: INSPECTION

Check the disassembled parts for cracks, damage and wear, and replace with new parts if defective.

1. DAMPER STRUT

1) Check for oil leakage.
2) Move the piston rod up and down to check its operates smoothly without any binding.
3) Play of piston rod
● Measure the play as follows:
Fix outer shell and fully extend the rod. Set a dial gauge at the end of the rod: L [10 mm (0.39 in)], then apply a force of W [20 N (2 kg, 4 lb)] to threaded portion. With the force of 20 N (2 kg, 4 lb) applied, read dial gauge indication: P_1. Apply a force of 20 N (2 kg, 4 lb) in the opposite direction of “W”, then read dial gauge indication: P_2.



G4M0508

The free play is determined by the following equation:

Play = P_1, P_2

Limit of play:
Less than 0.8 mm (0.031 in)

If the play is greater, replace the strut with new one.

2. STRUT MOUNT

Check rubber part for wear, cracks and deterioration, and replace it with new one if defective.

3. DUST COVER

If any cracks or damage are found, replace it with new one.

4. COIL SPRING

When vehicle posture is uneven, although there are no considerable reasons like tire puncture, uneven loading, etc., check coil spring and spring seats for cracks, deformation, etc., and replace it with a new one if defective.

5. HELPER

Replace it with new one if cracked or damaged.

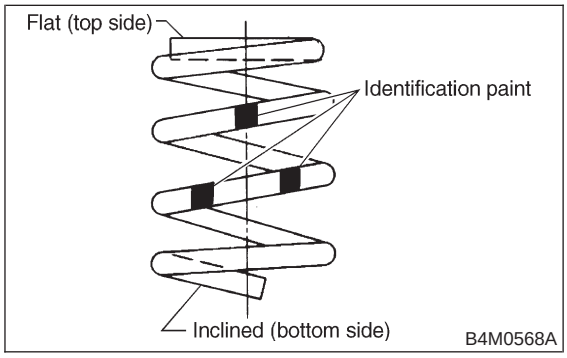
D: ASSEMBLY

1) Before installing coil spring, strut mount, etc., on the strut, check for the presence of air in the dampening force generating mechanism of the strut since air prevents proper dampening force from being produced.
2) Checking for the presence of air
   (1) Place the strut vertically with the piston rod facing upward.
   (2) Move the piston rod to the center of its entire stroke.
   (3) While holding the piston rod end with fingertips, move the rod up and down.
   (4) If the piston rod moves at least 10 mm (0.39 in) in former step, purge air from the strut.
3) Air purging procedure
   (1) Place the strut vertically with the piston rod facing upward.
   (2) Fully extend the piston rod.
   (3) With the piston rod fully extended, place the piston rod side down. The strut must stand vertically.
   (4) Fully contract the piston rod.
   (5) Repeat 3 or 4 times from first step.

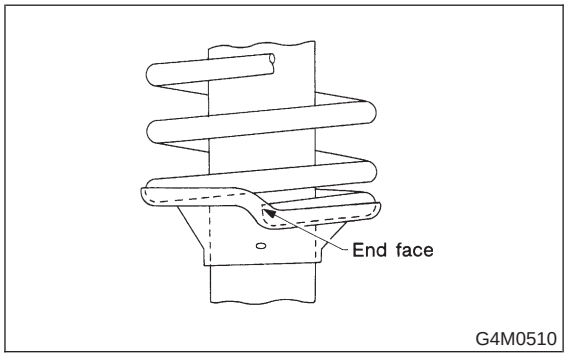
NOTE:
After completely purging air from the strut, be sure to place the strut with the piston rod facing upward. If it is laid down, check for entry of air in the strut as outlined under “Checking for the presence of air”.

4) Using a coil spring compressor, compress the coil spring.

NOTE:
Make sure that the vertical installing direction of coil spring is as shown in figure.

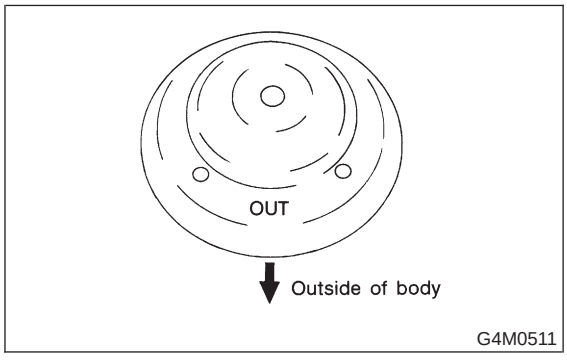


5) Set the coil spring correctly so that its end face fits well into the spring seat as shown.



6) Install helper and dust cover to the piston rod.
7) Pull the piston rod fully upward, and install rubber seat and spring seat.

NOTE:
Ensure that upper spring seat is positioned with “OUT” mark facing outward.

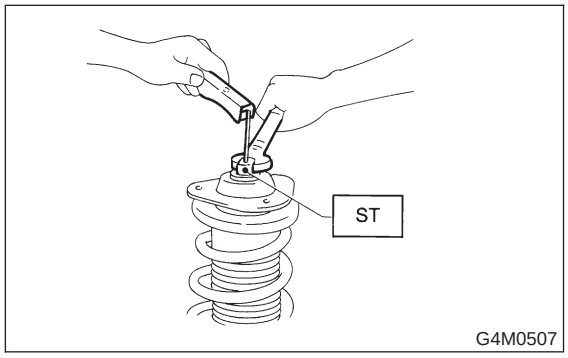


8) Install strut mount to the piston rod, and tighten the self-locking nut temporarily.

CAUTION:
Be sure to use a new self-locking nut.

9) Using hexagon wrench to prevent strut rod from turning, tighten self-locking nut with ST.
ST 927760000 STRUT MOUNT SOCKET

Tightening torque:
54±5 N·m (5.5±0.5 kg-m, 39.8±3.6 ft-lb)



10) Loosen the coil spring carefully.

E: INSTALLATION

1) Install strut mount at upper side of strut to body and tighten with nuts.

Tightening torque:
20±6 N·m (2.0±0.6 kg-m, 14.5±4.3 ft-lb)

2) Connect housing to lower side of strut.
3) Position aligning mark on camber adjusting bolt with aligning mark on lower side bracket of strut.

CAUTION:
- **While holding head of adjusting bolt, tighten self-locking nut.**
- **Be sure to use new self-locking nut.**

Tightening torque:
152±20 N·m (15.5±2.0 kg-m, 112±14 ft-lb)

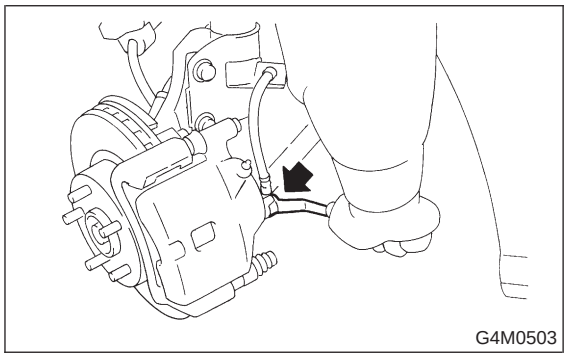
4) Install ABS sensor harness to strut. (ABS equipped models.)

Tightening torque:
152±20N·m (15.5±2.0 kg-m, 112±14 ft-lb)

5) Install brake hose at lower side of strut with clamp.

6) Install union bolts which secure brake caliper to brake hose.

Tightening torque:
18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)



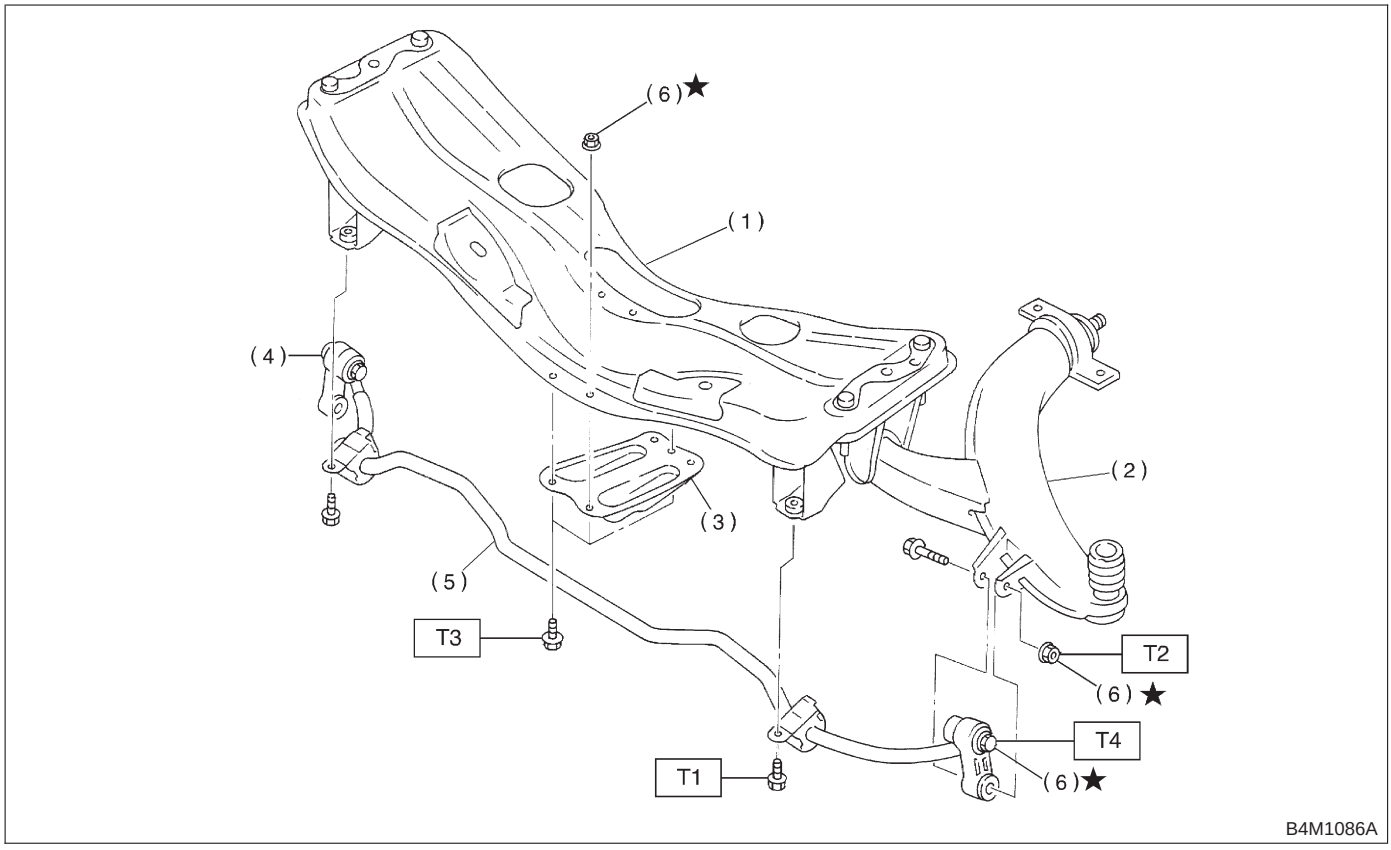
CAUTION:
Be sure to bleed air from brake system.

7) Install wheels.

NOTE:
Check wheel alignment and adjust if necessary.

5. Front Stabilizer

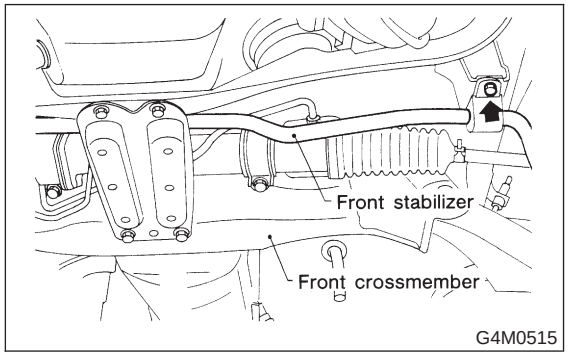
A: REMOVAL



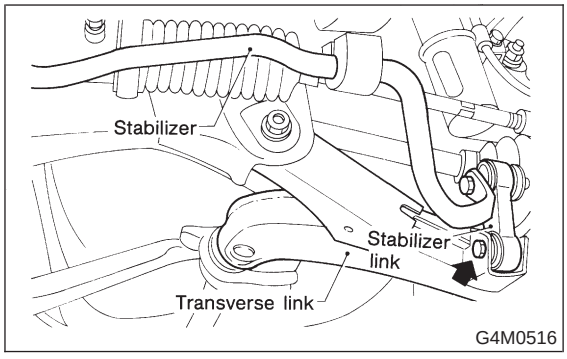
(1) Front crossmember
(2) Transverse link
(3) Jack-up plate
(4) Stabilizer link
(5) Front stabilizer
(6) Self-locking nut

Tightening torque:N·m (kg-m, ft-lb)
T1: 25±4 (2.5±0.4, 18.1±2.9)
T2: 29±5 (3.0±0.5, 21.7±3.6)
T3: 18±5 (1.8±0.5, 13.0±3.6)
T4: 44±6 (4.5±0.6, 32.5±4.3)

1) Jack-up the front part of the vehicle, support it with safety stand (rigid racks).
2) Remove bolts which secure stabilizer to crossmember.



3) Remove bolts which secure stabilizer link to front transverse link.



4) Remove jack-up plate from lower part of crossmember.

B: INSPECTION

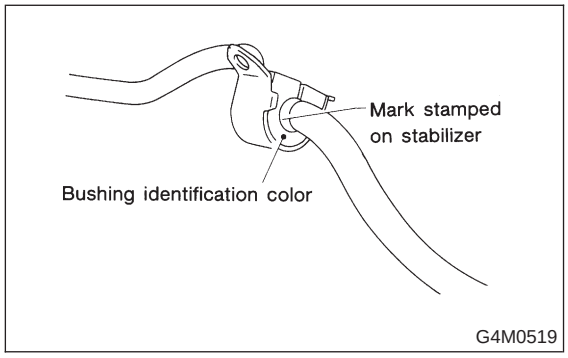
1) Check bushing for cracks, fatigue or damage.

2) Check stabilizer link for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link and its play.

C: INSTALLATION

1) To install, reverse the removal procedure.

NOTE:
● Install bushing (on front crossmember side) while aligning it with paint mark on stabilizer.
● Ensure that bushing and stabilizer have the same identification colors when installing.



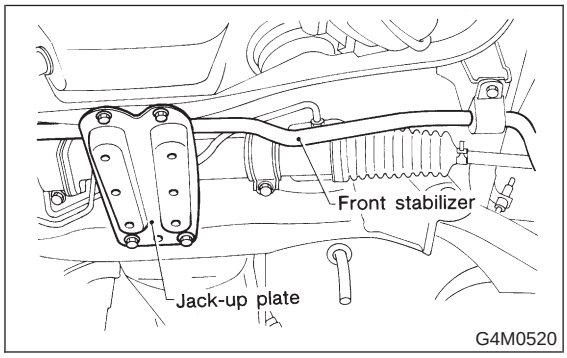
2) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is at curb weight condition.

Tightening torque:
Jack-up plate to crossmember:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)
Stabilizer link to front transverse link:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)
Stabilizer to crossmember:
25±4 N·m (2.5±0.4 kg-m, 18.1±2.9 ft-lb)

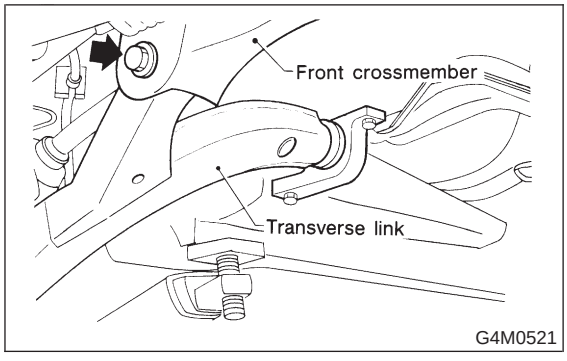
6. Front Crossmember

A: REMOVAL

1) Disconnect ground cable from battery.
2) Loosen front wheel nuts.
3) Lift-up vehicle, and remove front tires and wheels.
4) Remove both stabilizer and jack-up plate.



5) Disconnect tie-rod end from housing.
6) Remove front exhaust pipe.
7) Remove front transverse link from front crossmember and body.



8) Remove nuts attaching engine mount cushion rubber to crossmember.
9) Remove self-locking nuts connecting steering U/J and pinion shaft.
10) Lift engine by approx. 10 mm (0.39 in) by using chain block.
11) Support crossmember with a jack, remove nuts securing crossmember to body and lower crossmember gradually along with steering gearbox.

CAUTION:
When removing crossmember downward, be careful that tie-rod end does not interfere with DOJ boot.

B: INSTALLATION

1) Installation is in the reverse order of removal procedures.

CAUTION:
Always tighten rubber bushing when wheels are in full contact with the ground and vehicle is at curb weight condition.

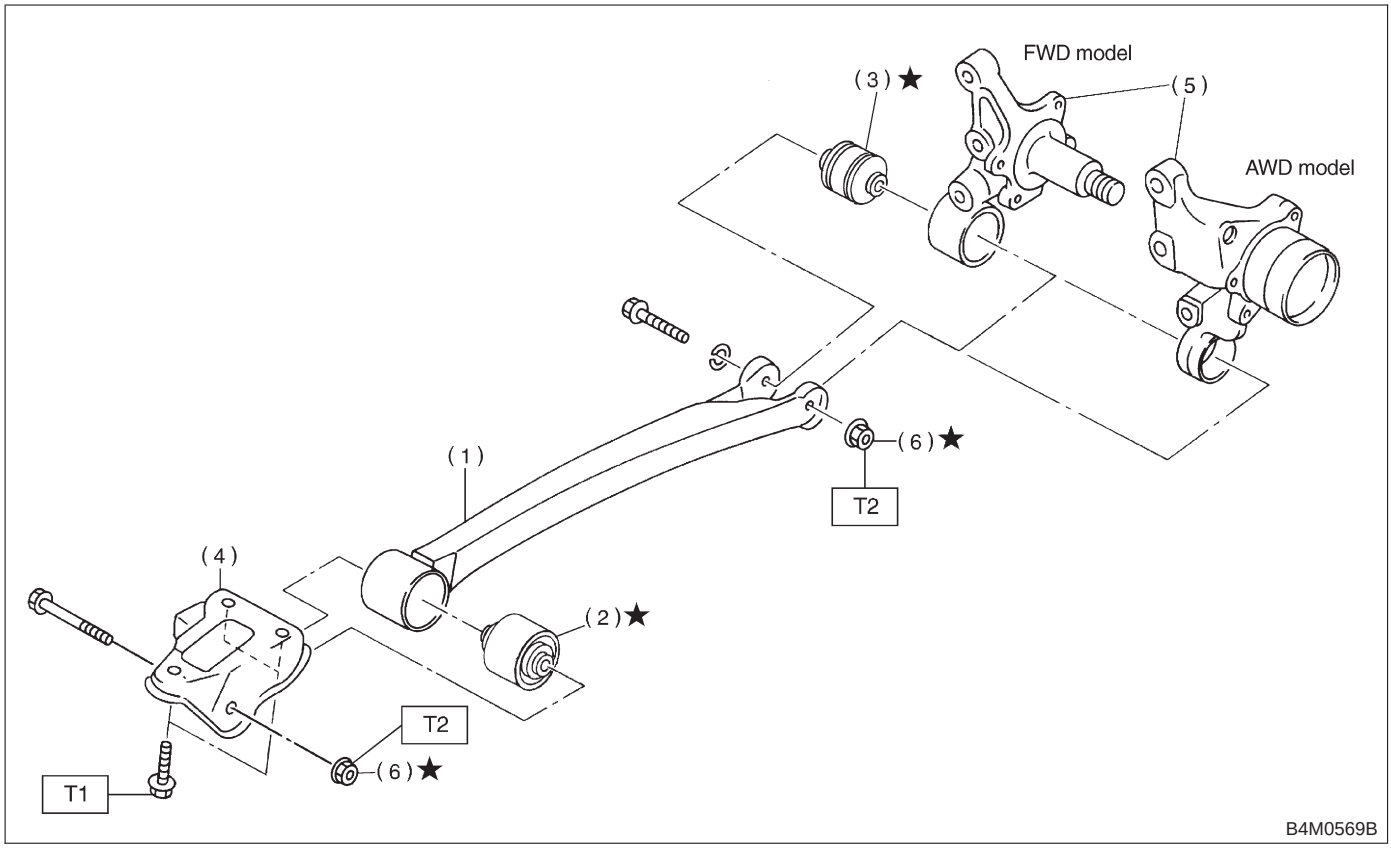
Tightening torque:
Transverse link bushing to crossmember:
98±15 N·m (10.0±1.5 kg-m, 72±11 ft-lb)
Stabilizer to bushing:
25±4 N·m (2.5±0.4 kg-m, 18.1±2.9 ft-lb)
Tie-rod end to housing:
27.0±2.5 N·m (2.75±0.25 kg-m, 19.9±1.8 ft-lb)
Front cushion rubber to crossmember:
69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)
Universal joint to pinion shaft:
24±3 N·m (2.4±0.3 kg-m, 17.4±2.2 ft-lb)
Crossmember to body:
98±15 N·m (10.0±1.5 kg-m, 72±11 ft-lb)

2) Purge air from power steering system.

NOTE:
Check wheel alignment and adjust if necessary.

7. Rear Trailing Link

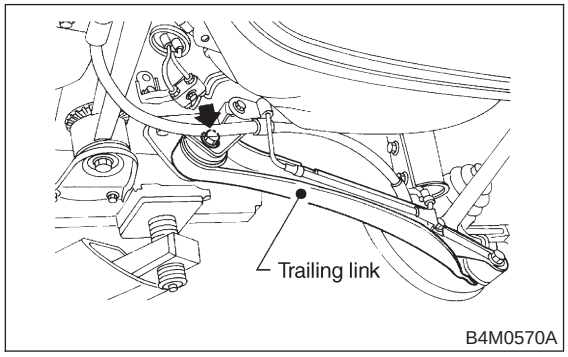
A: REMOVAL



(1) Trailing link
(2) Front bushing
(3) Rear bushing
(4) Bracket
(5) Housing
(6) Self-locking nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 98±20 (10.0±2.0, 72±14)
T2: 113±15 (11.5±1.5, 83±11)

1) Loosen rear wheel nuts.
2) Lift-up vehicle, support it with safety stands (rigid racks) and remove rear wheels.
3) Remove both rear parking brake clamp and ABS sensor harness. (ABS equipped models.)
4) Remove bolt which secure trailing link to trailing link bracket.

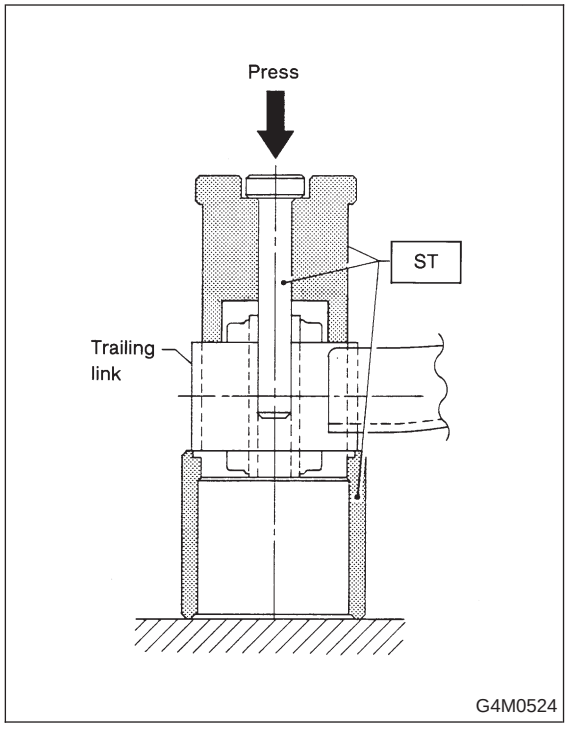


5) Remove bolt which secure trailing link to rear housing.

B: DISASSEMBLY

1. FRONT BUSHING

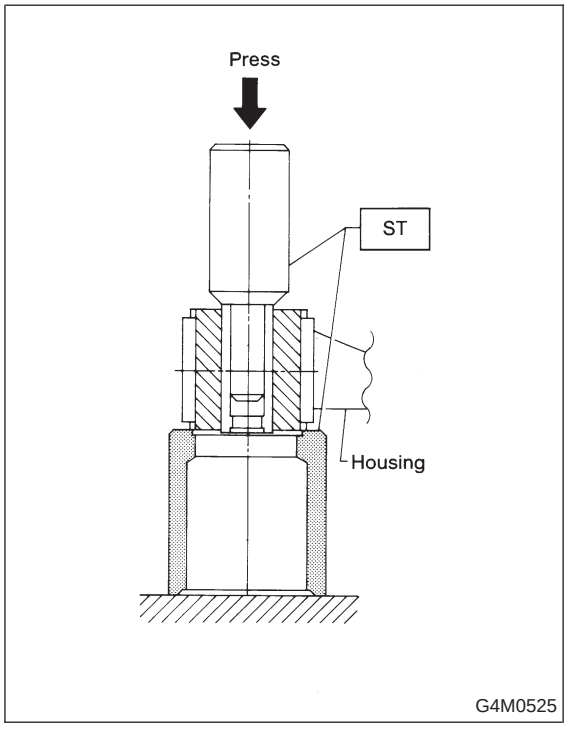
Using ST, press front bushing out of place.
ST 927720000 INSTALLER & REMOVER SET



2. REAR BUSHING

1) Remove housing.
- AWD mode <Ref. to 4-2 [W2A0].>
- FWD mode <Ref. to 4-2 [W3A0].>

2) Using ST, press rear bushing out of place.
ST 927730000 INSTALLER & REMOVER SET



C: INSPECTION

Check trailing links for bends, corrosion or damage.

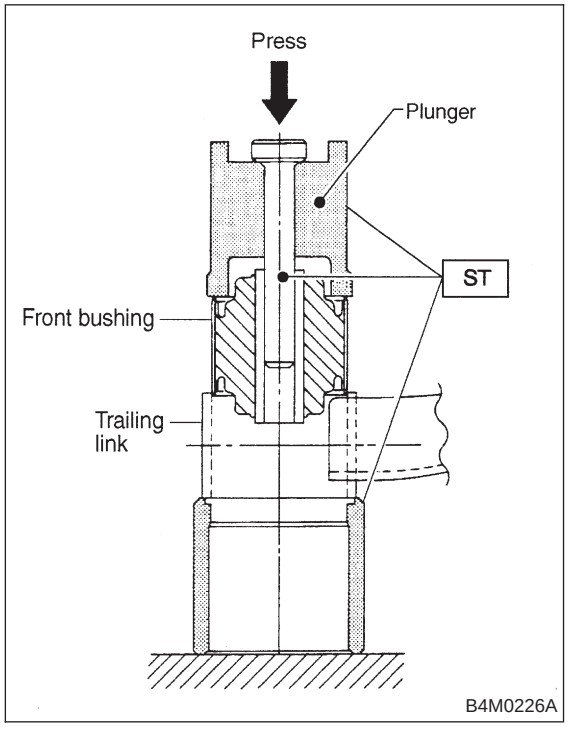
D: ASSEMBLY

To assemble, reverse above disassembly procedures.

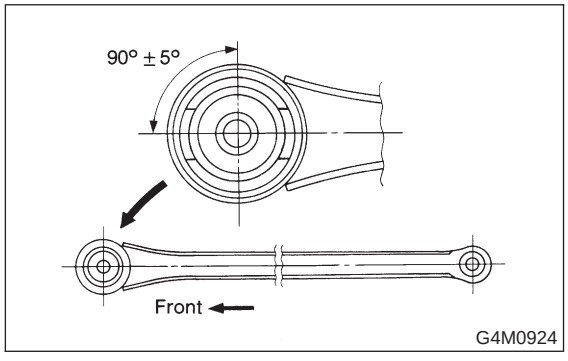
1. FRONT BUSHING

Using ST, press bushing into trailing link.
ST 927720000 INSTALLER & REMOVER SET

CAUTION:
When installing bushing, turn ST plunger upside down and press it until plunger end surface contacts trailing link end surface.



CAUTION:
Install front bushing in the proper direction, as shown in figure.

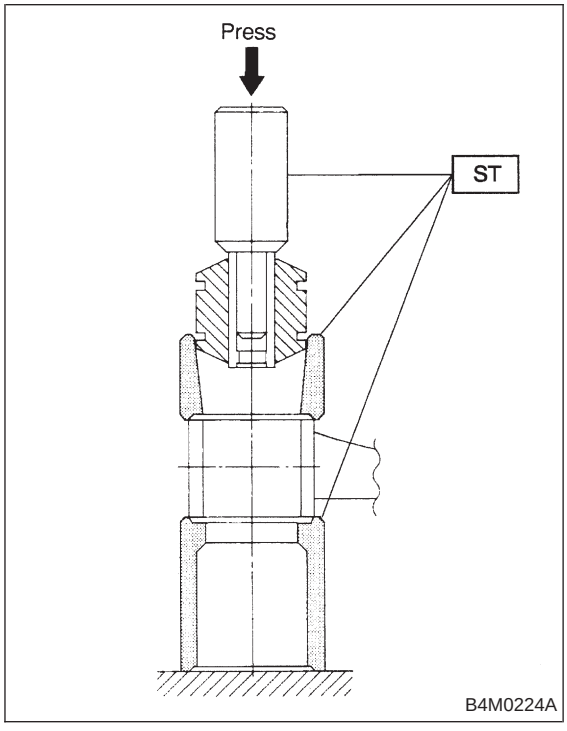


2. REAR BUSHING

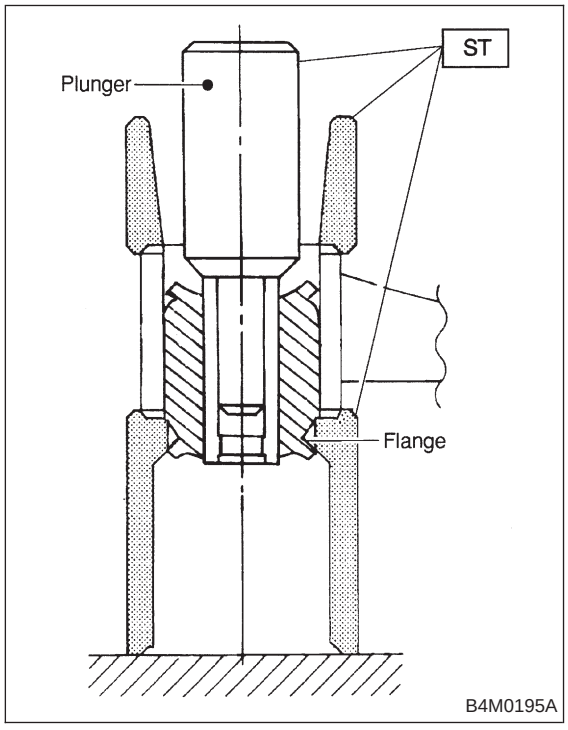
1) Using ST, press bushing into trailing link.
ST 927730000 INSTALLER & REMOVER SET

NOTE:
If it is difficult to press bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

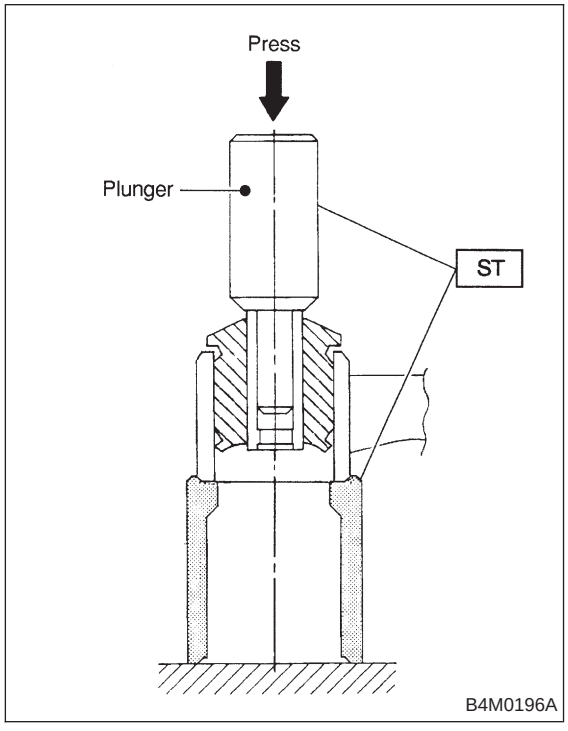
Specified lubricant:
TIRE LUBE : water = 1 : 3



2) Press ST plunger until bushing flange protrudes beyond trailing link.
ST 927730000 INSTALLER & REMOVER SET



3) Turn trailing link upside down. Press ST plunger in the direction opposite that outlined in the former procedure until bushing is correctly positioned in trailing link.
ST 927730000 INSTALLER & REMOVER SET



E: INSTALLATION

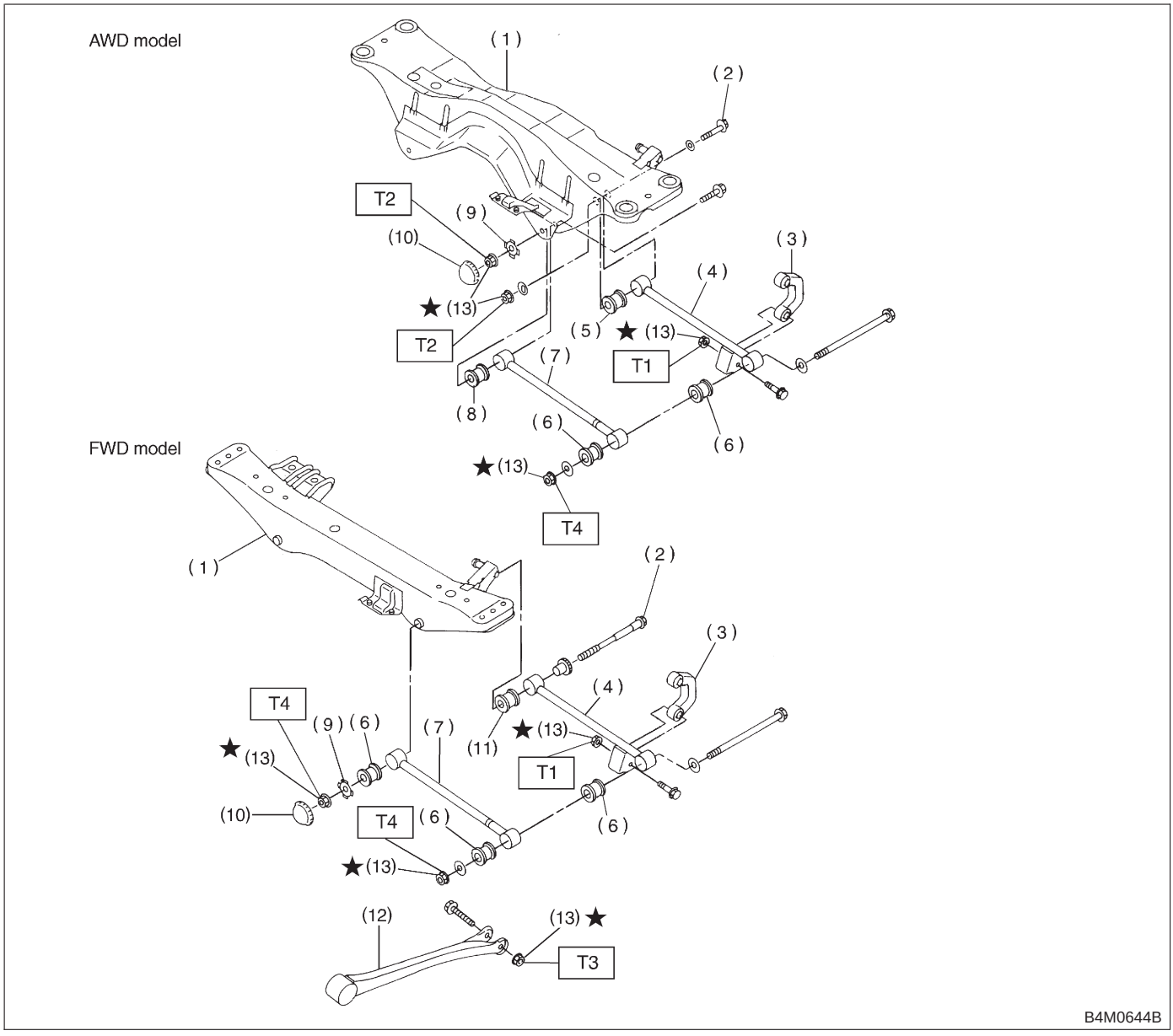
Installation is in the reverse order of removal.

CAUTION:
Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is at curb weight condition.

NOTE:
Check wheel alignment and adjust if necessary.

8. Lateral Link

A: REMOVAL



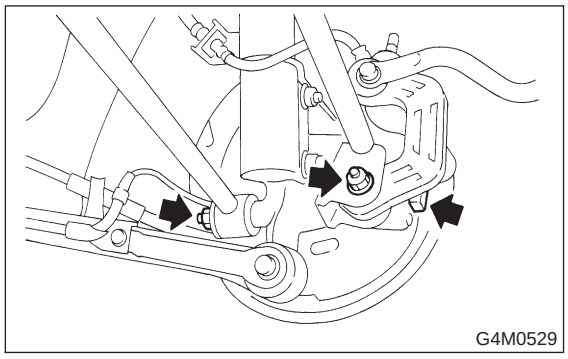
(1) Crossmember
(2) Adjusting bolt
(3) Stabilizer link
(4) Rear lateral link
(5) Bushing (C)
(6) Bushing (A)
(7) Front lateral link
(8) Bushing (B)
(9) Washer
(10) Cap (Protection)
(11) Bushing (D)
(12) Trailing link
(13) Self-locking nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 44±6 (4.5±0.6, 32.5±4.3)
T2: 98±15 (10.0±1.5, 72±11)
T3: 113±15 (11.5±1.5, 83±11
T4: 137±20 (14.0±2.0, 101±14)

1. FWD MODEL

1) Loosen wheel nuts. Lift-up vehicle and remove wheel.
2) Remove rear exhaust pipe and muffler.
3) Remove stabilizer link from rear lateral link.
4) Scribe an aligning mark on adjusting bolt, adjusting wheel and crossmember.

5) Remove bolts securing lateral links to housing.



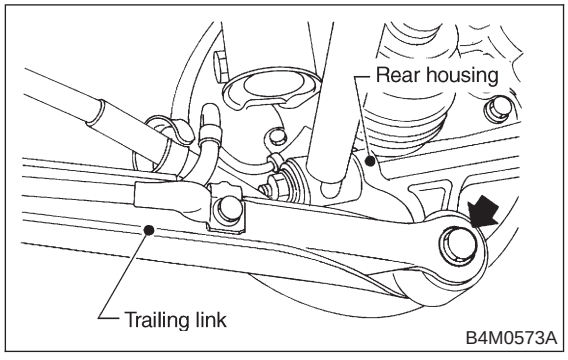
6) Turn cap (lateral link) counterclockwise until it contacts stopper, then remove cap.
7) While holding adjusting bolt's head with a wrench, loosen self-locking nut.

CAUTION:
Always loosen self-locking nut before turning adjusting bolt.

8) Lateral link removal
(1) Left lateral links
Remove adjusting bolt and front and rear lateral links.
(2) Right lateral links
Support crossmember with transmission jack. Remove bolts securing crossmember to vehicle body.
Lower transmission jack until adjusting bolt can be removed. Remove adjusting bolt, front and rear lateral links.

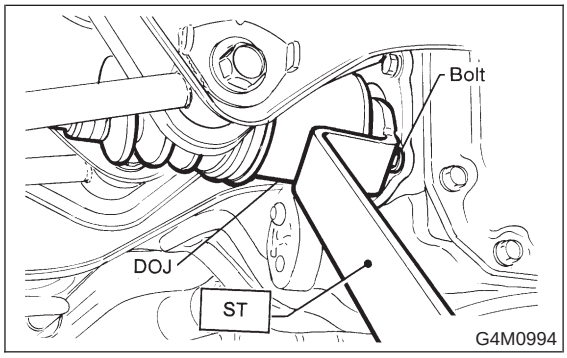
2. AWD MODEL

1) Loosen wheel nuts. Lift-up vehicle and remove wheel.
2) Remove stabilizers link from lateral link.
3) Remove ABS sensor harness from trailing link. (ABS equipped models.)
4) Remove bolt securing trailing link to housing.



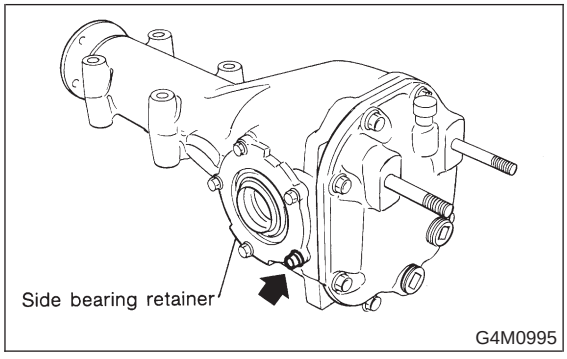
5) Remove bolts which secure lateral link assembly to rear housing.
6) Remove crossmember reinforcement lower from crossmember. (4 door model only)
7) Remove DOJ from rear differential using ST.
ST 28099PA100 DRIVE SHAFT REMOVER

NOTE:
The side spline shaft circlip comes out together with the shaft.



CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

ST 28099PA100 DRIVE SHAFT REMOVER



8) Scribe an alignment mark on rear lateral link adjusting bolt and crossmember.
9) Remove bolts securing front and rear lateral links to crossmember, detach lateral links.

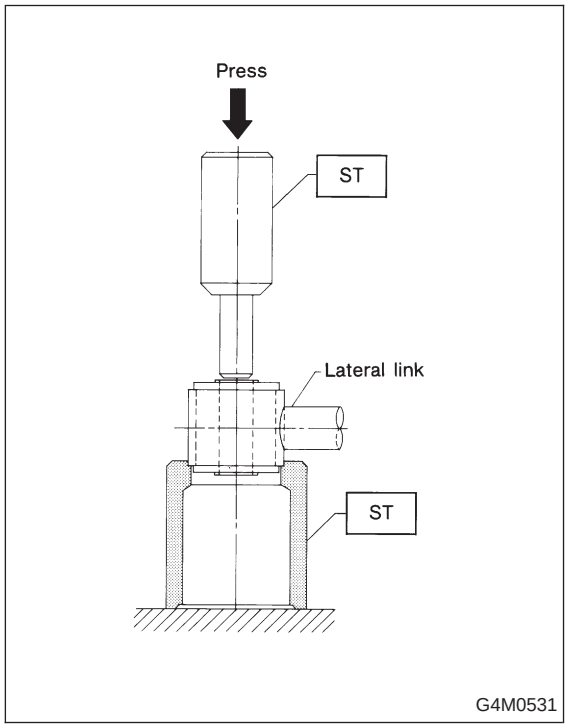
CAUTION:
To loosen adjusting bolt, always loosen nut while holding the head of adjusting bolt.

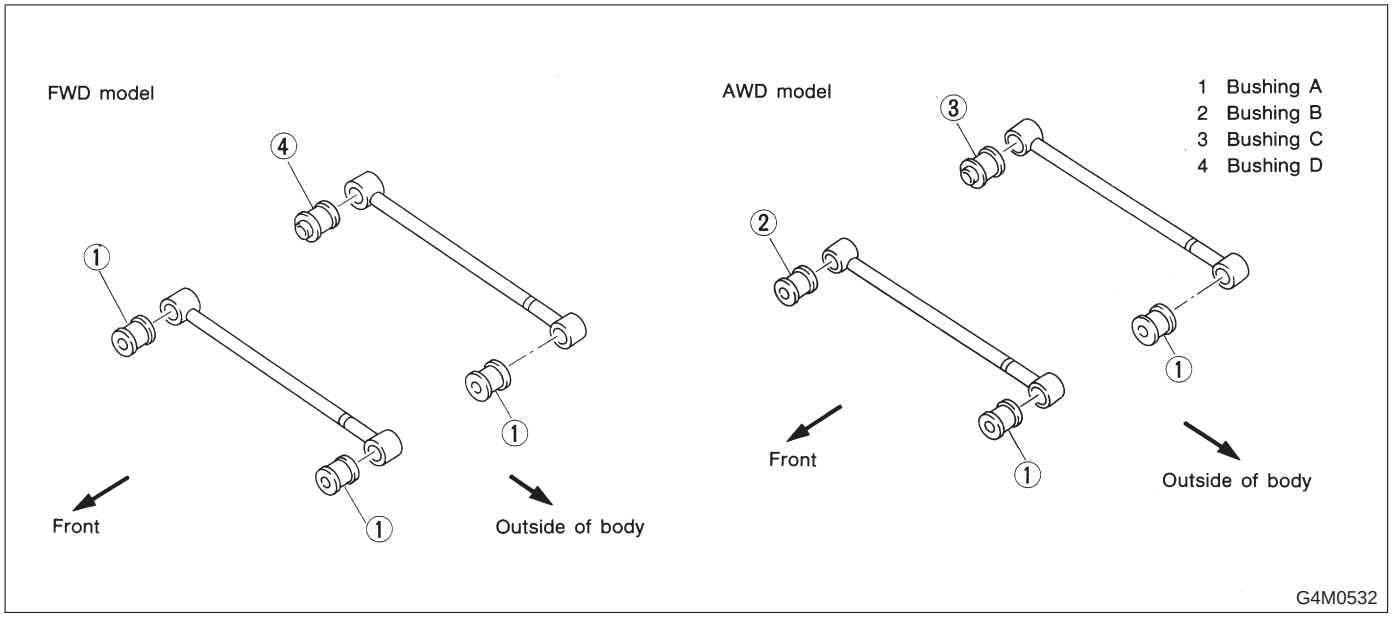
B: DISASSEMBLY

Using ST, press bushing out of place.

NOTE:
● Using the following table as a guide, verify the type of bushings.
● Select ST according to the type of bushings used.

Bushing	ST: INSTALLER & REMOVER SET
Bushing A	927700000
Bushing B	927690000
Bushing C	927700000
Bushing D	927710000





C: INSPECTION

Visually check lateral links for damage or bends.

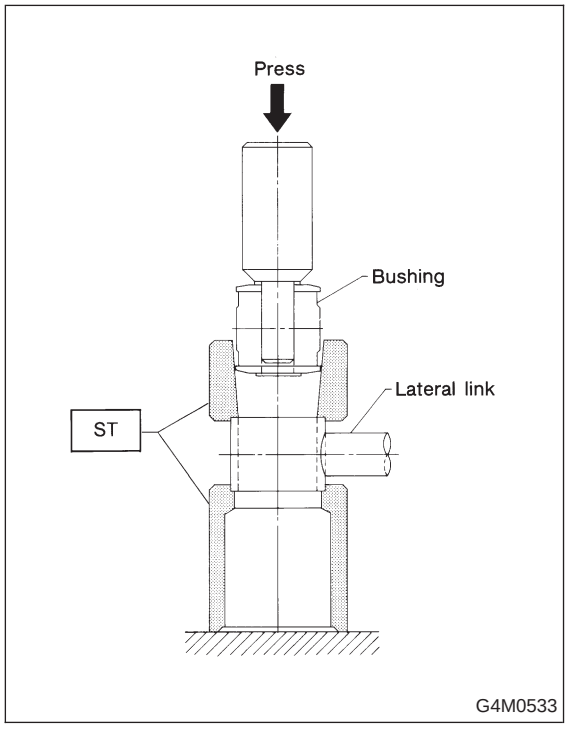
D: ASSEMBLY

1) Using ST, press bushing into place.

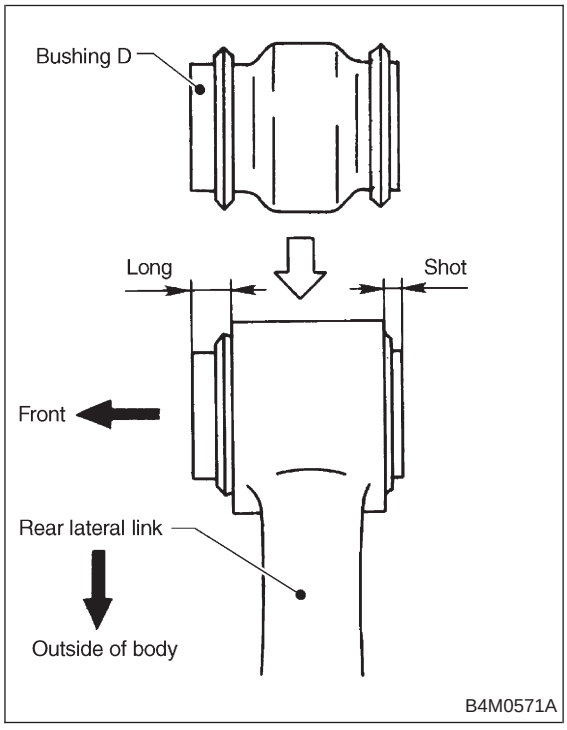
CAUTION:
Select ST according to the type of bushings used.

NOTE:
● Use the same ST as that used during disassembly.
● If it is difficult to press bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant. Specified lubricant:

Specified lubricant:
TIRE LUBE : water = 1 : 3

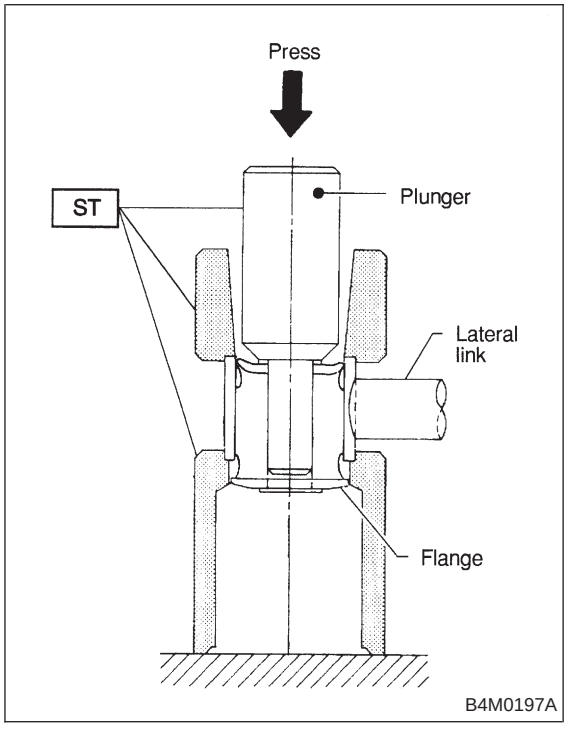


NOTE:
Pay attention to the direction of bushing “D” as shown in figure.



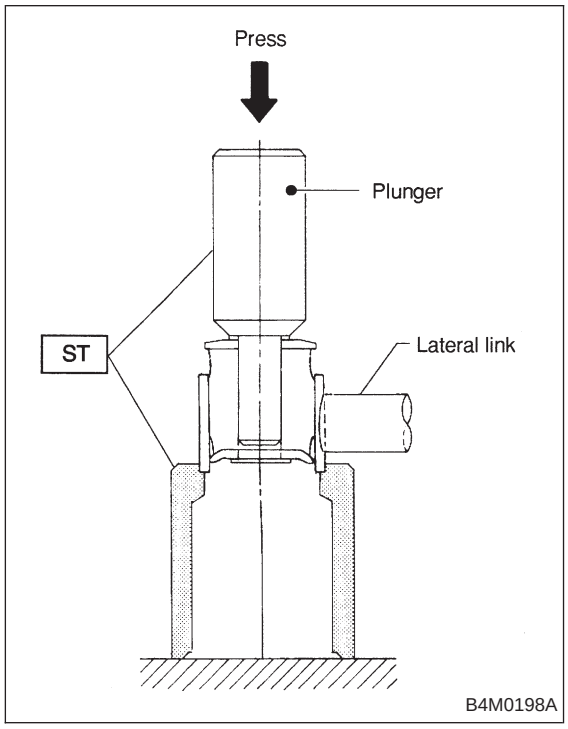
2) Press ST plunger until bushing flange protrudes beyond lateral link.

NOTE:
Use the same ST as that used during disassembly.



3) Turn lateral link upside down. Press ST plunger in the opposite direction that outlined in step 2) until bushing is correctly positioned in trailing link.

NOTE:
Use the same ST as that used during disassembly.



E: INSTALLATION

To install, reverse removal procedures, reading the following instructions.

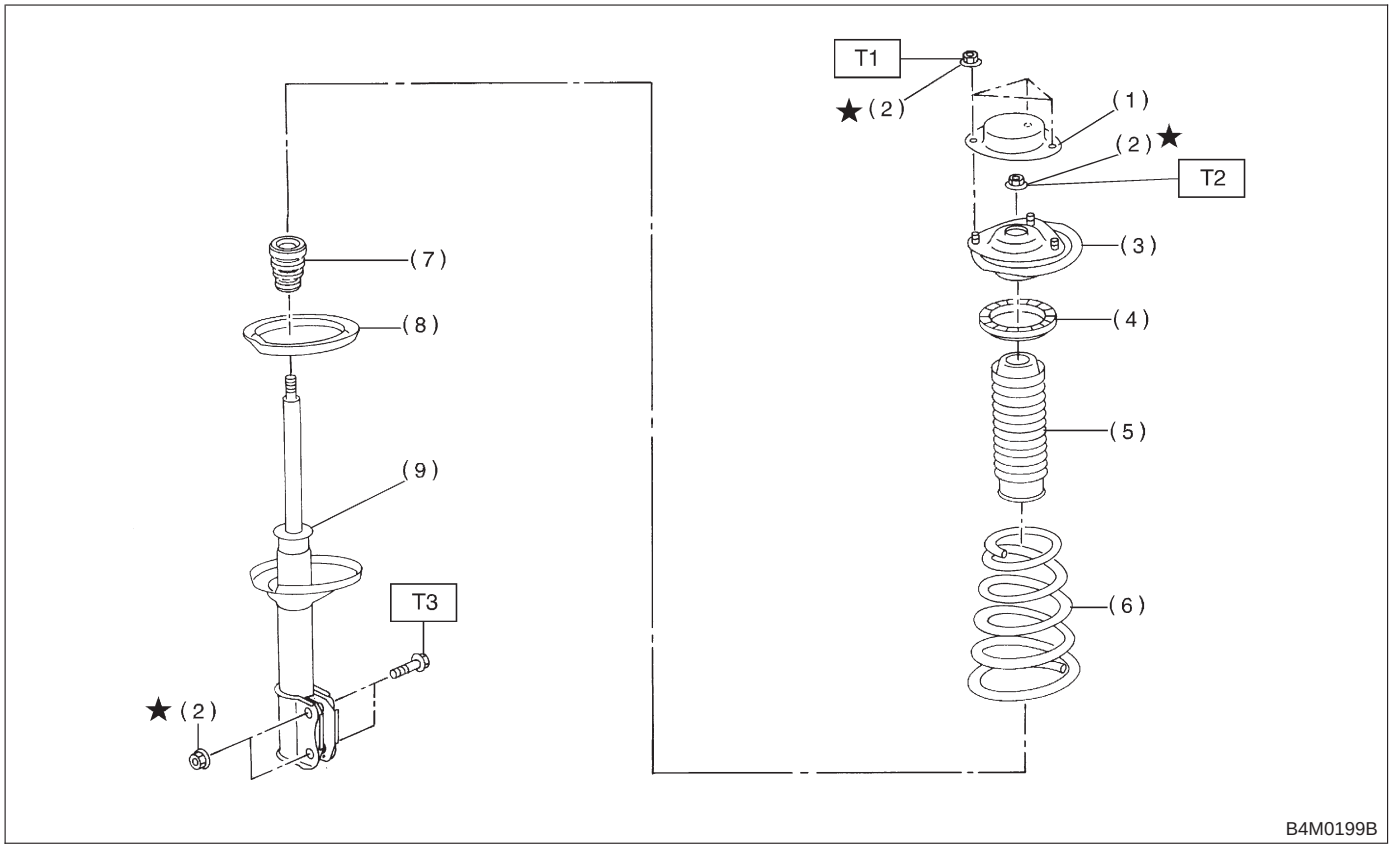
● Installation of DOJ to differential <Ref. to 4-2 [W4E2].>

CAUTION:
● Do not allow DOJ splines to damage side oil seal.
● Always tighten rubber bushing when wheels are in full contact with the ground and vehicle is at curb weight condition.
● Tighten nut when installing adjusting bolt.
● Replace self-locking nut with new one.

NOTE:
● Lateral link washers for FWD and AWD models can be identified by colors, as follows:
Olive (FWD model)
Gold (AWD model)
● Check wheel alignment and adjust if necessary.

9. Rear Strut

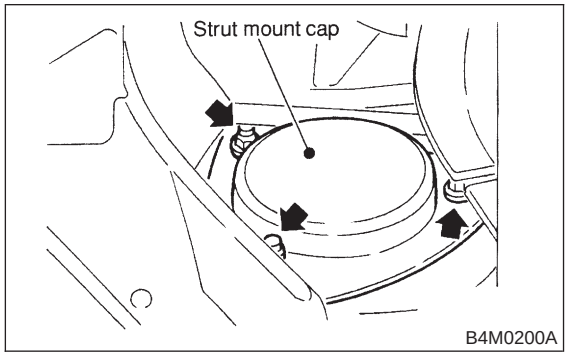
A: REMOVAL



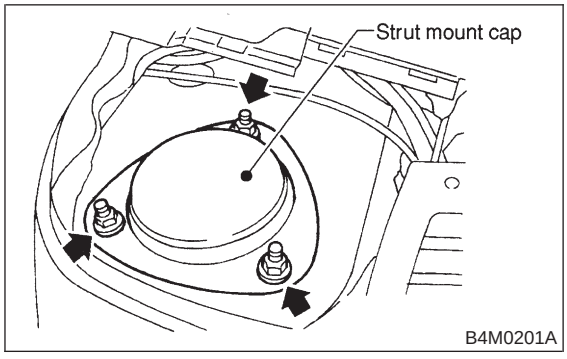
(1) Strut mount cap
(2) Self-locking nut
(3) Strut mount
(4) Rubber seat upper
(5) Dust cover
(6) Coil spring
(7) Helper
(8) Rubber seat lower
(9) Damper strut

Tightening torque: N·m (kg-m, ft-lb)
T1: 20±6 (2.0±0.6, 14.5±4.3)
T2: 59±10 (6.0±1.0, 43±7)
T3: 196^{+39}_{-10} ($20.0^{+4.0}_{-1.0}$, 145^{+29}_{-7})

1) Depress brake pedal and secure it in that position using a wooden block, etc.
2) Remove rear seat cushion and backrest. (Sedan)

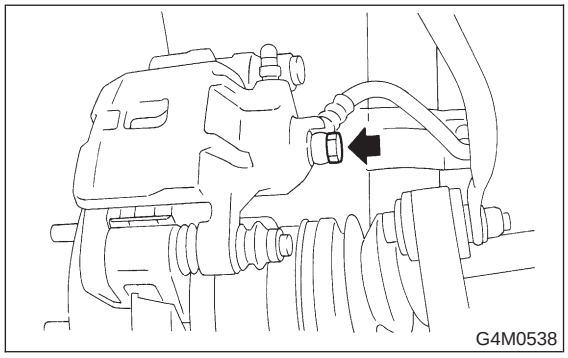


3) Remove strut cap of rear quarter trim. (Wagon)

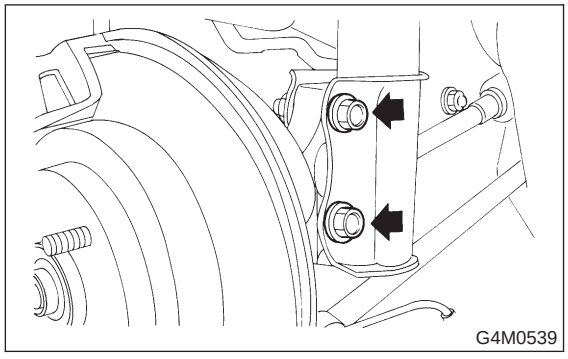


4) Loosen rear wheel nuts.
5) Jack-up vehicle, support it with safety stands (rigid racks) and remove rear wheels.
6) Remove brake hose clip.

7) Models equipped with rear disc brakes:
Remove union bolt from brake caliper.



8) Models equipped with rear drum brakes:
Disconnect brake hose from brake pipe from strut, and disconnect brake pipe from drum brake.
9) Remove bolts which secure rear strut to housing.



10) Remove nuts securing strut mount to body.
11) Remove strut mount cap.

B: DISASSEMBLY

For disassembly of rear strut, refer to procedures outlined under front strut as a guide.
<Ref. to 4-1 [W4B0].>

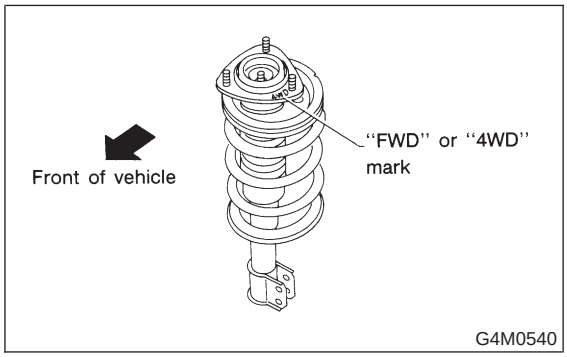
C: INSPECTION

Refer to Front Strut as a guide for inspection procedures. <Ref. to 4-1 [W4C0].>

D: ASSEMBLY

Refer to Front Strut as a guide for assembly procedures. <Ref. to 4-1 [W4D0].>

CAUTION:
● Install rear strut with “FWD” or “4WD” mark on strut mount facing outside of vehicle body.
● Insert the protrusion of lower rubber seat into the strut spring seat hole.



E: INSTALLATION

1) Install strut mount cap.
2) Tighten self-locking nut used to secure strut mount to vehicle body.

CAUTION:
Use a new self-locking nut.

NOTE:
Tighten strut mount and cap as a unit.

Tightening torque:
20±6 N·m (2.0±0.6 kg-m, 14.5±4.3 ft-lb)

3) Tighten bolts securing rear strut to housing.

Tightening torque:
196^{+39}_{-10} N·m ($20.0^{+4.0}_{-1.0}$ kg-m, 145^{+29}_{-7} ft-lb)

CAUTION:
Use a new self-locking nut.

4) Models with rear disc brakes:
Tighten brake hose union bolt on brake caliper.

Tightening torque:
18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)

Models with rear drum brakes:
Connect brake hose to brake pipe.

Tightening torque:
15^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)

5) Insert brake hose clip between brake hose and lower side of strut.

CAUTION:
● Check that hose clip is positioned properly.

● Check brake hose for twisting, or excessive tension.
● Models equipped with ABS:
Do not subject ABS sensor harness to excessive tension.

6) Be sure to bleed air from brake system.
7) Lower vehicle and tighten wheel nut.

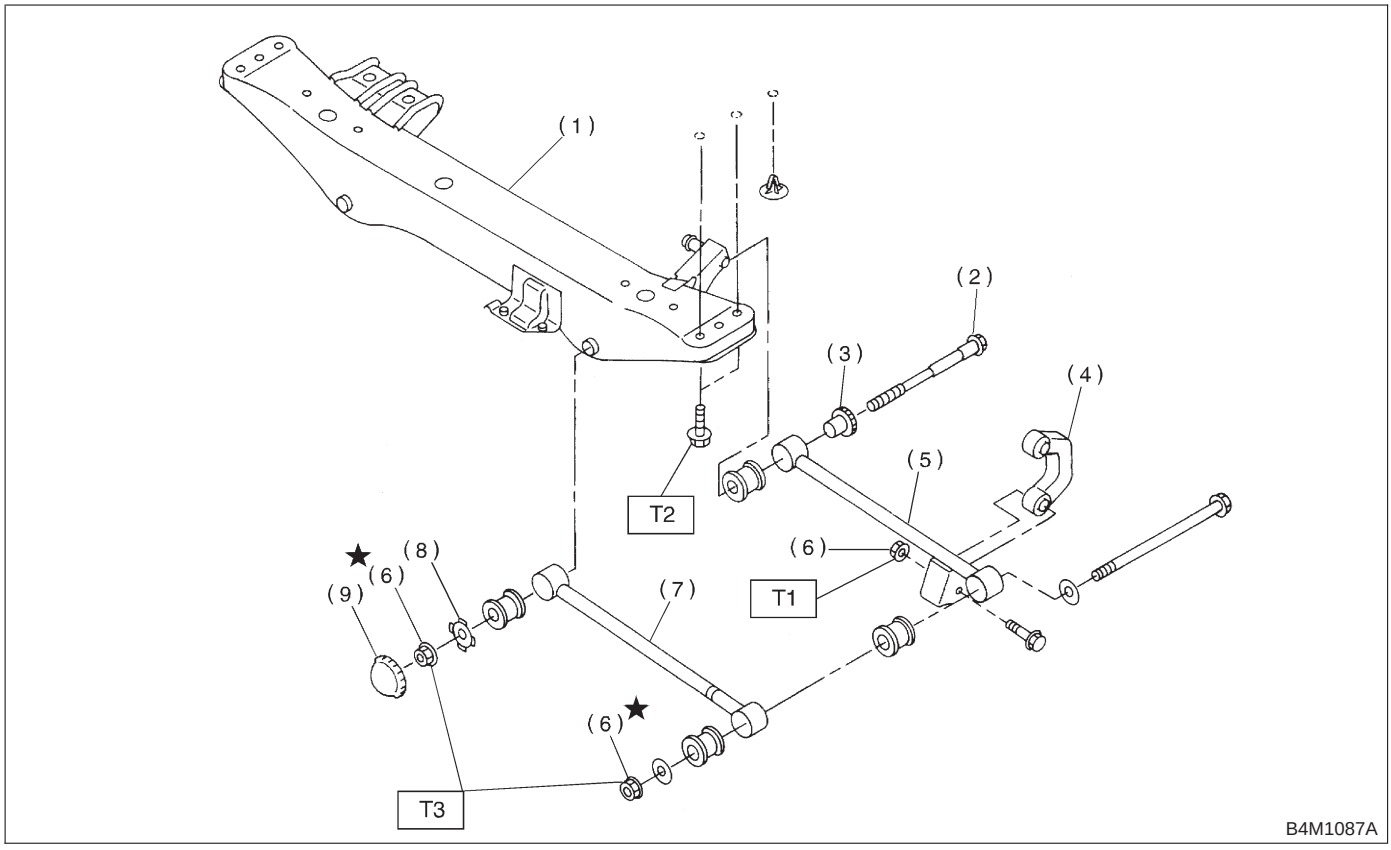
Tightening torque:
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

8) Sedan:
Install rear seat backrest and rear seat cushion.
Wagon:
Install strut cap of rear quarter trim.

NOTE:
Check wheel alignment and adjust if necessary.

10. Rear Crossmember (FWD Model)

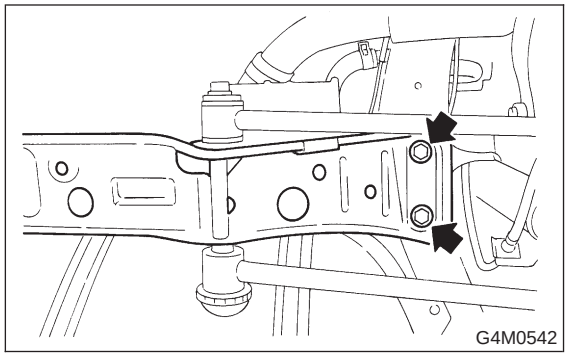
A: REMOVAL



(1) Crossmember
(2) Adjusting bolt
(3) Adjusting wheel
(4) Stabilizer link
(5) Rear lateral link
(6) Self-locking nut
(7) Front lateral link
(8) Washer
(9) Cap (Protection)

Tightening torque: N·m (kg-m, ft-lb)
T1: 44±6 (4.5±0.6, 32.5±4.3)
T2: 127±20 (13.0±2.0, 94±14)
T3: 137±20 (14.0±2.0, 101±14)

1) Disconnect lateral links from housing.
2) Remove rear exhaust pipe and muffler.
3) Remove heat-shield cover.
4) Remove four bolts securing crossmember to body.



B: INSPECTION

Check removed parts for wear, damage and cracks, and correct or replace if defective.

C: INSTALLATION

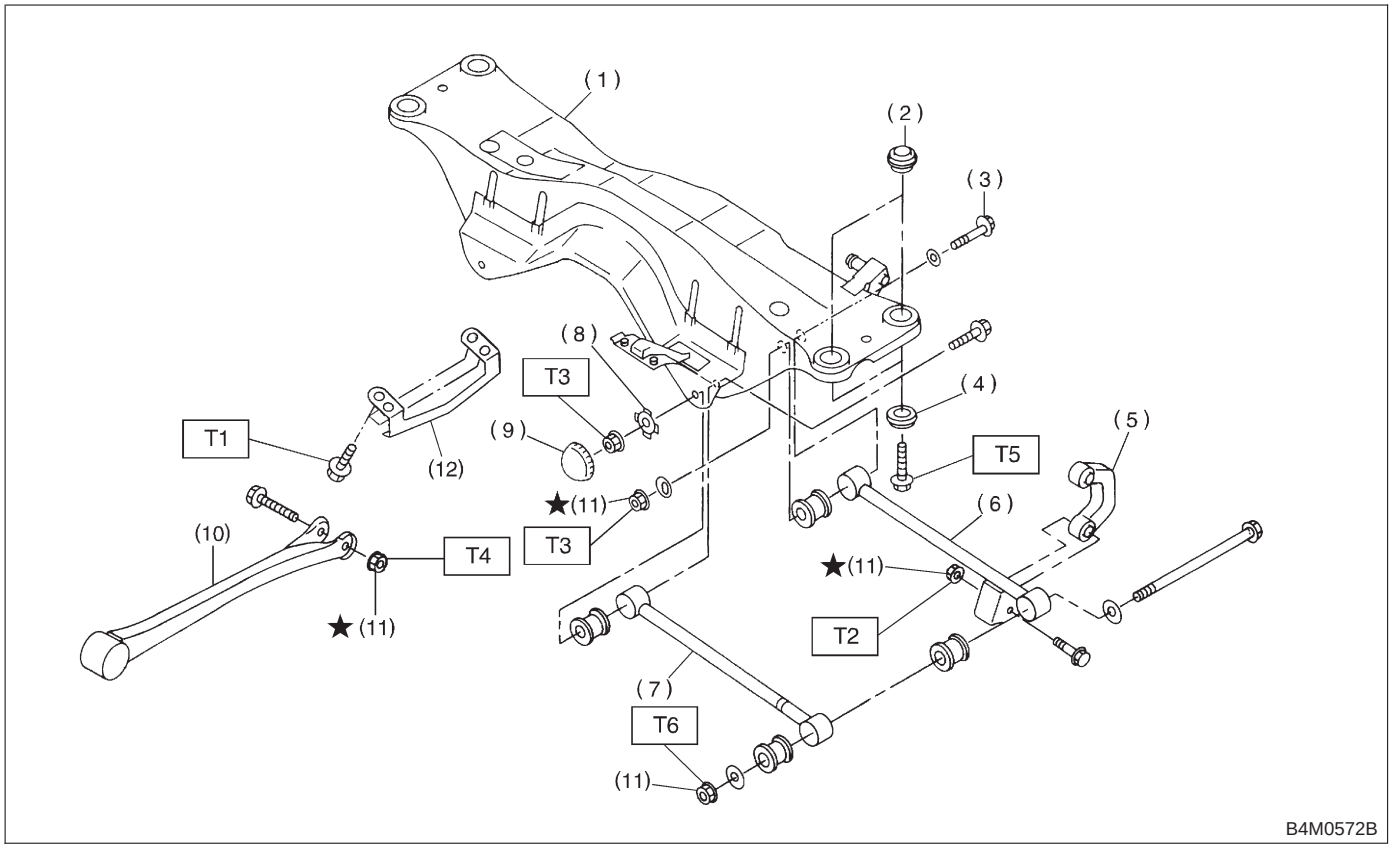
Installation is in reverse order of removal procedure.

NOTE:
● Discard loosened self-locking nut and replace with a new one.
● Always tighten nut (not adjusting bolt), when tightening adjusting bolt.
● Always tighten rubber bushing when wheels are in full contact with the ground and vehicle is at curb weight condition.

NOTE:
Check wheel alignment and adjust if necessary.

11. Rear Crossmember (AWD Model)

A: REMOVAL

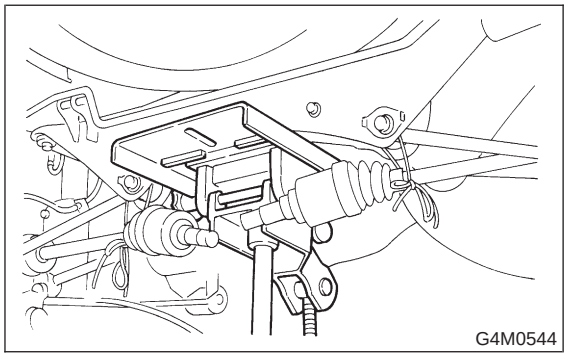


(1) Crossmember
(2) Floating bushing
(3) Adjusting bolt
(4) Stopper
(5) Stabilizer link
(6) Rear lateral link
(7) Front lateral link
(8) Washer
(9) Cap (Protection)
(10) Trailing link
(11) Self-locking nut
(12) Crossmember reinforcement lower (Sedan model only)

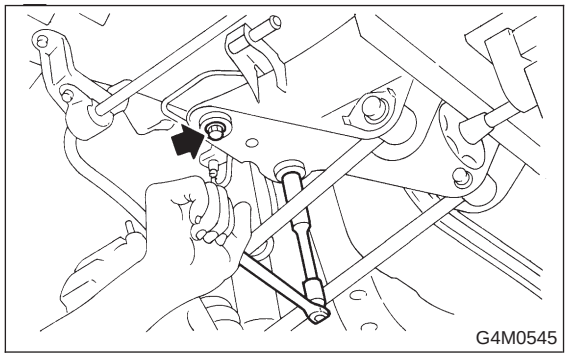
Tightening torque: N·m (kg-m, ft-lb)
T1: 25±7 (2.5±0.7, 18.1±5.1)
T2: 44±6 (4.5±0.6, 32.5±4.3)
T3: 98±15 (10.0±1.5, 72±11)
T4: 113±15 (11.5±1.5, 83±11)
T5: 127±20 (13.0±2.0, 94±14)
T6: 137±20 (14.0±2.0, 101±14)

CAUTION:
Do not subject ABS sensor harness to excessive tension. (ABS equipped models.)

1) Separate front exhaust pipe and rear exhaust pipe.
2) Remove rear exhaust pipe and muffler.
3) Remove crossmember reinforcement lower. (Sedan model only)
4) Remove rear differential. <Ref. to 3-4 [W2B0].>
5) Place transmission jack under rear crossmember.



6) Remove bolts securing crossmember to vehicle body, and remove crossmember.



7) Scribe an alignment mark on rear lateral link cam bolt and crossmember.
8) Remove four bolts securing front and rear lateral links to crossmember by loosening nuts.

B: INSPECTION

Check removed parts for damage and cracks, and correct or replace if defective.

C: INSTALLATION

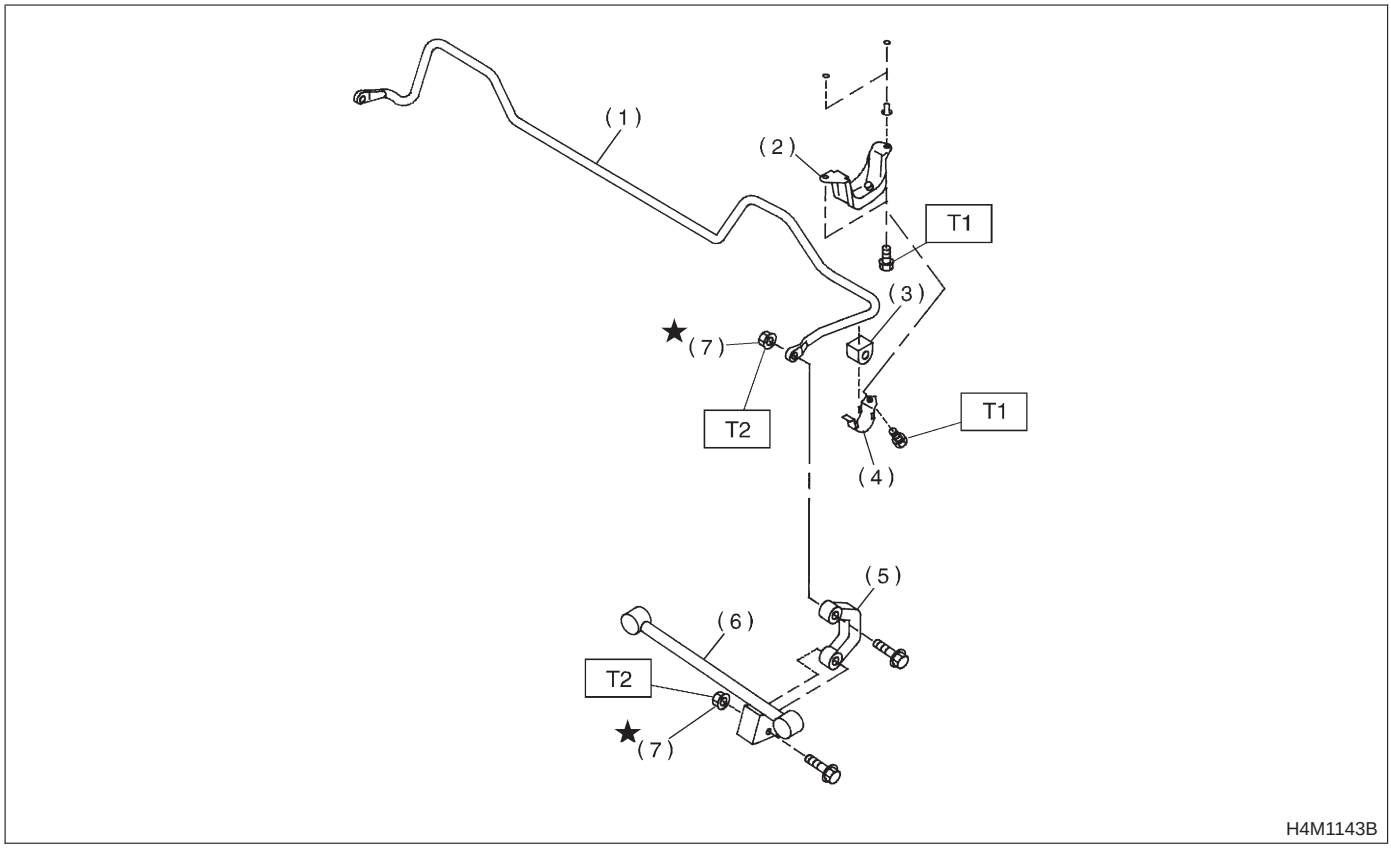
1) Install in reverse order of removal.
2) Install rear differential. <Ref. to 3-4 [W2F0].>

CAUTION:
Always tighten rubber bushing when wheels are in full contact with the ground and vehicle is at curb weight condition.

NOTE:
Check wheel alignment and adjust if necessary.

12. Rear Stabilizer

A: REMOVAL



(1) Rear stabilizer
(2) Stabilizer bracket
(3) Stabilizer bushing
(4) Clamp
(5) Stabilizer link
(6) Rear lateral link
(7) Self-locking nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 25±7 (2.5±0.7, 18.1±5.1)
T2: 44±6 (4.5±0.6, 32.5±4.3)

1) Jack-up the rear part of the vehicle, support it with safety stands (rigid racks).
2) Remove bolts which secure stabilizer link to rear lateral link.
3) Remove bolts which secure stabilizer to stabilizer bracket.

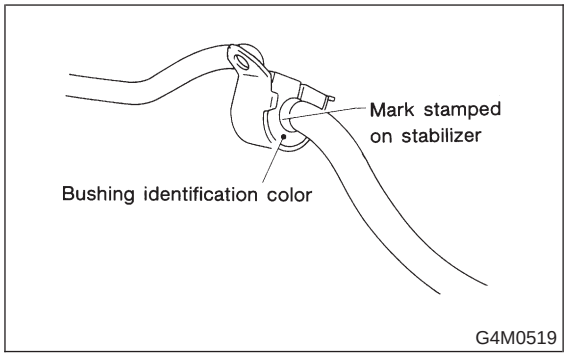
B: INSPECTION

1) Check bushing for cracks, fatigue or damage.
2) Check stabilizer links for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link.

C: INSTALLATION

1) To install, reverse the removal procedure.

NOTE:
● Install bushing while aligning it with paint mark on stabilizer.
● Ensure that bushing and stabilizer have the same identification colors when installing.



2) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.
3) Tightening torque:

Stabilizer link to rear lateral link:
44±6 N·m (4.5±0.6 kg-m, 32.5±4.3 ft-lb)

Stabilizer to stabilizer bracket:
25±7 N·m (2.5±0.7 kg-m, 18.1±5.1 ft-lb)

1. Suspension

A: IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible causes	Countermeasures
(1) Permanent distortion or breakage of coil spring	Replace.
(2) Unsmooth operation of damper strut	Replace.
(3) Installation of wrong strut	Replace with proper parts.
(4) Installation of wrong coil spring	Replace with proper parts.

B: POOR RIDE COMFORT

1) Large rebound shock
2) Rocking of vehicle continues too long after running over bump and/or hump.
3) Large shock in bumping

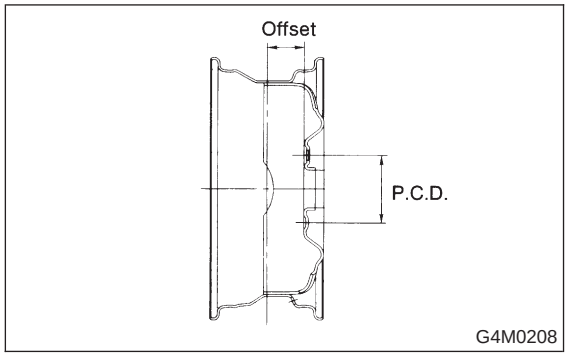
Possible causes	Countermeasures
(1) Breakage of coil spring	Replace.
(2) Over-inflation pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace coil springs with new ones.
(4) Fault in operation of damper strut	Replace.
(5) Damage or deformation of strut mount	Replace.
(6) Unsuitability of maximum and/or minimum length of damper strut	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly	Replace.
(9) Oil leakage of damper strut	Replace.

C: NOISE

Possible causes	Countermeasures
(1) Wear or damage of damper strut component parts	Replace.
(2) Loosening of suspension link installing bolt and/or nut	Retighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum and/or minimum length of damper strut	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.
(7) Deformation of stabilizer clamp	Replace.

WHEELS AND AXLES 4-2

1. Tire and Wheel Size



			Tire size	Rim size	Rim offset mm (in)	P.C.D. mm (in)
2200 cc model	Front and Rear	L BRIGHTON POST	P185/70R14 87S	14 × 5 1/2JJ	55 (2.17)	100 (3.94) dia.
		LS	P195/60R15 87H	15 × 6JJ	55 (2.17)	
	T-type tire	FWD	T125/70D15	15 × 4T	53 (2.09)	
		AWD	T135/70D16	16 × 4T	50 (1.97)	
2500 cc model	Front and Rear	GT	P205/55R16 89H	16 × 6 1/2JJ	55 (2.17)	
		OUTBACK SUS	P205/70R15 95S	15 × 6JJ	55 (2.17)	
	T-type tire	GT	T135/70D16	16 × 4T	50 (1.97)	
		OUTBACK SUS	T135/80R16	16 × 4T	50 (1.97)	

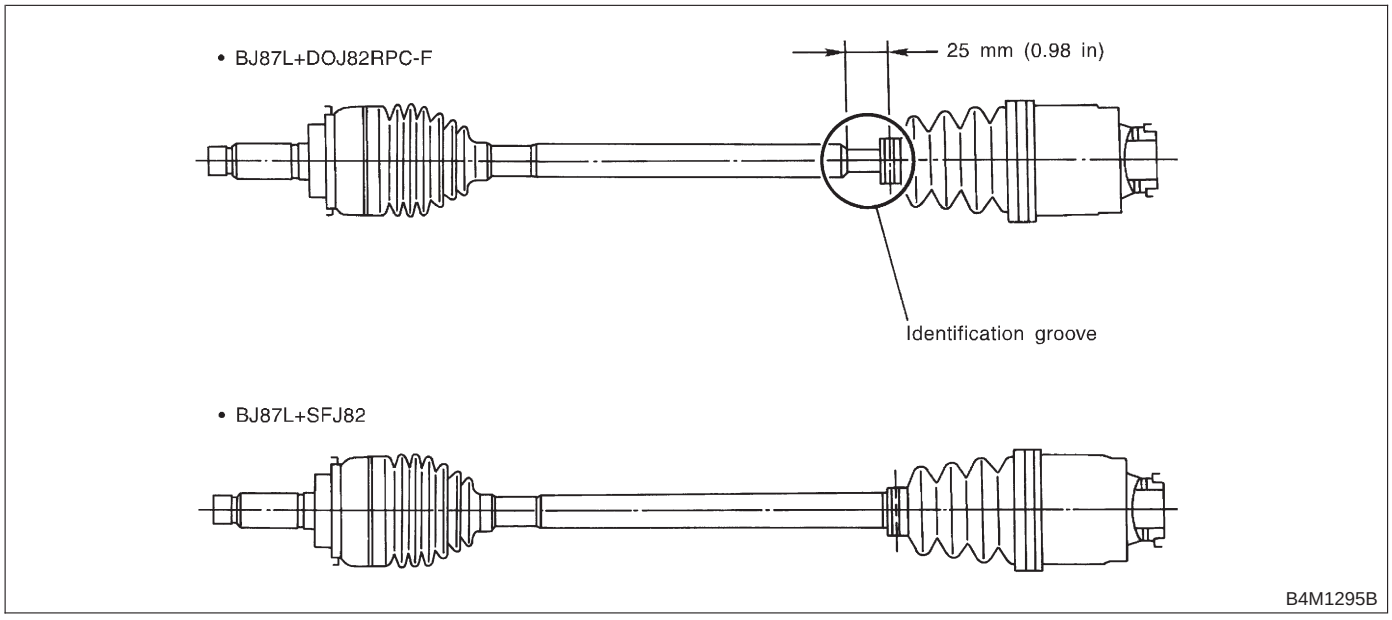
NOTE: “T-type” tire for temporary use is supplied as a spare tire.

2. Tire Inflation Pressure

	Tire size	Tire inflation pressure kPa (kg/cm^2, psi)		
		Light load	Full load	Trailler towing
Except OUTBACK and SUS model	P185/70R14 87S P195/60R15 87H P205/55R16 89H	Ft: 220 (2.2, 32) Rr: 210 (2.1, 30)		—
	T125/70D15 T135/70D16	420 (4.2, 60)		—
OUTBACK and SUS model	P205/70R15 95S	Ft: 200 (2.0, 29) Rr: 190 (1.9, 28)		Ft: 200 (2.0, 29) Rr: 220 (2.2, 32)
	T135/80R16	420 (4.2, 60)		—

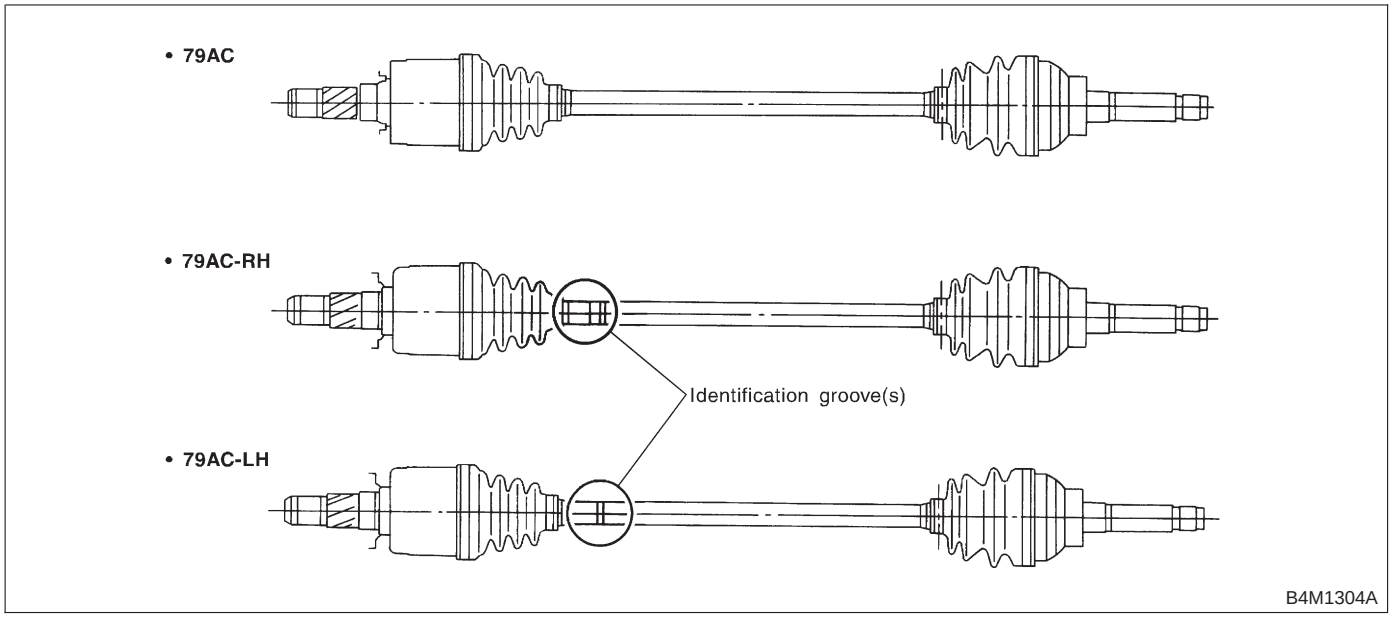
3. Front Drive Shaft Assembly

Type of drive shaft assembly	SHAFT
	No. of identification groove on shaft
BJ87L+DOJ82RPC-F	1 (One)
BJ87L+SFJ82	0 (None)



4. Rear Drive Shaft Assembly (AWD Model)

Type of axle shaft assembly	SHAFT
	No. of identification grooves on shaft
79AC	None
79AC-RH	2 (Two)
79AC-LH	1 (One)



5. Application Table

Model	Power unit	Front drive shaft		Rear drive shaft	
		5MT	4AT	5MT	4AT
FWD	2200 cc	—	BJ87L+DOJ82RPC-F	—	—
AWD	2200 cc	BJ87L+DOJ82RPC-F	BJ87L+SFJ82	79AC-RH, 79AC-LH	79AC
AWD	2500 cc	BJ87L+DOJ82RPC-F	BJ87L+SFJ82	79AC-RH, 79AC-LH	79AC-RH, 79AC-LH

6. Wheel Balance

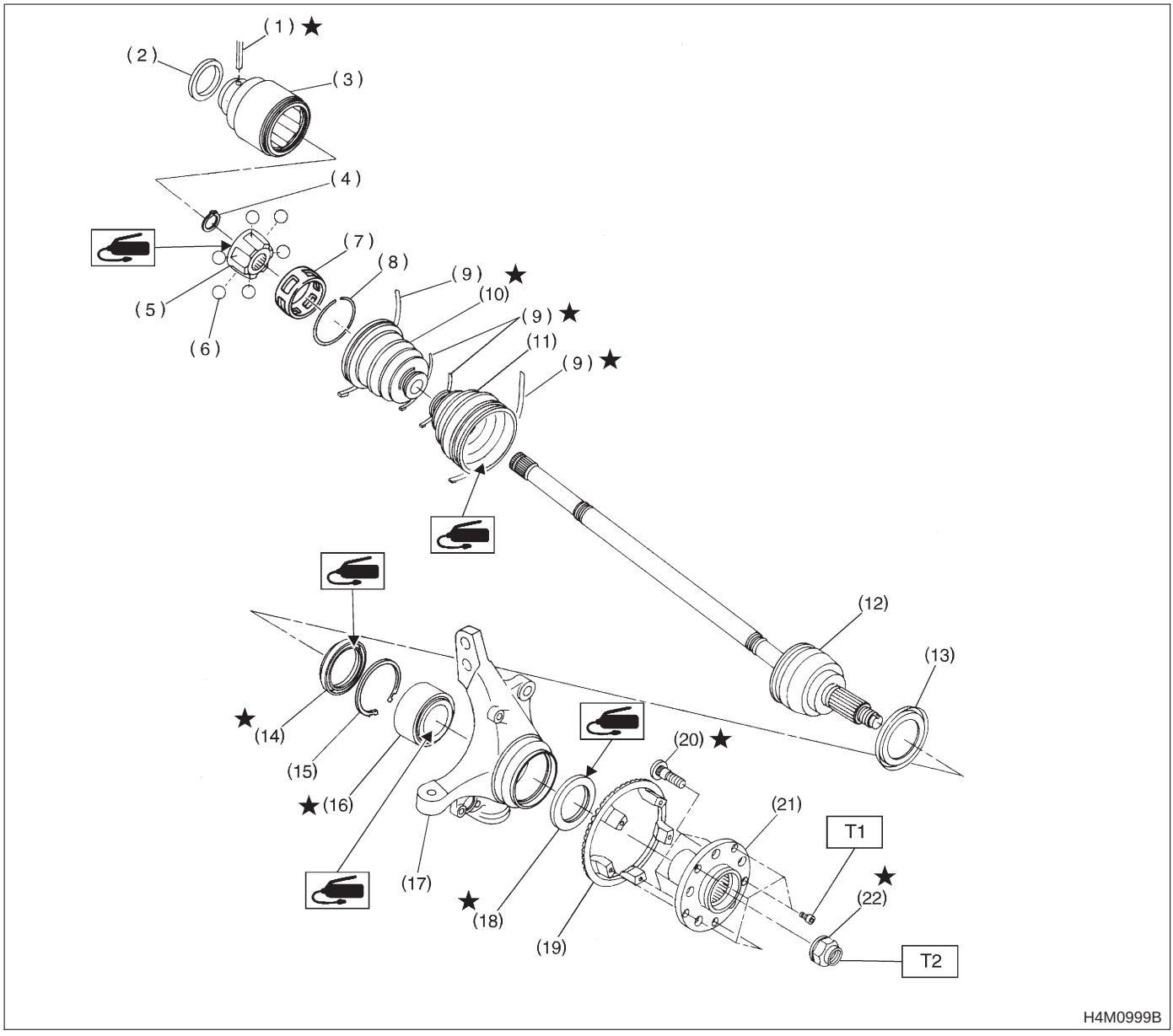
Wheel balancing	Standard	Service limit
Dynamic unbalance	Less than 5 g (0.18 oz)	

Balance weight part number (For steel wheel)	Weight g (oz)
28101AA001	5 (0.18)
28101AA011	10 (0.35)
28101AA021	15 (0.53)
28101AA031	20 (0.71)
28101AA041	25 (0.88)
28101AA051	30 (1.06)
28101AA061	35 (1.23)
28101AA071	40 (1.41)
28101AA081	45 (1.59)
28101AA091	50 (1.76)
28101AA101	55 (1.94)
28101AA111	60 (2.12)

Balance weight part number (For aluminum wheel)	Weight g (oz)
23141GA462	5 (0.18)
23141GA472	10 (0.35)
23141GA482	15 (0.53)
23141GA492	20 (0.71)
23141GA502	25 (0.88)
23141GA512	30 (1.06)
23141GA522	35 (1.23)
23141GA532	40 (1.41)
23141GA542	45 (1.59)
23141GA552	50 (1.76)
—	55 (1.94)
23141GA572	60 (2.12)

1. Front Axle

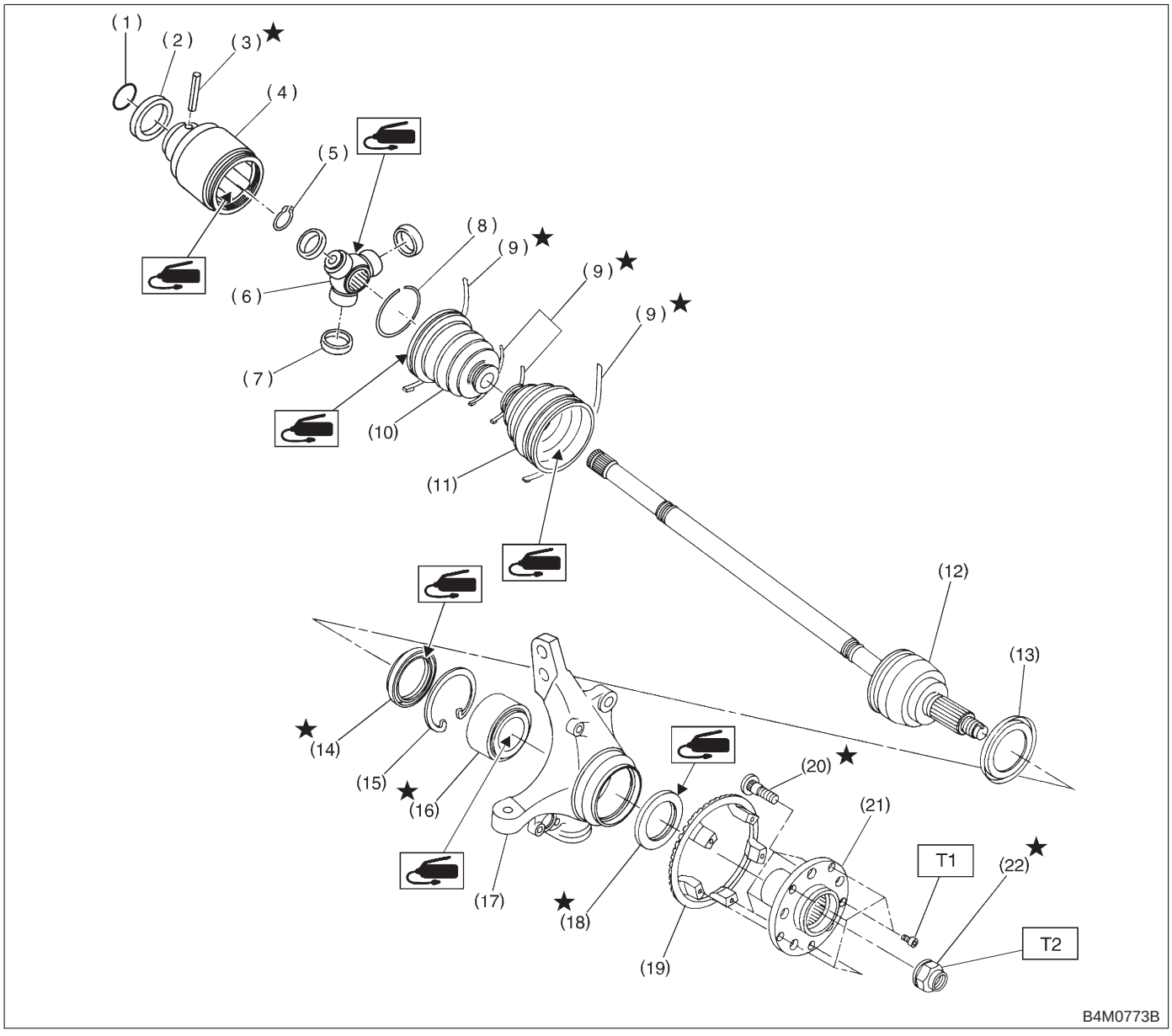
A: EXCEPT AWD AT MODEL



(1) Spring pin
(2) Baffle plate (DOJ)
(3) Outer race (DOJ)
(4) Snap ring
(5) Inner race (DOJ)
(6) Ball
(7) Cage
(8) Circlip
(9) Boot band
(10) Boot (DOJ)
(11) Boot (BJ)
(12) BJ ASSY
(13) Baffle plate
(14) Oil seal (IN)
(15) Snap ring
(16) Bearing
(17) Housing
(18) Oil seal (OUT)
(19) Tone wheel
(20) Hub bolt
(21) Hub
(22) Axle nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 186±20 (19±2, 137±14)

B: AWD AT MODEL

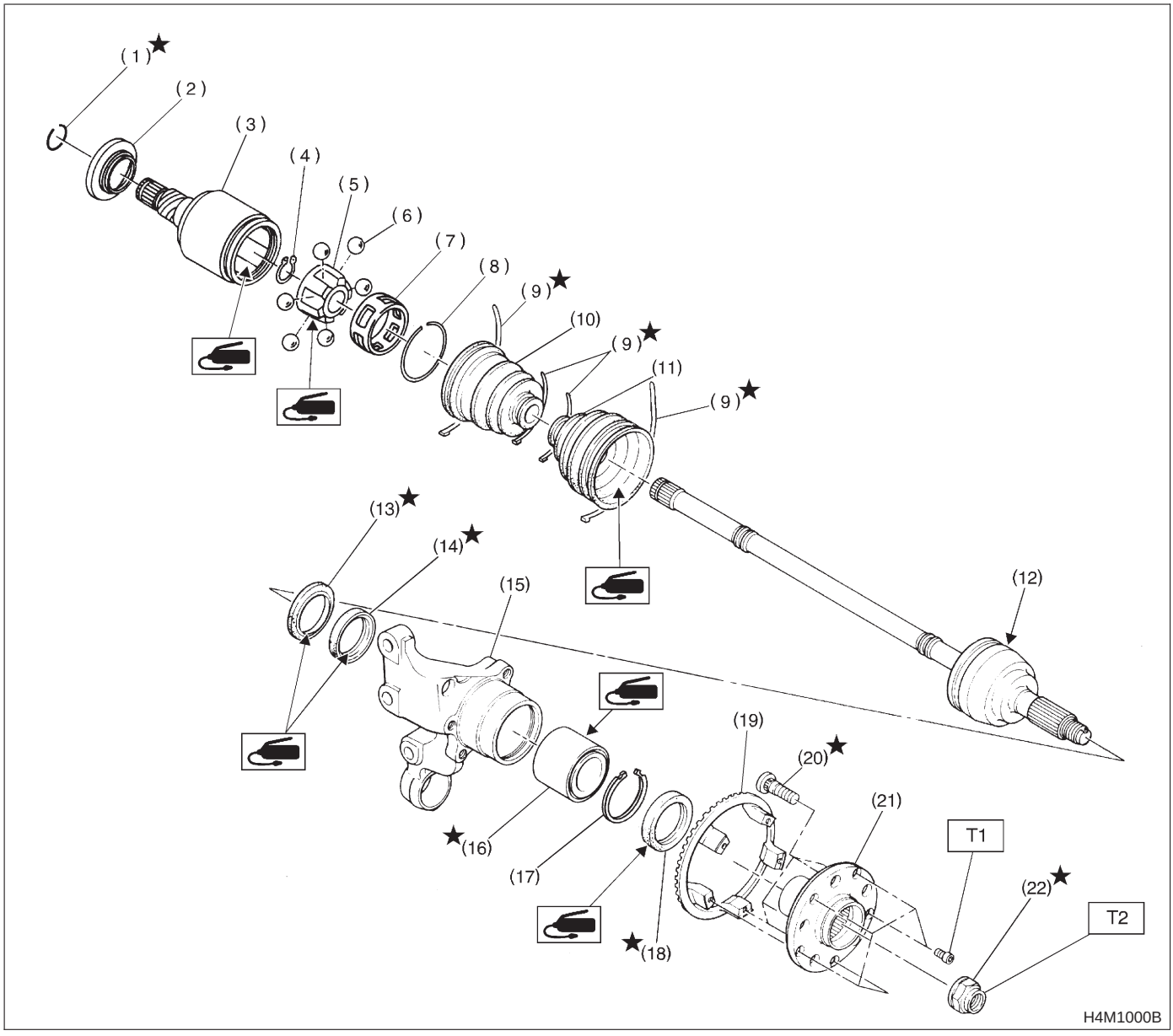


(1) O-ring
(2) Baffle plate (SFJ)
(3) Spring pin
(4) Outer race (SFJ)
(5) Snap ring
(6) Trunnion
(7) Free ring
(8) Circlip
(9) Boot band
(10) Boot band
(11) Boot (BJ)
(12) BJ ASSY
(13) Baffle plate
(14) Oil seal (IN)
(15) Snap ring
(16) Bearing
(17) Housing
(18) Oil seal (OUT)
(19) Tone wheel
(20) Hub bolt
(21) Hub
(22) Axle nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 186±20 (19±2, 137±14)

2. Rear Axle

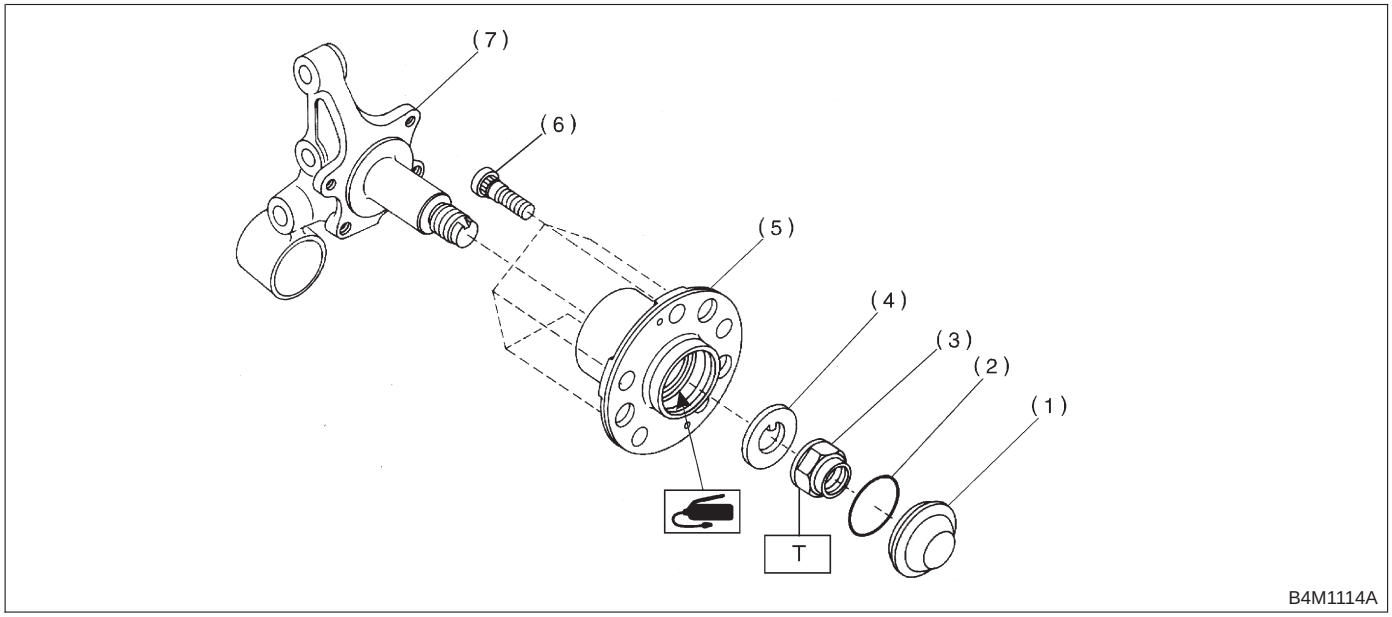
A: AWD MODEL



(1) Circlip (2200 cc AT vehicles)
(2) Baffle plate (DOJ)
(3) Outer race (DOJ)
(4) Snap ring
(5) Inner race
(6) Ball
(7) Cage
(8) Circlip
(9) Boot band
(10) Boot (DOJ)
(11) Boot (BJ)
(12) BJ ASSY
(13) Oil seal (IN. No. 2)
(14) Oil seal (IN. No. 3)
(15) Housing
(16) Bearing
(17) Snap ring
(18) Oil seal (OUT)
(19) Tone wheel
(20) Hub bolt
(21) Hub
(22) Axle nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 186±20 (19±2, 137±14)

B: FWD MODEL



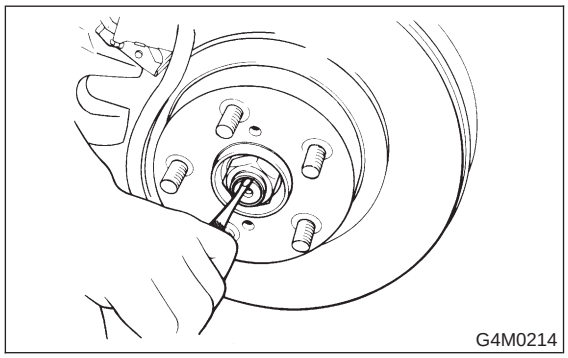
(1) Hub cap
(2) O-ring
(3) Axle nut
(4) Washer
(5) Hub unit
(6) Hub bolt
(7) Spindle

Tightening torque: N·m (kg-m, ft-lb)
T: 186±20 (19±2, 137±14)

1. Front Axle

A: REMOVAL

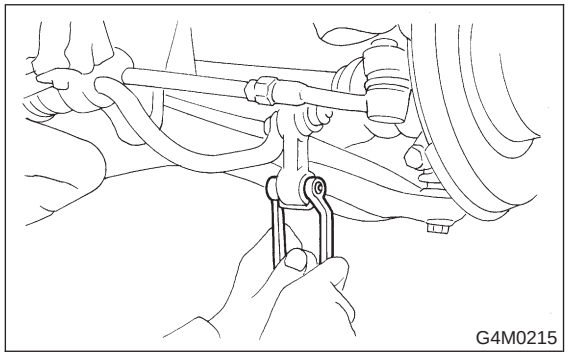
1) Disconnect ground cable from battery.
2) Jack-up vehicle, support it with safety stands, and remove front wheels.
3) Unlock axle nut.



4) Remove axle nut using a socket wrench.

CAUTION:
Be sure to loose and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

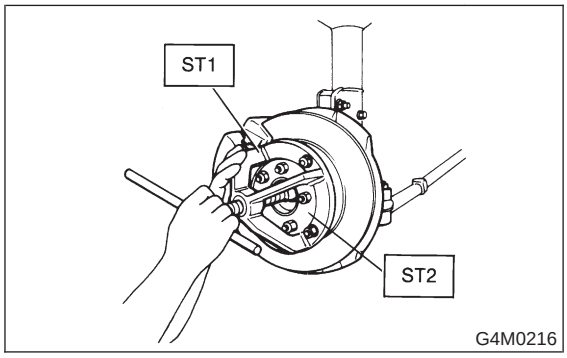
5) Remove stabilizer link.



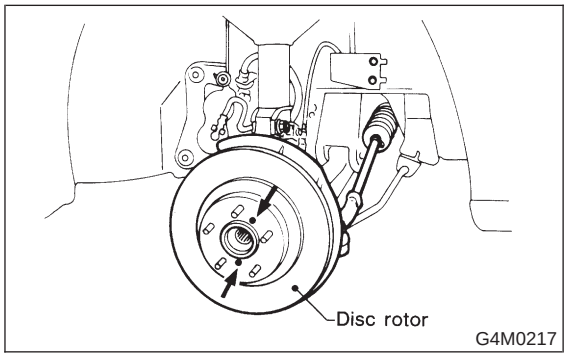
6) Remove DOJ/SFJ from transmission spindle.

7) Remove front drive shaft assembly from hub. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

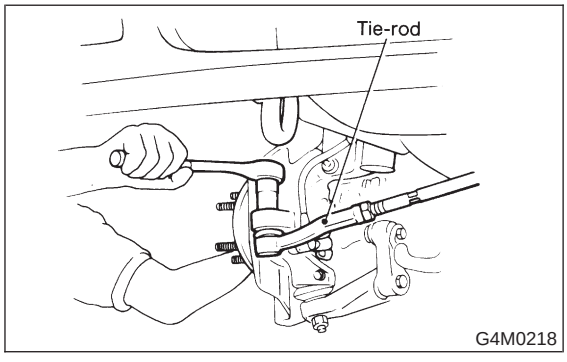
CAUTION:
● Be careful not to damage oil seal lip when removing front drive shaft.
● When replacing front drive shaft, also replace inner oil seal.



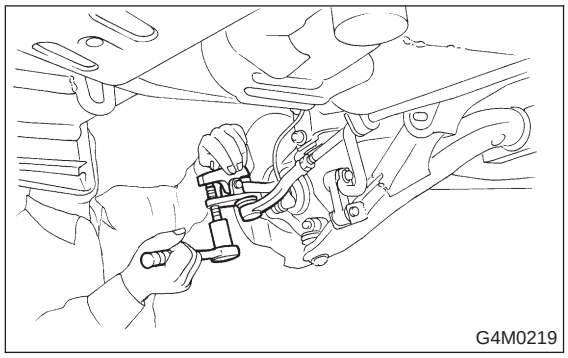
8) Remove disc brake caliper from housing, and suspend it from strut using a wire.
9) Remove disc rotor from hub.
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on the rotor.



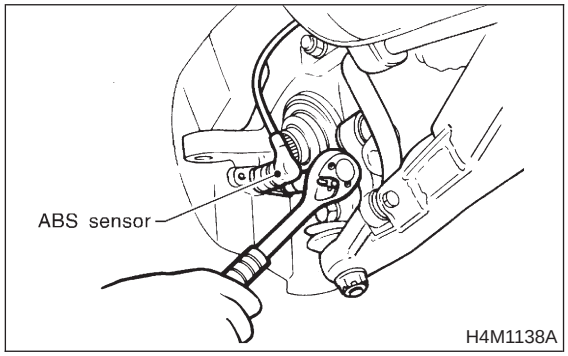
10) Remove cotter pin and castle nut which secure tie-rod end to housing knuckle arm.



11) Using a puller, remove tie-rod ball joint from knuckle arm.

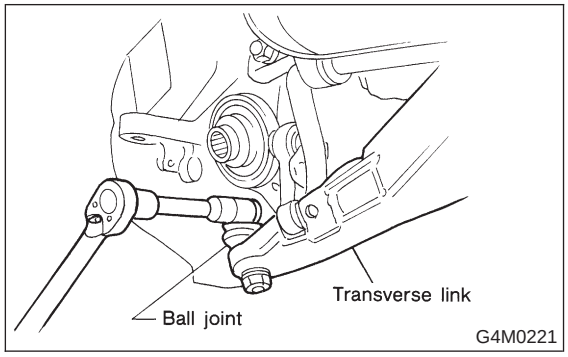

G4M0219

12) On ABS equipped models, remove ABS sensor assembly and harness in advance.



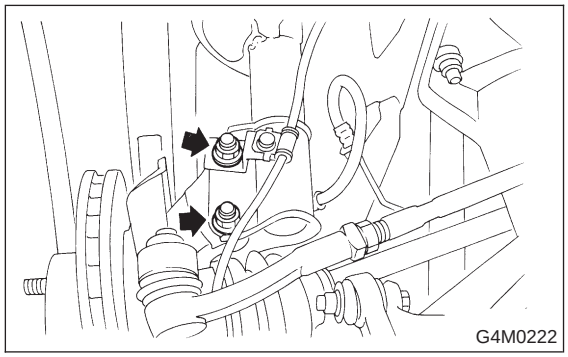
H4M1138A

13) Remove transverse link ball joint from housing.



G4M0221

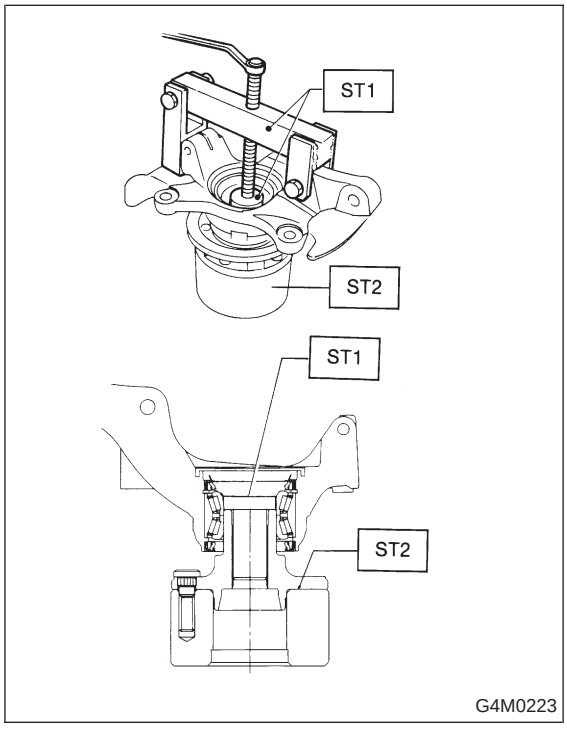
14) After scribing an alignment mark on camber adjusting bolt head, remove bolts which connect housing and strut, and disconnect housing from strut.


G4M0222

B: DISASSEMBLY

1) Using ST1, support housing and hub securely.
2) Attach ST2 to housing and drive hub out.

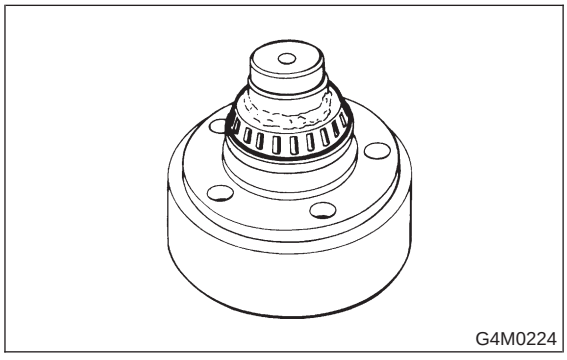
ST1 927080000 HUB STAND
ST2 927060000 HUB REMOVER



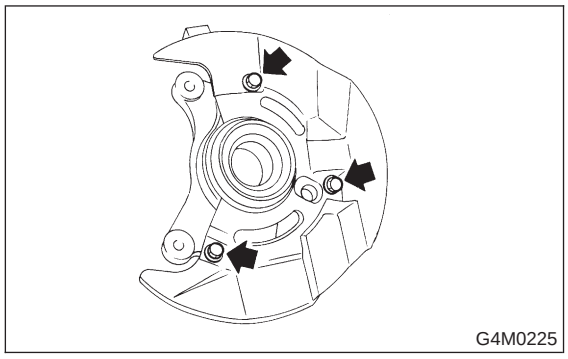
G4M0223

If inner bearing race remains in the hub, remove it with a suitable tool (commercially available).

CAUTION:
● Be careful not to scratch polished area of hub.
● Be sure to install inner race on the side of outer race from which it was removed.


G4M0224

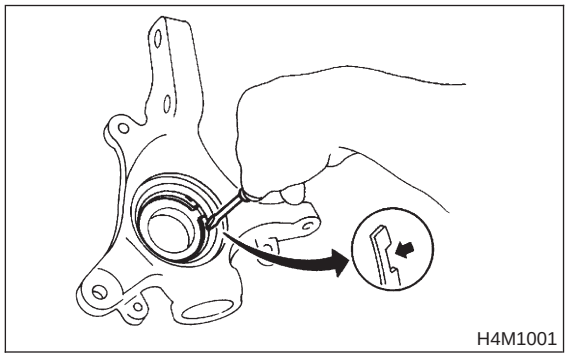
3) Remove disc cover from housing.



4) Using a standard screwdriver, remove outer and inner oil seals.

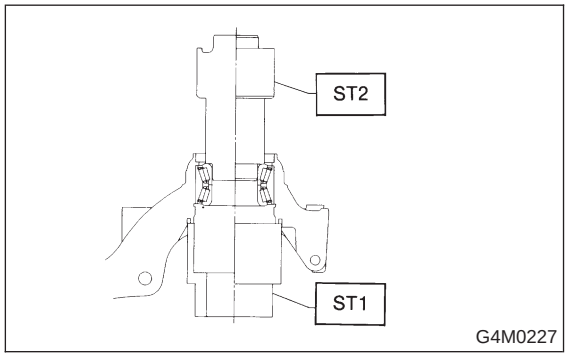
CAUTION:
Do not use old oil seals.

5) Using flat bladed screwdriver, remove snap ring.



6) Using ST1, support housing securely.
7) Using ST2, press inner race to drive out outer bearing.
ST1 927400000 HOUSING STAND
ST2 927100000 BEARING REMOVER

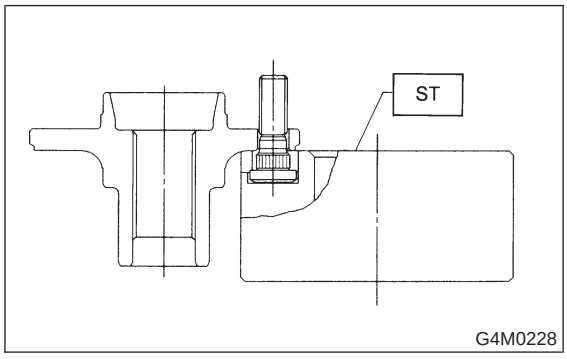
CAUTION:
- **Do not remove outer race unless it is faulty.**
- **Discard outer race after removal.**
- **Do not replace inner or outer race separately; always replace as a unit.**



8) Loosen bolts which secure tone wheel to hub. Remove tone wheel (only vehicle equipped with ABS).

9) Using ST and a hydraulic press, drive hub bolts out.
ST 927080000 HUB STAND

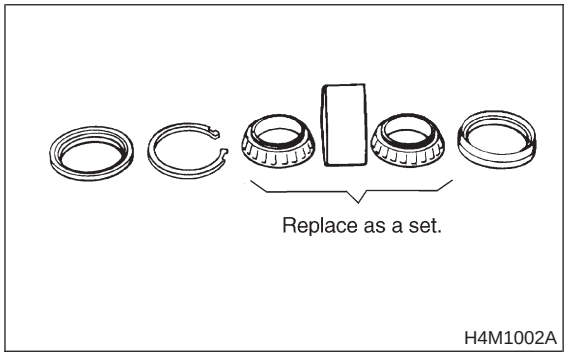
CAUTION:
Be careful not to hammer hub bolts. This may deform hub.



C: INSPECTION

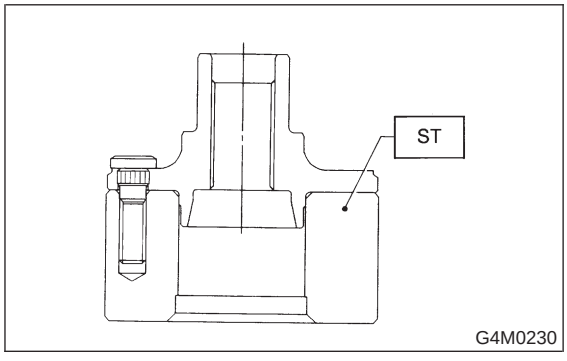
Check the removed parts for wear and damage. If defective, replace with new ones.

CAUTION:
- **If bearing is faulty, replace it as a bearing set.**
- **Be sure to replace oil seal at every overhaul.**



D: ASSEMBLY

1) Attach hub to ST securely.
ST 927080000 HUB STAND



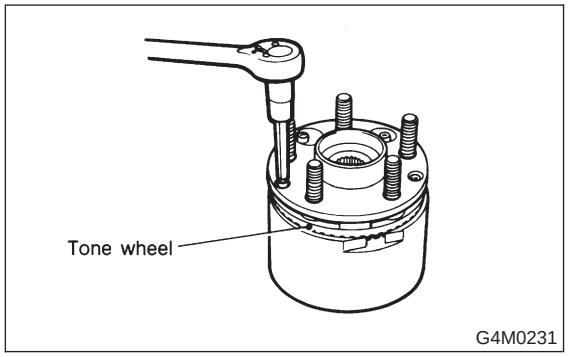
2) Using a hydraulic press, press new hub bolts into place.

CAUTION:
Be sure to press hub bolts until their seating surfaces contact the hub.

NOTE:
Use 12 mm (0.47 in) dia. holes in HUB STAND to prevent bolts from tilting.

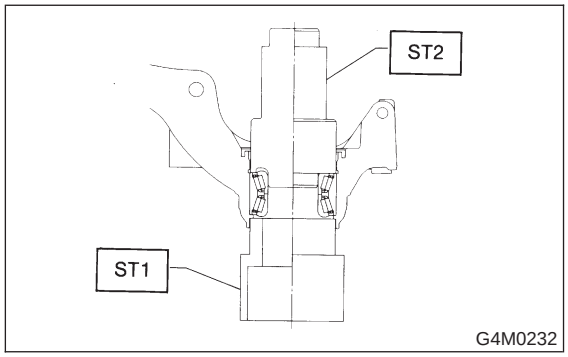
3) Remove foreign particles (dust, rust, etc.) from mating surfaces of hub and tone wheel, and install tone wheel to hub (only vehicle equipped with ABS).

CAUTION:
- **Be careful not to damage tone wheel teeth.**
- **Ensure tone wheel closely contacts hub.**



4) Clean dust or foreign particles from inside the housing.
5) Using ST1 and ST2, press a new bearing into place.
ST1 927400000 HOUSING STAND
ST2 927100000 BEARING REMOVER

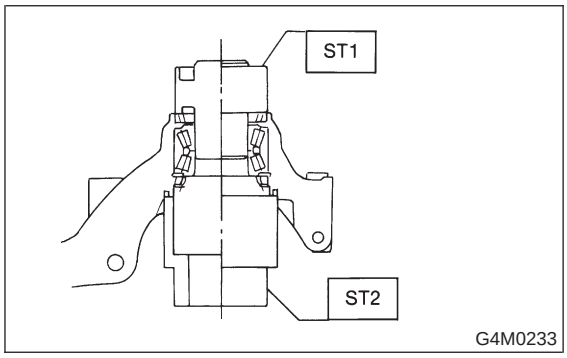
CAUTION:
- **Always press outer race when installing bearing.**
- **Be careful not to remove plastic lock from inner race when installing bearing.**
- **Charge bearing with new grease when outer race is not removed.**



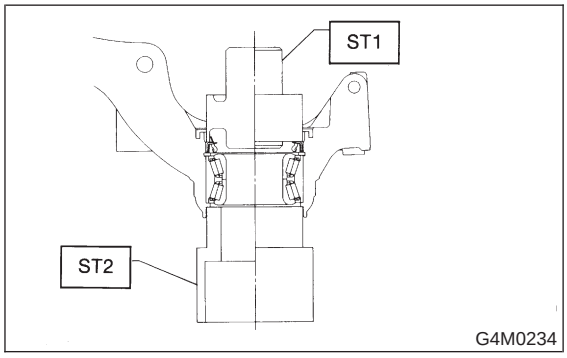
6) Install snap ring in its groove.

NOTE:
Make sure to install it firmly to groove.

7) Using ST1 and ST2, press outer oil seal until it contacts the bottom of housing.
ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



8) Using ST1 and ST2, press inner oil seal until it contacts circlip.
ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



9) Invert ST and housing.
ST 927400000 HOUSING STAND
10) Apply sufficient grease to oil seal lip.

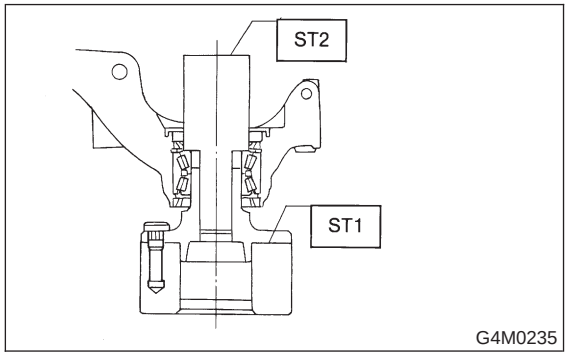
Specified grease:
SHELL 6459N

CAUTION:
- **If specified grease is not available, remove bearing grease and apply Auto Rex A instead.**
- **Do not mix different types of grease.**

11) Install disc cover to housing the three bolts.

Tightening torque:
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)

12) Attach hub to ST1 securely.
13) Clean dust or foreign particles from the polished surface of hub.
14) sing ST2, press bearing into hub by driving inner race.
ST1 927080000 HUB STAND
ST2 927120000 HUB INSTALLER



E: INSTALLATION

1) Install transverse link ball joint to housing.

Tightening torque:
44±6 N·m (4.5±0.6 kg-m, 32.5±4.3 ft-lb)

2) While aligning alignment mark on camber adjusting bolt head, connect housing and strut.

CAUTION:
Use a new self-locking nut.

Tightening torque:
147±15 N·m (15±1.5 kg-m, 108±11 ft-lb)

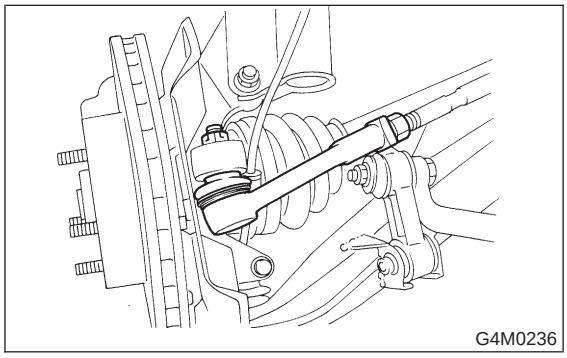
3) Install speed sensor and harness on housing (only vehicle equipped with ABS).
4) Install disc rotor on hub.
5) Install disc brake caliper on housing.

Tightening torque:
59±10 N·m (6±1 kg-m, 43±7 ft-lb)

6) Install front drive shaft. <Ref. to 4-2 [W4E1].>
7) Connect stabilizer link.

8) Install tie-rod end ball joint on housing knuckle arm.

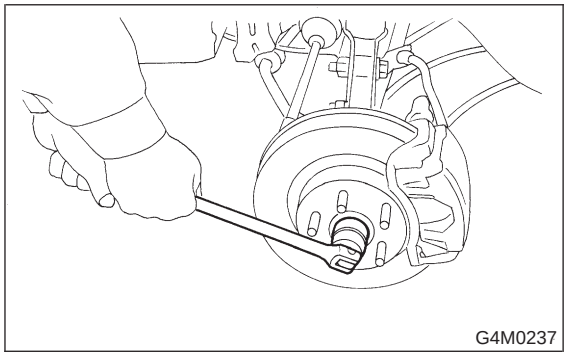
Tightening torque:
27.0±2.5 N·m (2.75±0.25 kg-m, 19.9±1.8 ft-lb)



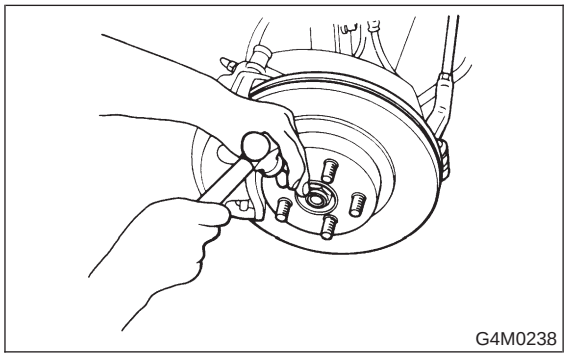
9) While depressing brake pedal, tighten axle nut and lock it securely.

CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**
- **Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.**

Tightening torque:
186±20 N·m (19±2 kg-m, 137±14 ft-lb)



10) After tightening axle nut, lock it securely.



11) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

2. Rear Axle (AWD Model)

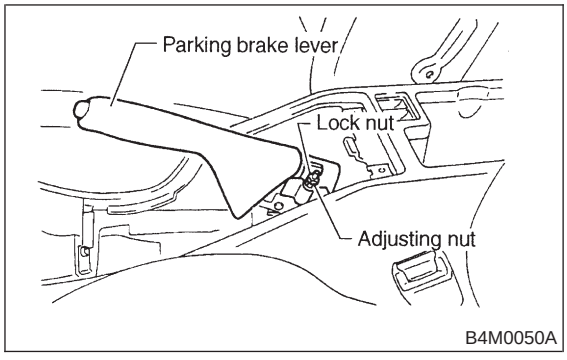
A: REMOVAL

1. DISC BRAKE

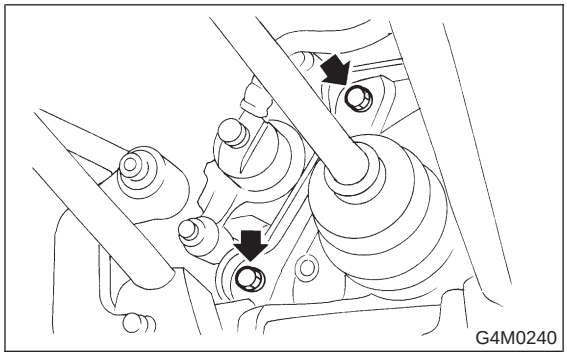
1) Disconnect ground cable from battery.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjusting nut.



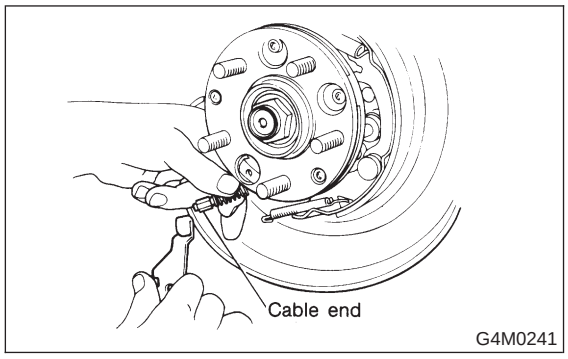
6) Remove disc brake caliper from back plate, and suspend it from strut using a piece of wire.



7) Remove disc rotor from hub.

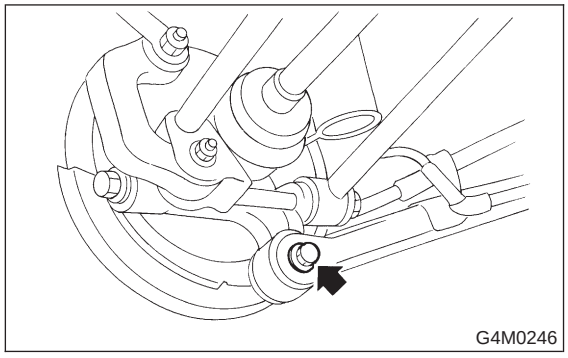
NOTE:
If disc rotor seizes up within hub, drive it out by installing an 8-mm bolt into bolt hole in disc rotor.

8) Disconnect parking brake cable end.



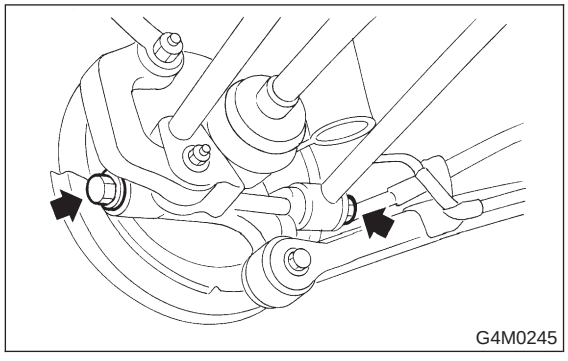
9) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.



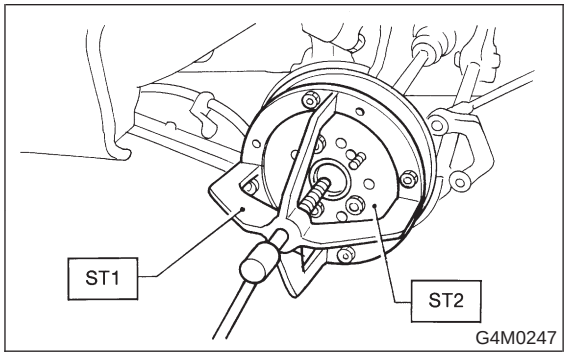
10) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.

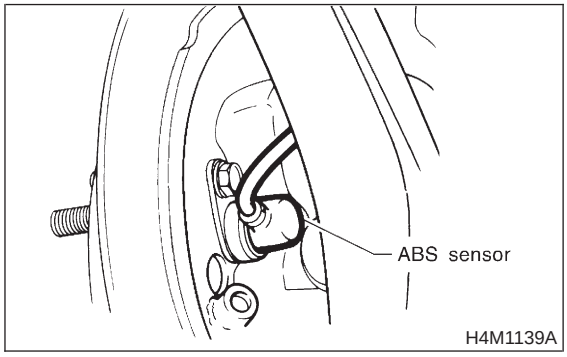


11) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

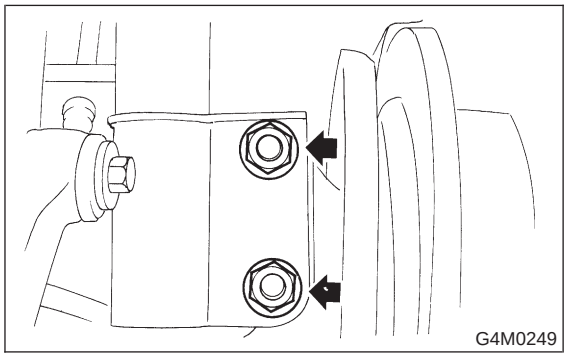
CAUTION:
- **Be careful not to damage oil seal lip when removing rear drive shaft.**
- **When rear drive shaft is to be replaced, also replace inner oil seal with a new one.**



12) Remove rear ABS sensor from back plate (only vehicle equipped with ABS).



13) Remove bolts which secure rear housing to strut, and separate the two.

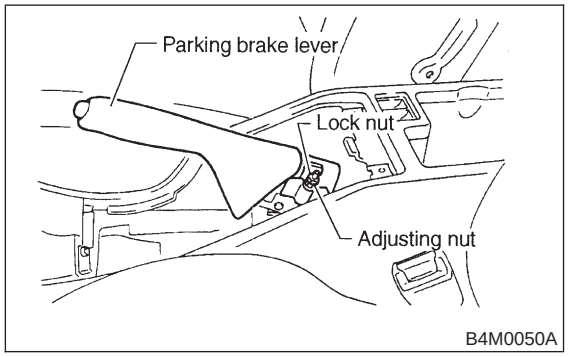


2. DRUM BRAKE

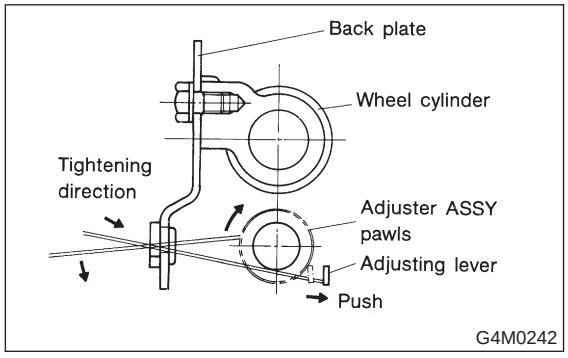
1) Disconnect ground cable from battery.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

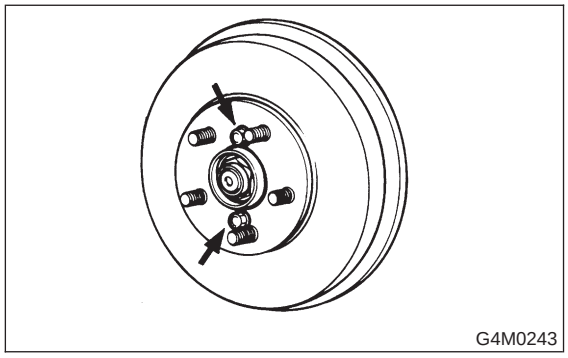
3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjusting nut.



6) Remove brake drum from hub.
7) If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.

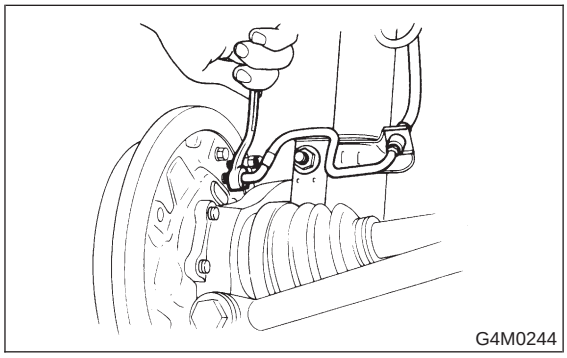


NOTE:
If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.

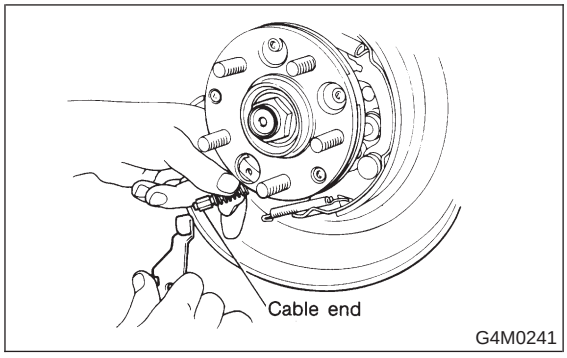


8) Using a flare-nut wrench, disconnect brake pipe from wheel cylinder.

CAUTION:
Cover open end of wheel cylinder to prevent entry of foreign particles.

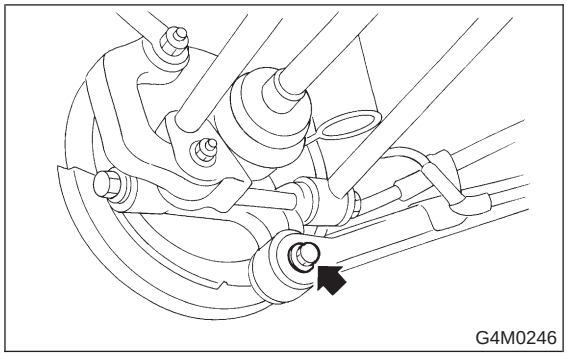


9) Disconnect parking brake cable end.



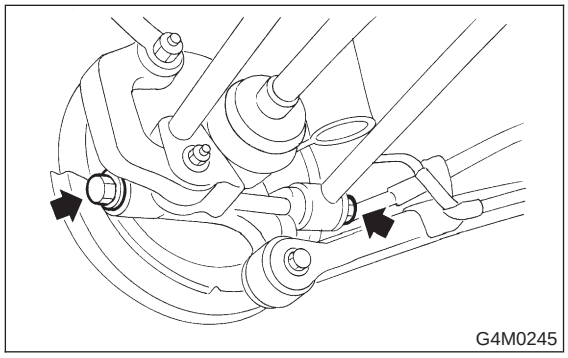
10) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.



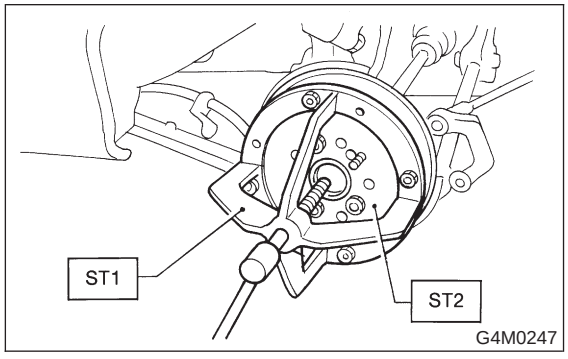
11) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.

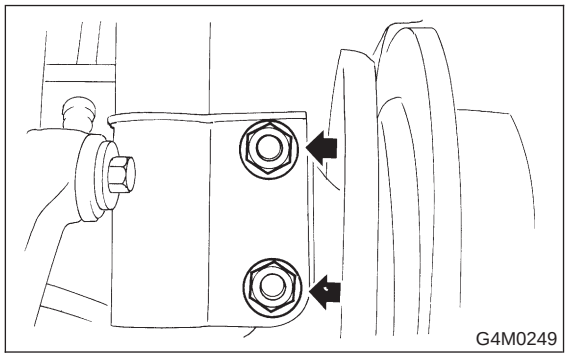


12) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
- **Be careful not to damage oil seal lip when removing rear drive shaft.**
- **When rear drive shaft is to be replaced, also replace inner oil seal with a new one.**

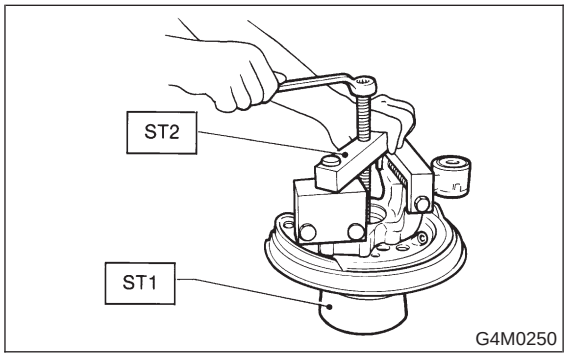


13) Remove bolts which secure rear housing to strut, and separate the two.



B: DISASSEMBLY

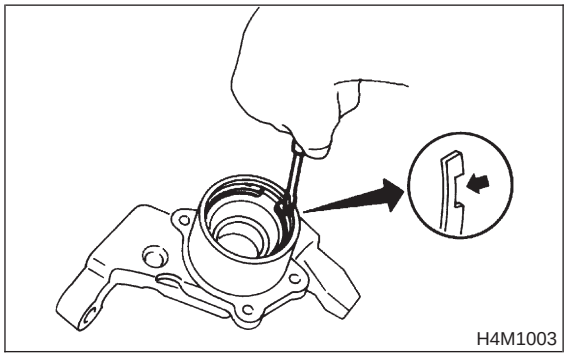
1) Using ST1 and ST2, remove hub from rear housing.
ST1 927080000 HUB STAND
ST2 927420000 HUB REMOVER



2) Remove back plate from rear housing.
3) Using a standard screwdriver, remove outer and inner oil seals.

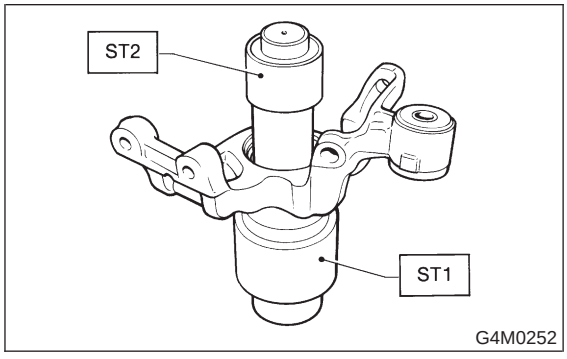
CAUTION:
Use new oil seals.

4) Using flat bladed screwdriver, remove snap ring.



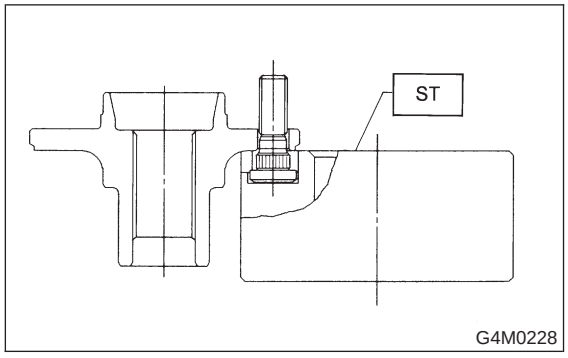
5) Using ST1 and ST2, remove bearing by pressing inner race.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

CAUTION:
- **Do not remove bearing unless damaged.**
- **Do not re-use bearing after removal.**



6) Remove tone wheel bolts and remove tone wheel from hub (only vehicle equipped with ABS).
7) Using ST, press hub bolts out.
ST 927080000 HUB STAND

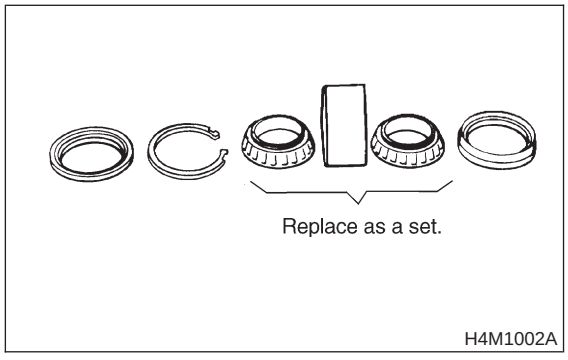
CAUTION:
Be carful not to hammer hub bolts. This may deform hub.



C: INSPECTION

Check the removed parts for wear and damage. If defective, replace with new ones.

CAUTION:
- **If a bearing is faulty, replace it as a bearing set.**
- **Be sure to replace oil seal at every overhaul.**

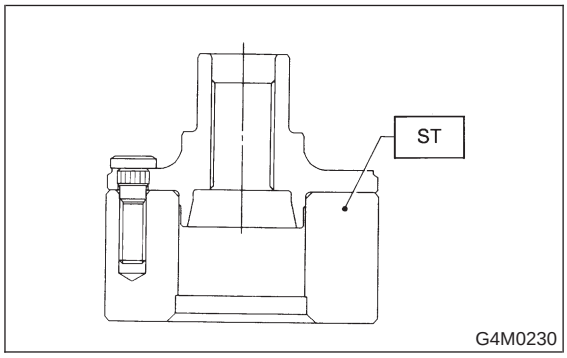


D: ASSEMBLY

1) Using ST, press new hub bolt into place.

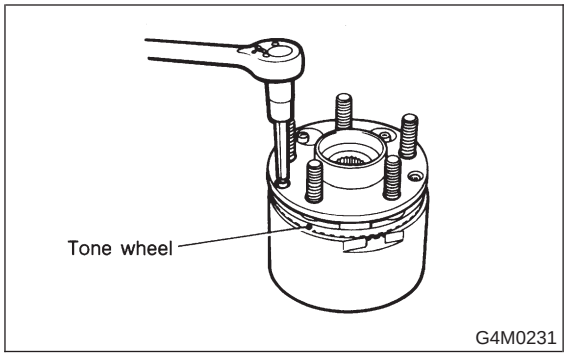
CAUTION:
- **Ensure hub bolt closely contacts hub.**
- **Use a 12 mm (0.47 in) hole in the ST to prevent hub bolt from tilting during installation.**

ST 927080000 HUB STAND



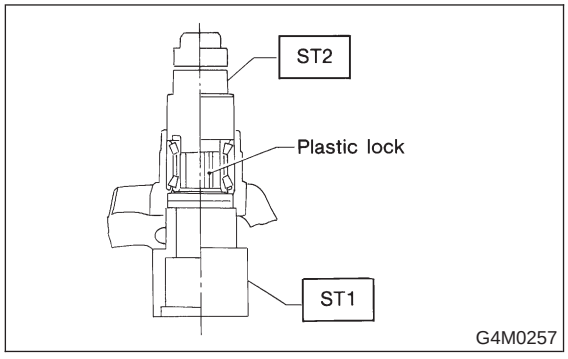
2) Remove foreign particles (dust, rust, etc.) from mating surfaces of hub and tone wheel, and install tone wheel to hub (only vehicle equipped with ABS).

CAUTION:
- **Ensure tone wheel closely contacts hub.**
- **Be careful not to damage tone wheel teeth.**



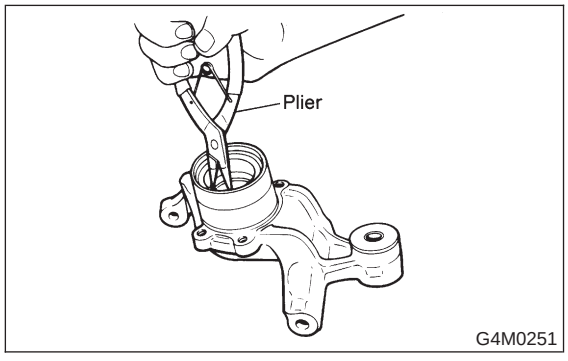
3) Clean housing interior completely. Using ST1 and ST2, press bearing into housing.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

CAUTION:
● Always press outer race when installing bearing.
● Be careful not to remove plastic lock from inner race when installing bearing.
● Charge bearing with new grease when outer race is not removed.

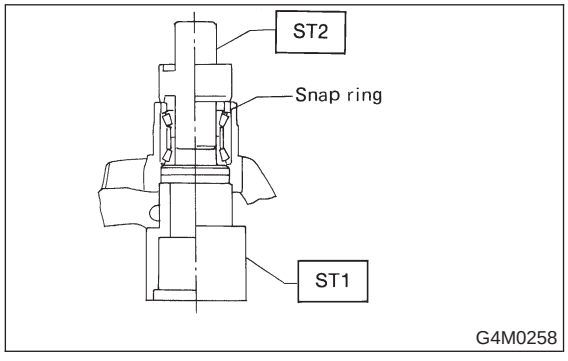


4) Install snap ring.

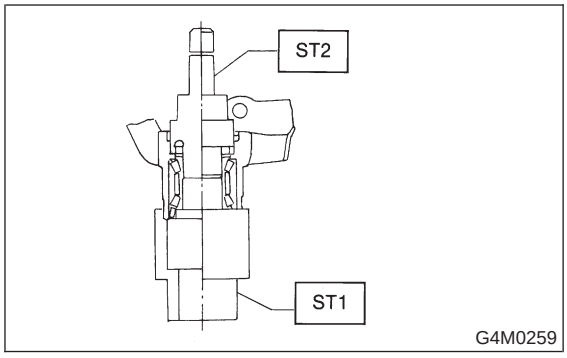
CAUTION:
Ensure snap ring fits in groove properly.



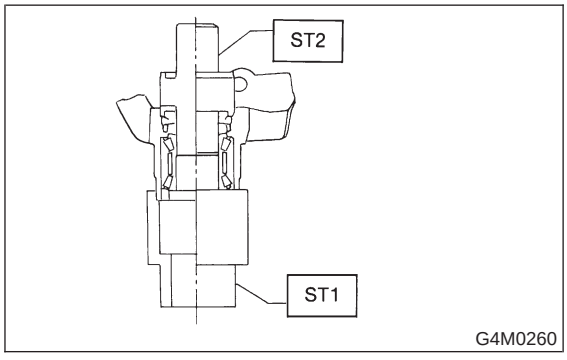
5) Using ST1 and ST2, press outer oil seal until it comes in contact with snap ring.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER



6) Invert both ST1 and housing.
7) Using ST2, press inner oil seal into housing until it touches bottom.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER



8) Using ST1 and ST2, press sub seal into place.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER



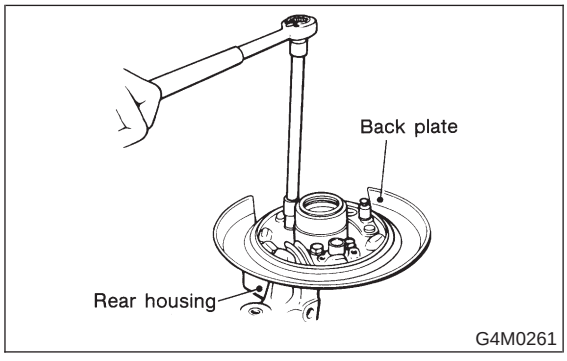
9) Apply sufficient grease to oil seal lip.

Specified grease:
SHELL 6459N

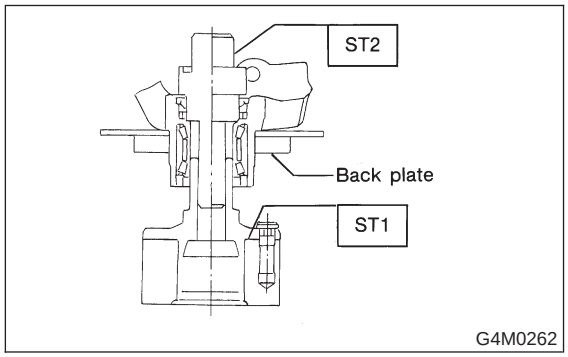
CAUTION:
● If specified grease is not available, remove bearing grease and apply Auto Rex A instead.
● Do not mix different types of grease.

10) Install back plate to rear housing.

Tightening torque:
52±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)



11) Using ST1 and ST2, press bearing into hub.
ST1 927080000 HUB STAND
ST2 927450000 HUB INSTALLER



E: INSTALLATION

1. DISC BRAKE

1) Connect rear housing assembly and strut assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
147±15 N·m (15±1.5 kg-m, 108±11 ft-lb)

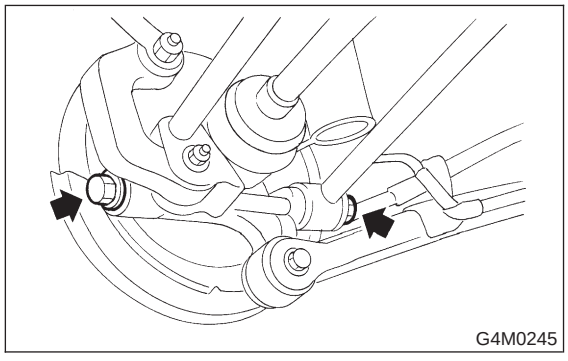
2) Fit BJ (bell joint) to rear housing splines.

CAUTION:
Be careful not to damage inner oil seal lip.

3) Connect rear housing assembly to lateral link assembly.

CAUTION:
Use a new self-locking nut.

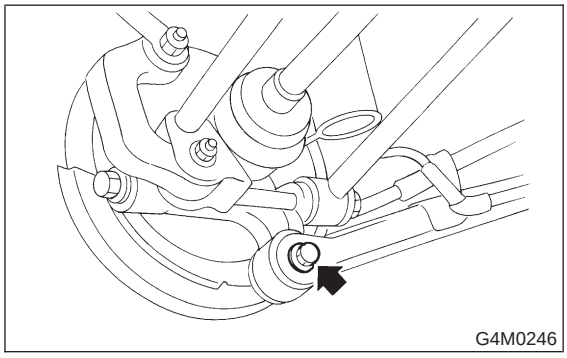
Tightening torque:
137±20 N·m (14±2 kg-m, 101±14 ft-lb)



4) Connect rear housing assembly to trailing link assembly.

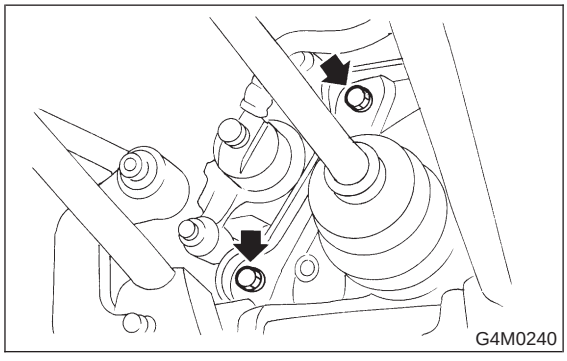
CAUTION:
Use a new self-locking nut.

Tightening torque:
98 — 127 N·m (10 — 13 kg-m, 72 — 94 ft-lb)

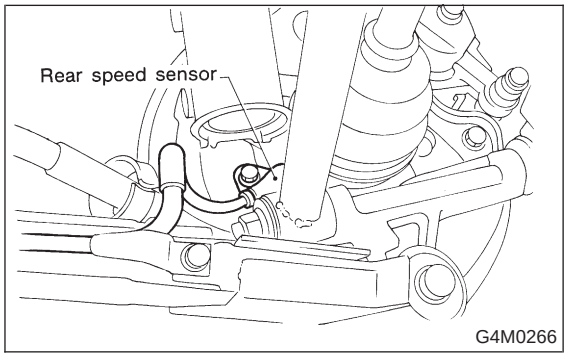


5) Connect parking brake cable to parking brake.
6) Install disc rotor on rear housing assembly.
7) Install disc brake caliper on back plate.

Tightening torque:
52±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)



8) Install rear speed sensor to back plate (only vehicle equipped with ABS).



9) Bleed air from brake system. <Ref. to 4-4 [W11B0].>
10) Adjust parking brake lever stroke by turning adjuster.
11) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a

socket wrench. Lock axle nut after tightening.

Tightening torque:
186±20 N·m (19±2 kg-m, 137±14 ft-lb)

CAUTION:
● Use a new axle nut.
● Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
● Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

12) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

2. DRUM BRAKE

1) Connect rear housing assembly and strut assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
147±15 N·m (15±1.5 kg-m, 108±11 ft-lb)

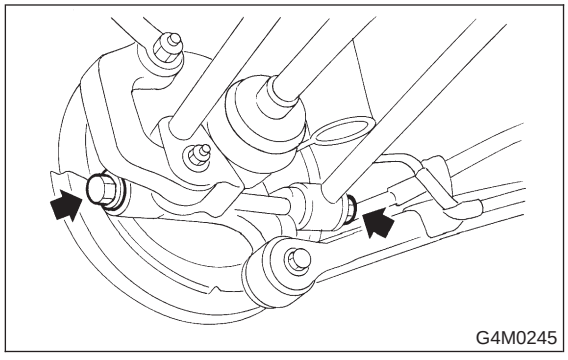
2) Fit BJ (bell joint) to rear housing splines.

CAUTION:
Be careful not to damage inner oil seal lip.

3) Connect rear housing assembly to lateral link assembly.

CAUTION:
Use a new self-locking nut.

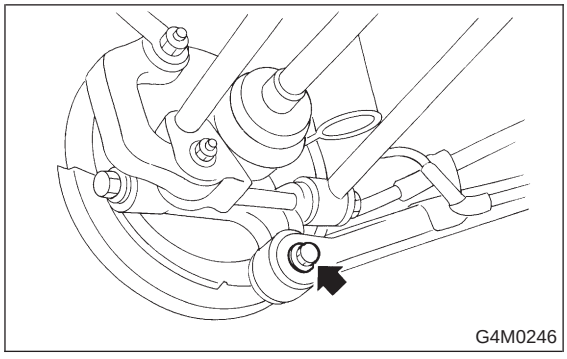
Tightening torque:
137±20 N·m (14±2 kg-m, 101±14 ft-lb)


G4M0245

4) Connect rear housing assembly to trailing link assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
98 — 127 N·m (10 — 13 kg-m, 72 — 94 ft-lb)


G4M0246

5) Connect parking brake cable to parking brake.
6) Clean brake pipe connection. Using a flare-nut wrench, connect brake pipe to wheel cylinder.
7) Connect parking brake cable to lever.
8) Install brake drum on rear housing assembly.
9) Bleed air from brake system. <Ref. to 4-4 [W11B0].>
10) Adjust parking brake lever stroke by turning adjuster.
11) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a socket wrench. Lock axle nut after tightening.

Tightening torque:
186±20 N·m (19±2 kg-m, 137±14 ft-lb)

CAUTION:
● Use a new axle nut.
● Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
● Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

12) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

3. Rear Axle (FWD Model)

A: REMOVAL

1. DISC BRAKE

1) Disconnect ground cable from battery.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

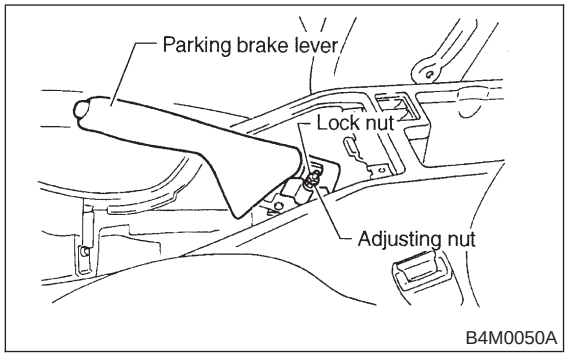
CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Pry hub cap off with a screwdriver placed between it and hub.
4) Unlock axle nut.
5) Remove axle nut using a socket wrench. Remove washer.

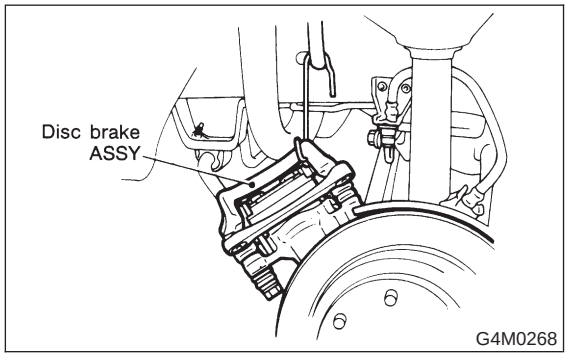
CAUTION:
Do not re-use old axle nut. Replace with a new one.

NOTE:
Temporarily tighten axle nut to hold hub in place.

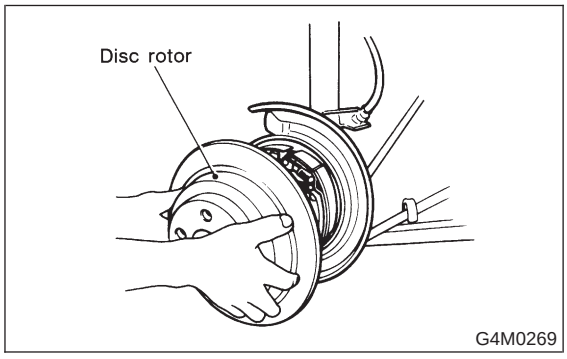
6) Return parking brake lever and loosen adjusting nut.



7) Remove disc brake assembly from back plate. Suspend disc brake assembly from strut using a wire.

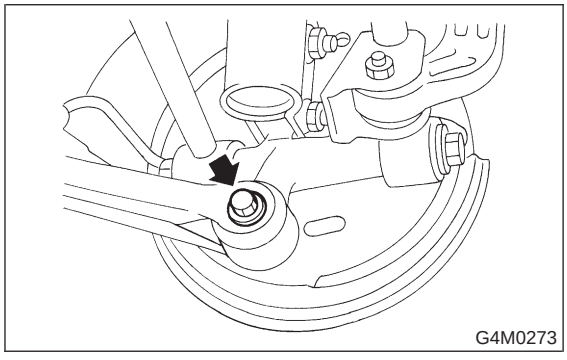


8) Remove disc rotor from hub.
If disc rotor seizes up within hub, drive it out by installing an 8-mm bolt in bolt hole on disc rotor.



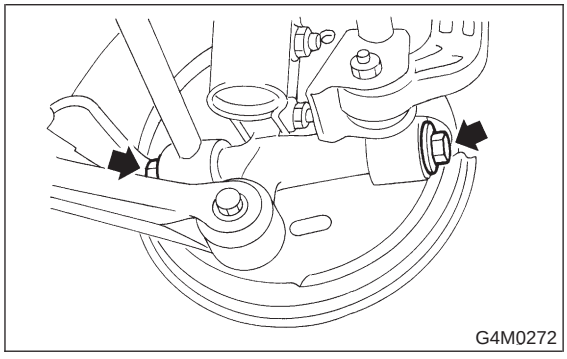
9) Disconnect end of parking brake cable.
10) Remove bolts which secure trailing link assembly to rear spindle.

CAUTION:
Discard old self-locking nut. Replace with a new one.

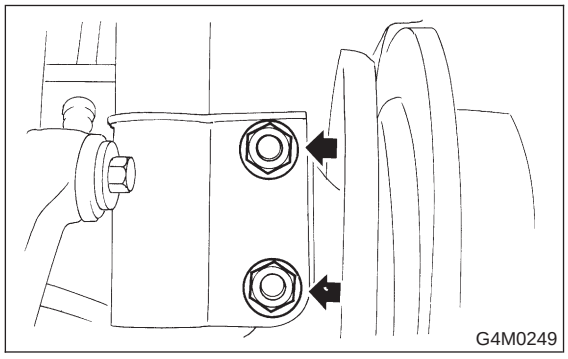


11) Remove bolts which secure lateral link assembly to rear spindle.

CAUTION:
Discard old self-locking nut. Replace with a new one.



12) Remove bolts which secure strut assembly to rear spindle.
Remove rear spindle, back plate and hub as a unit.



2. DRUM BRAKE

1) Disconnect ground cable from battery.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

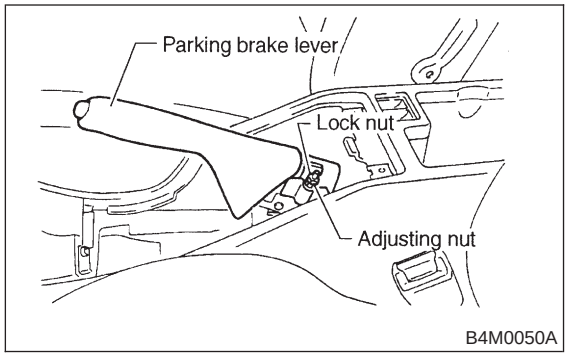
CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Pry hub cap off with a screwdriver placed between it and hub.
4) Unlock axle nut.
5) Remove axle nut using a socket wrench. Remove washer.

CAUTION:
Do not re-use old axle nut. Replace with a new one.

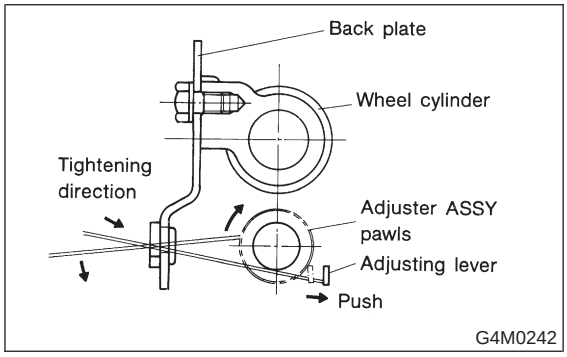
NOTE:
Temporarily tighten axle nut to hold hub in place.

6) Return parking brake lever and loosen adjusting nut.

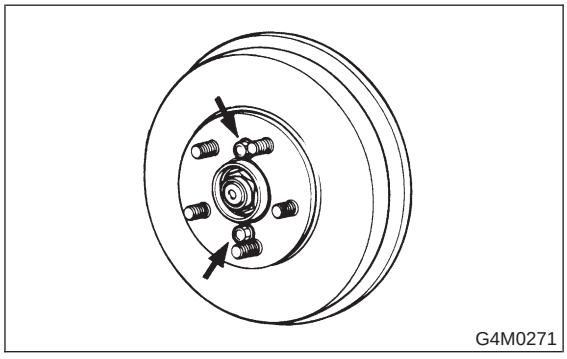


7) Remove brake drum from hub.

8) If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.



NOTE:
If brake drum seizes up within hub, drive it out by installing an 8-mm bolt in bolt hole on brake drum.

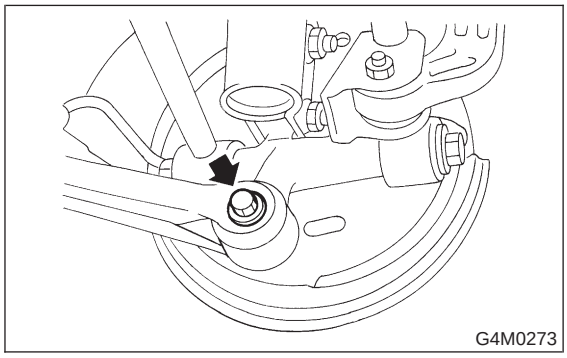


9) Disconnect end of parking brake cable.
10) Using a flare-nut wrench, disconnect brake pipe from wheel cylinder.

CAUTION:
Cover brake pipe connection to prevent entry of foreign particles.

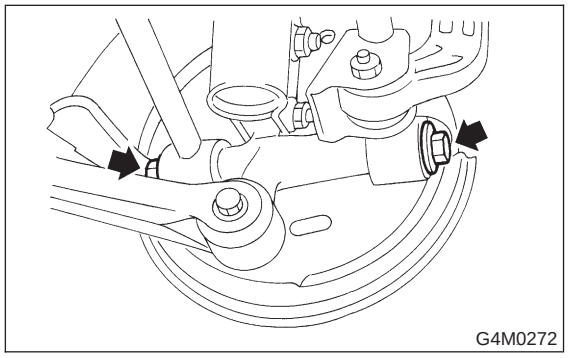
11) Remove bolts which secure trailing link assembly to rear spindle.

CAUTION:
Discard old self-locking nut. Replace with a new one.

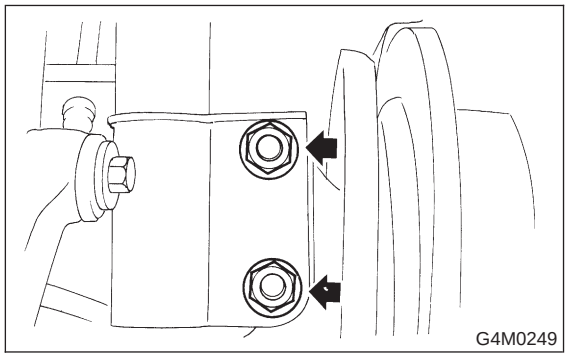


12) Remove bolts which secure lateral link assembly to rear spindle.

CAUTION:
Discard old self-locking nut. Replace with a new one.

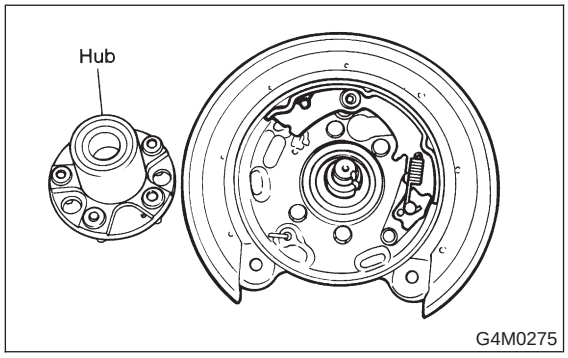


13) Remove bolts which secure strut assembly to rear spindle.
Remove rear spindle, back plate and hub as a unit.

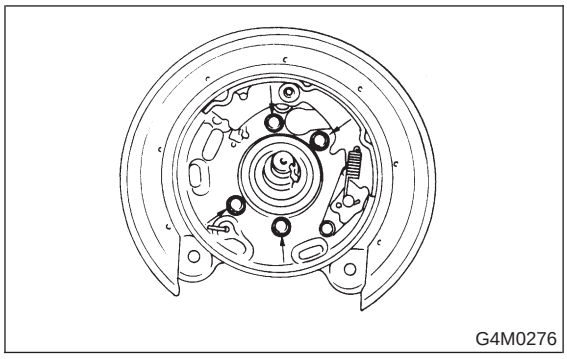


B: DISASSEMBLY

1) Remove hub from rear spindle.



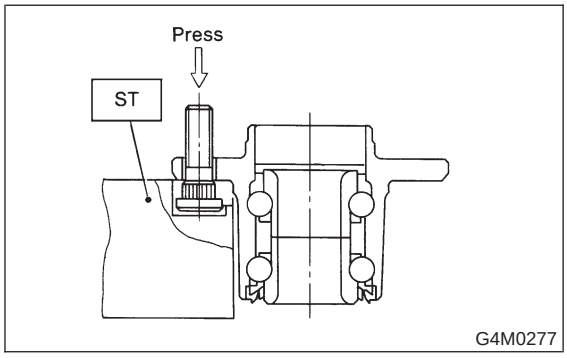
2) Remove back plate from rear spindle.



3) Using ST, press hub bolts out.

CAUTION:
Do not hammer hub bolt since this may deform hub.

ST 927080000 HUB STAND



C: INSPECTION

Clean the removed parts and check them for wear, damage and corrosion. If faulty, replace.

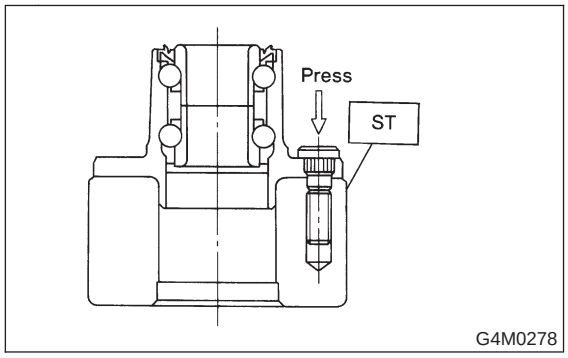
CAUTION:
Hub unit cannot be disassembled. If faulty, replace it as a unit.

D: ASSEMBLY

1) Using ST, press new hub bolts into place.

NOTE:
● Use a 12 mm (0.47 in) hole in ST to prevent hub bolt from tilting during installation.
● Ensure hub bolt closely contacts hub.

ST 927080000 HUB STAND



2) Completely clean dust or dirt from the mating/polished surface of rear spindle back plate.
3) Install back plate to rear spindle.

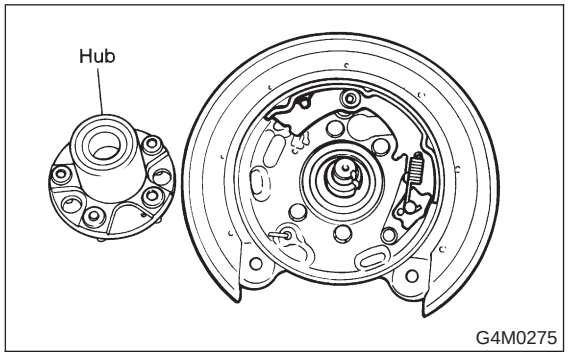
Tightening torque:
52±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)

4) Charge oil seal located on the rear of hub with grease.

Specified grease:
SHELL 6459N

5) Install hub on rear spindle. Temporarily tighten axle nut and washer to hold hub in place.

CAUTION:
Discard old axle nut. Replace with a new one.



E: INSTALLATION

1. DISC BRAKE

1) Connect rear spindle assembly to strut assembly.

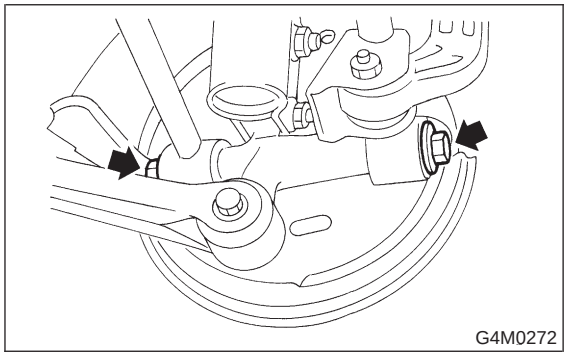
Tightening torque:
147±15 N·m (15±1.5 kg-m, 108±11 ft-lb)

CAUTION:
Use a new self-locking nut.

2) Connect rear spindle assembly to lateral link assembly.

Tightening torque:
137±20 N·m (14±2 kg-m, 101±14 ft-lb)

CAUTION:
Use new self-locking nut.



3) Connect rear spindle assembly to trailing link assembly.

Tightening torque:
113±15 N·m (11.5±1.5 kg-m, 83±11 ft-lb)

CAUTION:
Use a new self-locking nut.

4) Connect end of parking brake cable.
5) Install disc rotor to hub unit.
6) Install disc brake assembly to back plate.

Tightening torque:
52±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)

7) Tighten axle nut using a socket wrench, and lock securely.

Tightening torque:
186±20 N·m (19±2 kg-m, 137±14 ft-lb)

CAUTION:
● Use a new axle nut.
● Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
● Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

8) Install O-ring to hub cap flange, and install hub cap by lightly tapping it with a plastic-faced hammer.
9) Install wheel and tighten wheel nuts to specified torque.

Tightening torque (Wheel nut):
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

2. DRUM BRAKE

1) Connect rear spindle assembly to strut assembly.

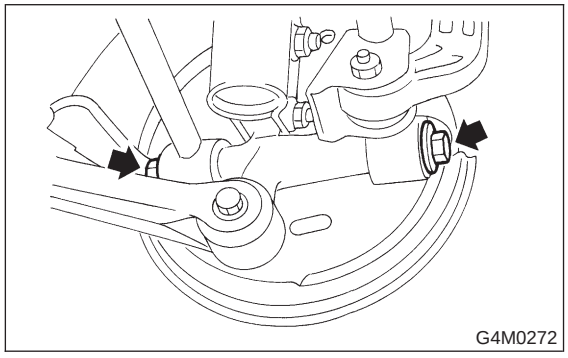
Tightening torque:
147±15 N·m (15±1.5 kg-m, 108±11 ft-lb)

CAUTION:
Use a new self-locking nut.

2) Connect rear spindle assembly to lateral link assembly.

Tightening torque:
137±20 N·m (14±2 kg-m, 101±14 ft-lb)

CAUTION:
Use new self-locking nut.


G4M0272

3) Connect rear spindle assembly to trailing link assembly.

Tightening torque:
113±15 N·m (11.5±1.5 kg-m, 83±11 ft-lb)

CAUTION:
Use a new self-locking nut.

4) Completely clean brake pipe connection. Using a flare-nut wrench, connect brake pipe to wheel cylinder.
5) Connect parking brake cable to lever.
6) Install brake drum on hub unit.
7) Bleed air from brake system. <Ref. to 4-4 [W11B0].>
8) Tighten axle nut using a socket wrench, and lock securely.

Tightening torque:
186±20 N·m (19±2 kg-m, 137±14 ft-lb)

CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**
- **Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.**

9) Install O-ring to hub cap flange, and install hub cap by lightly tapping it with a plastic-faced hammer.
10) Install wheel and tighten wheel nuts to specified torque.

Tightening torque (Wheel nut):
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

4. Front and Rear Drive Shafts

A: REMOVAL

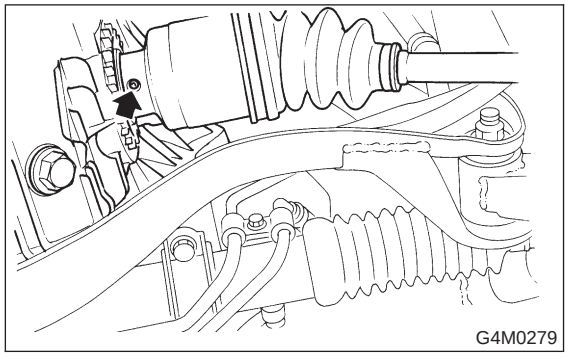
1. FRONT DRIVE SHAFT

1) Disconnect ground cable from battery.
2) Jack-up vehicle, support it with safety stands (rigid racks), and remove front wheel cap and wheels.
3) Unlock axle nut.
4) While depressing brake pedal, remove axle nut using a socket wrench.

CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

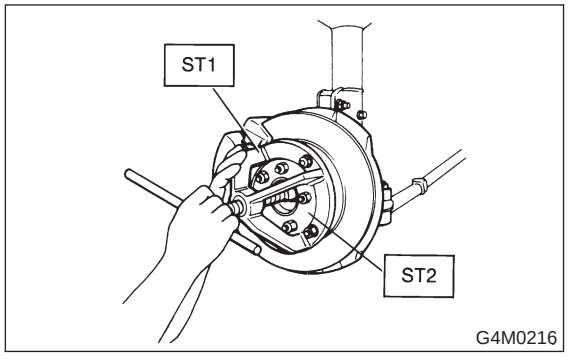
5) Disconnect stabilizer link from transverse link.
6) Disconnect transverse link from housing.
7) Remove spring pin which secures transmission spindle to DOJ/SFJ.

CAUTION:
Use a new spring pin.


G4M0279

8) Remove front drive shaft assembly. If it is hard to remove, use ST1 and ST2.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
- **Be careful not to damage oil seal lip when removing front drive shaft.**
- **When front drive shaft is to be replaced, also replace inner oil seal.**



G4M0216

2. REAR DRIVE SHAFT

1) Disconnect ground cable from battery.
2) Lift-up vehicle, and remove rear wheel cap and wheels.

CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Unlock axle nut.
4) Loosen axle nut using a socket wrench.

CAUTION:
Do not remove axle nut.

5) Remove ABS sensor clamps and parking brake cable bracket.
6) Remove bolts which secure lateral link assembly to rear housing.

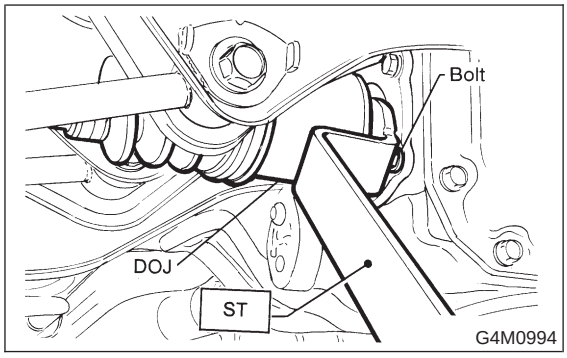
CAUTION:
Discard old self-locking nut. Replace with a new one.

7) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.

8) Remove crossmember reinforcement lower from crossmember (4 door model only).
9) Remove DOJ from rear differential using ST. (Except 2200 cc AT vehicles)
ST 28099PA100 DRIVE SHAFT REMOVER

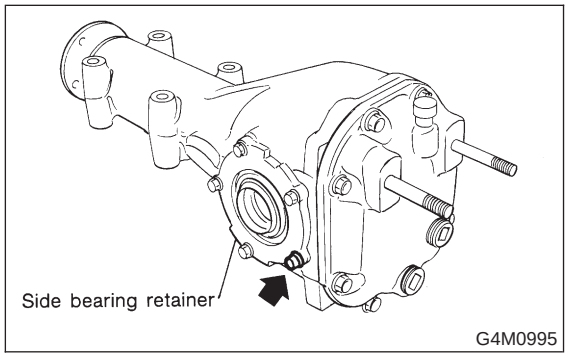
CAUTION:
Do not remove circlip attached to inside of differential.



G4M0994

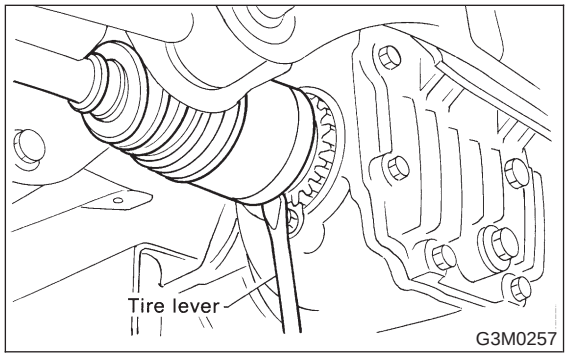
CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

ST 28099PA100 DRIVE SHAFT REMOVER

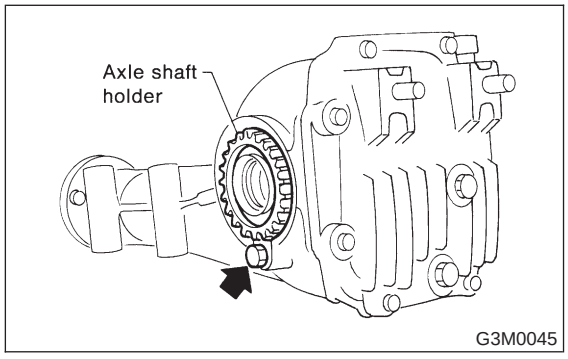


10) Remove DOJ from rear differential using tire lever. (2200 cc AT vehicles)

NOTE:
The side spline shaft circlip comes out together with the shaft.

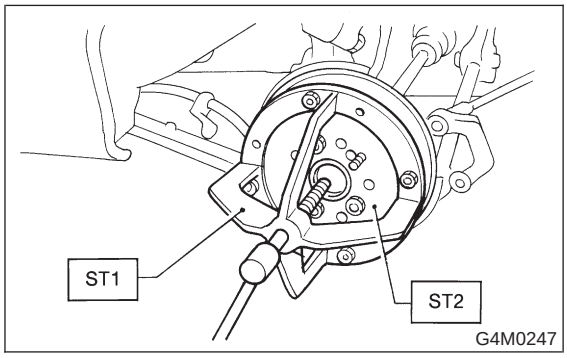


CAUTION:
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.



11) Remove axle nut and drive shaft. If it is hard to remove, use ST1 and ST2.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

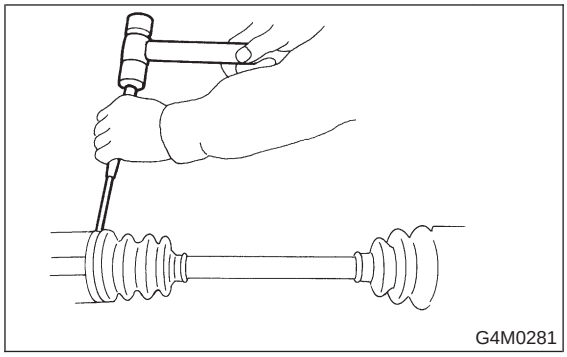
CAUTION:
- **Be careful not to damage oil seal lip when removing rear drive shaft.**
- **When rear drive shaft is to be replaced, also replace inner oil seal with a new one.**



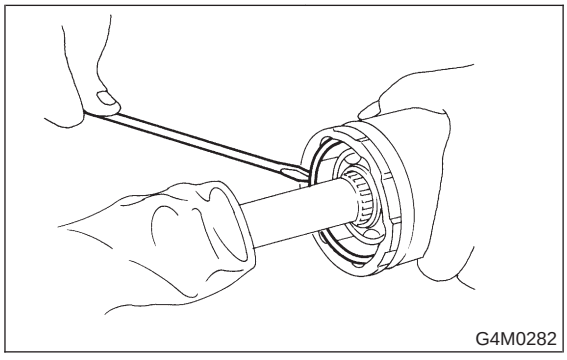
B: DISASSEMBLY

1. EXCEPT AWD AT FRONT DRIVE SHAFT

1) Remove both DOJ boot bands.
2) Loosen band by means of screwdriver or pliers taking care to not damage the boot.



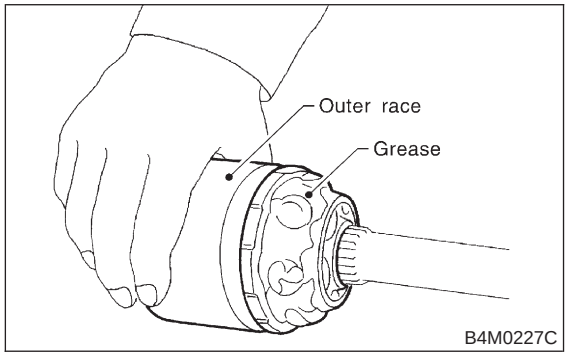
3) Remove the larger end of DOJ boot from DOJ outer race.
4) Pry and remove round circlip located at the neck of DOJ outer race with a screwdriver.



5) Take out DOJ outer race from shaft assembly.
6) Wipe off grease and take out balls.

CAUTION:
The grease is a special grease (grease for constant velocity joint). Do not confuse with other greases.

NOTE:
Disassemble exercising care not to lose balls (6 pcs).



NOTE:
Clean all parts as necessary.

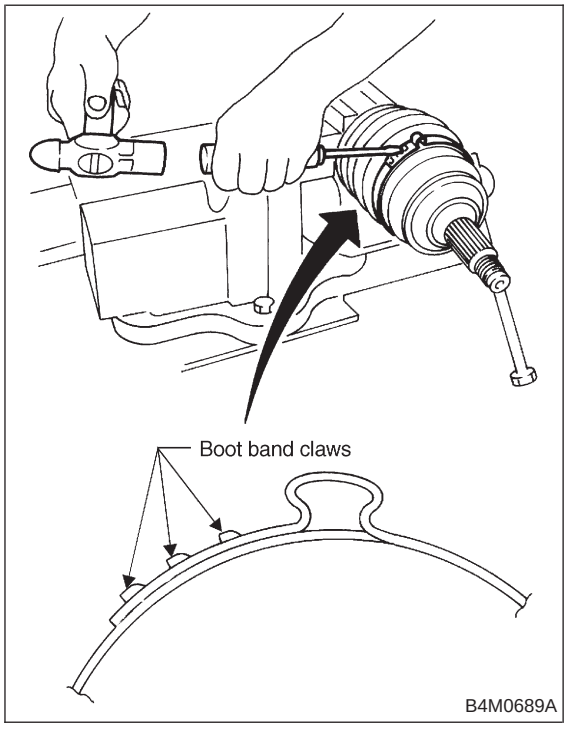
7) To remove the cage from the inner race, turn the cage by a half pitch to the track groove of the inner race and shift the cage.
8) Remove snap ring, which holds the inner race to shaft, by using pliers.
9) Take out DOJ inner race.
10) Take off DOJ cage from shaft and remove DOJ boot.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to protect the boot from scratches.

11) Place drive shaft in a vise between wooden blocks.

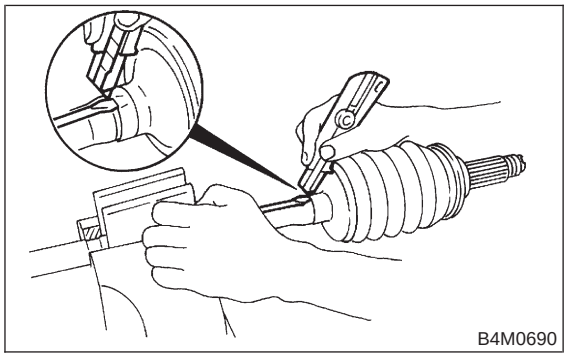
CAUTION:
Do not place drive shaft directly in the vise; use wooden block.

12) Raise boot band claws by means of screwdriver and hammer.



13) Cut and remove the boot.

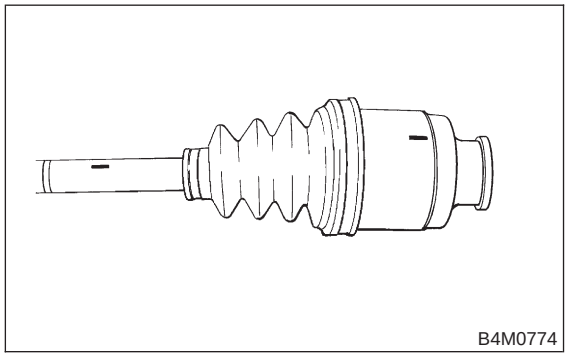
CAUTION:
The boot must be replaced with a new one whenever it is removed.



14) Thus, disassembly of axle is completed, but BJ cannot be disassembled.

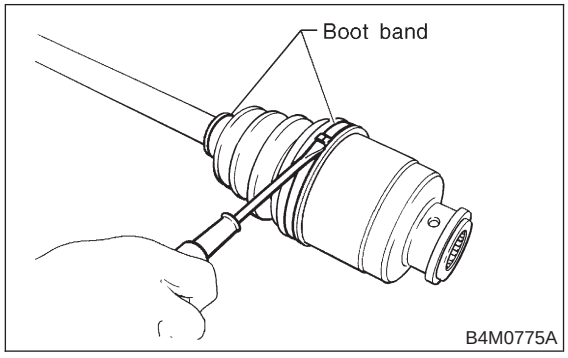
2. AWD AT FRONT DRIVE SHAFT

1) Place alignment marks on shaft and outer race.

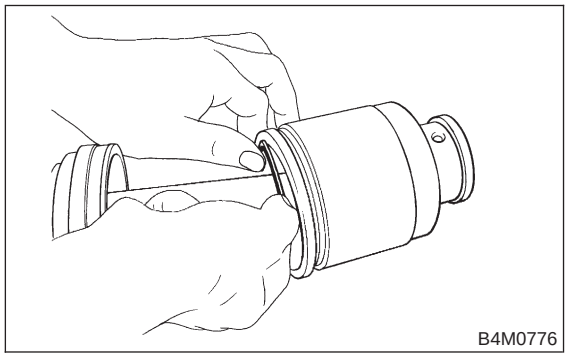


2) Remove SFJ boot band and boot.

CAUTION:
Be careful not to damage boot.



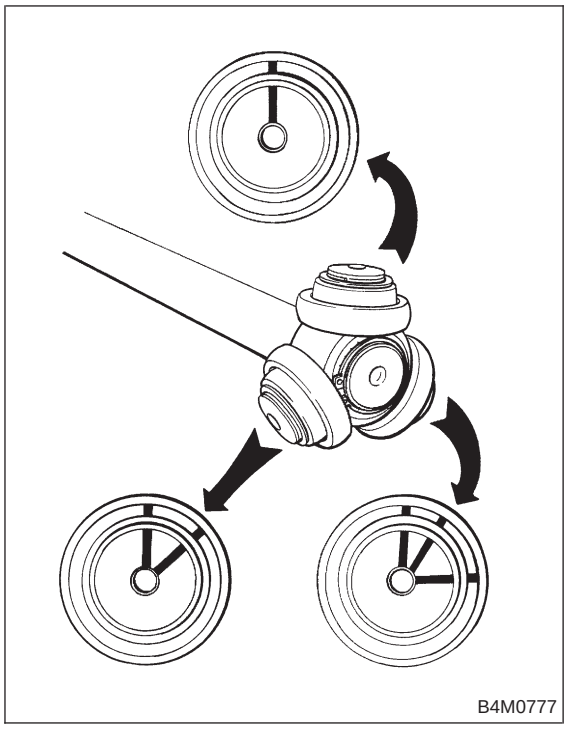
3) Remove circlip from SFJ outer race using screwdriver.



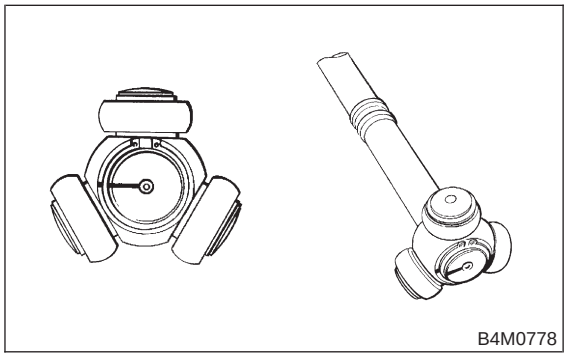
4) Remove SFJ outer race from shaft assembly.
5) Wipe off grease.

CAUTION:
The grease is a special grease. Do not confuse with other greases.

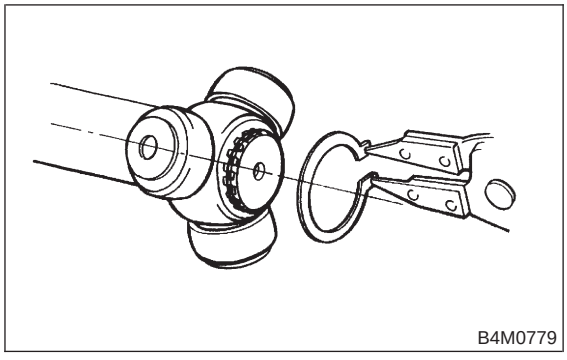
6) Place alignment mark on free ring and trunnion.



7) Remove free ring from trunnion.
8) Place alignment mark on trunnion and shaft.



9) Remove snap ring and trunnion.



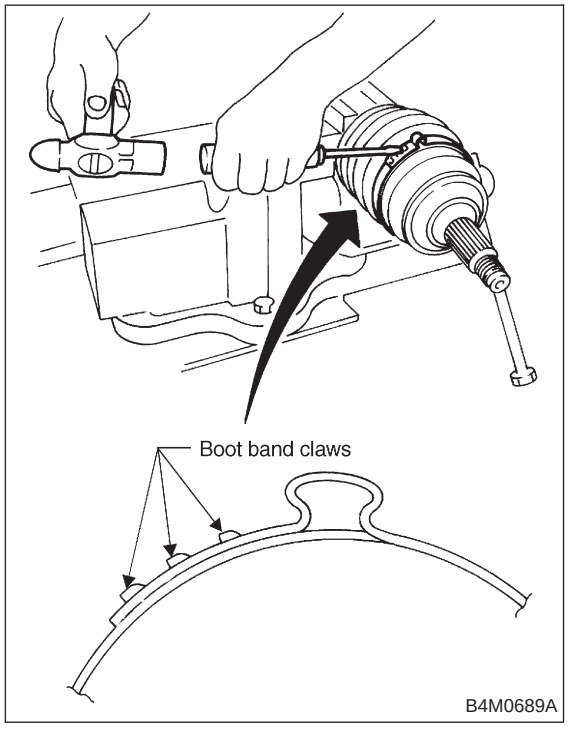
CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

10) Remove SFJ boot.

11) Place drive shaft in a vise between wooden blocks.

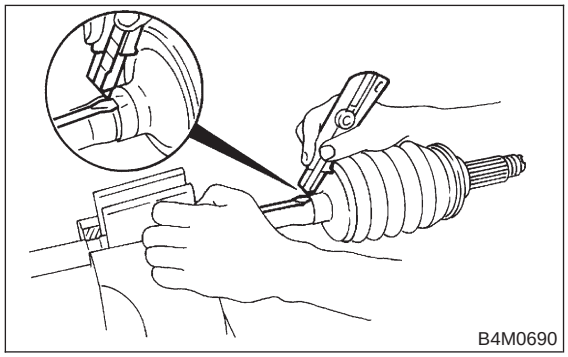
CAUTION:
Do not place drive shaft directly in the vise; use wooden block.

12) Raise boot band claws by means of screwdriver and hammer.



13) Cut and remove the boot.

CAUTION:
The boot must be replaced with a new one whenever it is removed.

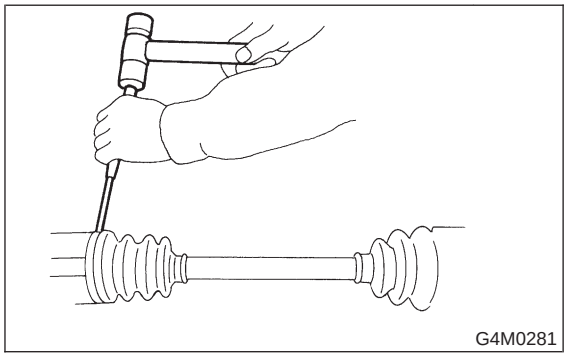


14) Thus, disassembly of axle is completed, but BJ cannot be disassembled.

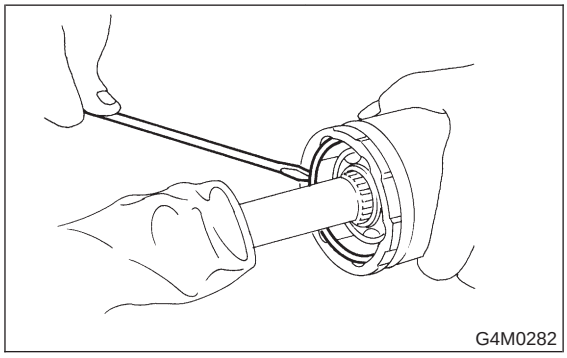
3. REAR DRIVE SHAFT

1) Straighten bent claw of larger end of DOJ boot.

2) Loosen band by means of screwdriver or pliers with care of not damaging boot.



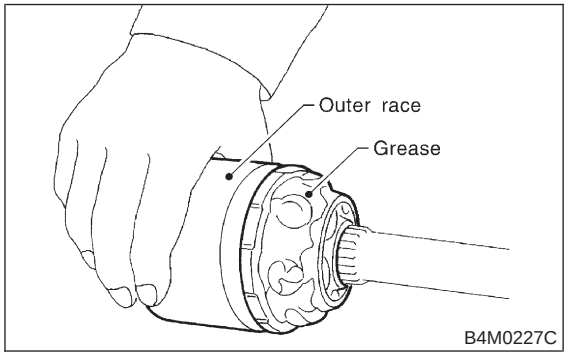
3) Remove boot band on the small end of DOJ boot in the same manner.
4) Remove the larger end of DOJ boot from DOJ outer race.
5) Pry and remove round circlip located at the neck of DOJ outer race with a screwdriver.



6) Take out DOJ outer race from shaft assembly.
7) Wipe off grease and take out balls.

CAUTION:
The grease is a special grease (grease for constant velocity joint). Do not confuse with other greases.

NOTE:
Disassemble exercising care not to lose balls (6 pcs).



8) To remove the cage from the inner race, turn the cage by a half pitch to the track groove of the inner race and shift the cage.

9) Remove snap ring, which fixes inner race to shaft, by using pliers.
10) Take out DOJ inner race.
11) Take off DOJ cage from shaft and remove DOJ boot.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

12) Remove BJ boot in the same procedure as DOJ boot.
13) Thus, disassembly of axle is completed, but BJ is unable to be disassembled.

C: INSPECTION

Check the removed parts for damage, wear, corrosion etc. If faulty, repair or replace.
1) DOJ (Double Offset Joint)
Check seizure, corrosion, damage, wear and excessive play.
2) SFJ (Shudder-less Freering tripod Joint)
Check seizure, corrosion, damage and excessive play.
3) Shaft
Check excessive bending, twisting, damage and wear.
4) BJ (Bell Joint)
Check seizure, corrosion, damage and excessive play.
5) Boot
Check for wear, warping, breakage or scratches.
6) Grease
Check for discoloration or fluidity.

D: ASSEMBLY

1. EXCEPT AWD AT FRONT DRIVE SHAFT

CAUTION:
Use specified grease.

BJ side:
NTG2218 (Part No. 28093AA020)

DOJ side:
VU-3A702 (Yellow) (Part No. 23223GA050)

1) Place BJ boot and small boot band on BJ side of shaft.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

2) Place drive shaft in a vise.

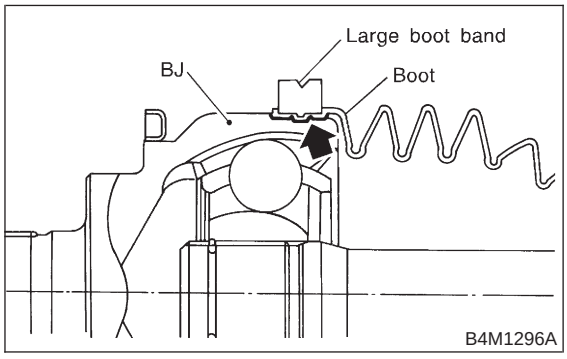
CAUTION:
Do not place drive shaft directly in the vise; use wooden blocks.

3) Apply a coat of specified grease [60 to 70 g (2.12 to 2.47 oz)] to BJ.

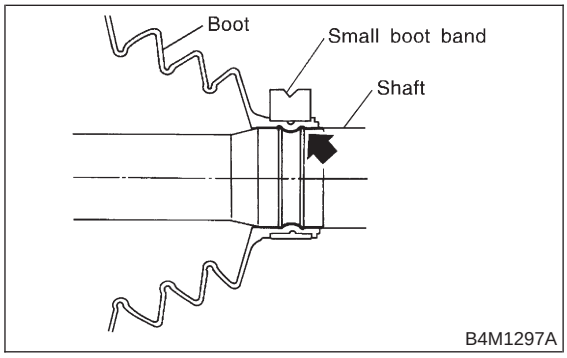
4) Apply an even coat of specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.

NOTE:
The inside of the larger end of BJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.

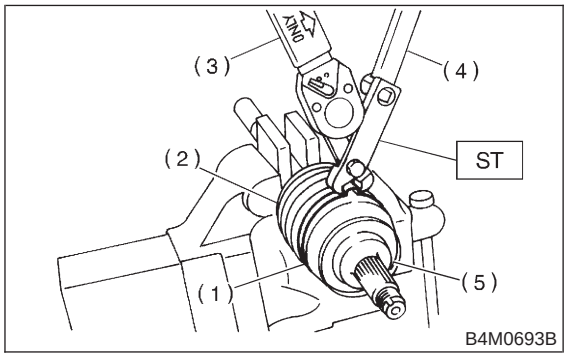
5) Install boot projecting portion to BJ groove.



6) Set large boot band in place.
7) Install boot projecting portion to shaft groove.



8) Tighten boot bands using ST, torque wrench and socket flex handle.
ST 28099AC000 BOOT BAND PLIER

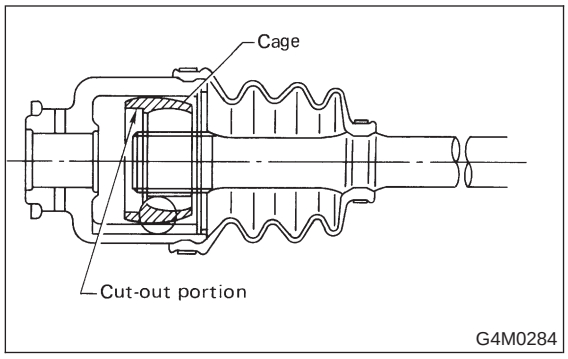


(1) Large boot band
(2) Boot
(3) Torque wrench
(4) Socket flex handle
(5) BJ

Tightening torque:
Large boot band
152 N·m (16.0 kg-m, 116 ft-lb) or more
Small boot band
133 N·m (13.6 kg-m, 98 ft-lb) or more

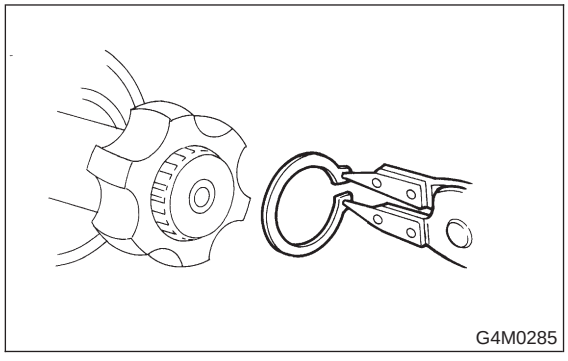
9) Place DOJ boot at the center of shaft.
10) Insert DOJ cage onto shaft.

NOTE:
Insert the cage with the cut-out portion facing the shaft end, since the cage is directional.



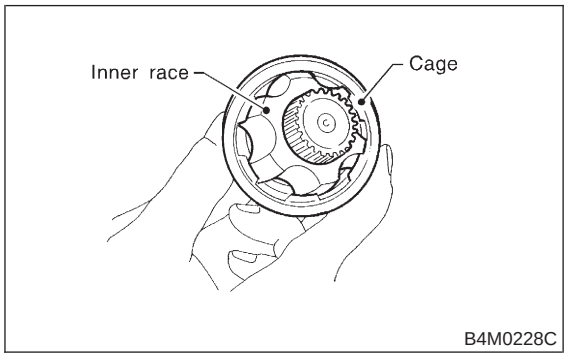
11) Install DOJ inner race on shaft and fit snap ring with pliers.

NOTE:
Confirm that the snap ring is completely fitted in the shaft groove.

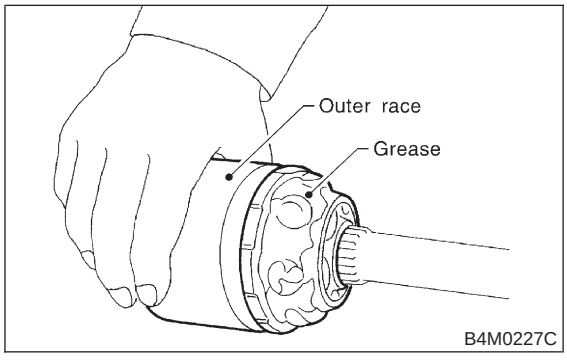


12) Install cage, which was previously fitted, to inner race fixed upon shaft.

NOTE:
Fit the cage with the protruded part aligned with the track on the inner race and then turn by a half pitch.

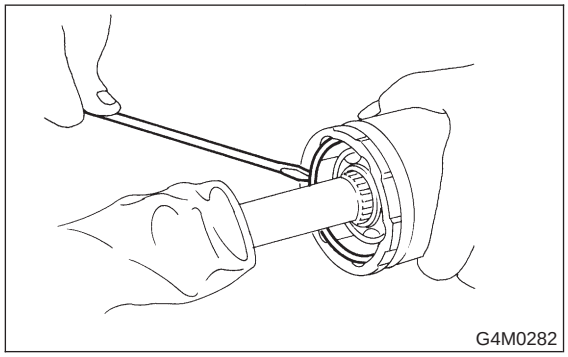


13) Put 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.
14) Apply a coat of specified grease to the cage pocket and six balls.
15) Insert six balls into the cage pocket.
16) Align the outer race track and ball positions and place in the part where shaft, inner race, cage and balls are previously installed, and then fit outer race.



17) Install circlip in the groove on DOJ outer race.

NOTE:
● Assure that the balls, cage and inner race are completely fitted in the outer race of DOJ.
● Exercise care not to match the open end of circlip in the ball groove of outer race.
● Pull the shaft lightly and assure that the circlip is completely fitted in the groove.


G4M0282

18) Apply an even coat of specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.
19) Install DOJ boot taking care not to twist it.

NOTE:
● The inside of the larger end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
● When installing DOJ boot, position outer race of DOJ at center of its travel.

20) Put a band through the clip and wind twice in alignment with band groove of boot.

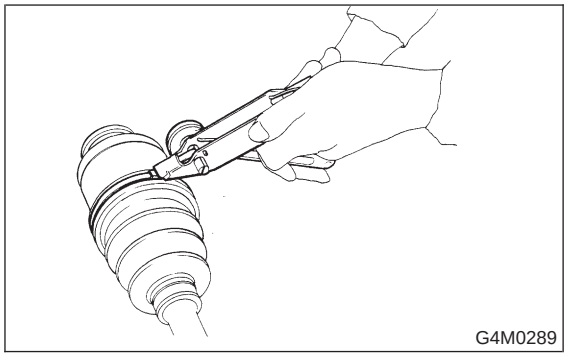
CAUTION:
Use a new band.

21) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:
When tightening boot, exercise care so that the air within the boot is appropriate.

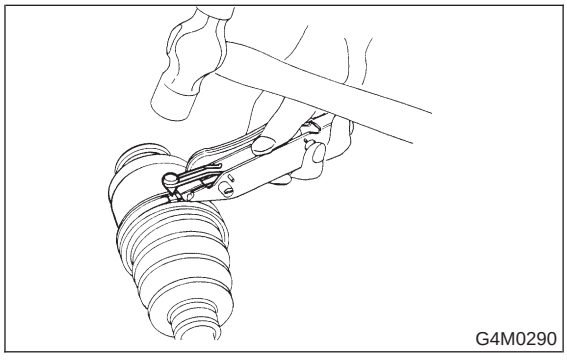
22) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten band until it cannot be moved by hand.


G4M0289

23) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

CAUTION:
Tap only to the extent that the boot underneath is not damaged.


G4M0290

24) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:
Be careful so that the end of the band is in close contact with clip.

25) Fix up boot on BJ in the same manner.

NOTE:
Extend and retract DOJ to provide equal grease coating.

2. AWD AT FRONT DRIVE SHAFT

CAUTION:
Use specified grease.

BJ side:
NTG2218 (Part No. 28093AA020)

SFJ side:
NTG30B (Part No. 28095AC000)

1) Place BJ boot and small boot band on BJ side of shaft.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

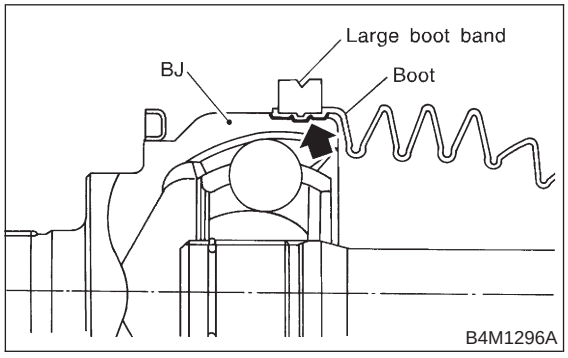
2) Place drive shaft in a vise.

CAUTION:
Do not place drive shaft directly in the vise; use wooden blocks.

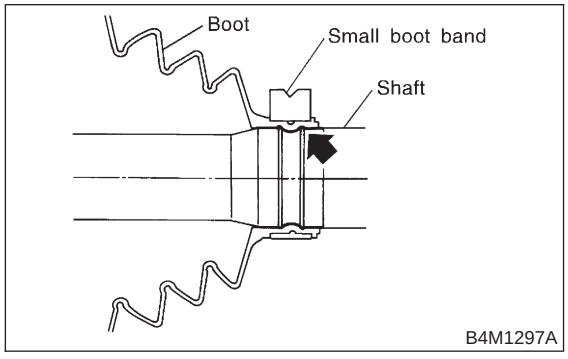
3) Apply a coat of specified grease [60 to 70 g (2.12 to 2.47 oz)] to BJ.
4) Apply an even coat of specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.

NOTE:
The inside of the larger end of BJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.

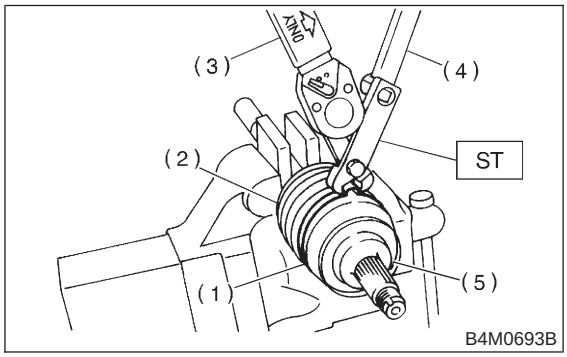
5) Install boot projecting portion to BJ groove.



6) Set large boot band in place.
7) Install boot projecting portion to shaft groove.



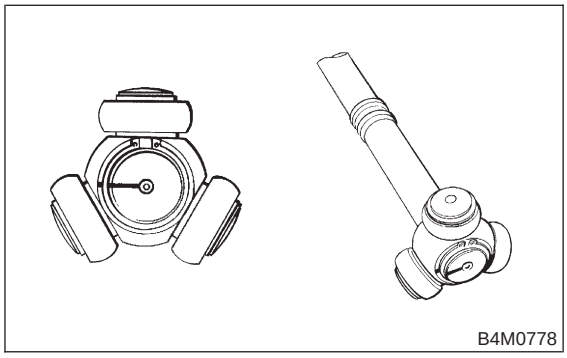
8) Tighten boot bands using ST, torque wrench and socket flex handle.
ST 28099AC000 BOOT BAND PLIER



(1) Large boot band
(2) Boot
(3) Torque wrench
(4) Socket flex handle
(5) BJ

Tightening torque:
Large boot band
157 N·m (16.0 kg-m, 116 ft-lb) or more
Small boot band
133 N·m (13.6 kg-m, 98 ft-lb) or more

9) Place SFJ boot at the center of shaft.
10) Align alignment marks and install trunnion on shaft.

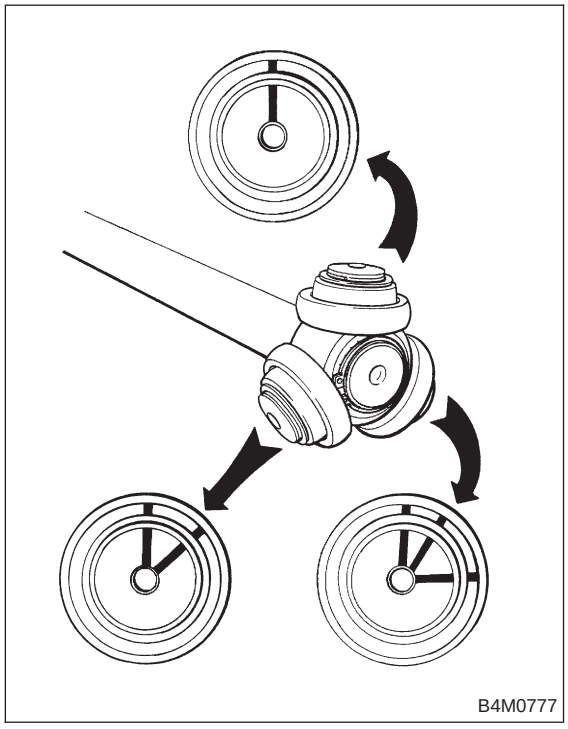


11) Install snap ring to shaft.

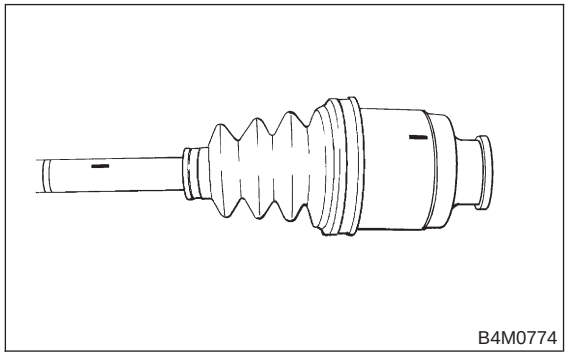
CAUTION:
Confirm that the snap ring is completely fitted in the shaft groove.

12) Fill 100 to 110 g (3.53 to 3.88 oz) of specified grease into the interior of SFJ outer race.
13) Apply a coat of specified grease to free ring and trunnion.

14) Align alignment marks on free ring and trunnion and install free ring.



15) Align alignment marks on shaft and outer race, and install outer race.



16) Install circlip in the groove on SFJ outer race.

CAUTION:
Pull the shaft lightly and assure that the circlip is completely fitted in the groove.

17) Apply an even coat of the specified grease 30 to 40 g (1.06 to 1.41 oz) to the entire inner surface of boot.

18) Install SFJ boot taking care not to twist it.

CAUTION:
- **The inside of the larger end of SFJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.**
- **When installing SFJ boot, position outer race of SFJ at center of its travel.**

19) Put a band through the clip and wind twice in alignment with band groove of boot.

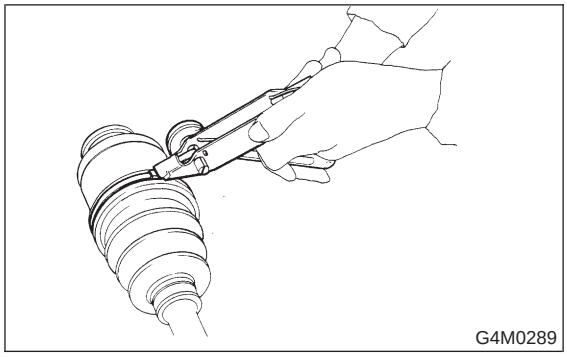
CAUTION:
Use a new band.

20) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:
When tightening boot, exercise care so that the air within the boot is appropriate.

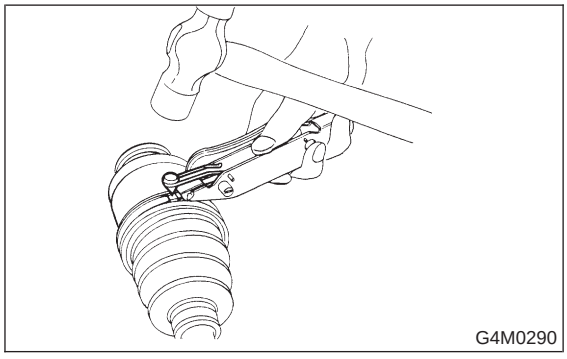
21) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten band until it cannot be moved by hand.



22) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

CAUTION:
Tap to an extent that the boot underneath is not damaged.



23) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:
Be careful so that the end of the band is in close contact with clip.

24) Fix up boot on BJ in the same manner.

NOTE:
Extend and retract SFJ to provide equal grease coating.

3. REAR DRIVE SHAFT

CAUTION:
Use specified grease.

BJ side:
Molylex No. 2 (Part No. 723223010) or Sunlight TB2-A

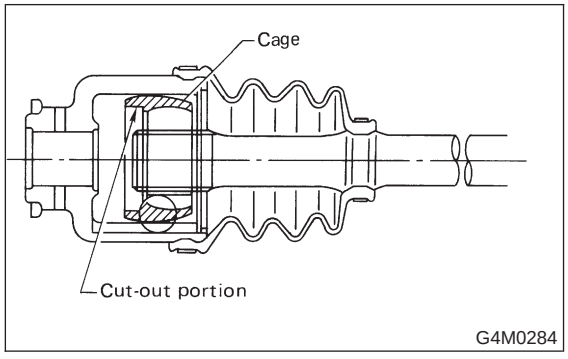
DOJ side:
VU-3A702 (Yellow) (Part No. 23223GA050)

1) Install BJ boot in specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz) of specified grease.
2) Place DOJ boot at the center of shaft.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

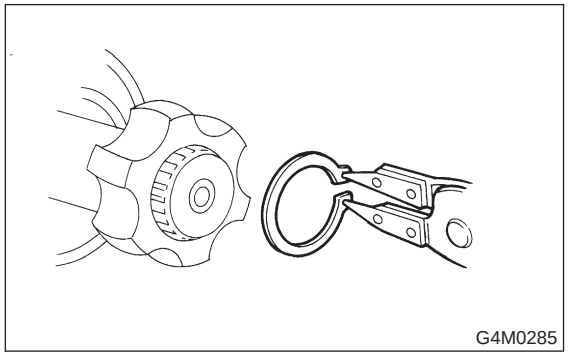
3) Insert DOJ cage onto shaft.

NOTE:
Insert the cage with the cut-out portion facing the shaft end, since the cage has an orientation.



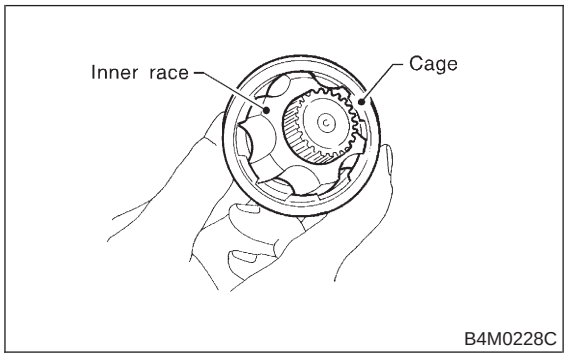
4) Install DOJ inner race on shaft and fit snap ring with pliers.

NOTE:
Confirm that the snap ring is completely fitted in the shaft groove.

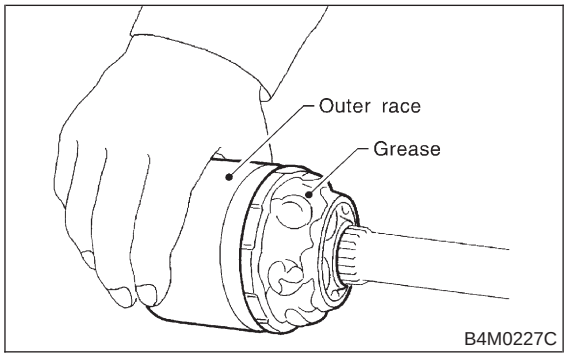


5) Install cage, which was previously fitted, to inner race fixed upon shaft.

NOTE:
Fit the cage with the protruded part aligned with the track on the inner race and then turn by a half pitch.

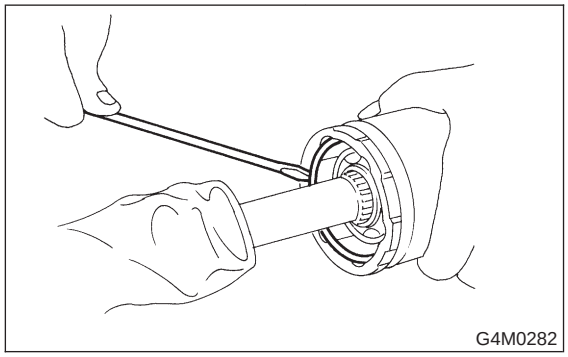


6) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.
7) Apply a coat of specified grease to the cage pocket and six balls.
8) Insert six balls into the cage pocket.
9) Align the outer race track and ball positions and place in the part where shaft, inner race, cage and balls are previously installed, and then fit outer race.



10) Install circlip in the groove on DOJ outer race.

NOTE:
● Assure that the balls, cage and inner race are completely fitted in the outer race of DOJ.
● Exercise care not to place the matched position of circlip in the ball groove of outer race.
● Pull the shaft lightly and assure that the circlip is completely fitted in the groove.


G4M0282

11) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.
12) Install DOJ boot taking care not to twist it.

NOTE:
● The inside of the larger end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
● When installing DOJ boot, position outer race of DOJ at center of its travel.

13) Put a band through the clip and wind twice in alignment with band groove of boot.

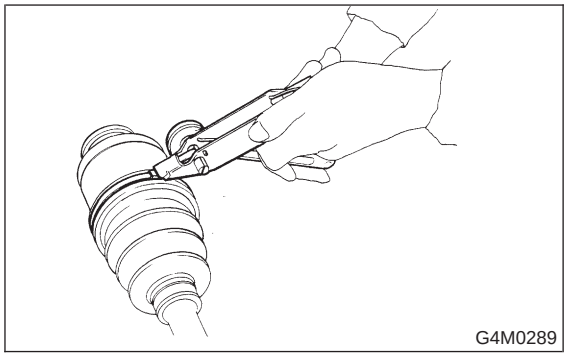
CAUTION:
Use a new band.

14) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:
When tightening boot, exercise care so that the air within the boot is appropriate.

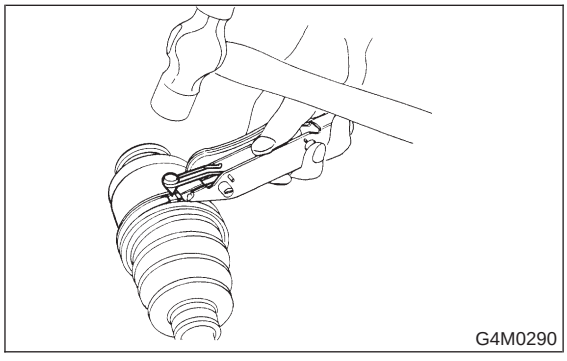
15) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten band until it cannot be moved by hand.


G4M0289

16) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

CAUTION:
Tap to an extent that the boot underneath is not damaged.


G4M0290

17) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:
Be careful so that the end of the band is in close contact with clip.

18) Fix up boot on BJ in the same manner.

NOTE:
Extend and retract DOJ to provide equal grease coating.

E: INSTALLATION

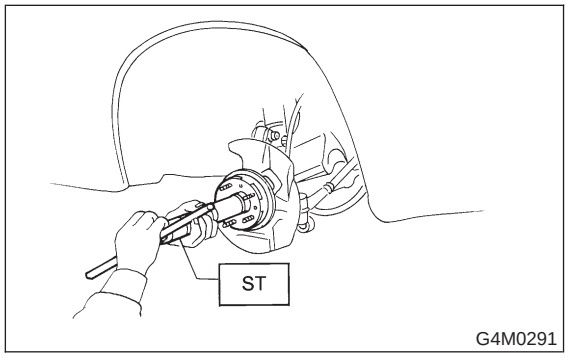
1. FRONT DRIVE SHAFT

1) Insert BJ into hub splines.

CAUTION:
Be careful not to damage inner oil seal lip.

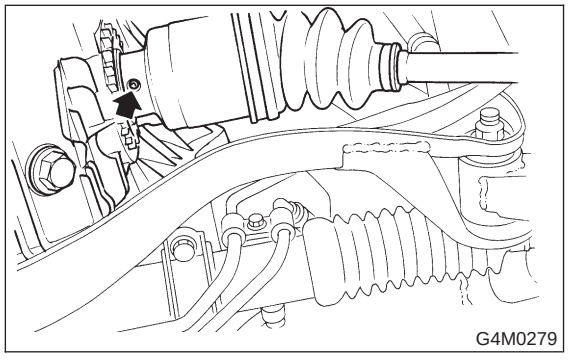
2) Using ST1 and ST2, pull drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER

CAUTION:
Do not hammer drive shaft when installing it.



3) Tighten axle nut temporarily.
4) Install DOJ/SFJ on transmission spindle and drive spring pin into place.

CAUTION:
Always use a new spring pin.



5) Connect transverse link to housing.

Tightening torque (self-locking nut):
49±10 N·m (5.0±1.0 kg-m, 36±7 ft-lb)

CAUTION:
Use a new self-locking nut.

6) Install stabilizer bracket.
7) While depressing brake pedal, tighten axle nut to the specified torque.

Tightening torque:
186±20 N·m (19±2 kg-m, 137±14 ft-lb)

CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**
- **Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.**

8) After tightening axle nut, lock it securely.

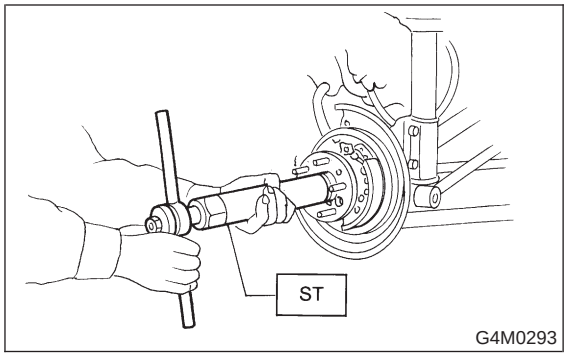
2. REAR DRIVE SHAFT

1) Insert BJ into rear housing splines.

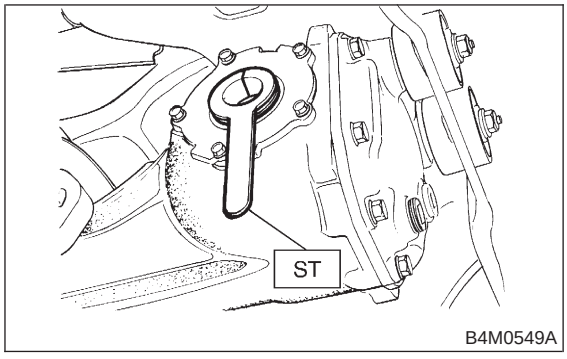
CAUTION:
Be careful not to damage inner oil seal lip.

2) Using ST1 and ST2, pull drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER

CAUTION:
Do not hammer drive shaft when installing it.



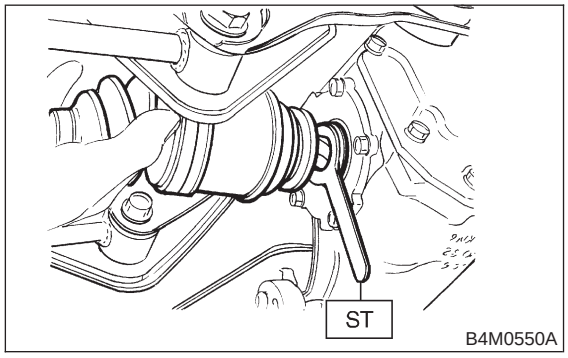
3) Tighten axle nut temporarily.
4) Replace circlips from DOJ spline with new one. (2200 cc AT vehicles only)
5) Using ST, install DOJ into differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



6) Insert DOJ spline end into bore of side oil seal, and remove ST.

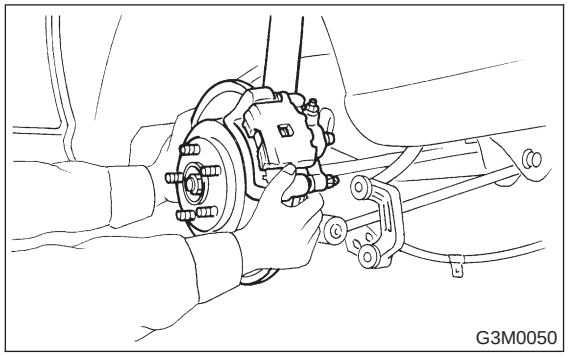
CAUTION:
Do not allow DOJ splines to damage side oil seal.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



7) Align DOJ and differential splines.
8) Push housing to insert DOJ into differential.

NOTE:
Make sure DOJ is inserted properly.



9) Connect crossmember reinforcement lower to crossmember (4 door model only).
10) Connect rear housing assembly to trailing link assembly, and tighten self-locking nut.

Tightening torque:
113±15 N·m (11.5±1.5 kg-m, 83±11 ft-lb)

11) Connect rear housing assembly to lateral link assembly, and tighten self-locking nut.

Tightening torque:
137±20 N·m (14±2 kg-m, 101±14 ft-lb)

12) Install stabilizer bracket.
13) While depressing brake pedal, tighten axle nut using a socket wrench.

Tightening torque:
186±20 N·m (19±2 kg-m, 137±14 ft-lb)

CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**
- **Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.**

14) After tightening axle nut, lock it securely.

5. Replacement of Front SFJ, DOJ and BJ Boots

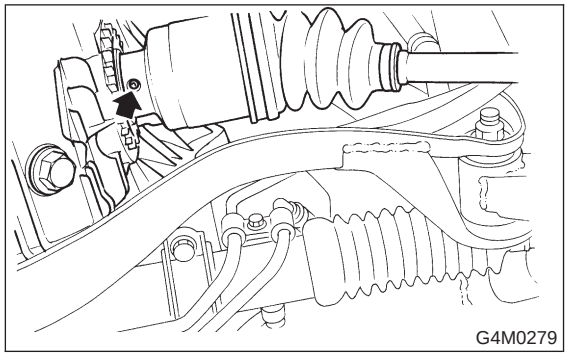
A: REMOVAL

1) Disconnect ground cable from battery.
2) Jack-up vehicle, support it with safety stands (rigid racks), and remove front wheel cap and wheels.

NOTE:
Do not remove axle nut.

3) Remove stabilizer link.
4) Disconnect transverse link from housing.
5) Remove spring pin which secures transmission spindle to DOJ/SFJ.

CAUTION:
Use a new spring pin.

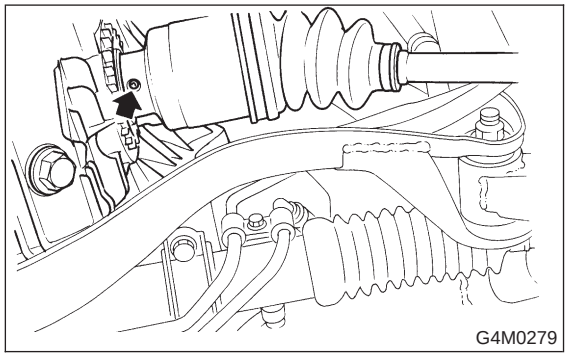


6) Remove SFJ, DOJ and BJ boots from drive shaft. <Ref. to 4-2 [W4B1].> or <Ref. to 4-2 [W4B2].>

B: INSTALLATION

1) Install SFJ, DOJ and BJ boots to drive shaft. <Ref. to 4-2 [W4D1].> or <Ref. to 4-2 [W4D2].>
2) Install DOJ/SFJ on transmission spindle and drive spring pin into place.

CAUTION:
Always use a new spring pin.



3) Connect transverse link to housing.
4) Install stabilizer link.

6. Replacement of Rear DOJ and BJ Boots

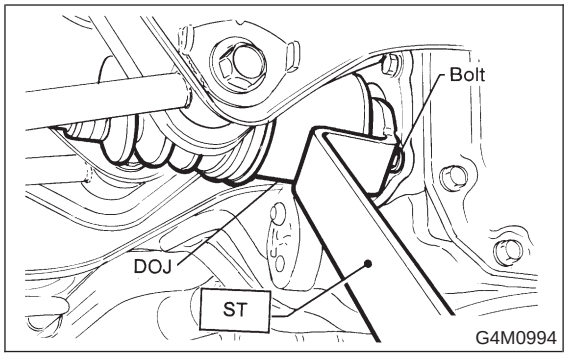
A: REMOVAL

1) Disconnect ground cable from battery.
2) Lift-up vehicle, and remove rear wheel cap and wheels.

NOTE:
Axle nut need not be removed.

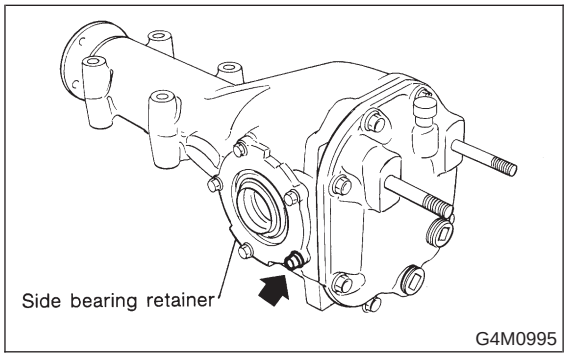
3) Remove ABS sensor clamps and parking brake cable bracket.
4) Disconnect stabilizer link from lateral link.
5) Remove bolts which secure lateral link assembly to rear housing.
6) Remove bolts which secure trailing link assembly to rear housing.
7) Remove crossmember reinforcement lower from crossmember (4 door model only).
8) Remove DOJ from rear differential using ST. (Except 2200 cc AT vehicles)
ST 28099PA100 DRIVE SHAFT REMOVER

CAUTION:
Do not remove circlip attached to inside of differential.



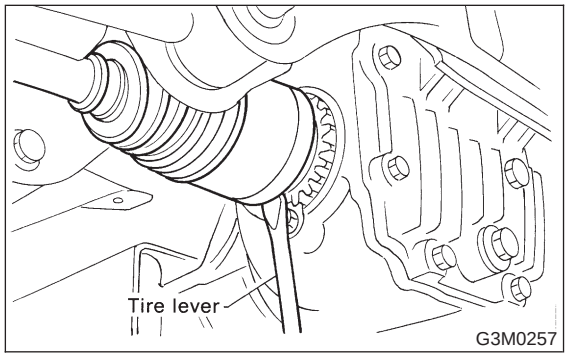
CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

ST 28099PA100 DRIVE SHAFT REMOVER

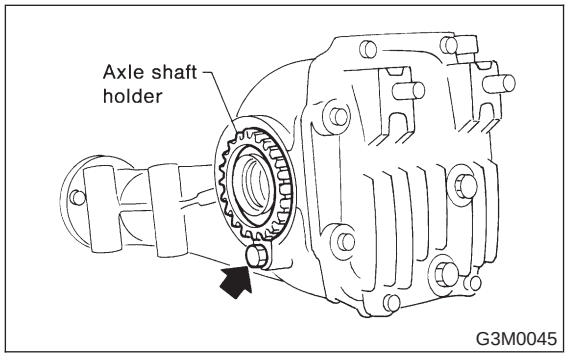


9) Remove DOJ from rear differential using tire lever. (2200 cc AT vehicles)

NOTE:
The side spline shaft circlip comes out together with the shaft.



CAUTION:
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.

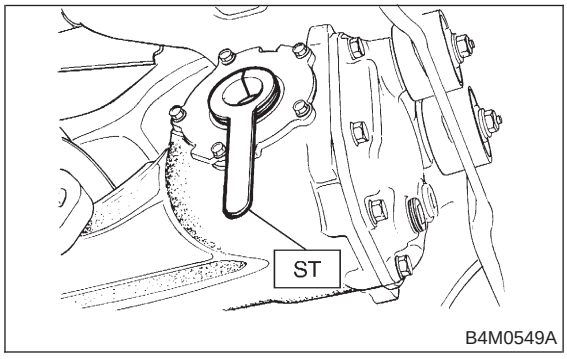


10) Remove DOJ and BJ boots from drive shaft. <Ref. to 4-2 [W4B3].>

B: INSTALLATION

1) Install DOJ and BJ boots to drive shaft. <Ref. to 4-2 [W4D3].>
2) Replace circlips from DOJ spline with new one. (2200 cc AT vehicles only)

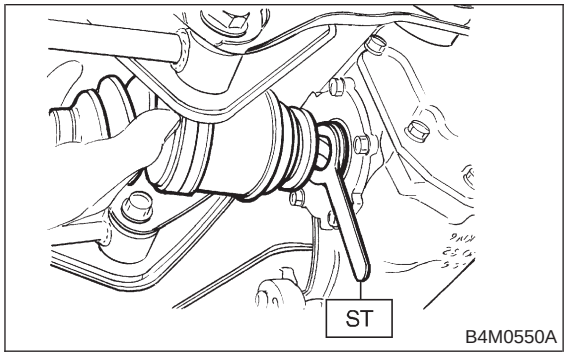
3) Using ST, install DOJ into differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



4) Insert DOJ spline end into bore of side oil seal, and remove ST.

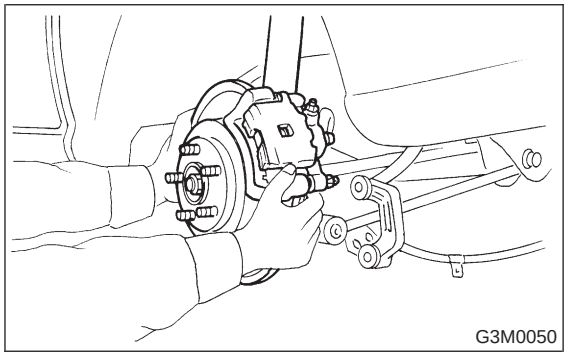
CAUTION:
Do not allow DOJ splines to damage side oil seal.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



5) Align DOJ and differential splines.
6) Push housing to insert DOJ into differential.

NOTE:
Make sure DOJ is inserted properly.



CAUTION:
Discard old self-locking nut. Replace with a new one.

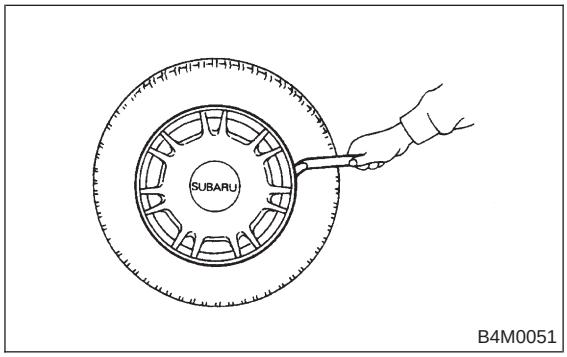
7) Connect rear housing assembly to trailing link assembly, and tighten self-locking nut.
8) Connect rear housing assembly to lateral link

assembly, and tighten self-locking nut.
9) Connect stabilizer link to lateral link.
10) Install crossmember reinforcement lower to crossmember (4 door model only).
11) Install ABS sensor clamps and parking brake cable bracket.

7. Full Wheel Cap

A: REMOVAL

Pry off the full wheel cap with a wheel cap remover inserted between openings in the cap.



B: INSTALLATION

Align the valve hole in the wheel cap with the valve on the wheel and secure the wheel cap by tapping four points by hand.

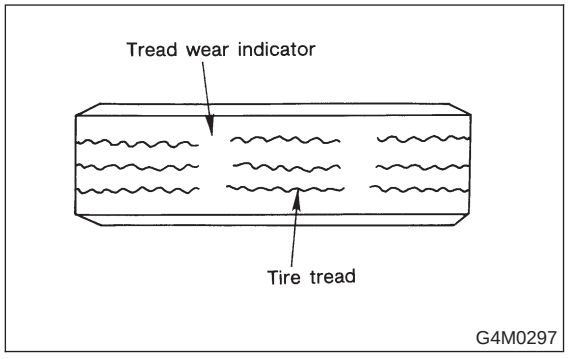
8. Steel Wheel and Tire

A: INSPECTION

1) Deformation or damage on the rim can cause air leakage. Check the rim flange for deformation, crack, or damage, and repair or replace as necessary.
2) Take stone, glass, nail etc. off the tread groove.
3) Replace tire:

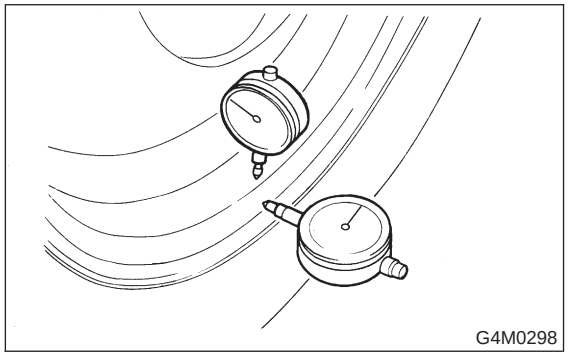
CAUTION:
● When replacing a tire, make sure to use only the same size, construction and load range as originally installed.
● Avoid mixing radial, belted bias or bias tires on the vehicle.

(1) when large crack on side wall, damage or crack on tread is found.
(2) when the “tread wear indicator” appears as a solid band across the tread.

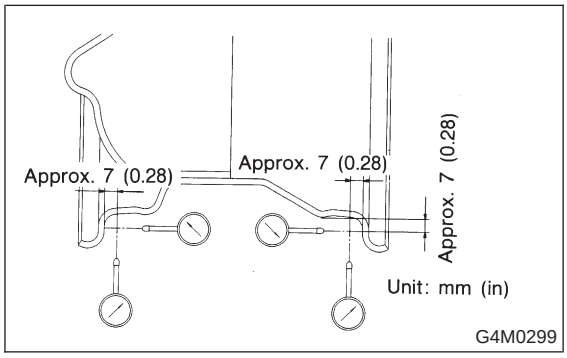


1. INSPECTION OF WHEEL RUNOUT

1) Jack-up vehicle until wheels clear the floor.
2) Slowly rotate wheel to check rim “runout” using a dial gauge.



	Axial runout limit	Radial runout limit
Steel wheel	1.5 mm (0.059 in)	
Aluminum wheel	1.0 mm (0.039 in)	



3) If rim runout exceeds specifications, remove tire from rim and check runout while attaching dial gauge to positions shown in figure.
4) If measured runout still exceeds specifications, replace the wheel.

9. Aluminum Wheel

A: INSPECTION

Inspection for aluminum wheels is basically the same as the one for steel wheels. However, check the rim flange for cracks or damage, and replace (not repair) aluminum wheel if air leakage is found.

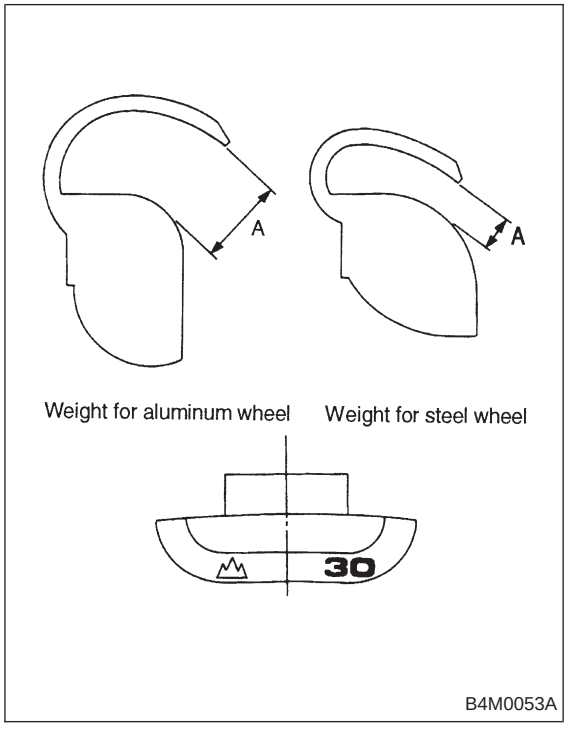
B: PRECAUTIONS

Aluminum wheels are easily scratched. To maintain their appearance and safety, do the following:
1) Do not damage aluminum wheels during removal, disassembly, installation, wheel balancing, etc. After removing aluminum wheels, place them on a rubber mat, etc.
2) While vehicle is being driven, be careful not to ride over sharp obstacles or allow aluminum wheels to contact the shoulder of the road.
3) When installing tire chain, be sure to install it properly not to have a slack; otherwise it may hit wheel while driving.
4) When washing aluminum wheel, use neutral synthetic detergent and water. Avoid using the cleanser including abrasive, hard brushes or an automatic car washer.

10. Wheel Balancing

1) Proper wheel balance may be lost if the tire is repaired or if it wears. Check the tire for dynamic balance, and repair as necessary.
2) To check for dynamic balance, use a dynamic balancer. Drive in the balance weight on both the top and rear sides of the rim.
3) Some types of balancer can cause damage to the wheel. Use an appropriate balancer when adjusting the wheel balance.
4) Use genuine balance weights.

CAUTION:
● 55 g (1.94 oz) weight used with aluminum wheel is not available.
● Balance weights are available for use with any of 14- to 16-inch wheels.



Service limit: A
Weight for steel wheel;
1.6 — 2.0 mm (0.063 — 0.079 in)
Weight for aluminum wheel;
4.6 — 5.4 mm (0.181 — 0.213 in)

11. Installation of Wheel Assembly to Vehicle

1) Attach the wheel to the hub by aligning the wheel bolt hole with the hub bolt.
2) Temporarily attach the wheel nuts to the hub bolts. (In the case of aluminum wheel, use SUBARU genuine wheel nut for aluminum wheel.)
3) Manually tighten the nuts making sure the wheel hub hole is aligned correctly to the guide portion of hub.
4) Tighten the wheel nuts in a diagonal selection to the specified torque. Use a wheel nut wrench.

Wheel nut tightening torque:
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

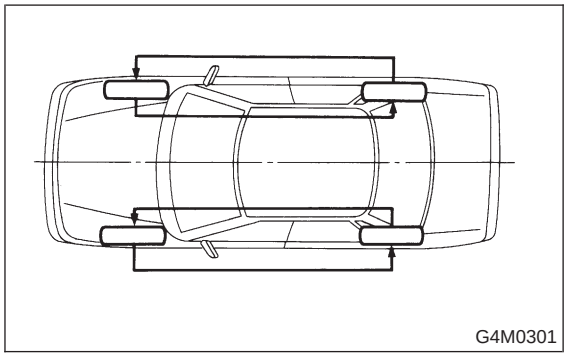
CAUTION:
● Tighten the wheel nuts in two or three steps by gradually increasing the torque and working diagonally, until the specified torque is reached. For drum brake models, excess tightening of wheel nuts may cause wheels to "judder".
● Do not depress the wrench with a foot; Always use both hands when tightening.
● Make sure the bolt, nut and the nut seating surface of the wheel are free from oils.

5) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after running 1,000 km (600 miles).

12. Tire Rotation

If tires are maintained at the same positions for a long period of time, uneven wear results. Therefore, they should be periodically rotated. This lengthens service life of tires.

CAUTION:
When rotating tires, replace unevenly worn or damaged tires with new ones.


G4M0301

13. “T-type” Tire

“T-type” tire for temporary use is prepared as a spare tire.

CAUTION:
● Keep the inflation pressure at 420 kPa (4.2 kg/cm^2, 60 psi) at all times.
● When the wear indicator appears on the tread surface, replace the tire with a new one.
● Do not use a tire chain with the “T-type” tire. Because of the smaller tire size, a tire chain will not fit properly and will result in damage to the vehicle and the tire.
● Do not drive at a speed greater than 80 km/h (50 MPH).
● Drive as slowly as possible and avoid passing over bumps.
● Replace with a conventional tire as soon as possible since this “T-type” tire is only for temporary use.

STEERING SYSTEM 4-3

1. Steering System

A: SPECIFICATIONS

			Except OUTBACK model	OUTBACK model
Whole system	Minimum turning radius m (ft)		5.3 (17.4)	5.6 (18.4)
	Steering angle (Inside-Outside)		37.6° — 32.6°	34.4° — 30.2°
	Steering wheel diameter mm (in)		385 (15.16)	
	Overall gear ratio (Turns, lock to lock)		16.5 (3.2)	19 (3.4)
Gearbox	Type		Rack and pinion, Integral	
	Backlash		0 (Automatically adjustable)	
	Valve (Power steering system)		Rotary valve	
Pump (Power steering system)	Type		Vane pump	
	Oil tank		Installed on pump	
	Output cm^3 (cu in)/rev.		7.2 (0.439)	
	Relief pressure kPa (kg/cm^2, psi)		7,355 (75, 1,067)	
	Hydraulic fluid control		Dropping in response to increased engine revolutions	
	Hydraulic fluid ℓ (US qt, Imp qt)		1,000 rpm: 7 (7.4, 6.2) 3,000 rpm: 5 (5.3, 4.4)	
	Range of revolution rpm		500 — 7,500	
	Revolving direction		Clockwise	
Working fluid (Power steering system)	Name		ATF DEXRON II, IIE or III	
	Capacity	Oil tank ℓ (US qt, Imp qt)	0.35 (0.4, 0.3)	
		Total	0.7 (0.7, 0.6)	

B: SERVICE DATA

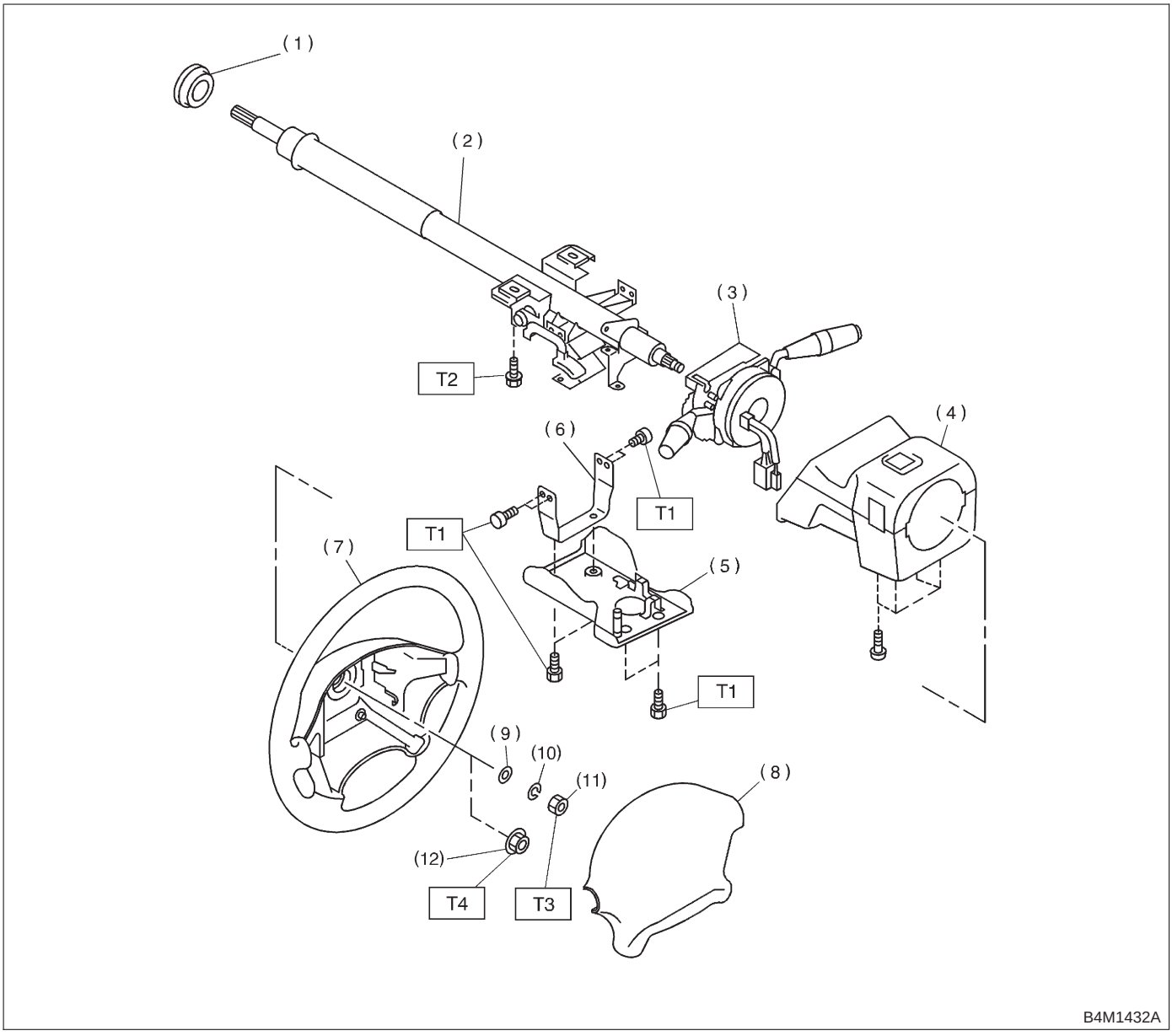
			Except OUTBACK model	OUTBACK model
Steering wheel	Free play mm (in)		17 (0.67)	
Turning angle	Inner tire & wheel		37.6°	34.4°
	Outer tire & wheel		32.6°	30.2°
Steering shaft	Clearance between steering wheel and column cover mm (in)		3.0 (0.118)	
Steering gearbox (Power steering system)	Sliding resistance N (kg, lb)		240.3 (24.5, 54.0) or less	
	Rack shaft play in radial direction mm (in)		0.15 (0.0059) or less	
		Right-turn steering	Horizontal movement: 0.3 (0.012) or less	
		Left-turn steering	Vertical movement: 0.15 (0.0059) or less	
	Input shaft play mm (in)	In radial direction	0.18 (0.0071) or less	
		In axial direction	0.1 (0.004) or less	
	Turning resistance N (kg, lb)		Within 30 mm (1.18 in) from rack center in straight ahead position: Less than 11.18 (1.14, 2.51) Maximum allowable value: 12.7 (1.3, 2.9)	
Oil pump (Power steering system)	Pulley shaft mm (in)	Radial play	0.4 (0.016) or less	
		Axial play	0.9 (0.035) or less	
	Pulley	Ditch deflection mm (in)	1.0 (0.039) or less	
		Resistance to rotation N (kg, lb)	9.22 (0.94, 2.07) or less	
	Regular pressure kPa (kg/cm^2, psi)		981 (10, 142) or less	
	Relief pressure kPa (kg/cm^2, psi)		7,355 (75, 1,067)	
Steering wheel effort (Power steering system)	At standstill with engine idling on a concrete road N (kg, lb)		31.4 (3.2, 7.1) or less	
	At standstill with engine stalled on a concrete road N (kg, lb)		147 (15, 33) or less	

C: RECOMMENDED POWER STEERING FLUID

Recommended power steering fluid	Manufacturer
ATF DEXRON II, ATF DEXRON IIE or ATF DEXRON III	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

1. Steering Wheel and Column (Tilt)

A: WITH AIRBAG MODEL

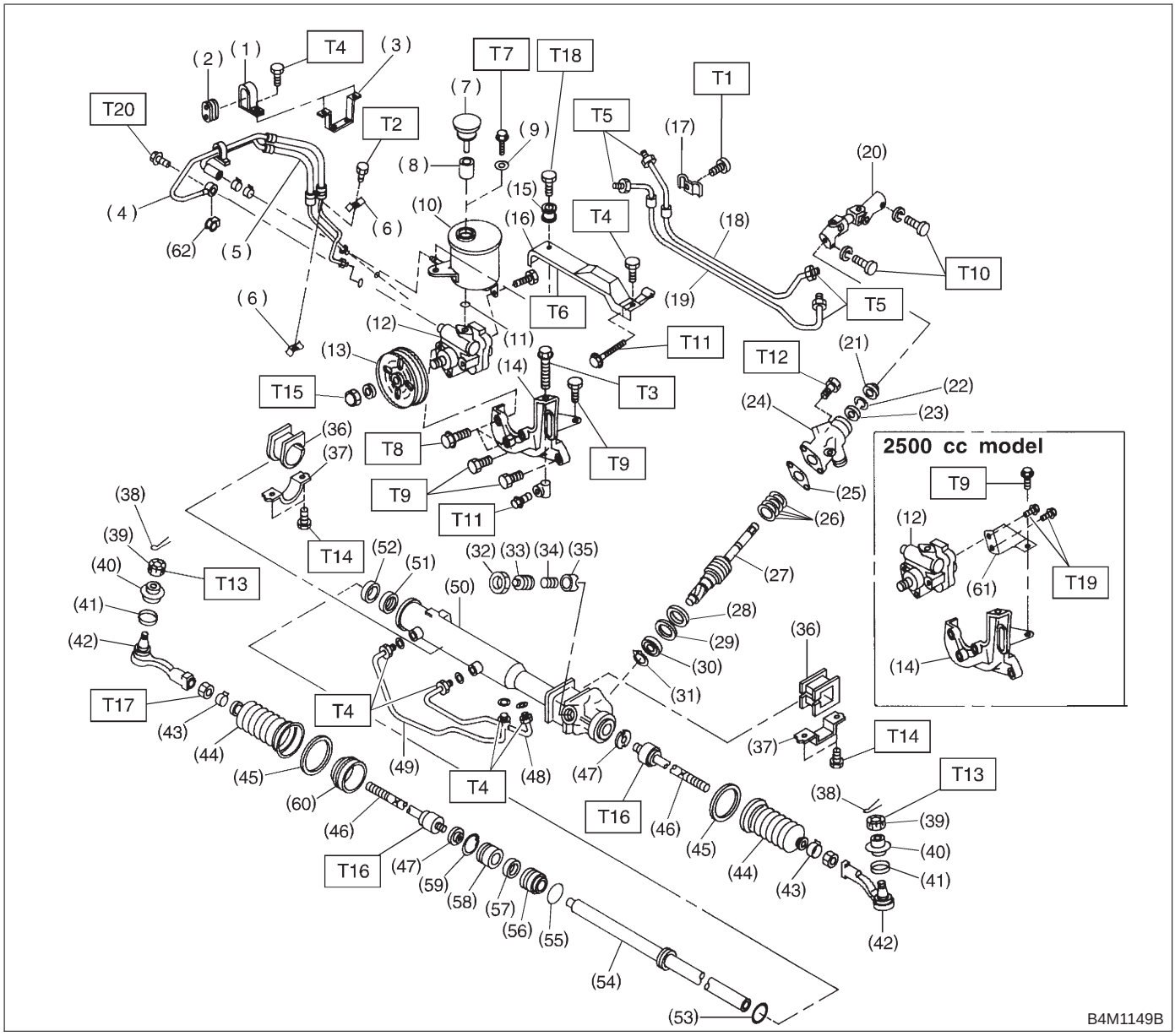


(1) Bushing
(2) Column shaft
(3) Steering roll connector
(4) Column cover
(5) Knee protector
(6) Bracket absorbent
(7) Steering wheel
(8) Airbag module
(9) Plain washer
(10) Spring washer
(11) Nut
(12) Flange nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 3.4±1.0 (0.35±0.1, 2.5±0.7)
T2: 25±5 (2.5±0.5, 18.1±3.6)
T3: 34±5 (3.5±0.5, 25.3±3.6)
T4: 44±5 (4.5±0.5, 32.5±3.6)

2. Power Steering System

A: LHD MODEL

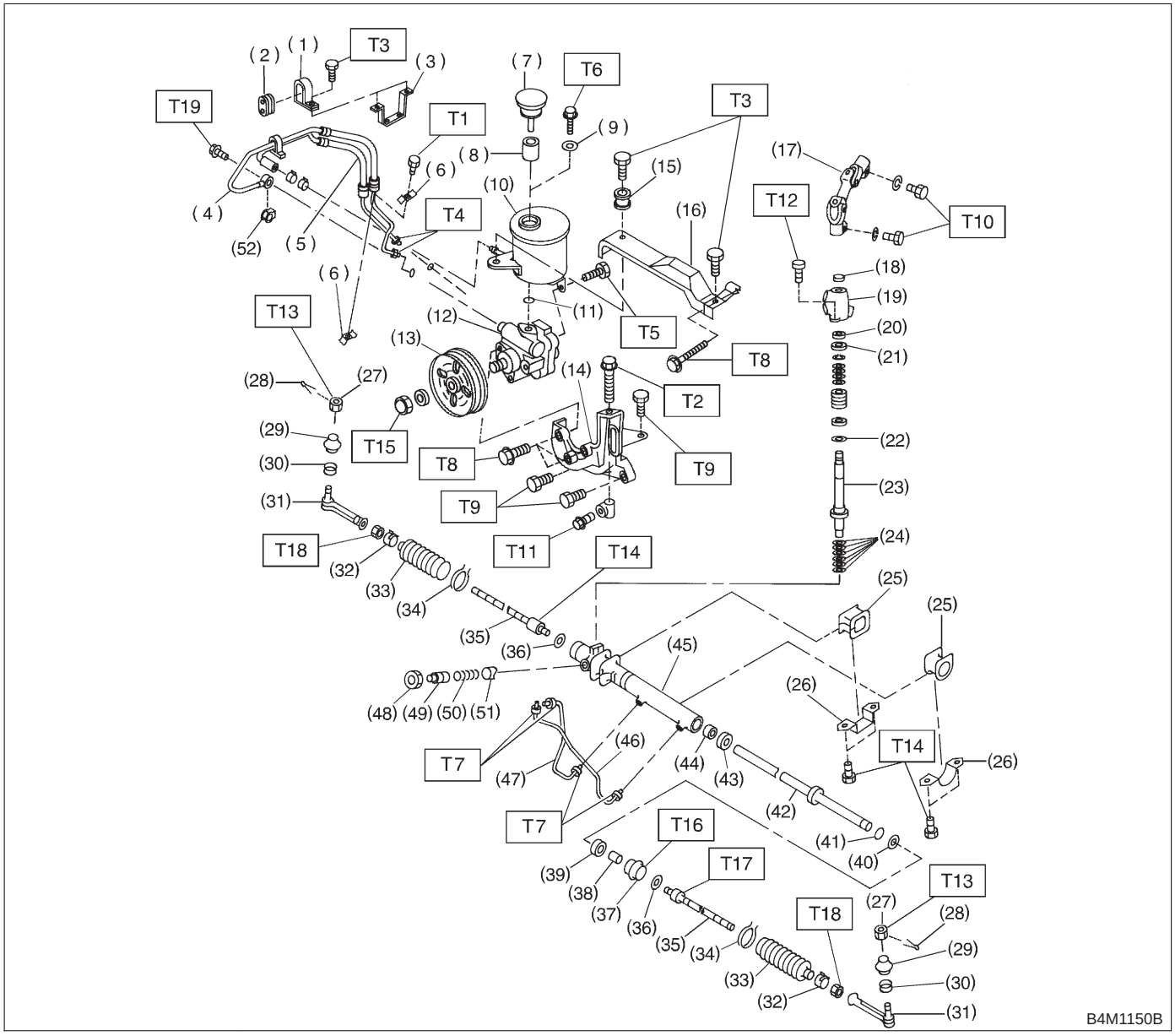


(1) Clamp
(2) Adapter
(3) Hose bracket
(4) Pipe C
(5) Pipe D
(6) Clamp E
(7) Cap
(8) Strainer
(9) Seal washer
(10) Tank
(11) O-ring
(12) Oil pump
(13) Pulley
(14) Bracket
(15) Bush
(16) Belt cover
(17) Clamp plate
(18) Pipe F
(19) Pipe E
(20) Universal joint
(21) Dust seal
(22) C-ring
(23) Oil seal
(24) Valve housing
(25) Packing
(26) Seal ring
(27) Pinion and valve ASSY
(28) Oil seal
(29) Back-up washer
(30) Ball bearing
(31) Snap ring
(32) Lock nut
(33) Adjusting screw
(34) Spring
(35) Sleeve
(36) Adapter
(37) Clamp
(38) Cotter pin
(39) Castle nut
(40) Dust seal
(41) Clip
(42) Tie-rod end
(43) Small clip
(44) Boot
(45) Large clip

(46) Tie-rod
(47) Lock washer
(48) Pipe B
(49) Pipe A
(50) Housing ASSY
(51) Back-up washer
(52) Oil seal
(53) Piston ring
(54) Rack
(55) O-ring
(56) Rack bushing
(57) Oil seal
(58) Rack stopper
(59) Circlip
(60) Spacer
(61) Stay (2500 cc model only)
(62) Gasket

Tightening torque: N·m (kg-m, ft-lb)
T1: 5.4±1.5 (0.55±0.15, 4.0±1.1)
T2: 7.4±2.0 (0.75±0.20, 5.4±1.4)
T3: 8±2 (0.8±0.2, 5.8±1.4)
T4: 13±3 (1.3±0.3, 9.4±2.2)
T5: 15±5 (1.5±0.5, 10.8±3.6)
T6: 15.7±2.4 (1.60±0.24, 11.58±1.77)
T7: 18.1±2.5 (1.85±0.25, 13.35±1.84)
T8: 20.1±2.5 (2.05±0.25, 14.8±1.8)
T9: 22±2 (2.2±0.2, 15.9±1.4)
T10: 24±3 (2.4±0.3, 17.4±2.2)
T11: 24.5±2.0 (2.50±0.2, 18.07±1.48)
T12: 25±5 (2.5±0.5, 18.1±3.6)
T13: 27.0±2.5 (2.75±0.25, 19.92±1.84)
T14: 59±12 (6.0±1.2, 43±9)
T15: 60.8±6.9 (6.2±0.7, 44.8±5.1)
T16: 78±10 (8.0±1.0, 58±7)
T17: 83±5 (8.5±0.5, 61.5±3.6)
T18: 6.35±1.0 (0.65±0.1, 4.7±0.7)
T19: 15.7±2.5 (1.6±0.25, 11.6±1.8)
T20: 34±5 (3.5±0.5, 25.3±3.6)

B: RHD MODEL



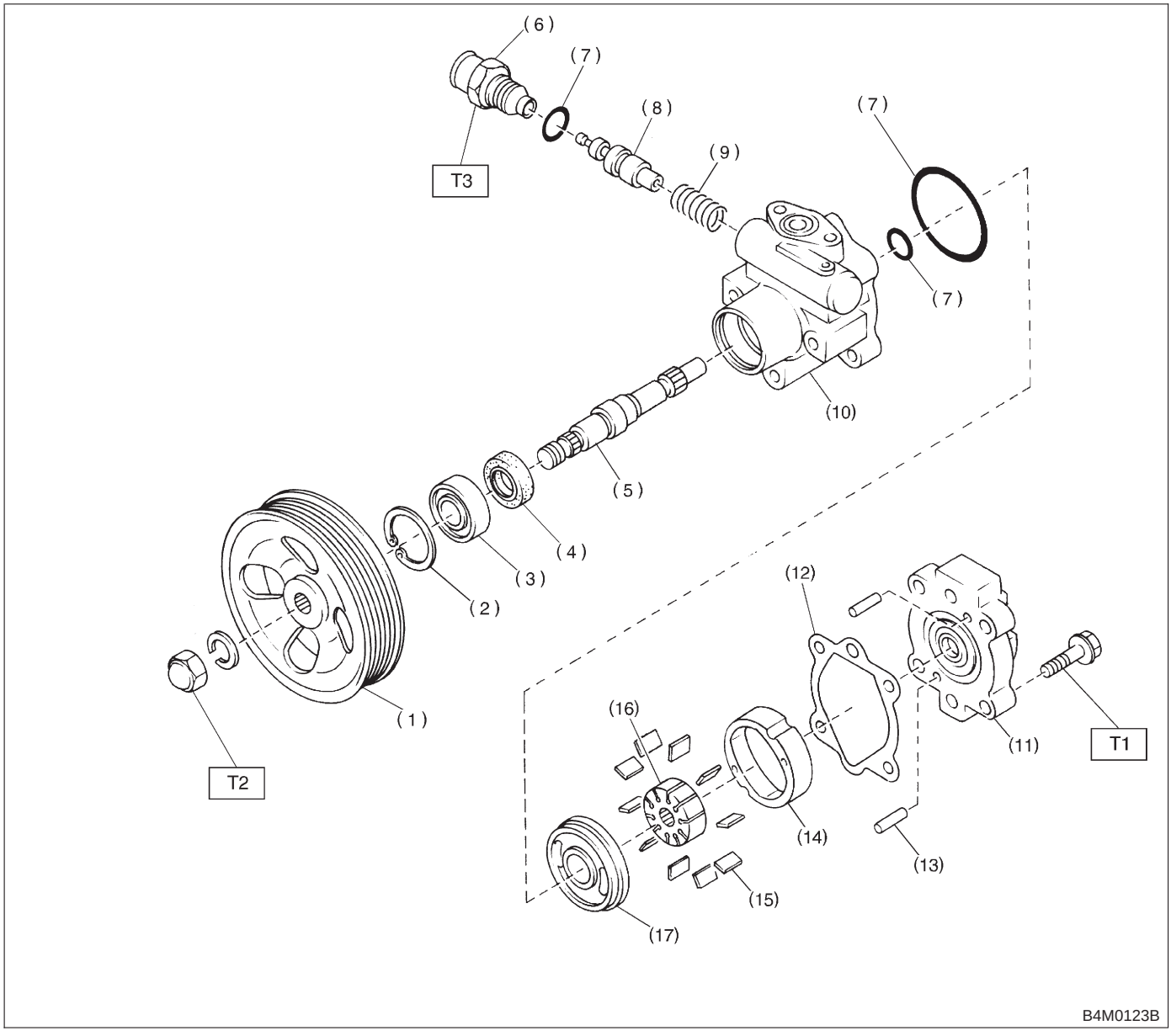
(1) Clamp
(2) Adapter
(3) Hose bracket
(4) Pipe C
(5) Pipe D
(6) Clamp E
(7) Cap
(8) Strainer
(9) Seal washer
(10) Tank
(11) O-ring
(12) Oil pump
(13) Pulley
(14) Bracket
(15) Bush
(16) Belt cover
(17) Universal joint
(18) Dust cover
(19) Valve housing
(20) Y-packing
(21) Ball bearing
(22) Spacer
(23) Pinion
(24) Shim
(25) Adapter
(26) Clamp
(27) Castle nut
(28) Cotter pin
(29) Dust seal
(30) Clip
(31) Tie-rod end
(32) Clip
(33) Boot
(34) Wire
(35) Tie-rod
(36) Lock washer
(37) Holder
(38) Bush
(39) Y-packing
(40) Oil seal
(41) O-ring
(42) Rack
(43) Oil seal
(44) Back-up washer
(45) Housing ASSY
(46) Pipe A
(47) Pipe B
(48) Lock nut
(49) Adjusting screw
(50) Spring
(51) Sleeve

(52) Gasket

Tightening torque: N·m (kg-m, ft-lb)

- ***T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)***
- ***T2: 8±2 (0.8±0.2, 5.8±1.4)***
- ***T3: 13±3 (1.3±0.3, 9.4±2.2)***
- ***T4: 15±5 (1.5±0.5, 10.8±3.6)***
- ***T5: 15.7±2.4 (1.60±0.24, 11.58±1.77)***
- ***T6: 18.1±2.5 (1.85±0.26, 13.35±1.84)***
- ***T7: 20±4 (2.0±0.4, 14±2.9)***
- ***T8: 20.1±2.5 (2.05±0.25, 14.8±1.8)***
- ***T9: 22±2 (2.2±0.2, 15.9±1.4)***
- ***T10: 24±3 (2.4±0.3, 17.4±2.2)***
- ***T11: 24.5±2.0 (2.50±0.20, 18.07±1.48)***
- ***T12: 25±5 (2.5±0.5, 18.1±3.6)***
- ***T13: 27.0±2.5 (2.75±0.26, 19.92±1.84)***
- ***T14: 59±12 (6.0±1.2, 43±9)***
- ***T15: 61±7 (6.2±0.7, 44.8±5.1)***
- ***T16: 64±10 (6.5±1.0, 47±7)***
- ***T17: 78±10 (8.0±1.0, 58±7)***
- ***T18: 83±5 (8.5±0.5, 61.5±3.6)***
- ***T19: 34±5 (3.5±0.5, 25.3±3.6)***

3. Power Steering Oil Pump



(1) Pulley
(2) Snap ring
(3) Bearing
(4) Oil seal
(5) Shaft
(6) Connector
(7) O-ring
(8) Spool valve
(9) Spring
(10) Front casing
(11) Rear cover
(12) Gasket
(13) Knock pin
(14) Cam ring
(15) Vane
(16) Rotor
(17) Side plate

Tightening torque: N·m (kg-m, ft-lb)
T1: 16±2 (1.6±0.2, 11.6±1.4)
T2: 61±7 (6.2±0.7, 44.8±5.1)
T3: 74±5 (7.5±0.5, 54.2±3.6)

1. Supplemental Restraint System “Airbag” AIRBAG

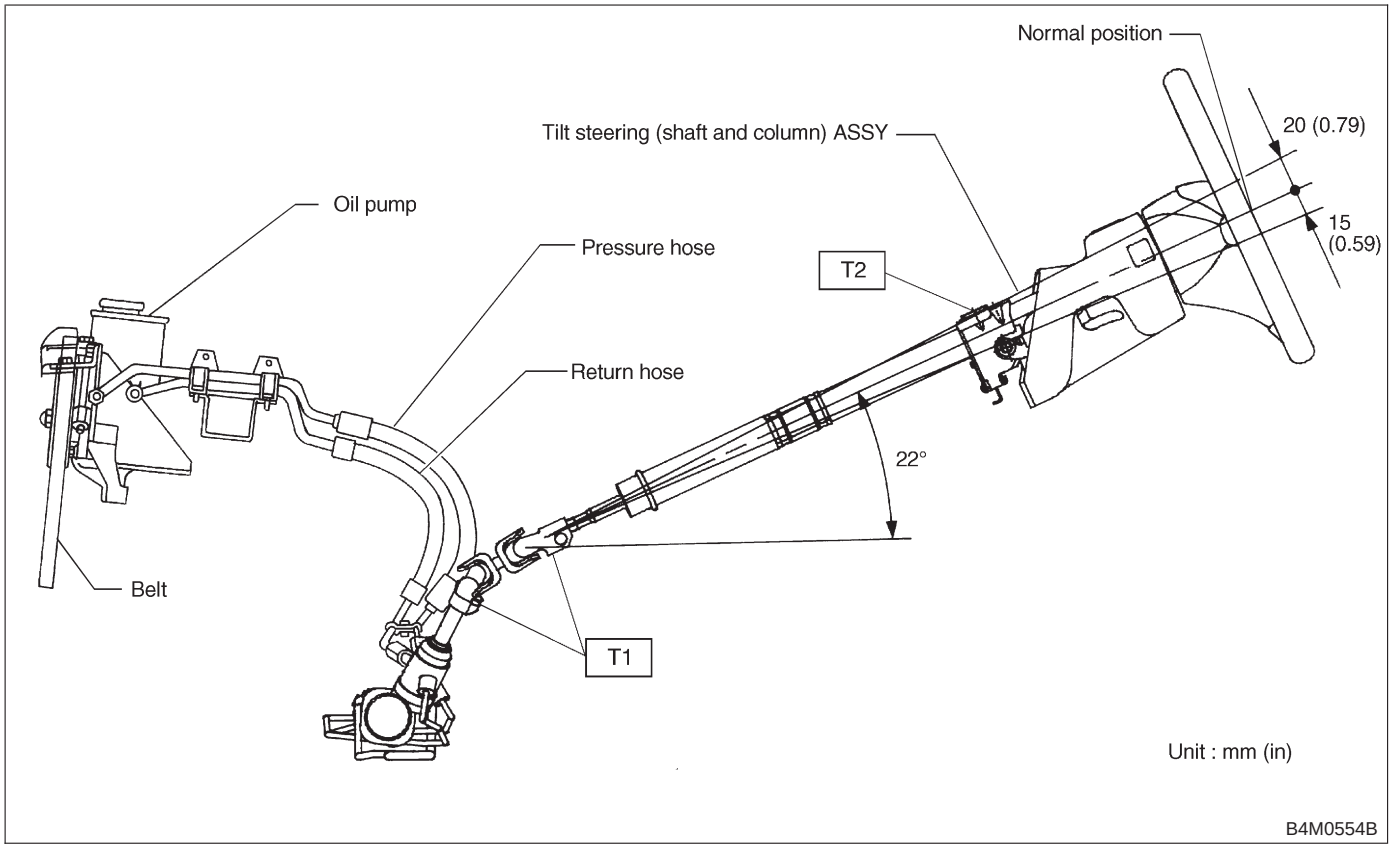
A: PRECAUTION

Airbag system wiring harness is routed near the steering wheel, steering shaft and column.

WARNING:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
● Be careful not to damage Airbag system wiring harness when servicing the steering wheel, steering shaft and column.

2. Tilt Steering Column

A: REMOVAL

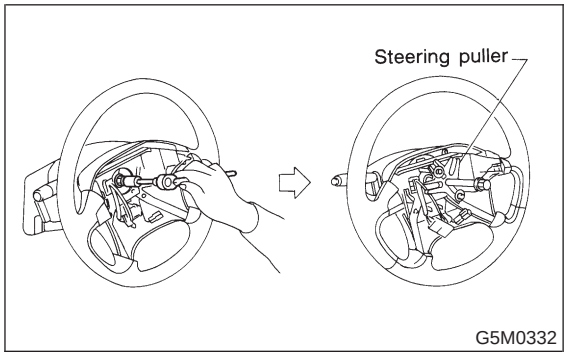


Tightening torque: N·m (kg-m, ft-lb)
T1: 24±3 (2.4±0.3, 17.4±2.2)
T2: 25±5 (2.5±0.5, 18.1±3.6)

1) Disconnect battery minus terminal.
2) Lift-up vehicle.
3) Remove airbag module. (with airbag model) <Ref. to 5-5 [W3A1].>

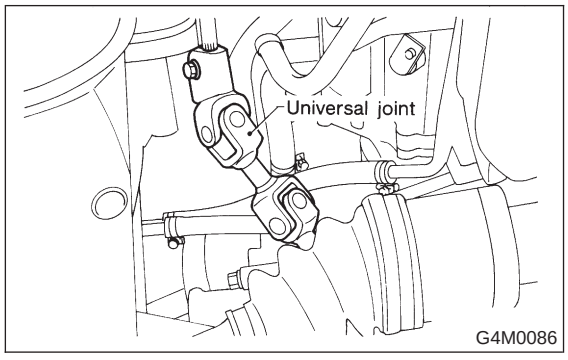
WARNING:
Always refer to "5-5 Supplemental Restraint System" before performing airbag module service (if so equipped). <Ref. to 5-5 [W3A0].>

4) Remove steering wheel nut, then draw out steering wheel from shaft using steering puller.

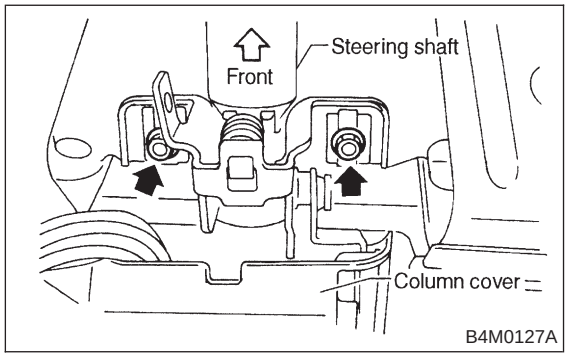


5) Remove universal joint bolts and then remove universal joint.

CAUTION:
Scribe alignment marks on universal joint so that it can be reassembled at the original serration.



6) Remove trim panel under instrument panel.
7) Disconnect connectors for ignition switch and combination switch wiring harness under instrument panel.
8) Remove the two bolts under instrument panel securing steering shaft.

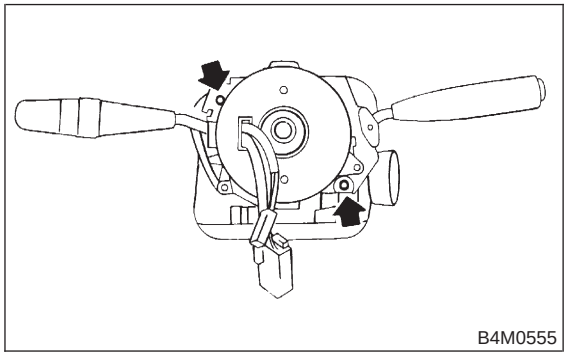


9) Pull out steering shaft assembly from hole on toe board.

CAUTION:
Be sure to remove universal joint before removing steering shaft assembly installing bolts when removing steering shaft assembly or when lowering it for servicing of other parts.

B: DISASSEMBLY

Remove the four screws securing upper and lower steering column covers, and the two screws securing combination switch, then remove related parts.

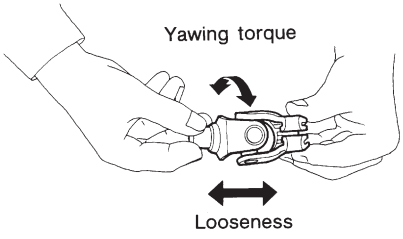


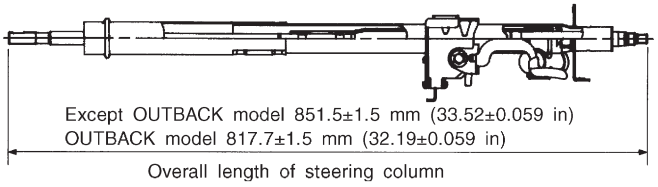
NOTE:
Steering column assembly can not be disassembled.

C: INSPECTION

1. BASIC INSPECTION

Clean the disassembled parts with a cloth, and check for wear, damage, or any other faults. If necessary, repair or replace faulty parts.

Part name	Inspection	Corrective action
Universal joint	• Free play • Swinging torque • Yawing torque looseness  **Standard value of universal joint free play: 0 mm (0 in)** **Max. value of universal joint swinging torque: 0.3 N·m (0.03 kg-m, 0.2 ft-lb)**	Replace if faulty.

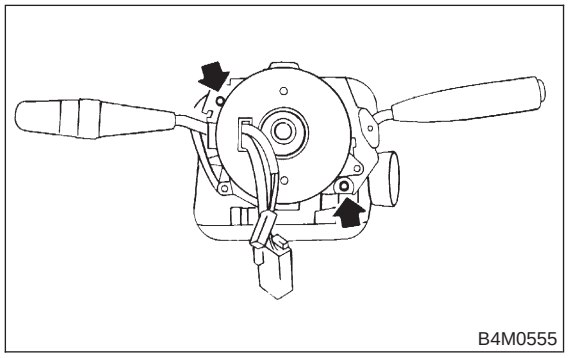
Part name	Inspection	Corrective action
Steering column	● Overall length of steering column Measure overall length of steering column. Standard overall length of steering column:  B4M0129C	Replace steering column assembly.

2. AIRBAG MODEL INSPECTION

WARNING:
For airbag model inspection procedures, refer to Supplemental Restraint System. <Ref to 5-5 [W200].>

D: ASSEMBLY

1) Insert combination switch to upper column shaft, and install lower column cover with tilt lever held in the lowered position. Then route ignition key harness and combination switch harness between column cover mounting bosses.



2) Fit upper column cover to lower column cover, and tighten combination switch and column cover.

Tightening torque:
1.2±0.2 N·m (0.12±0.02 kg-m, 0.9±0.1 ft-lb)

CAUTION:
Don't overtorque screw.

E: INSTALLATION

1) Insert end of steering shaft into toe board grommet.
2) Tighten steering shaft mounting bolts under instrument panel.

Tightening torque:
25±5 N·m (2.5±0.5 kg-m, 18.1±3.6 ft-lb)

3) Connect ignition and combination switch connectors under instrument panel.
4) Connect airbag system connector at harness spool.

NOTE:
Make sure to apply double lock.

5) Install universal joint.
(1) Align bolt hole on the long yoke side of universal joint with the cutout at the serrated section of shaft end, and insert universal joint.
(2) Align bolt hole on the short yoke side of universal joint with the cutout at the serrated section of gearbox assembly. Lower universal joint completely.
(3) Temporarily tighten bolt on the short yoke side. Raise universal joint to make sure the bolt is properly passing through the cutout at the serrated section.
(4) Tighten bolt on the long yoke side, then that on the short yoke side.

Tightening torque:
24±3 N·m (2.4±0.3 kg-m, 17.4±2.2 ft-lb)

CAUTION:
● Make sure that universal joint bolts is tightened through notch in shaft serration.
● Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.

Standard clearance between gearbox to DOJ:
Over 15 mm (0.59 in)

6) Align center of roll connector. (with airbag model)
<Ref. to 5-5 [W6B1].>

CAUTION:
Ensure that front wheels are set in straight-forward direction.

7) Set steering wheel to neutral and install it onto steering shaft.

CAUTION:
When using a flange nut, do not use a plain washer or spring washer.

Tightening torque:

- ***When using plain washer, spring washer and nut;***
  34±5 N·m (3.5±0.5 kg-m, 25.3±3.6 ft-lb)
- ***When using flange nut;***
  44±5 N·m (4.5±0.5 kg-m, 32.5±3.6 ft-lb)

Column cover-to-steering wheel clearance:
2 — 4 mm (0.08 — 0.16 in)

CAUTION:
Insert roll connector guide pin into guide hole on lower end of surface of steering wheel to prevent damage.
Draw out airbag system connector, horn connector and cruise control connectors from guide hole of steering wheel lower end. (with airbag model)

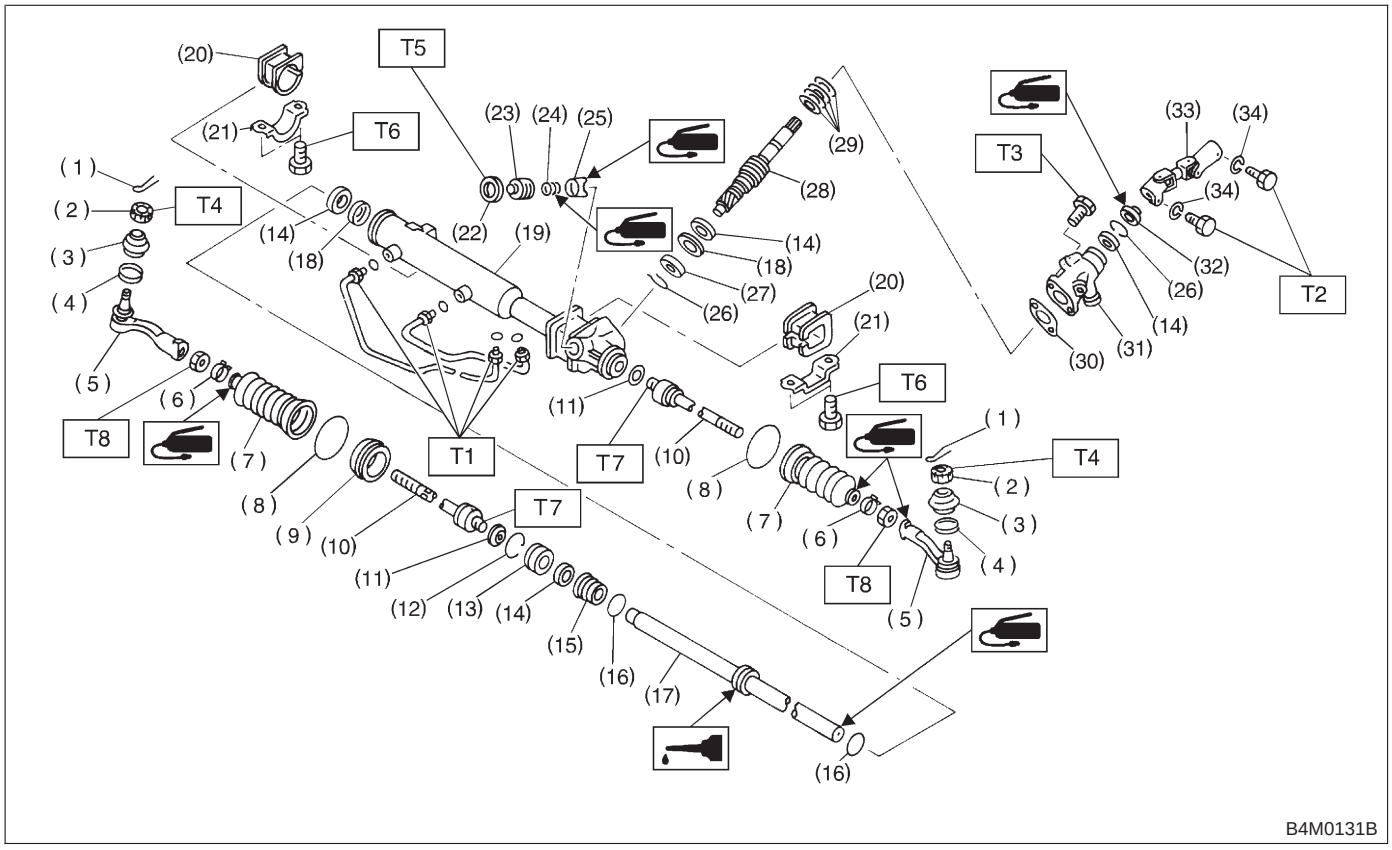
8) Install airbag module to steering wheel. (with airbag model)

WARNING:
Always refer to 5-5 Supplemental Restraint System before performing the service operation. <Ref. to 5-5 [W3A0].>

3. Steering Gearbox (Power Steering System) [LHD model]

A: REMOVAL

NOTE:
For disassembly and assembly of gearbox unit, refer to section Control Valve (Power Steering Gearbox) [LHD model]. <Ref. to 4-3 [W5B0].> and <Ref. to 4-3 [W5D0].>



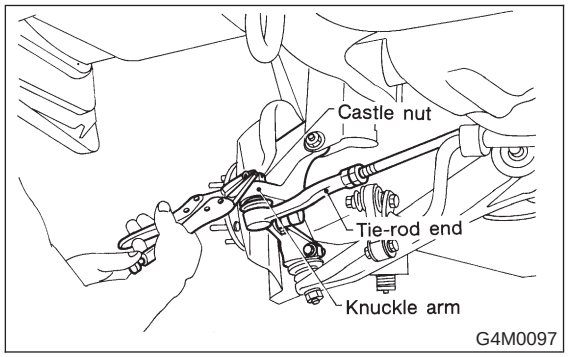
(1) Cotter pin
(2) Castle nut
(3) Dust cover
(4) Clip
(5) Tie-rod end
(6) Clip
(7) Boot
(8) Clip
(9) Spacer
(10) Tie-rod
(11) Lock washer
(12) Circlip
(13) Rack stopper
(14) Oil seal
(15) Rack bushing
(16) O-ring
(17) Rack
(18) Back-up washer
(19) Rack housing
(20) Adapter
(21) Clamp
(22) Lock nut
(23) Adjusting screw
(24) Spring
(25) Sleeve
(26) C-ring
(27) Ball bearing
(28) Valve
(29) Seal ring
(30) Packing
(31) Valve housing
(32) Dust seal
(33) Universal joint
(34) Spring washer

Tightening torque: N·m (kg-m, ft-lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 24±3 (2.4±0.3, 17.4±2.2)
T3: 25±5 (2.5±0.5, 18.1±3.6)
T4: 27.0±2.5 (2.75±0.25, 19.9±1.8)
T5: 39±10 (4.0±1.0, 29±7)
T6: 59±12 (6.0±1.2, 43±9)
T7: 78±10 (8.0±1.0, 58±7)
T8: 83±5 (8.5±0.5, 61.5±3.6)

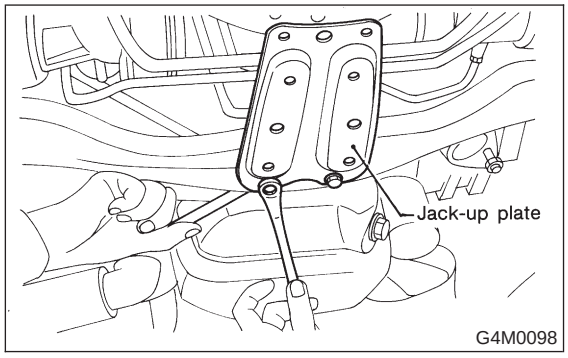
1) Disconnect battery minus terminal.
2) Loosen front wheel nut.
3) Lift vehicle and remove front wheels.
4) Remove front exhaust pipe assembly.

WARNING:
Be careful, exhaust pipe is hot.

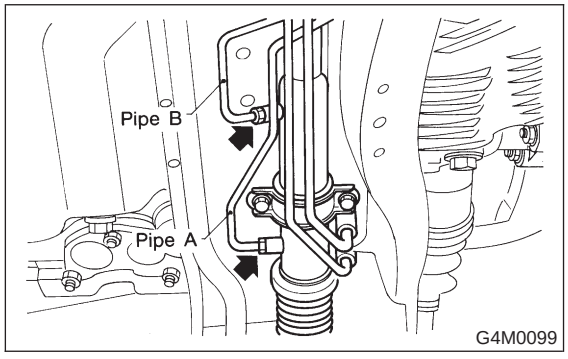
5) Using a puller, remove tie-rod end from knuckle arm after pulling off cotter pin and removing castle nut.



6) Remove jack-up plate and front stabilizer.

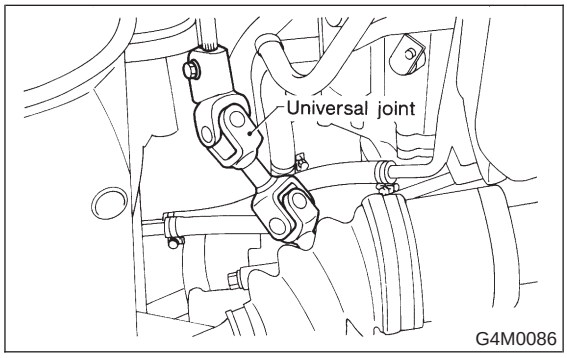


7) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.



8) Remove lower side bolt of universal joint, then remove upper side bolt and lift the joint upward.

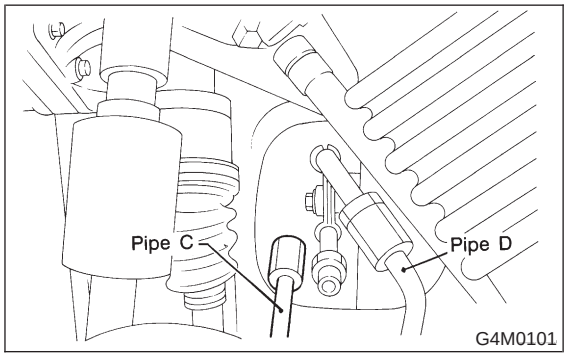
NOTE:
Place a mark on the joint and mating serration so that they can be re-installed at the original position.



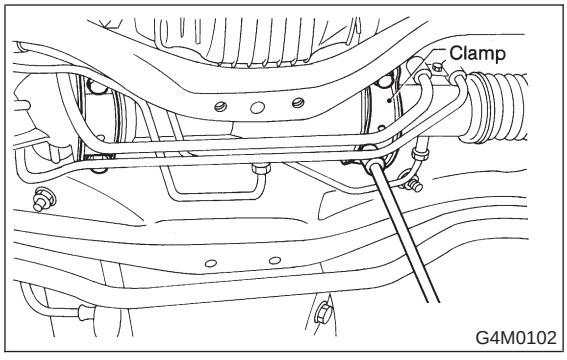
9) Disconnect pipes C and D from pipe of gearbox.

CAUTION:
Be careful not to damage these pipes.

NOTE:
Disconnect upper pipe D first, and lower pipe C second.



10) Remove clamp bolts securing gearbox to crossmember, and remove gearbox.

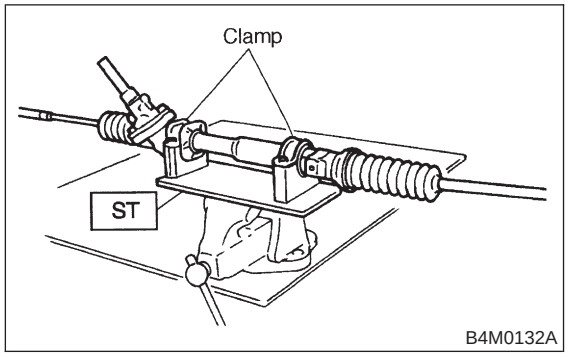


B: DISASSEMBLY

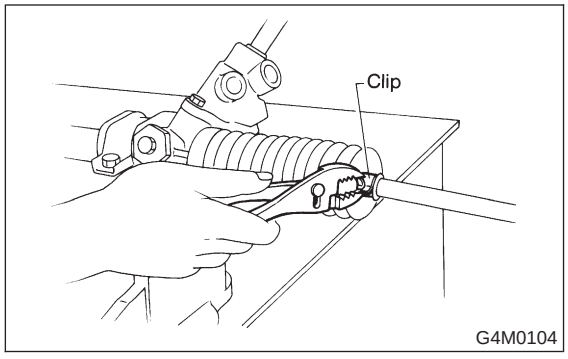
1) Disconnect four pipes from gearbox.

2) Secure gearbox removed from vehicle in vice using ST.
ST 926200000 STAND

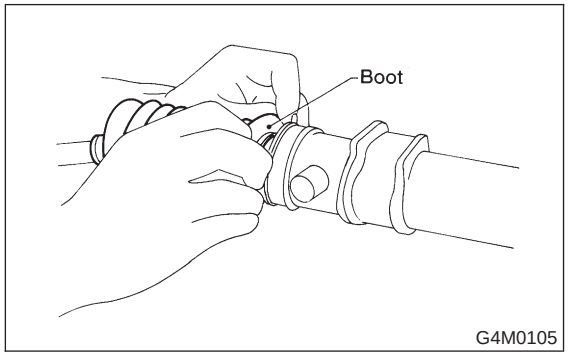
CAUTION:
Secure the gearbox in a vice using the ST as shown. Do not attempt to secure it without this ST.



3) Remove tie-rod end and lock nut from gearbox.
4) Remove small clip from boot using pliers, and move boot to tie-rod end side.

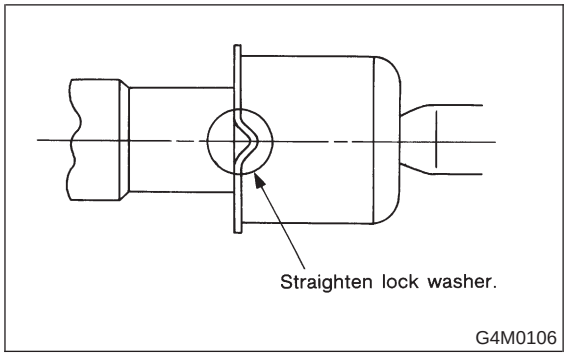


5) Remove boot together with large clips.



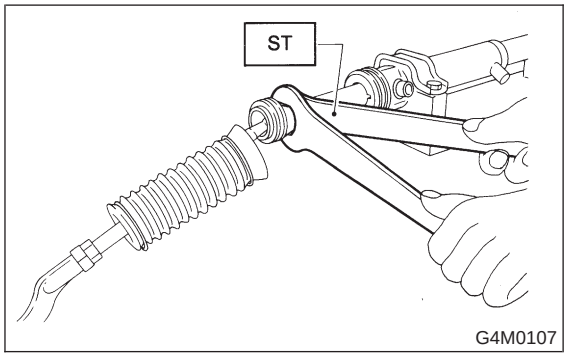
6) Straighten lock washer under ball joint.

CAUTION:
- **Be extremely careful not to hit surface of right hand rack; otherwise, oil leakage may result.**
- **Tie-rod lock washer must be replaced with a new one whenever it is removed.**

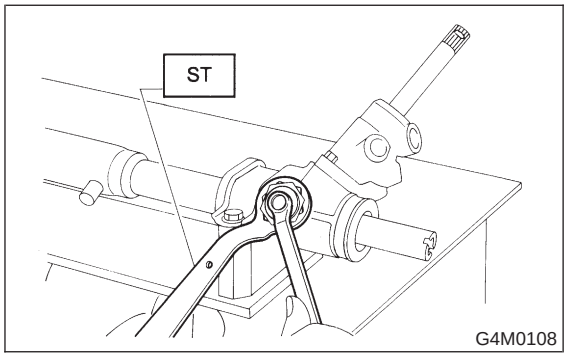


7) Loosen ball joint using ST and spanner and remove tie-rod from rack.

NOTE:
When loosening ball joint, securely fix the rack using ST.
ST 925700000 WRENCH



8) Loosen lock nut using ST, and remove adjusting screw.
ST 926230000 SPANNER



9) Remove spring and sleeve.
10) Remove dust seal.

CAUTION:
Be careful not to damage housing and input shaft, or to allow foreign matters to get inside when removing dust seal.

C: INSPECTION

1) Clean all disassembled parts, and check for wear, damage, or any other faults, then repair or replace as necessary.

2) When disassembling, check inside of gearbox for water. If any water is found, carefully check boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

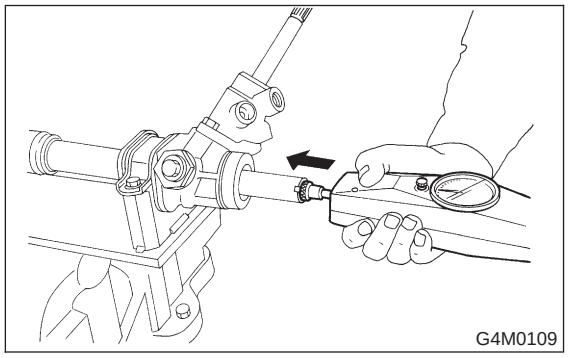
No.	Parts	Inspection	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If bend or damage is excessive, replace entire gearbox.
2	Dust seal	(1) Crack or damage (2) Wear	If outer wall slips, lip is worn out or damage is found, replace it with new one.
3	Rack and pinion	Poor mating of rack with pinion	(1) Adjust backlash properly. By measuring turning torque of gearbox and sliding resistance of rack, check if rack and pinion engage uniformly and smoothly with each other. <Ref. to 4-3 [W3C1].> (2) Keeping rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace entire gearbox.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace gearbox with new one.
		(4) Wear or damage on rack bush	If free play of rack shaft in radial direction is out of the specified range, replace gearbox with new one. <Ref. to 4-3 [W3C1].>
		(5) Wear on input shaft bearing	If free plays of input shaft in radial and axial directions are out of the specified ranges, replace gearbox with new one. <Ref. to 4-3 [W3C1].>
5	Boot	Crack, damage or deterioration	Replace.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace.
7	Tie-rod end	Damage or deterioration on dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe (4) Damage to O-ring	Replace.

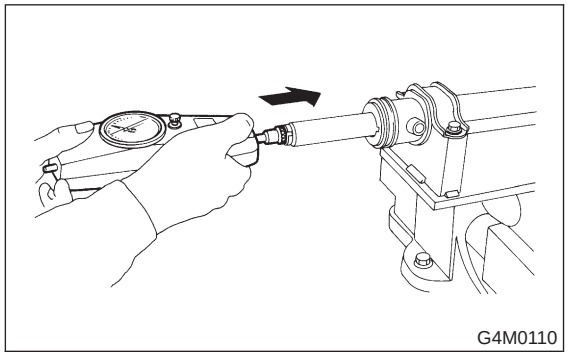
1. SERVICE LIMIT

Make a measurement as shown in the figures. If it exceeds the specified service limit, adjust or replace.

NOTE:
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.
ST 926200000 STAND

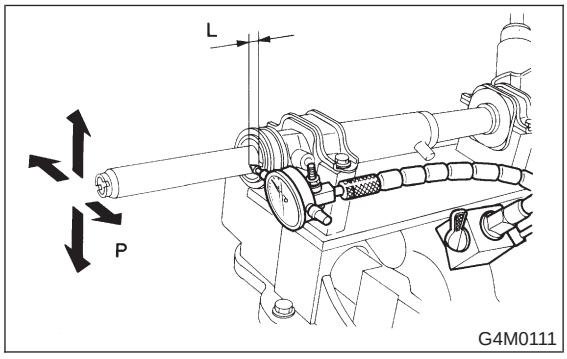
Sliding resistance of rack shaft:
Service limit
240.3 N (24.5 kg, 54.0 lb) or less


G4M0109


G4M0110

2. RACK SHAFT PLAY IN RADIAL DIRECTION

Right-turn steering:
Service limit
0.15 mm (0.0059 in) or less
On condition
L: 5 mm (0.20 in)
P: 98 N (10 kg, 22 lb)

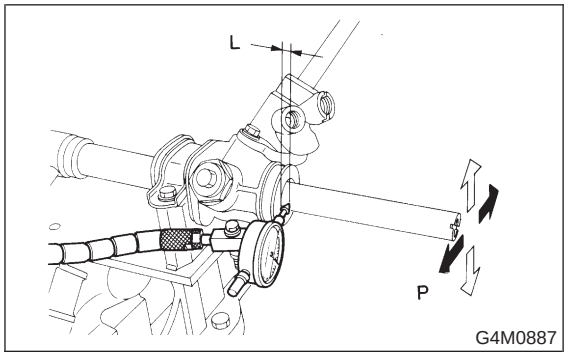


G4M0111

Left-turn steering:

Service limit
Direction⇦ ⇨
0.3 mm (0.012 in) or less
Direction⬅ ➡
0.15 mm (0.0059 in) or less

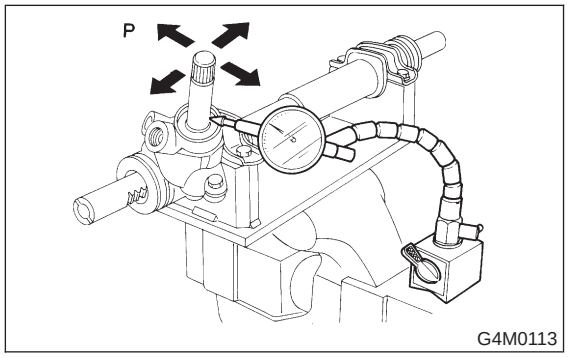
On condition
L: 5 mm (0.20 in)
P: 98 N (10 kg, 22 lb)



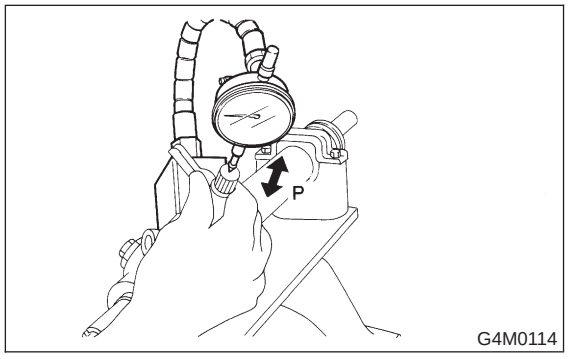
G4M0887

3. INPUT SHAFT PLAY

In radial direction:
Service limit
0.18 mm (0.0071 in) or less
On condition
P: 98 N (10 kg, 22 lb)



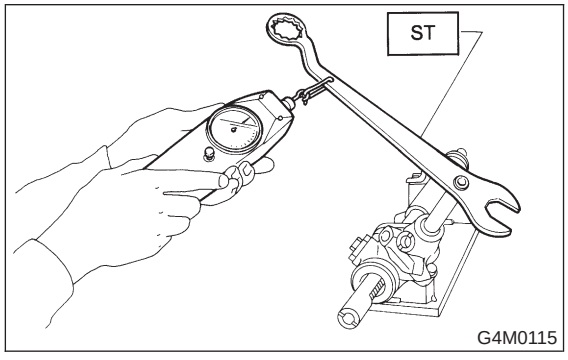
In axial direction:
Service limit
0.1 mm (0.004 in) or less
On condition
P: 20 — 49N (2 — 5 kg, 4 — 11 lb)



4. TURNING RESISTANCE OF GEARBOX

Using ST, measure gearbox turning resistance.
ST 926230000 SPANNER

Service limit:
Straight-ahead position within 30 mm (1.18 in) from rack center
Less than 11.18 N (1.14 kg, 2.51 lb)
Maximum allowable resistance
12.7 N (1.3 kg, 2.9 lb)



D: ASSEMBLY

CAUTION:
Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:
VALIANT GREASE M2 (Part No. 003608001)

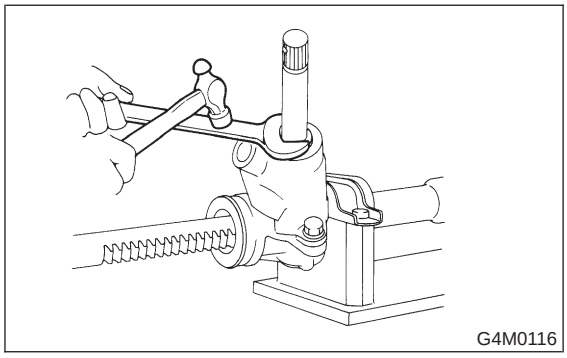
1) Apply grease to teeth of rack so that grease applied is about as high as teeth, and also apply a thin film of grease to sliding portion of rack shaft.

CAUTION:
● When moving rack to stroke end without tie-rod attached, prevent shocks from being applied at the end.
● Do not apply grease to threaded portion at end of rack shaft.
● Move rack shaft to stroke end two or three times to squeeze grease which accumulates on both ends. Remove grease to prevent it from choking air passage hole.

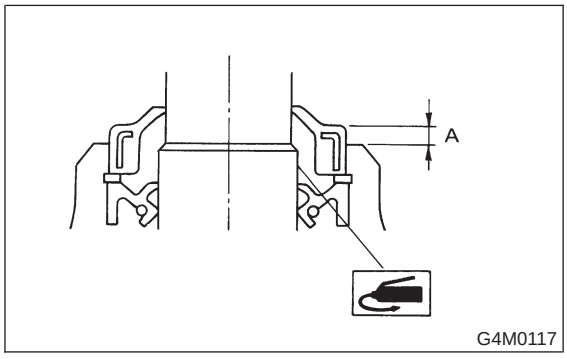
2) Apply grease to sleeve insertion hole.
3) Apply grease to dust seal insertion hole.

CAUTION:
Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.

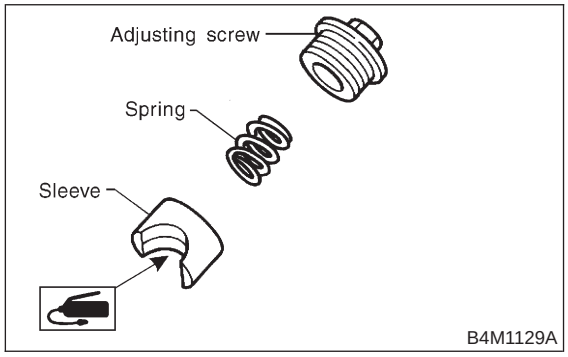
4) Press-fit dust seal into gearbox housing while tapping it via a spanner or the like so that stepping between gearbox and dust seal is normally 2 mm (0.08 in).



Depth: A
2 mm (0.08 in)



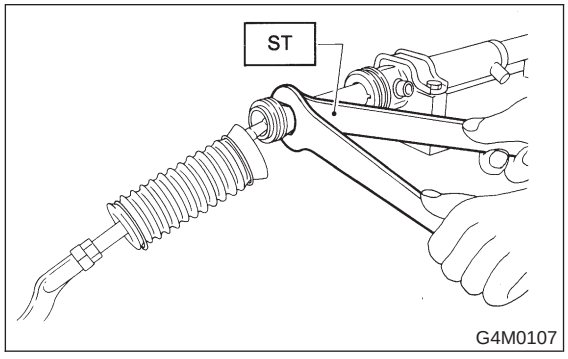
5) Apply grease to sliding surface of sleeve and spring seat, then insert sleeve into pinion housing. Fit spring into sleeve screw, pack grease inside of screw, then install the screw.



6) Fit new lock washer on screwed portion of rack end. Aligning cut portion of rack and nail of washer, screw in and tighten ball joint by using ST and spanner.
ST 925700000 WRENCH

Tightening torque (Ball joint):
78±10 N·m (8.0±1.0 kg-m, 58±7 ft-lb)

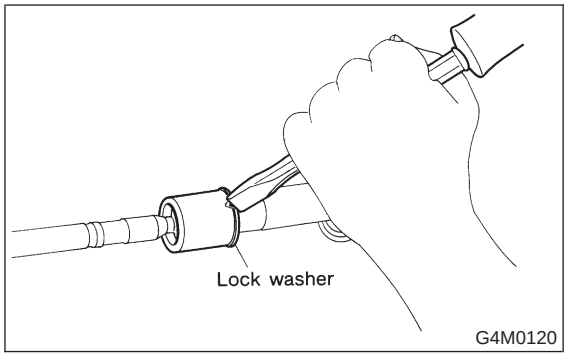
CAUTION:
Pay attention to prevent rack surface on the right side from being damaged by a tool or the like, otherwise oil leakage might be caused.



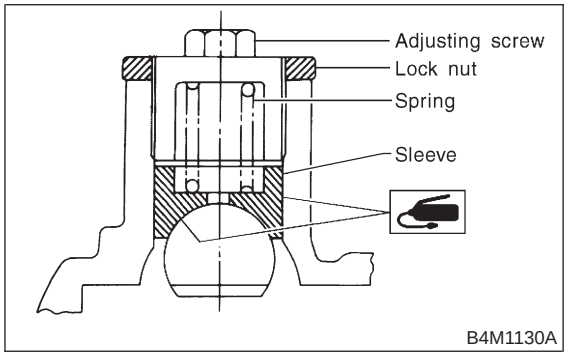
NOTE:
While tightening ball joint, hold rack with ST to prevent it from revolving.

7) Bend lock washer using a chisel.

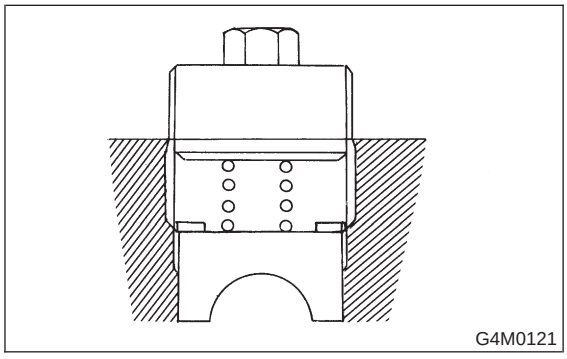
CAUTION:
Be careful not to scratch rack when bending lock washer.



8) Rack and pinion backlash adjustment
(1) Loosen adjusting screw.
(2) Rotate input shaft so that rack is in the straight ahead direction.
(3) Apply grease to sleeve.

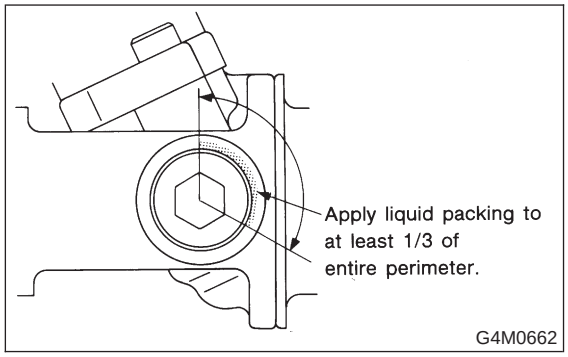


(4) Tighten adjusting screw by two threads.



(5) Apply liquid packing to at least 1/3 of entire perimeter of adjusting screw thread.

Liquid packing:
THREE BOND 1141



(6) Tighten adjusting screw to 15 N·m (1.5 kg-m, 11 ft-lb) and back off 26°.
(7) Install lock nut. While holding adjusting screw with a wrench, tighten lock nut using ST.
ST 926230000 SPANNER

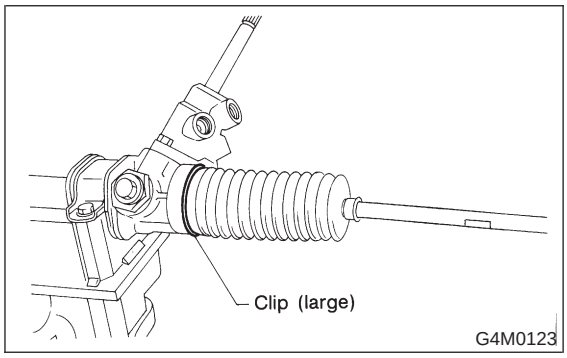
Tightening torque (Lock nut):
39±10 N·m (4.0±1.0 kg-m, 29±7 ft-lb)

NOTE:
● Hold adjusting screw with a wrench to prevent it from turning while tightening lock nut.
● Make adjustment so that steering wheel can be rotated fully from lock to lock without binding.

9) Check for service limit as per article of “Service limit”.
<Ref. to 4-3 [W3C1].> Make replacement and adjustment if necessary.
10) Install boot and mounting rubber to housing.

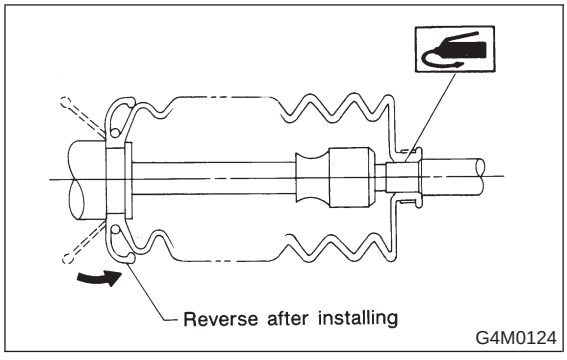
NOTE:
Apply grease through small hole in boot.

11) Fit clip (large) to boot, and then install boot to gearbox while holding boot flange.
After installing boot, fold back boot flange to the extent that large clip can not be seen.



NOTE:
● Before installing boot, be sure to apply grease to the groove of tie-rod.
● Install fitting portions of boots to the following portions in both sides of assembled steering gearbox.
(1) The groove on gearbox
(2) The groove on the rod
● Make sure that boot is installed without unusual inflation or deflation.

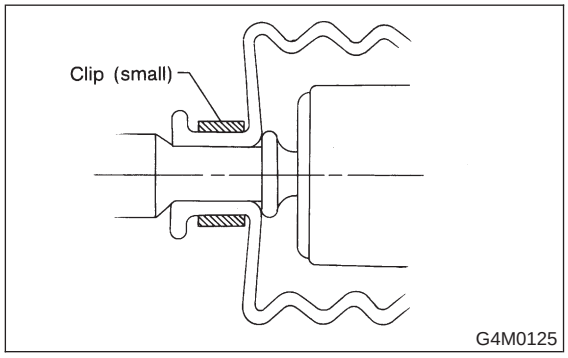
12) Turn boot until it seats well on gearbox and rubber mounting, then bend boot flange back.



13) Fix boot end with clip (small).

CAUTION:
Use screwdriver with blunted tip to prevent boot from damage, when installing.

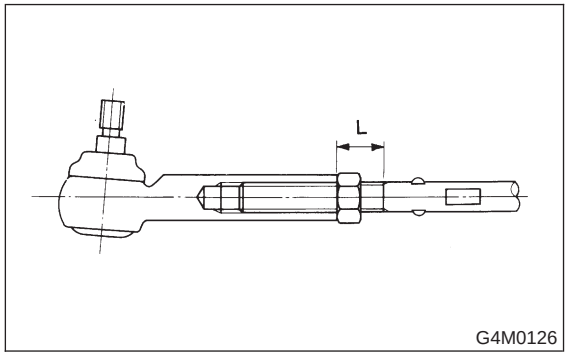
NOTE:
After installing, check boot end is positioned into groove on tie-rod.



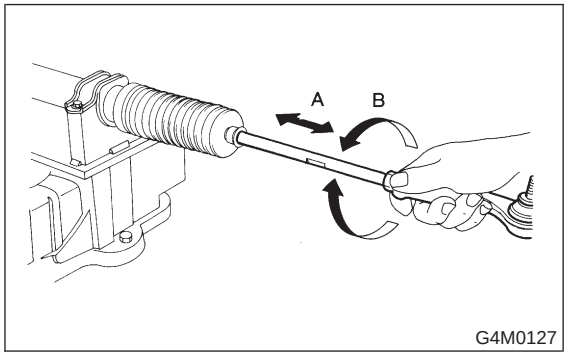
14) If tie-rod end was removed, screw in lock nut and tie-rod end to screwed portion of tie-rod, and tighten lock nut temporarily in a position as shown in figure.

Installed tie-rod length: L
15 mm (0.59 in)

NOTE:
Pay attention to difference between right and left tie-rod ends.



15) Inspect gearbox as follows:
A) Holding tie-rod end, repeat lock to lock two or three times as quickly as possible.
B) Holding tie-rod end, turn it slowly at a radius one or two times as large as possible.
After all, make sure that boot is installed in the specified position without deflation.

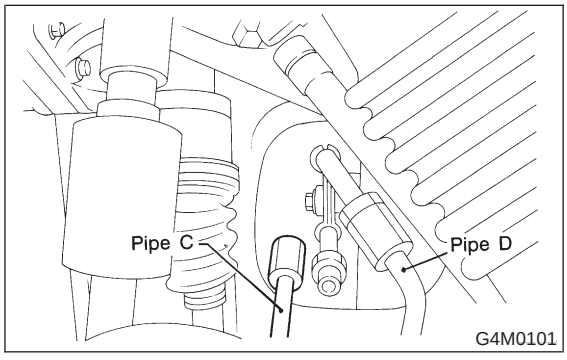


16) Remove gearbox from ST.
ST 926200000 STAND
17) Install four pipes on gearbox.
(1) Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A.

Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)

(2) Connect pipes C and D to gearbox.
Connect lower pipe C first, and upper pipe D second.

Tightening torque:
15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

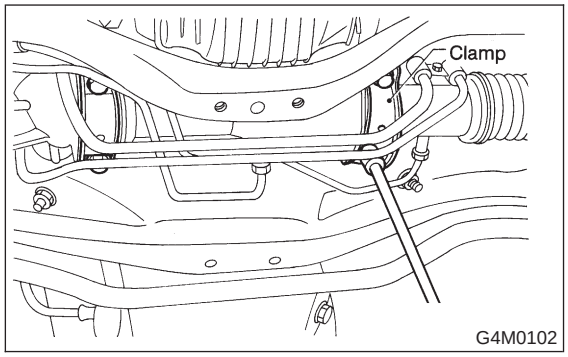


E: INSTALLATION

1) Insert gearbox into crossmember, being careful not to damage gearbox boot.

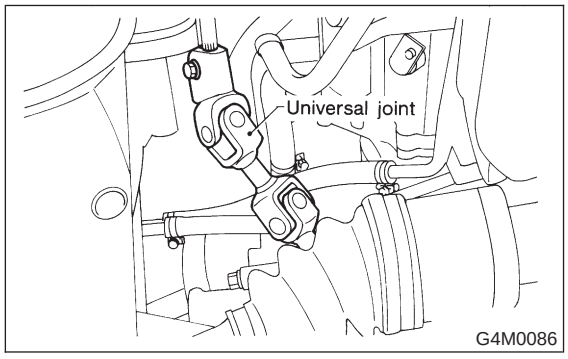
2) Tighten gearbox to crossmember bracket via clamp with bolt to the specified torque.

Tightening torque:
59±12 N·m (6.0±1.2 kg-m, 43±9 ft-lb)



3) How to install the joint.
(1) Push the long yoke of the joint, all the way into the serrated portion of the steering shaft, setting the bolt hole in the cutout.
(2) Then pull the short yoke all way out of the serrated portion of the gear box, setting the bolt hole in the cutout.
(3) Insert the bolt through the short yoke, pull the joint and confirm that the bolt is on cutout of the gearbox.
(4) Fasten the short yoke side with a spring washer and bolt, then fasten the long yoke side.

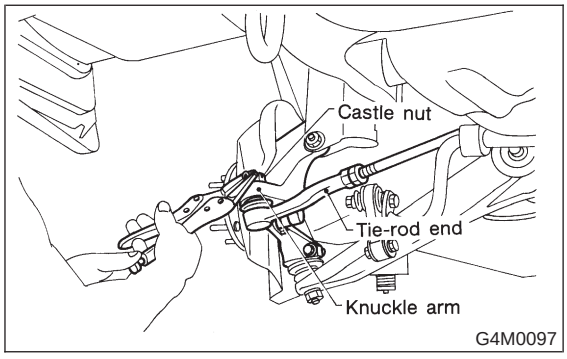
Tightening torque:
24±3 N·m (2.4±0.3 kg-m, 17.4±2.2 ft-lb)



4) Connect tie-rod end and knuckle arm, and tighten with castle nut. Fit cotter pin into the nut and bend the pin to lock.

Castle nut tightening torque:
Tighten to 27.0±2.5 N·m (2.75±0.25 kg-m, 19.9±1.8 ft-lb), and tighten further within 60° until cotter pin hole is aligned with a slot in the nut.

CAUTION:
When connecting, do not hit cap at the bottom of tie-rod end with hammer.



5) Install front stabilizer to vehicle.
6) Install front exhaust pipe assembly.
<Ref. to 2-9 [W1B0].>
7) Install tires.
8) Tighten wheel nuts to the specified torque.

Tightening torque:
88±10 N·m (9.0±1.0 kg-m, 65±7 ft-lb)

9) Connect ground cable to battery.
10) Pour fluid into oil tank, and bleed air. <Ref. to 4-3 [W9A0].>
11) Check for fluid leaks.
12) Install jack-up plate.

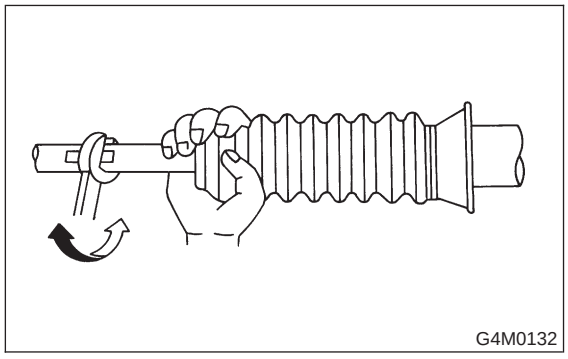
WARNING:
Be careful, exhaust manifold is hot.

13) Lower vehicle.
14) Check fluid level in oil tank.

15) After adjusting toe-in and steering angle, tighten lock nut on tie-rod end.

Tightening torque:
83±5 N·m (8.5±0.5 kg-m, 61.5±3.6 ft-lb)

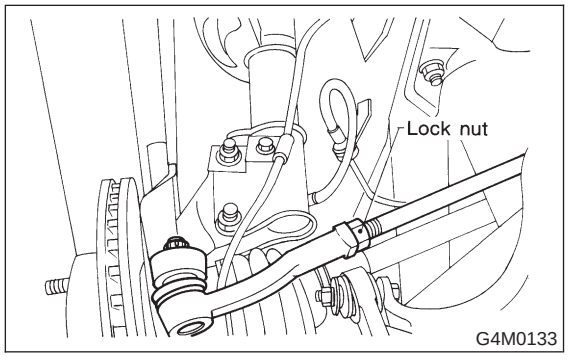
CAUTION:
When adjusting toe-in, hold boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.


G4M0132

F: ADJUSTMENT

1) Adjust front toe.

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)

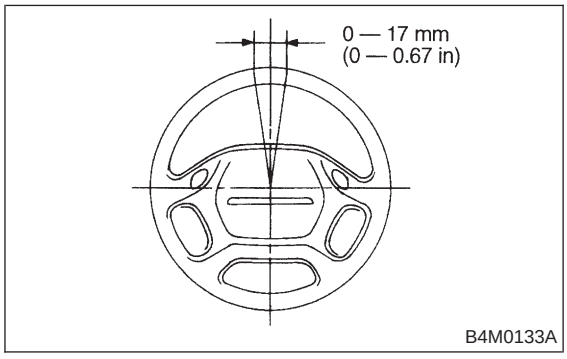


G4M0133

2) Adjust steering angle of wheels.

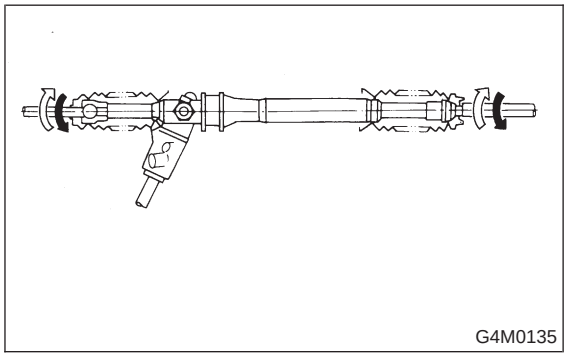
Steering angle:
Except OUTBACK model;
Inner wheel 37.6°±1.5
Outer wheel 32.6°±1.5
OUTBACK model;
Inner wheel 34.4°±1.5
Outer wheel 30.2°±1.5

3) If steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



B4M0133A

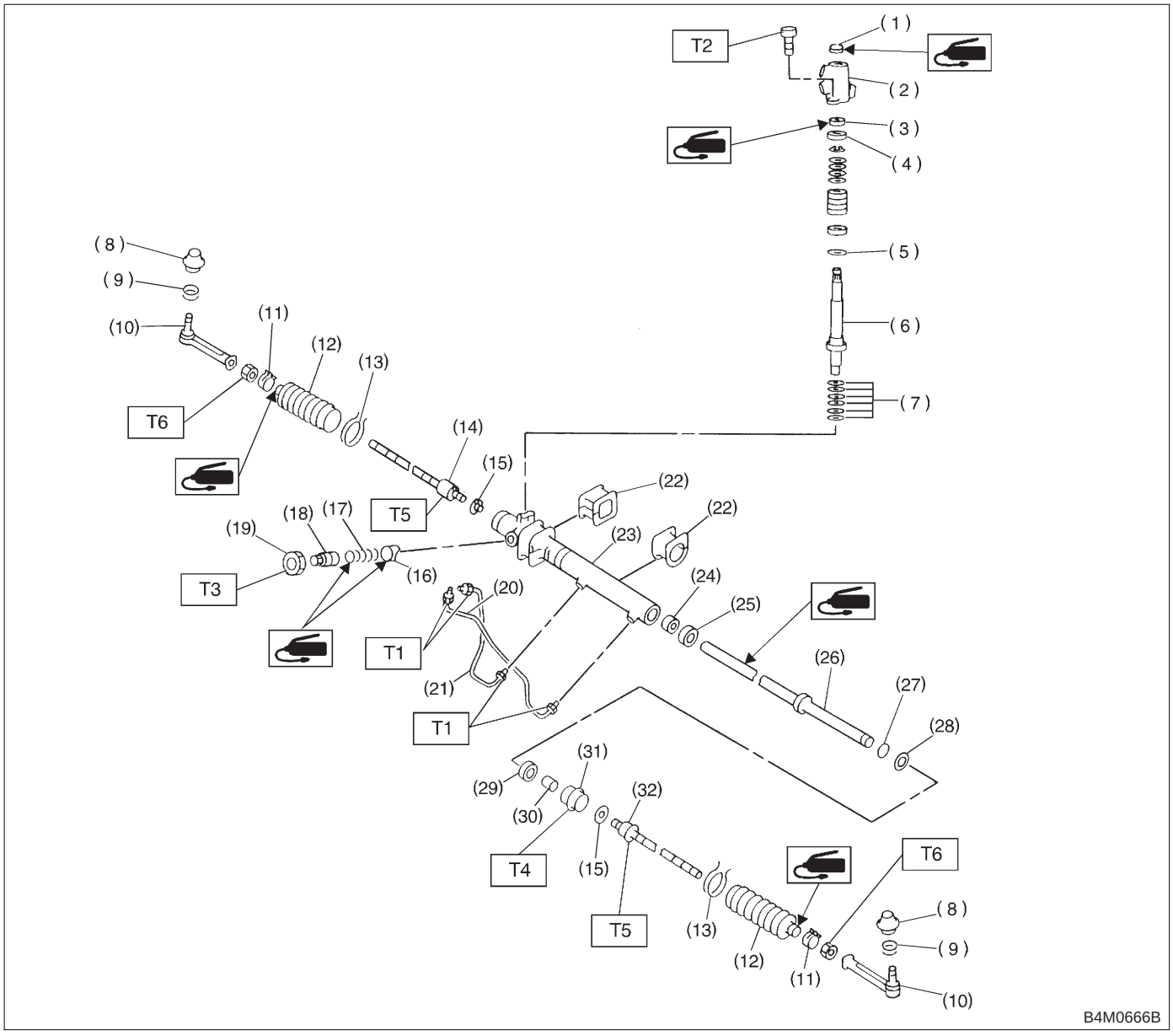
4) If steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the same direction by the same turns.


G4M0135

4. Steering Gearbox (Power Steering System) [RHD model]

A: REMOVAL

NOTE:
For disassembly and assembly of gearbox unit, refer to section Control Valve (Power Steering Gearbox) [RHD model]. <Ref. to 4-3 [W6B0].> and <Ref. to 4-3 [W6D0].>



(1) Dust cover
(2) Valve housing
(3) Y-packing
(4) Ball-bearing
(5) Spacer
(6) Pinion
(7) Shim
(8) Dust seal
(9) Clip
(10) Tie-rod end
(11) Clip
(12) Boot
(13) Wire
(14) Tie-rod RH
(15) Lock washer
(16) Sleeve
(17) Spring
(18) Adjusting screw
(19) Lock nut
(20) Pipe A
(21) Pipe B
(22) Adapter
(23) Housing ASSY
(24) Back-up washer

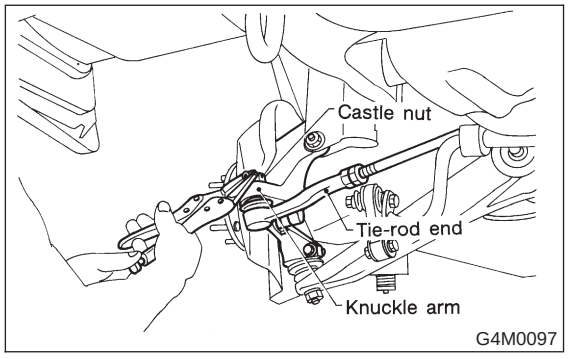
(25) Oil seal
(26) Rack
(27) O-ring
(28) Oil seal
(29) Y-packing
(30) Bush
(31) Holder
(32) Tie-rod LH

Tightening torque: N·m (kg-m, ft-lb)
T1: 20±4 (2.0±0.4, 14.5±2.9)
T2: 25±5 (2.5±0.5, 18.1±3.6)
T3: 39±10 (4.0±1.0, 29±7)
T4: 64±10 (6.5±1.0, 47±7)
T5: 78±10 (8.0±1.0, 58±7)
T6: 83±5 (8.5±0.5, 61.5±3.6)

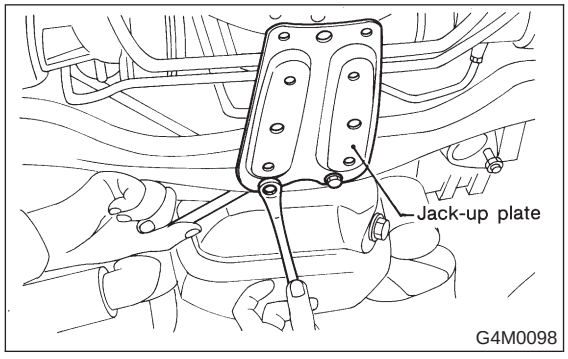
1) Disconnect battery negative terminal.
2) Disconnect both oxygen sensor and exhaust gas temperature warning sensor connectors from front exhaust pipe assembly.

WARNING:
Be careful as exhaust pipe is hot.

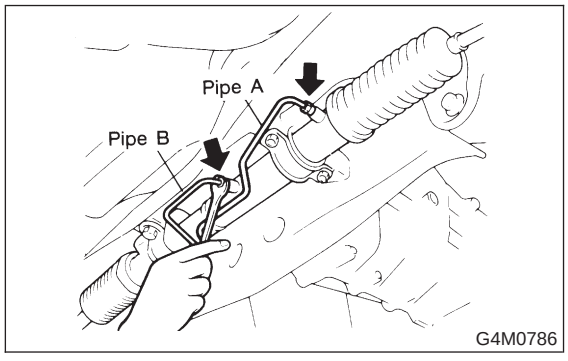
3) Raise vehicle with a jack and remove front wheel.
4) Disconnect front exhaust pipe assembly.
5) Remove cotter pin and castle nut. Using a puller, remove tie-rod end from knuckle arm.



6) Remove jack-up plate and stabilizer.

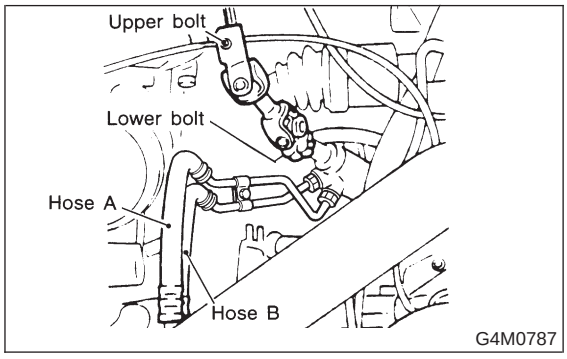


7) Disconnect one pipe joint A from center of gearbox assembly, and connect a vinyl hose to it. While turning steering wheel to the left and right, drain fluid through the hose. Similarly, drain fluid from the other pipe joint B.



8) Remove lower and upper bolts from universal joint, and remove universal joint in the upward direction.

NOTE:
Scribe alignment marks on universal joint so that it can be reassembled at the original serration.



9) Remove flare nuts from control valve of gearbox assembly, and disconnect upper and lower hoses B and A.

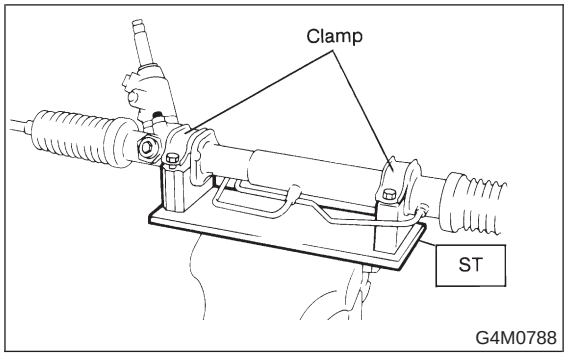
CAUTION:
- **Always disconnect hoses B and A in that order.**
- **Be careful not to damage the hoses during removal.**

10) Remove bolts securing gearbox to crossmember, and detach gearbox.

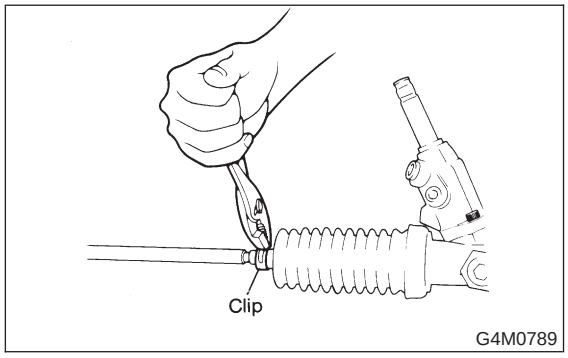
B: DISASSEMBLY

1) Disconnect four pipes from gearbox.
2) Secure gearbox removed from vehicle in vice using ST.
ST 926200000 STAND

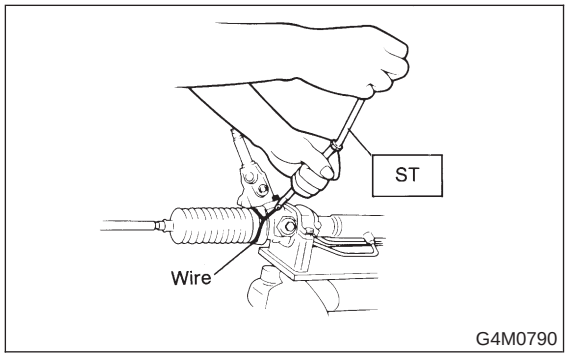
CAUTION:
Secure the gearbox assembly in a vice using the ST as shown. Do not attempt to secure it without this ST.



3) Pry off clip from outer end of boot, and slide boot toward tie-rod end.

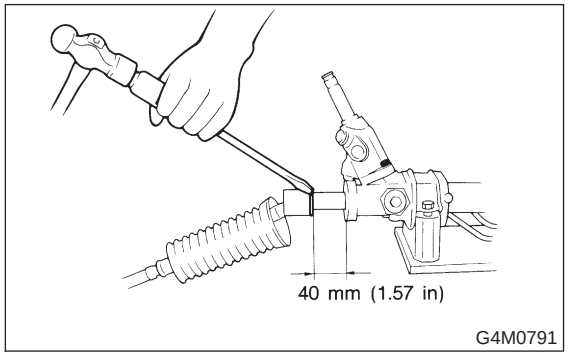


4) Using ST, remove lock wire from inner end of boot, and remove boot.
ST 927590000 WRENCH

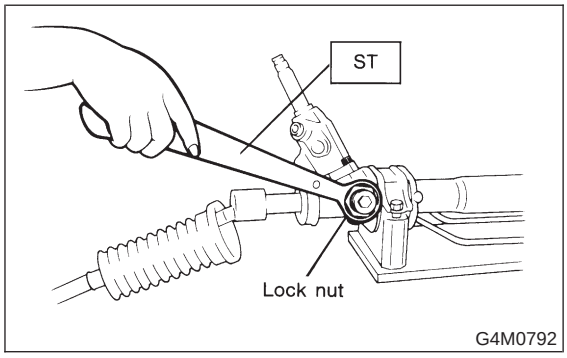


5) Extend rack approximately 40 mm (1.57 in) out. Unlock lock wire at lock washer on each side of tie-rod end using a standard screwdriver.

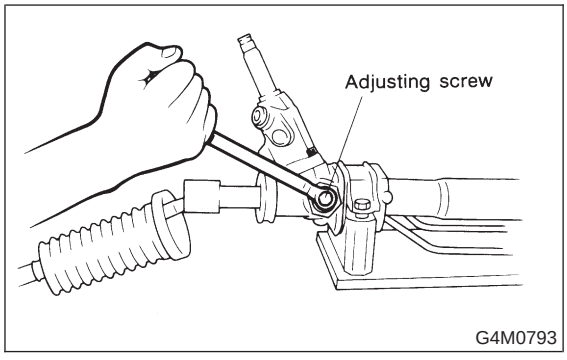
CAUTION:
Be careful not to scratch rack surface as oil leaks may result.



6) Using ST, loosen lock nut.
ST 926230000 SPANNER

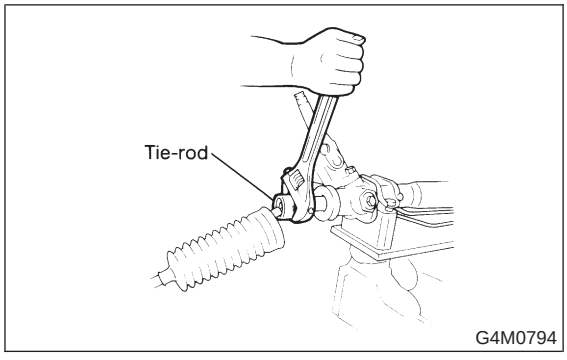


7) Tighten adjusting screw until it no longer tightens.



8) Using a wrench [32 mm (1.26 in) width across flats] or adjustable wrench, remove tie-rod.

CAUTION:
● Check ball joint for free play, and tie-rod for bends. Replace if necessary.
● Check dust seals used with tie-rod end ball joint for damage or deterioration. Replace if necessary.

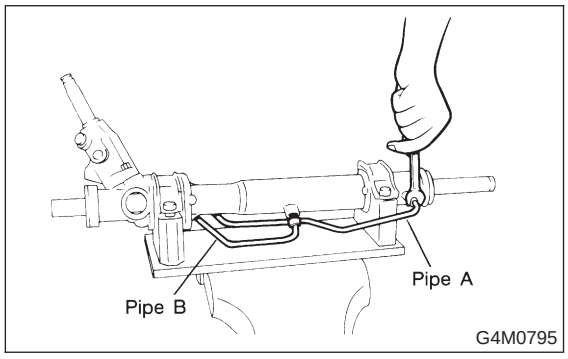


9) Loosen adjusting screw and remove spring and sleeve.

CAUTION:
Replace spring and/or sleeve if damaged.

10) Disconnect pipes A and B from steering body and control valve housing.

CAUTION:
Replace pipes and/or flare nuts if damaged.



C: INSPECTION

1) Clean all disassembled parts, and check for wear, damage, or any other faults, then repair or replace as necessary.
2) When disassembling, check inside of gearbox for water. If any water is found, carefully check boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

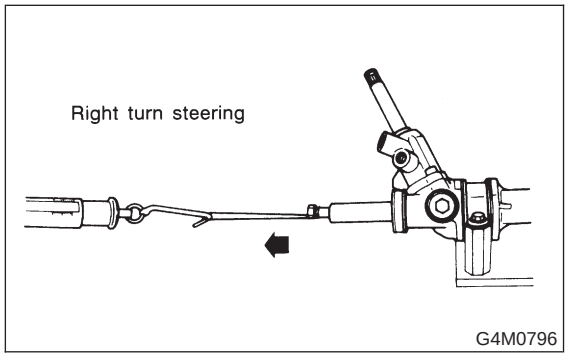
No.	Parts	Inspection	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If bend or damage is excessive, replace entire gearbox.
2	Dust seal	(1) Crack or damage (2) Wear	If outer wall slips, lip is worn out or damage is found, replace it with new one.
3	Rack and pinion	Poor mating of rack with pinion	(1) Adjust backlash properly. By measuring turning torque of gearbox and sliding resistance of rack, check if rack and pinion engage uniformly and smoothly with each other. <Ref. to 4-3 [W4C1].> (2) Keeping rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace entire gearbox.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace gearbox with new one.
		(4) Wear or damage on rack bush	If free play of rack shaft in radial direction is out of the specified range, replace gearbox with new one. <Ref. to 4-3 [W4C1].>
		(5) Wear on input shaft bearing	If free plays of input shaft in radial and axial directions are out of the specified ranges, replace gearbox with new one. <Ref. to 4-3 [W4C1].>
5	Boot	Crack, damage or deterioration	Replace.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace.
7	Tie-rod end	Damage or deterioration on dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe (4) Damage to O-ring	Replace.

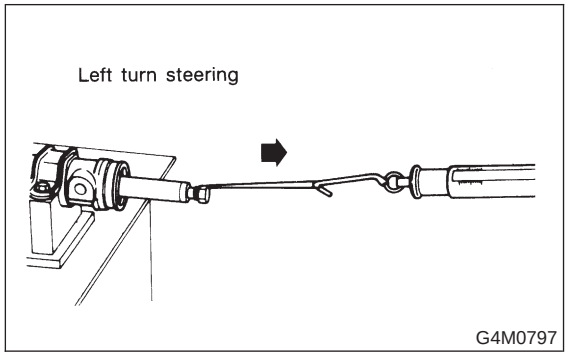
1. SERVICE LIMIT

Make a measurement as shown in the figures. If it exceeds the specified service limit, adjust or replace.

NOTE:
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.
ST 926200000 STAND

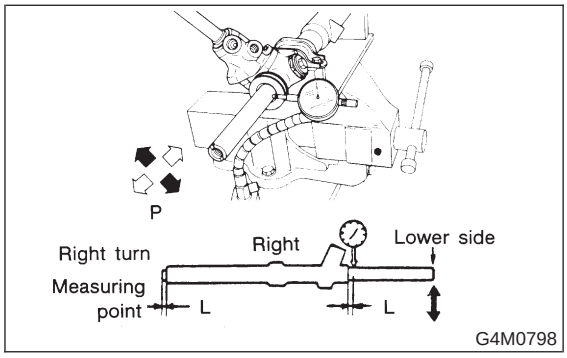
Sliding resistance of rack shaft:
Service limit
304 N (31 kg, 68 lb) or less
Difference between left and right sliding resistance
Less than 20%



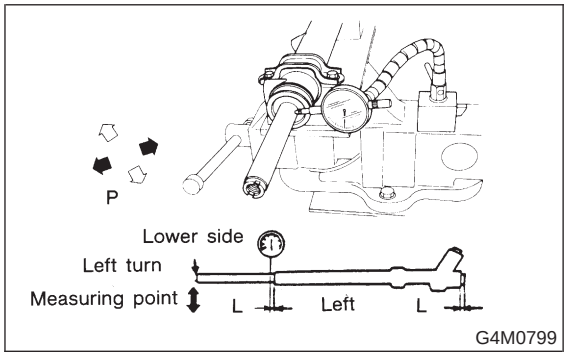


2. RACK SHAFT PLAY IN RADIAL DIRECTION

Right-turn steering:
Service limit
Less than 0.4 mm (0.016 in) (direction ⬅ ➡)
Less than 0.6 mm (0.024 in) (direction ⇦ ⇨)
On condition
L: 5 mm (0.20 in)
P: 98 N (10 kg, 22 lb)

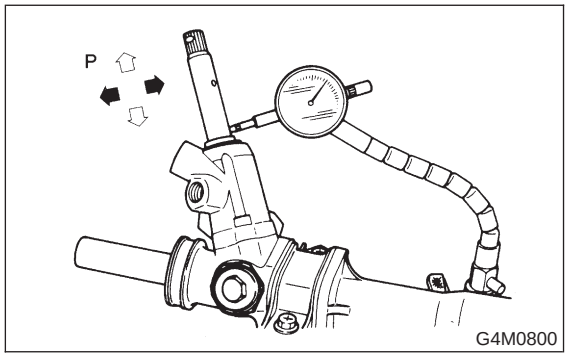


Left-turn steering:
Service limit
Less than 0.4 mm (0.016 in) (direction ⬅ ➡ and ⇦ ⇨)
On condition
L: 5 mm (0.20 in)
P: 98 N (10 kg, 22 lb)

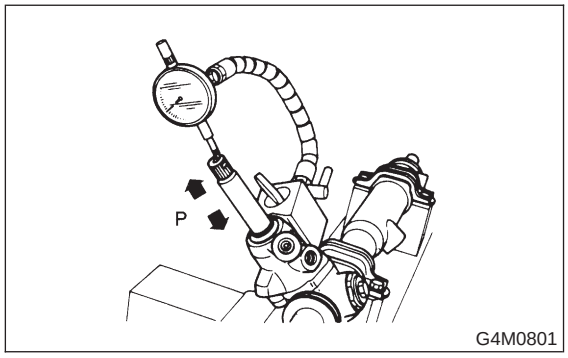


3. INPUT SHAFT PLAY

In radial direction:
Service limit
0.18 mm (0.0071 in) or less
On condition
P: 98 N (10 kg, 22 lb)



In axial direction:
Service limit
0.27 mm (0.0106 in) or less
On condition
P: 20 — 49 N (2 — 5 kg, 4 — 11 lb)

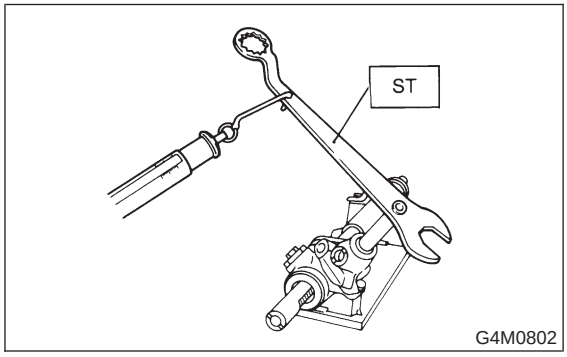


4. TURNING RESISTANCE OF GEARBOX

Using ST, measure gearbox turning resistance.
ST 926230000 SPANNER

Service limit:
Straight-ahead position within 30 mm (1.18 in) from rack center
Less than 11.18 N (1.14 kg, 2.51 lb)
Maximum allowable resistance
15.79 N (1.61 kg, 3.55 lb) or less

Difference between left and right sliding resistance:
Less than 20%



D: ASSEMBLY

CAUTION:
Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:
VALIANT GREASE M2 (Part No. 003608001)

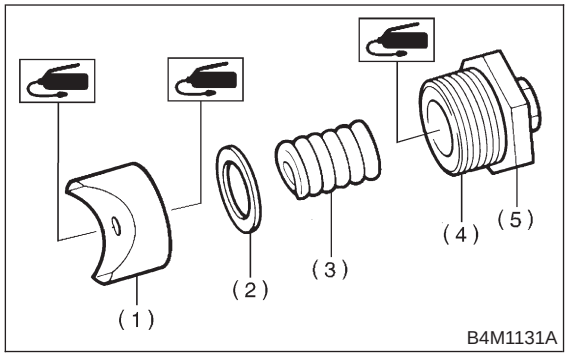
1) Clean all parts and tools before reassembling.
2) Move rack shaft fully to the left and right two or three times to lubricate shaft ends with grease. Remove excess grease, being careful not to block air vent hole.

CAUTION:
● When rack is fully moved to its stroke ends with tie-rod removed, be careful not to bump rack ends.
● Ensure that screw located at end of rack shaft is free from grease.

3) Apply grease to bore wall which accommodates sleeve.

CAUTION:
Ensure that hands are clean when applying grease.

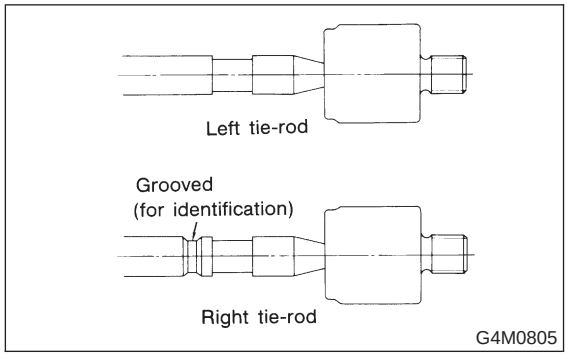
4) Apply a coat of grease to sliding surface of sleeve and seating surface of spring, and insert sleeve into steering body. Charge adjusting screw with grease, insert spring into adjusting screw and install on steering body.



(1) Sleeve
(2) Seat
(3) Spring
(4) Adjusting screw
(5) Lock nut

5) Installation of tie-rod
(1) Tighten adjusting screw until it will no longer tighten.
(2) The left and right tie-rod differ as indicated in the table.

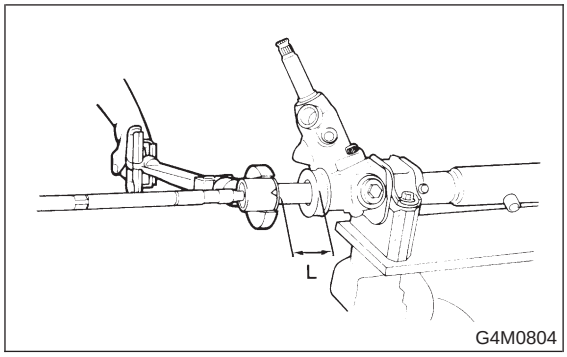
Right tie-rod (pinion side)	No air vent hole provided.	Grooved. (for identification)
Left tie-rod (cylinder side)	Air vent hole provided.	Not grooved. (for identification)



(3) Install lock washers and tighten left and right tie-rods into rack ends.

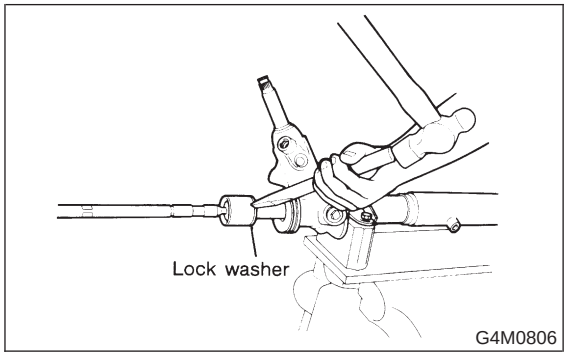
On condition
L: Approximately 40 mm (1.57 in)

Tightening torque:
78±10 N·m (8.0±1.0 kg-m, 58±7 ft-lb)

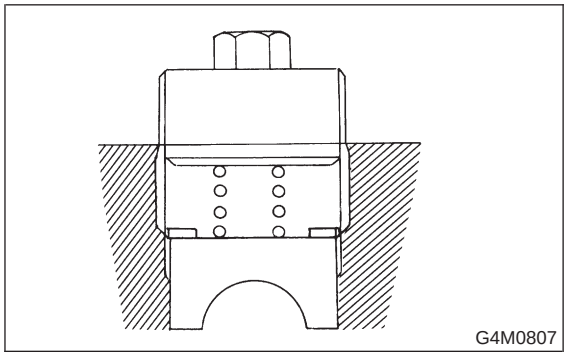


6) Using a chisel and hammer, bend lock washers (at two places).

CAUTION:
Be careful not to scratch rack.



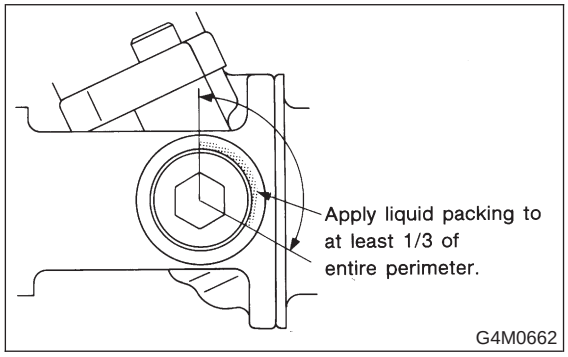
7) Rack and pinion backlash adjustment
(1) Loosen adjusting screw three to four turns.
(2) Rotate input shaft so that rack is in the straight ahead direction. [Ensure that distance between rack end and stopper is 70.8 mm (2.787 in).]
(3) Tighten adjusting screw by two threads.



(4) Turn adjusting screw so that the entire thread area is coated with liquid packing.

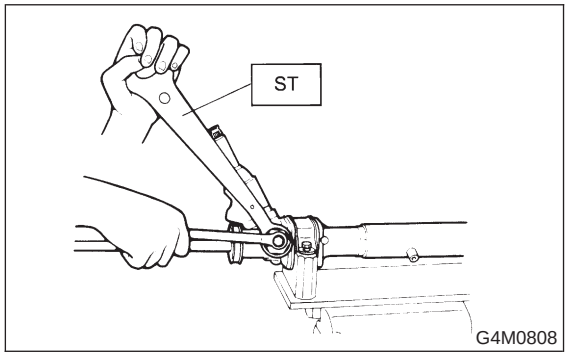
Liquid packing:
THREE BOND 1102 or equivalent

NOTE:
● Apply liquid packing of approximately 1.5 grams (0.053 oz) to adjusting screw thread area.
● Also turn plug to ensure that its entire contact area is coated with liquid packing.



(5) Tighten adjusting plug to 5 N·m (0.5 kg-m, 3.6 ft-lb) and loosen, then tighten to 5 N·m (0.5 kg-m, 3.6 ft-lb) and loosen, and finally tighten to 5 N·m (0.5 kg-m, 3.6 ft-lb) and loosen 26°.
(6) While holding adjusting plug using a closed wrench, tighten lock nut using ST.
ST 926300000 SPANNER

Tightening torque:
39±10 N·m (4±1 kg-m, 29±7 ft-lb)



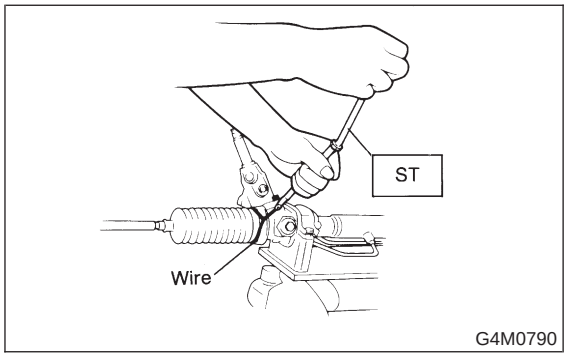
CAUTION:
● Do not allow liquid packing to come in contact with sleeve.
● While rotating input shaft to fully move rack shaft to the left and right, ensure that rack moves smoothly without binding, and that rotating torque is constant.

8) Installation of boot
(1) Apply a coat of grease to inner wall of boot small end.
(2) Position boot large end in rubber mount groove and gearbox, and small end in groove of tie-rod.

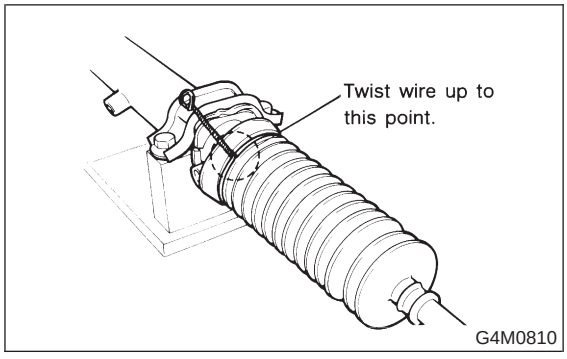
CAUTION:
● Ensure that both ends of boot are properly situated in grooves.
● Ensure that boot is free from abnormal swelling or dents.

9) Attach lock wire to boot large end, and twist it while pulling it upward with a force of approximately 39±10 N (4±1 kg, 9±2 lb).
ST 927590000 WRENCH

CAUTION:
Ensure that lock wire is not loose.

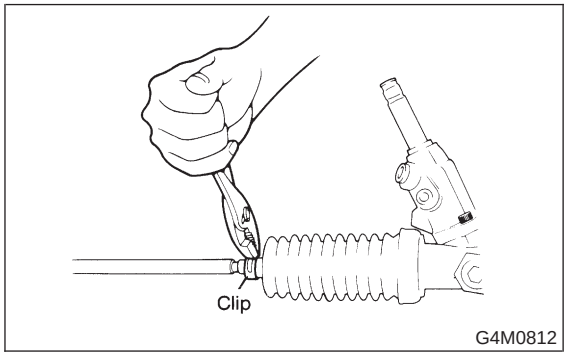


10) Then bend wire end along boot as shown.



11) Install clip using pliers.

CAUTION:
After installing clip, ensure that boot's small end is properly positioned in groove on tie-rod.



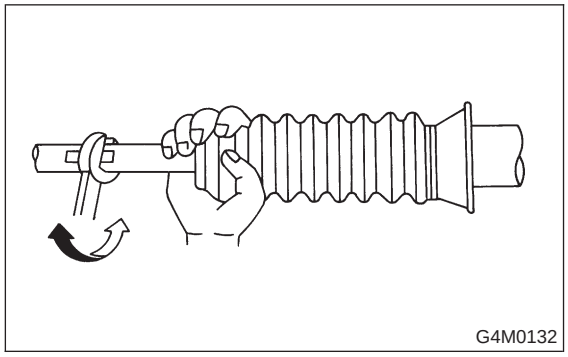
12) Install pipes A and B.

Tightening torque:
20±4 N·m (2.0±0.4 kg-m, 14.5±2.9 ft-lb)

E: INSTALLATION

Installation is in the reverse order of removal.
Do the following:

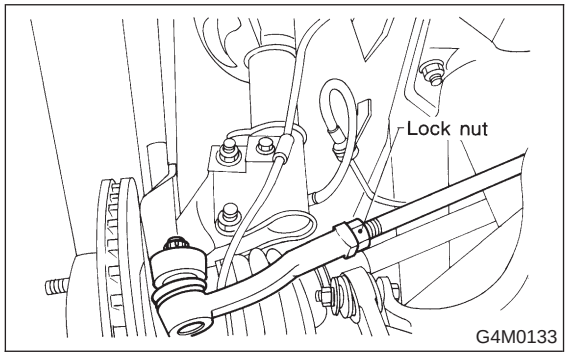
CAUTION:
When adjusting toe-in, hold boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.



F: ADJUSTMENT

1) Adjust front toe.

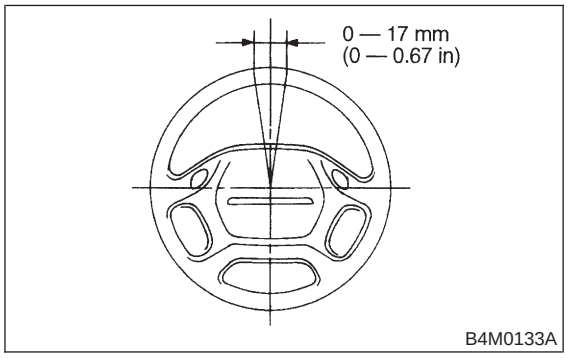
Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



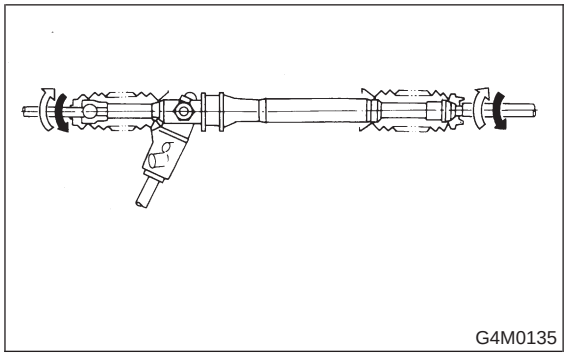
2) Adjust steering angle of wheels.

Standard of steering angle:
Inner wheel 37.6°±1.5°
Outer wheel 32.6°±1.5°

3) If steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.

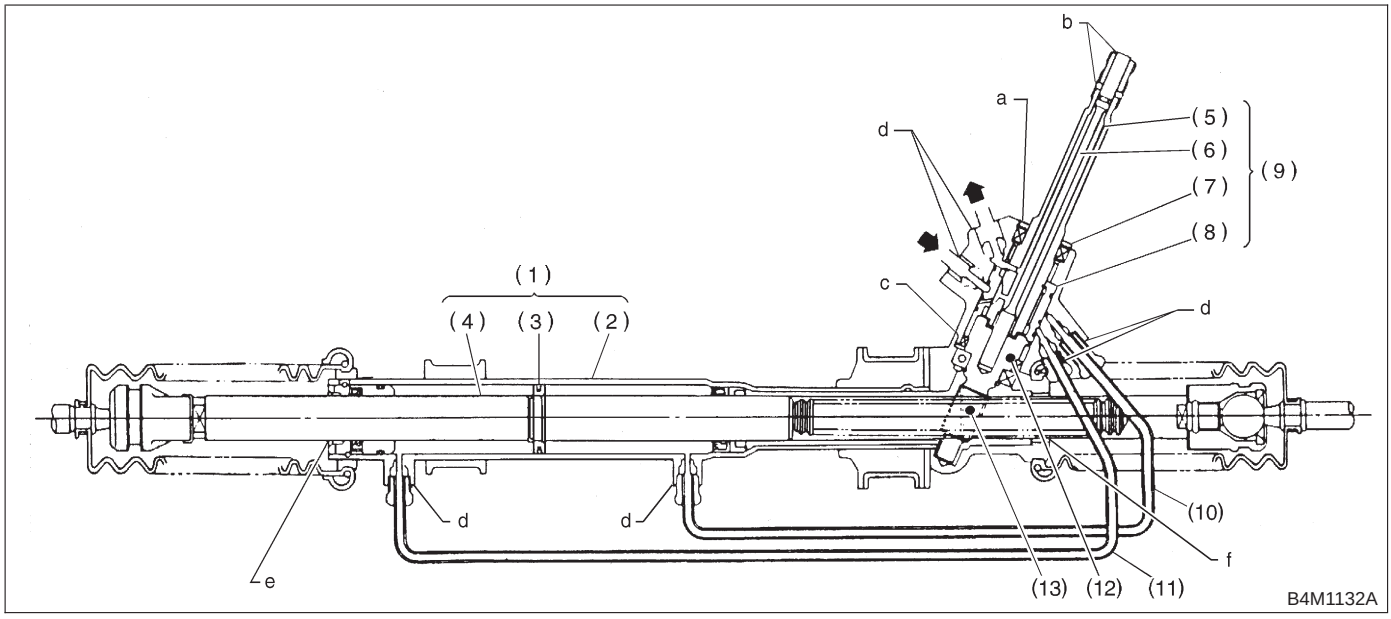


4) If steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the same direction by the same amount.



5. Control Valve (Power Steering Gearbox) [LHD model]

A: CHECKING OIL LEAKING POINTS



(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack axle
(5) Input shaft
(6) Torsion bar
(7) Valve housing
(8) Valve body
(9) Control valve
(10) Pipe B
(11) Pipe A
(12) Pinion
(13) Pinion axle

1. OIL LEAKING POINTS

1) If leak point is other than a, b, c, or d, perform check step 5) in “OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS” before dismounting gearbox from vehicle. <Ref. to 4-3 [W5A2].> If gearbox is dismounted without confirming where the leak is, it must be mounted again to locate the leak point.
2) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the oil from the suspected portion and turn the steering wheel from lock to lock about 30 to 40 times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.
3) Before starting oil leak repair work, be sure to clean the gearbox, hoses, pipes, and surrounding parts. After completing repair work, clean these areas again.

2. OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS

NOTE:
Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also be prepared. However, it is essential to pinpoint the cause of trouble, and limit the number of replacement parts as much as possible.

1) Leakage from “a”
The oil seal is damaged. Replace valve assembly with a new one.
2) Leakage from “b”
The torsion bar O-ring is damaged. Replace valve assembly with a new one.
3) Leakage from “c”
The oil seal is damaged. Replace valve assembly with a new one.
4) Leakage from “d”
The pipe is damaged. Replace the faulty pipe or O-ring.
5) If leak is other than a, b, c, or d, and if oil is leaking from the gearbox, move the right and left boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove oil from the surrounding portions. Then, turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion immediately after and several hours after this operation.

6) Leakage from “e”
The cylinder seal is damaged. Replace rack bush with a new one.
7) Leakage from “f”
There are two possible causes. Take following step first. Remove the pipe assembly B from the valve housing, and close the circuit with ST.
ST 926420000 PLUG
Turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion between immediately after and several hours after this operation.

CAUTION:
- **If leakage from “f” is noted again:**

The oil seal of pinion and valve assembly is damaged. Replace pinion and valve assembly with a new one. Or replace the oil seal and the parts that are damaged during disassembly with new ones.
- **If oil stops leaking from “f”:**

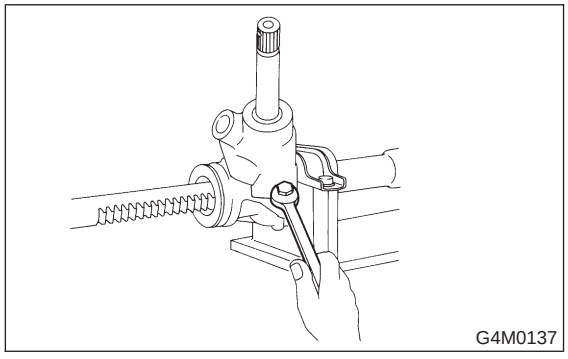
The oil seal of rack housing is damaged. Replace the oil seal and the parts that are damaged during disassembly with new ones.

B: DISASSEMBLY

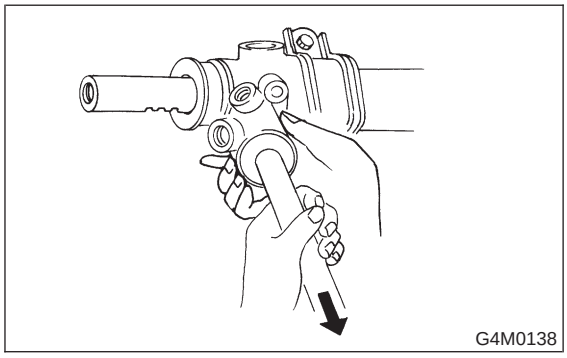
NOTE:
This section focuses on the disassembly and reassembly of control valve. For the inspection and adjustment and the service procedures for associated parts, refer to “Steering Gearbox (Power Steering System) [LHD model]”.
<Ref. to 4-3 [W300].>

1. VALVE ASSEMBLY

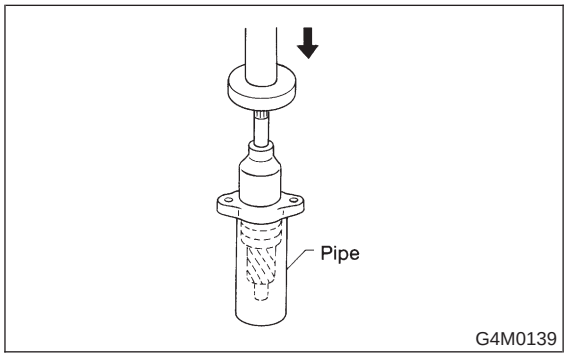
1) Loosen two bolts securing valve assembly.


G4M0137

2) Carefully draw out input shaft and remove valve assembly.


G4M0138

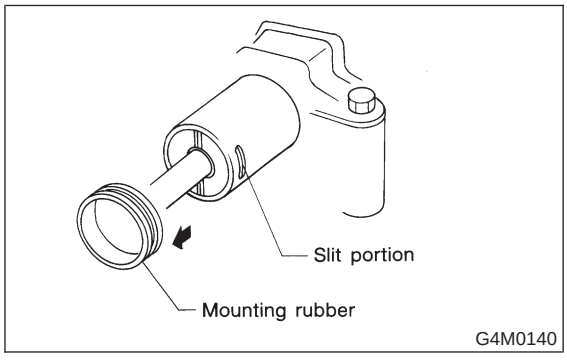
3) Draw out pinion and valve assembly from valve housing, as necessary, using pipe of I.D. 44 to 46 mm (1.73 to 1.81 in) and a press.



G4M0139

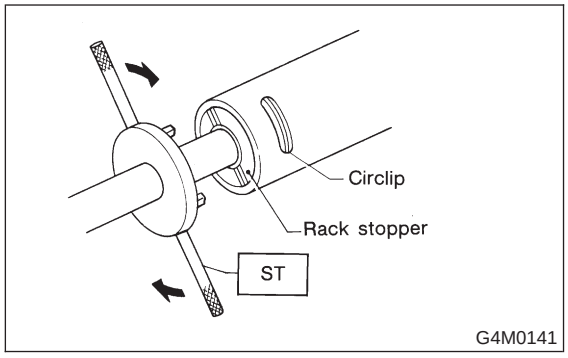
2. RACK ASSEMBLY

1) Slide mounting rubber to expose slit.

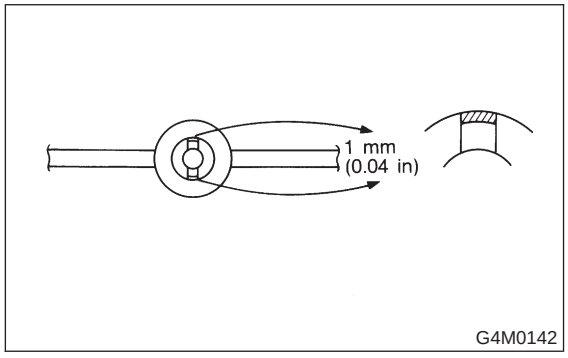


G4M0140

2) Rotate rack stopper in the direction of arrow using ST until the end of circlip comes out of stopper, then rotate it in the opposite direction, and pull out circlip.
ST 926340001 WRENCH

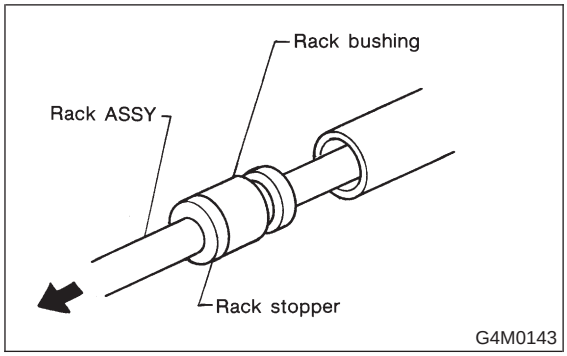


NOTE:
If ST is used, grind area (shown in figure) by 1 mm (0.04 in) in advance.
ST 926340000 WRENCH



3) Pull rack assembly from cylinder side, and draw out rack bushing and rack stopper together with rack assembly.

CAUTION:
Be careful not to contact rack to inner wall of cylinder when drawing out. Any scratch on cylinder inner wall will cause oil leakage.



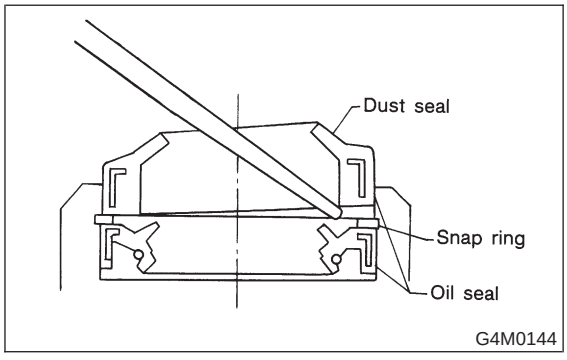
4) Remove rack bushing and rack stopper from rack assembly.

CAUTION:
Do not reuse removed rack bushing and circlip.

C: REPLACEMENT OF SEAL AND PACKING

1. VALVE HOUSING OIL SEAL

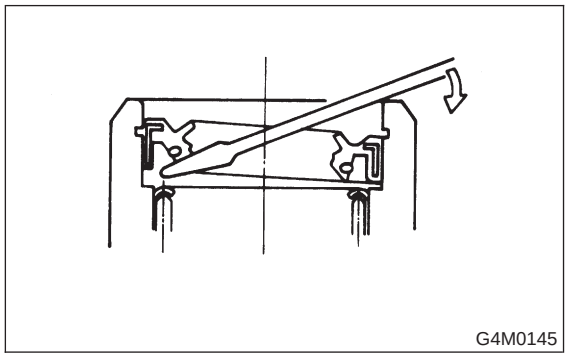
1) Pry off dust seal using screwdriver.



2) Remove snap ring using snap ring pliers.

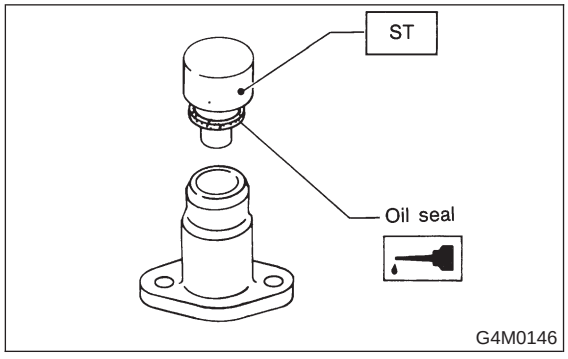
3) Pry off oil seal using screwdriver.

CAUTION:
After removing, check inside surface of valve housing for damage. If oil seal contacting surface is damaged, replace valve housing with a new one.



4) Press-fit oil seal into valve housing using ST and press.
ST 927610000 INSTALLER

NOTE:
Before fitting, coat oil seal fully with specified power steering fluid.



5) Fit snap ring in snap ring groove using snap ring pliers.

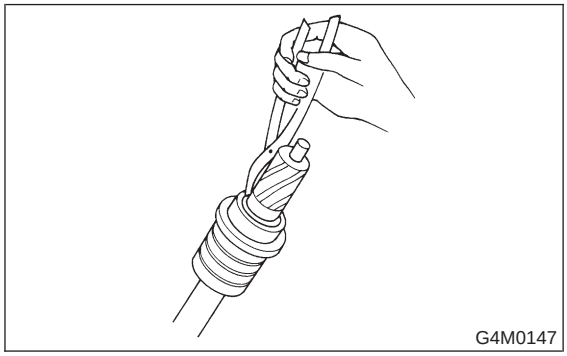
CAUTION:
Be careful not to scratch oil seal with snap ring pliers.

NOTE:
Rotate snap ring to check for proper installation.

2. PINION AND VALVE ASSEMBLY

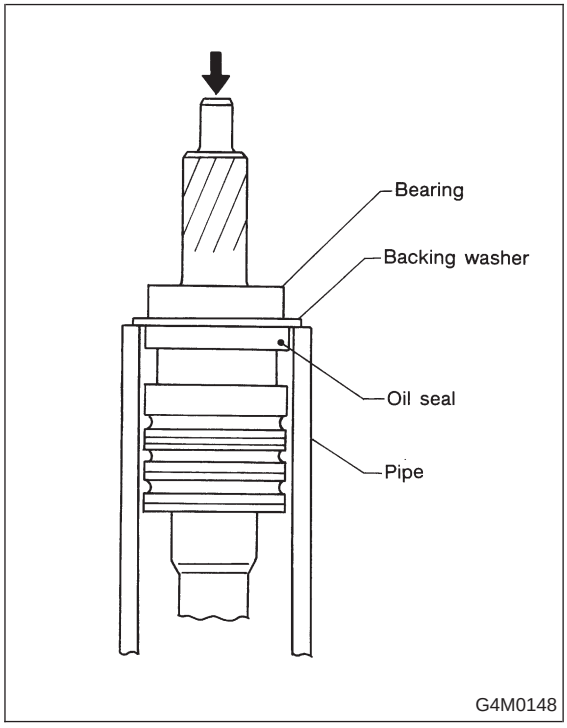
1) Remove snap ring using snap ring pliers.

CAUTION:
- **Do not reuse removed snap ring.**
- **Be careful not to scratch pinion and valve assembly.**



2) Press out bearing together with backing washer using pipe of I.D. 38.5 to 39.5 mm (1.516 to 1.555 in) and press.

CAUTION:
Do not reuse removed bearing.



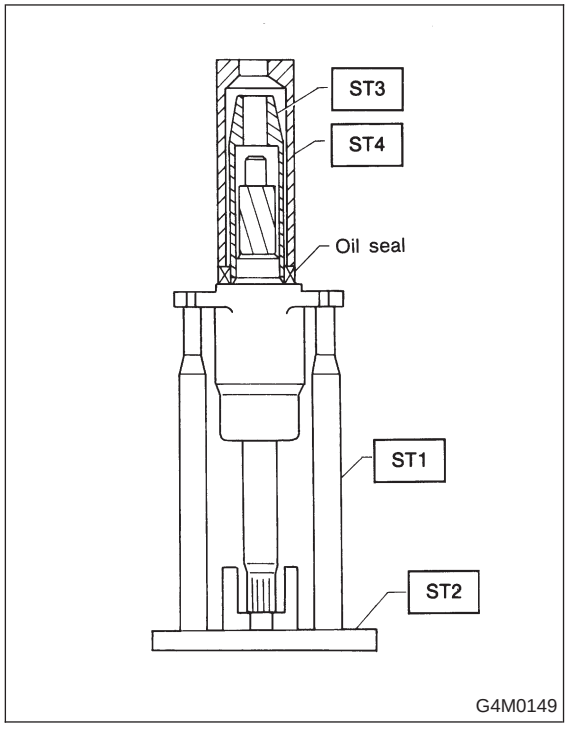
3) Remove oil seal.

CAUTION:
Do not reuse removed oil seal.

4) Fit pinion and valve assembly into valve housing.

NOTE:
Apply specified power steering fluid to outer diameter surface of input shaft and outer surface of valve body seal ring, and pay special attention not to damage seal when inserting pinion and valve assembly.

5) Secure valve assembly to ST1 and ST2.
ST1 926370000 INSTALLER A
ST2 927630000 STAND BASE
ST3 926360000 INSTALLER A
ST4 927620000 INSTALLER B



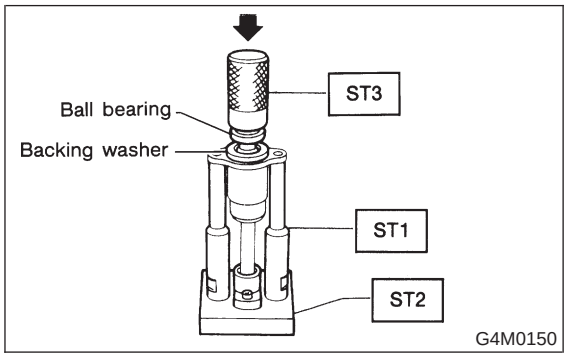
6) Put ST3 over pinion, and insert oil seal, then force-fit oil seal into housing using ST4.

NOTE:
● Apply specified power steering fluid to oil seal and ST3, being careful not to damage oil seal lip.
● Push oil seal until ST3 contacts housing end face.

7) Remove ST3, and fit backing washer.

8) Force-fit ball bearing using ST3.
ST1 926370000 INSTALLER A
ST2 927630000 STAND BASE
ST3 927640000 INSTALLER B

NOTE:
Be careful not to tilt ball bearing during installation.



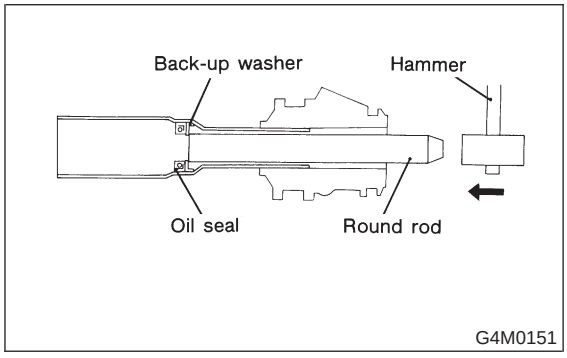
9) Install snap ring using snap ring pliers.

NOTE:
Rotate snap ring to check for proper installation.

3. RACK HOUSING OIL SEAL AND BACK-UP WASHER

1) Insert a round rod [26 — 27 mm (1.02 — 1.06 in) dia.] from pinion housing side and remove oil seal and back-up washer by hammering the rod.

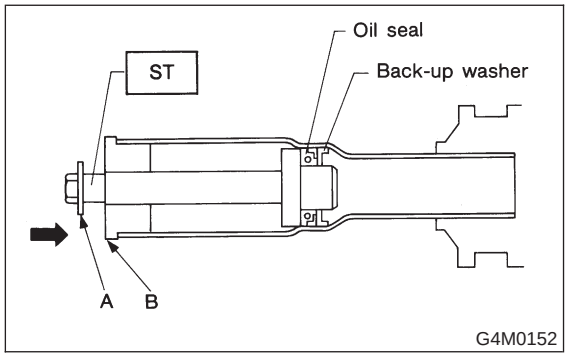
NOTE:
● Discard removed oil seal and back-up washer.
● Apply the unchamfered end of remover to back-up washer.



2) Force-fit oil seal and back-up washer using ST.
ST 927650000 INSTALLER

CAUTION:
Be careful not to damage or scratch cylinder inner wall.

NOTE:
- Apply specified power steering fluid to oil seal.
- Pay special attention not to install back-up washer and oil seal in wrong direction.
- Push oil seal until the stepped portion of A contacts end face of B.



D: ASSEMBLY

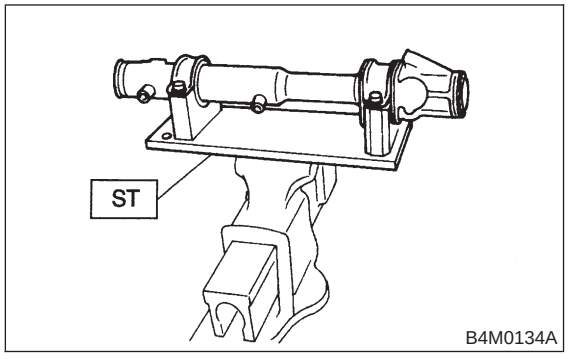
1. RACK ASSEMBLY

CAUTION:
Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:
VALIANT GREASE M2 (Part No. 003608001)

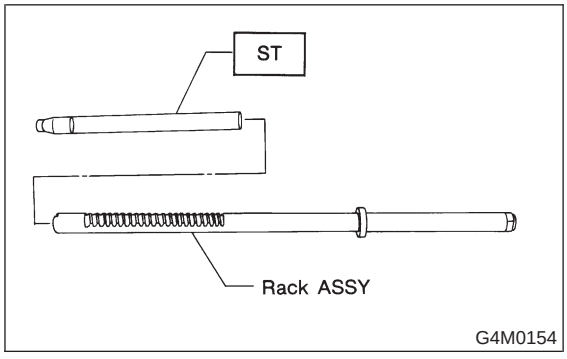
1) Fixing rack housing
Fix rack housing in vice using ST.
ST 926200000 STAND

CAUTION:
- **When fixing rack housing in vice, be sure to use this special tool. Do not fix rack housing in vice using pad such as aluminum plates, etc.**
- **When using old rack housing, be sure to clean and remove rust before assembling. Check pinion housing bushing carefully.**



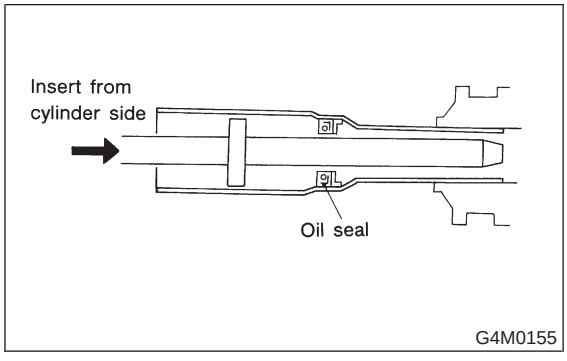
2) Fit ST over toothed portion of rack assembly, and check for binding or unsmooth insertion. If any deformation is noted on flats at the end of rack, shape by using file, and wash with cleaning fluid.
3) Apply genuine grease to teeth of thoroughly washed rack assembly, and fit ST over the toothed portion.
ST 926390001 COVER & REMOVER

CAUTION:
- **Be careful not to block air passage with grease. Remove excessive grease.**
- **After fitting cover, check air passage hole for clogging. If clogged, open by removing grease from the hole.**
- **Check rack shaft for damage.**
- **Apply specified power steering fluid to this ST and surface of piston ring to prevent seal from being damaged.**



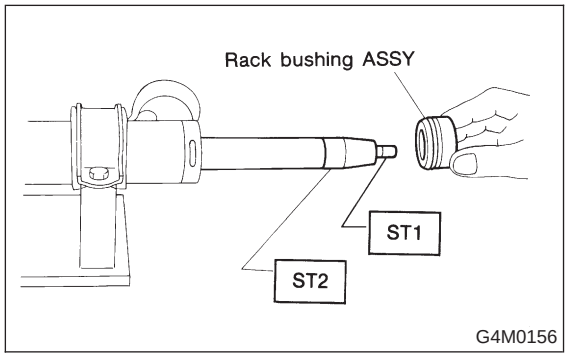
4) Insert rack assembly into rack housing from cylinder side, and remove ST after it has passed completely through oil seal.
ST 926390001 COVER & REMOVER

NOTE:
Before inserting rack assembly, apply a coat of specified power steering fluid to surfaces of ST and rack piston.



5) Fit ST1 and ST2 over the end of rack, and install rack bushing.
ST1 926400000 GUIDE
ST2 927660000 GUIDE

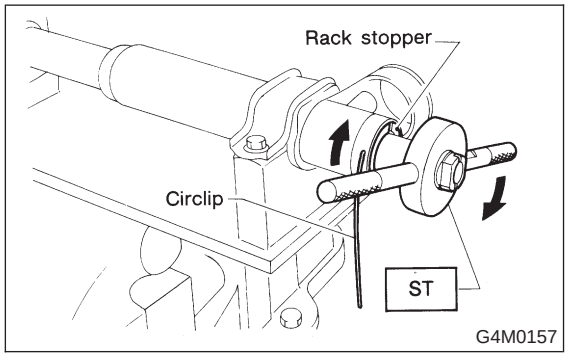
CAUTION:
● If burrs, or nicks are found on this guide and rack shaft portion, remove by filing.
● Dip rack bushing in specified power steering fluid before installing, and pay attention not to damage O-ring and oil seal.



6) Insert rack stopper into cylinder tube until internal groove (on cylinder side) is aligned with external groove (on rack stopper). Turn rack stopper with ST so that rack stopper hole is seen through cylinder slits.
7) Insert rack stopper into rack housing, and wrap circlip using ST to secure rack stopper in position.
ST 926340001 WRENCH

CAUTION:
Be careful not to scratch rack while winding circlip.

NOTE:
Rotate wrench another 90 to 180° after the end of circlip has been wrapped in.



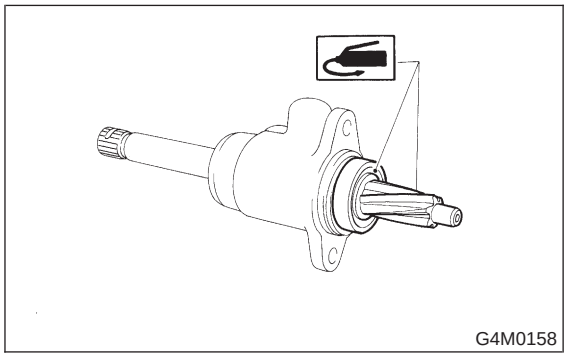
8) Fit mounting rubber onto rack housing.

2. VALVE ASSEMBLY

CAUTION:
Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:
VALIANT GREASE M2 (Part No. 003608001)

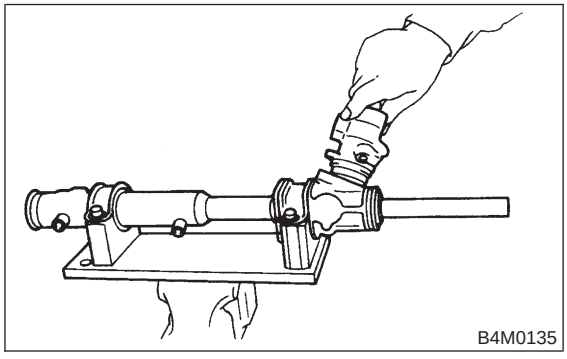
1) Apply genuine grease to pinion gear and bearing of valve assembly.



2) Install packing on valve assembly. Insert valve assembly into place while facing rack teeth toward pinion.

CAUTION:
Be sure to use a new packing.

NOTE:
Do not allow packing to be caught when installing valve assembly.



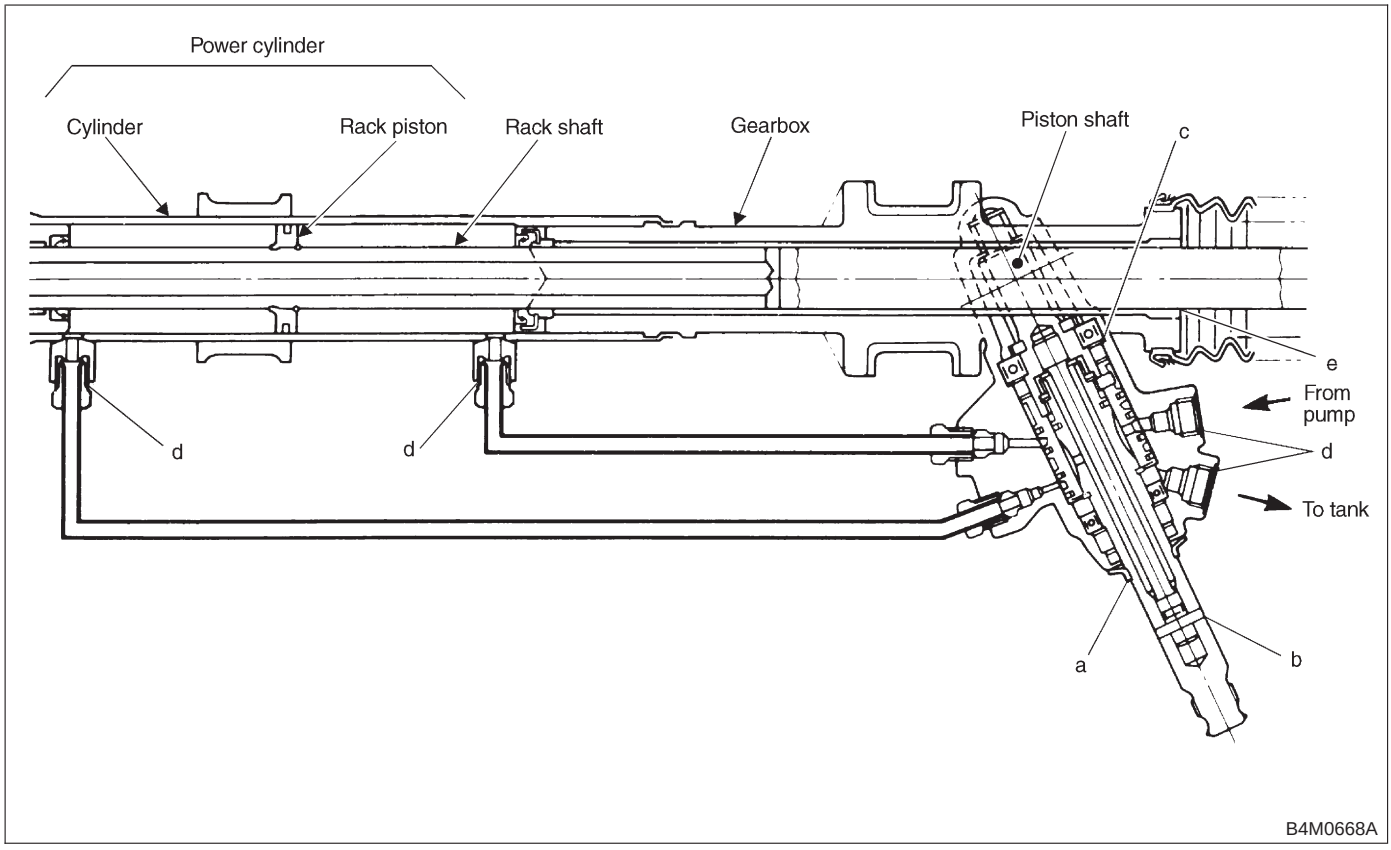
3) Tighten bolts alternately to secure valve assembly.

Tightening torque:
25±5 N·m (2.5±0.5 kg-m, 18.1±3.6 ft-lb)

CAUTION:
Be sure to alternately tighten bolts.

6. Control Valve (Power Steering Gearbox) [RHD model]

A: CHECKING OIL LEAKING POINTS



1. OIL LEAKING POINTS

1) If leak point is other than a, b, c, or d, perform check step 5) in “OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS” before dismounting gearbox from vehicle. <Ref. to 4-3 [W6A2].> If gearbox is dismounted without confirming where the leak is, it must be mounted again to locate the leak point.
2) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the oil from the suspected portion and turn the steering wheel from lock to lock about 30 to 40 times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.
3) Before starting oil leak repair work, be sure to clean the gearbox, hoses, pipes, and surrounding parts. After completing repair work, clean these areas again.

2. OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS

NOTE:
Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also be prepared. However, it is essential to pinpoint the cause of trouble, and limit the number of replacement parts as much as possible.

1) Leakage from “a”
The oil seal is damaged. Replace valve assembly with a new one.
2) Leakage from “b”
The torsion bar O-ring is damaged. Replace valve assembly with a new one.
3) Leakage from “c”
The oil seal is damaged. Replace valve assembly with a new one.
4) Leakage from “d”
The pipe is damaged. Replace the faulty pipe or O-ring.
5) If leak is other than a, b, c, or d, and if oil is leaking from the gearbox, move the right and left

boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove oil from the surrounding portions. Then, turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion immediately after and several hours after this operation.

6) Leakage from “e”

There are two possible causes. Take following step first. Remove the pipe assembly B from the valve housing, and close the circuit with ST.

ST 926420000 PLUG

Turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion between immediately after and several hours after this operation.

CAUTION:

● If leakage from “e” is noted again:

The oil seal of pinion and valve assembly is damaged. Replace pinion and valve assembly with a new one. Or replace the oil seal and the parts that are damaged during disassembly with new ones.

● If oil stops leaking from “e”:

The oil seal of rack housing is damaged. Replace the oil seal and the parts that are damaged during disassembly with new ones.

B: DISASSEMBLY

NOTE:

This section focuses on the disassembly and reassembly of control valve. For the inspection and adjustment and the service procedures for associated parts, refer to “Steering Gearbox (Power Steering System) [RHD model]”. <Ref. to 4-3 [W400].>

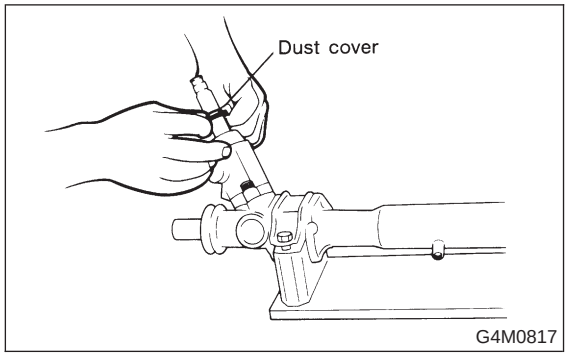
1. VALVE ASSEMBLY

1) Slide dust cover out.

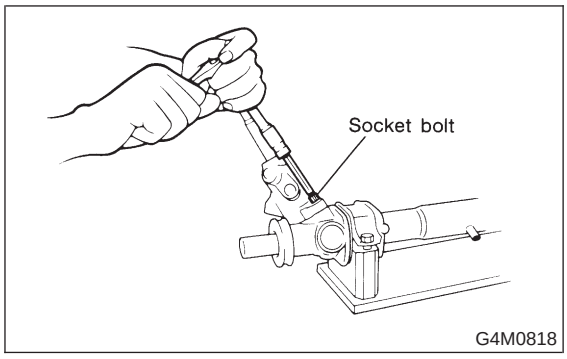
CAUTION:

● Be careful not to scratch housing or input shaft during dust cover removal. Also do not allow foreign matter to enter housing interior.

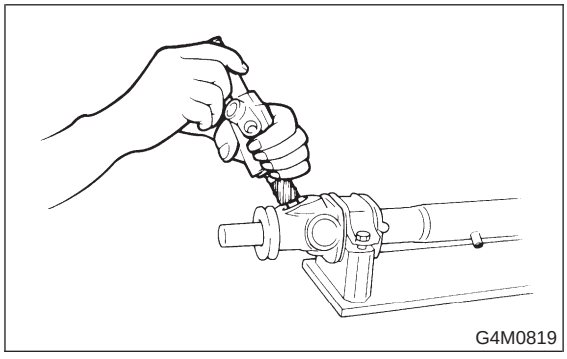
● Replace dust cover with a new one if its inside bore or lips are worn or damaged.



2) Remove the two bolts securing valve housing.



3) Remove valve housing, pinion and valve as a unit.

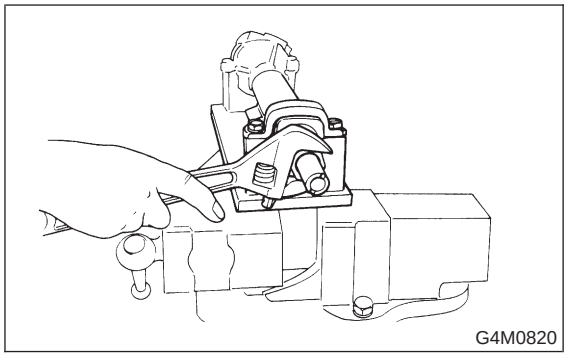


2. RACK ASSEMBLY

1) Remove holder using a 32 mm (1.26 in) wrench or adjustable wrench.

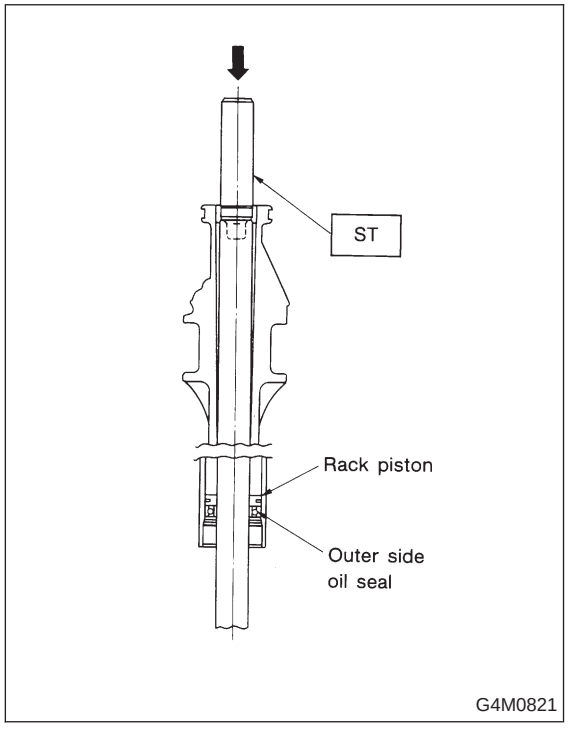
CAUTION:

Discard old holder and replace with new one.



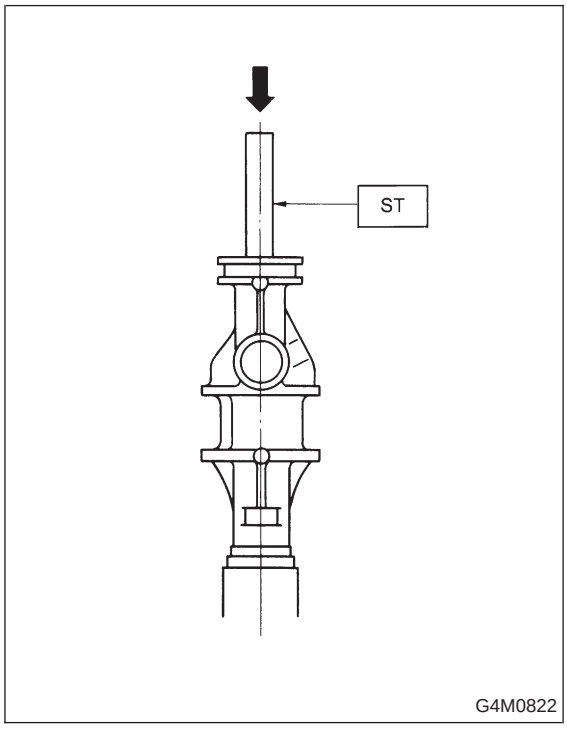
2) Install ST on valve side of rack and press outer side oil seal out.
ST 34099FA030 INSTALLER & REMOVER

CAUTION:
● Block pipe connection of steering body to prevent fluid from flowing out.
● Do not allow rack to come in contact with inner wall of cylinder. Otherwise, cylinder wall may be scratched, resulting in oil leaks.
● Remove holder and rack as a unit.
● Check rack and steering body for bends or cracks and replace as required.
● Discard oil seal after removal and replace with new ones.

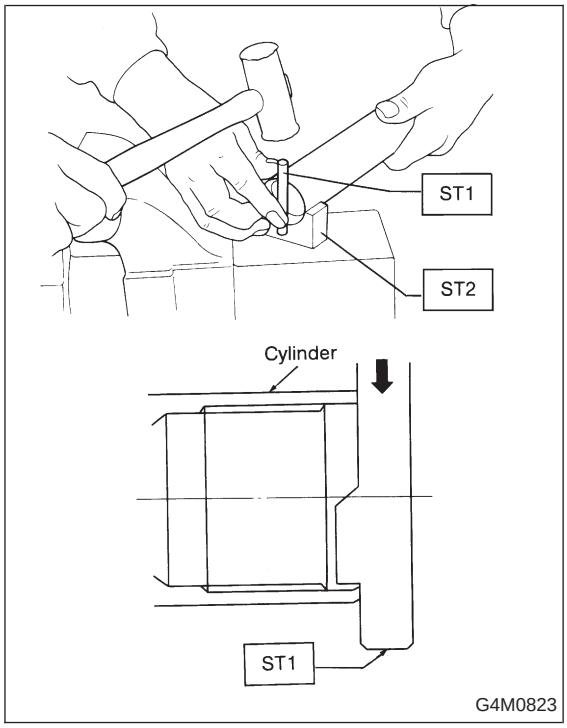


3) Insert ST from valve side and press back-up ring and oil seal out.
ST 927580000 REMOVER

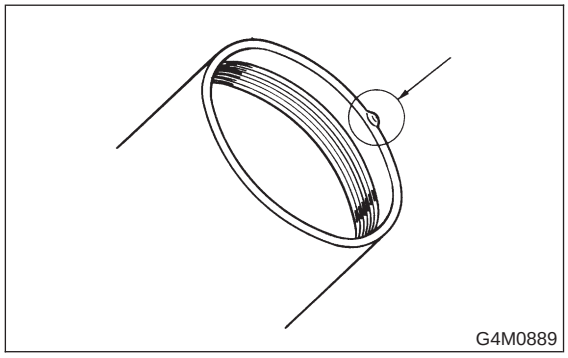
CAUTION:
Discard back-up ring and oil seal after removal and replace with new ones.



4) Using ST1 and ST2, repair cylinder's clinched sections.
ST1 34099FA080 PUNCH
ST2 34099FA070 BASE



5) If cylinder edge is deformed in a convex shape, repair using an oil stone.



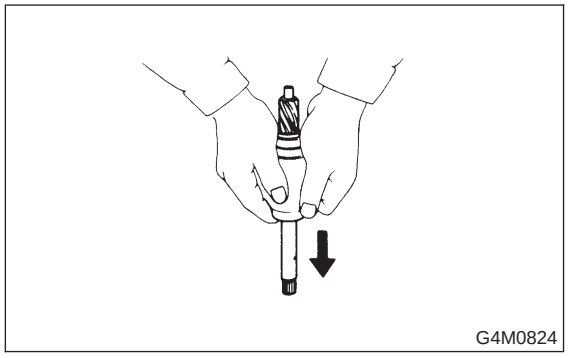
C: REPLACEMENT OF SEAL AND PACKING

1. VALVE HOUSING OIL SEAL

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

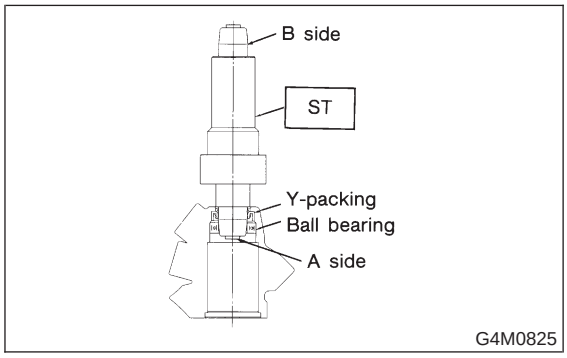
1) After removing dust cover, extract pinion and valve from valve housing.

CAUTION:
- **If pinion and valve is difficult to remove, use a press.**
- **Discard Y-packing after removal and replace with a new one.**
- **Check rotor for bends and serrations for damage and replace as required.**

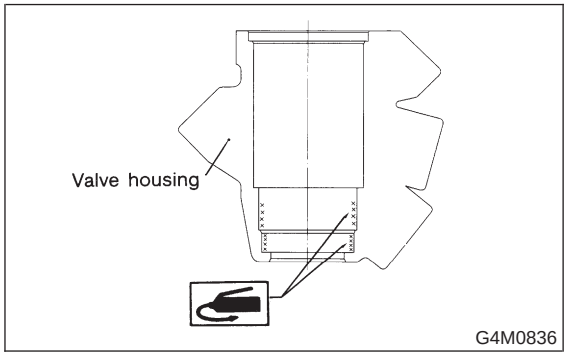


2) Using ST and press, remove dust seal, back-up washer, Y-packing and ball bearing from valve housing.
ST 34099FA000 INSTALLER & REMOVER

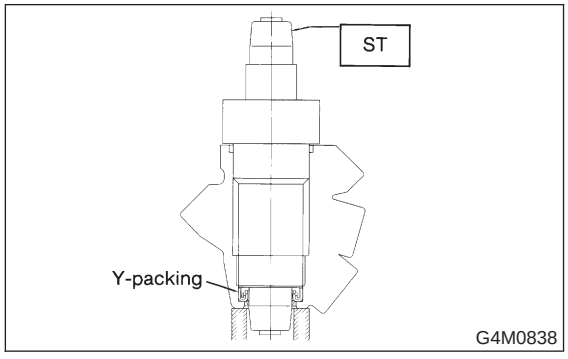
CAUTION:
- **Use the "A" end of remover.**
- **Do not apply a force to end surface of valve housing.**
- **Do not reuse Y-packing after removal.**



3) Apply a coat of grease to inner wall of valve housing, Y-packing and outer perimeter of dust seal.

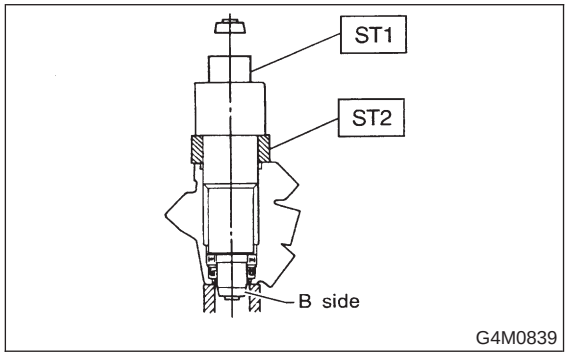


4) Using ST and press, install Y-packing in valve housing.
ST 34099FA000 INSTALLER & REMOVER
(1) Face Y-packing in the direction shown in figure when installing.
(2) To avoid scratching Y-packing, apply a coat of grease to contact surface of installer and Y-packing.
(3) To facilitate installation, attach Y-packing to installer and position in valve housing before pressing into place.

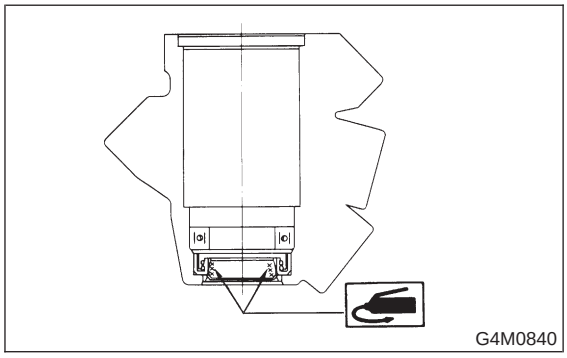


5) Attach ST2 to ST1, and press ball bearing into place using a press.
ST1 34099FA000 INSTALLER & REMOVER
ST2 34099FA050 SPACER

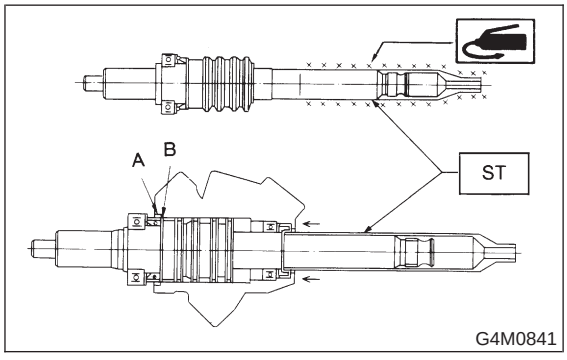
NOTE:
● To facilitate installation, attach ball bearing to remover and position in valve housing before pressing it into place.
● Use the “B” end of remover.



6) Charge Y-packing with specified steering grease.

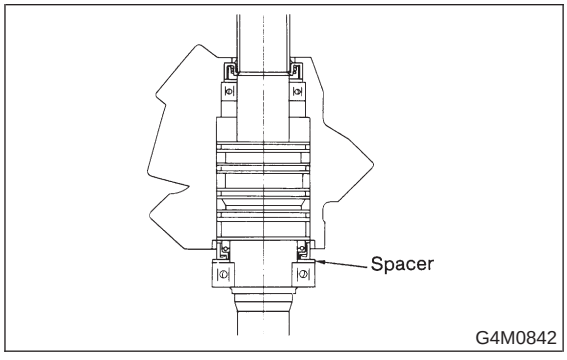


7) Apply a coat of specified steering grease to ST surface, and install ST onto end of input shaft. Insert pinion and valve until “A” of oil seal contacts “B” of valve housing. The ST is used to prevent scratching Y-packing.
ST 34099FA020 GUIDE

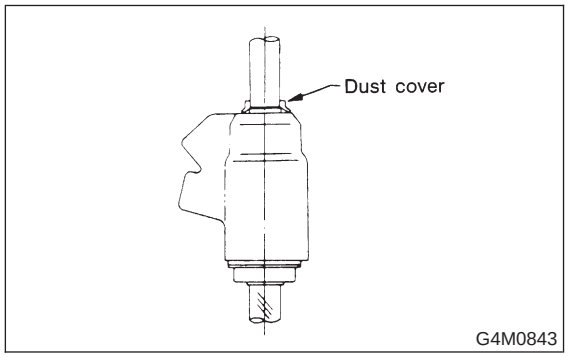


8) While supporting pinion and valve, push end of pinion until bearing contacts brazed end of valve housing.

CAUTION:
Do not allow spacer to extend beyond brazed end. Otherwise, pinion cannot be inserted properly.



9) Apply a coat of grease to sealing lips of dust cover, and insert dust cover until it contacts staged portion of input shaft.



10) Adjust sealing lip-to-housing end clearance to 0 to 0.5 mm (0 to 0.020 in). If sealing lip is too close to housing end, steering wheel will not return smoothly; if it is too far from housing end, dust or dirt will enter the clearance.

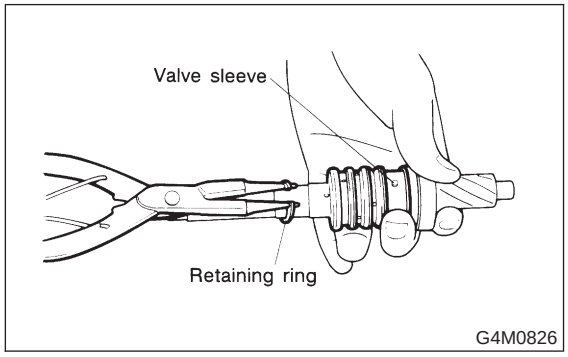
NOTE:
Ensure that pinion and valve is properly positioned in valve housing before adjustment.

2. PINION AND VALVE ASSEMBLY

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

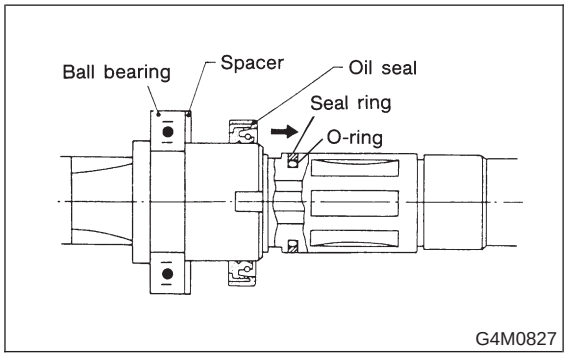
1) Remove snap ring securing valve sleeve to pinion and valve, and remove valve sleeve.

CAUTION:
Be careful not to scratch pinion and valve when removing snap ring.

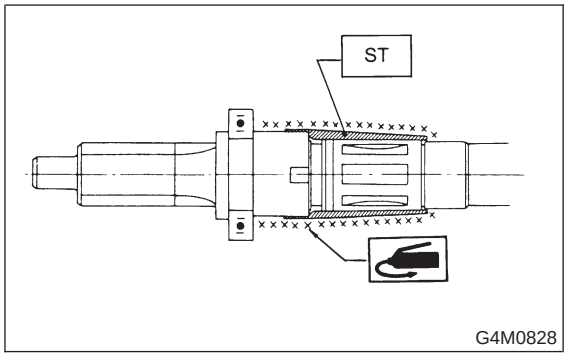


2) Remove oil seal and spacer.
3) Using a long rod, remove seal ring and O-ring from pinion.

CAUTION:
Be careful not to scratch outer surface and seal ring groove of input shaft. If scratched, sealing effect will be lost, resulting in a malfunctioning valve.

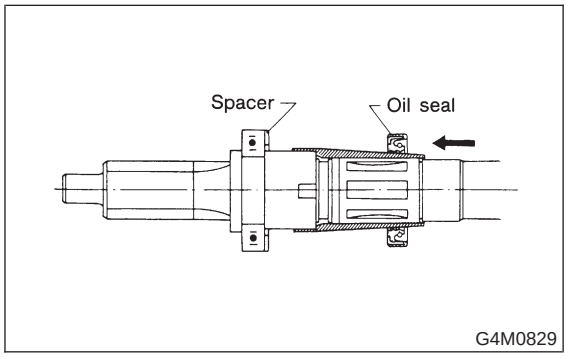


4) Wash and clean pinion & valve and valve housing.
5) Attach ST to pinion, and apply grease to outer perimeter of the cover and mating surface of oil seal.
ST 926270000 COVER



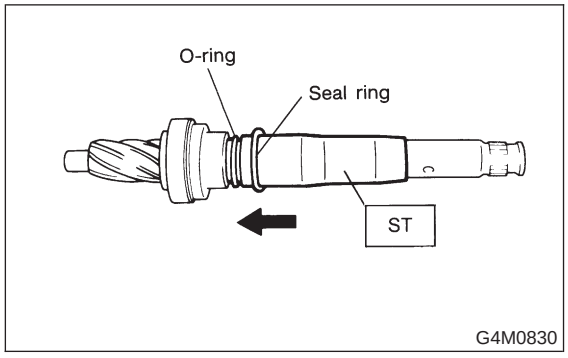
6) Apply a coat of grease to spacer and sealing lips of oil seal, and install spacer and oil seal.

CAUTION:
- **Face chamfered side of spacer toward oil seal.**
- **Face oil seal in correct direction.**

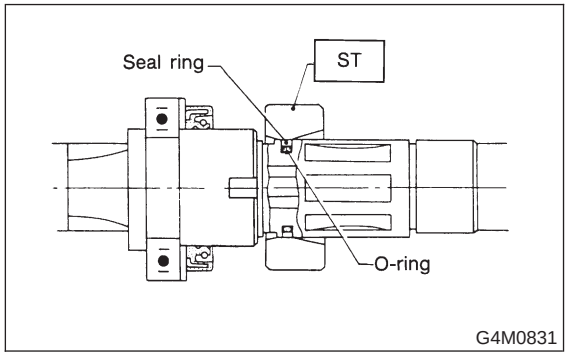


7) Install ST to input shaft, and apply a coat of grease to the cover surface. Install O-ring and seal ring.
ST 926450000 COVER

CAUTION:
Do not expand O-ring and seal ring more than necessary.

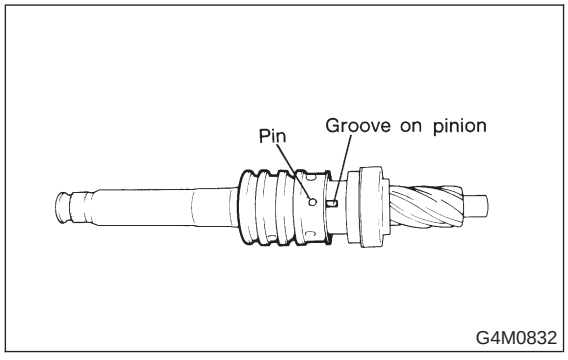


8) Apply a coat of grease to inner wall of ST, and secure seal ring assembled in former step as shown. Leave seal ring unattended for approximately 10 minutes until it settles down.
ST 926280000 FORMER



9) While aligning valve sleeve pin with groove on pinion, secure with snap ring.

CAUTION:
● Be careful not to damage inner wall of valve sleeve and contact surface of pinion.
● Before assembling valve sleeve and pinion, clean in kerosene and dry with compressed air.

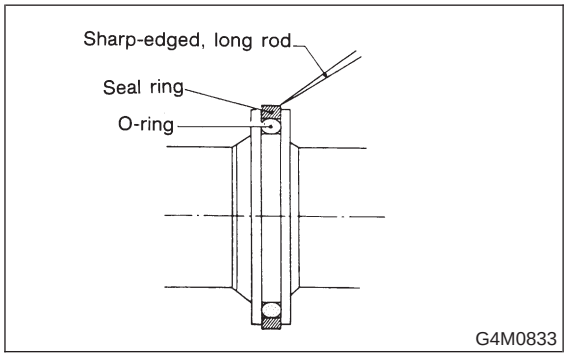


3. RACK PISTON SEAL RING AND O-RING

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

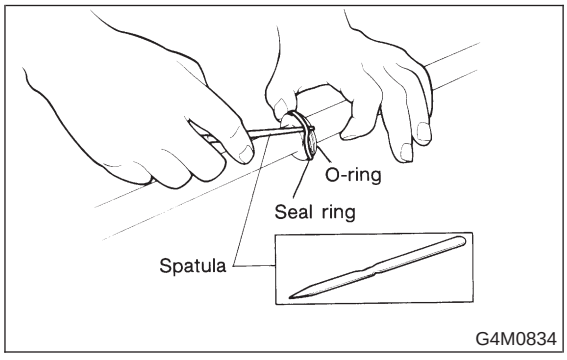
1) Using a sharp-edged, long rod, remove seal ring and O-ring from rack piston.

CAUTION:
Be careful not to scratch outer surface of rack piston and seal ring groove. A scratch may reduce the sealing effect, resulting in faulty piston operation.



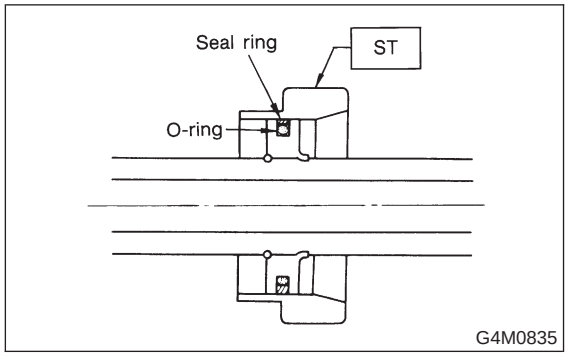
2) Wash clean rack piston.
3) Install O-ring and seal ring in groove on rack piston.

CAUTION:
● Do not expand O-ring and seal ring more than necessary.
● To facilitate installation of seal ring, first position one half of entire seal ring in groove. Then slowly position the second half using a spatula, as shown.



4) Apply a coat of grease to inner surface of ST and insert rack piston into it. Leave ST at least 10 minutes until seal ring settles down in place.
ST 927600000 FORMER

CAUTION:
Be careful not to scratch rack, piston and seal ring during installation.



D: ASSEMBLY

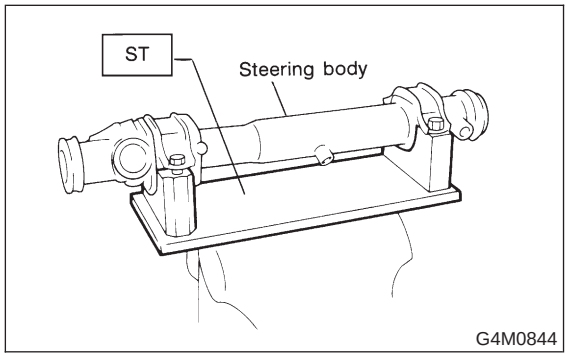
1. RACK ASSEMBLY

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

1) Attach steering body to ST as shown. Apply a coat of grease to needle bearing.
ST 926200000 STAND

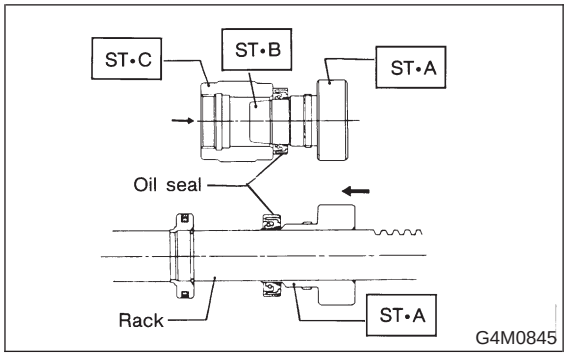
CAUTION:
- **Use a ST to support steering body.**
- **Ensure that needle bearing is free from defects. If it is faulty, replace steering body with a new one.**

NOTE:
If steering body is removed from vehicle, be sure to remove rust and clean.

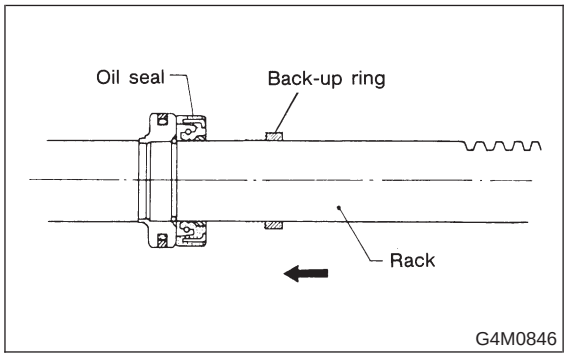


2) Using ST·B and ST·C, attach oil seal to ST·A. Insert ST·A into rack from gear side. Remove oil seal from ST·A when it approaches piston and remove STs from rack.
ST 927490000 INSTALLER; A·B·C

NOTE:
Face oil seal in the direction shown in figure.

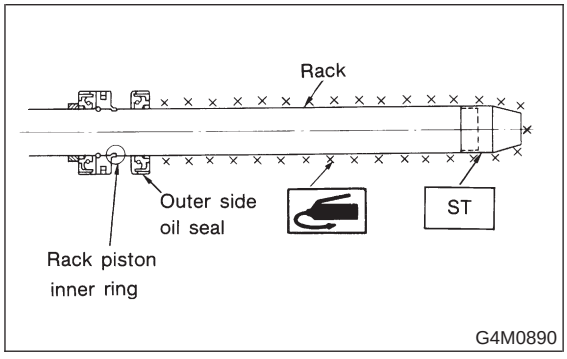


3) Install back-up ring from gear side of rack.



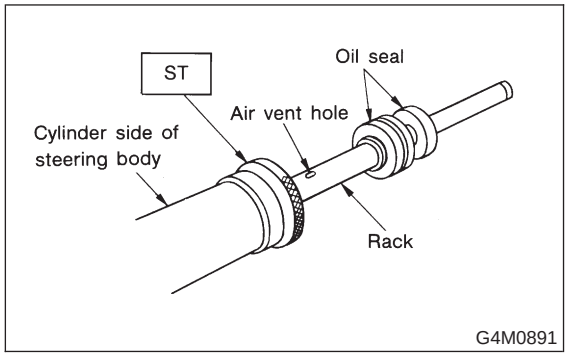
4) Install ST on rack and equally apply a thin coat of grease to rack and ST, then install oil seal.
ST 926250000 GUIDE

CAUTION:
Be careful not to scratch oil seal lips with piston's knurl section.



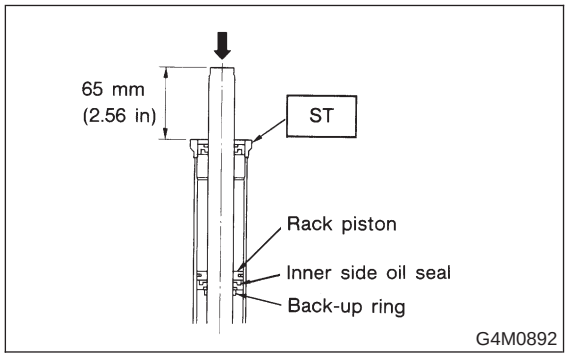
5) Apply a coat of grease to grooves in rack, sliding surface of sleeve and sealing surface of piston. Install ST on the end of steering body cylinder. Then insert rack into steering body from cylinder side.
ST 34099FA010 GUIDE (Oil seal)

CAUTION:
● Be sure to apply grease so that it covers the entire surface of rack gear teeth.
● Do not allow grease to block air vent hole on rack.

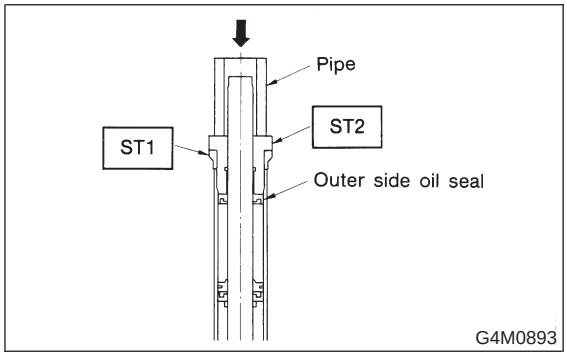


6) Slowly press inner side oil seal until distance between ST and end of rack is 65 mm (2.56 in).
ST 34099FA010 GUIDE (Oil seal)

CAUTION:
Ensure ST's inner wall is free of scratches. Otherwise, it may damage oil seal during installation.

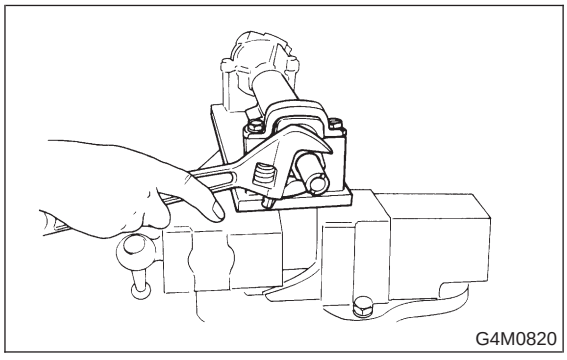


7) Pass ST2 and pipe through rack and press outer side oil seal until ST1 is in contact with ST2.
ST1 34099FA010 GUIDE (Oil seal)
ST2 34099FA040 INSTALLER (Oil seal)



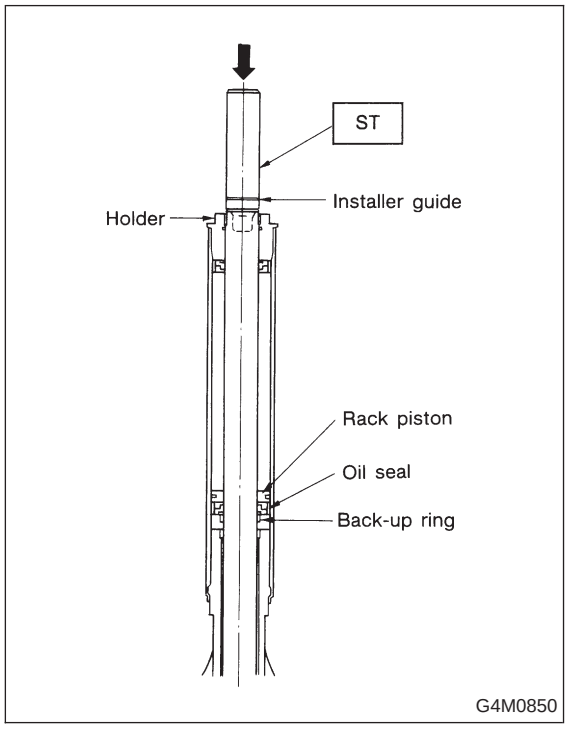
8) Install holder from cylinder side of steering body.

Tightening torque:
64±5 N·m (6.5±0.5 kg-m, 47.0±3.6 ft-lb)



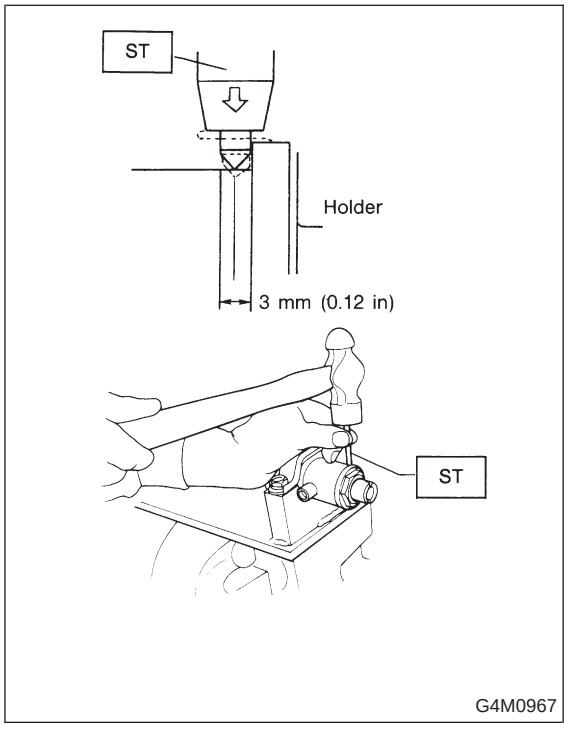
9) Attach ST to rack cylinder. Using a press, install back-up ring and oil seal.
ST 34099FA030 INSTALLER & REMOVER

NOTE:
Press ST until its groove is aligned with end of holder.



10) Using ST, clinch steering body cylinder at a point less than 3 mm (0.12 in) from holder.
ST 34099FA060 PUNCH HOLDER

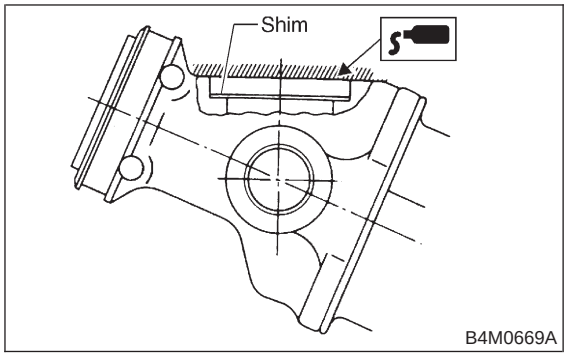
CAUTION:
Be careful not to deform holder.



2. VALVE ASSEMBLY

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

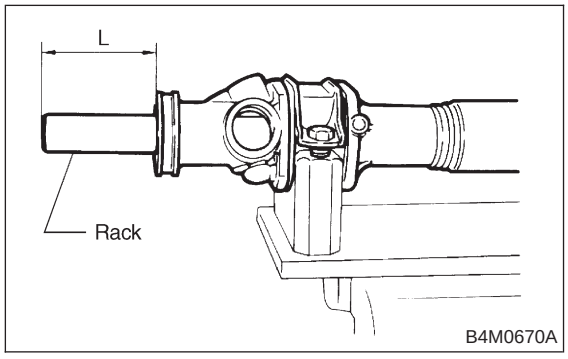
1) Remove traces of sealer, oil, rust, etc., from mating surfaces of valve housing and steering body.
2) Position a shim in graded portion of steering body pinion housing, and apply an even coat of sealer (Fuji Bond C: 004403004 or three bond 1105 (00440310) or equivalent) to end of pinion housing.



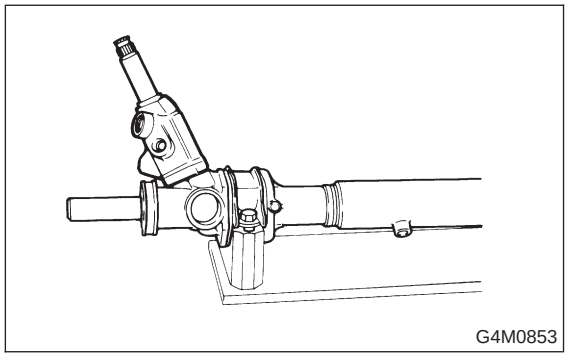
3) Use the same number of shims as that used when steering body was removed.

4) If steering body, valve housing or pinion and valve is replaced with a new one, add two or three shims, install valve on pinion housing and tighten with two bolts to 25±5 N·m (2.5±0.5 kg-m, 18.1±3.6 ft-lb). Then, measure clearance between steering body and valve housing using a thickness gauge. Remove shims so that the clearance is zero.
5) Extend rack "L" beyond pinion side of steering body.

L: 70.8 mm (2.787 in)



6) Apply grease to pinion gear teeth and ball bearing. Insert valve into place.



7) Alternately and slowly tighten socket bolts.

NOTE:
Replace faulty parts before installing valve. Otherwise, valve may not be installed properly.

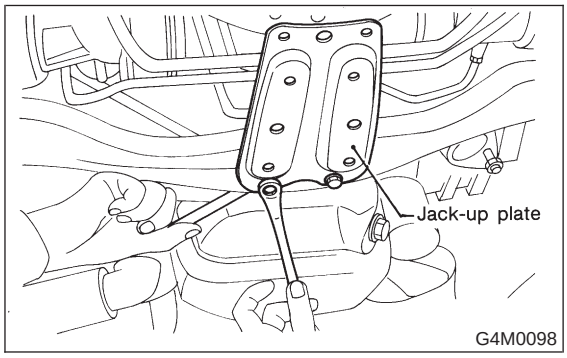
Tightening torque:
25±5 N·m (2.5±0.5 kg-m, 18.1±3.6 ft-lb)

7. Pipe Assembly (Power Steering System)

A: REMOVAL

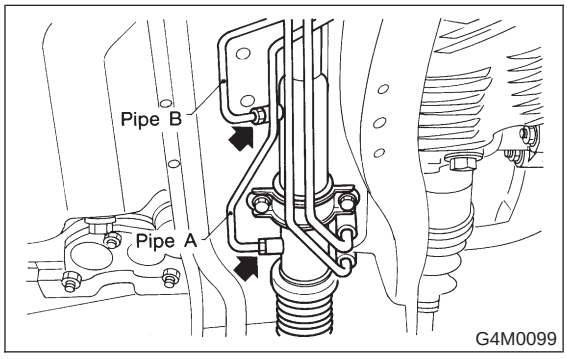
1. LHD MODEL

1) Disconnect battery minus terminal.
2) Lift vehicle and remove jack-up plate.

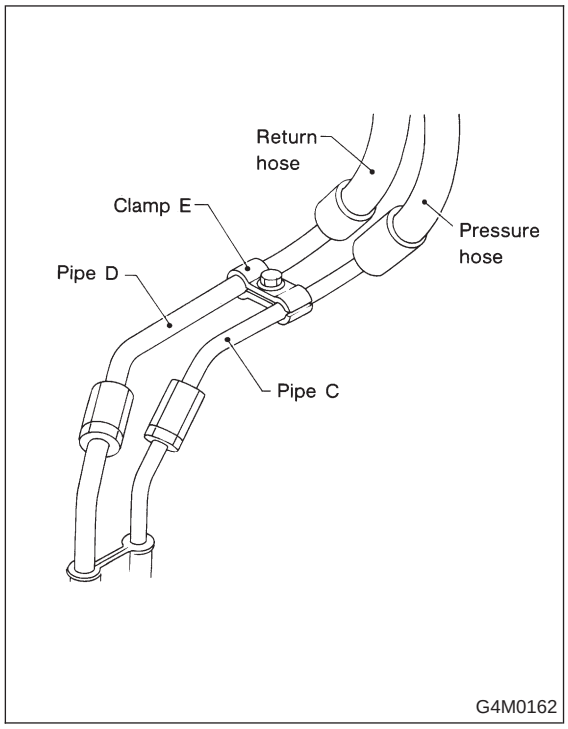


3) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.

CAUTION:
Improper removal and installation of parts often causes fluid leak trouble. To prevent this, clean the surrounding portions before disassembly and reassembly, and pay special attention to keep dirt and other foreign matter from mating surfaces.

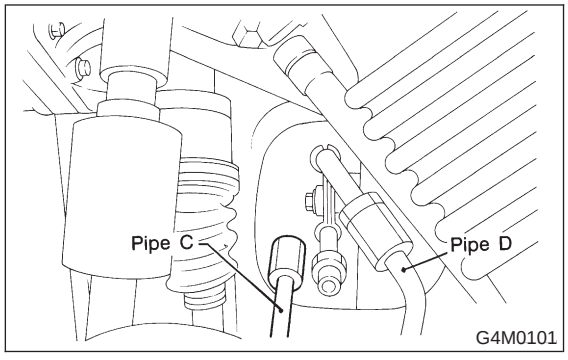


4) Remove clamp E from pipes C and D.



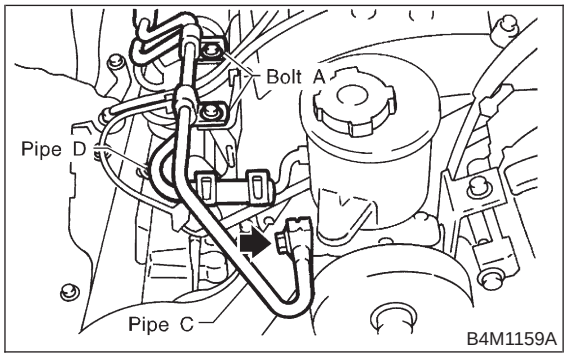
5) Disconnect pipe C·D from pipe (on the gearbox side).

CAUTION:
● When disconnecting pipe C·D, use two wrenches to prevent deformities.
● Be careful to keep pipe connections free from foreign matter.



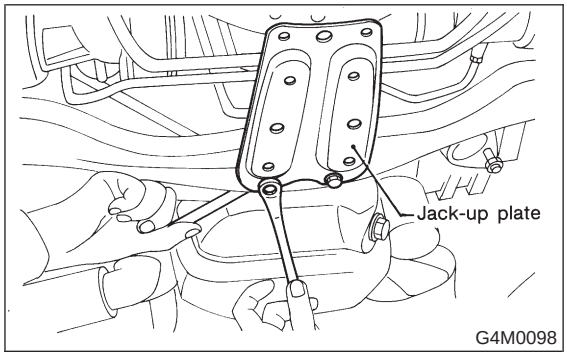
6) Remove bolt A.
Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

CAUTION:
● Do not allow fluid from the hose end to come into contact with pulley belt.
● To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



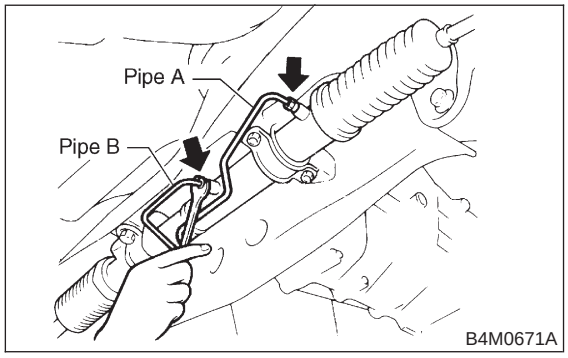
2. RHD MODEL

1) Disconnect battery negative terminal.
2) Lift vehicle and remove jack-up plate.

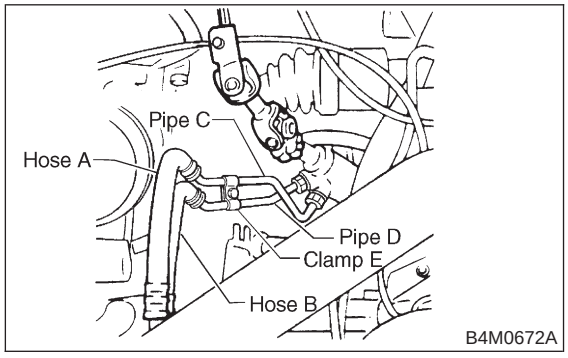


3) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.

CAUTION:
Improper removal and installation of parts often causes fluid leak trouble. To prevent this, clean the surrounding portions before disassembly and reassembly, and pay special attention to keep dirt and other foreign matter from mating surfaces.



4) Remove clamp E from pipes C and D.

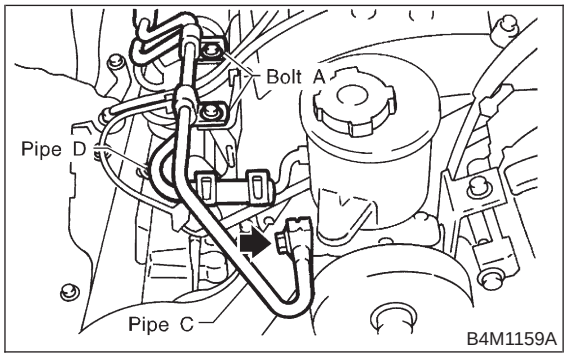


5) Remove flare nuts from control valve of gearbox assembly, and then disconnect pipe C·D.

CAUTION:
● When disconnecting pipe C·D, use two wrenches to prevent deformities.
● Be careful to keep pipe connections free from foreign matter.

6) Remove bolt A.
Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

CAUTION:
● Do not allow fluid from the hose end to come into contact with pulley belt.
● To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



B: CHECK

Check all disassembled parts for wear, damage or other abnormalities. Repair or replace faulty parts as required.

Part name	Inspection	Remedy
Pipe	● O-ring fitting surface for damage ● Nut for damage ● Pipe for damage	Replace with new one.
Clamp Clamp E	● Clamps for weak clamping force	Replace with new one.
Hose	● Flared surface for damage ● Flare nut for damage ● Outer surface for cracks ● Outer surface for wear ● Clip for damage ● End coupling or adapter for degradation	Replace with new one.

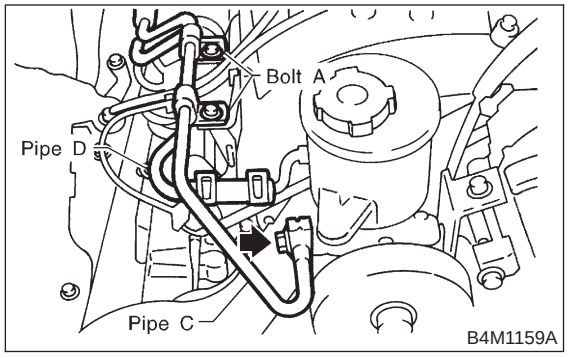
C: INSTALLATION

1. LHD MODEL

1) Interconnect pipes C and D.

Tightening torque:
Joint nut
15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

CAUTION:
Visually check that hose between tank and pipe D is free from bending or twisting.



2) Connect pipe D from oil tank.
3) Connect pipe C from oil pump.

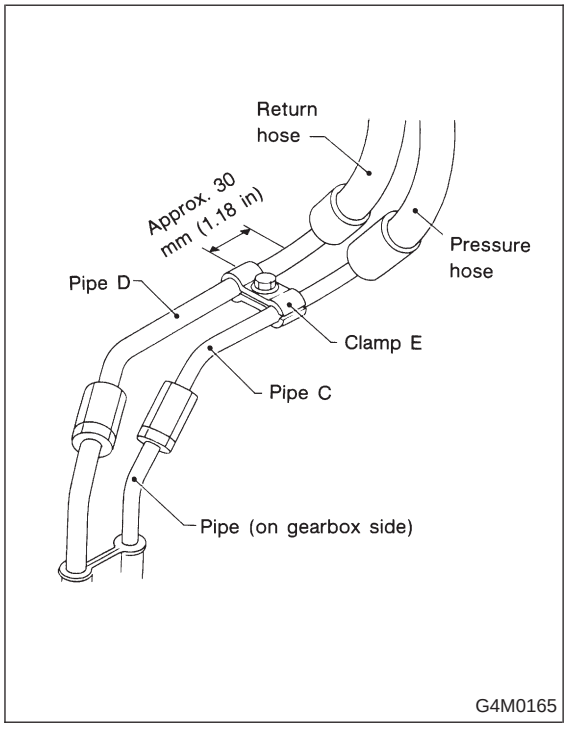
CAUTION:
Use a new gasket.

Tightening torque:
34±5 N·m (3.5±0.5 kg-m, 25.3±3.6 ft-lb)

4) Tighten bolt A.

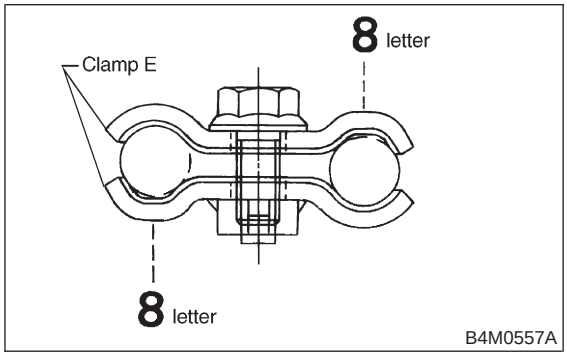
Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)

5) Temporarily connect pipes C and D to pipes (on the gearbox side).



6) Temporarily install clamp E on pipes C and D.

CAUTION:
Ensure that the letter “8” on each clamp side are diagonally opposite each other as shown in the figure.



7) Tighten clamp E firmly.

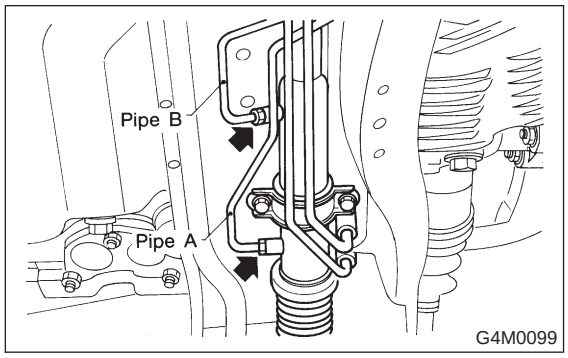
Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)

8) Tighten joint nut.

Tightening torque:
15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

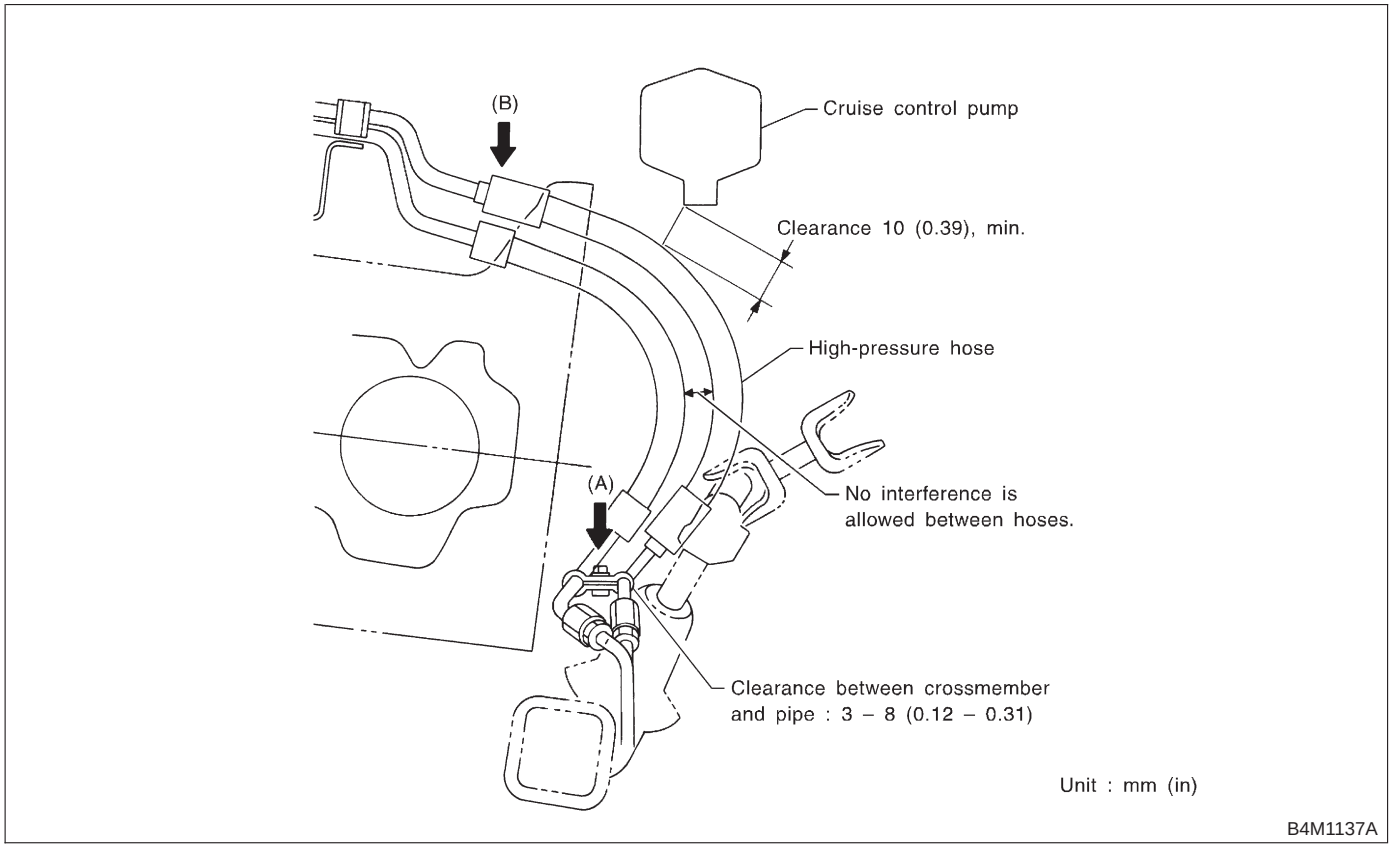
9) Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A second.

Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)



10) Install jack-up plate.
11) Connect battery minus terminal.
12) Feed the specified fluid and discharge air.

NOTE:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.



13) Finally check clearance between pipes and/or hoses, as shown above.
If clearance between cruise control pump and power steering hose is less than 10 mm (0.39 in), proceed as follows:

(1) Move clamped section (A) (refer to figure above.) down to a point where pipe is close to crossmember.

Pipe-to-crossmember clearance:
10 mm (0.39 in), min.

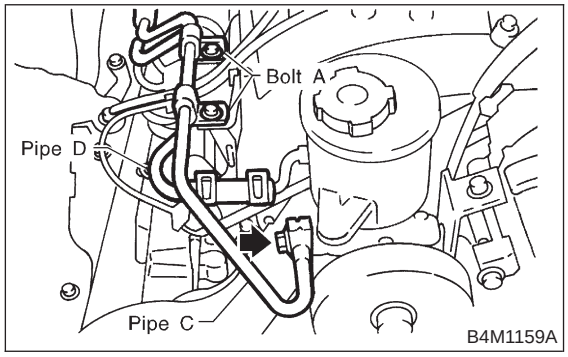
(2) Check that clearance between cruise control pump and power steering hose is at least 10 mm (0.39 in). If it is not, bend section (B) down until a clearance of at least 10 mm (0.39 in) is obtained.

2. RHD MODEL

1) Interconnect pipes C and D.

Tightening torque:
Joint nut
15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

CAUTION:
Visually check that hose between tank and pipe D is free from bending or twisting.



2) Connect pipe D from oil tank.
3) Connect pipe C from oil pump.

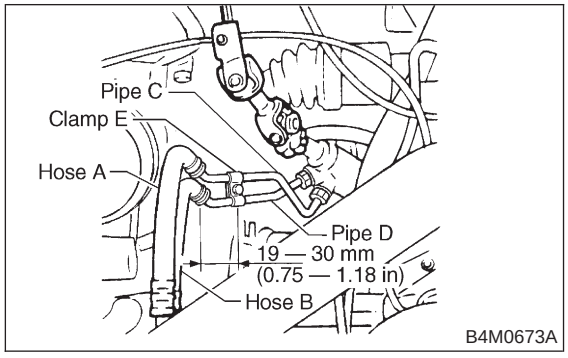
CAUTION:
Use a new gasket.

Tightening torque:
34±5 N·m (3.5±0.5 kg-m, 25.3±3.6 ft-lb)

4) Tighten bolt A.

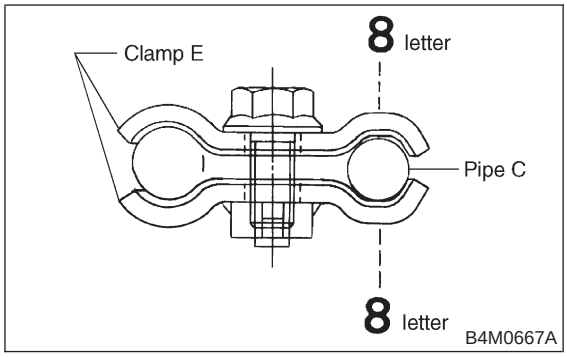
Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)

5) Temporarily connect pipes C and D to control valve of gearbox.



6) Temporarily install clamp E on pipes C and D.

CAUTION:
Ensure that the letter "8" side of clamp E is on the pipe C side as shown in the figure.



7) Tighten clamp E firmly.

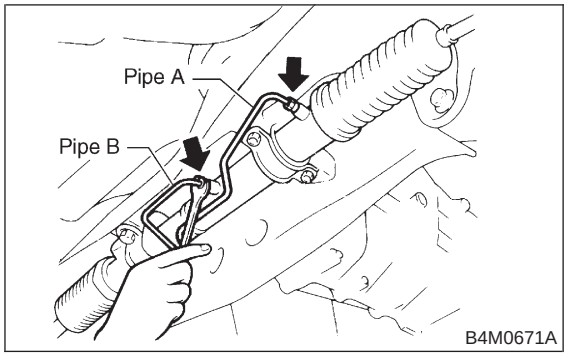
Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)

8) Tighten joint nut.

Tightening torque:
15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

9) Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe A first, and lower pipe B second.

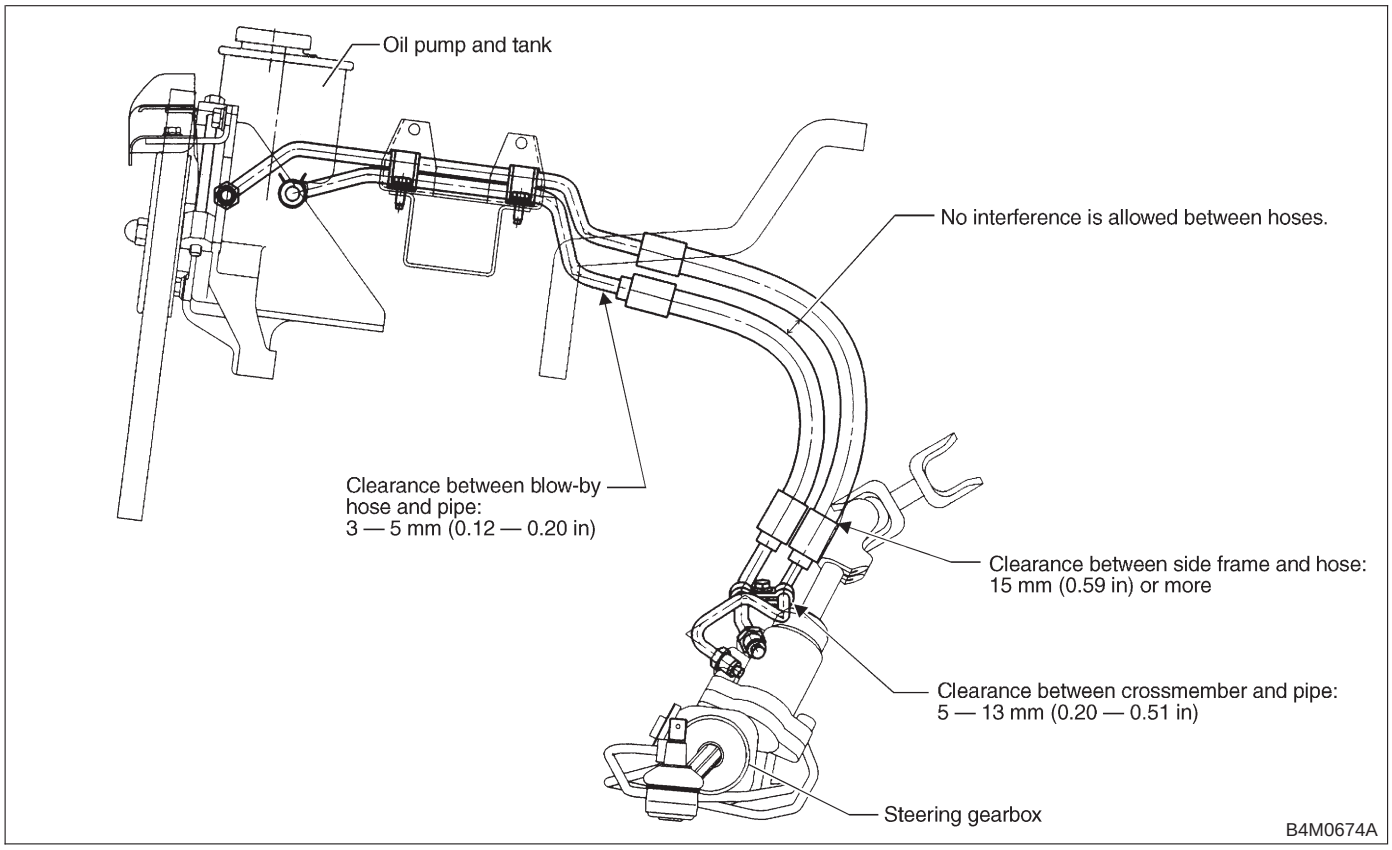
Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)



10) Install jack-up plate.
11) Connect battery negative terminal.

12) Feed the specified fluid and discharge air.

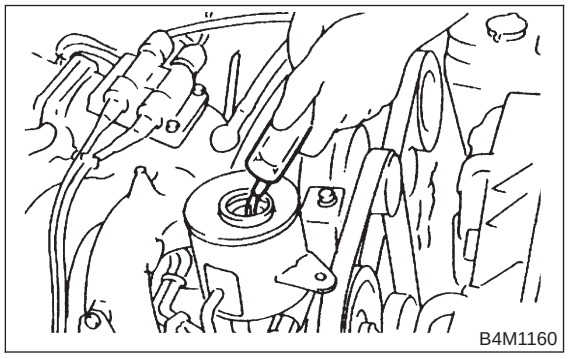
NOTE:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.



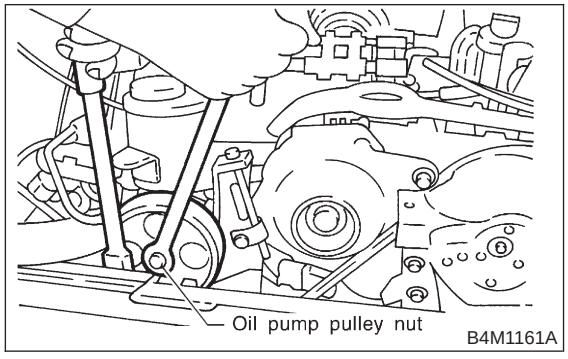
8. Oil Pump (Power Steering System)

A: REMOVAL

1) Remove ground cable from battery.
2) Drain the working fluid about 0.35 ℓ (0.4 US qt, 0.3 Imp qt) from oil tank.

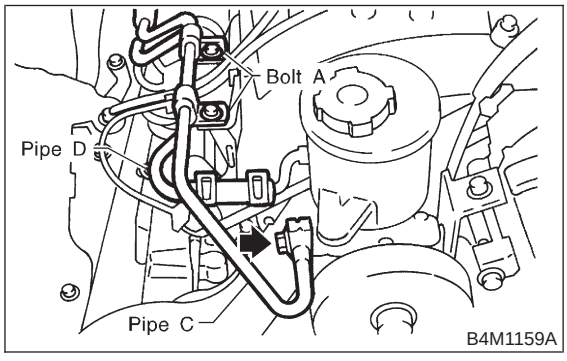


3) Remove pulley belt cover bracket.
4) Loosen oil pump pulley nut, then remove bolts which secure alternator.

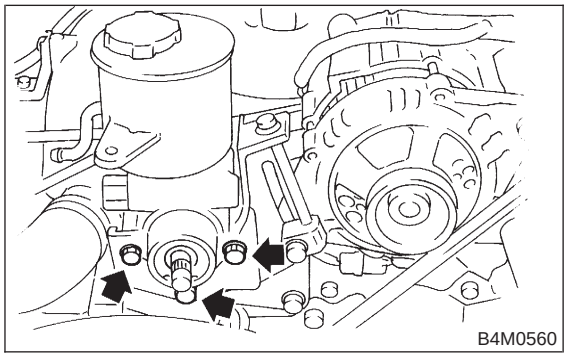


5) Loosen pulley belt(s).
6) Remove the nut and detach oil pump pulley.
7) Remove bolt A. Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

CAUTION:
● Do not allow fluid from the hose end to come into contact with pulley belt.
● To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.
● Except when only oil tank needs to be inspected, detach oil tank and oil pump as a unit. Then separate one from the other on a work bench to prevent oil from spilling on any part of the engine.



8) Remove three bolts from the front side of oil pump and detach the pump.

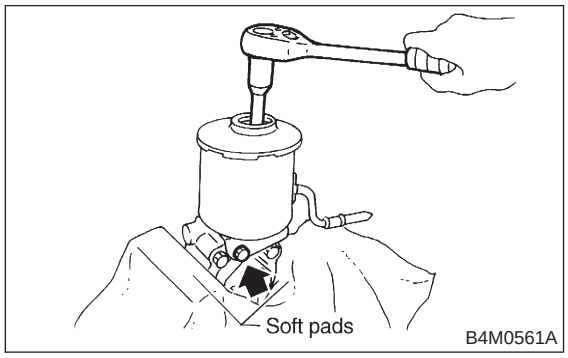


9) Remove three bolts from the lower side of bracket and detach the bracket.

CAUTION:
The bracket does not need to be removed unless it is damaged.

10) Place oil pump in a vise, remove two bolts from oil tank and detach oil tank.

CAUTION:
Do not place oil pump directly in the vise; use soft pads and hold oil pump lightly to protect the pump.



11) Remove O-ring from oil pump.
12) Remove stay from oil pump. (2500 cc model only)

B: CHECK

In accordance with the following table, check all removed parts for wear and damage, and make repair or replacement if necessary.

No.	Parts	Inspection	Corrective action
1	Oil pump (Exterior)	(1)Crack, damage or oil leakage	Replace oil pump with a new one.
		(2)Play of pulley shaft	Measure radial play and axial play. If any of these exceeds the service limit, replace oil pump with a new one. <Ref. to 4-3 [W8B1].>
2	Pulley	(1)Damage	Replace it with a new one.
		(2)Bend	Measure V ditch deflection. If it exceeds the service limit, replace pulley with a new one. <Ref. to 4-3 [W8B1].>
3	Cap	Crack or damage	Replace it with a new one.
4	Strainer	(1)Clogging with dirt	Wash it.
		(2)Breakage	Replace it with a new one.
5	Oil pump (Interior)	(1)Defect or burning of vane pump	Check resistance to rotation of pulley. If it is past the service limit, replace oil pump with a new one. <Ref. to 4-3 [W8B1].>
		(2)Bend in the shaft or damage to bearing	Oil pump emits a noise that is markedly different in tone and loudness from a sound of a new oil pump when turning with a string put around its pulley, replace oil pump with a new one.
6	O-ring	Crack or deterioration	Replace it with a new one.
7	Oil tank	Crack, damage or oil leakage	Replace it with a new one.
8	Bracket	Crack or damage	Replace it with a new one.

1. SERVICE LIMIT

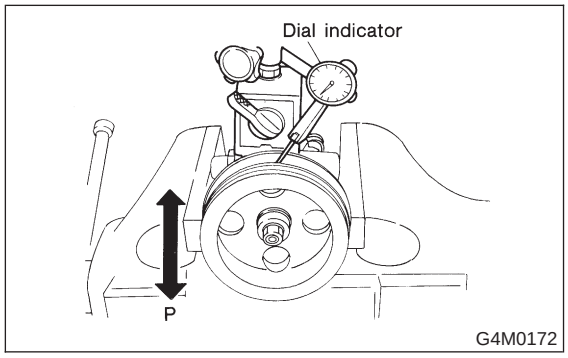
Make a measurement as follows. If it exceeds the specified service limit, replace the parts with new ones.

CAUTION:
● Fix oil pump on a vise to make a measurement. At this time, hold oil pump with the least possible force between two wood pieces.
● Do not set outside of flow control valve or pulley on a vise; otherwise outside or pulley might be deformed. Select properly sized wood pieces.

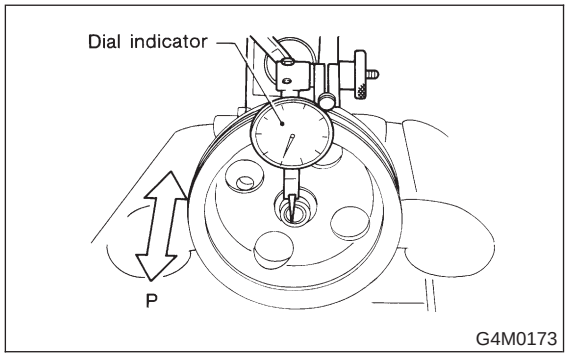
Play of pulley shaft

On condition:
P: 9.8 N (1.0 kg, 2.2 lb)

Service limit:
Radial play
0.4 mm (0.016 in) or less



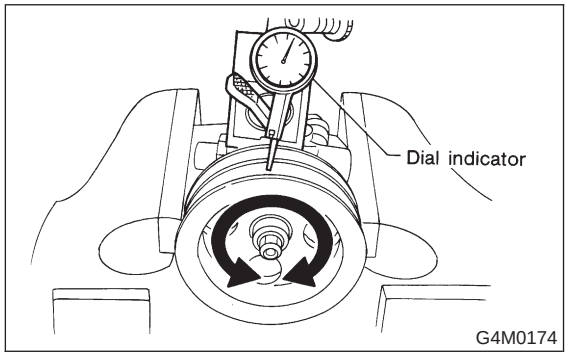
Axial play
0.9 mm (0.035 in) or less



Ditch deflection of pulley

Service limit:
1.0 mm (0.039 in) or less

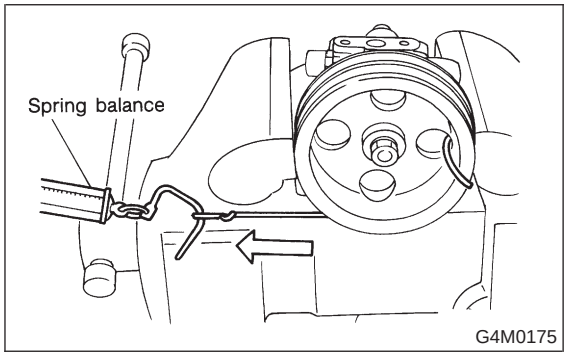
NOTE:
Read the value for one surface of V ditch, and then the value for another off the dial.



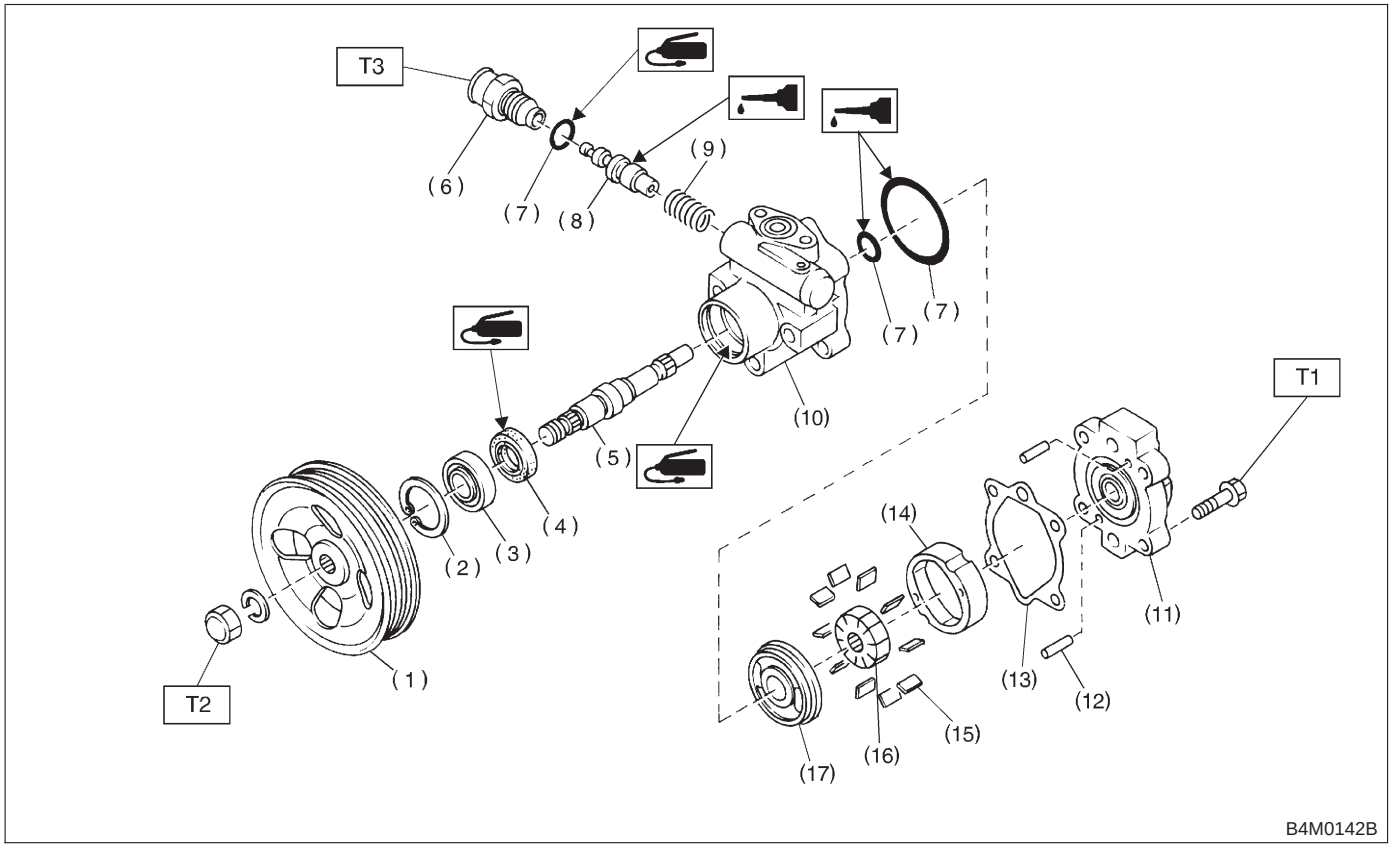
Resistance to rotation of pulley

Service limit:
Maximum load; 9.22 N (0.94 kg, 2.07 lb) or less

NOTE:
● A rather higher value may be indicated when pulley starts turning.
● Measure the load during rotation and make a judgment.



C: DISASSEMBLY

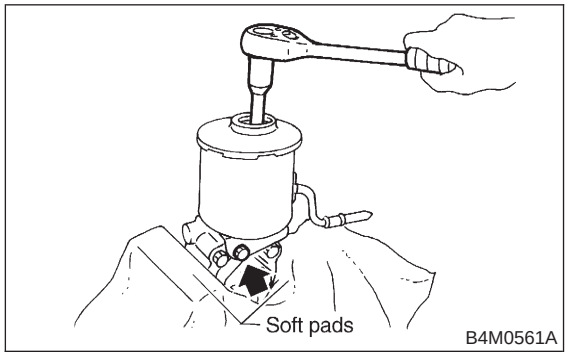


(1) Pulley
(2) Snap ring
(3) Bearing
(4) Oil seal
(5) Shaft
(6) Connector
(7) O-ring
(8) Spool valve
(9) Spring
(10) Front casing
(11) Rear cover
(12) Knock pin
(13) Seal washer
(14) Cam ring
(15) Vane
(16) Rotor
(17) Side plate

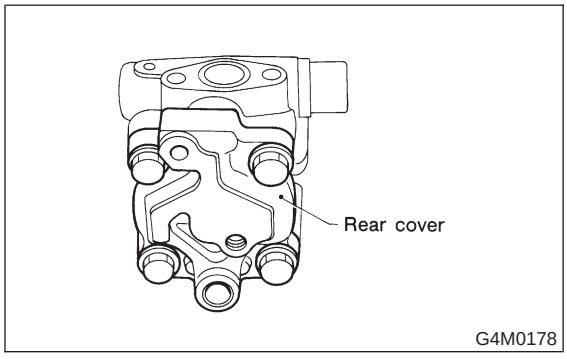
Tightening torque: N·m (kg-m, ft-lb)
T1: 16±2 (1.6±0.2, 11.6±1.4)
T2: 61±7 (6.2±0.7, 45.0±5.2)
T3: 74±5 (7.5±0.5, 54.2±3.6)

1) Oil pump body
(1) Place oil pump in a vise, and remove two bolts which secure tank.

CAUTION:
Do not place oil pump directly in vise; use soft pads and hold oil pump lightly to protect it.

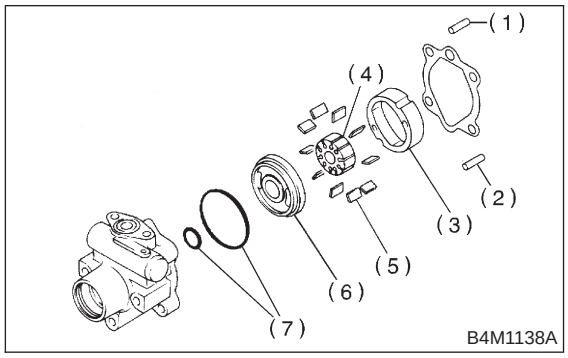


(2) Remove four bolts which secure rear cover.



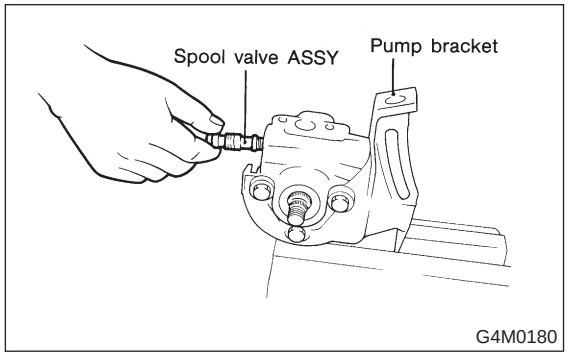
(3) Remove the following parts from front casing.

CAUTION:
Discard old seal washer; replace with a new one.

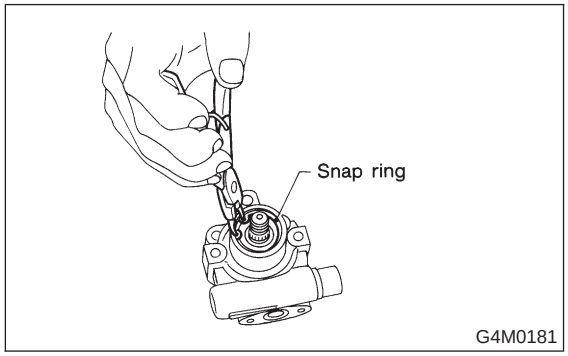


(1) Seal washer
(2) Knock pin.....2 ea.
(3) Cam ring
(4) Rotor
(5) Vane.....10 ea.
(6) Side plate
(7) O-ring.....2 ea.

2) Control valve
Slightly loosen outlet connector, and remove connector. Remove the following parts for pump casing.
- Spool valve assembly
- Flow control spring
- Connector
- O-ring

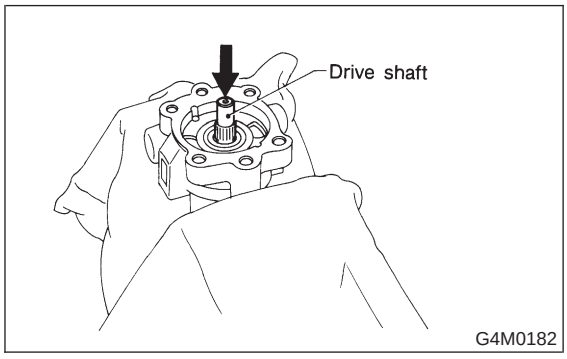


3) Shaft
(1) Remove snap ring from front casing.



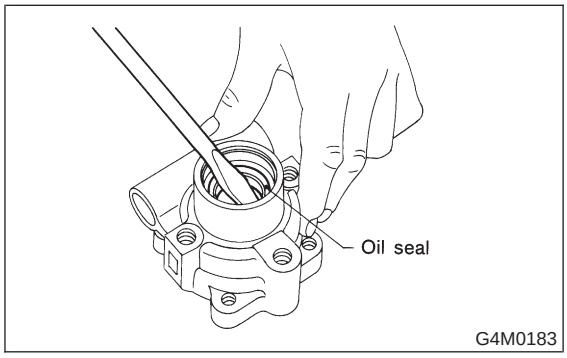
(2) Remove shaft using a hand press.

CAUTION:
- **Discard old drive shaft assembly; replace with a new one.**
- **Be careful not to scratch or dent casing's surface which serves as a seal.**



(3) Pry oil seal off using a screwdriver.

CAUTION:
Be careful not to scratch inner surface of casing.



4) Remove pressure switch.

D: INSPECTION

Perform the following inspection procedures and repair or replace defective parts.

Part name	Description	Remedy
1. Front casing	(1) Damage on body surfaces (2) Excessive wear on hole, into which spool valve is inserted. (3) Wear and damage on cartridge assembly mounting surface (4) Wear and damage on surfaces in contact with shaft and oil seal	Replace with a new one together with spool valve as selective fit is made.
2. Rear cover	(1) Damage on body surfaces (2) Wear and damage on sliding surfaces	Replace with a new one.
3. Shaft	(1) Shaft bend (2) Wear and damage on surfaces in contact with bushing and oil seal (3) Wear and damage on rotor mounting surfaces (4) Bearing damage	Replace with a new one.
4. Side plate	Wear and damage on sliding surfaces	Replace with a new one.
5. Cam ring	Ridge wear on sliding surfaces	If damage is serious, replace with a new cartridge assembly.
6. Vane	Excessive wear on nose radius and side surfaces	
7. Rotor	(1) Wear and damage on sliding surfaces (2) Ridge wear on vane sliding grooves (If light leaks with vane in slit against light source)	
	(3) Damage resulting from snap ring removal	Correct with oil stone. If damage is serious, replace with a new cartridge assembly.
8. Spool valve	Damage or burrs on sliding surface periphery	Replace with a new one together with front casing as selective fit is made.
9. Connector	Damage on threads	Replace with a new one.
10. Spring	Damage	Replace with a new one.
11. Bolts and nuts	Damage on threads	Replace with a new one.

E: ASSEMBLY

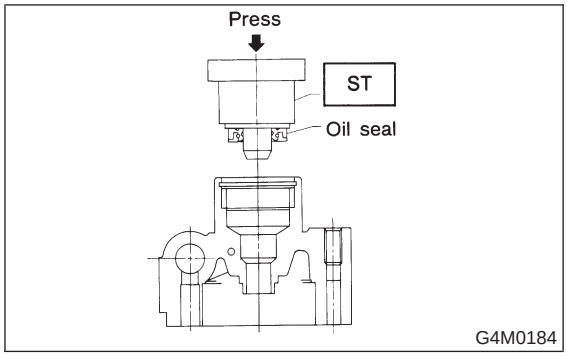
1) Reassembly precautions
   (1) Whenever O-rings, oil seals, and snap rings are removed, they must be replaced with new ones.
   (2) Thoroughly wash parts and allow to dry. They must be kept free from cleaning oil and dust.
   (3) Reassembly procedure must be performed in clean place. Ensure that parts are kept away from waste threads or other dust particles.
   (4) Cleaning oil tends to stay inside the front casing. Remove it completely by blowing compressed air.
   (5) Ensure that parts are free from rust. (Use specified power steering fluid for rust prevention after cleaning and drying.)
   (6) Reverse the sequence of disassembly procedures.
2) Shaft
   (1) Apply grease to oil seal and inner surface of front casing (at bearing location).

CAUTION:
Make sure that the front body internal surfaces are free from damage.

(2) Using ST, press-fit oil seal into front body.
ST 340099AA000 INSTALLER

CAUTION:
When press-fitting, use care to prevent damage to surface mating with rear body.

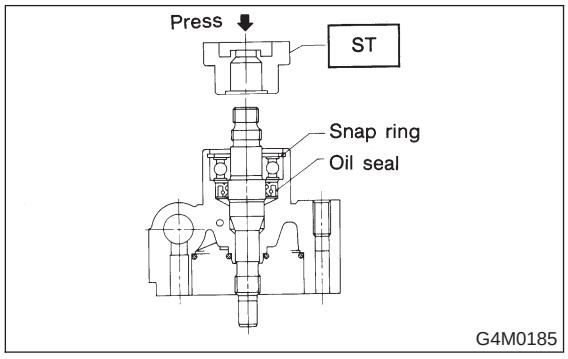
NOTE:
Orient oil seal toward correct direction.



(3) Using ST, press-fit shaft assembly into front body and mount snap ring.

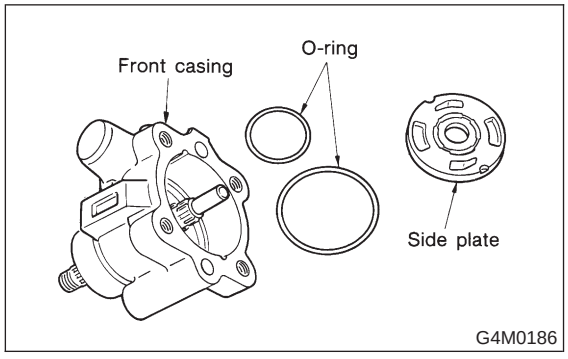
ST 340099AA020 INSTALLER

NOTE:
Turn snap ring to ensure that it fits right into the groove.



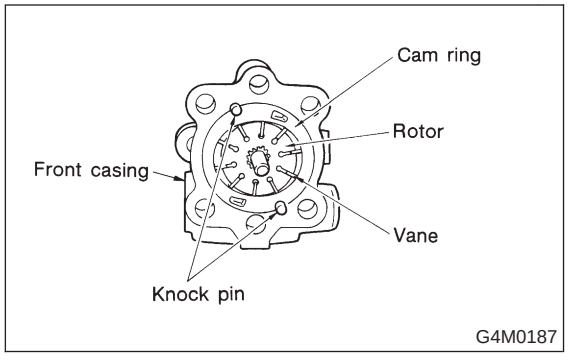
3) Cartridge assembly
(1) Apply specified power steering fluid to O-rings and fit them into front casing.
(2) Install side plate to front casing.

CAUTION:
Use care not to let side plate gall.



(3) Mount rotor onto shaft.
(4) Install 10 vanes into rotor with their nose radius facing toward cam ring.
(5) Install cam ring to front casing, securing with knock pins.

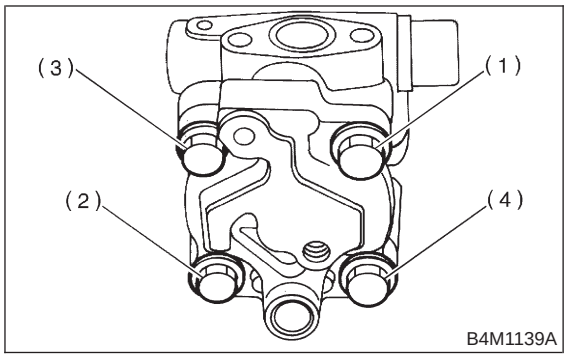
CAUTION:
Do not use hammer to fit knock pins in position.



4) Rear cover
(1) Mount seal washer on front casing.
(2) With knock pin positions aligned, install rear cover.

Tightening torque:
16±2 N·m (1.6±0.2 kg-m, 11.6±1.4 ft-lb)

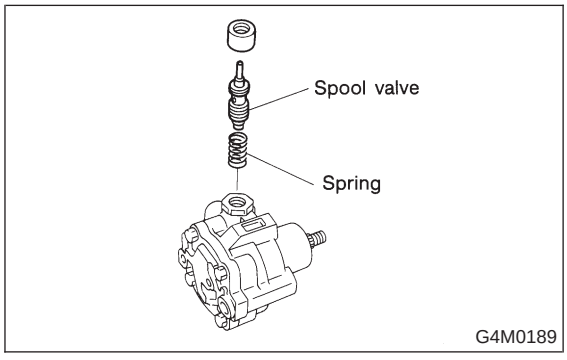
CAUTION:
Loosely tighten bolts in the sequence (1), (2), (3), and (4) shown in figure. Then, tighten in the same sequence.



5) Spool Valve

CAUTION:
● Use care to prevent damage to O-ring at installation.
● When tightening connector, ensure that O-ring does not protrude or get caught.

(1) Install spring into front casing. Then, with spool valve dipped in specified hydraulic oil, install it into the front casing.



(2) Using a 5-mm dia. round bar, ensure that valve moves smoothly.
(3) Set O-ring, with grease applied to it, onto connector and secure connector to front casing.

Tightening torque:
74±5 N·m (7.5±0.5 kg-m, 54.2±3.6 ft-lb)

6) Check
(1) When reassembly procedures have been completed, turn shaft by hand to ensure it turns smoothly. If it binds or other unusual conditions are evident, disassemble again and check for foreign matter trapped on sliding surfaces and

improper installation. Eliminate the cause of trouble.
(2) Check followings by referring to “CHECK” article.
- Excessive play in pulley shaft
- Ditch deflection of pulley
- Resistance to rotation of pulley
- Measurement of generated oil pressure

F: INSTALLATION

1) Install bracket on engine.

Tightening torque:
22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)

2) Install oil pump on oil tank as follows outside the vehicle:

NOTE:
Prior to installation, make sure that all oil is removed from oil pump, oil tank and pipe.

3) Place oil pump in vise.

CAUTION:
Do not place oil pump directly in vise; use soft pads and hold oil pump lightly to protect it.

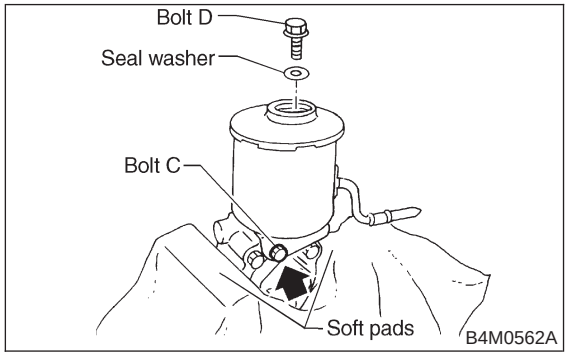
4) Install O-ring on oil pump.

CAUTION:
Discard old O-ring and replace with a new one.

5) Install oil tank on oil pump.

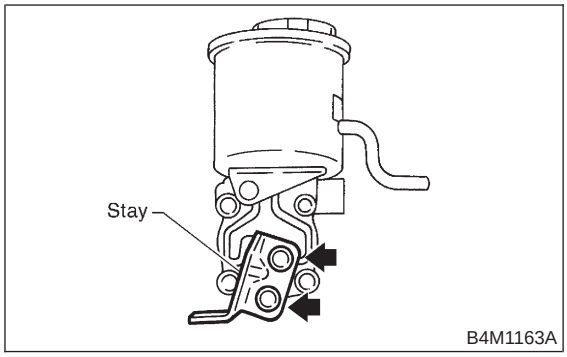
Tightening torque:
Bolt C: 15.7±2.4 N·m (1.60±0.24 kg-m, 11.58±1.77 ft-lb)
Bolt D: 18.1±2.5 N·m (1.85±0.25 kg-m, 13.35±1.84 ft-lb)

CAUTION:
Discard old seal washer and replace with a new one.



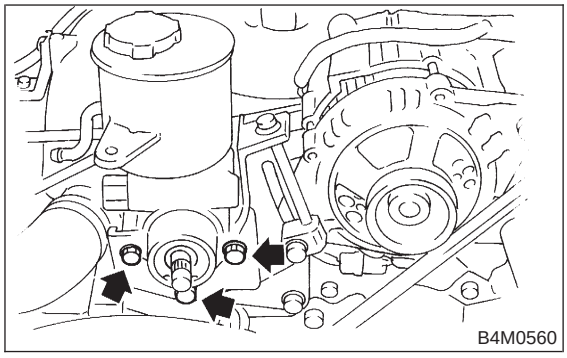
6) Install stay to oil pump. (2500 cc model only)

Tightening torque:
15.7±2.5 N·m (1.6±0.25 kg-m, 11.6±1.8 ft-lb)



7) Install oil pump, previously assembled to oil tank, on bracket.

Tightening torque:
20.1±2.5 N·m (2.05±0.25 kg-m, 14.8±1.8 ft-lb)

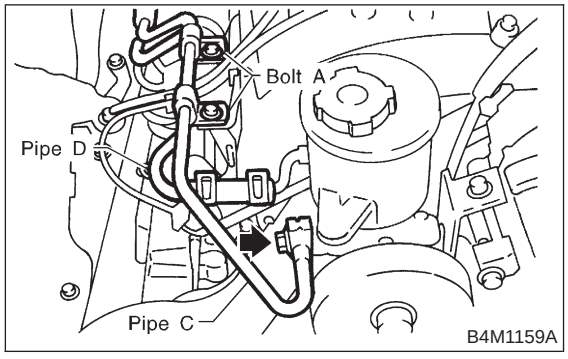


8) Place oil pump pulley and tighten pulley nut temporarily.

9) Interconnect pipes C and D.

Tightening torque:
Joint nut
15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

CAUTION:
If a hose is twisted at this step, the hose may come into contact with some other parts.



10) Connect pipe D from oil tank.
11) Connect pipe C from oil pump.

CAUTION:
Use a new gasket.

Tightening torque:
34±5 N·m (3.5±0.5 kg-m, 25.3±3.6 ft-lb)

12) Tighten bolt A.

Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)

13) Install pulley belt to oil pump.
14) Tighten oil pump pulley nut to the specified torque.

Tightening torque:
61±7 N·m (6.2±0.7 kg-m, 44.8±5.1 ft-lb)

15) Adjust pulley belt tension. <Ref. to 1-5 [G2A0].>
16) Tighten bolt belt tension.

Tightening torque:
8±2 N·m (0.8±0.2 kg-m, 5.8±1.4 ft-lb)

17) Install pulley belt cover bracket.
18) Connect minus terminal of battery.
19) Feed the specified fluid and discharge air.

CAUTION:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

9. Power Steering Fluid

A: RECOMMENDED POWER STEERING FLUID AND AIR BLEEDING

Recommended power steering fluid	Manufacturer
ATF DEXRON II, ATF DEXRON IIE or ATF DEXRON III	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

1) Feed the specified fluid with its level being about 5 cm (2.0 in) lower than the mouth of tank.
2) Continue to turn steering wheel slowly from lock to lock until bubbles stop appearing in the tank while keeping the fluid at that level.
3) In case air is absorbed to deliver bubbles into piping because the fluid level is lower, leave it about half an hour and then do the former step all over again.
4) Start, and idle the engine.
5) Continue to turn steering wheel slowly from lock to lock again until bubbles stop appearing in the tank while keeping the fluid at that level.
It is normal that bubbles stop appearing after three times turning of steering wheel.
6) In case bubbles do not stop appearing in the tank, leave it about half an hour and then do the former step all over again.
7) Stop the engine, and take out safety stands after jacking up vehicle again.
Then lower the vehicle, and idle the engine.
8) Continue to turn steering wheel from lock to lock until bubbles stop appearing and change of the fluid level is within 3 mm (0.12 in).
9) In case the following happens, leave it about half an hour and then do former step again.
(1) The fluid level changes over 3 mm (0.12 in).
(2) Bubbles remain on the upper surface of the fluid.
(3) Grinding noise is generated from oil pump.
10) Check the fluid leakage at flare nuts after turning steering wheel from lock to lock with engine running.

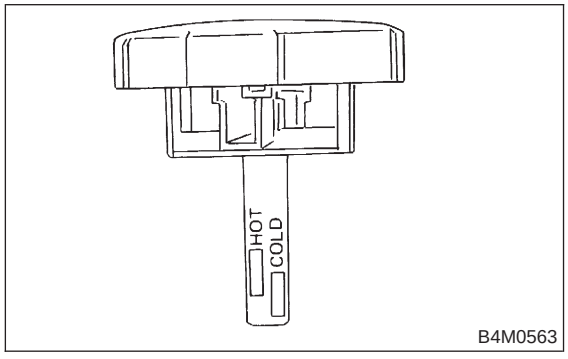
CAUTION:
● Before checking, wipe off any fluid on flare nuts and piping.
● In case the fluid leaks from flare nut, it is caused by dust (or the like) and/or damage between flare and tapered seat in piping.
● So remove the flare nut, tighten again it to the specified torque after cleaning flare and tapered seat. If flare or tapered seat is

damaged, replace it with a new one.

11) Inspect fluid level on flat and level surface with engine “OFF” by indicator of filler cap.
If the level is at lower point or below, add fluid to keep the level in the specified range of the indicator. If at upper point or above, drain fluid by using a syringe or the like.

Fluid capacity:
0.7 ℓ (0.7 US qt, 0.6 Imp qt)

(1) Check while fluid temperature is at 21°C (70°F) and the level gauge is in the “COLD” position.
(2) Check while fluid temperature is at 60°C (140°F) and the level gauge is in the “HOT” position.



1. Power Steering

A: STEERING CONDITION

Trouble	Possible cause	Corrective action
● Heavy steering effort in all ranges ● Heavy steering effort at stand still ● Steering wheel surges when turning.	1. Pulley belt ● Unequal length of pulley belts ● Adhesion of oil and grease ● Loose or damage of pulley belt ● Poor uniformity of pulley belt cross section ● Pulley belt touches to pulley bottom ● Poor revolution of pulleys except oil pump pulley ● Poor revolution of oil pump pulley	Adjust or replace.
	2. Tire and rim ● Improper tires out of specification ● Improper rims out of specification ● Tires not properly inflated*1	Replace or reinflate.
	3. Fluid ● Low fluid level ● Aeration ● Dust mix ● Deterioration of fluid ● Poor warming-up of fluid *2	Refill, bleed air, replace or instruct customer.
	4. Idling speed ● Lower idling speed ● Excessive drop of idling speed at start or at turning steering wheel *3	Adjust or instruct customer.
	5. Measure hydraulic pressure. <Ref. to 4-3 [K1B0].>	Replace problem parts.
	6. Measure steering effort. <Ref. to 4-3 [K1C0].>	Adjust or replace.
● Vehicle leads to one side or the other. ● Poor return of steering wheel to center ● Steering wheel surges when turning.	1. Fluid line ● Folded hose ● Flattened pipe	Reform or replace.
	2. Tire and rim ● Flat tire ● Mix use of different tires ● Mix use of different rims ● Abnormal wear of tire ● Unbalance of remained grooves ● Unbalance of tire pressure	Fix or replace.
	3. Front alignment ● Improper or unbalance caster ● Improper or unbalance toe-in ● Loose connection of suspension	Adjust or retighten.
	4. Others ● Damaged joint assembly ● Unbalanced height ● One-sided weight	Replace, adjust or instruct customer.
	5. Measure steering effort. <Ref. to 4-3 [K1C0].>	Adjust or replace.

***1 If tires and/or rims are wider, the load to power steering system is the more. Accordingly, in a condition, for example before fluid warms-up, relief valve may work before maximum turning angle. In this case, steering effort may be heavy. When measured hydraulic pressure is normal, there is no abnormal thing.**
***2 In cold weather, steering effort may be heavy due to increased flow resistance of cold fluid. After warming up engine, turn steering wheel from stop to stop several times to warm up fluid. Then if steering effort reduces normally, there is no abnormal thing.**
***3 In cold weather or with insufficient warm-up of engine, steering effort may be heavy due to excessive drop of idling when turning steering wheel. In this case, it is recommended to start the vehicle with increasing engine speed than usual. Then if steering effort reduces normally, there is no abnormal thing.**

B: MEASUREMENT OF HYDRAULIC PRESSURE

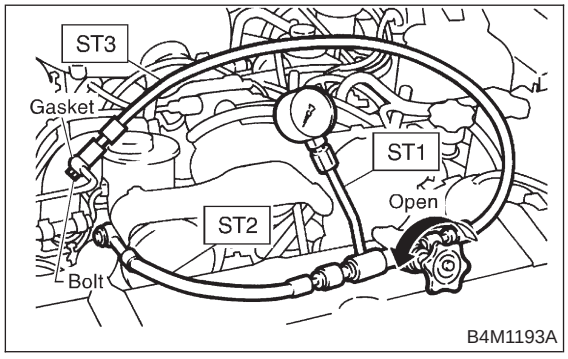
CAUTION:
● Be sure to complete all items aforementioned in "STEERING CONDITION", prior to measuring hydraulic pressure. Otherwise, pressure can not be measured correctly. <Ref. to 4-3 [K1A0].>
● Do not leave the valve of pressure gauge closed or hold the steering wheel at stop end for 5 seconds or more in any case, as the oil pump may be damaged due to long keep of these conditions.
● Put cotton cloth waste at a place where fluid drops before pressure gauge is installed. Wipe off split fluid thoroughly after the measurement.

NOTE:
Keep engine idling during the measurement.

1B1 : MEASURE REGULAR PRESSURE.

1) Install STs to power steering pump.
(1) Drain the power steering fluid about 0.35 ℓ (0.4 US qt, 0.3 Imp qt) from oil tank.
(2) Remove two bolts securing power steering pipes to engine.
(3) Install ST1, 2 and 3 between power steering pump and pipes using gasket (Part No. 34621AC020) and bolt (Part No. 34620AC010).

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



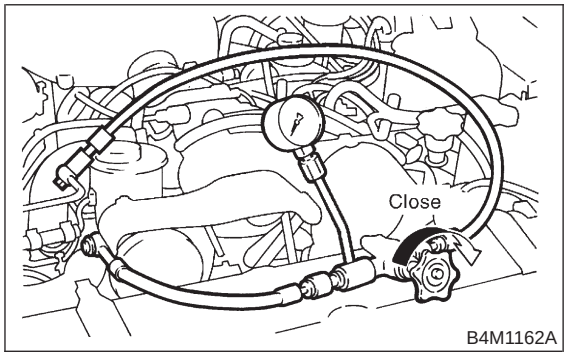
(4) Replenish power steering fluid up to specified level.
2) Open valve, and start the engine.
3) Measure regular pressure.

CHECK : ***Is pressure 981 kPa (10 kg/cm^2, 142 psi) or less?***
YES : Go to step **1B2**.
NO : Trouble may be due to crushed pipe or hose, leakage from fluid line, foreign particles in fluid line, etc. Replace faulty parts with new ones.

1B2 : MEASURE RELIEF PRESSURE.

1) Using STs, measure relief pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



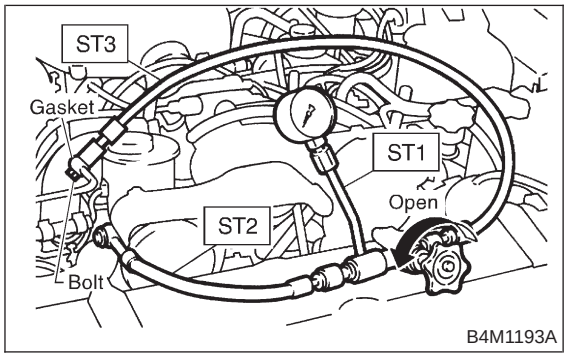
2) Close valve.

CHECK : ***Is pressure 7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)?***
YES : Go to step **1B3**.
NO : Trouble may be due to malfunctioning relief valve, fluid leaking into oil pump interior, abnormal wear of pump vanes, etc. Replace faulty parts with new ones.

1B3 : MEASURE WORKING PRESSURE.

1) Using STs, measure working pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A

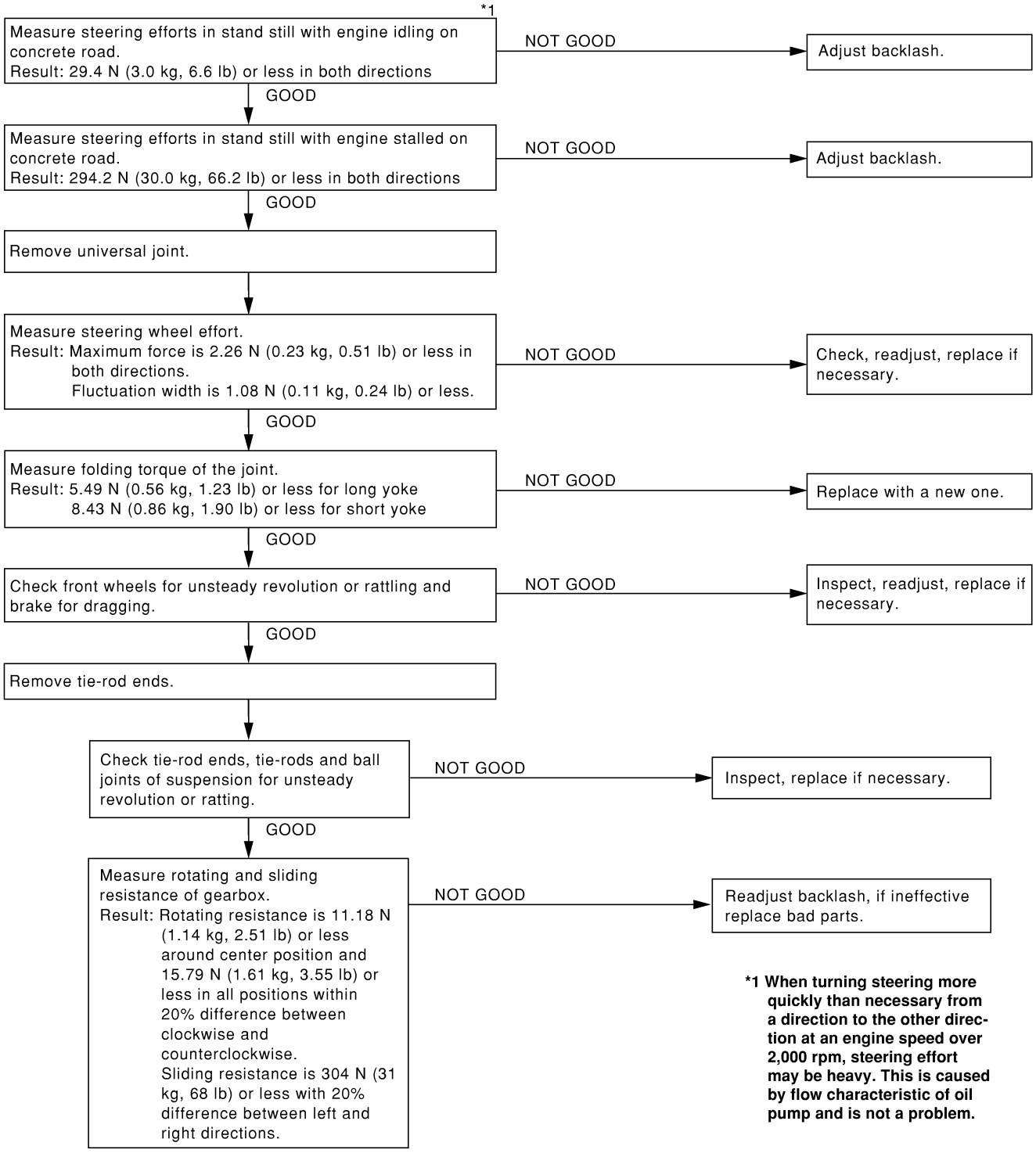


2) Open valve.
3) Measure working pressure of control valve by turning wheel from stop to stop.

CHECK : ***Is pressure 7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)?***
YES : Measure steering force. <Ref. to 4-3 [K1C0].>

NO : Control valve is inoperative. Replace control valve itself or control valve and pinion as a single unit with new ones.

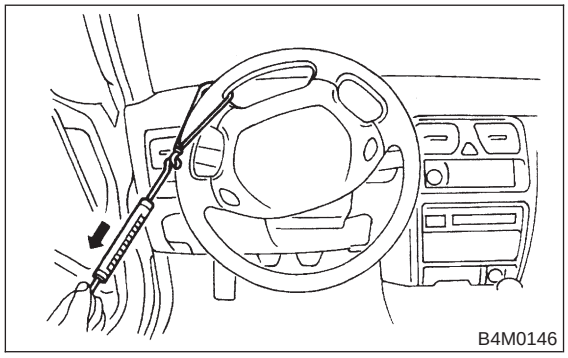
C: MEASUREMENT OF STEERING EFFORT

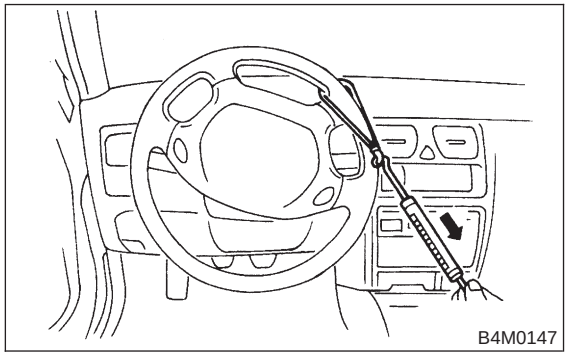


***1 When turning steering more quickly than necessary from a direction to the other direction at an engine speed over 2,000 rpm, steering effort may be heavy. This is caused by flow characteristic of oil pump and is not a problem.**

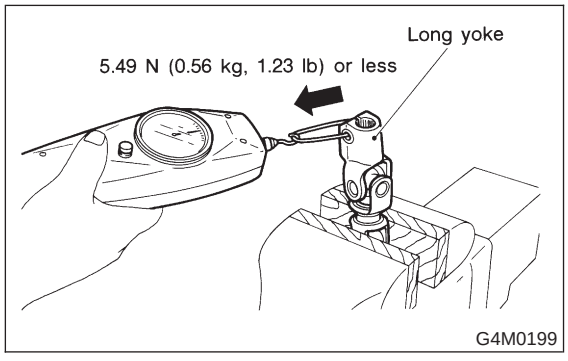
B4M1142A

1) Measurement of steering effort is as shown in the figures.

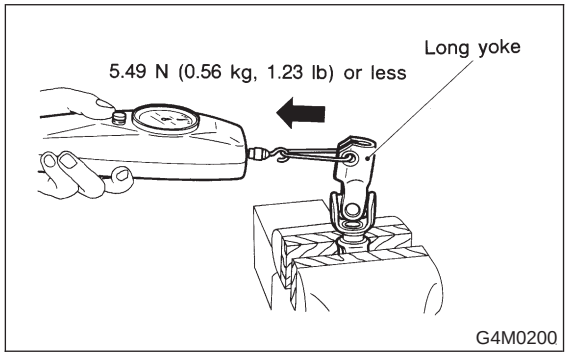

B4M0146


B4M0147

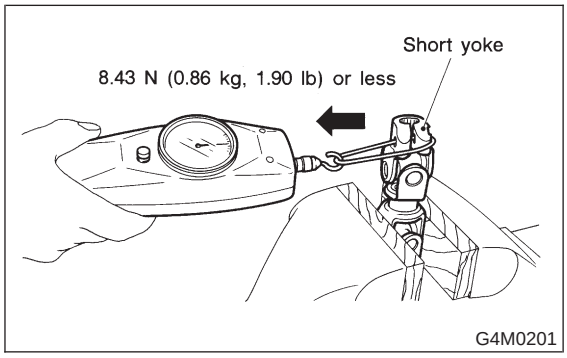
2) Measurement of folding torque of universal joint is as shown in the figures.



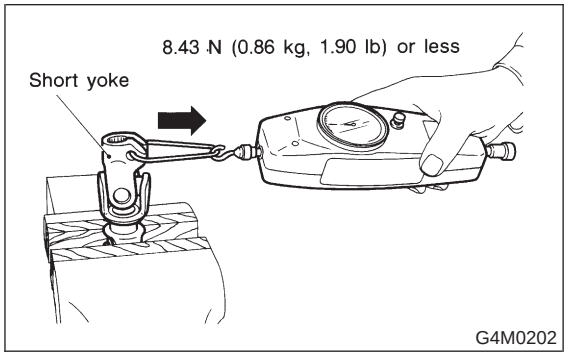
G4M0199



G4M0200



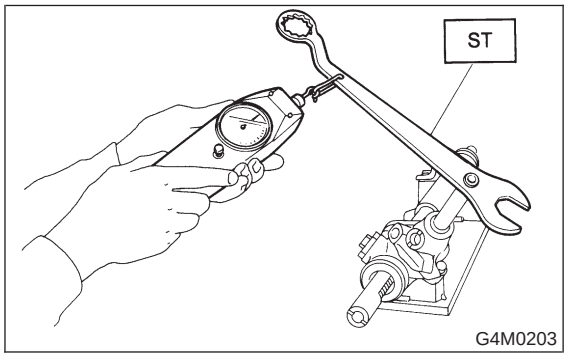
G4M0201



G4M0202

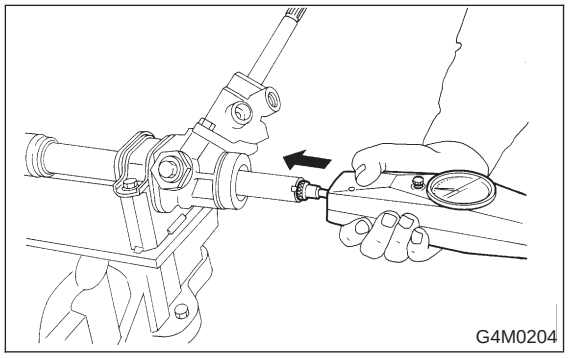
3) Using ST, measure resistances of gearbox.
ST 926230000 SPANNER

Rotating resistance:
Straight-ahead position within 30 mm (1.18 in) from rack center
Less than 11.18 N (1.14 kg, 2.51 lb)
Maximum allowable torque
15.7 N (1.6 kg, 3.5 lb)

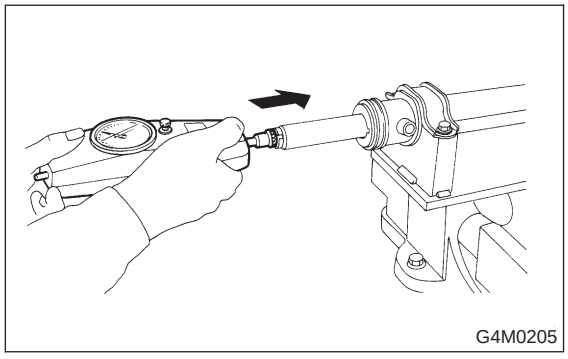


G4M0203

Sliding resistance:
Right-turn steering
304 N (31 kg, 68 lb) or less

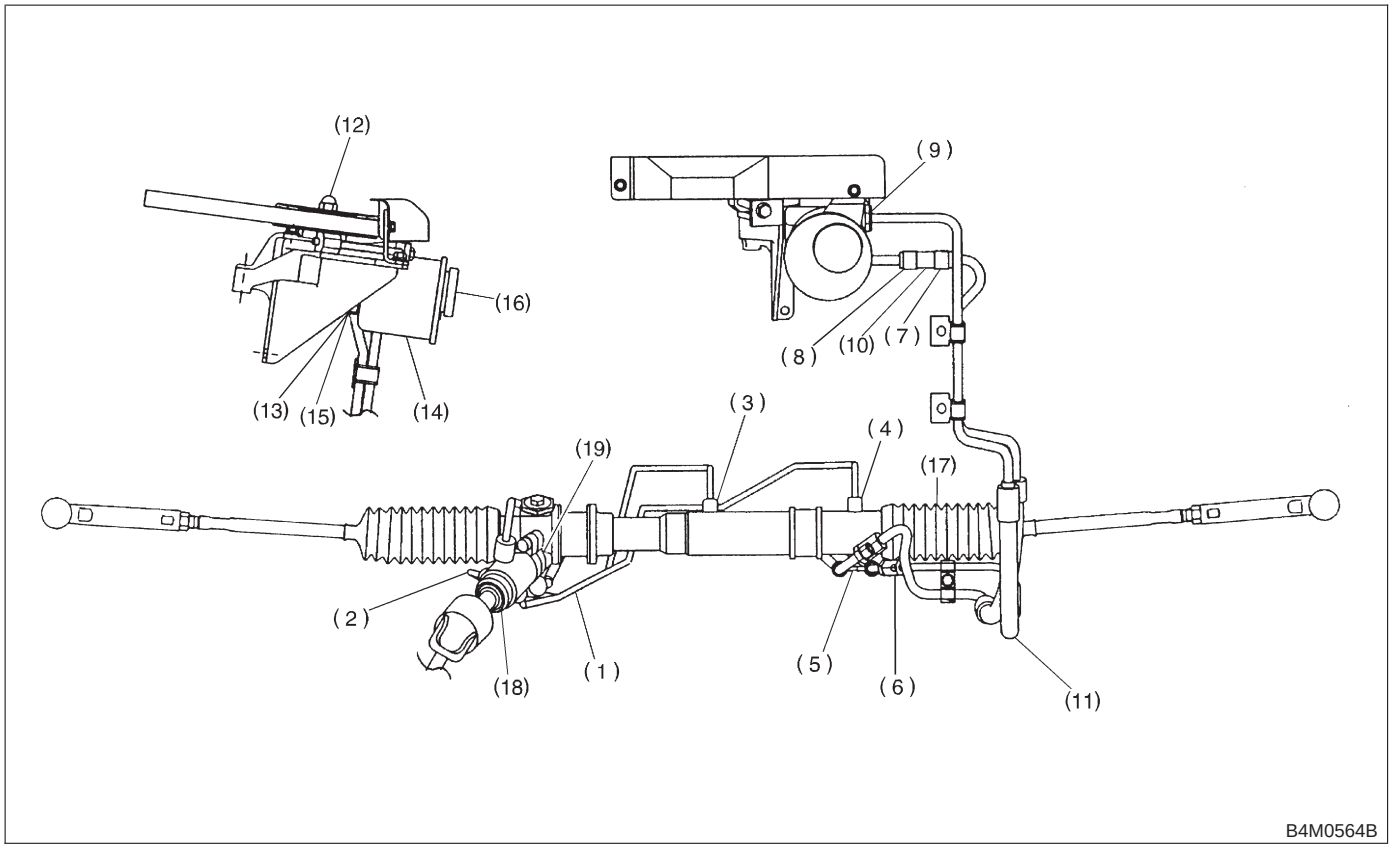


Left-turn steering
304 N (31 kg, 68 lb) or less



D: FLUID LEAKAGE

CAUTION:
It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.



Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) thru (9) in figure	Insufficient tightening of flare nut, catching dirt or the like, damage to flare or flare nut	Loosen and retighten, if ineffective, replace.
	Poor insertion of hose, poor clamping	Retighten or replace clamp.
	Damaged O-ring	Replace O-ring pipe or hose with new one, if ineffective, replace gearbox also.
Leakage from hose (10) and (11) in figure	Crack or damage in hose	Replace with a new one.
	Crack or damage in hose hardware	Replace with a new one.
Leakage from surrounding of cast iron portion of oil pump (12) and (13) in figure	Damaged O-ring	Replace O-ring.
	Damaged gasket	Replace gasket.
Leakage from oil tank, (14) and (15) in figure	Crack in oil tank, (14)	Replace oil tank.
	Damaged O-ring, (15)	Replace O-ring.
Leakage from filler neck (16)	Damaged cap packing	Replace cap.
	Crack in root of filler neck	Replace oil tank.
	High fluid level *1	Adjust fluid level.
Leakage from surrounding of power cylinder of gearbox, (17) in figure	Damaged oil seal	Replace oil seal.
Leakage from control valve of gearbox, (18) and (19) in figure	Damaged packing or oil seal	Replace problem parts.
	Damage in control valve	Replace control valve.

***1 Fluid level is specified at optimum position (range) for ordinary use. Accordingly, if the vehicle is used often under hard conditions such as on very rough roads or in mountainous areas, fluid may bleed out from cap air vent hole. This is not a problem. If a customer complains strongly and is not likely to be satisfied with the leakage, lower the fluid level to the extent that fluid will not bleed out under the conditions described, and have the customer check the fluid level and its quality more frequency than usual.**

E: NOISE AND VIBRATION

CAUTION:
Don't keep the relief valve operated over 5 seconds at any time or inner parts of the oil pump may be damaged due to rapid increase of fluid temperature.

NOTE:
● Grinding noise may be heard immediately after the engine start in extremely cold condition. In this case, if the noise goes off during warm-up there is no abnormal function in the system. This is due to the fluid characteristic in extremely cold condition.
● Oil pump makes whine or growl noise slightly due to its mechanism. Even if the noise can be heard when steering wheel is turned at stand still there is no abnormal function in the system provided that the noise eliminates when the vehicle is running.
● When stopping with service brake and/or parking brake applied, power steering can be operated easily due to its light steering effort. If doing so, the disk rotates slightly and makes creaking noise. The noise is generated by creaking between the disk and pads. If the noise goes off when the brake is released, there is no abnormal function in the system.
● There may be a little vibration around the steering devices when turning steering wheel at standstill, even though the component parts are properly adjusted and have no defects.
Hydraulic systems are likely to generate this kind of vibration as well as working noise and fluid noise because of combined conditions, i.e., road surface and tire surface, engine speed and turning speed of steering wheel, fluid temperature and braking condition.
This phenomena does not indicate there is some abnormal function in the system.
The vibration can be known when steering wheel is turned repeatedly at various speeds from slow to rapid step by step with parking brake applied on concrete road and in "D" range for automatic transmission vehicle.

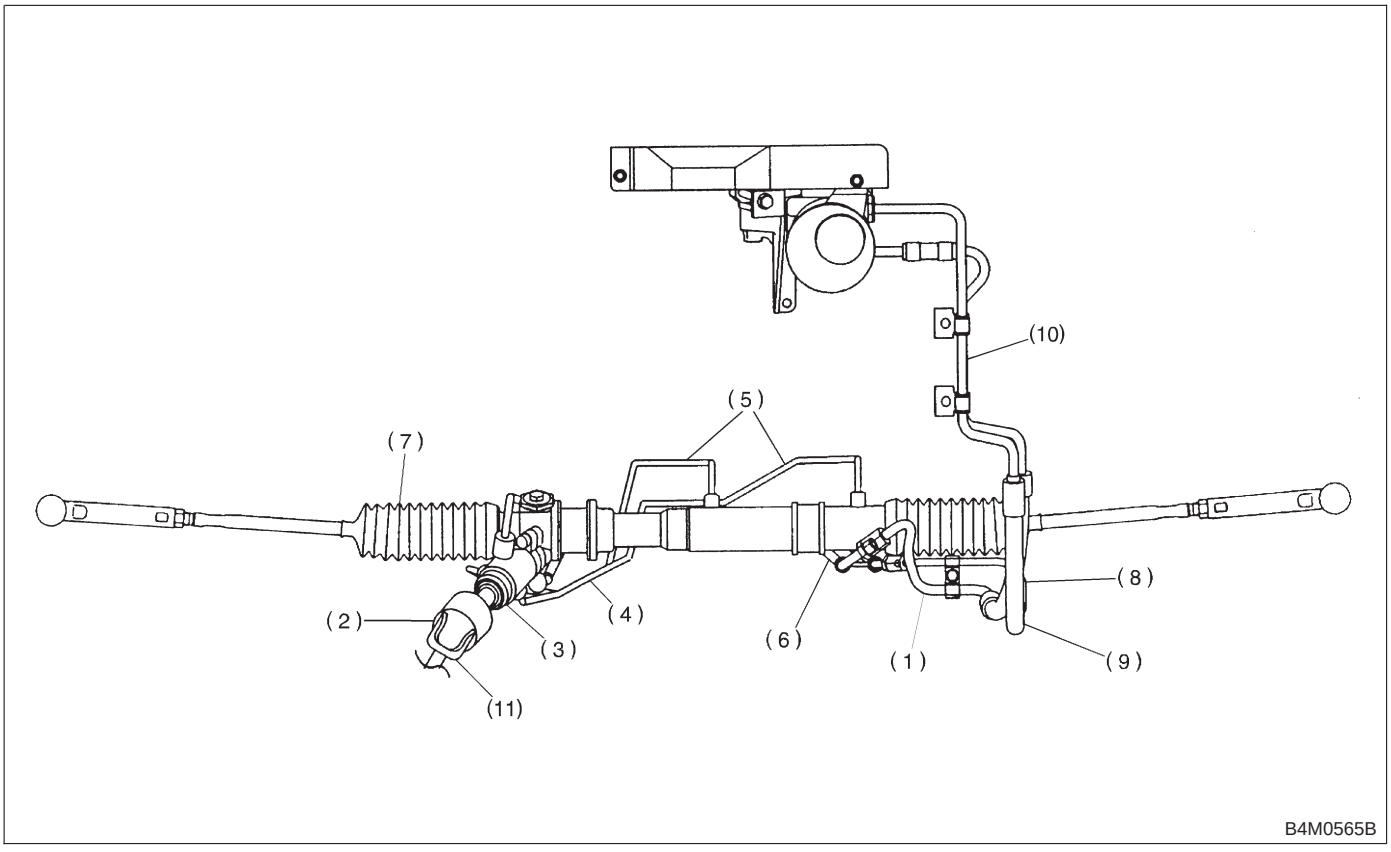
Trouble	Possible cause	Corrective action
Hiss noise (continuous) While engine is running.	Relief valve emits operating sound when steering wheel is completely turned in either direction. (Don't keep this condition over 5 seconds.)	Normal
	Relief valve emits operating sound when steering wheel is not turned. This means that the relief valve is faulty.	Defective Replace oil pump.

Trouble	Possible cause	Corrective action
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check clearance. Correct if necessary. <Ref. to 4-3 [K1F0].>
	Loosened installation of oil pump, oil tank, pump bracket, gearbox or crossmember	Retighten.
	Loosened installation of oil pump pulley or other pulley(s)	Retighten.
	Loosened linkage or play of steering or suspension Loosened tightening of joint or steering column	Retighten or replace.
	Sound generates from the inside of gearbox or oil pump.	Replace the gearbox or oil pump.
Knocking When turning steering wheel in both direction with small angle repeatedly at engine ON or OFF.	Excessive backlash Loosened lock nut for adjusting backlash	Adjust and retighten.
	Loosened tightening or play of tie-rod, tie-rod end	Retighten or replace.
Grinding noise (continuous) While engine is running.	Vane pump aeration	Inspect and retighten fluid line connection. Refill fluid and vent air.
	Vane pump seizing	Replace oil pump.
	Pulley bearing seizing of oil pump	Replace oil pump.
	Folded hose, flat pipe	Replace.
Squeal, squeak (intermittent or continuous) While engine is running.	Maladjustment of pulley belt Damaged or charged pulley belt Unequal length of pulley belts	Adjust or replace. (Replace two belts as a set.)
	Run out or soilage of V-groove surface of oil pump pulley	Clean or replace.
Sizzling noise (continuous) While engine is running.	Fluid aeration	Fix wrong part causing aeration. Replace fluid and vent air.
	Damaged pipe of gearbox	Replace pipe.
	Abnormal inside of hose or pipe Flat hose or pipe	Rectify or replace.
	Abnormal inside of oil tank	Replace.
	Removed oil tank cap	Install cap.
Whistle (continuous) While engine is running.	Abnormal pipe of gearbox or abnormal inside of hose	Replace bad parts of gearbox or hose.
Whine or growl (continuous or intermittent) While engine is running with/ without steering turned.	Loosened installation of oil pump, oil pump bracket	Retighten.
	Abnormal inside of oil pump, hose	Replace oil pump, hose, if the noise can be heard when running as well as stand still.
	Torque converter growl air conditioner compression growl	Remove power steering pulley belt and confirm.
Creaking noise (intermittent) While engine is running with steering turned.	Abnormal inside of gearbox	Replace bad parts of gearbox.
	Abnormal bearing for steering shaft	Apply grease or replace.
	Generates when turning steering wheel with brake (service or parking) applied.	If the noise goes off when brake is released, it is normal.
Vibration While engine is running with/ without steering turned.	Too low engine speed at start	Adjust and instruct customers.
	Vane pump aeration	Fix wrong part. Vent air.
	Damaged valve in oil pump, gearbox	Replace oil pump, bad parts of gearbox.
	Looseness of play of steering, suspension parts	Retighten.

F: CLEARANCE TABLE

CAUTION:
This table lists various clearances that must be correctly adjusted to ensure normal vehicle driving without interfering noise, or any other faults.

Location	Minimum allowance mm (in)	Location	Minimum allowance mm (in)
(1) Crossmember — Pipe	5 (0.20)	(6) Exhaust pipe — Pipe	15 (0.59)
(2) DOJ — Shaft or joint	14 (0.55)	(7) Exhaust pipe — Gearbox bolt	15 (0.59)
(3) DOJ — Valve housing	11 (0.43)	(8) Side frame — Hose A and B	15 (0.59)
(4) Pipe — Pipe	2 (0.08)	(9) Cruise control pump — Hose A and B	15 (0.59)
(5) Stabilizer — Pipe	5 (0.20)	(10) Pipe portion of hose A — Pipe portion of hose B	1.5 (0.059)
		(11)AT cooling hose — Joint	20 (0.79)



G: BREAKAGE OF HOSES

CAUTION:
Although surface layer materials of rubber hoses have excellent weathering resistance, heat resistance and resistance for low temperature brittleness, they are likely to be damaged chemically by brake fluid, battery electrolyte, engine oil and automatic transmission fluid and their service lives are to be very shortened. It is very important to keep the hoses free from before mentioned fluids and to wipe out immediately when the hoses are adhered with the fluids.
Since resistances for heat or low temperature brittleness are gradually declining according to time accumulation of hot or cold conditions for the hoses and their service lives are shortening accordingly, it is necessary to perform careful inspection frequently when the vehicle is used in hot weather areas, cold weather area and/or a driving condition in which many steering operations are required in short time. Particu-

larly continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.

So, avoid to keep this kind of condition when servicing as well as driving.

Trouble	Possible cause	Corrective action
Pressure hose burst	Excessive holding time of relief status	Instruct customers.
	Malfunction of relief valve	Replace oil pump.
	Poor cold characteristic of fluid	Replace fluid.
Forced out return hose	Poor connection	Correct.
	Poor holding of clip	Retighten.
	Poor cold characteristic of fluid	Replace fluid.
Fluid bleeding out of hose slightly	Wrong layout, tensioned	Replace hose.
	Excessive play of engine due to deterioration of engine mounting rubber	Replace defective parts.
	Improper stop position of pitching stopper	Replace defective parts.
Crack on hose	Excessive holding time of relief status	Replace. Instruct customer.
	Excessive tightening torque for return hose clip	Replace.
	Power steering fluid, brake fluid, engine oil, electrolyte adhere on the hose surface	Replace. Pay attention on service work.
	Too many times use in extremely cold weather	Replace. Instruct customers.

BRAKES 4-4

1. Brakes

A: SPECIFICATIONS

1. MODELS WITH ABS

Model		Sedan			Wagon		
Engine (cc)		2200			2200		
Driving system		FWD	AWD		FWD	AWD	
		L	L	LS	L	L	LS
Front brake	Type	Disc (Floating type, ventilated)					
	Effective disc diameter mm (in)	210 (8.27)					
	Disc thickness × Outer diameter mm (in)	24 × 260 (0.94 × 10.24)					
	Effective cylinder diameter mm (in)	57.2 (2.252)					
	Pad dimensions (length × width × thickness) mm (in)	112.4 × 44.3 × 11.0 (4.43 × 1.744 × 0.433)					
	Clearance adjustment	Automatic adjustment					
Rear brake	Type	Disc (Floating type)					
	Effective disc diameter mm (in)	230 (9.06)					
	Disc thickness × Outer diameter mm (in)	10 × 266 (0.39 × 10.47)					
	Effective cylinder diameter mm (in)	34.9 (1.374)			38.1 (1.500)		
	Pad dimensions (length × width × thickness) mm (in)	92.4 × 33.7 × 10.0 (3.638 × 1.327 × 0.394)					
	Clearance adjustment	Automatic adjustment					

Model		4 Door Sedan			Wagon		
Engine (cc)		2200			2200		
Driving system		FWD	AWD		FWD	AWD	
		L	L	LS	L	L	LS
Hill holder		—	★	—	—	★	—
Parking brake	Type	Mechanical on rear brakes, drum in disc					
	Effective drum diameter mm (in)	170 (6.69)					
	Lining dimensions (length × width × thickness) mm (in)	162.6 × 30.0 × 3.2 (6.40 × 1.181 × 0.126)					
	Clearance adjustment	Manual adjustment					
Master cylinder	Type	Tandem					
	Effective diameter mm (in)	26.99 (1-1/16)					
	Reservoir type	Sealed type					
	Brake fluid reservoir capacity cm^3 (cu in)	190 (11.59)					
Brake booster	Type	Vacuum suspended					
	Effective diameter mm (in)	205 + 230 (8.07 + 9.06)					
Proportioning valve	Split point kPa (kg/cm^2, psi)	2,942 (30.0, 427)					
	Reducing ratio	0.3					
Brake line		Dual circuit system					
ABS		—	OP	STD	—	OP	STD

★: Equipped on manual transmission vehicle.

2. MODELS WITHOUT ABS

Model		Sedan		Wagon			
Engine (cc)		2200					
Driving system		FWD	AWD	FWD	AWD		
		L	L	L	POST	BRIGHTON	L
Front brake	Type	Disc (Floating type, ventilated)					
	Effective disc diameter mm (in)	210 (8.27)					
	Disc thickness × Outer diameter mm (in)	24 × 260 (0.94 × 10.24)					
	Effective cylinder diameter mm (in)	57.2 (2.252)					
	Pad dimensions (length × width × thickness) mm (in)	112.4 × 44.3 × 11.0 (4.43 × 1.744 × 0.433)					
	Clearance adjustment	Automatic adjustment					
Rear brake	Type	Drum (Leading-Trailing type)					
	Effective drum diameter mm (in)	228.6 (9)					
	Effective cylinder diameter mm (in)	17.4 (0.685)		19.0 (0.748)			
	Lining dimensions (length × width × thickness) mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)					
	Clearance adjustment	Automatic adjustment					

Model		Sedan		Wagon			
Engine (cc)		2200					
Driving system		FWD	AWD	FWD	AWD		
		L	L	L	POST	BRIGHTON	L
Hill holder		★	★	—	—	—	★
Parking brake	Type	Mechanical on rear brakes, drum in disc					
	Effective drum diameter mm (in)	228.6 (9)					
	Lining dimensions (length × width × thickness) mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)					
	Clearance adjustment	Automatic adjustment					
Master cylinder	Type	Tandem					
	Effective diameter mm (in)	23.81 (15/16)					
	Reservoir type	Sealed type					
	Brake fluid reservoir capacity cm^3 (cu in)	190 (11.59)					
Brake booster	Type	Vacuum suspended					
	Effective diameter mm (in)	230 (9.06)					
Proportioning valve	Split point kPa (kg/cm^2, psi)	3,678 (37.5, 533)					
	Reducing ratio	0.3					
Brake line		Dual circuit system					

★: Equipped on manual transmission vehicle.

3. 2500 cc MODEL

Model		Sedan		Wagon		
Engine (cc)		2500				
Driving system		AWD				
		GT	LSi	GT	LSi	OUTBACK
Front brake	Type	Disc (Floating type, ventilated)				
	Effective disc diameter mm (in)	228 (8.98)				
	Disc thickness × Outer diameter mm (in)	24 × 277 (0.94 × 10.91)				
	Effective cylinder diameter mm (in)	42.8 (1.687) × 2				
	Pad dimensions (length × width × thickness) mm (in)	112.3 × 50.0 × 11.0 (4.42 × 1.969 × 0.433)				
	Clearance adjustment	Automatic adjustment				
Rear brake	Type	Disc (Floating type)				
	Effective disc diameter mm (in)	230 (9.06)				
	Disc thickness × Outer diameter mm (in)	10 × 266 (0.39 × 10.47)				
	Effective cylinder diameter mm (in)	38.1 (1.500)				
	Pad dimensions (length × width × thickness) mm (in)	92.4 × 33.7 × 10.0 (3.638 × 1.327 × 0.394)				
	Clearance adjustment	Automatic adjustment				

Model		Sedan		Wagon		
Engine (cc)		2500				
Driving system		AWD				
		GT	LSi	GT	LSi	OUTBACK
Hill holder		—	—	—	—	—
Parking brake	Type	Mechanical on rear brakes, drum in disc				
	Effective drum diameter mm (in)	170 (6.69)				
	Lining dimensions (length × width × thickness) mm (in)	162.6 × 30.0 × 3.2 (6.40 × 1.181 × 0.126)				
	Clearance adjustment	Manual adjustment				
Master cylinder	Type	Tandem				
	Effective diameter mm (in)	26.99 (1-1/16)				
	Reservoir type	Sealed type				
	Brake fluid reservoir capacity cm^3 (cu in)	190 (11.59)				
Brake booster	Type	Vacuum suspended				
	Effective diameter mm (in)	205 + 230 (8.07 + 9.06)				
Proportioning valve	Split point kPa (kg/cm^2, psi)	3,678 (37.5, 533)				
	Reducing ratio	0.3				
Brake line		Dual circuit system				
ABS		STD				

B: SERVICE DATA

ITEM		STANDARD	SERVICE LIMIT
Front brake	Pad thickness (including back metal)	17 mm (0.67 in)	7.5 mm (0.295 in)
	Disc thickness	24 mm (0.94 in)	22 mm (0.87 in)
	Disc runout	—	0.075 mm (0.0030 in)
Rear brake (Disc type)	Pad thickness (including back metal)	15 mm (0.59 in)	6.5 mm (0.256 in)
	Disc thickness	10 mm (0.39 in)	8.5 mm (0.335 in)
	Disc runout	—	0.10 mm (0.0039 in)
Rear brake (Drum type)	Inside diameter	228.6 mm (9 in)	230.6 mm (9.08 in)
	Lining thickness	4.1 mm (0.161 in)	1.5 mm (0.059 in)
Rear brake (Disc type parking)	Inside diameter	170 mm (6.69 in)	171 mm (6.73 in)
	Lining thickness	3.2 mm (0.126 in)	1.5 mm (0.059 in)
Parking brake	Lever stroke	7 to 8 notches/196N (20 kg,44 lb)	

			Without ABS	With ABS
Brake booster		Brake pedal force	Fluid pressure	
	Brake fluid pressure without engine running	147N (15 kg, 33 lb)	785 kPa (8 kg/cm^2, 114 psi)	588 kPa (6 kg/cm^2, 85 psi)
		294N (30kg, 66 lb)	2,158 kPa (22 kg/cm^2, 313 psi)	1,667 kPa (17 kg/cm^2, 242 psi)
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147N (15 kg, 33 lb)	5,492 kPa (56 kg/cm^2, 796 psi)	5,394 kPa (55 kg/cm^2, 782 psi)
		294N (30kg, 66 lb)	8,434 kPa (86 kg/cm^2, 1,223 psi)	10,003 kPa (102 kg/cm^2, 1,450 psi)

C: RECOMMENDED BRAKE FLUID

FMVSS No. 116, fresh DOT3 or 4 brake fluid

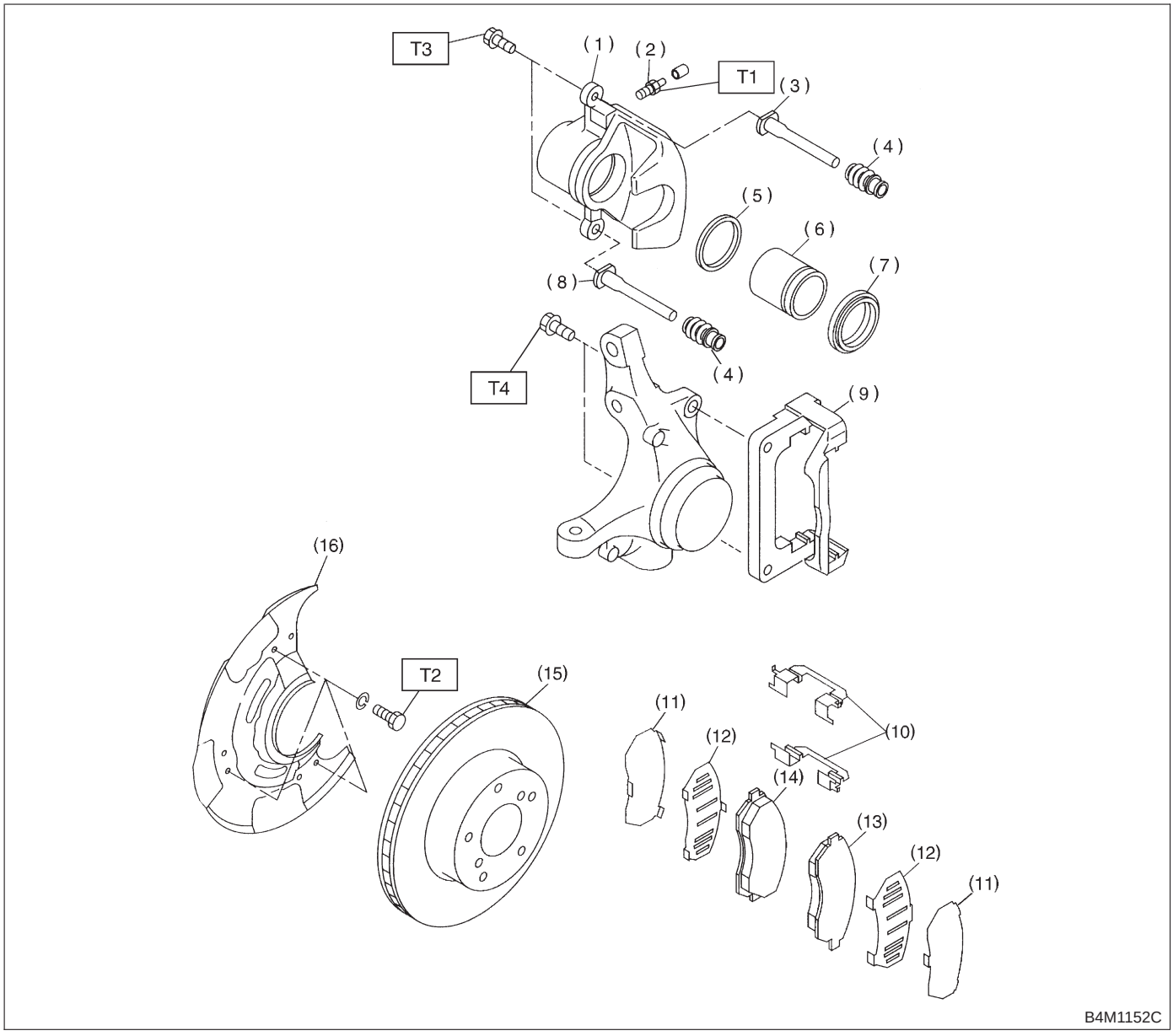
CAUTION:
- **Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading.**
- **When brake fluid is supplemented, be careful not to allow any dust into the reservoir.**
- **Use fresh DOT3 or 4 brake fluid when replacing or refilling the fluid.**

D: BRAKE FLUID LEVEL INDICATOR

Reserve tank with level indicator:
Residual fluid quantity at light ON
Approx. 80 cm^3 (4.88 cu in)
Tank capacity
205 cm^3 (12.51 cu in)

1. Front Disc Brake

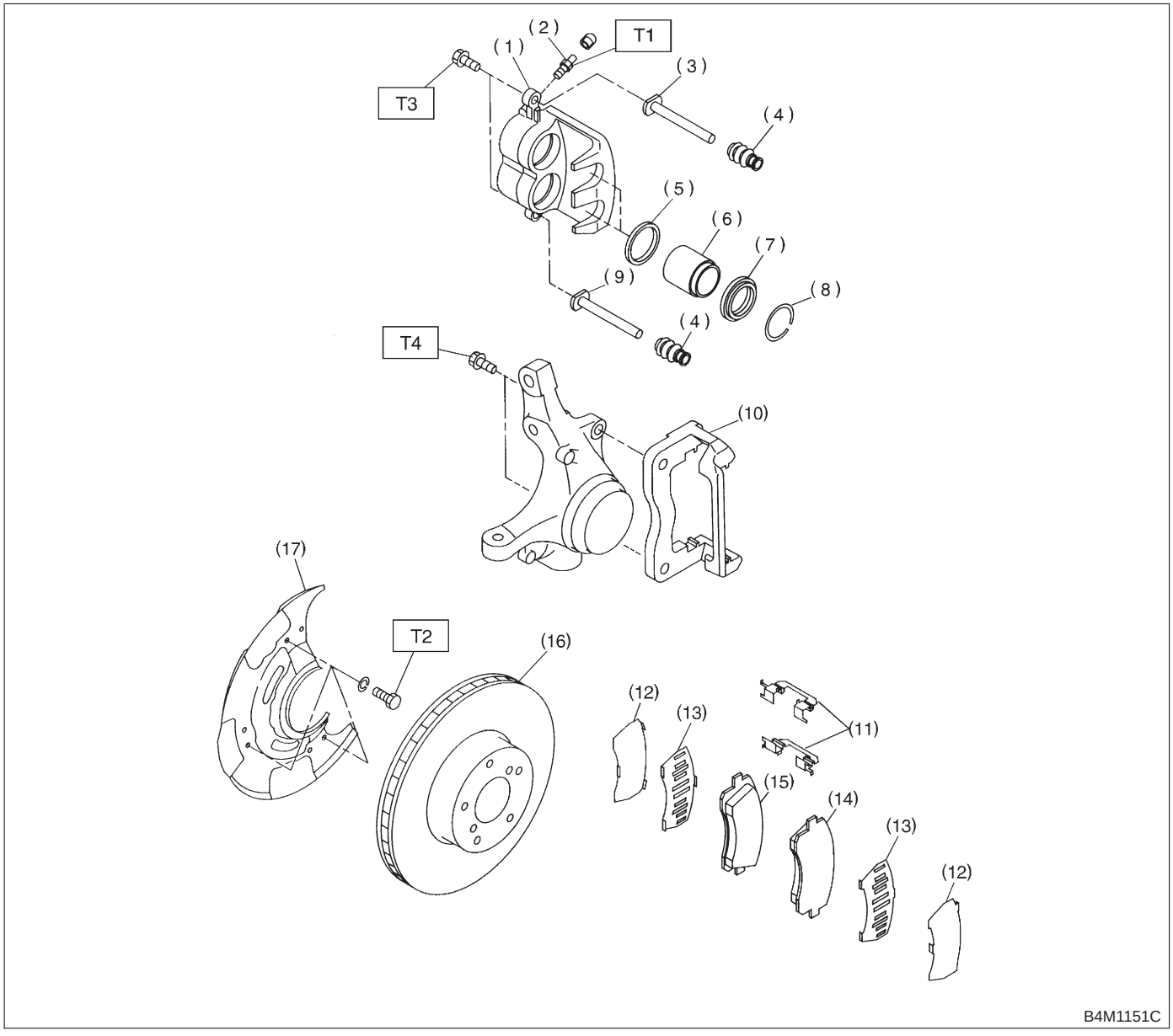
A: EXCEPT 2500 cc MODEL



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 37±5 (3.8±0.5, 27.5±3.6)
T4: 78±10 (8.0±1.0, 58±7)

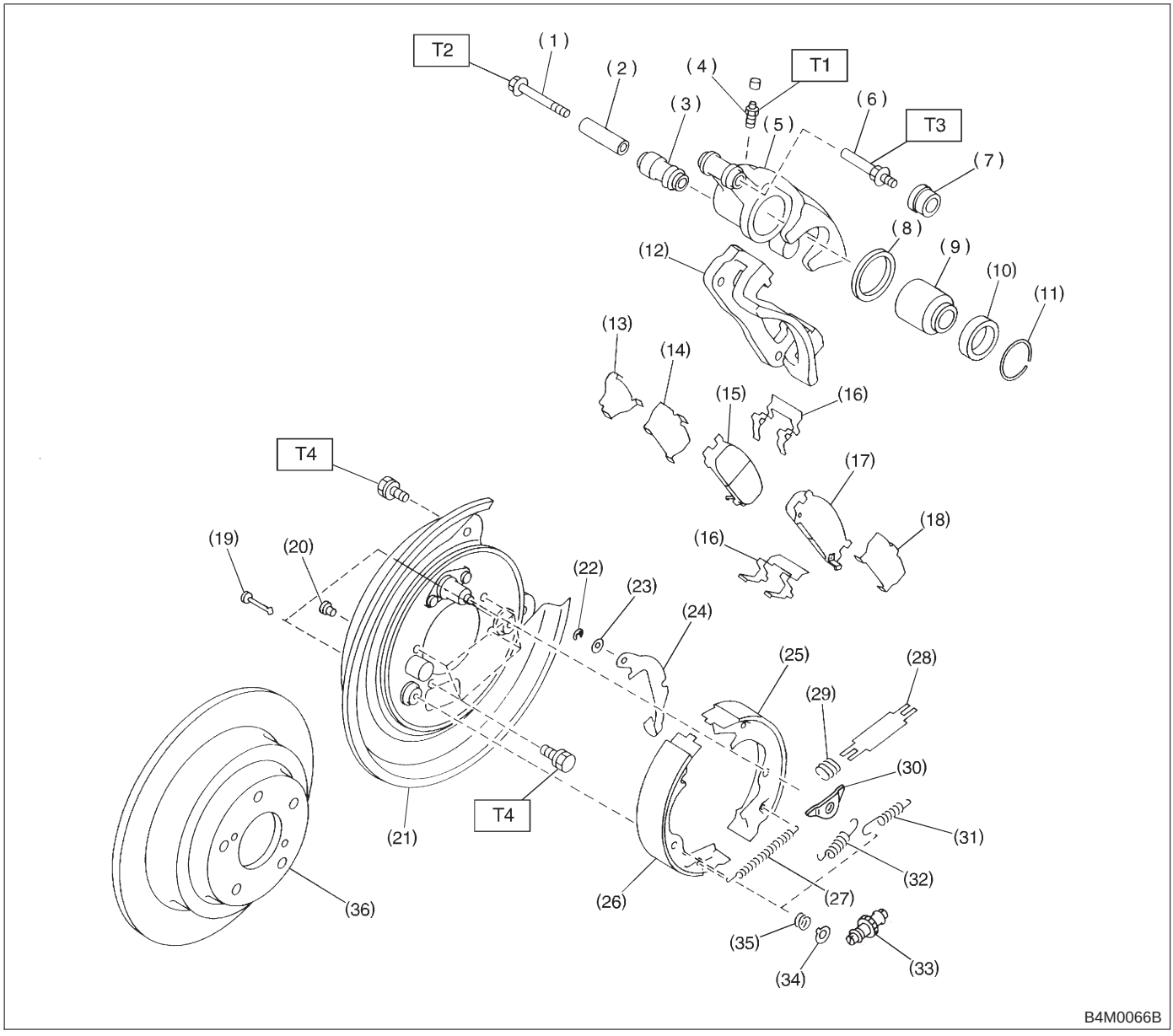
B: 2500 cc MODEL



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Boot ring
(9) Lock pin (Yellow)
(10) Support
(11) Pad clip
(12) Outer shim
(13) Inner shim
(14) Pad (Outside)
(15) Pad (Inside)
(16) Disc rotor
(17) Disc cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 37±5 (3.8±0.5, 27.5±3.6)
T4: 78±10 (8.0±1.0, 58±7)

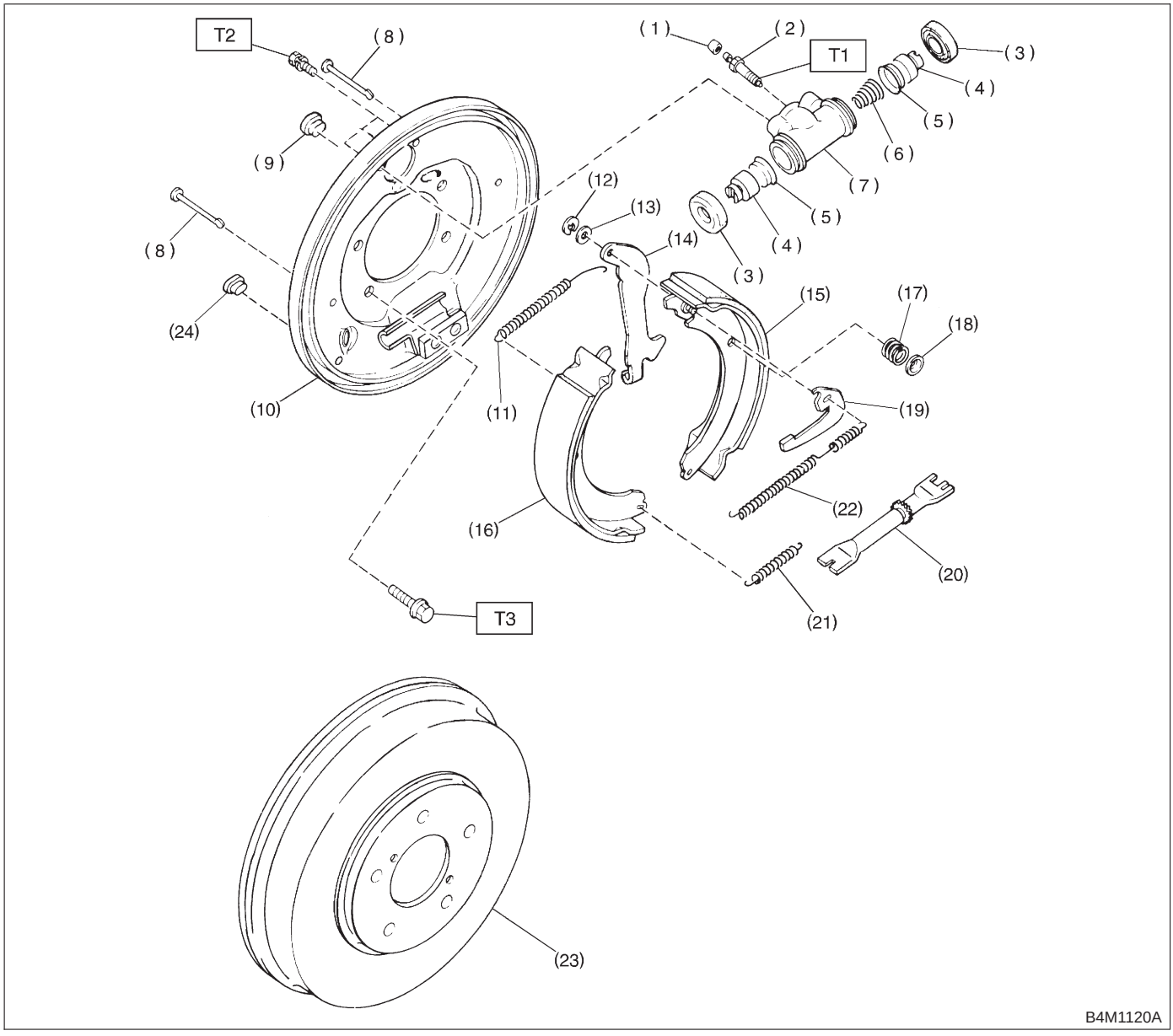
2. Rear Disc Brake



(1) Lock pin
(2) Lock pin sleeve
(3) Lock pin boot
(4) Air bleeder screw
(5) Caliper body
(6) Guide pin
(7) Guide pin boot
(8) Piston seal
(9) Piston
(10) Piston boot
(11) Boot ring
(12) Support
(13) Shim
(14) Inner shim
(15) Inner pad
(16) Pad clip
(17) Outer pad
(18) Outer shim
(19) Shoe hold-down pin
(20) Cover
(21) Back plate
(22) Retainer
(23) Spring washer
(24) Parking brake lever
(25) Parking brake shoe (Secondary)
(26) Parking brake shoe (Primary)
(27) Adjusting spring
(28) Strut
(29) Strut shoe spring
(30) Shoe guide plate
(31) Secondary shoe return spring
(32) Primary shoe return spring
(33) Adjuster
(34) Shoe hold-down cup
(35) Shoe hold-down spring
(36) Disc rotor

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 20±4 (2.0±0.4, 14.5±2.9)
T3: 26±5 (2.7±0.5, 19.5±3.6)
T4: 52±6 (5.3±0.6, 38.3±4.3)

3. Rear Drum Brake

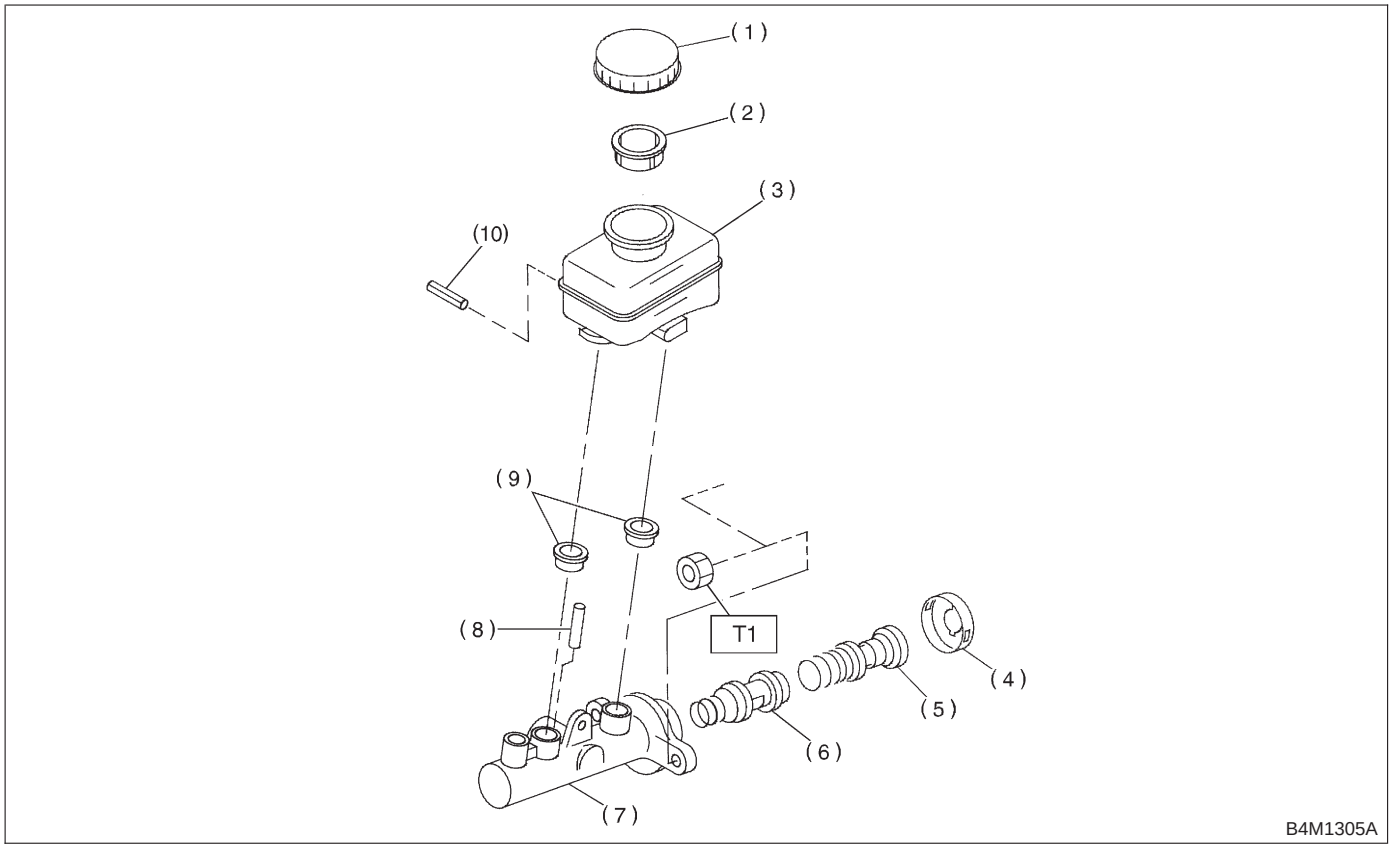


(1) Air bleeder cap
(2) Air bleeder screw
(3) Boot
(4) Piston
(5) Cup
(6) Spring
(7) Wheel cylinder body
(8) Pin
(9) Plug
(10) Back plate
(11) Upper shoe return spring
(12) Retainer
(13) Washer
(14) Parking brake lever
(15) Brake shoe (Trailing)
(16) Brake shoe (Leading)
(17) Shoe hold-down spring
(18) Cup
(19) Adjusting lever
(20) Adjuster
(21) Lower shoe return spring
(22) Adjusting spring
(23) Drum
(24) Plug

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 10±2 (1.0±0.2, 7.2±1.4)
T3: 52±6 (5.3±0.6, 38.3±4.3)

4. Master Cylinder

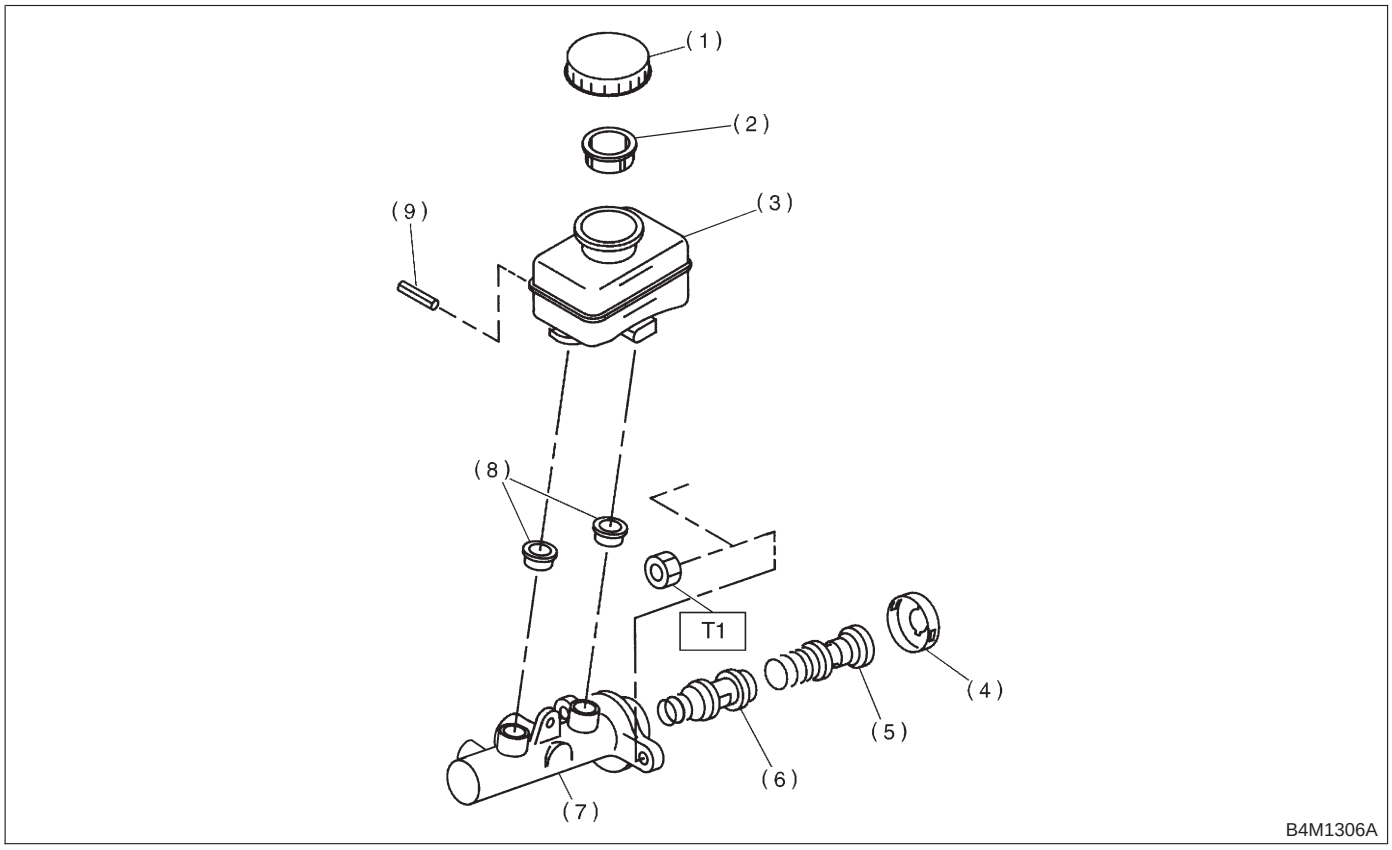
A: LHD MODEL



(1) Cap
(2) Filter
(3) Reservoir tank
(4) Piston retainer
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin (With ABS)
(9) Seal
(10) Pin

Tightening torque: N·m (kg-m, ft-lb)
T1: 14±4 (1.4±0.4, 10.1±2.9)

B: RHD MODEL

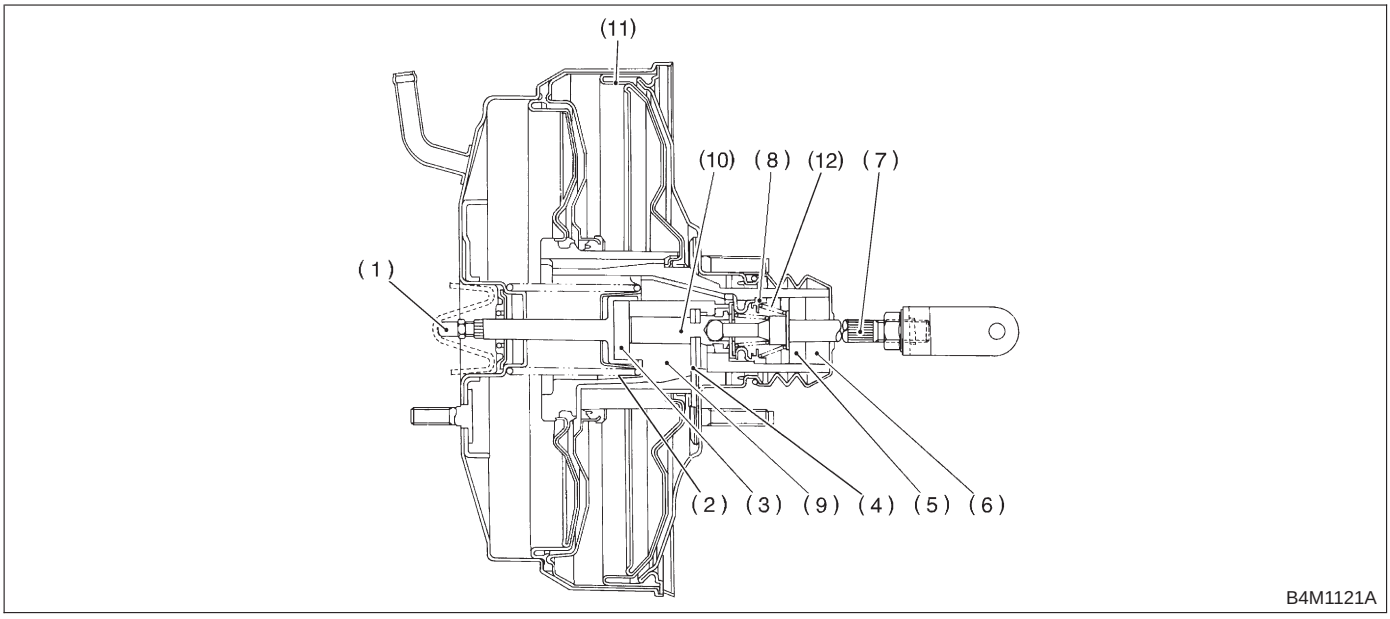


(1) Cap
(2) Filter
(3) Reservoir tank
(4) Piston retainer
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Seal
(9) Pin

Tightening torque: N·m (kg-m, ft-lb)
T1: 14±4 (1.4±0.4, 10.1±2.9)

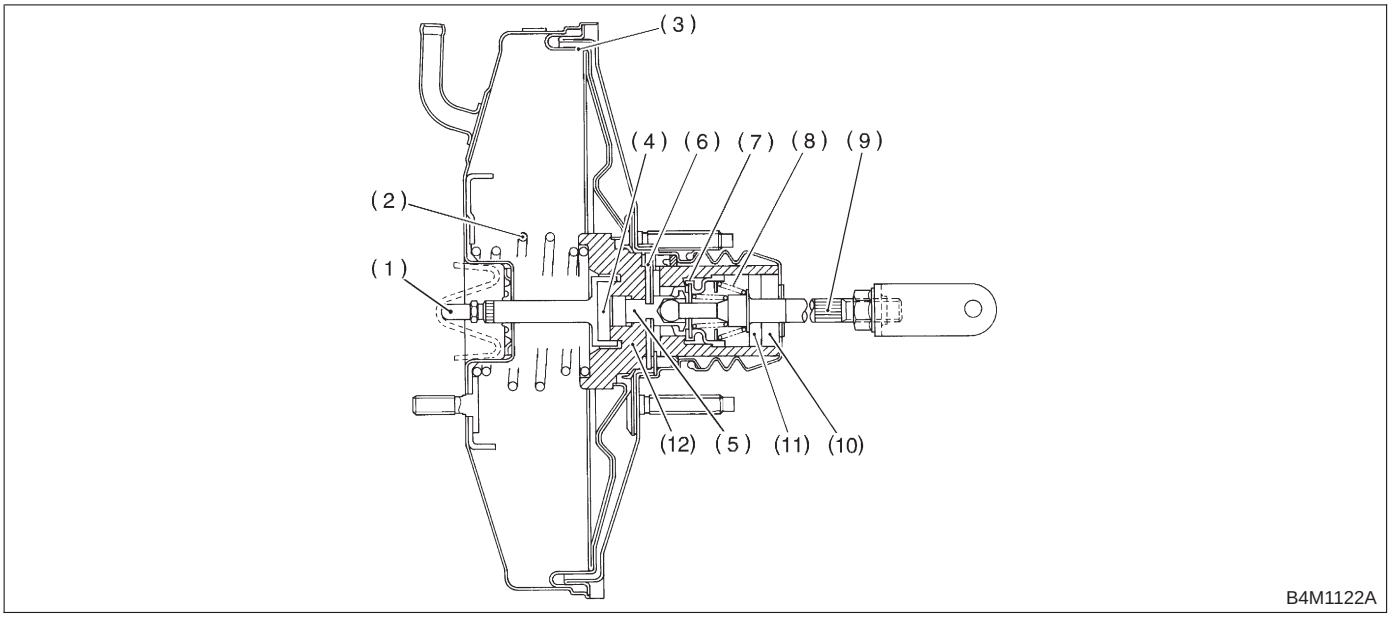
5. Brake Booster

A: MODELS WITH ABS



(1) Push rod
(2) Return spring
(3) Reaction disc
(4) Key
(5) Filter
(6) Silencer
(7) Operating rod
(8) Poppet valve
(9) Valve body
(10) Plunger valve
(11) Diaphragm plate
(12) Valve return spring

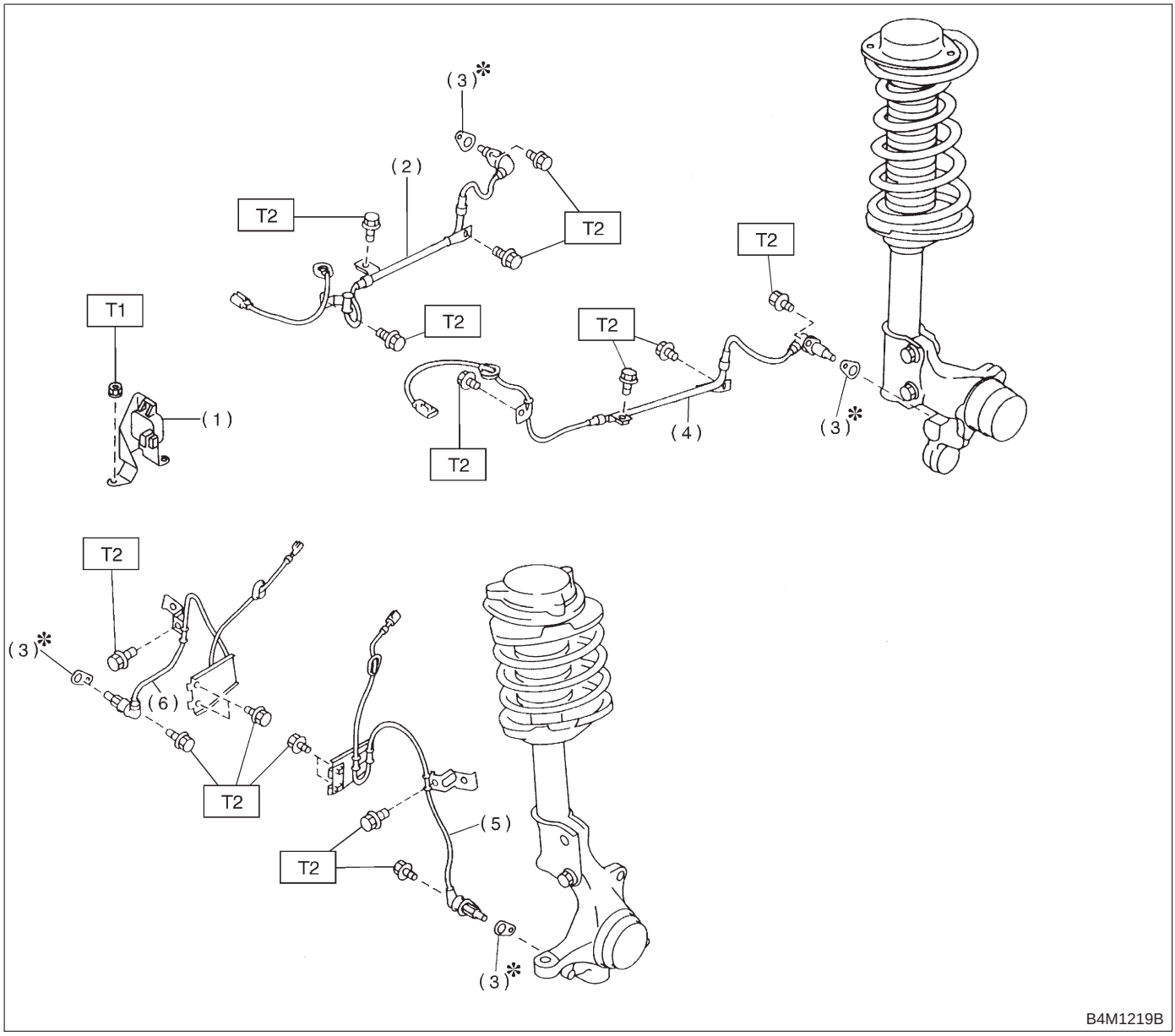
B: MODELS WITHOUT ABS



(1) Push rod
(2) Return spring
(3) Diaphragm plate
(4) Reaction disc
(5) Plunger valve
(6) Key
(7) Poppet valve
(8) Valve return spring
(9) Operating rod
(10) Silencer
(11) Filter
(12) Valve body

6. ABS System

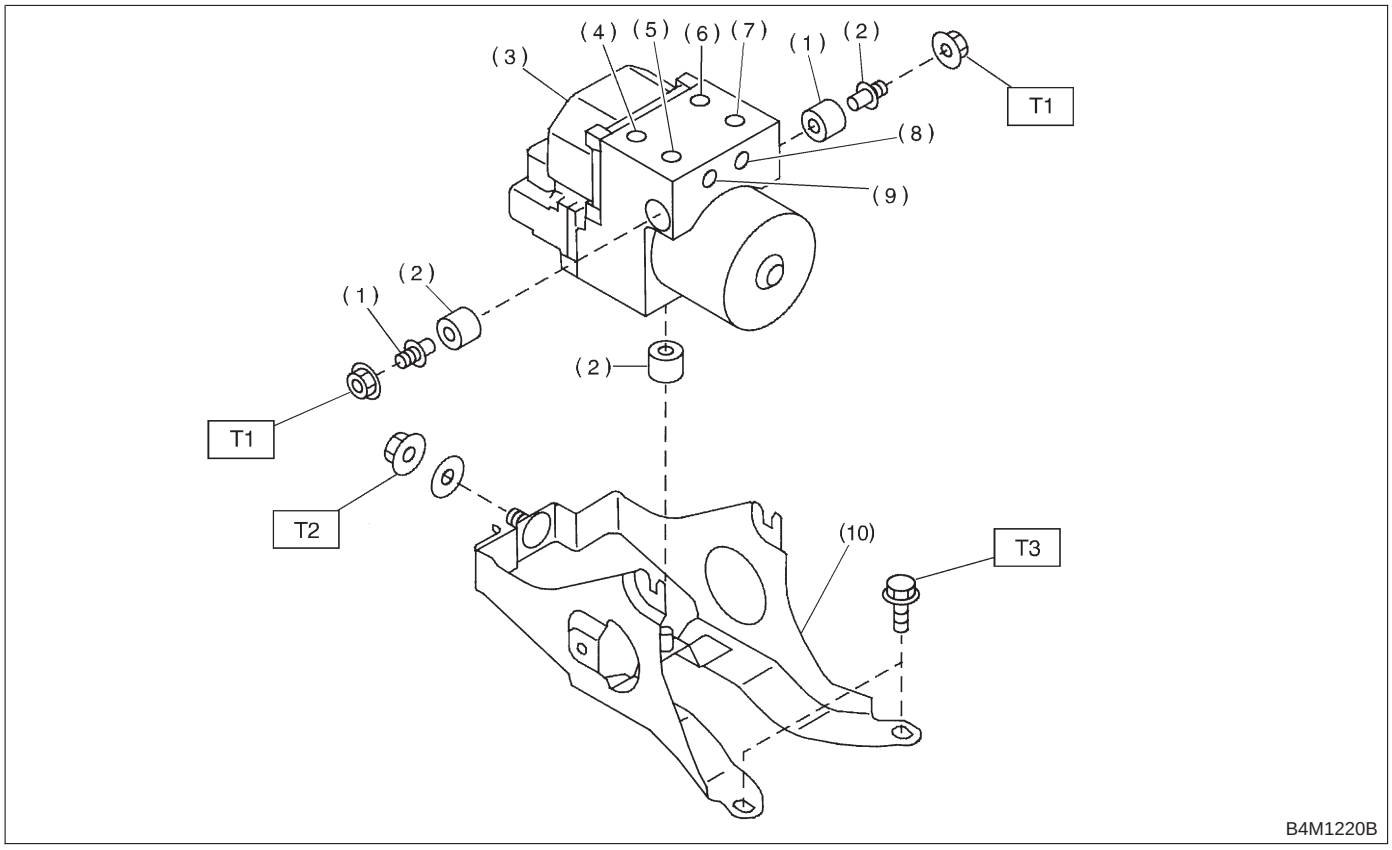
A: SENSOR



(1) G sensor
(2) Rear ABS sensor RH
(3) ABS spacer
(4) Rear ABS sensor LH
(5) Front ABS sensor LH
(6) Front ABS sensor RH

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 32±10 (3.3±1.0, 24±7)

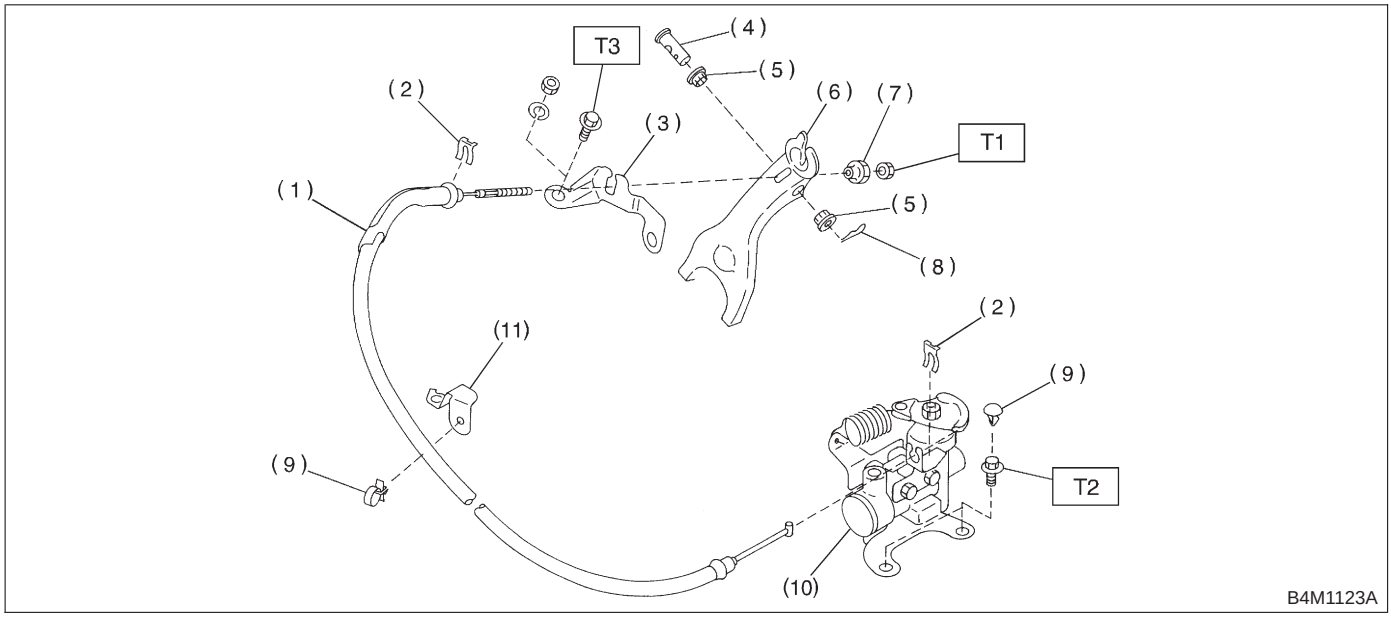
B: ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)



(1) Stud bolt
(2) Damper
(3) ABS control module and hydraulic control unit
(4) Front-LH outlet
(5) Secondary inlet
(6) Front-RH outlet
(7) Primary inlet
(8) Rear-LH outlet
(9) Rear-RH outlet
(10) Bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 18±5 (1.8±0.5, 13.0±3.6)
T2: 29±7 (3.0±0.7, 21.7±5.1)
T3: 32±10 (3.3±1.0, 24±7)

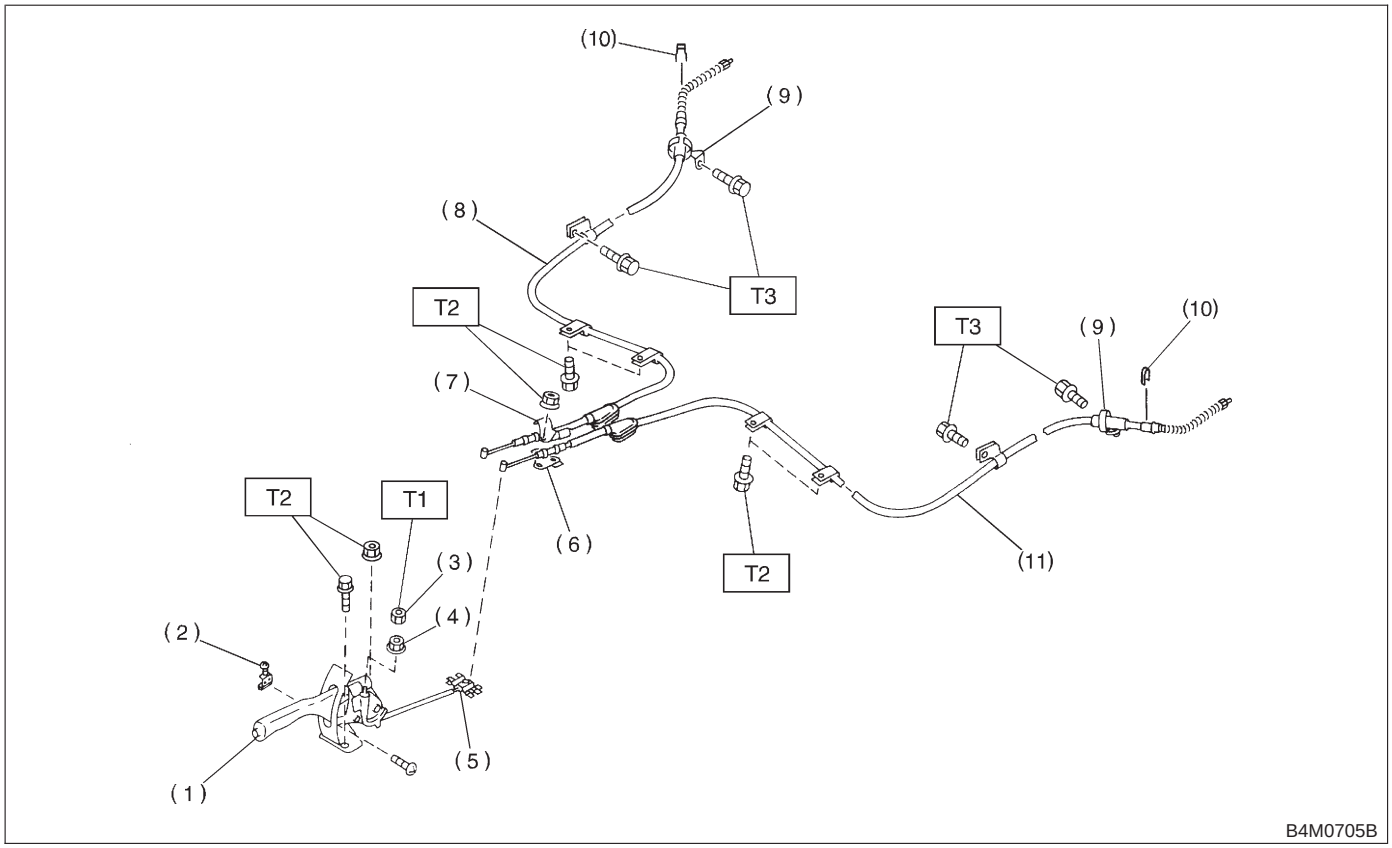
7. Hill Holder



(1) PHV cable
(2) Clamp
(3) Bracket A
(4) Pin
(5) Bushing
(6) Release fork
(7) Adjusting nut
(8) Snap pin
(9) Clip
(10) PHV (Pressure hold valve)
(11) Bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 3.4±1.0 (0.35±0.10, 2.5±0.7)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 33±4 (3.4±0.4, 24.6±2.9)

8. Parking Brake



8. Parking Brake

(1) Parking brake lever
(2) Parking brake switch
(3) Lock nut
(4) Adjusting nut
(5) Equalizer
(6) Bracket
(7) Clamp
(8) Parking brake cable RH
(9) Cable guide
(10) Clamp (Rear disc brake model only)
(11) Parking brake cable LH

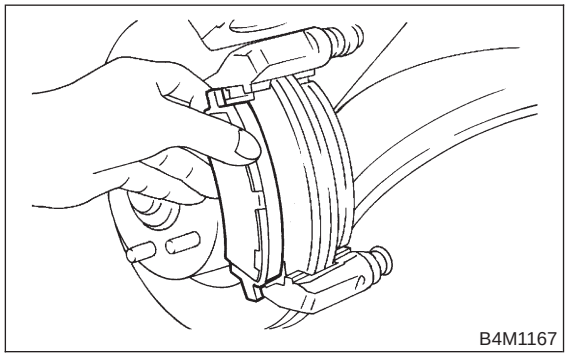
Tightening torque: N·m (kg-m, ft-lb)
T1: 5.9±1.5 (0.60±0.15, 4.3±1.1)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 32±10 (3.3±1.0, 24±7)

1. Front Disc Brake

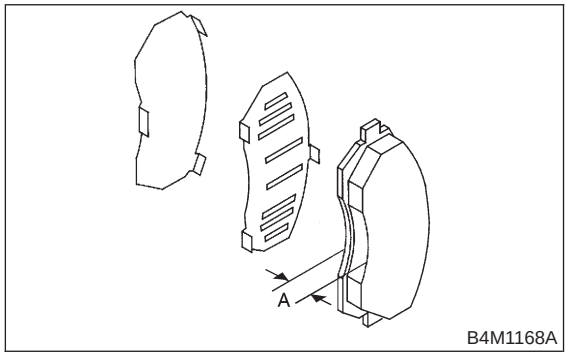
A: ON-CAR SERVICE

1. PAD

1) Remove lock pin.
2) Raise caliper body.
3) Remove pad.


B4M1167

4) Check pad thickness A.

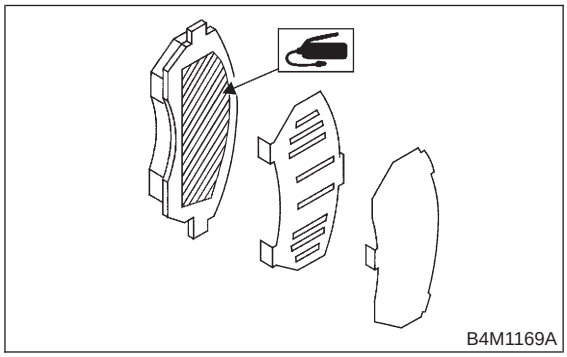


B4M1168A

Pad thickness (including back metal) mm (in)	Standard value	17 (0.67)
	Wear limit	7.5 (0.295)

CAUTION:
● Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
● A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
● Replace pad if there is oil or grease on it.

5) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.

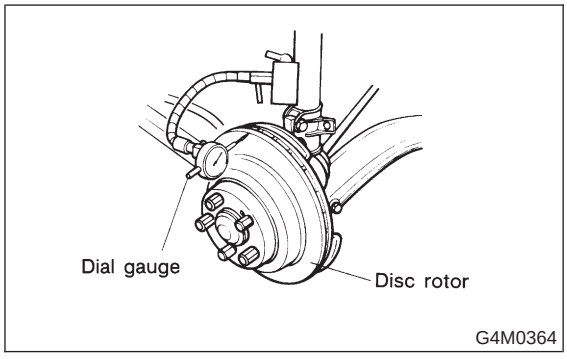

B4M1169A

6) Install pads on support.
7) Install caliper body on support.

NOTE:
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

2. DISC ROTOR

1) Install disc rotor by tightening the five wheel nuts.
2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.

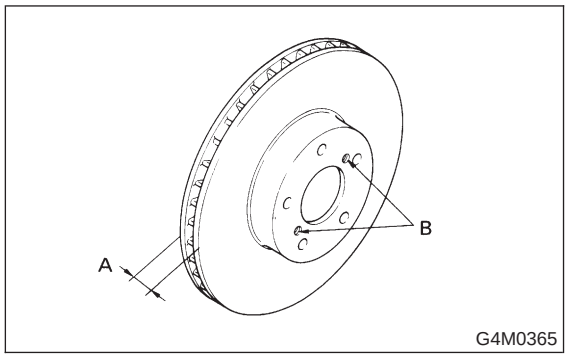


G4M0364

NOTE:
Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor runout limit:
0.075 mm (0.0030 in)

3) Measure disc rotor thickness.

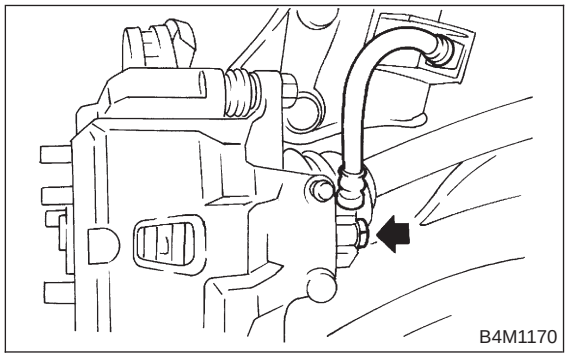


NOTE:
Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

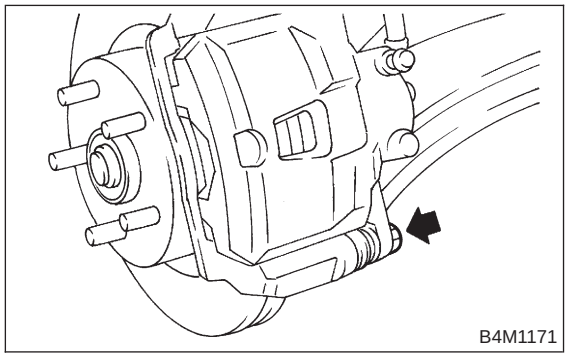
Disc rotor thickness A mm (in)	Standard value	Service limit
	24.0 (0.945)	22.0 (0.866)

B: REMOVAL

1) Remove union bolt and disconnect brake hose from caliper body assembly.

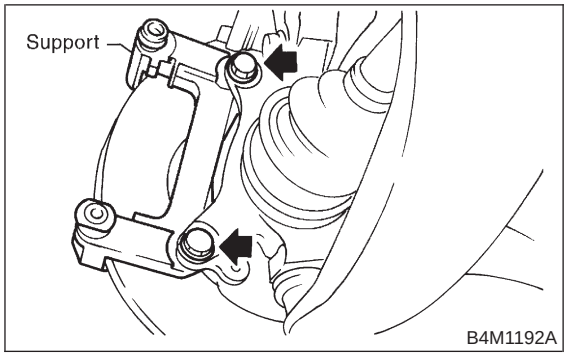


2) Remove bolt securing lock pin to caliper body.



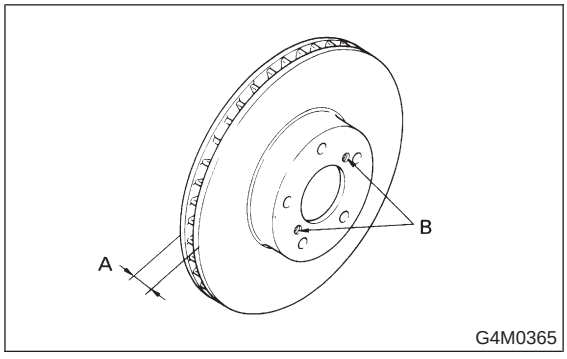
3) Raise caliper body and move it toward vehicle center to separate it from support.
4) Remove support from housing.

NOTE:
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.



5) Remove disc rotor from hub.

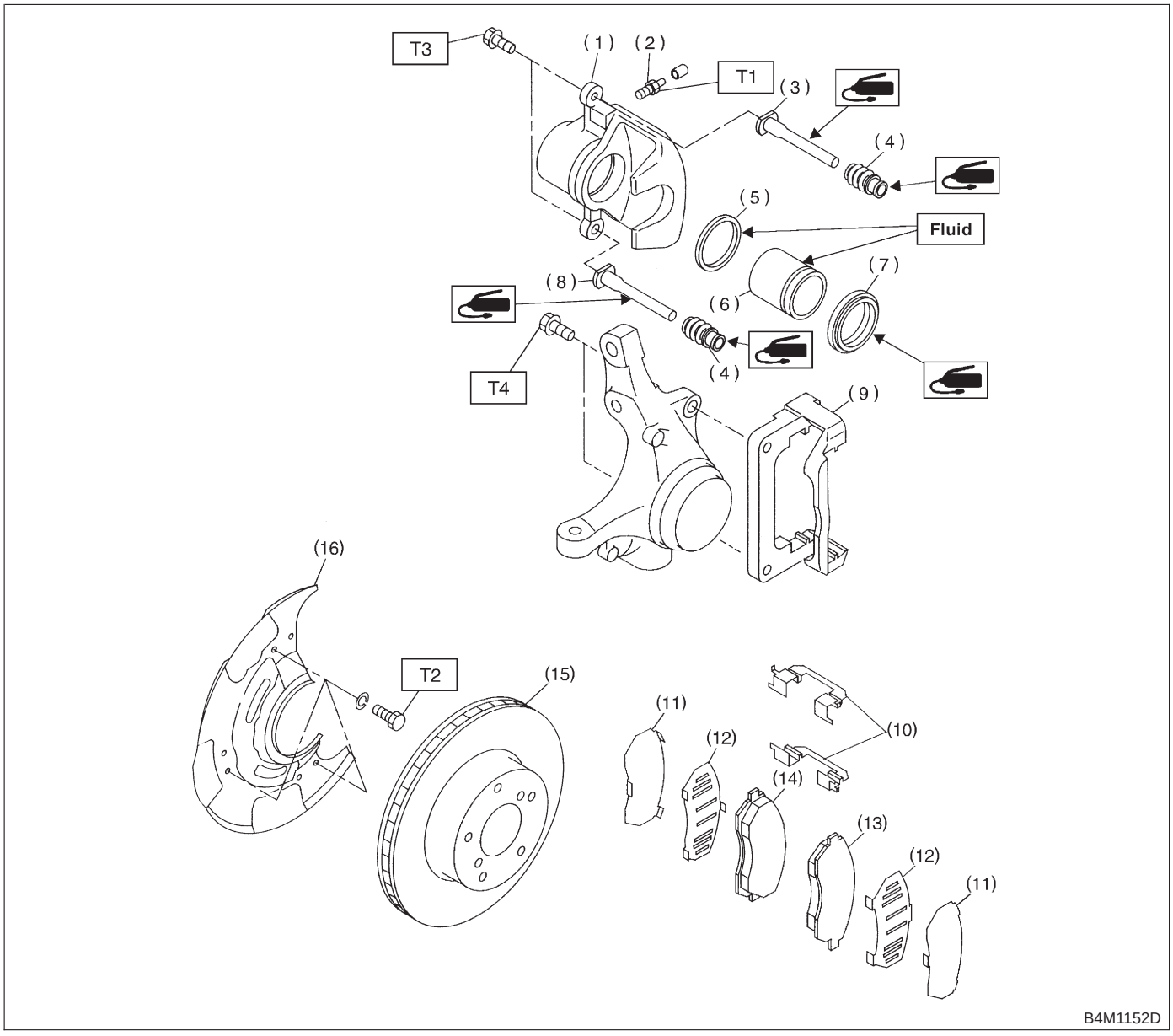
NOTE:
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



6) Clean mud and foreign particles from caliper body assembly and support.

C: DISASSEMBLY

1. EXCEPT 2500 cc MODEL



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover

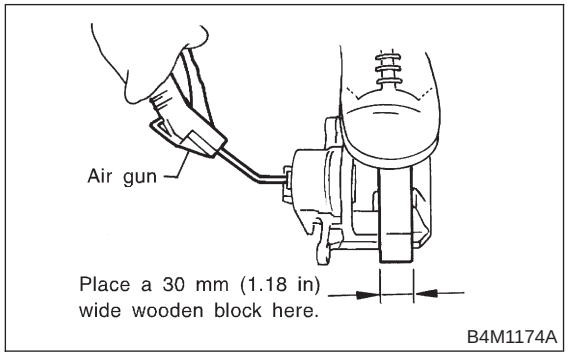
Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 37±5 (3.8±0.5, 27.5±3.6)
T4: 78±10 (8.0±1.0, 58±7)

1) Clean mud and foreign particles from caliper body assembly and support.

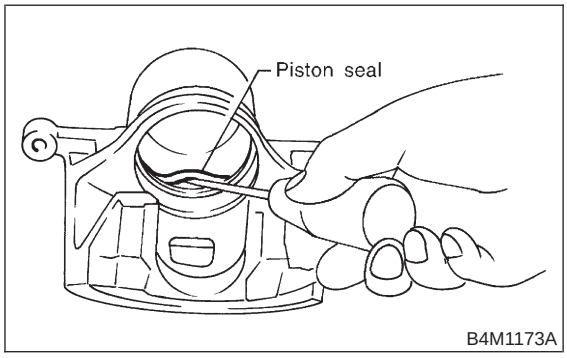
CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

2) Gradually supply compressed air via caliper body brake hose to force piston out.

CAUTION:
- **Place a wooden block as shown in Figure to prevent damage to piston.**
- **Do not apply excessively high-pressure.**

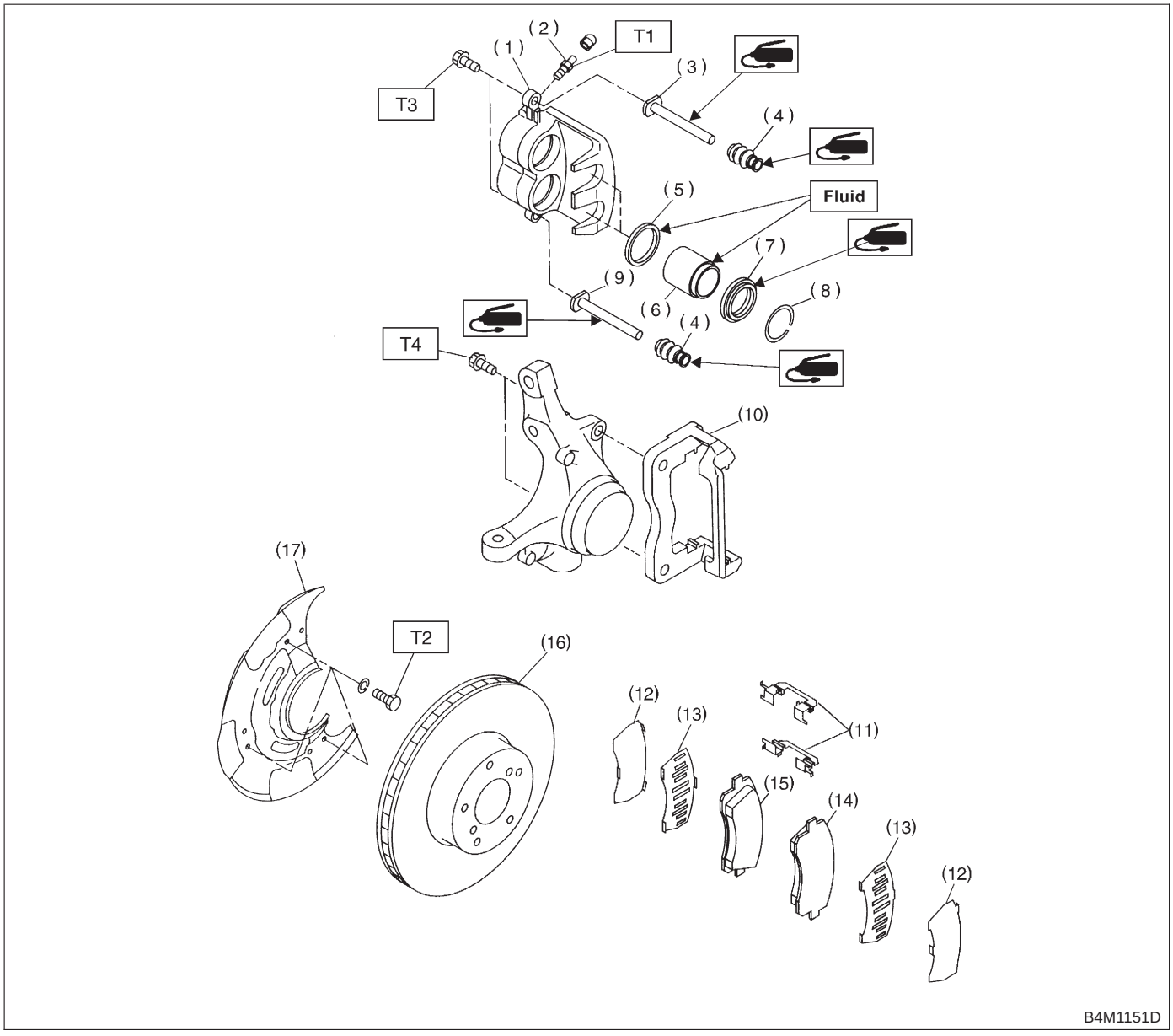


3) Remove piston boot.
4) Remove piston seal from caliper body cylinder.



5) Remove guide pin and boot from caliper body.

2. 2500 cc MODEL



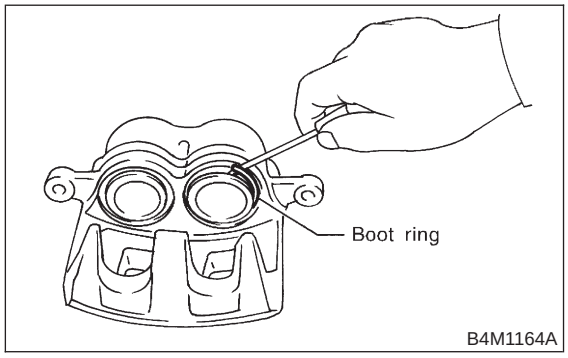
(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Boot ring
(9) Lock pin (Yellow)
(10) Support
(11) Pad clip
(12) Outer shim
(13) Inner shim
(14) Pad (Outside)
(15) Pad (Inside)
(16) Disc rotor
(17) Disc cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 37±5 (3.8±0.5, 27.5±3.6)
T4: 78±10 (8.0±1.0, 58±7)

1) Clean mud and foreign particles from caliper body assembly and support.

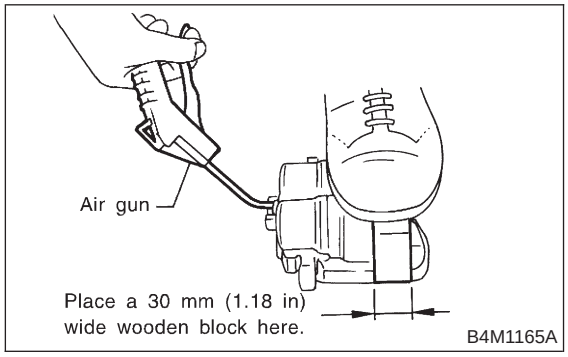
CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

2) Using a standard screwdriver, remove boot ring from piston.

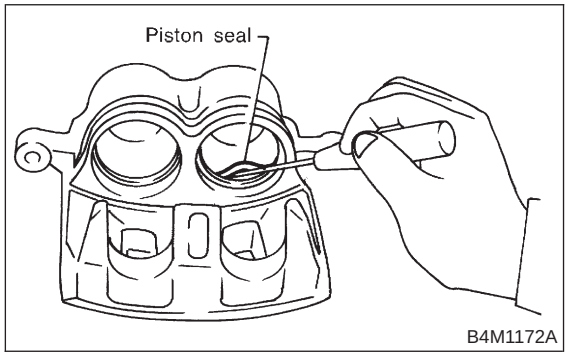


3) Remove boot from piston end.
4) Gradually supply compressed air via caliper body brake hose to force piston out.

CAUTION:
Place a wooden block as shown in Figure to prevent damage to piston.



5) Remove piston seal from caliper body cylinder.



6) Remove lock pin boot and guide pin boot.

D: INSPECTION

1) Repair or replace faulty parts.
2) Check caliper body and piston for uneven wear, damage or rust.
3) Check rubber parts for damage or deterioration.

E: ASSEMBLY

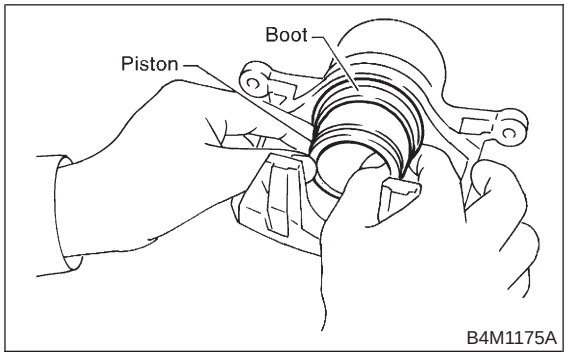
1. EXCEPT 2500 cc MODEL

1) Clean caliper body interior using brake fluid.
2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and install piston boot onto cylinder.

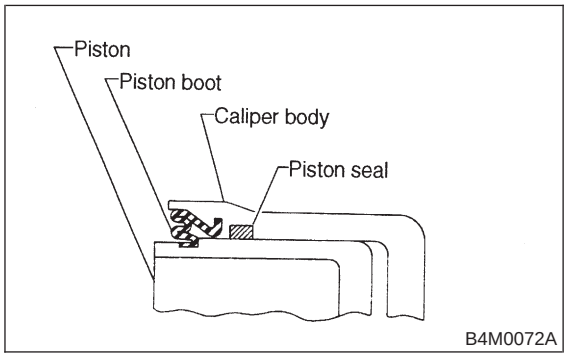
Grease:
NIGLUBE RX-2 (Part No. 003606000)

5) Insert piston into cylinder.

CAUTION:
Do not force piston into cylinder.

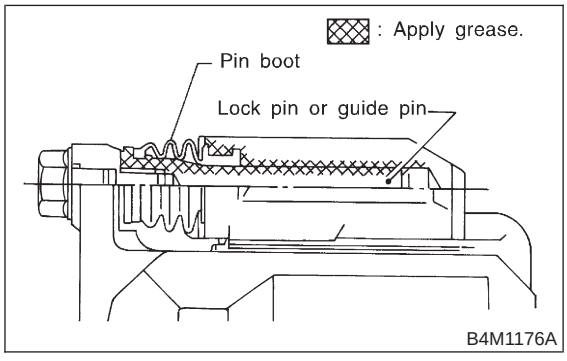


6) Position boot in grooves on cylinder and piston.



7) Apply a coat of specified grease to lock pin and guide pin outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. 003606000)

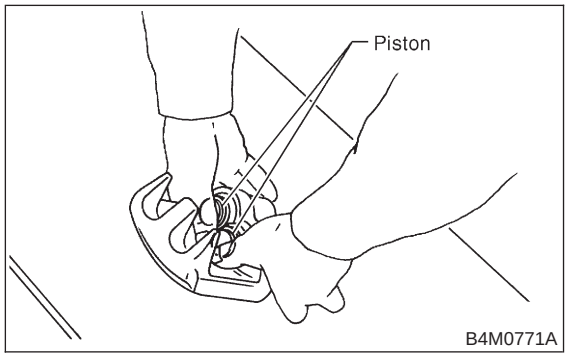


8) Install lock and guide pin boot on support.

2. 2500 cc MODEL

1) Clean caliper body interior using brake fluid.
2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Insert piston into cylinder.

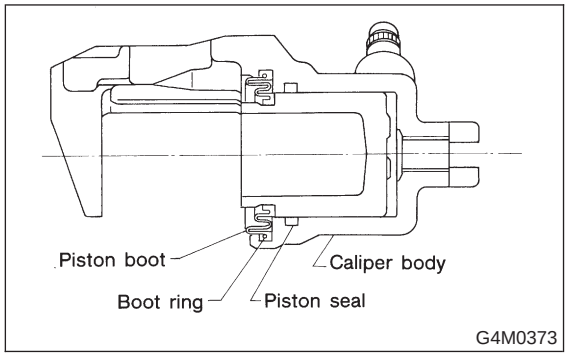
CAUTION:
Do not force piston into cylinder.



5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

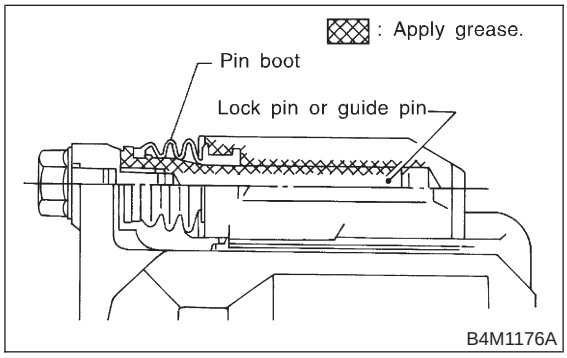
Grease:
NIGLUBE RX-2 (Part No. 003606000)

To facilitate installation, fit boot starting with piston end.



6) Position boot in grooves on cylinder and piston.
7) Install boot ring. Be careful not scratch boot.
8) Apply a coat of specified grease to lock pin and guide pin, outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. 003606000)



9) Install lock pin boot and guide pin boot on support.

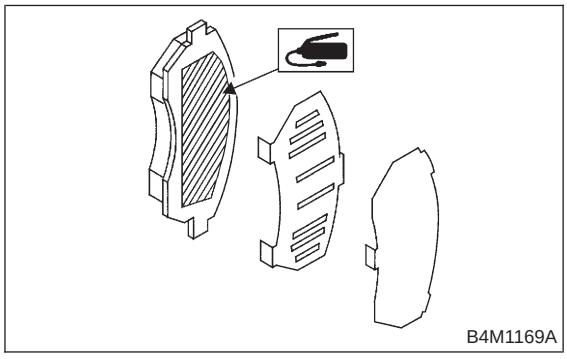
F: INSTALLATION

1) Install disc rotor on hub.
2) Install support on housing.

Tightening torque:
78±10 N·m (8±1 kg-m, 58±7 ft-lb)

CAUTION:
- **Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.**
- **A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.**
- **When replacing the pad, replace pads of the right and left wheels at the same time.**

3) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.



4) Install pads, rubber coated shim and stainless shim on support.
5) Install caliper body on support.

Tightening torque:
39±5 N·m (4±0.5 kg-m, 28.9±3.6 ft-lb)

6) Connect brake hose.

Tightening torque:
18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)

CAUTION:
Replace brake hose gaskets with new ones.

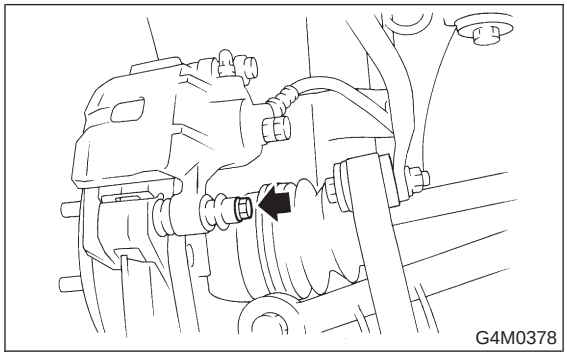
7) Bleed air from brake system.

2. Rear Disc Brake

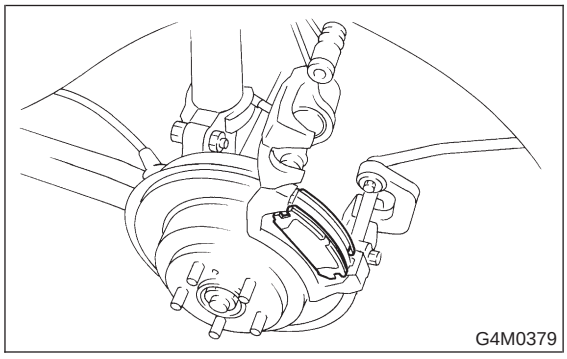
A: ON-CAR SERVICE

1. PAD

1) Remove lock pin.

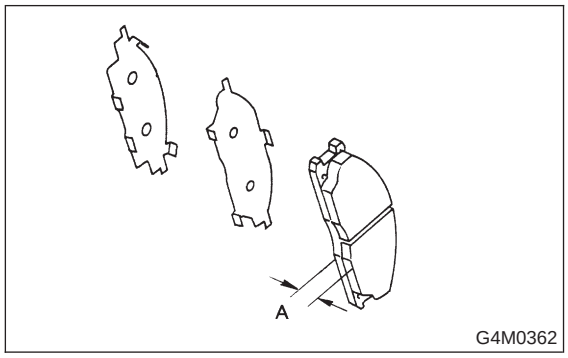


2) Raise caliper body.
3) Remove pad from support.



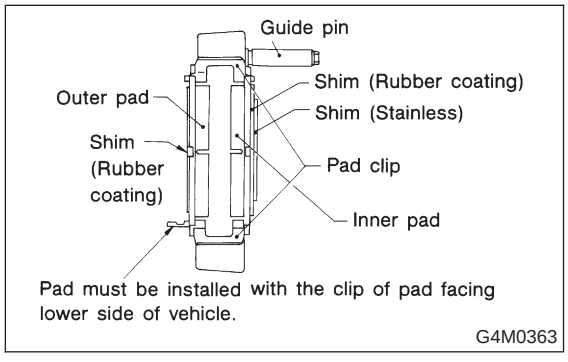
4) Check pad thickness (including back metal).

Pad thickness: A
Standard value
15.0 mm (0.591 in)
Wear limit
6.5 mm (0.256 in)



CAUTION:
● Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
● A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
● Replace pad if there is oil or grease on it.

5) Apply thin coat of PBC GREASE (Part No. 03607000) to the frictional portion between pad and pad clip.
6) Install pad on support.



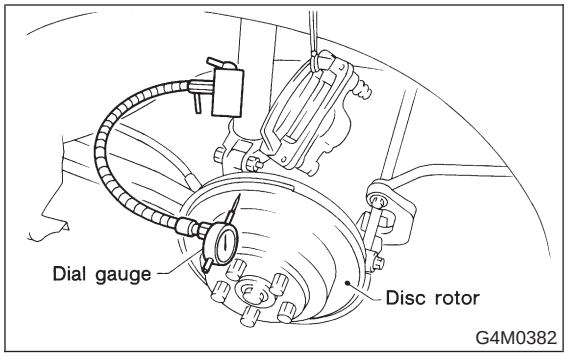
7) Install caliper body on support.

Tightening torque:
20±4 N·m (2.0±0.4 kg-m, 14.5±2.9 ft-lb)

NOTE:
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

2. DISC ROTOR

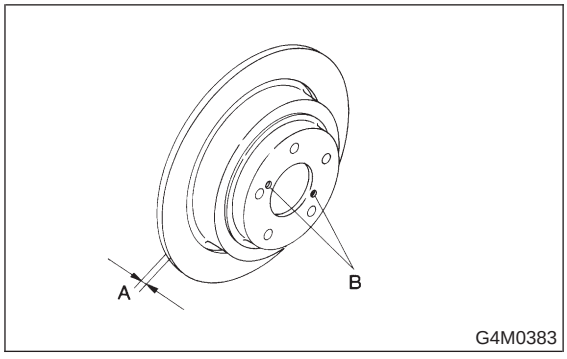
1) Install disc rotor by tightening the five wheel nuts.
2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.



NOTE:
Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor runout limit:
0.1 mm (0.004 in)

3) Measure disc rotor thickness.

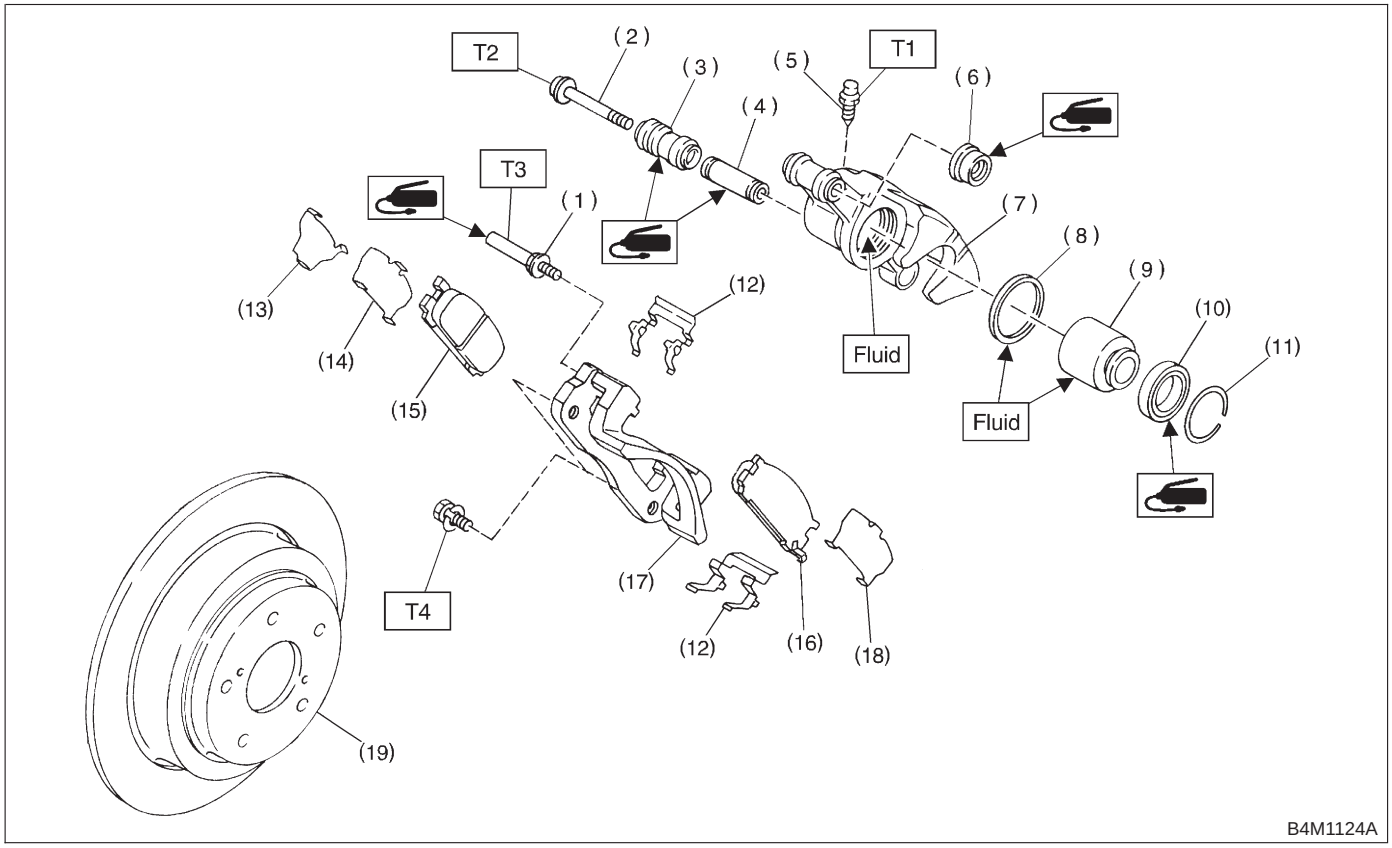


NOTE:
Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor thickness: A
Standard value
10 mm (0.39 in)
Service limit
8.5 mm (0.335 in)

NOTE:
When removing disc rotor, refer to instructions under Parking Brake. <Ref. to 4-4 [W4A0].>

B: REMOVAL



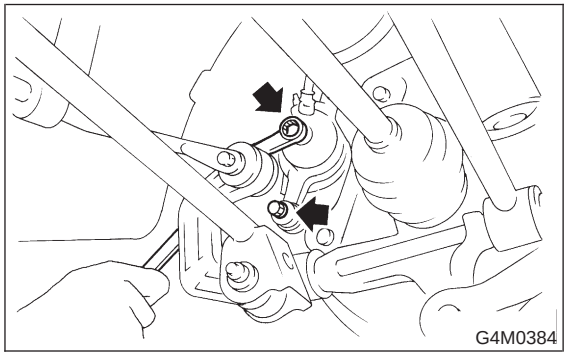
(1) Guide pin
(2) Lock pin
(3) Lock pin boot
(4) Lock pin sleeve
(5) Air bleeder screw
(6) Guide pin boot
(7) Caliper body
(8) Piston seal
(9) Piston
(10) Piston boot
(11) Boot ring
(12) Pad clip
(13) Shim
(14) Inner shim
(15) Inner pad
(16) Outer pad
(17) Support
(18) Outer shim
(19) Disc rotor

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 20±4 (2.0±0.4, 14.5±2.9)
T3: 26±5 (2.7±0.5, 19.5±3.6)
T4: 52±6 (5.3±0.6, 38.3±4.3)

1) Lift-up vehicle and remove wheels.

2) Disconnect brake hose from caliper body assembly.

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wipe off completely if spilled.



3) Remove lock pin.

4) Raise caliper body and move it toward vehicle center to separate it from support.
5) Remove support from back plate.

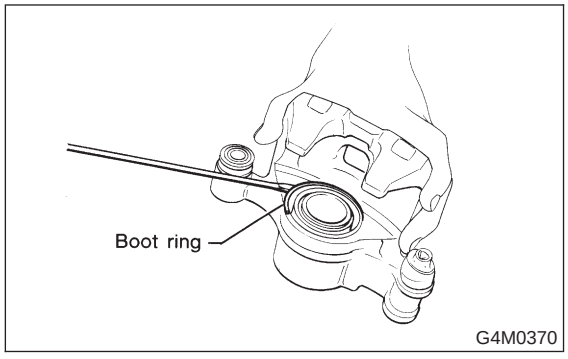
NOTE:
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.

6) Clean mud and foreign particles from caliper body assembly and support.

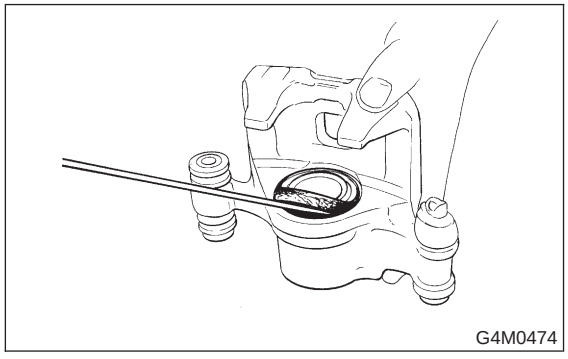
CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

C: DISASSEMBLY

1) Remove the boot ring.

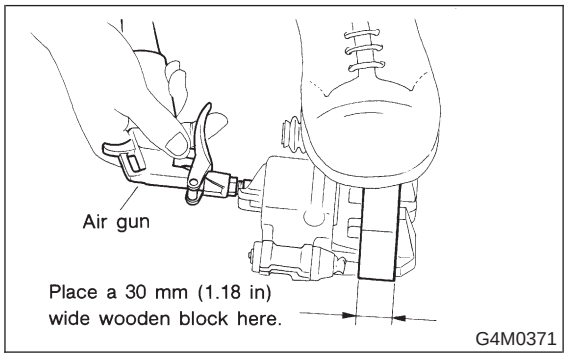


2) Remove the piston boot.

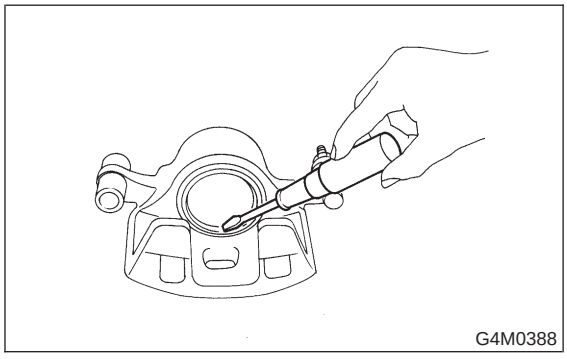


3) Gradually supply compressed air via inlet of caliper body to force piston out.

CAUTION:
- **Place a wooden block as shown in Figure to prevent damage to piston.**
- **Do not apply excessively high-pressure.**



4) Remove piston seal from caliper body cylinder.



5) Remove lock pin sleeve and boot from caliper body.
6) Remove guide pin boot.

D: INSPECTION

1) Repair or replace faulty parts.
2) Check caliper body and piston for uneven wear, damage or rust.
3) Check rubber parts for damage or deterioration.

E: ASSEMBLY

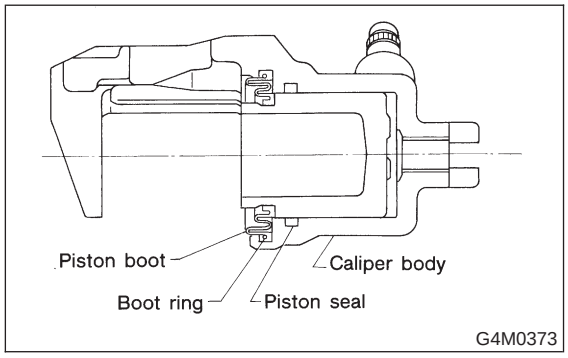
1) Clean caliper body interior using brake fluid.
2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Insert piston into cylinder.

CAUTION:
Do not force piston into cylinder.

5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

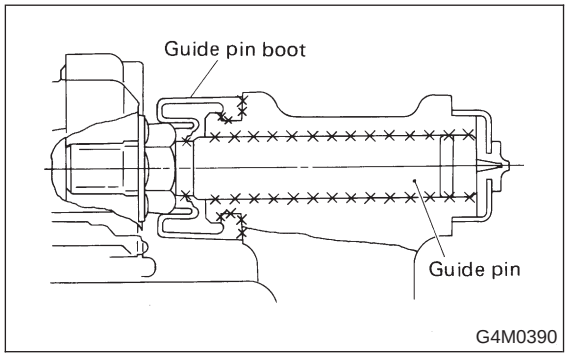
Grease
NIGLUBE RX-2 (Part No. 003606000)

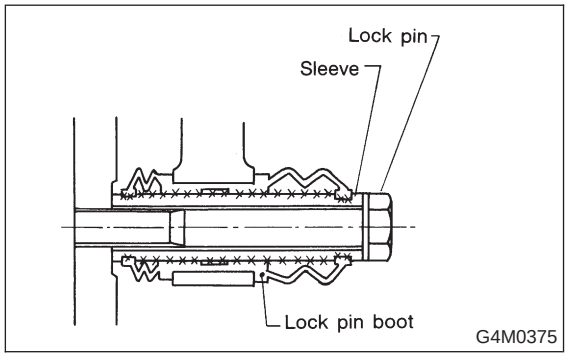
6) Install the piston boot to the caliper body, and attach boot ring.



7) Apply a coat of specified grease to guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.

Grease
NIGLUBE RX-2 (Part No. 003606000)





8) Install guide pin boot on caliper body.
9) Install lock pin boot on caliper body and insert lock pin sleeve into place.

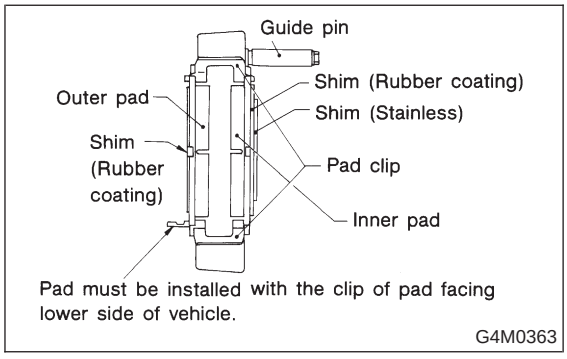
F: INSTALLATION

1) Install disc rotor on hub.
2) Install support on back plate.

Tightening torque:
52±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)

CAUTION:
● Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
● A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
● Replace pads if there is oil or grease on them.

3) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.
4) Install pads on support.



5) Install caliper body on support.

Tightening torque:
20±4 N·m (2.0±0.4 kg-m, 14.5±2.9 ft-lb)

6) Connect brake hose.

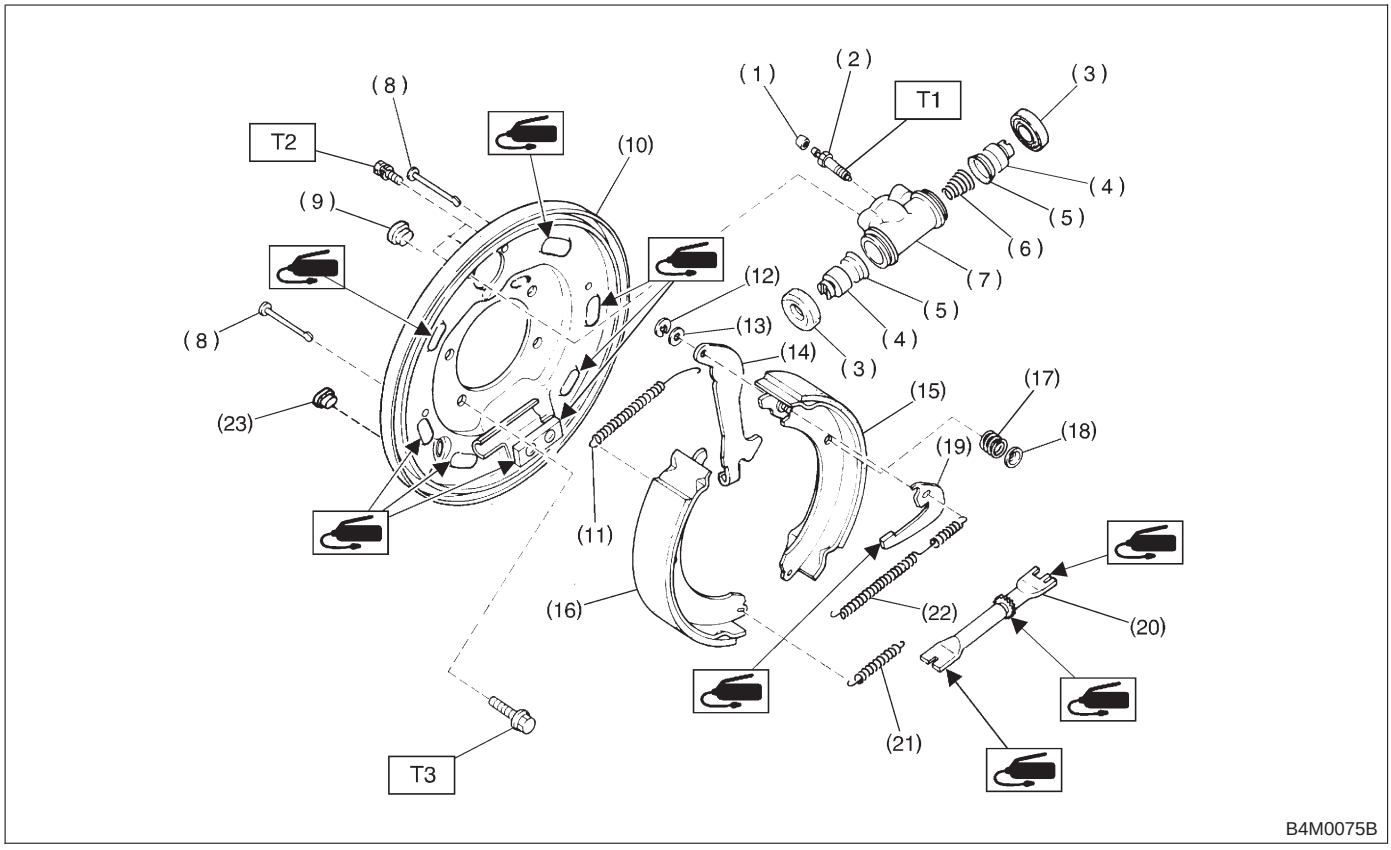
Tightening torque:
18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)

CAUTION:
● The brake hose must be connected without any twist.
● Replace brake hose gaskets with new ones.

7) Bleed air from brake system.

3. Rear Drum Brake

A: REMOVAL

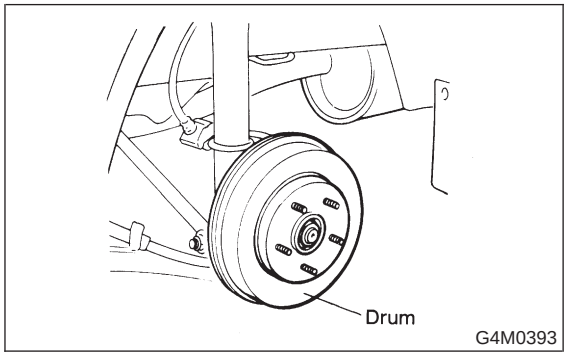


(1) Air bleeder cap
(2) Air bleeder screw
(3) Boot
(4) Piston
(5) Cup
(6) Spring
(7) Wheel cylinder body
(8) Pin
(9) Plug
(10) Back plate
(11) Upper shoe return spring
(12) Retainer
(13) Washer
(14) Parking brake lever
(15) Brake shoe (Trailing)
(16) Brake shoe (Leading)
(17) Shoe hold-down spring
(18) Cup
(19) Adjusting lever
(20) Adjuster
(21) Lower shoe return spring
(22) Adjusting spring
(23) Plug

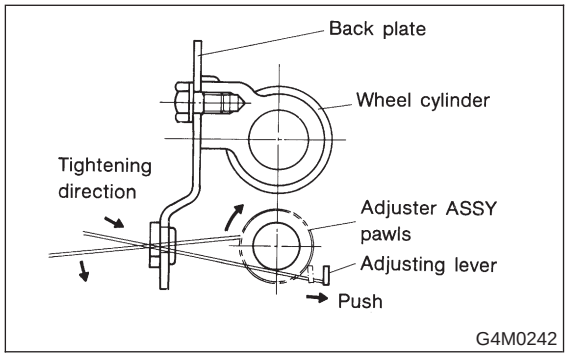
Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 10±2 (1.0±0.2, 7.2±1.4)
T3: 52±6 (5.3±0.6, 38.3±4.3)

1. BRAKE DRUM AND SHOE

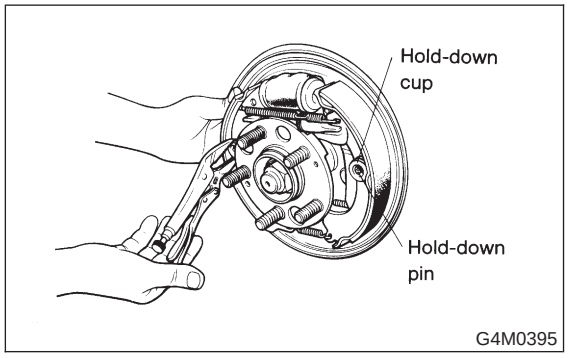
1) Loosen wheel nuts, jack-up vehicle, support it with rigid racks, and remove wheel.
2) Release parking brake.
3) Remove brake drum from brake assembly.



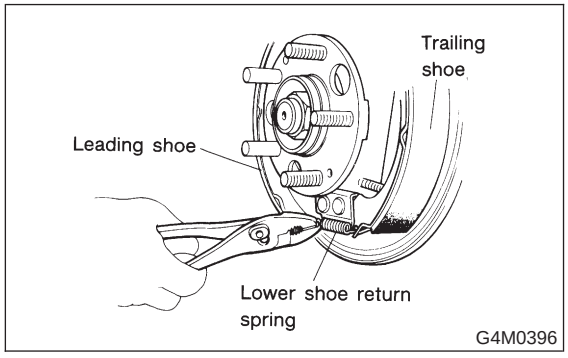
NOTE:
If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then, turn adjuster assembly pawls using a slot-type screwdriver until brake shoe separates from the drum.



4) Hold hold-down pin by securing rear of back plate with your hand.

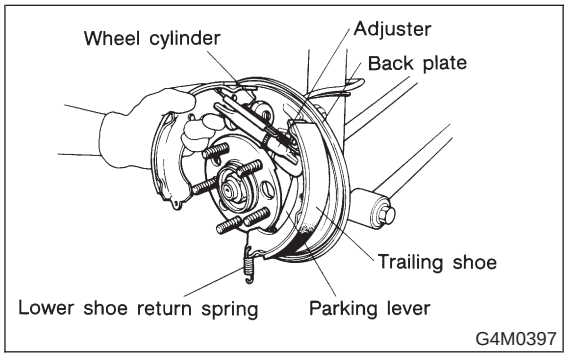


5) Disconnect hold-down cup from hold-down pin by rotating hold-down cup.
6) Disconnect lower shoe return spring from shoes.

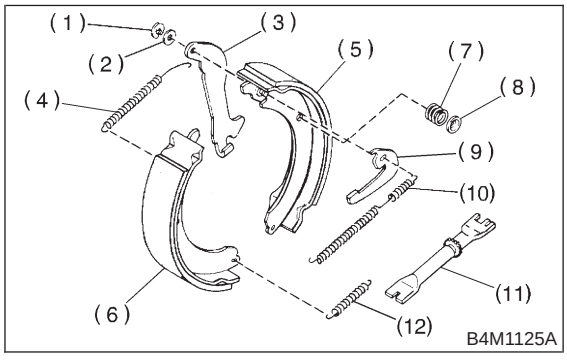


7) Remove shoes one by one from back plate with adjuster.

CAUTION:
Be careful not to bend parking brake cable excessively when removing brake shoes.



8) Disconnect parking brake cable from parking lever.
9) Remove the following:

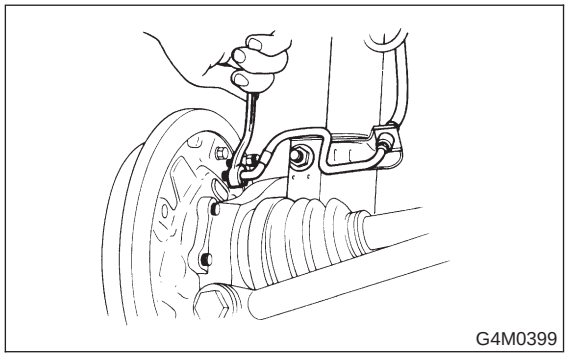


(1) Retainer
(2) Washer
(3) Parking lever
(4) Upper shoe return spring
(5) Trailing shoe
(6) Leading shoe
(7) Shoe hold-down spring
(8) Shoe hold-down cup
(9) Adjusting lever
(10) Adjusting spring
(11) Adjuster
(12) Lower shoe return spring

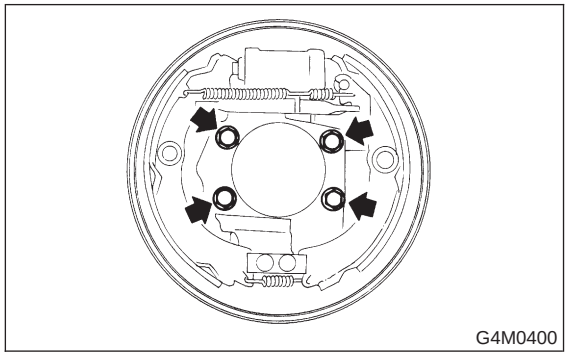
2. BRAKE ASSEMBLY

1) Remove wheel.
2) Remove axle nut.
3) Remove brake drum

4) Unscrew the brake pipe flare nut and disconnect brake pipe.

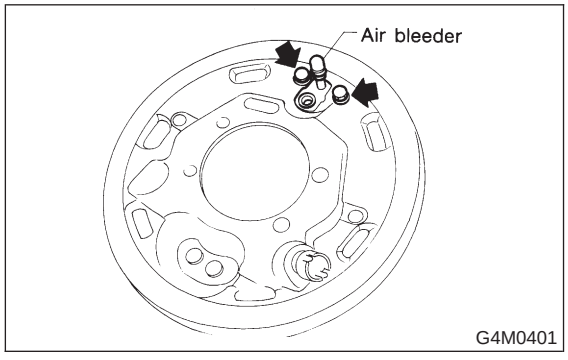

G4M0399

5) Remove hub. <Ref. to 4-2 [W2A0].> and <Ref. to 4-2 [W3A0].>
6) Remove the bolts installing back plate, and then, remove brake assembly.


G4M0400

3. WHEEL CYLINDER

1) Remove brake drum and shoes.
2) Unscrew brake pipe flare nut; and disconnect brake pipe.
3) Remove the bolts installing wheel cylinder on back plate, and remove it.

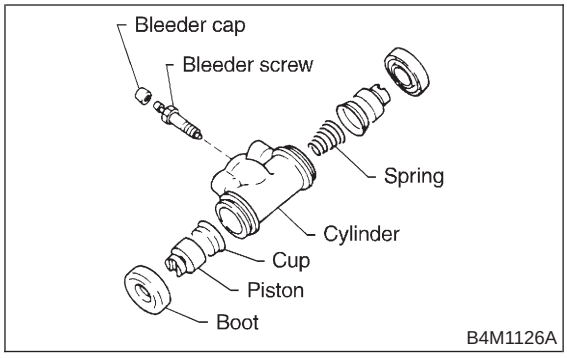


G4M0401

B: DISASSEMBLY

1. WHEEL CYLINDER

1) Remove right and left dust boots from wheel cylinder.



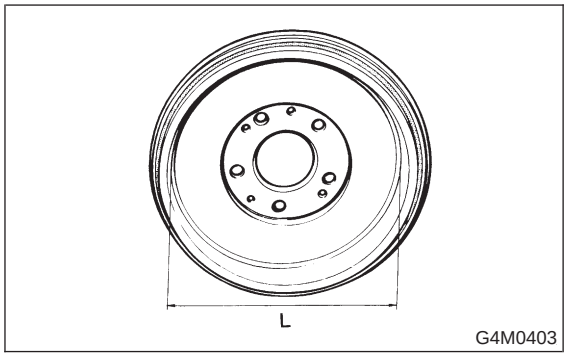
B4M1126A

2) Remove piston, cup, spring and air bleeder screw and cap.

C: INSPECTION

1) If the inside surface of brake drum is streaked, correct the surface. And, if it is unevenly worn, taperingly streaked, or the outside surface of brake drum is damaged, correct or replace it.
2) Measure the drum inner diameter.

Drum inner diameter: "L"
Standard
228.6 mm (9 in)
Service limit
230.6 mm (9.08 in)



G4M0403

3) Measure the lining thickness.

Lining thickness:
Standard
4.1 mm (0.161 in)
Service limit
1.5 mm (0.059 in)

4) If the deformation or wear of back plate, shoe, etc. are notable, replace them.
5) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

D: ASSEMBLY

1. WHEEL CYLINDER

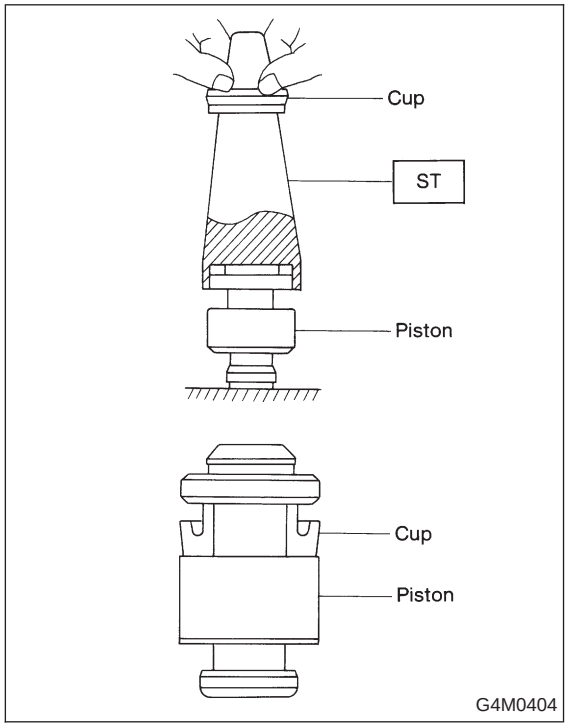
1) Clean all parts in brake fluid. Check and replace faulty parts.
- Cup and boot for damage or fatigue
- Cylinder, piston and spring or damage or rust formation

2) Assembly is the reverse order of disassembly.
   (1) When installing the cup, use ST, apply brake fluid to the frictional surface for smooth installation and pay attention to cup direction.
   (2) STs are available in different sizes.

CAUTION:
- **When replacing the repair kit, make sure that the sizes of cylinder and cup are the same as those which were replaced.**
- **Use only the tool of the correct size.**

ST: ADAPTER	
Applicable size	Part No.
17.46 mm (11/16 in)	925460000
19.05 mm (3/4 in)	926460000

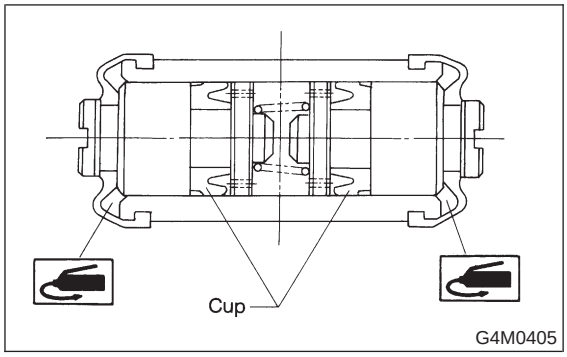
CAUTION:
While assembling, be careful to prevent any metal chip, dust or dirt from entering the wheel cylinder.



3) Apply rubber grease to the boot inside as shown in Figure.

Grease:
NIGLUBE RX-2 (Part No. 003606000)

CAUTION:
Never use brake grease.

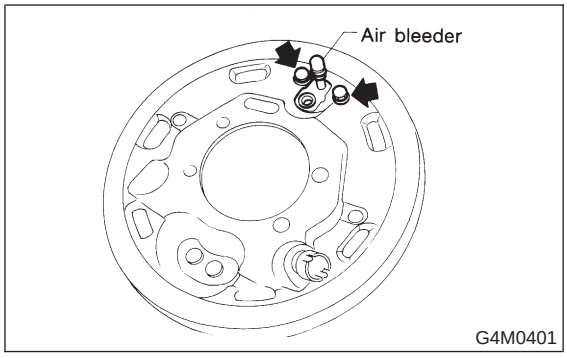


E: INSTALLATION

1. WHEEL CYLINDER

Install wheel cylinder on back plate, and tighten bolts.

Tightening torque:
10±2 N·m (1.0±0.2 kg-m, 7.2±1.4 ft-lb)

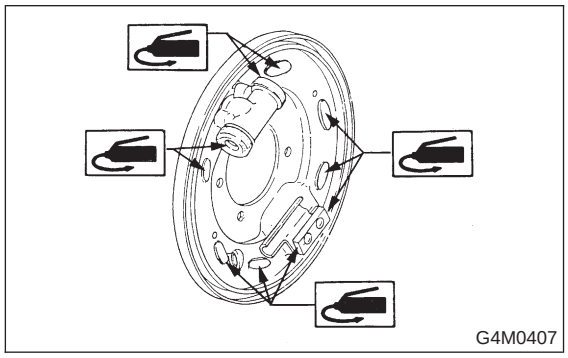


2. BRAKE DRUM AND SHOE

1) Clean back plate and wheel cylinder.

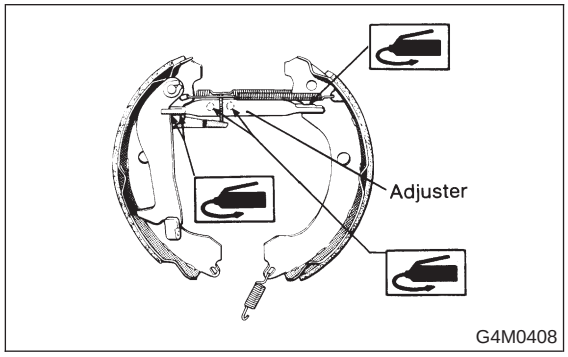
2) Apply grease to portions indicated by arrows in Figure.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)

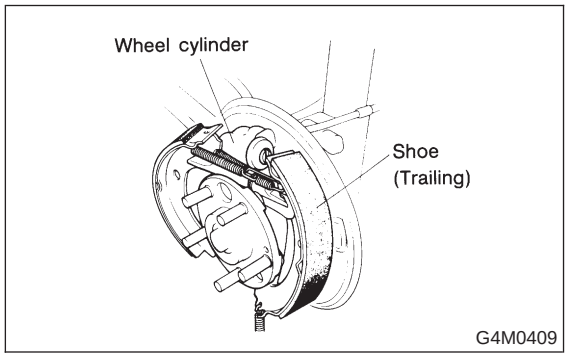


3) Apply grease to adjusting screw and both ends of adjuster.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)



4) Connect upper shoe return spring to shoes.
5) While positioning shoes (one at a time) in groove on wheel cylinder, secure shoes.

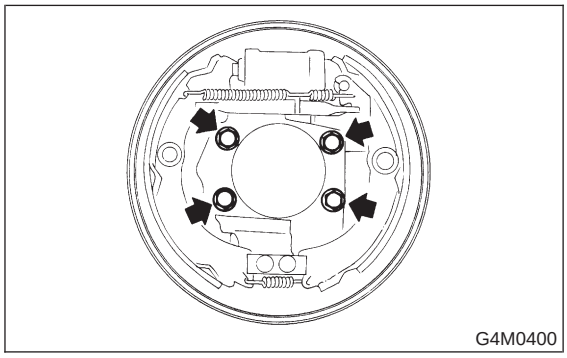


6) Connect lower shoe return spring.
7) Fix shoes by connecting hold-down cup to hold-down pin.

3. BRAKE ASSEMBLY

1) Install brake assembly on housing, and tighten bolts to install back plate.

Tightening torque:
52±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)



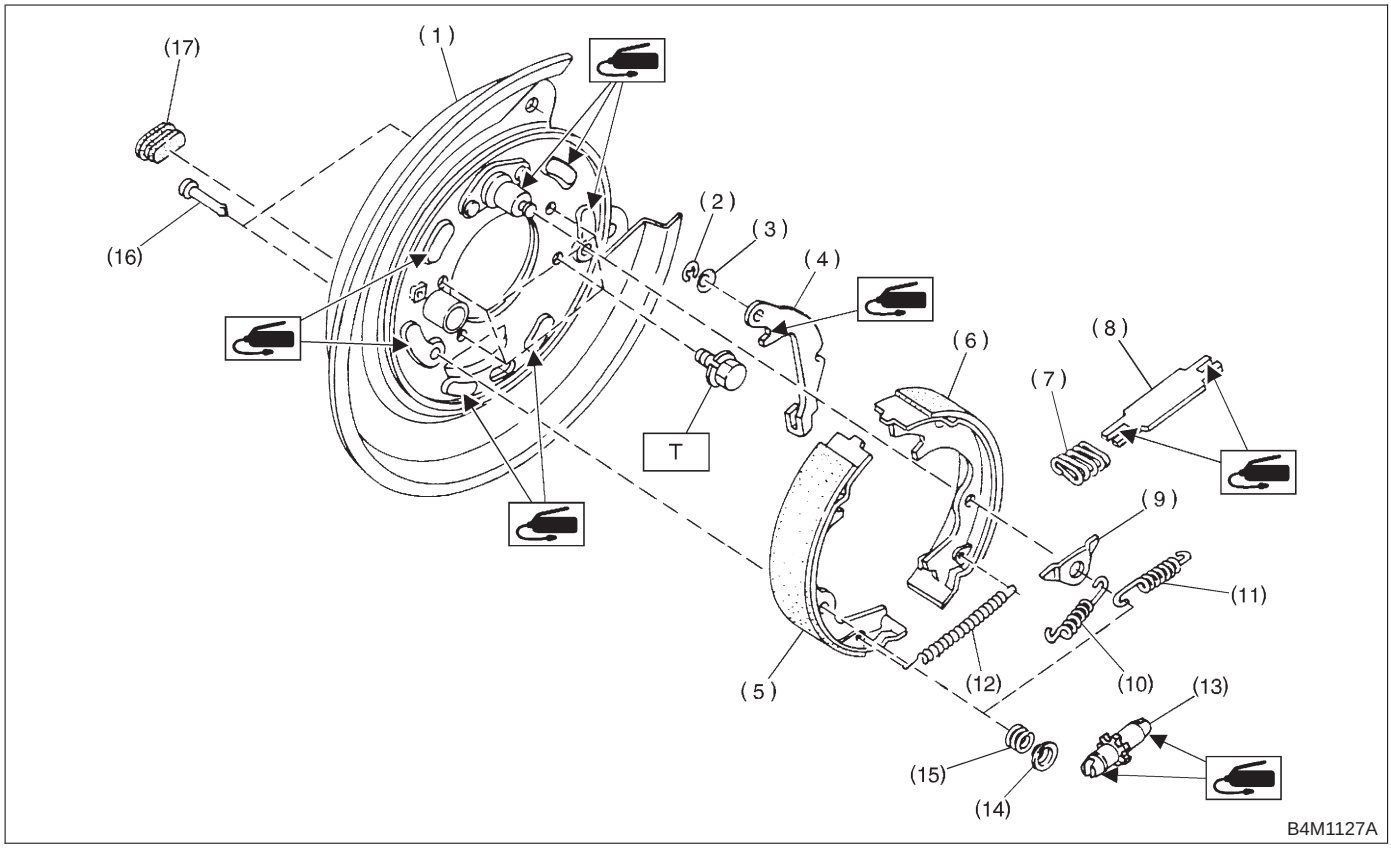
2) Install hub. <Ref. to 4-2 [W2E0].> and <Ref. to 4-2 [W3E0].>
3) Connect brake pipe, and tighten brake pipe flange nut.

Tightening torque:
$15^{+3}/_{-2}$ N·m ($1.5^{+0.3}/_{-0.2}$ kg-m, $10.8^{+2.2}/_{-1.4}$ ft-lb)

4) Set the outside diameter of brake shoes less than 0.5 to 0.8 mm (0.020 to 0.031 in) in comparison with the inside diameter of brake drum.
5) Install brake drum.
6) After installing brake assembly, bleed air from brake line.

4. Parking Brake (Rear Disc Brake)

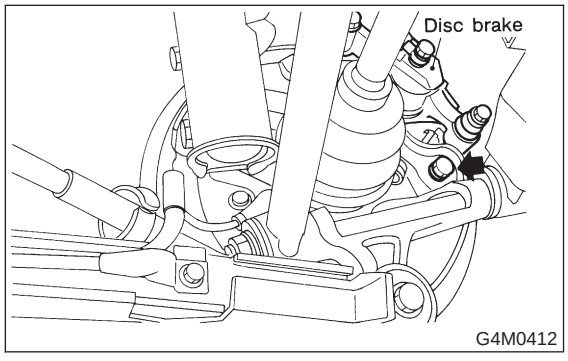
A: REMOVAL



(1) Back plate
(2) Retainer
(3) Spring washer
(4) Lever
(5) Parking brake shoe (Primary)
(6) Parking brake show (Secondary)
(7) Strut spring
(8) Strut
(9) Shoe guide plate
(10) Primary return spring
(11) Secondary return spring
(12) Adjusting spring
(13) Adjuster
(14) Shoe hold-down cup
(15) Shoe hold down spring
(16) Shoe hold down pin
(17) Adjusting hole cover

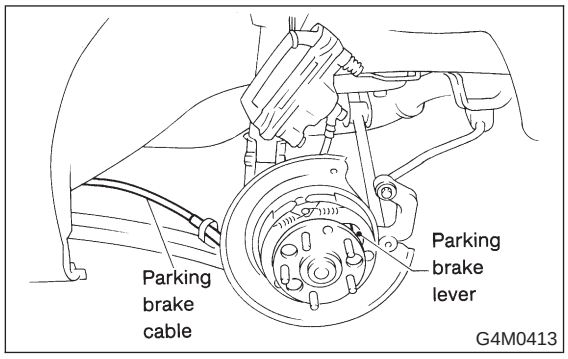
Tightening torque: N·m(kg-m, ft-lb)
T: 52±6 (5.3±0.6, 38.3±4.3)

1) Remove the two mounting bolts to the disc brake assembly and remove the disc brake assembly.



2) Suspend the disc brake assembly so that the hose is not stretched.
3) Remove the disc rotor.
4) Remove shoe return spring from parking brake assembly.
5) Remove front shoe hold down spring and pin with pliers.
6) Remove strut and strut spring.
7) Remove adjuster assembly from parking brake assembly.
8) Remove brake shoe.
9) Remove rear shoe hold-down spring and pin with pliers.

10) Remove parking cable from parking lever.



11) Using a standard screwdriver, raise retainer. Remove parking lever and washer from brake shoe.

B: INSPECTION

1) Measure brake disc inside diameter. If the disc is scored or worn, replace the brake disc.

Disc inside diameter:
Standard
170 mm (6.69 in)
Service limit
171 mm (6.73 in)

2) Measure the lining thickness. If it exceeds the limit, replace shoe assembly.

Lining thickness:
Standard
3.2 mm (0.126 in)
Service limit
1.5 mm (0.059 in)

CAUTION:
Replace the brake shoes on the right and left brake assembly at the same time.

C: INSTALLATION

CAUTION:
Be sure lining surface is free from oil contamination.

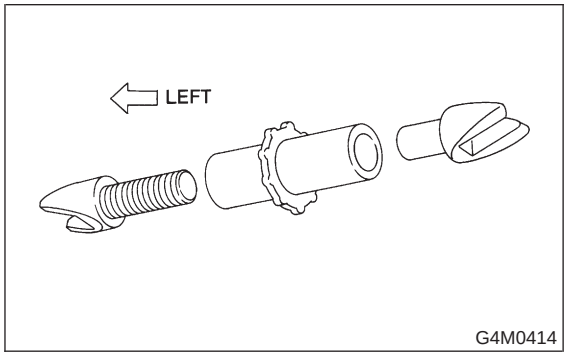
Brake grease:
Dow Corning Molykote No 7439 (Part No. 725191460)

1) Apply brake grease to the following places.
- Six contact surfaces of shoe rim and back plate packing
- Contact surface of shoe wave and anchor pin
- Contact surface of lever and strut
- Contact surface of shoe wave and adjuster assembly
- Contact surface of shoe wave and strut
- Contact surface of lever and shoe wave

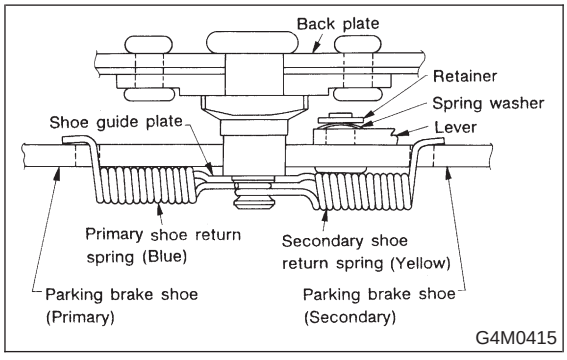
2) Installation is in reverse order of removal.

CAUTION:
- **Use new retainers and clinch them when installing brake shoes to levers.**
- **Ensure that parking lever moves smoothly.**
- **Do not confuse left parking lever with right one.**
- **Do not confuse left strut with right one.**

NOTE:
Ensure that adjuster assembly is securely installed with screw in the left side, facing vehicle front.



NOTE:
Ensure that shoe return spring is installed as shown in Figure.



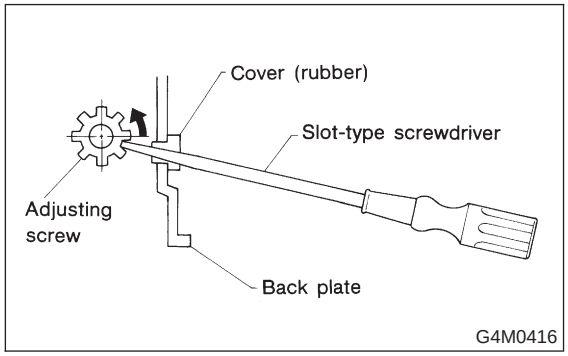
3) Adjust parking brakes. <Ref. to 4-4 [W4D0].>

CAUTION:
After replacing parking brake lining, be sure to drive vehicle for “break-in” purposes.
(1) Drive the vehicle about 35 km/h (22 MPH).
(2) With the parking brake release button pushed in, pull the parking brake lever gently, pulling with a force of approximately 147 N (15 kg, 33 lb).
(3) Drive the vehicle for about 200 m (0.12 mile) in this condition.
(4) Wait 5 to 10 minutes for the parking brake to cool down. Repeat this procedure once more.
(5) After breaking-in, re-adjust parking brakes.

D: ADJUSTMENT

1. SHOE CLEARANCE

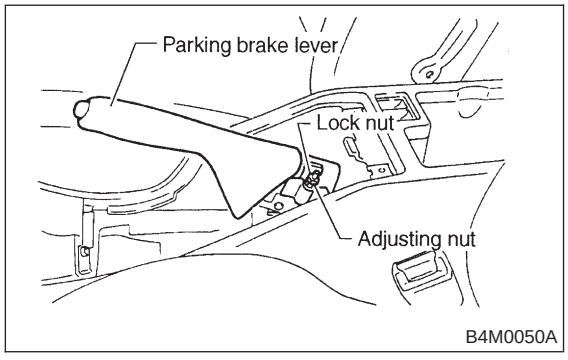
1) Remove adjusting hole cover from back plate.
2) Turn adjusting screw using a slot-type screwdriver until brake shoe is in close contact with disc rotor.



3) Turn back (downward) adjusting screw 3 or 4 notches.
4) Install adjusting hole cover to back plate.

2. LEVER STROKE

1) Remove console box lid.
2) Forcibly pull parking brake lever 3 to 5 times.
3) Adjust parking brake lever by turning adjusting nut until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).



4) Tighten lock nut.
5) Install console box lid.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kg, 44 lb)

Tightening torque (Lock nut):
5.9±1.5 N·m (0.60±0.15 kg-m, 4.3±1.1 ft-lb)

5. Master Cylinder

A: REMOVAL

1) Thoroughly drain brake fluid from reservoir tank.
2) Disconnect fluid level indicator harness connector.
3) Remove brake pipes from master cylinder.
4) Remove master cylinder mounting nuts, and take out master cylinder from brake booster.

CAUTION:
Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the painted surface; wipe it off quickly if spilt.

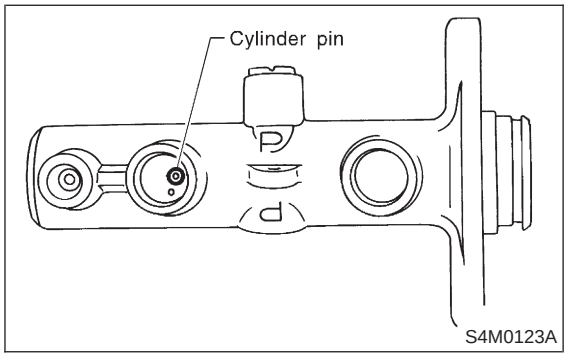
B: DISASSEMBLY

1. PRECAUTIONS FOR DISASSEMBLING

1) Remove mud and dirt from the surface of brake master cylinder.
2) Prepare tools necessary for disassembly operation, and arrange them neatly on work bench.
3) Clean work bench.

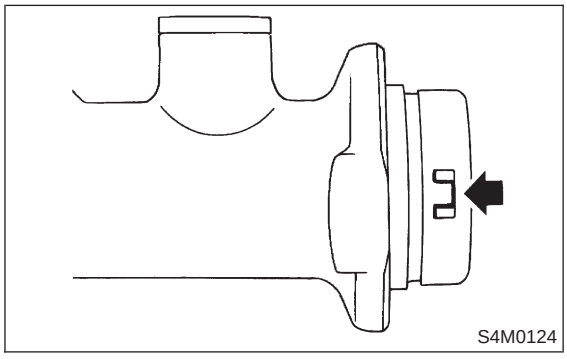
2. DISASSEMBLING PROCEDURE

1) Remove reserve tank.
2) Remove cylinder pin. (only vehicle equipped with ABS)



3) Pry up the pawl and remove the piston retainer.

NOTE:
Piston may jump out from master cylinder.



4) Extract primary piston assembly and secondary piston assembly.

CAUTION:
● Do not disassemble the piston assembly; otherwise, the spring set value may be changed.
● Use brake fluid or methanol to wash inside wall of cylinder, pistons and piston cups. Be careful not to damage parts when washing. If methanol is used for washing, do not dip rubber parts, such as piston cups, in it for more than 30 seconds; otherwise, they may become swelled.

C: INSPECTION

If any damage, deformation, wear, swelling, rust, and other faults are found on the primary piston assembly, secondary piston assembly, supply valve stopper, or gasket, replace the faulty part.

CAUTION:
● The primary and secondary pistons must be replaced as complete assemblies.
● The service limit of the clearance between each piston and the master cylinder inner dia. is 0.11 mm (0.0043 in).
● When handling parts, be extremely careful not to damage or scratch the parts, or let any foreign matter get on them.

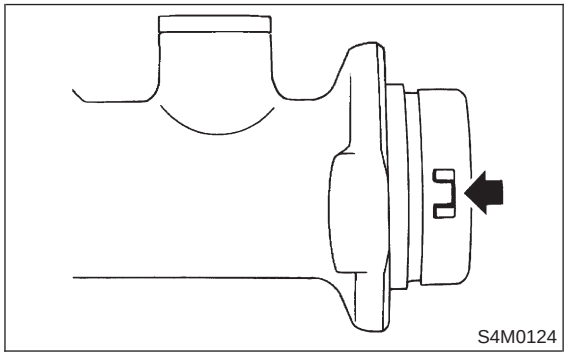
D: ASSEMBLY

1. PRECAUTIONS FOR ASSEMBLING

1) When assembling, be sure to use recommended brake fluid.
2) Ensure that the inside wall of cylinder, pistons, and piston cups are free from dirt when assembling.
3) Be extremely careful not to damage, scratch, or dent cylinder inside wall, pistons, and piston cups.
4) Do not drop parts. Never attempt to use any part that has been dropped accidentally.

2. ASSEMBLING OPERATION

1) Assembling piston assembly:
Apply recommended brake fluid to inside wall of cylinder, and to outer surface of piston assembly, and install piston assemblies carefully into cylinder.
2) Assembling cylinder pin:
3) Press the pawl and install the piston retainer into the master cylinder.



E: INSTALLATION

To install the master cylinder to the body, reverse the sequence of removal procedure.

Tightening torque:
Master cylinder mounting nut
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)
Piping flare nut
$15^{+3}/_{-2}$ N·m ($1.5^{+0.3}/_{-0.2}$ kg-m, $10.8^{+2.2}/_{-1.4}$ ft-lb)

CAUTION:
Be sure to use recommended brake fluid.

6. Brake Booster

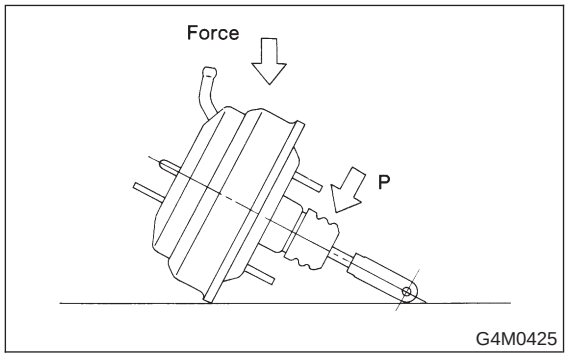
A: REMOVAL

1) Remove or disconnect the following parts at engine compartment.
   (1) Disconnect connector for brake fluid level indicator.
   (2) Remove brake pipes from master cylinder.
   (3) Remove master cylinder installing nuts.
   (4) Disconnect vacuum hose from brake booster.
2) Remove the following parts from the pedal bracket.
   (1) Snap pin and clevis pin
   (2) Four brake booster installing nuts
3) Remove brake booster while shunning brake pipes.

B: HANDLING PRECAUTIONS

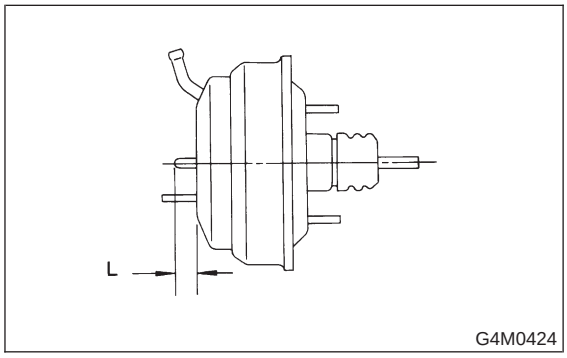
1) Be careful not to drop brake booster. Brake booster should be discarded if it has been dropped.
2) Use special care when handling operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of ±3°, it may result in damage to the power piston cylinder.
3) Use care when placing brake booster on the floor.

CAUTION:
If external force is applied from above when brake booster is placed in this position, the resin portion as indicated by "P", may be damaged.



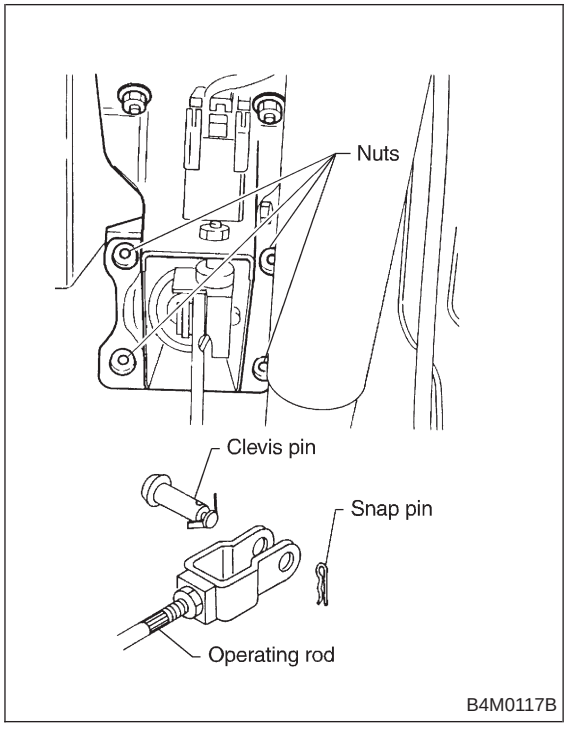
4) Do not change the push rod length. If it has been changed, reset the projected length "L" to the standard length.

Standard:
L = 10 mm (0.39 in)

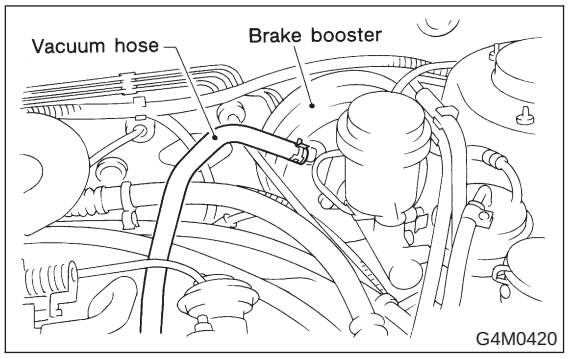


C: INSTALLATION

1) Mount brake booster in position.
2) Connect operating rod to brake pedal with clevis pin and snap pin.



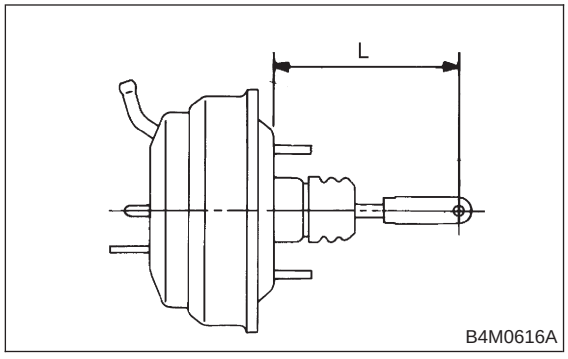
3) Connect vacuum hose to brake booster.



4) Mount master cylinder onto brake booster.
5) Connect brake pipes to master cylinder.
6) Connect electric connector for brake fluid level indicator.
7) Adjust operating rod of brake booster.

Standard: L
145.3 mm (5.72 in)

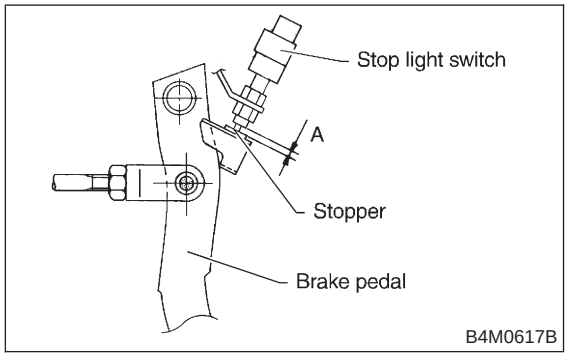
If it is not in specified value, adjust it by adjusting brake booster operating rod.



8) Measure the clearance between threaded end of stop light switch and stopper.
If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:
Be careful not to rotate stop light switch.

Stop light switch clearance: A
0.3 mm (0.012 in)



9) Apply grease to operating rod connecting pin to prevent it from wearing.

10) Bleed air from brake system.

Tightening torque (Air bleeder screw):
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

11) Conduct road tests to ensure brakes do not drag.

D: OPERATION CHECK (WITHOUT USING GAUGES)

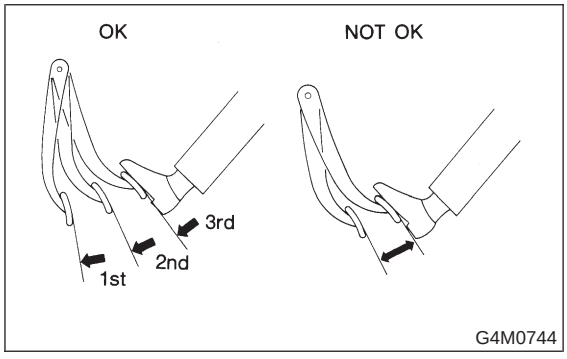
CAUTION:
When checking operation, be sure to securely apply the hand brake.

1. CHECKING WITHOUT USING GAUGES

This method cannot determine the exact portion which has failed, but it can provide a rough understanding of the nature of the failure if checking is conducted in accordance with the following procedures.

2. AIR TIGHTNESS CHECK

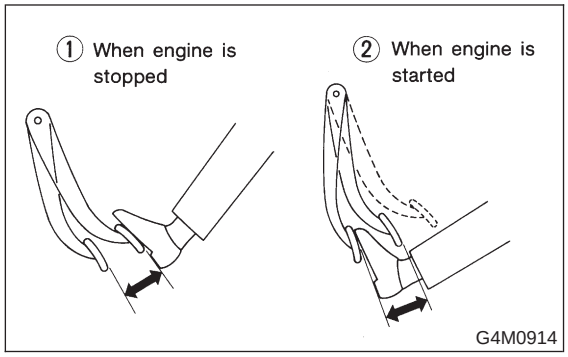
Start engine, and run it for 1 to 2 minutes, then turn it off.
Depress brake pedal several times applying the same pedal force as that used in ordinary braking operations. The pedal stroke should be greatest on the 1st depression, and it should become smaller with each successive depression. If no change occurs in the pedal height while in a depressed state, brake booster is faulty.



NOTE:
● In the event of defective operation, inspect the condition of the check valve and vacuum hose.
● Replace them if faulty and conduct the test again.
● If no improvement is observed, check precisely with gauges.

3. OPERATION CHECK

1) With engine off, depress brake pedal several times applying the same pedal force and make sure that the pedal height does not vary with each depression of the pedal.



2) With brake pedal depressed, start engine.
3) As engine starts, brake pedal should move slightly toward the floor. If no change occurs in the pedal height, brake booster is faulty.

NOTE:
If faulty, check precisely with gauges.

4. LOADED AIR TIGHTNESS CHECK

Depress brake pedal while engine is running, and turn off engine while the pedal is still depressed. Keep the pedal depressed for 30 seconds; if no change occurs in the pedal height, brake booster is functioning normally; if the pedal height increases, it is faulty.

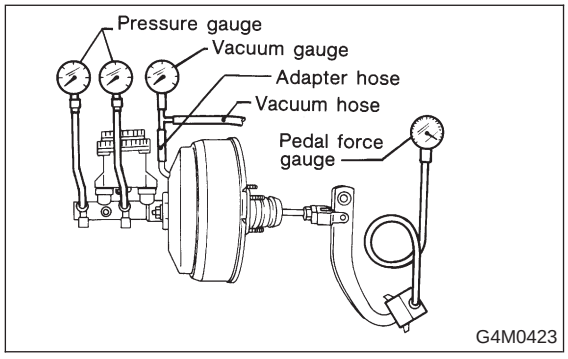
NOTE:
If faulty, check precisely with gauges.

E: OPERATION CHECK (WITH USING GAUGES)

CAUTION:
When checking operation, be sure to securely apply the hand brake.

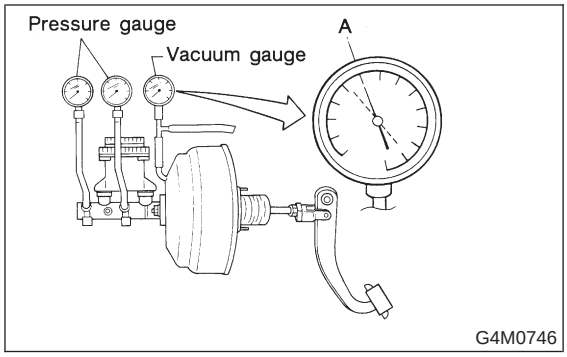
1. CHECKING WITH GAUGES

Connect gauges as shown in Figure. After bleeding air from pressure gauges, proceed to each check.



2. AIR TIGHTNESS CHECK

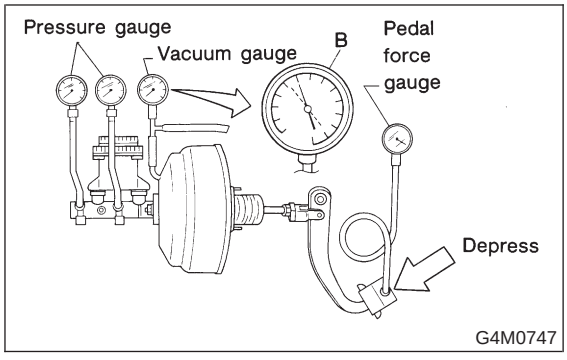
1) Start engine and keep it running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point A is indicated on vacuum gauge. Do not depress brake pedal.



2) Stop engine and watch the gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly. If defective, the cause may be one of those listed below.
- Check valve malfunction
- Leak from vacuum hose
- Leak from the shell jointed portion or stud bolt welded portion
- Damaged diaphragm
- Leak from valve body seal and bearing portion
- Leak from plate and seal assembly portion
- Leak from poppet valve assembly portion

3. LOADED AIR TIGHTNESS CHECK

1) Start engine and depress brake pedal with pedal force of 196 N (20 kg, 44 lb). Keep engine running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point B is indicated on vacuum gauge while the pedal is still depressed.



2) Stop engine and watch vacuum gauge.
If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly. If defective, refer to “AIR TIGHTNESS CHECK”. <Ref. to 4-4 [W6D2].>

4. LACK OF BOOSTING ACTION CHECK

Turn off engine, and set the vacuum gauge reading at “0”. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed below.

Brake pedal force	147N (15 kg, 33 lb)	294N (30kg, 66 lb)
Models without ABS	785 kPa (8 kg/cm^2, 114 psi)	2,158 kPa (22 kg/cm^2, 313 psi)
Models with ABS	588 kPa (6 kg/cm^2, 85 psi)	1,667 kPa (17 kg/cm^2, 242 psi)

5. BOOSTING ACTION CHECK

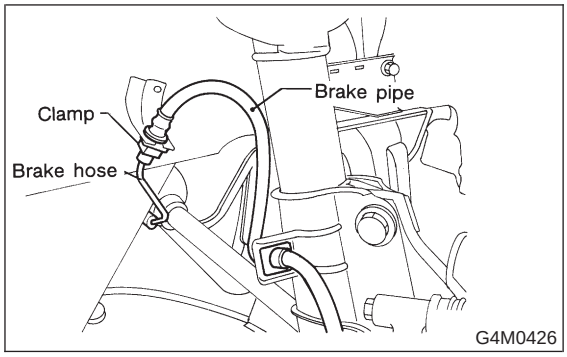
Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed below.

Brake pedal force	147N (15 kg, 33 lb)	294N (30kg, 66 lb)
Models without ABS	5,492 kPa (56 kg/cm^2, 796 psi)	8,434 kPa (86 kg/cm^2, 1,223 psi)
Models with ABS	5,394 kPa (55 kg/cm^2,782 psi)	10,003 kPa (102 kg/cm^2, 1,450 psi)

7. Brake Hose

A: REMOVAL

1) Separate brake pipe from brake hose.
(Always use flare nut wrench and be careful not to deform flare nut.)



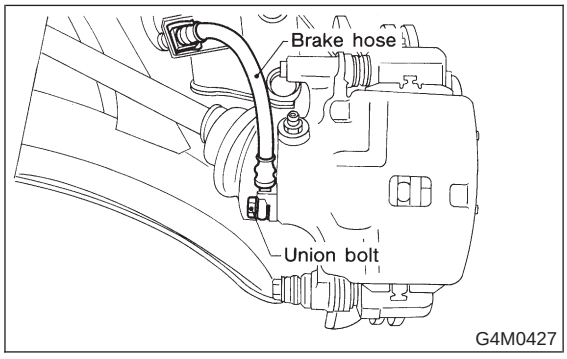
2) Pull out clamp to remove brake hose.
3) Remove clamp at strut and union bolt.

B: INSTALLATION

1. FRONT BRAKE HOSE

1) Route end of brake hose (on caliper side) through hole in brake hose bracket at strut location.
2) Tighten end of brake hose at caliper using a union bolt.

Tightening torque (Union bolt):
18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)



3) Secure middle fitting of brake hose to bracket at strut location using a clamp.
4) Position disc in straight-forward direction and route brake hose through hole in bracket on wheel apron side.

CAUTION:
Be sure brake hose is not twisted.

5) Temporarily tighten flare nut to connect brake pipe and hose.
6) Fix brake hose with clamp at wheel apron bracket.

7) While holding hexagonal part of brake hose fitting with a wrench, tighten flare nut to the specified torque.

Tightening torque (Brake pipe flare nut): 15^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)

8) Bleed air from the brake system.

2. REAR BRAKE HOSE

1) Pass brake hose through the hole of bracket, and lightly tighten flare nut to connect brake pipe.
2) Insert clamp upward to fix brake hose.
3) While holding hexagonal part of brake hose fitting with a wrench, tighten flare nut to the specified torque.

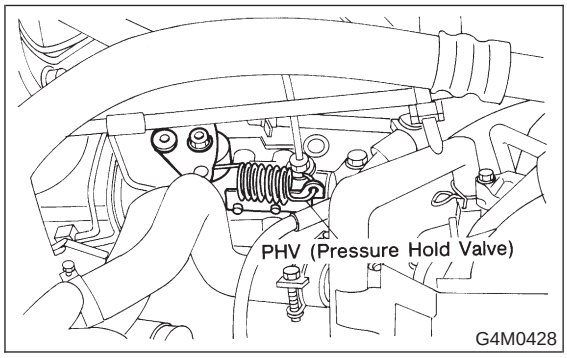
Tightening torque (Brake pipe flare nut): 15^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)

4) Bleed air from the brake system.

8. Hill Holder

A: REMOVAL

1) Drain brake fluid from reservoir of master cylinder.
2) Remove adjusting nut and cable clamp, and disconnect PHV cable from cable bracket on engine.



3) Detach PHV cable from clips.
4) Remove cable clamp, and disconnect PHV cable from PHV stay.

CAUTION:
Carefully protect boots and inner cable from damage when disconnecting PHV cable.

5) Disconnect brake pipes from PHV.

CAUTION:
● Pay attention not to drop brake fluid onto body painting since it may dissolve paint.
● Pay attention not to damage hexagonal head of flare nut by using pipe wrench without fail.

6) Detach PHV along with support from side frame.

CAUTION:
Exercise utmost care to prevent foreign matter from entering into PHV when removing it.

B: INSPECTION

Check up removed parts as follows, and replace defective ones.
1) Check if boots of PHV cable are damaged or degraded, and if inner cable is damaged or corroded.
2) Check if return spring is worn out, damaged or corroded.
3) Confirm that rolling sound of ball is heard with PHV inclined and lever rotates smoothly.

CAUTION:
Never disassemble PHV. Replace entire PHV assembly if necessary.

C: INSTALLATION

1) Install PHV onto side frame.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

2) Connect brake pipes to PHV.

Tightening torque:
$15^{+3}/_{-2}$ N·m ($1.5^{+0.3}/_{-0.2}$ kg-m, $10.8^{+2.2}/_{-1.4}$ ft-lb)

CAUTION:
Confirm that brake pipes are not deformed and/or damaged. Replace them with new ones if necessary.

3) Install PHV cable to PHV stay.

CAUTION:
If cable clamp (and clips) is damaged, replace it with a new one.

4) Connect PHV cable with clips.

NOTE:
Avoid sharp bending of PHV cable as it may cause breakage.

5) Install PHV cable onto cable bracket on engine.
6) Apply grease to the following points.
- Hook portion of return spring
- Cable end portion of lever

Grease:
SUNLIGHT 2 (Part No. 003602010)

7) Be sure to bleed air from the system.

CAUTION:
After replacing PHV cable or clutch cable with new one, operate clutch pedal about 30 times as a running-in operation prior to adjustment.

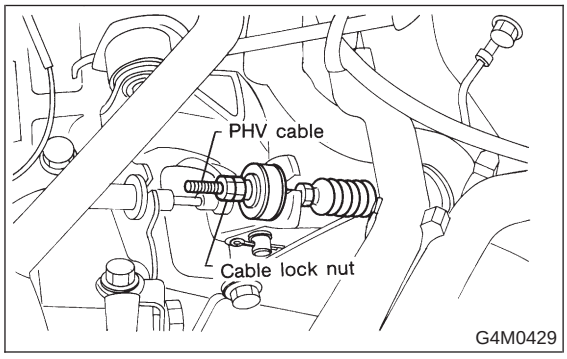
D: ADJUSTMENTS

Confirm stopping and starting performances by activating hill holder on an uphill road of 3° or higher inclination.
1) If vehicle does not stop;
Tighten adjusting nut of PHV cable.
2) If vehicle does not start properly;
- Case A — When hill holder is released later than engagement of clutch pedal (Engine tends to stall.):

Loosen adjusting nut gradually until smooth starting is enabled.
- Case B — When hill holder is released earlier than engagement of clutch pedal (Vehicle slips down slightly.):

Tighten adjusting nut so that hill holder is released later than engagement of clutch pedal (status in Case A). Then make adjustment the same as in Case A.

NOTE:
Whenever turning adjusting nut, prevent PHV cable from revolving as shown in Figure.



9. Parking Brake Lever

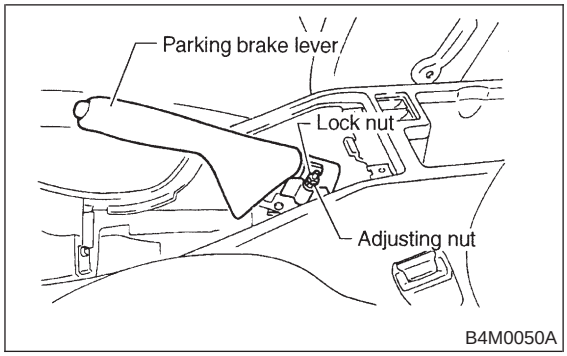
A: REPLACEMENT

1) Remove console box from front floor.
2) Disconnect electric connector for parking brake switch.
3) Loosen parking brake adjuster, and remove inner cable end from equalizer.
4) Remove parking brake lever.
5) Install parking brake lever in the reverse order of removal.

Tightening torque (Lever installing bolt and nut):
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

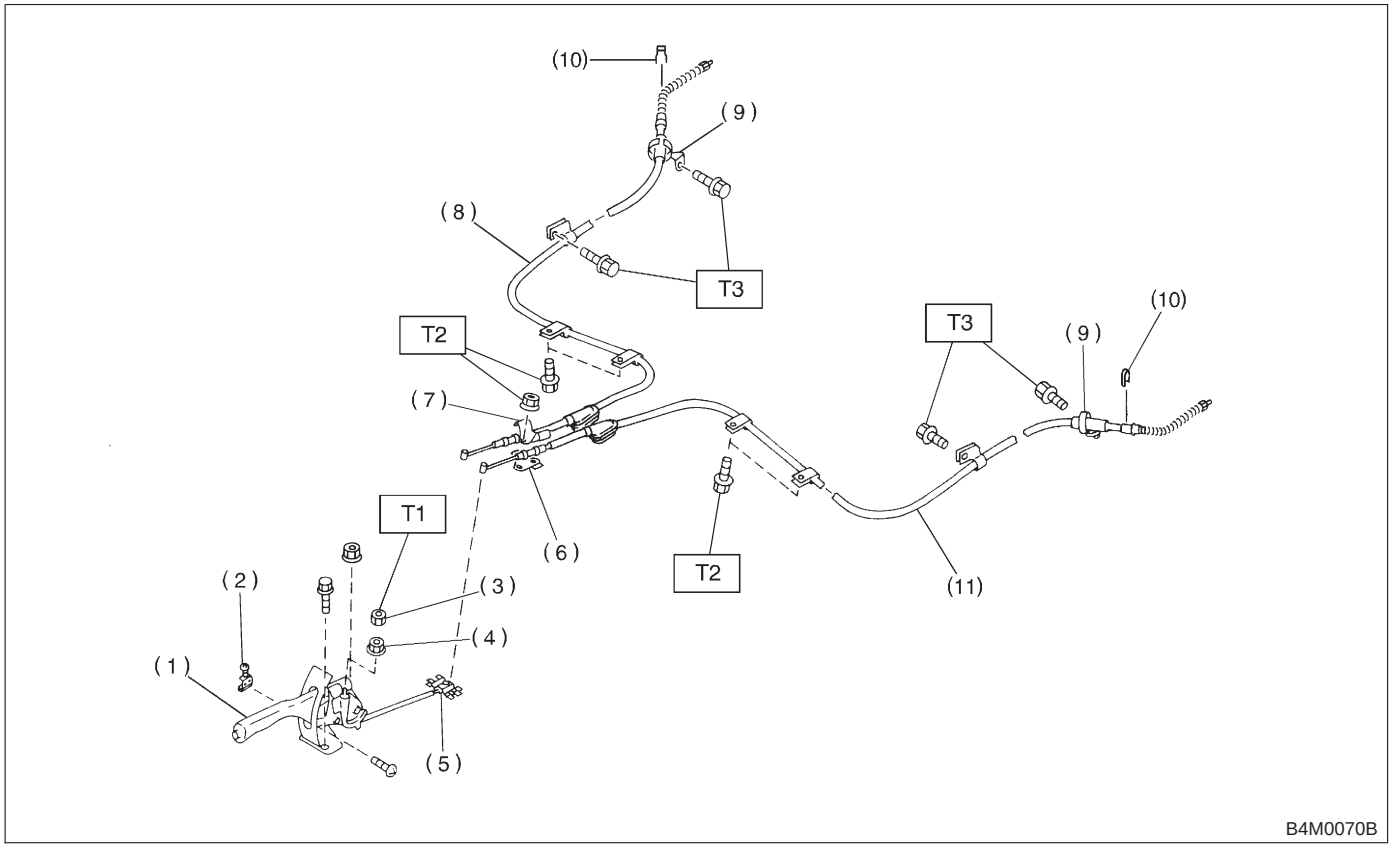
6) Adjust parking brake lever by turning adjusting nut until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).
7) Tighten lock nut.

Tightening torque (Lock nut):
5.9±1.5 N·m (0.60±0.15 kg-m, 4.3±1.1 ft-lb)



10. Parking Brake Cable

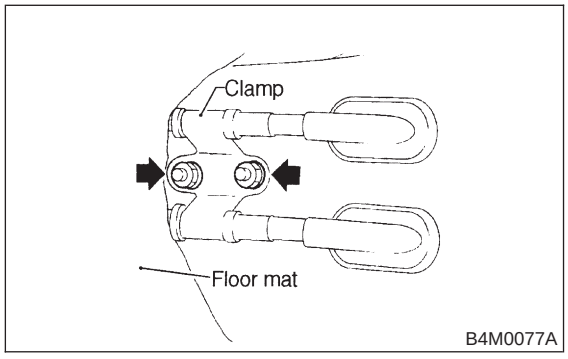
A: REPLACEMENT



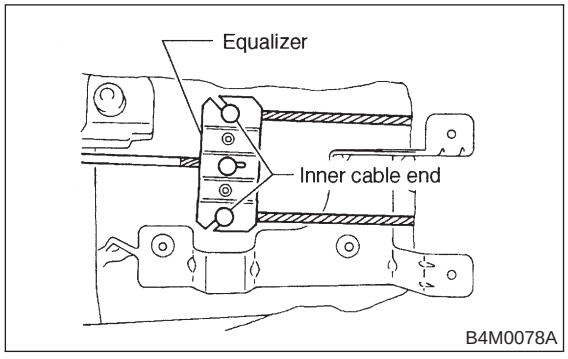
(1) Parking brake lever
(2) Parking brake switch
(3) Lock nut
(4) Adjusting nut
(5) Equalizer
(6) Bracket
(7) Clamp
(8) Parking brake cable RH
(9) Cable guide
(10) Clamp (Rear disc brake model only)
(11) Parking brake cable LH

Tightening torque: N·m (kg-m, ft-lb)
T1: 5.9±1.5 (0.60±0.15, 4.3±1.1)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 32±10 (3.3±1.0, 24±7)

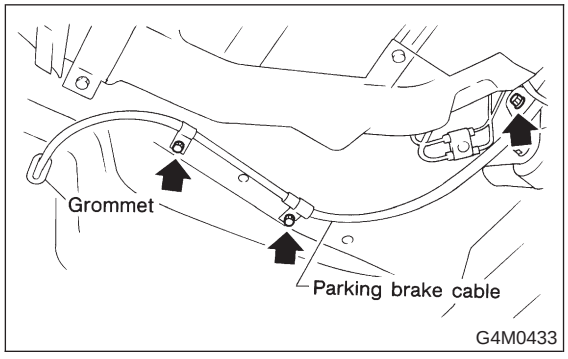
1) Lift-up vehicle.
2) Remove rear wheels.
3) Remove rear cushion.
4) Remove console box from front floor.
5) Loosen parking cable adjusting nut.
6) Roll up floor mat and remove clamps.



7) Remove inner cable end from equalizer.



8) Pull out parking brake cable from parking brake assembly. <Ref. to 4-4 [W4A0].>
9) Pull out clamp from parking brake assembly.
10) Remove bolt and bracket from trailing link bracket.
11) Remove bolt and clamp from rear floor.

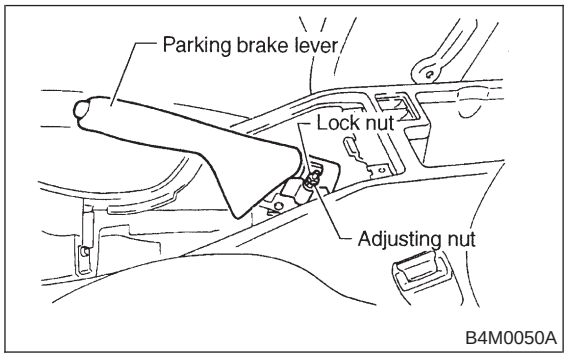


12) Detach grommet from rear floor.
13) Remove cable assembly from cabin by forcibly pulling it backward.
14) Detach parking brake cable from cable guide at rear trailing link.
15) Install (new) parking brake assembly in the reverse order of removal.

NOTE:
● Be sure to pass cable through cable guide inside the tunnel.
● Be sure to adjust the shoe clearance. (Only rear disc brake model) <Ref. to 4-4 [W4D1].>

16) Adjust parking brake lever by turning adjusting nut until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).
17) Tighten lock nut.

Tightening torque (Lock nut):
5.9±1.5 N·m (0.60±0.15 kg-m, 4.3±1.1 ft-lb)



11. Air Bleeding

A: GENERAL RULES FOR EFFECTIVE BLEEDING

1) Start with the brakes (wheels) connecting to the secondary chamber of the master cylinder.
2) The time interval between two brake pedal operations (from the time when the pedal is released to the time when it is depressed another time) shall be approximately 3 seconds.
3) The air bleeder on each brake shall be released for 1 to 2 seconds.

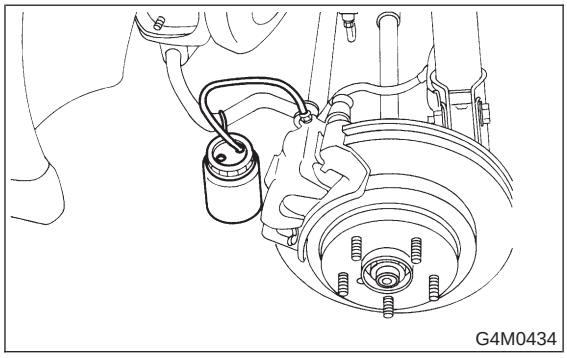
B: BLEEDING PROCEDURE

CAUTION:
● The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
● Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
● Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
● Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:
● During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
● Brake pedal operating must be very slow.
● For convenience and safety, it is advisable to have two men working.

1) Make sure that there is no leak from joints and connections of the brake system.

2) Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.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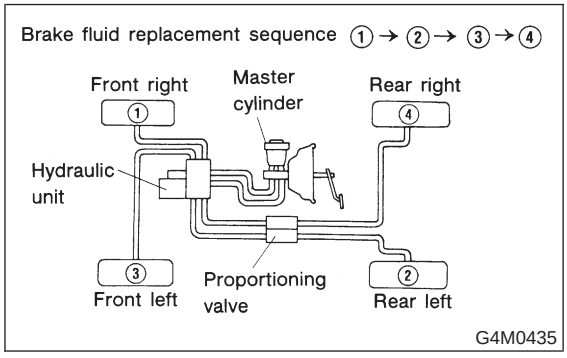

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3) Slowly depress the brake pedal and keep it depressed. Then, open the air bleeder to discharge air together with the fluid.
Release air bleeder for 1 to 2 seconds.
Next, with the bleeder closed, slowly release the brake pedal.
Repeat these steps until there are no more air bubbles in the vinyl tube.
Allow 3 to 4 seconds between two brake pedal operations.

CAUTION:
Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

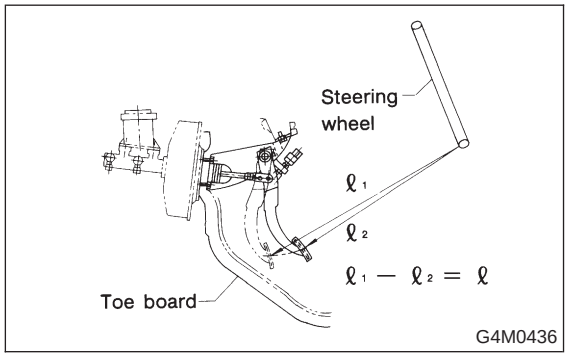
NOTE:
Brake pedal operating must be very slow.

4) Tighten air bleeder securely when no air bubbles are visible.

Air bleeder tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

5) Perform these steps for the brakes connecting to the secondary chamber of master cylinder, first, and then for the ones connecting to primary chamber. With all procedures completed, fully depress the brake pedal and keep it in that position for approximately 20 seconds to make sure that there is no leak evident in the entire system.
6) Perform sequence control. (With ABS model) <Ref. to 4-4 [W15D0].>

7) Check the pedal stroke.
While the engine is idling, depress the brake pedal with a 490 N (50 kg, 110 lb) load and measure the distance between the brake pedal and steering wheel. With the brake pedal released, measure the distance between the pedal and steering wheel again. The difference between the two measurements must be more than specified.



Specified pedal stroke:
Without ABS
90 mm (3.54 in)
With ABS
95 mm (3.74 in)
When depressing brake pedal with a 490 N (50 kg, 110 lb) load.

(1) Models without ABS
If the distance is more than specifications, there is a possibility that air is in the brake line.
Bleed air from the brake line.
(2) Models with ABS
If the distance is more than specifications, there is a possibility air is in the inside of the hydraulic unit. Therefore, air must be bled from the inside of the hydraulic unit to the brake pipes in accordance with the bleeding sequence control. <Ref. to 4-4 [W15D0].>

8) Add brake fluid to the required level (MAX. level) of reserve tank.
9) As a final step, test run the vehicle at low speed and apply brakes relatively hard 2 to 3 times to ensure that brakes provide normal braking action on all four wheels without dragging and uneven braking.

12. Brake Fluid

A: REPLACEMENT

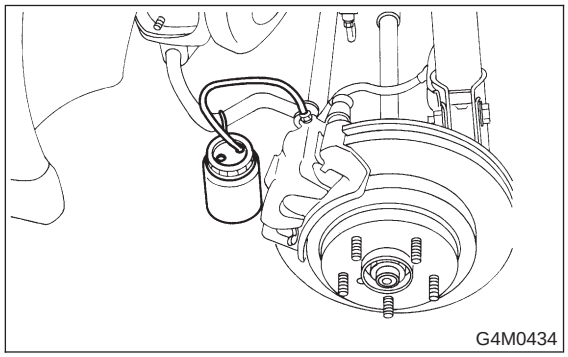
CAUTION:
● To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
● The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
● Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
● Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
● Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:
● During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
● Brake pedal operating must be very slow.
● For convenience and safety, it is advisable to have two men working.
● The amount of brake fluid required is approximately 500 mℓ (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.

1) Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
2) Remove both front and rear wheels.
3) Draw out the brake fluid from reserve tank with syringe.
4) Refill reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid

5) Install one end of a vinyl tube onto the air bleeder of and insert the other end of the tube into a container to collect the brake fluid.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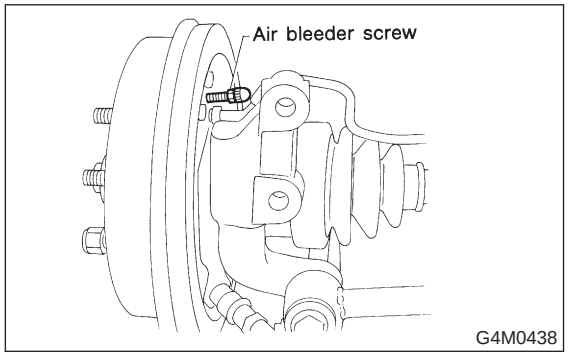

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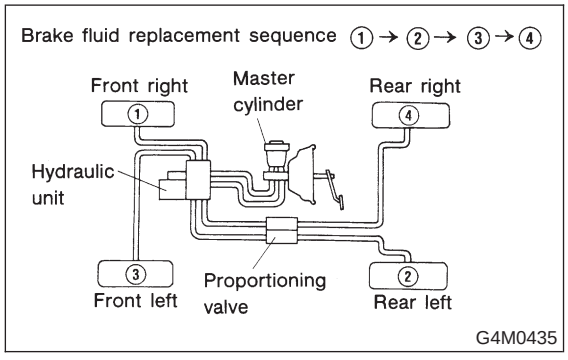

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6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
7) Loosen bleeder screw approximately 1/4 turn until a small amount of brake fluid drains into container, and then quickly tighten screw.
8) Repeat again from the twe former procedures until there are no air bubbles in drained brake fluid and new fluid flows through vinyl tube.

CAUTION:
Add brake fluid as necessary while performing the air bleed operation, in order to prevent the tank from running short of brake fluid.

9) After completing the bleeding operation, hold brake pedal depressed and tighten screw and install bleeder cap.

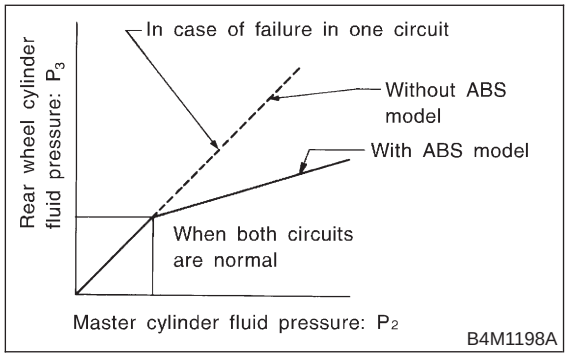
Tightening torque (Bleeder screw):
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

10) Bleed air from each wheel cylinder using the same procedures as described in before.
11) Depress brake pedal with a force of approximately 294 N (30 kg, 66 lb) and hold it there for approximately 20 seconds. At this time check pedal to see if it shows any unusual movement.
Visually inspect bleeder screws and brake pipe joints to make sure that there is no fluid leakage.
12) Install wheels, and drive vehicle for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.

13. Proportioning Valve

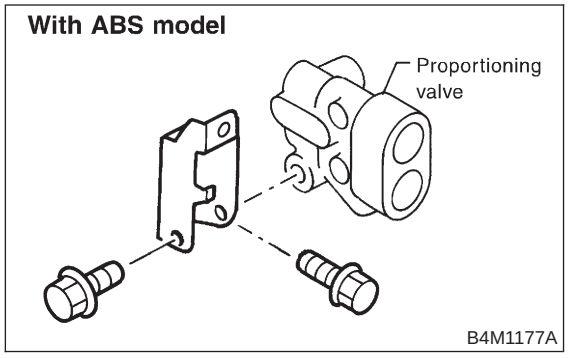
A: INSPECTION

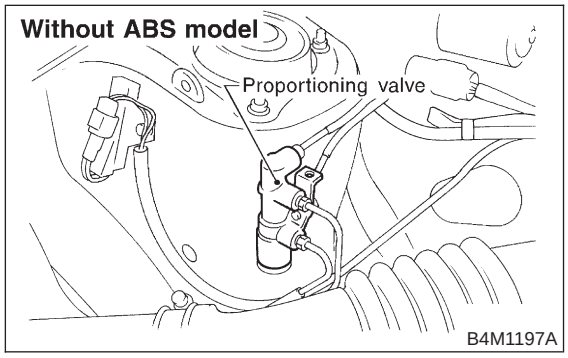
1) Install the oil pressure gauges to measure the master cylinder fluid pressure (front wheel brake fluid pressure) and rear wheel cylinder fluid pressure.
2) Bleed air from the oil pressure gauges.
3) Check the master cylinder fluid pressure and rear wheel cylinder fluid pressure.
The standard values are shown in Figure.



4) For the oil pressure in case of split point, refer to SPECIFICATIONS [S1A0].

B: REMOVAL





1) Remove brake pipe from proportioning valve at four places.
2) Remove proportioning valve from its bracket.

CAUTION:
Do not disassemble or adjust the proportioning valve. (The proportioning valve must be replaced as an assembly.)

C: INSTALLATION

1) Install proportioning valve to bracket.
2) Connect brake pipes correctly to proportioning valve.
3) Bleed air, then check each joint of brake pipe for oil leaks.

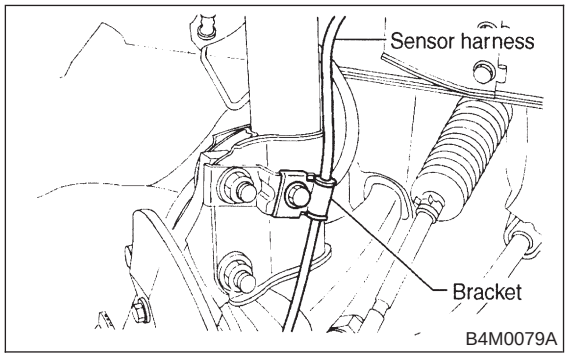
Tightening torque:
Proportioning valve to brake pipe flare nut: 15^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)
Proportioning valve to bracket: 18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

14. ABS Sensor

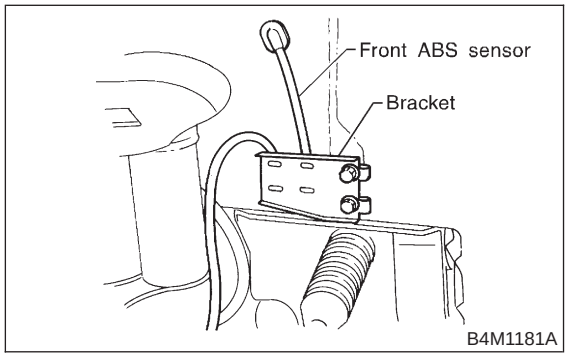
A: REMOVAL

1. FRONT ABS SENSOR

1) Disconnect front ABS sensor connector located in engine compartment.
2) Remove bolts which secure sensor harness to strut.

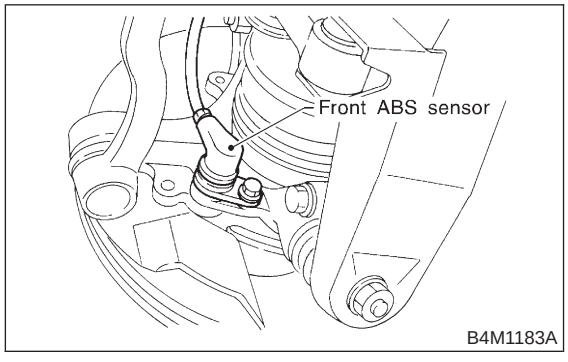


3) Remove bolts which secure sensor harness to body.



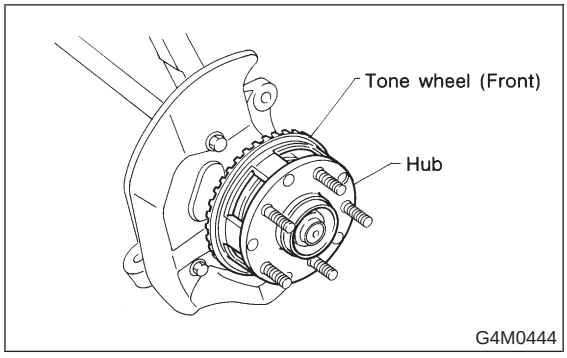
4) Remove bolts which secure front ABS sensor to housing, and remove front ABS sensor.

CAUTION:
● Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.
● Do not pull sensor harness during removal.



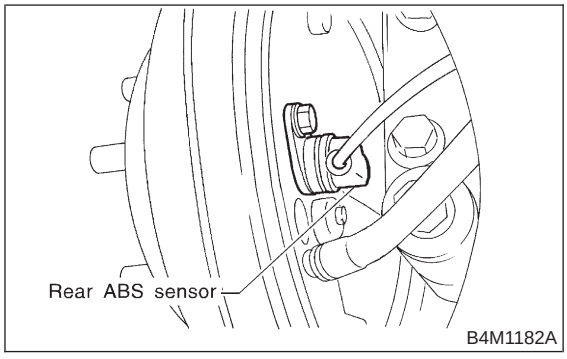
5) Remove front disc brake caliper and disc rotor from housing after removing front tire.
6) Remove front drive shaft and housing and hub assembly. <Ref. to 4-2 [W1A0].>
7) Remove tone wheel while removing hub from housing and hub assembly. <Ref. to 4-2 [W1B0].>

CAUTION:
Be careful not to damage teeth faces of tone wheel during removal.



2. REAR ABS SENSOR

1) Remove rear seat and disconnect rear ABS sensor connector.
2) Remove rear sensor harness bracket from rear trailing link and bracket.
3) Remove rear ABS sensor from rear back plate.



4) Remove rear tone wheel while removing hub from housing and hub assembly. <Ref. to 4-2 [W2B0].>

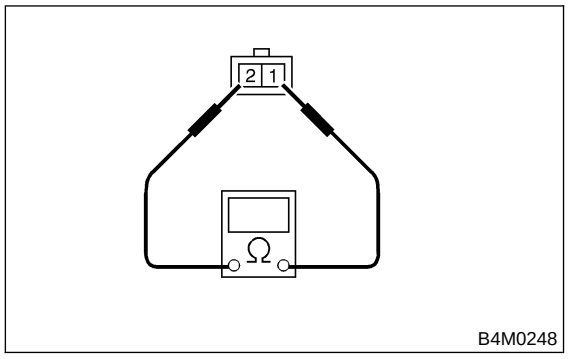
CAUTION:
● Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.
● Do not pull sensor harness during removal.

B: INSPECTION

1. ABS SENSOR

1) Check pole piece of ABS sensor for foreign particles or damage. If necessary, clean pole piece or replace ABS sensor.

2) Measure ABS sensor resistance.



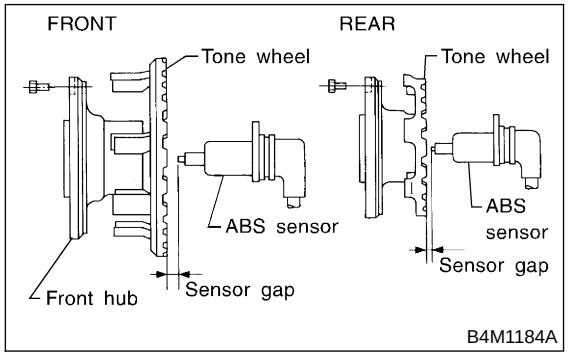
ABS sensor	Terminal No.	Standard
Front - LH	1 and 2	1.0±0.2 kΩ
Front - RH	1 and 2	
Rear - LH	1 and 2	
Rear - RH	1 and 2	

CAUTION:
If resistance is outside the standard value, replace ABS sensor with new one.

NOTE:
Check ABS sensor cable for discontinuity. If necessary, replace with a new one.

2. TONE WHEEL

1) Check tone wheel's teeth (44 pieces) for cracks or dents. If necessary, replace tone wheel with a new one.
2) Clearances (sensor gaps) should be measured one by one to ensure tone wheel and speed sensor are installed correctly.



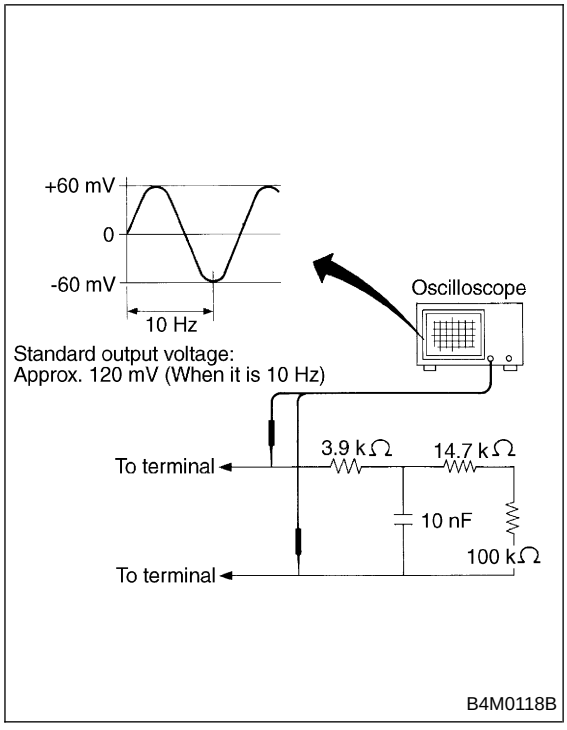
ABS sensor clearance:
Front
0.9 — 1.4 mm (0.035 — 0.055 in)
Rear
0.7 — 1.2 mm (0.028 — 0.047 in)

NOTE:
● If clearance is narrow, adjust by using spacer (Part No. 26755AA000).
● If clearance is wide, check the outputted voltage then replace ABS sensor or tone wheel if the outputted voltage is outside the specification.

3. OUTPUT VOLTAGE

Output voltage can be checked by the following method. Install resistor and condenser, then rotate wheel about 2.75 km/h (2 MPH) or equivalent.

NOTE:
Regarding terminal No., please refer to item 1. ABS SENSOR.

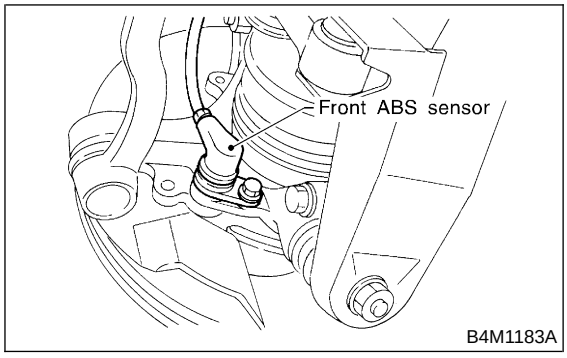


C: INSTALLATION

1. FRONT ABS SENSOR

1) Install tone wheel on hub, then install housing on hub assembly. <Ref. to 4-2 [W1D0].>
2) Temporarily install front ABS sensor on housing.

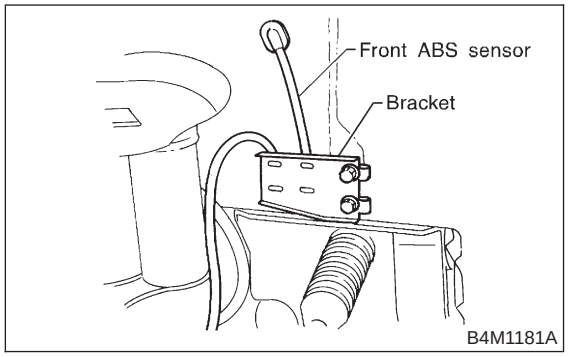
CAUTION:
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.



3) Install front drive shaft to hub spline. <Ref. to 4-2 [W1E0].>

4) Install front ABS sensor on strut and wheel apron bracket.

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)



5) Place a thickness gauge between ABS sensor's pole piece and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on housing to specified torque.

ABS sensor standard clearance:
0.9 — 1.4 mm (0.035 — 0.055 in)

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

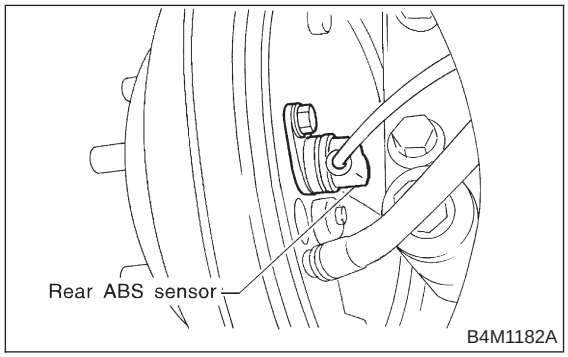
CAUTION:
Check the marks on the harness to make sure that no distortion exists. (RH: white, LH: yellow)

NOTE:
If the clearance is outside specifications, readjust.

2. REAR ABS SENSOR

1) Install rear tone wheel on hub, then rear housing on hub. <Ref. to 4-2 [W2D0].>
2) Temporarily install rear ABS sensor on back plate.

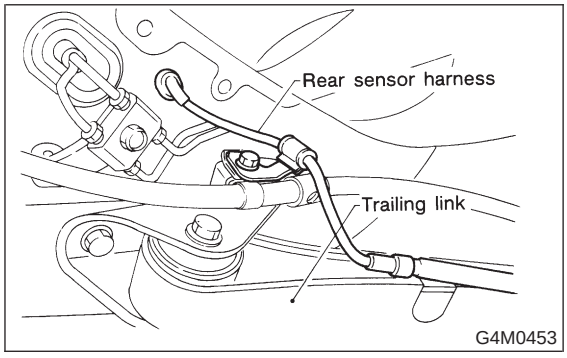
CAUTION:
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.



3) Install rear drive shaft to rear housing and rear differential spindle. <Ref. to 4-2 [W2E0].>

4) Install rear sensor harness on rear trailing link.

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)



5) Place a thickness gauge between ABS sensor's pole piece and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on back plate to specified torque.

ABS sensor standard clearance:
0.7 — 1.2 mm (0.028 — 0.047 in)

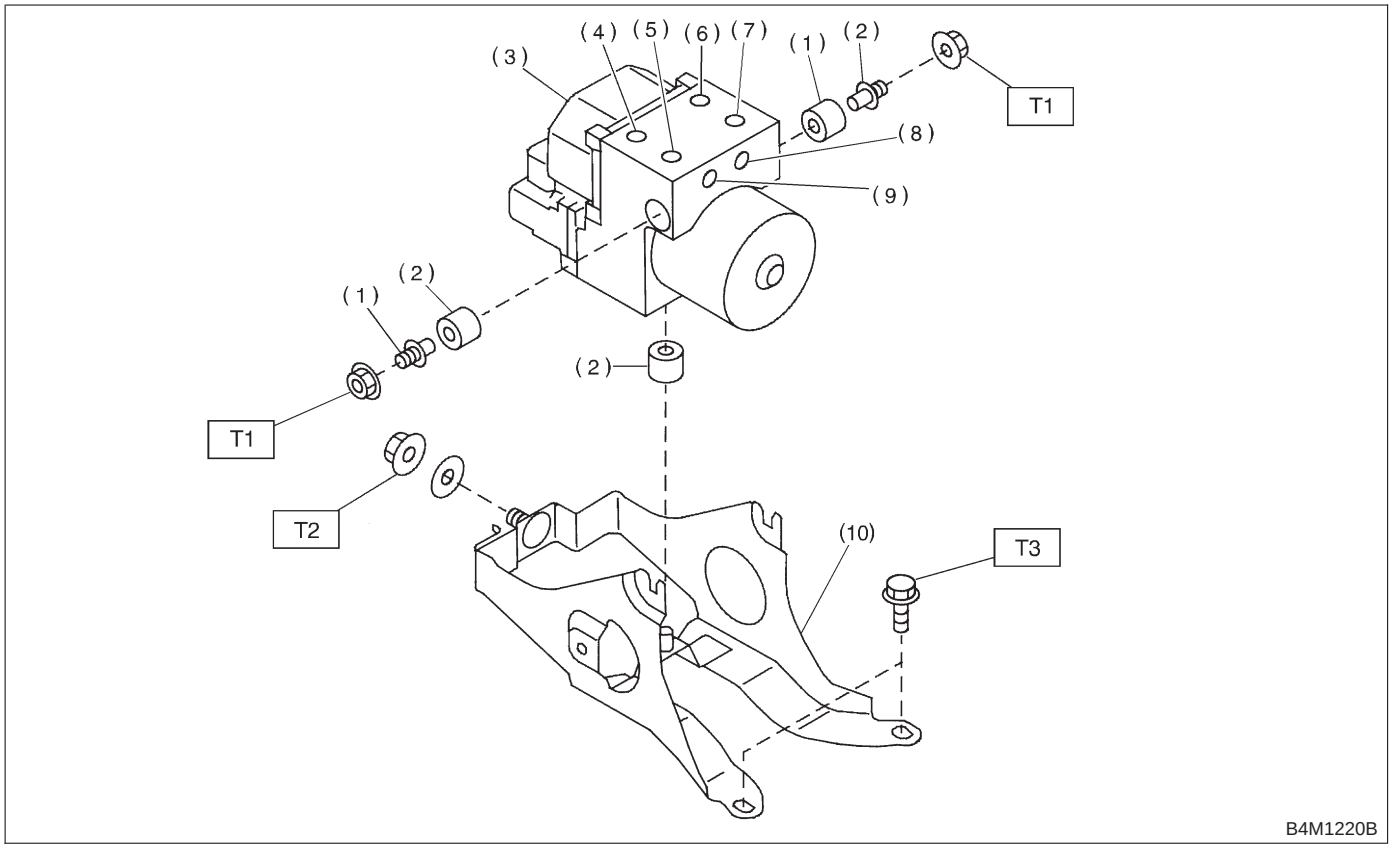
Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CAUTION:
Check the marks on the harness to make sure that no distortion exists. (RH: white, LH: yellow)

NOTE:
If the clearance is outside specifications, readjust.

15. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U)

A: REMOVAL



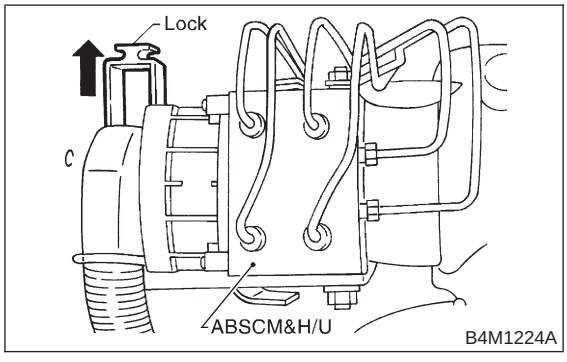
(1) Stud bolt
(2) Damper
(3) ABS control module and hydraulic control unit
(4) Front-LH outlet
(5) Secondary inlet
(6) Front-RH outlet
(7) Primary inlet
(8) Rear-LH outlet
(9) Rear-RH outlet
(10) Bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 18±5 (1.8±0.5, 13.0±3.6)
T2: 29±7 (3.0±0.7, 21.7±5.1)
T3: 32±10 (3.3±1.0, 24±7)

1) Disconnect ground cable from battery.
2) Remove air intake duct from engine compartment to facilitate removal of ABSCM&H/U.
3) Use an air-gun to get rid of water around the ABSCM&H/U.

CAUTION:
The contact will be insufficient if the terminal gets wet.

4) Pull on the lock of the ABSCM&H/U connector to remove it.



5) Disconnect connector from ABSCM&H/U.

CAUTION:
Be careful not to let water or other foreign matter contact the ABSCM&H/U terminal.

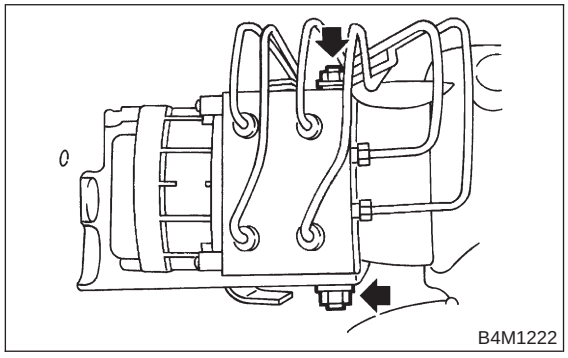
6) Unlock cable clip.

7) Disconnect brake pipes from ABSCM&H/U.

CAUTION:
Wrap brake pipes with vinyl bag to avoid spilling brake fluid on vehicle body.

8) Remove ABSCM&H/U from engine compartment.

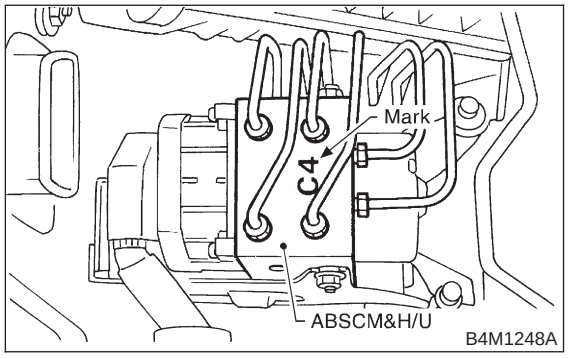
CAUTION:
● ABSCM&H/U cannot be disassembled. Do not attempt to loosen bolts and nuts.
● Do not drop or bump ABSCM&H/U.
● Do not turn the ABSCM&H/U upside down or place it on its side.
● Be careful to prevent foreign particles from getting into ABSCM&H/U.
● Apply a coat of rust-preventive wax (Nippeco LT or GB) to bracket attaching bolt after tightening.
● Do not pull harness disconnecting harness connector.


B4M1222

B: INSPECTION

1) Check connected and fixed condition of connector.
2) Check specifications of the mark with ABSCM&H/U.

Mark	Model
C1	FWD AT
C3	AWD AT
C4	AWD MT



B4M1248A

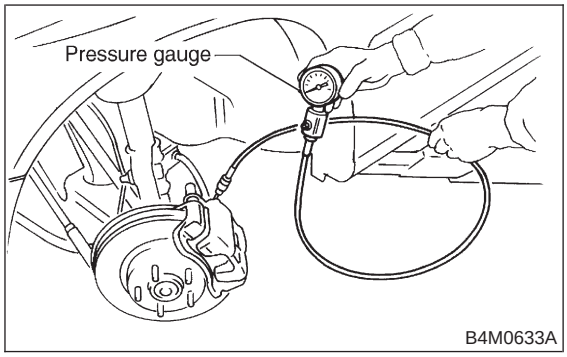
C: CHECKING THE HYDRAULIC UNIT ABS OPERATION

1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

1) Lift-up vehicle and remove wheels.
2) Disconnect the air bleeder screws from the FL and FR caliper bodies.
3) Connect two pressure gauges to the FL and FR caliper bodies.

CAUTION:
● Pressure gauges used exclusively for brake fluid must be used.
● Do not employ pressure gauge previously used for transmission since the piston seal is expanded which may lead to malfunction of the brake.

NOTE:
Wrap sealing tape around the pressure gauge.



B4M0633A

4) Bleed air from the pressure gauges.
5) Perform ABS sequence control.
<Ref. to 4-4 [W15D0].>
6) When the hydraulic unit begins to work, and first the FL side performs decompression, holding, and compression, and then the FR side performs decompression, holding, and compression.
7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Also check if any irregular brake pedal tightness is felt.

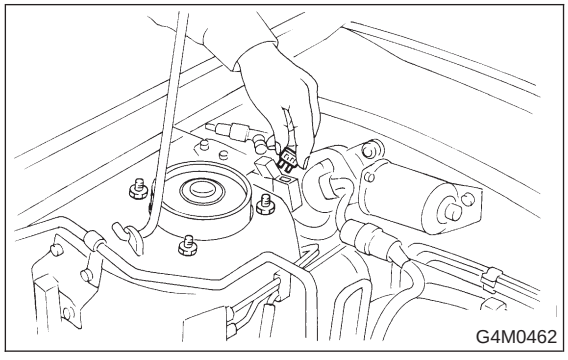
	Front wheel	Rear wheel
Initial value	3,432 kPa (35 kg/cm^2, 498 psi)	3,432 kPa (35 kg/cm^2, 498 psi)
When decompressed	490 kPa (5 kg/cm^2, 71 psi) or less	490 kPa (5 kg/cm^2, 71 psi) or less
When compressed	3,432 kPa (35 kg/cm^2, 498 psi) or more	3,432 kPa (35 kg/cm^2, 498 psi) or more

8) Remove pressure gauges from FL and FR caliper bodies.

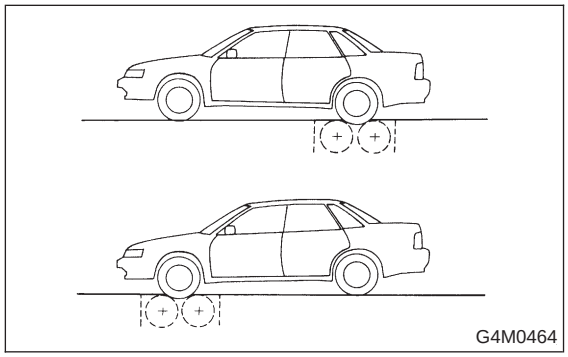
9) Remove air bleeder screws from the RL and RR caliper bodies.
10) Connect the air bleeder screws to the FL and FR caliper bodies.
11) Connect two pressure gauges to the RL and RR caliper bodies.
12) Bleed air from the pressure gauges and the FL and FR caliper bodies.
13) Perform ABS sequence control.
<Ref. to 4-4 [W15D0].>
14) When the hydraulic unit begins to work, at first the RR side performs decompression, holding, and compression, and then the RL side performs decompression, holding, and compression.
15) Read values indicated on the pressure gauges and check if they meet the standard value.
16) After checking, remove the pressure gauges from caliper bodies.
17) Connect the air bleeder screws to RL and RR caliper bodies.
18) Bleed air from brake line.

2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER

1) In the case of AWD AT vehicles, install a spare fuse with the FWD connector in the engine compartment to simulate FWD vehicles.


G4M0462

2) Prepare for operating ABS sequence control.
<Ref. to 4-4 [W15D0].>
3) Set the front wheels or rear wheels on the brake tester and set the select lever's position at "neutral".


G4M0464

4) Operate the brake tester.
5) Perform ABS sequence control. <Ref. to 4-4 [W15D0].>
6) Hydraulic unit begins to work; and check the following working sequence.
(1) The FL wheel performs decompression, holding, and compression in sequence, and subsequently the FR wheel repeats the cycle.
(2) The RR wheel performs decompression, holding, and compression in sequence, and subsequently the RL wheel repeats the cycle.
7) Read values indicated on the brake tester and check if the fluctuation of values, when decompressed and compressed, meet the standard values.

	Front wheel	Rear wheel
Initial value	981 N (100 kg, 221 lb)	981 N (100 kg, 221 lb)
When decompressed	490 N (50 kg, 110 lb) or less	490 N (50 kg, 110 lb) or less
When compressed	981 N (100 kg, 221 lb) or more	981 N (100 kg, 221 lb) or more

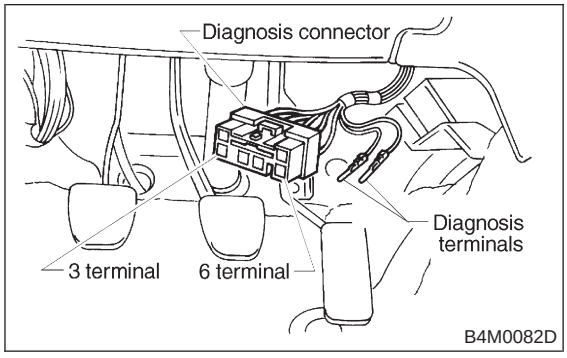
8) After checking, also check if any irregular brake pedal tightness is felt.

D: ABS SEQUENCE CONTROL

1) Under the ABS sequence control, after the hydraulic unit solenoid valve is driven, the operation of the hydraulic unit can be checked by means of the brake tester or pressure gauge.
2) ABS sequence control can be started by diagnosis connector or select monitor.

1. OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR

1) Connect diagnosis terminals to terminals No. 3 and No. 6 of the diagnosis connector beside driver's seat heater unit.



2) Set the speed of all wheels at 4 km/h (2 MPH) or less.
3) Turn ignition switch OFF.

4) Within 0.5 seconds after the ABS warning light goes out, depress the brake pedal and hold it immediately after ignition switch is turned to ON.

CAUTION:
Do not depress the clutch pedal.

NOTE:
● When the ignition switch is set to on, the brake pedal must not be depressed.
● Engine must not operate.

5) After completion of ABS sequence control, turn ignition switch OFF.

2. OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH SELECT MONITOR

NOTE:
● In the event of any trouble, the sequence control may not be operative. In such a case, activate the sequence control, referring to “OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR”. <Ref. to 4-4 [W15D1].>
● When the diagnosis terminal is connected to the diagnosis connector, the sequence control will not operate.

1) Connect select monitor to data link connector beside driver’s seat instrument panel lower cover.
2) Turn ignition switch ON.
3) Turn select monitor switch ON.
4) Put select monitor to {ABS/TCS} mode.
5) When {Function check sequence} is selected, ‘ABS sequence control’ will start.
6) The message ‘Press Brake Pedal Firmly’ is displayed as follows:
(1) When using the brake tester, depress brake pedal with braking force of 981 N (100 kg, 221 lb).
(2) When using the pressure gauge, depress brake pedal so as to make the pressure gauge indicate 3,432 kPa (35 kg/cm^2, 498 psi).

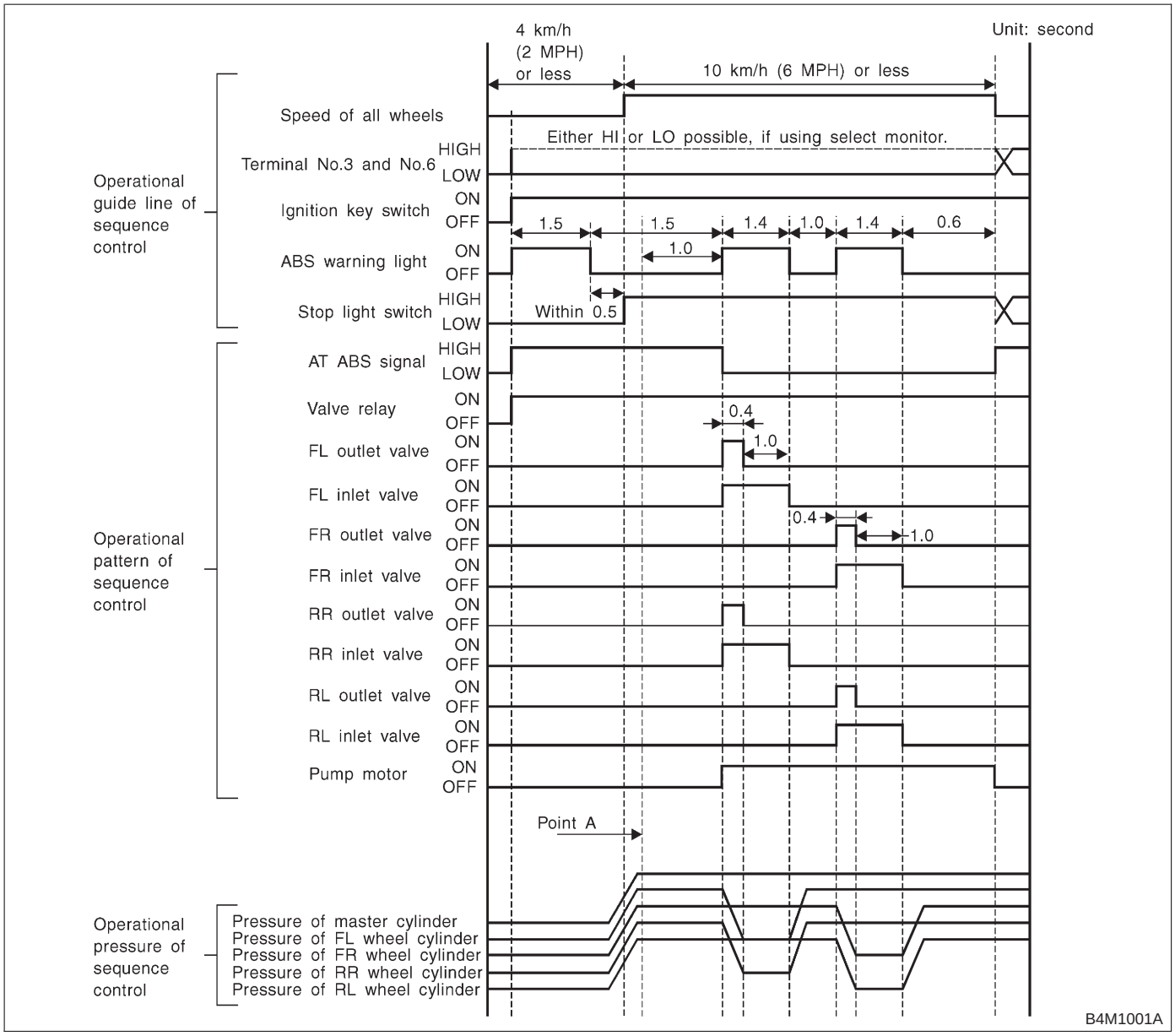
CAUTION:
Do not depress the clutch pedal.

7) When the message “Press YES” is displayed, press YES key.
8) Operation points will be displayed on select monitor.

3. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL

When the following conditions develop, the ABS sequence control stops and ABS operation is returned to the normal control mode.
1) When the speed of at least one wheel reaches 10 km/h (6 MPH).
2) When terminal No. 3 or No. 6 are separated from diagnosis terminals. (When select monitor is not used.)
3) When the brake pedal is released during sequence control and the braking lamp switch is set to off.
4) When brake pedal is depressed after ignition key is turned to ON, and before ABS warning light goes out. (When select monitor is not used.)
5) When brake pedal is not depressed after ignition key is turned to ON, and within 0.5 seconds after ABS warning light goes out. (When select monitor is not used.)
6) After completion of the sequence control.
7) When malfunction is detected. (When select monitor is used.)

4. CONDITIONS FOR ABS SEQUENCE CONTROL



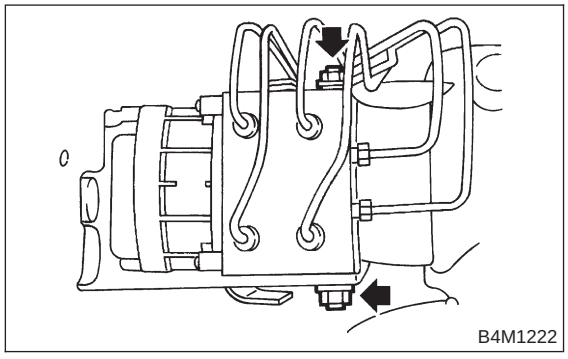
NOTE:
- When select monitor is used, control operation starts at point A. The patterns from IGN key ON to the point A show that operation is started by diagnosis connector.
- HIGH means high voltage.
- LOW means low voltage.

E: INSTALLATION

1) Install ABSCM&H/U.

CAUTION:
Confirm that the specifications of the ABSCM&H/U conforms to the vehicle specifications.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)



2) Connect brake pipes to their correct ABSCM&H/U connections.

Brake pipe tightening torque:
15^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)

3) Using cable clip, secure ABSCM&H/U harness to bracket.
4) Connect connector to ABSCM&H/U.

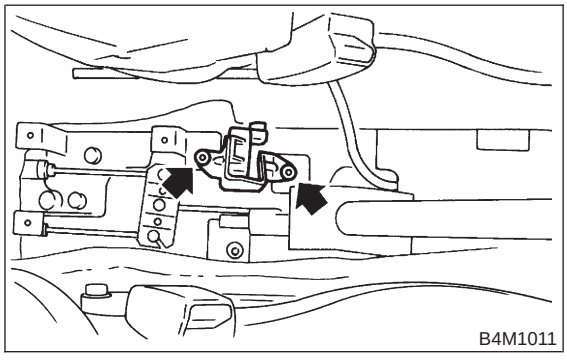
CAUTION:
● Be sure to remove all foreign matter from inside the connector before connecting.
● Ensure that the ABSCM&H/U connetor is securely locked.

5) Install air intake duct.
6) Connect ground cable to battery.
7) Bleed air from the brake system.

16. G Sensor

A: REMOVAL AND INSTALLATION

1) Turn ignition switch to OFF.
2) Remove console box. <Ref. to 5-4 [W1A0].>
3) Disconnect connector from G sensor.
4) Remove G sensor from body.



5) To install, reverse the removal procedure.

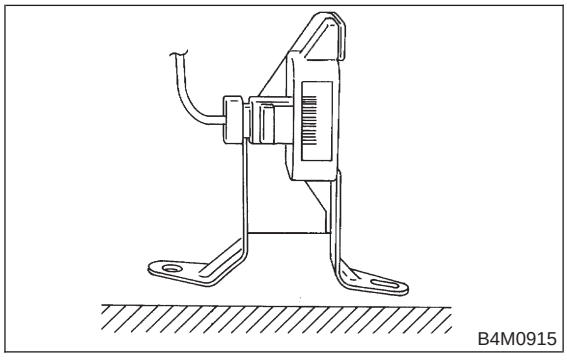
CAUTION:
Do not drop or bump G sensor.

B: INSPECTION WITH CIRCUIT TESTER

16B1 : CHECK G SENSOR.

1) Turn ignition switch to OFF.
2) Remove G sensor from vehicle.
3) Connect connector to G sensor.
4) Turn ignition switch to ON.
5) Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−)

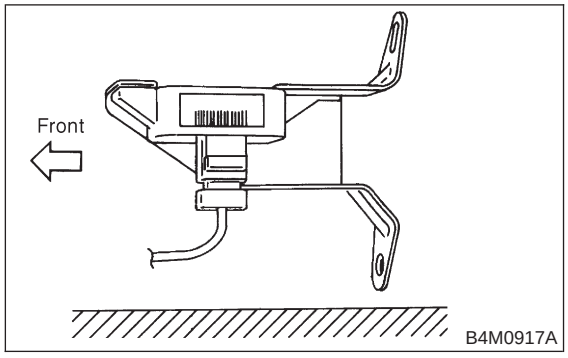


CHECK : ***Is the voltage 2.3±0.2 V when G sensor is horizontal?***
YES : Go to step **16B2**.
NO : Replace G sensor.

16B2 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−)

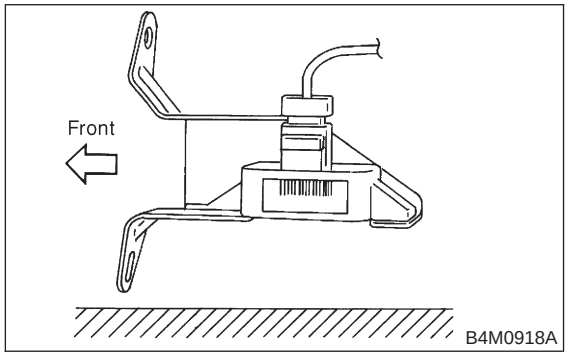


CHECK : ***Is the voltage 3.9±0.2 V when G sensor is inclined forwards to 90°?***
YES : Go to step **16B3**.
NO : Replace G sensor.

16B3 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−)



CHECK : ***Is the voltage 0.7±0.2 V when G sensor is inclined backwards to 90°?***
YES : G sensor is normal.
NO : Replace G sensor.

C: INSPECTION WITH SELECT MONITOR

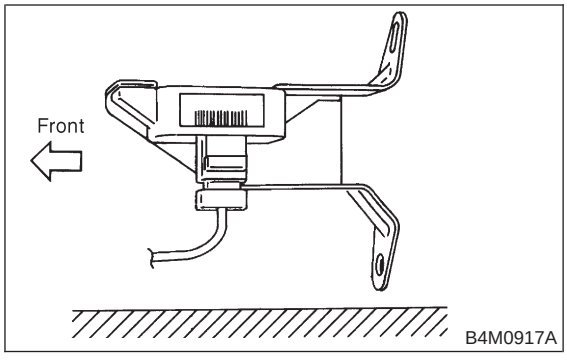
16C1 : CHECK G SENSOR.

1) Turn ignition switch to OFF.
2) Connect select monitor connector to data link connector.
3) Turn select monitor into {ABS/TCS} mode.
4) Set the display in the {Current Data Display & Save} mode.
5) Read the G sensor output voltage.

CHECK : ***Is the indicated reading 2.3±0.2 V when the vehicle is in horizontal position?***
YES : Go to step **16C2**.
NO : Replace G sensor.

16C2 : CHECK G SENSOR.

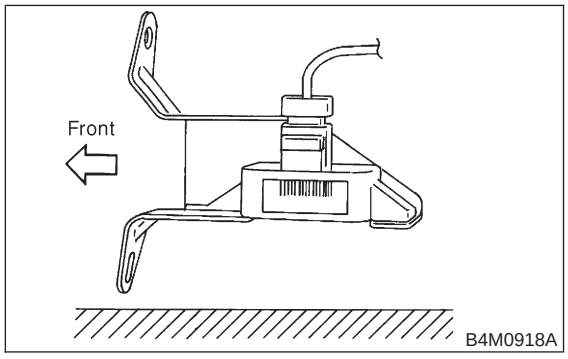
1) Remove console box.
2) Remove G sensor from vehicle. (Do not disconnect connector.)
3) Read the select monitor display.



CHECK : ***Is the indicated reading 3.9±0.2 V when G sensor is inclined forwards to 90°?***
YES : Go to step **16C3**.
NO : Replace G sensor.

16C3 : CHECK G SENSOR.

Read the select monitor display.



CHECK : ***Is the indicated reading 0.7±0.2 V when G sensor is inclined backwards to 90°?***

YES : G sensor is normal.

NO : Replace G sensor.

17. Brake Pipe AIRBAG

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the center brake pipe.

CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
● Be careful not to damage Airbag system wiring harness when servicing the center brake pipe.

B: REMOVAL AND INSTALLATION

CAUTION:
● When removing and installing the brake pipe, make sure that it is not bent.
● After installing the brake pipe and hose, bleed the air.
● After installing the brake hose, make sure that it does not touch the tire or suspension assembly, etc.

Brake pipe tightening torque:
$15^{+3}/_{-2}$ N·m ($1.5^{+0.3}/_{-0.2}$ kg-m, $10.8^{+2.2}/_{-1.4}$ ft-lb)

1. Entire Brake System

Trouble and possible cause	Corrective action
1. Insufficient braking	
(1) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
(2) Entry of air into the hydraulic mechanism	Bleed the air.
(3) Excessively wide shoe clearance	Adjust the clearance.
(4) Wear, deteriorated surface material, adhering water or fluid on the lining	Replace, grind or clean.
(5) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
2. Unstable or uneven braking	
(1) Fluid on the lining, drum or rotor	Eliminate cause of fluid leakage, clean, or replace.
(2) Drum or rotor eccentricity	Correct or replace the drum or rotor.
(3) Worn brake drum, or damage to the drum caused by sand	Correct by grinding, or replace.
(4) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
(5) Deformed back plate	Correct or replace.
(6) Improper tire inflation	Inflate to correct pressure.
(7) Disordered wheel alignment	Adjust alignment.
(8) Loosened back plate or the support installing bolts	Retighten.
(9) Loosened wheel bearing	Retighten to normal tightening torque or replace.
(10) Trouble in the hydraulic system	Replace the cylinder, brake pipe or hose.
(11) Uneven effect of the parking brake	Check, adjust, or replace the rear brake and cable system.
3. Excessive pedal stroke	
(1) Entry of air into the hydraulic mechanism	Bleed the air.
(2) Excessive play in the master cylinder push rod	Adjust.
(3) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
(4) Improperly adjusted shoe clearance	Adjust.
(5) Improper lining contact or worn lining	Correct or replace.
4. Brake dragging or improper brake return	
(1) Insufficient pedal play	Adjust play.
(2) Improper master cylinder return	Clean or replace the cylinder.
(3) Clogged hydraulic system	Replace.
(4) Improper return or adjustment of parking brake	Correct or adjust.
(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
(6) Excessively narrow shoe clearance	Adjust the clearance.
(7) Improper disc caliper operation	Correct or replace.
(8) Improper adjusted wheel bearing	Adjust or replace.
5. Brake noise (1) (creak sound)	
(1) Hardened or deteriorated lining	Replace the shoe assembly or pad.
(2) Worn lining	Replace the shoe assembly or pad.
(3) Loosened back plate or the support installing bolts	Retighten.
(4) Loose wheel bearing	Retighten to normal tightening torque.
(5) Dirty drum or rotor	Clean the drum or rotor, or clean and replace the brake assembly.
6. Brake noise (2) (hissing sound)	
(1) Worn lining	Replace the shoe assembly or pad.
(2) Improper installed shoe or pad	Correct or replace the shoe assembly or pad.
(3) Loose or bent drum or rotor	Retighten or replace.
7. Brake noise (3) (click sound)	

Trouble and possible cause	Corrective action
In the case of the disc brake:	
(1) Excessively worn pad or the support	Replace the pad or the support.
In the case of the drum brake:	
(1) Excessively worn shoe ridge	Replace the back plate.
(2) Lack of oil on the shoe ridge surface and anchor	Add more grease.

2. Hill Holder

CAUTION:
● Description in parentheses is a characteristic of hill holder and does not indicate abnormality.
Depressing force required for clutch pedal equipped to hill holder specifications is 20 to 29 N (2 to 3 kg, 4 to 7 lb) larger than the conventional specifications, which does not constitute abnormality.

● When vehicle cannot travel (brake cannot be released) because return spring is broken, remove adjusting nut, disconnect clutch and PHV, and then return PHV lever to release the brake. (Be sure to apply the parking brake before starting this operation.)
● The hill holder may not be activated on a slope of an extremely small inclination.

Trouble and possible cause	Corrective action
1. Counterforce of clutch pedal is too strong.	
(1) PHV cable is damaged or does not operate properly.	Repair or replace.
(2) Lever of PHV is defective.	Replace entire PHV assembly.
(3) Clutch system is anomalous.	Refer to “Clutch and pedal cable system”.
2. Vehicle does not stop on uphill road of 3° or higher inclination.	
(1) Front side of vehicle is lowered.	Refer to “Suspension”.
(2) PHV cable is broken.	Replace.
(3) Play of clutch is excessive.	Adjust.
(4) PHV cable is elongated.	Adjust.
(5) Sealing of PHV is poor.	Replace entire PHV assembly.
3. Shock is felt when starting.	
(1) Poor adjustment of starting performance:	Adjust.
(2) When depressing the brake pedal strongly:	(The stronger brake pedal depressing force, the later hill holder releases.)
(3) When starting on flat road after stopping reverse movement:	(Because hill holder is activated.)
4. Vehicle slips down when starting.	
(1) PHV cable is elongated.	Adjust.
(2) Clutch facing is worn out.	Adjust or replace.
(3) Bracket (cable) or stay (PHV) is deformed.	Repair or replace.
5. Vehicle cannot start after stoppage.	
(1) Return spring is fatigued or broken.	Replace.
(2) PHV lever won’t return.	Replace entire PHV assembly.
(3) When intentionally depressing brake pedal strongly:	[When the brake pedal is depressed by a force of 1,177 N (120 kg, 265 lb) or more.]
6. Abnormal sound is generated upon releasing brake pedal when stopping.	
(1) Rotor and pad matched with each other due to inadequate depressing force to brake pedal.	(Abnormal sound is not generated when depressing brake pedal a little stronger.)
7. Abnormal sound is generated when operating clutch pedal.	
(1) Grease is inadequate for the hook of return spring and sliding portion of PHV cable end.	Apply grease.
(2) When releasing after maintaining high fluid pressure:	(Flowing sound of fluid when releasing high fluid pressure.)
(3) Clutch system is anomalous.	Refer to “Clutch and pedal cable system”.

MEMO:

PEDAL SYSTEM AND CONTROL CABLES 4-5

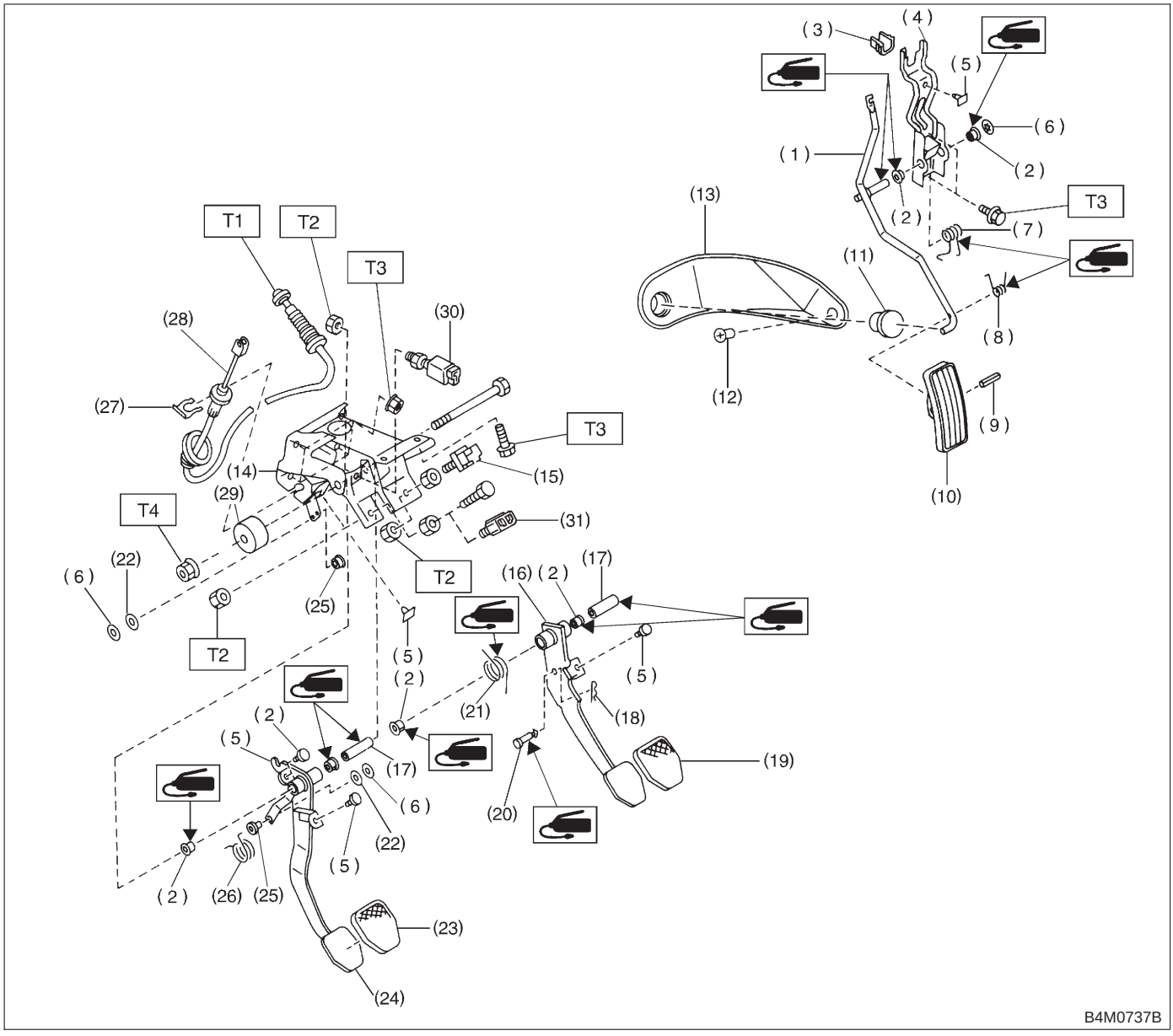
1. Pedal System

Brake pedal	Free play		1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb).]
Clutch pedal	Free play	At clutch pedal pad	Except 2500 cc model: 10 — 20 mm (0.39 — 0.79 in) 2500 cc model: 4 — 13 mm (0.16 — 0.51 in)
	Full stroke	At clutch pedal pad	Except 2500 cc model: 140 — 145 mm (5.51 — 5.71 in) 2500 cc model: 130 — 135 mm (5.12 — 5.31 in)
Accelerator pedal	Free play	At pedal pad	1 — 4 mm (0.04 — 0.16 in)
	Stroke	At pedal pad	50 — 55 mm (1.97 — 2.17 in)

1. Pedal

A: MT MODEL

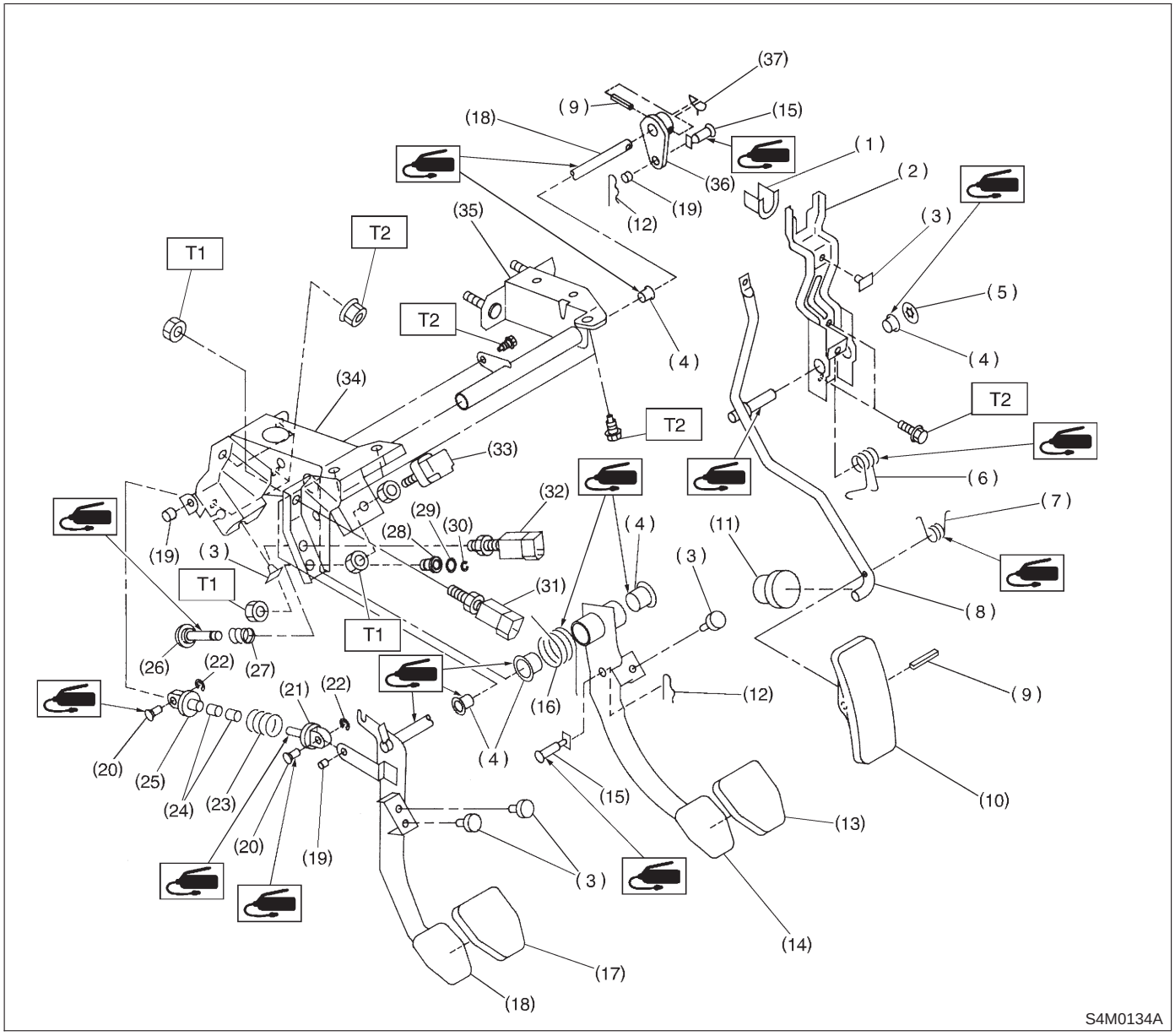
1. EXCEPT 2500 cc MODEL



(1) Accelerator pedal
(2) Bushing
(3) Holder
(4) Accelerator bracket
(5) Stopper
(6) Clip
(7) Accelerator spring
(8) Accelerator pedal spring
(9) Spring pin
(10) Accelerator pedal pad
(11) Accelerator stopper
(12) Clip
(13) Accelerator plate
(14) Pedal bracket
(15) Stop light switch
(16) Brake pedal
(17) Spacer
(18) Snap pin
(19) Brake pedal pad
(20) Clevis pin
(21) Brake pedal spring
(22) Washer
(23) Clutch pedal pad
(24) Clutch pedal
(25) Bushing assist
(26) Spring assist
(27) Clutch cable clamp
(28) Clutch cable
(29) Mass damper
(30) Clutch switch (Starter interlock)
(31) Clutch switch (With cruise control)

Tightening torque: N·m (kg-m, ft-lb)
T1: 5.9±1.5 (0.60±0.15, 4.3±1.1)
T2: 8±2 (0.8±0.2, 5.8±1.4)
T3: 18±5 (1.8±0.5, 13.0±3.6)
T4: 29±7 (3.0±0.7, 21.7±5.1)

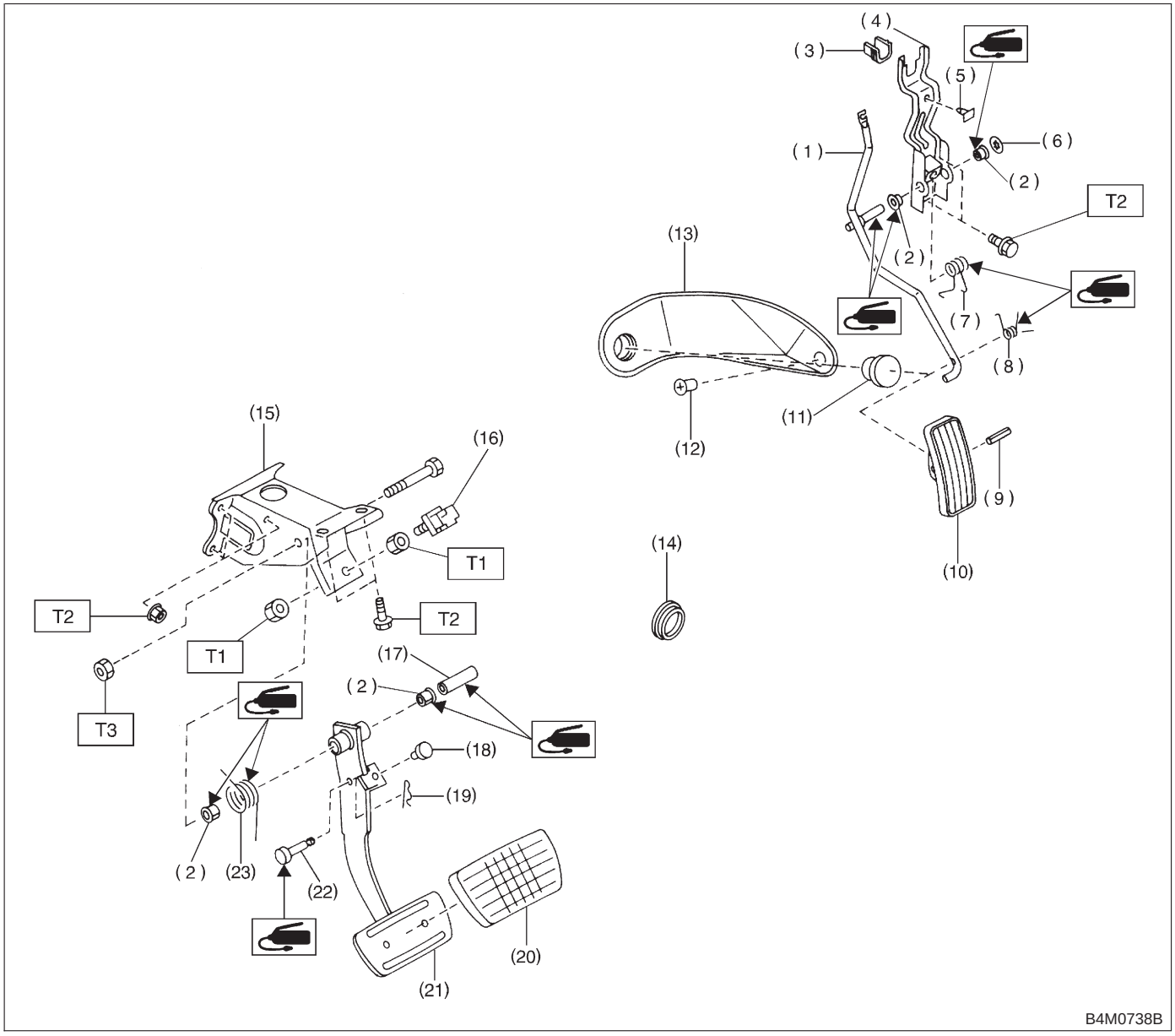
2. 2500 cc MODEL



(1) Holder
(2) Accelerator bracket
(3) Stopper
(4) Bushing
(5) Clip
(6) Accelerator spring
(7) Accelerator pedal spring
(8) Accelerator pedal
(9) Spring pin
(10) Accelerator pedal pad
(11) Accelerator stopper
(12) Snap pin
(13) Brake pedal pad
(14) Brake pedal
(15) Clevis pin
(16) Brake pedal spring
(17) Clutch pedal pad
(18) Clutch pedal
(19) Bushing C
(20) Clutch clevis pin
(21) Assist rod A
(22) Clip
(23) Assist spring
(24) Assist bushing
(25) Assist rod B
(26) Rod S
(27) Spring S
(28) Bushing S
(29) O-ring
(30) Clip
(31) Clutch switch (Starter interlock)
(32) Clutch switch (With cruise control)
(33) Stop light switch
(34) Pedal bracket
(35) Clutch master cylinder bracket
(36) Lever
(37) Lock wire

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±2 (0.8±0.2, 5.8±1.4)
T2: 18±5 (1.8±0.5, 13.0±3.6)

B: AT MODEL



(1) Accelerator pedal
(2) Bushing
(3) Holder
(4) Accelerator bracket
(5) Stopper
(6) Clip
(7) Accelerator spring
(8) Accelerator pedal spring
(9) Spring pin
(10) Accelerator pedal pad
(11) Accelerator stopper
(12) Clip
(13) Accelerator plate
(14) Plug
(15) Pedal bracket
(16) Stop light switch
(17) Spacer
(18) Stopper
(19) Snap pin
(20) Brake pedal pad
(21) Brake pedal
(22) Clevis pin
(23) Brake pedal spring

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±2 (0.8±0.2, 5.8±1.4)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 29±7 (3.0±0.7, 21.7±5.1)

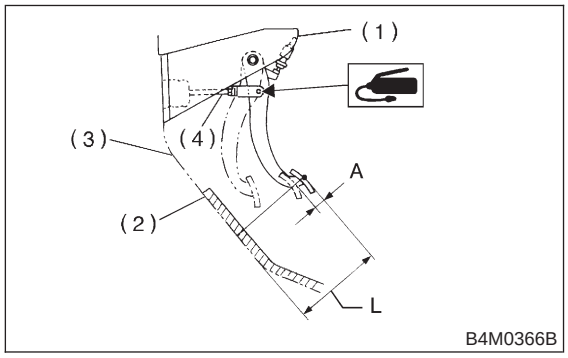
1. Pedal

A: ON-CAR SERVICE

1. BRAKE PEDAL

1) Check position of pedal pad.

Pedal height: L
148 mm (5.83 in)



(1) Stop light switch
(2) Mat
(3) Toe board
(4) Brake booster operating rod

2) If it is not in specified value, adjust it by adjusting brake booster operating rod length.
3) Check free play by operating pedal by hand. If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:
Be careful not to rotate stop light switch.

Brake pedal free play: A
1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb).]

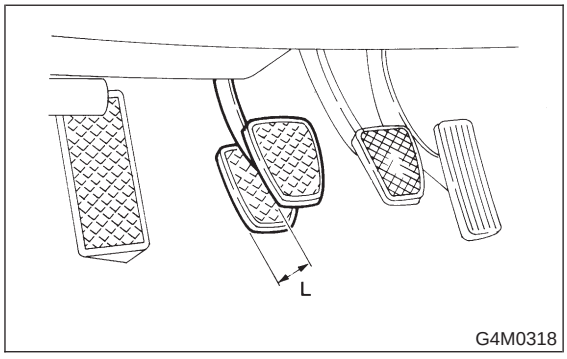
Stop light switch lock nut tightening torque:
8±2 N·m (0.8±0.2 kg-m, 5.8±1.4 ft-lb)

4) Apply grease to operating rod connecting pin to prevent it from wearing.

2. CLUTCH PEDAL (EXCEPT 2500 cc MODEL)

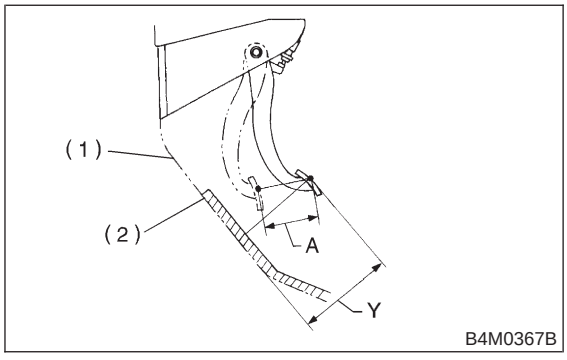
1) Check clutch pedal free play by operating pedal by hand.

Free play: L (At clutch pedal pad)
10 — 20 mm (0.39 — 0.79 in)



Pedal height: Y
158 nn (6.22 in)

Pedal stroke: A
140 — 145 mm (5.51 — 5.71 in)

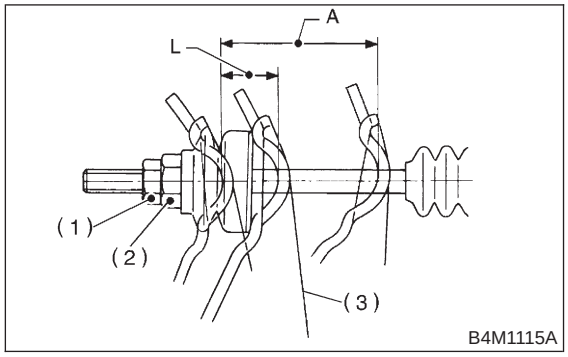


(1) Toe board
(2) Mat

2) If it is not in specified value, adjust it by turning adjusting nut on engine side end of clutch cable.

Free play: L
3 — 4 mm (0.12 — 0.16 in)

Full stroke: A
25.5 — 27 mm (1.004 — 1.063 in)



(1) Lock nut
(2) Adjusting nut
(3) Release fork

3) Apply grease to connecting portion of clutch pedal and clutch cable.

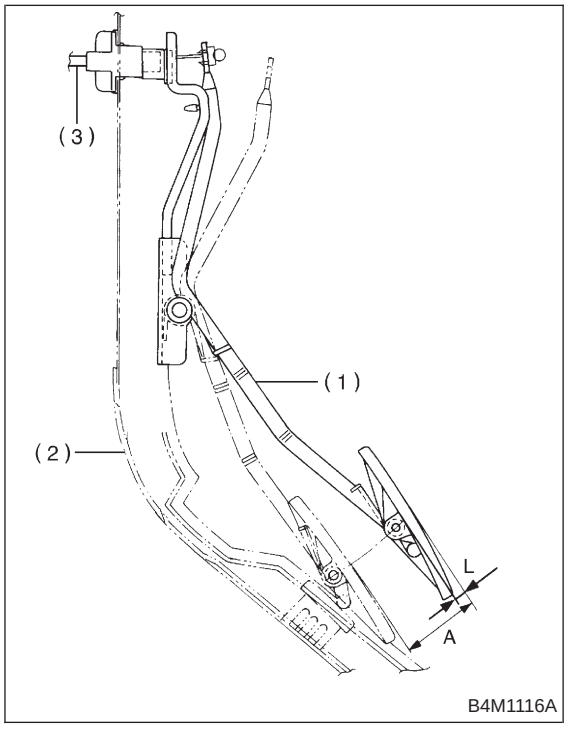
Lock nut tightening torque:
5.9±1.5 N·m (0.60±0.15 kg-m, 4.3±1.1 ft-lb)

3. ACCELERATOR PEDAL

Check pedal stroke and free play by operating accelerator pedal by hand.
If it is not within specified value, adjust it by turning nut connecting accelerator cable to throttle body.

Free play at pedal pad: L
1 — 4 mm (0.04 — 0.16 in)

Stroke at pedal pad: A
50 — 55 mm (1.97 — 2.17 in)

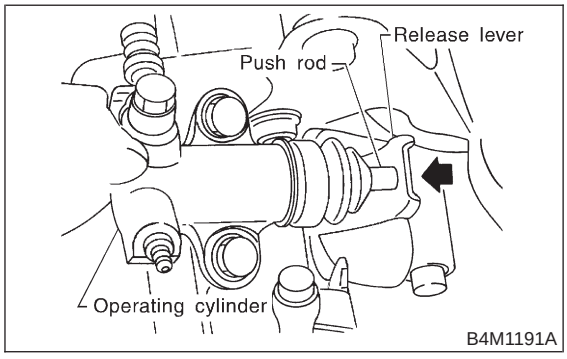


(1) Accelerator pedal
(2) Toe board
(3) Accelerator cable

Accelerator cable lock nut tightening torque:
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)

4. CLUTCH PEDAL (2500 cc MODEL)

1) Push release fork until operating cylinder push rod retracts. Check that clutch fluid level in reservoir tank increases.



2) If clutch fluid level increases, hydraulic clutch play is correct.
3) If clutch fluid level does not increase or push rod does not retract, clutch pedal must be adjusted. <Ref. to 4-5 [W1F1].>
4) Check the fluid level on the outside of the clutch master cylinder tank. If the level is below “MIN”, add clutch fluid to bring it up to “MAX”.

Recommended clutch fluid:
FMVSS No. 116, fresh DOT 3 or DOT 4 brake fluid

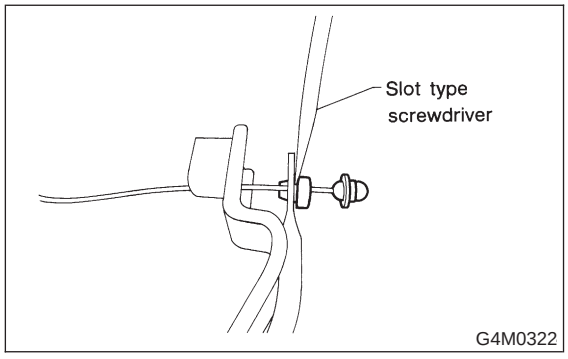
B: REMOVAL

1. ACCELERATOR PEDAL

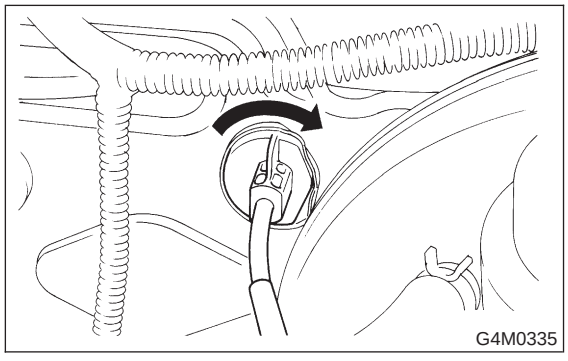
1) Disconnect ground cable from battery.
2) Disconnect accelerator cable from throttle body.

CAUTION:
Be careful not to kink accelerator cable.

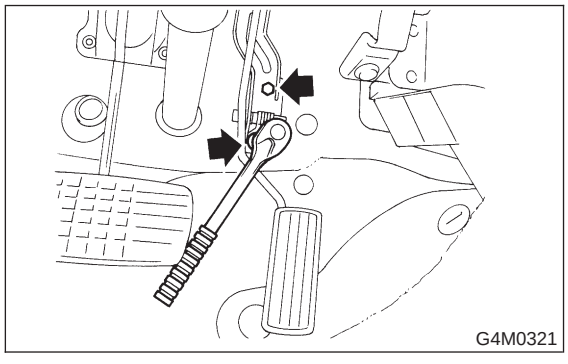
3) Remove instrument panel lower cover from instrument panel, and connector.
4) Disconnect accelerator cable from accelerator pedal lever.



5) Working inside engine compartment, remove casing cap out of the toe board by turning it clockwise.



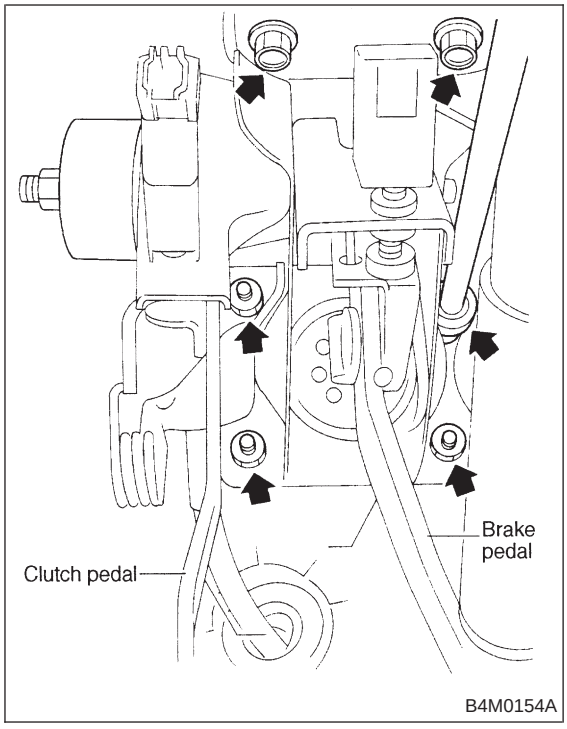
6) Pull out the cable from the toe board hole.
7) Remove accelerator pedal connecting bolt from accelerator pedal bracket.



2. BRAKE AND CLUTCH PEDAL (EXCEPT 2500 cc MODEL)

1) Disconnect ground cable from battery.
2) Disconnect clutch cable from release lever.
3) Remove instrument panel lower cover from instrument panel.
4) Disconnect the following parts from pedal bracket.
   (1) Operating rod of brake booster
   (2) Electrical connectors (for stop light switch, etc.)
5) Remove clevis pin which secures pedal to push rod.
6) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal bracket and clutch cable as a unit.

CAUTION:
Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.

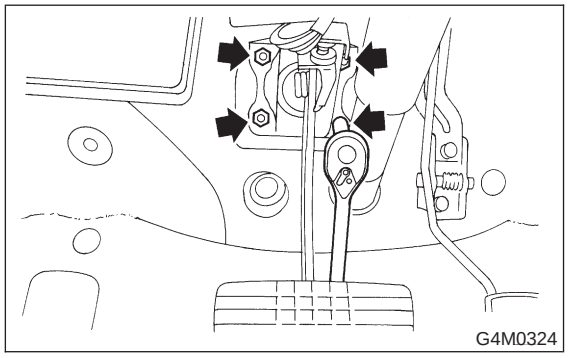


7) Depress clutch pedal, disconnect clutch cable from clutch pedal.

3. BRAKE PEDAL

1) Disconnect ground cable from battery.
2) Remove instrument panel lower cover from instrument panel.
3) Remove clevis pin which secures brake pedal to brake booster operating rod. Also disconnect stop light switch connector.

4) Remove two bolts and four nuts which secure brake pedal to pedal.



4. BRAKE AND CLUTCH PEDAL (2500 cc MODEL)

1) Remove steering bolts.
2) Raise vehicle on hoist and remove the two bolts which secure steering unit to underside of body.
3) Lower vehicle to floor.
4) Remove instrument panel lower cover from instrument panel.
5) Disconnect the following parts from pedal bracket.
- Operating rod of brake booster
- Electrical connectors (for stop light switch, etc.)

6) Remove clevis pin which secures lever to push rod.
7) Remove nut which secures clutch master cylinder.
8) Remove steering assembly.
9) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

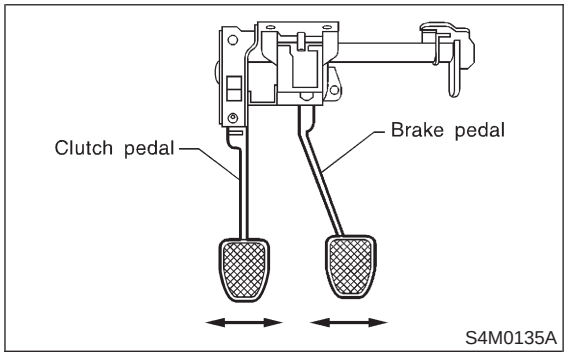
C: INSPECTION

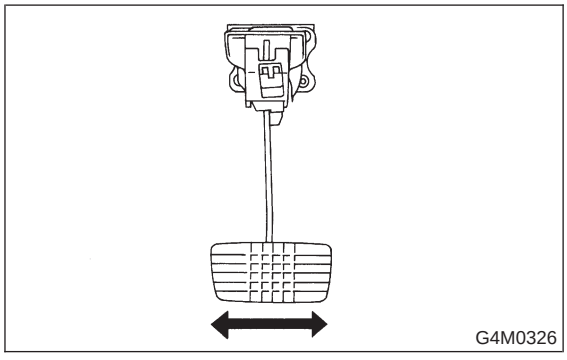
1. BRAKE AND CLUTCH PEDALS

Move brake and clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kg, 2 lb) to ensure pedal deflection is in specified range.

Deflection of brake and clutch pedal:
Service limit
5.0 mm (0.197 in) or less

CAUTION:
If excessive deflection is noted, replace bushings with new ones.



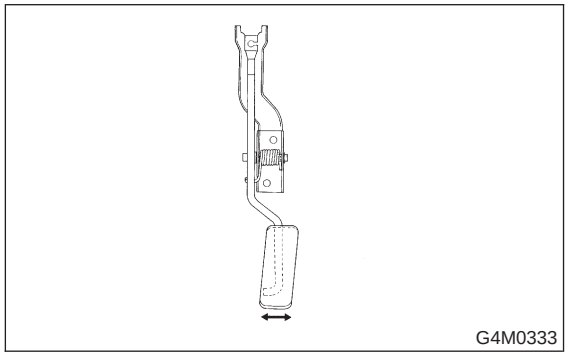


2. ACCELERATOR PEDAL

Lightly move pedal pad in lateral the direction to ensure pedal deflection is in specified range.

Deflection of accelerator pedal:
Service limit
5.0 mm (0.197 in) or less

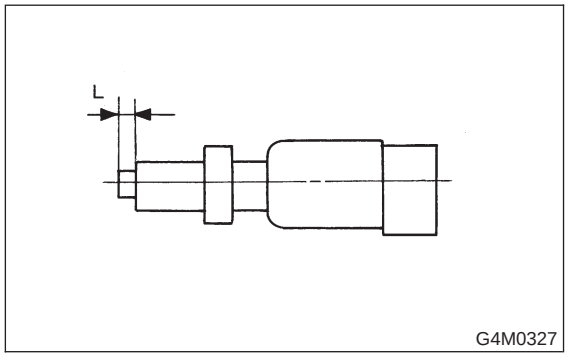
CAUTION:
If excessive deflection is noted, replace bushing and clip with new ones.



3. STOP LIGHT SWITCH

If stop light switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position: L
$2.8^{+1.5}_{0}$ mm ($0.110^{+0.059}_{0}$ in)

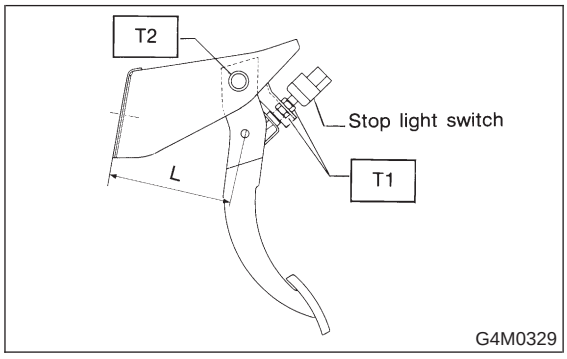


D: ASSEMBLY

1. BRAKE AND CLUTCH PEDAL

1) Attach stop light switch, etc. to pedal bracket temporarily.
2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
3) Align bores of pedal bracket, clutch pedal and brake pedal, attach brake pedal return spring and clutch pedal effort reducing spring (vehicle with hill holder), and then install pedal bolt.

Tightening torque:
T2: 29±7 N·m (3.0±0.7 kg-m, 21.7±5.1 ft-lb)



NOTE:
Clean up inside of bushings and apply grease before installing spacer.

4) Set brake pedal position by adjusting position of stop light switch.

Pedal position: L
125.9 mm (4.96 in)

Tightening torque:
T1: 8±2 N·m (0.8±0.2 kg-m, 5.8±1.4 ft-lb)

2. ACCELERATOR PEDAL

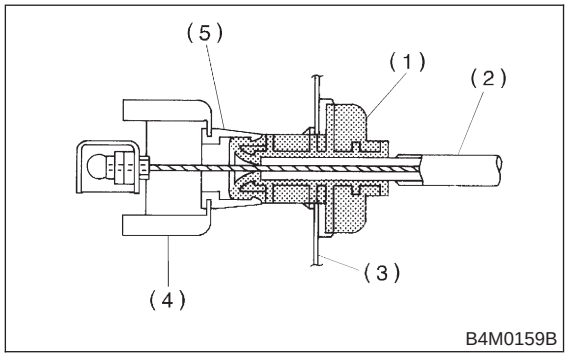
Clean and apply grease to spacer and inside bore of accelerator pedal. Install accelerator pedal onto pedal bracket.

E: INSTALLATION

1) Installation is in the reverse order of removal procedures.

CAUTION:
- **Be careful not to bend clutch cable too much.**
- **Never fail to cover outer cable end with boot.**
- **Be careful not to kink accelerator cable.**

● Make sure that holder and casing cap are securely connected.



(1) Casing cap
(2) Accelerator cable
(3) Toe board
(4) Accelerator pedal bracket
(5) Holder

2) Adjust clutch pedal (2500 cc model) <Ref. to 4-5 [W1F1].>
3) Adjustment after pedal installation <Ref. to 4-5 [W1A0].>

F: ADJUSTMENT

1. CLUTCH PEDAL (2500 cc MODEL)

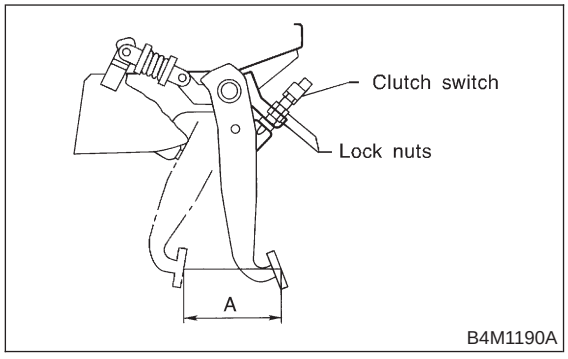
1) Turn cruise control clutch switch lock nuts until clutch pedal full stroke length is within specifications.

CAUTION:
Do not attempt to turn clutch switch to adjust clutch pedal full stroke length.

NOTE:
If lock nuts cannot adjust clutch pedal full stroke length to specifications, turn master cylinder push rod to adjust it.

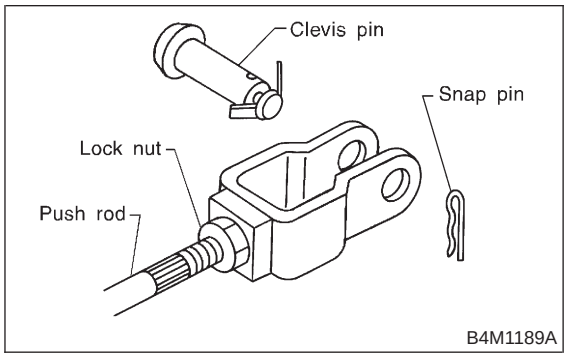
Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):
8±2 N·m (0.8±0.2 kg-m, 5.8±1.4 ft-lb)



2) Turn master cylinder push rod so that clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

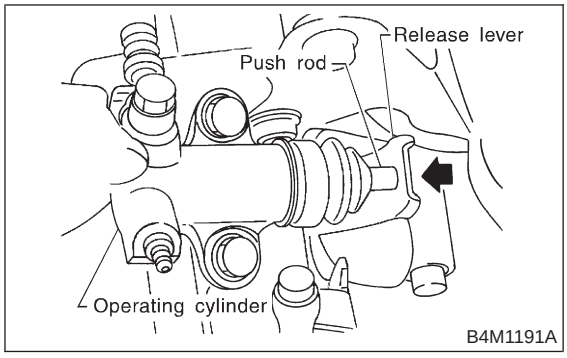
Tightening torque (Push rod lock nut):
8±2 N·m (0.8±0.2 kg-m, 5.8±1.4 ft-lb)



3) Depress and release clutch pedal 2 to 3 times to ensure that clutch pedal and release fork operate smoothly. If clutch pedal and release fork do not operate smoothly, bleed air from clutch hydraulic system. <Ref. to 2-10 [W2A2].>
4) Measure clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

Specified clutch pedal full stroke:
130 — 135 mm (5.12 — 5.31 in)

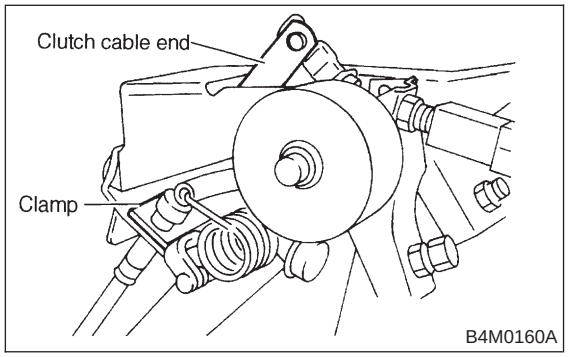
5) Move clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.
6) Push release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If clutch fluid level increases, hydraulic clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace master cylinder with new one. <Ref. to 2-10 [W6A0].>



2. Clutch Cable

A: REMOVAL

1) Disconnect clutch cable from release lever.
2) Depress clutch pedal to the floor.
3) Remove clutch cable clamp from pedal bracket.

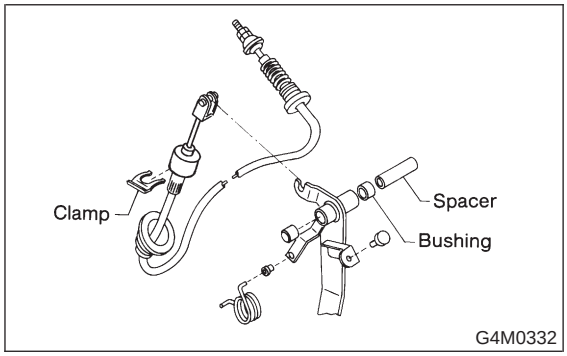


4) Disconnect clutch cable from pedal bracket and pedal end.
5) Remove clutch cable from body.

CAUTION:
Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.

B: INSTALLATION

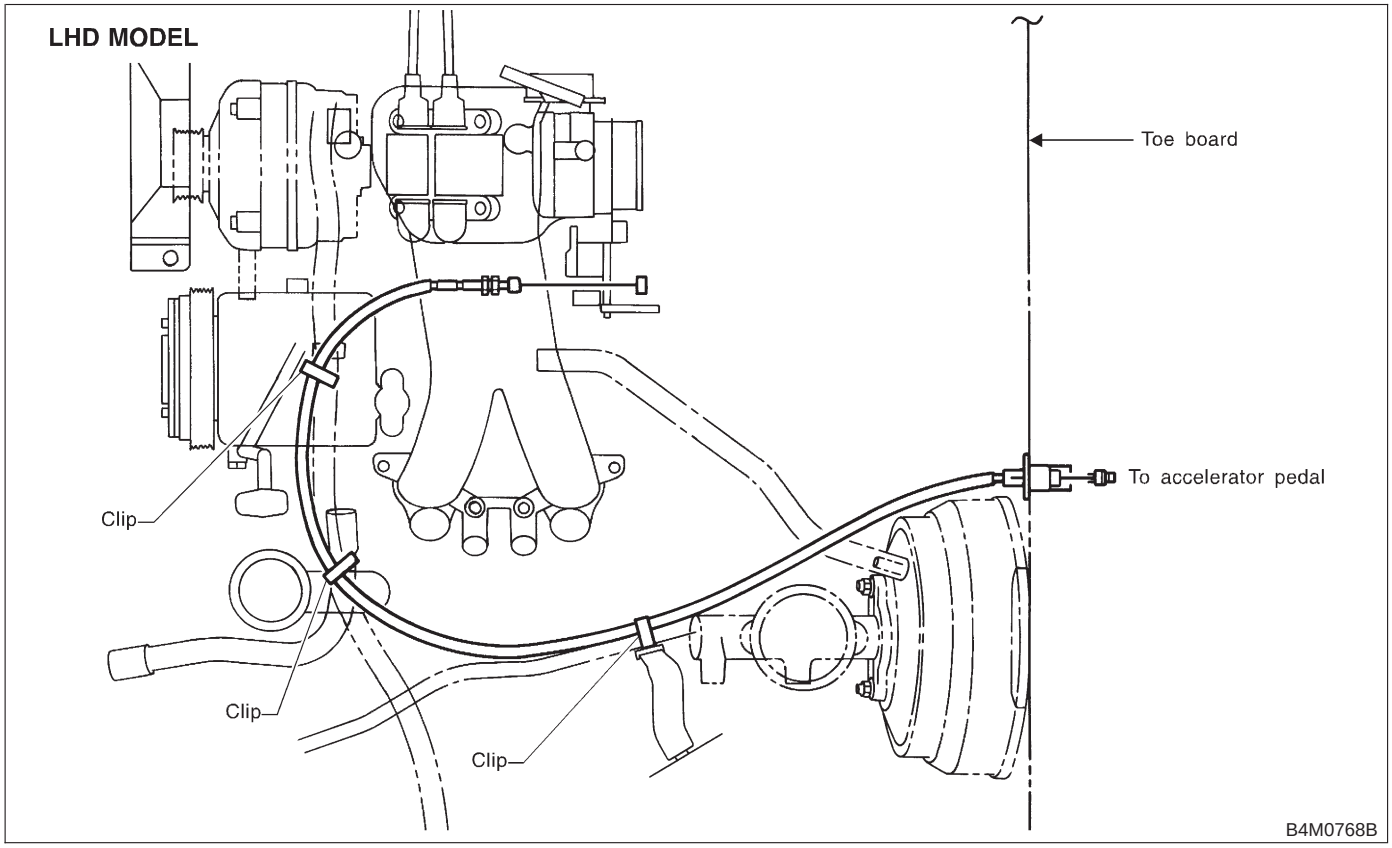
1) Clean clutch pedal fitting hole, and apply grease. Connect clutch cable to clutch pedal.

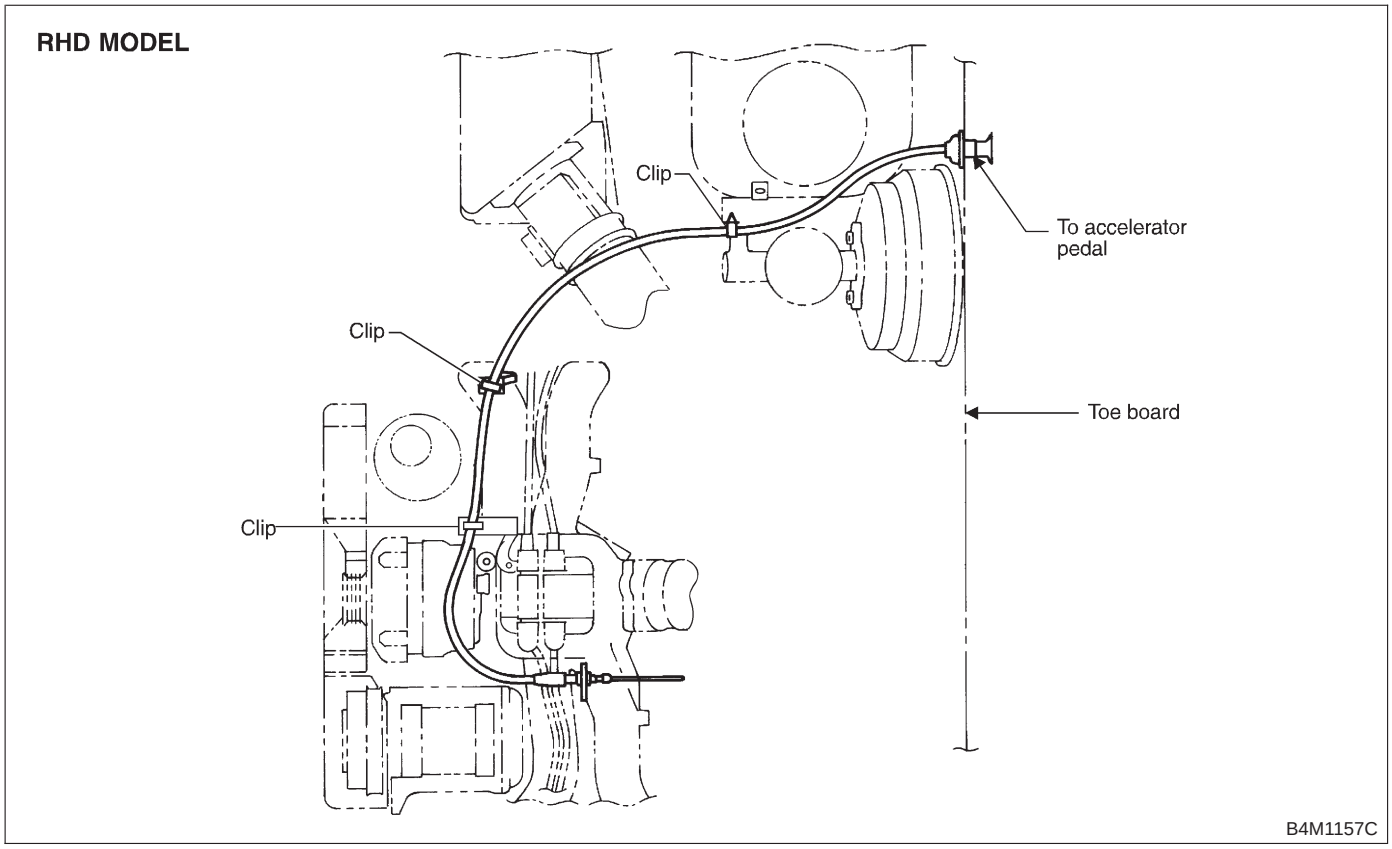


2) Fit clutch pedal to pedal bolt, and connect clutch cable to bracket with clamp.
3) Connect clutch cable end to pedal end.
4) Connect clutch cable from release lever.
5) Install grommet to toe board.
6) Adjust after cable installation. <Ref. to 4-5 [W1A2].>

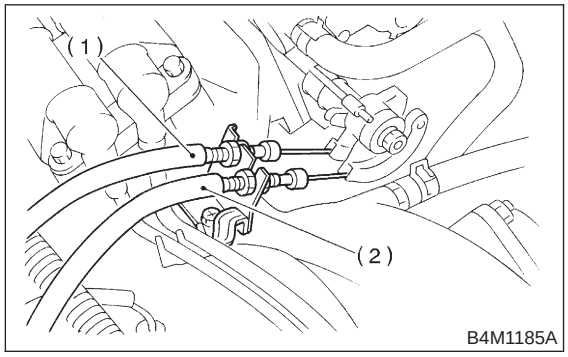
3. Accelerator Cable

A: REMOVAL





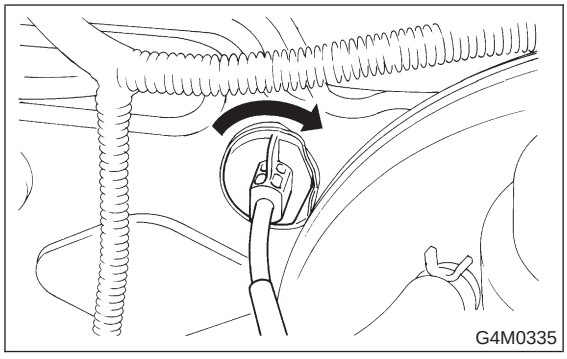
1) Disconnect accelerator cable from connector inside engine compartment first.
2) Remove lock nut from accelerator cable bracket.
3) Separate accelerator cable (1) from bracket, then unlock inner cable.



4) Remove cable end from throttle cam using your fingertips.

CAUTION:
Be careful not to bend inner cable.

5) Disconnect cable end from accelerator cable bracket inside driver compartment.
6) Remove clip inside engine compartment.
7) Working inside engine compartment, remove the casing cap out of the toe board by turning it clockwise.



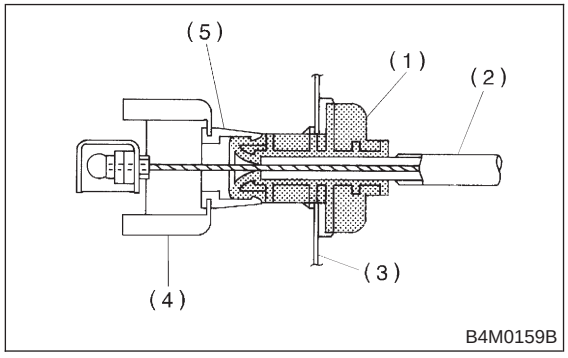
8) Pull out the cable from the toe board hole.

B: INSTALLATION

1) Installation is in the reverse order of removal procedures.

CAUTION:
- **Be careful not to kink accelerator cable.**

● **Make sure that holder and casing cap are securely connected.**



(1) Casing cap
(2) Accelerator cable
(3) Toe board
(4) Accelerator pedal bracket
(5) Holder

2) Adjustment after cable installation <Ref. to 4-5 [W1A3].>

1. Pedal System and Control Cables

Trouble	Corrective action
Excessively worn brake pedal pad	Replace.
Failure of clutch and/or accelerator pedals to operate	Connect cables correctly.
Stop light switch does not light up.	Adjust position of stop light switch.
Stop light switch is not smooth and/or stroke is not correct.	Replace.
Insufficient pedal play	Adjust pedal play.
Clutch and/or brake pedal free play insufficient	Adjust pedal free play.
Maladjustment of brake pedal or booster push rod	Inspect and adjust.
Excessively worn and damaged pedal shaft and/or bushing	Replace bushing and/or shaft with new one.

MEMO:

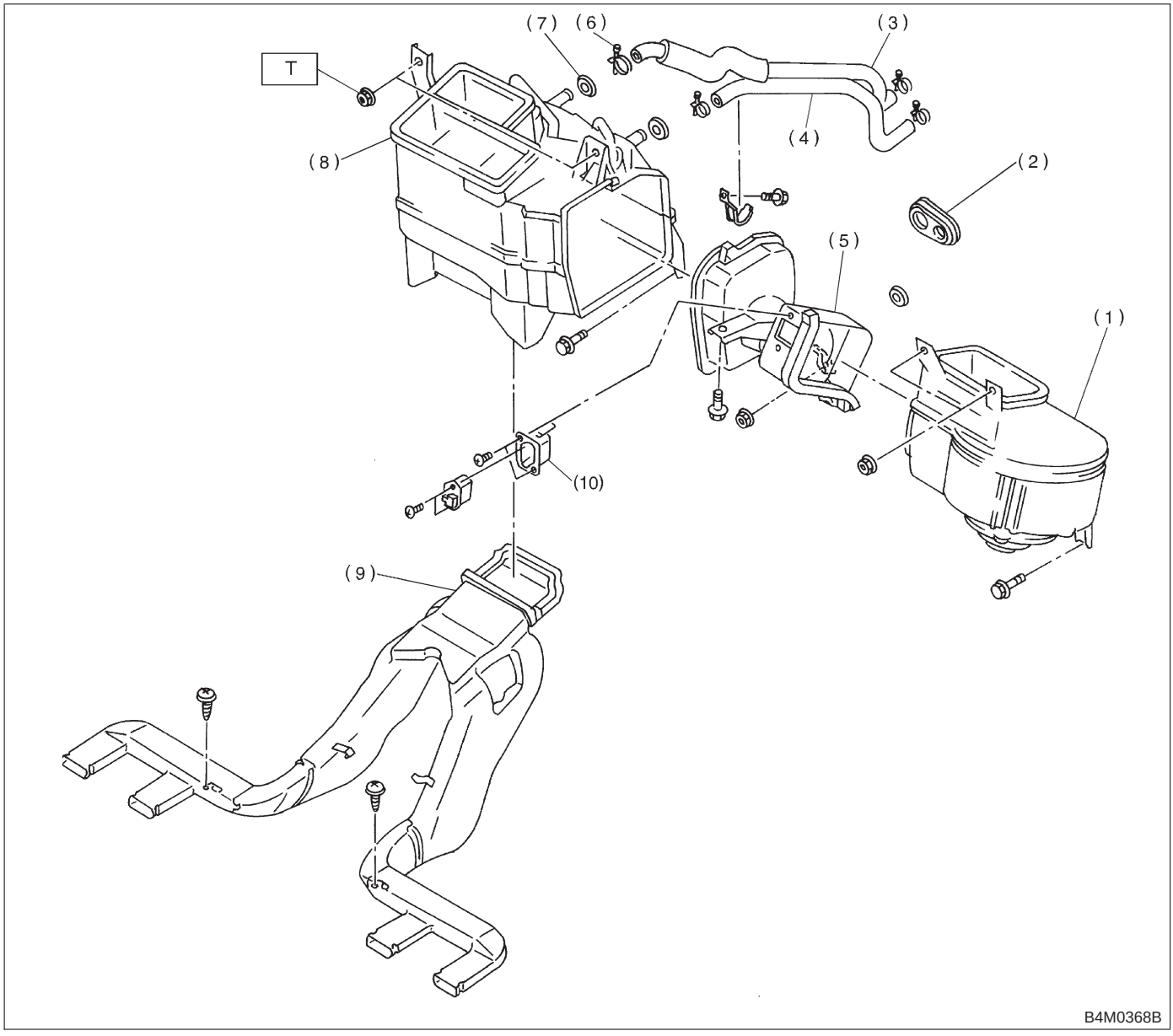
HEATER AND VENTILATOR 4-6

1. Specifications

A: HEATER SYSTEM

Item		Specifications	Condition	
Heating capacity		4.652 kW (4,000 kcal/h, 15,872 BTU/h) or more ... When 300 m^3(10,593 cu ft)/h	Mode selector switch	HEAT
			Temp. control lever	FULL HOT
			Temperature difference between hot water and inlet air	65°C (149°F)
			Hot water flow rate	360 ℓ (95.1 US gal, 79.2 Imp gal)/h
Air flow rate		300 m^3 (10,593 cu ft)/h	Heat mode (FRESH), FULL HOT at 12.5 V	
Max air flow rate		510 m^3 (18,008 cu ft)/h	Temperature control lever	FULL COLD
			Blower fan speed	4th position
			RECIRC switch position	RECIRC
Heater core size (height × length × width × thickness)		193.5 × 152.0 × 25.0 × 0.9 mm (7.62 × 5.98 × 0.984 × 0.035 in)	—	
Blower motor	Type	Magnet motor 230 W or less	at 12 V	
	Fan type and size (diameter × width)	Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)	—	

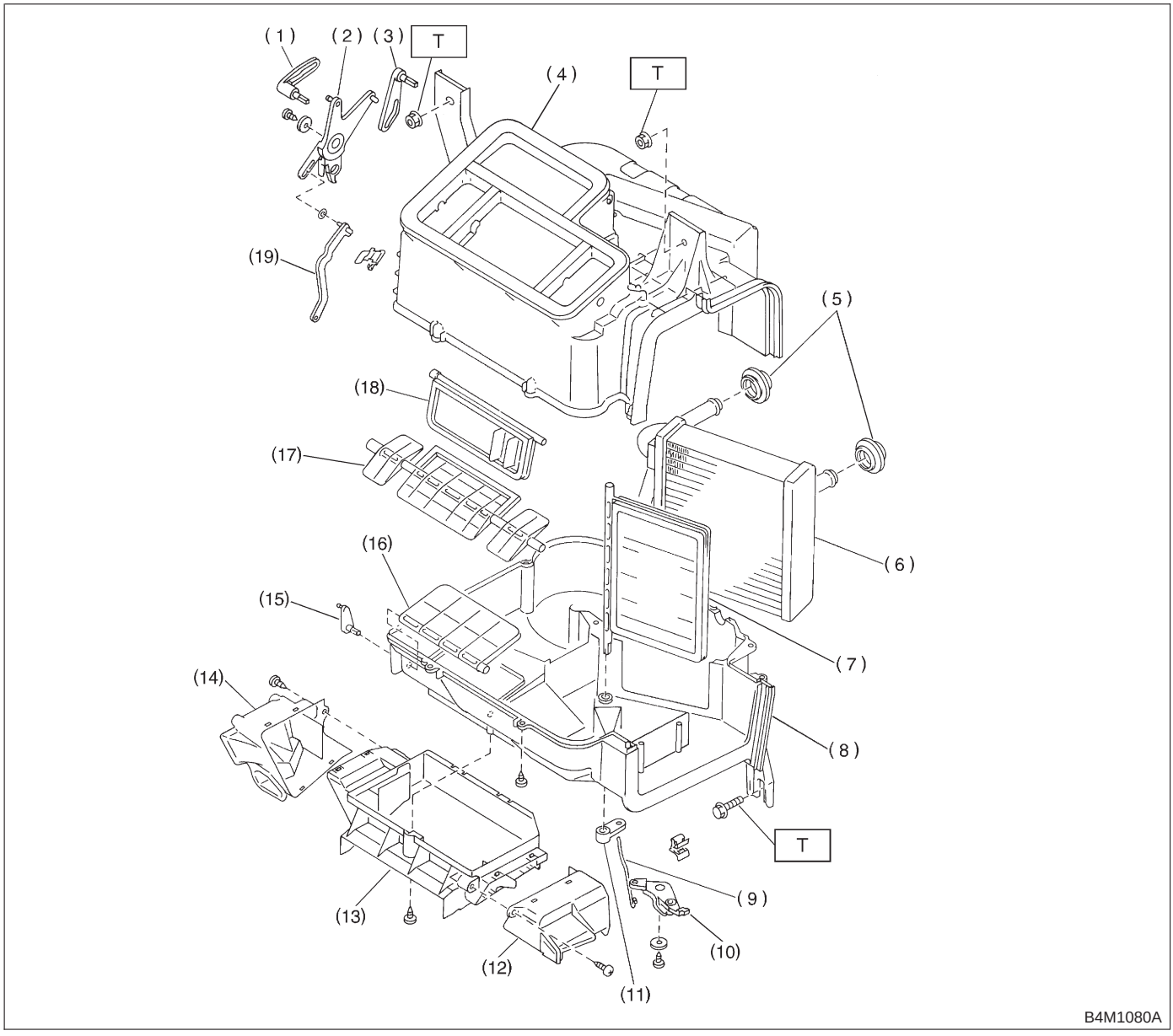
1. Heater System



(1) Intake unit
(2) Grommet
(3) Hose (Inlet)
(4) Hose (Outlet)
(5) Heater duct
(6) Clamp
(7) Grommet
(8) Heater unit
(9) Rear heater duct
(10) Resistor

Tightening torque: N·m (kg-m, ft-lb)
T: 7.35±1.96 (0.750±0.200, 5.421±1.446)

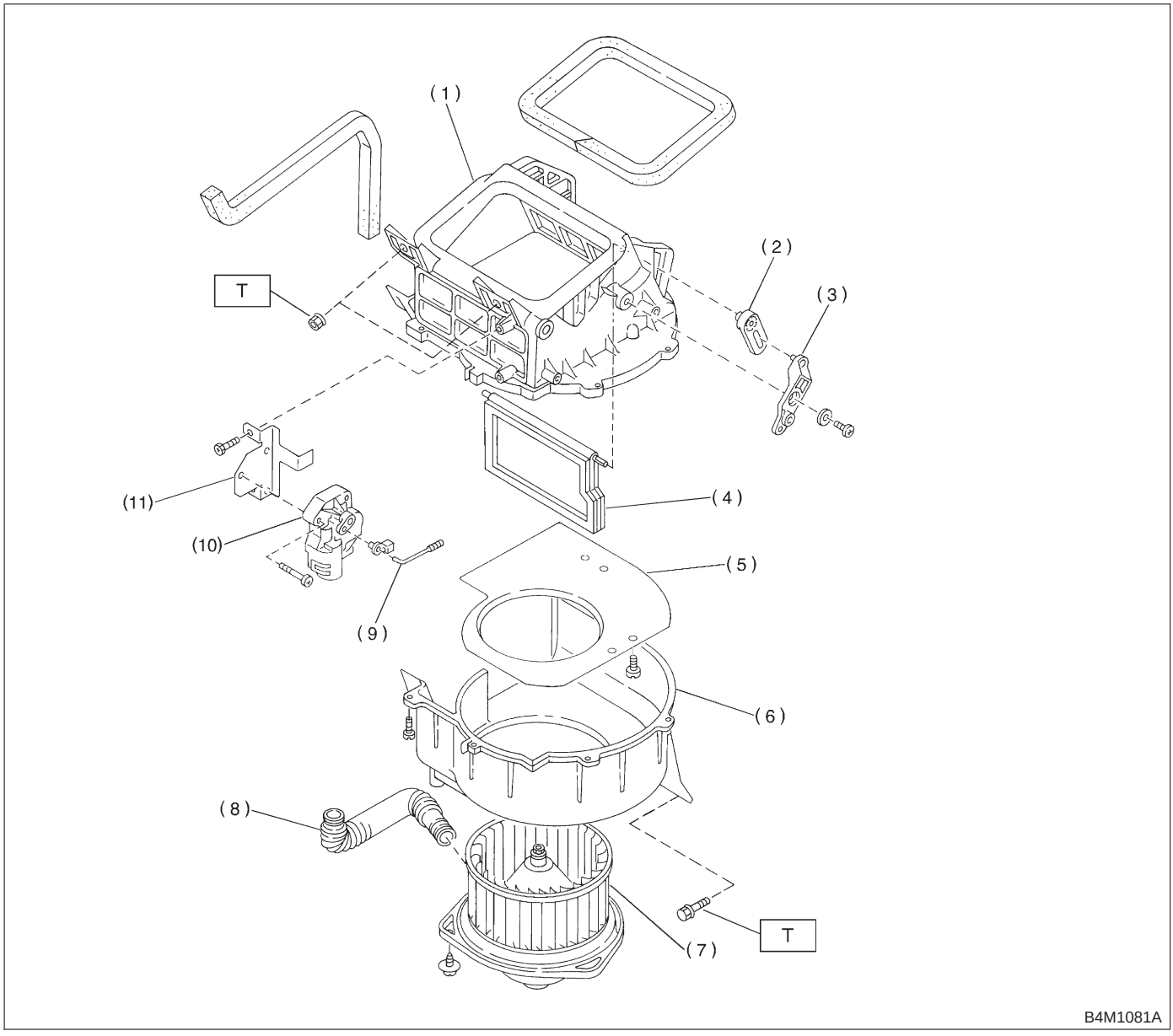
2. Heater Unit



(1) Vent lever
(2) Side link
(3) DEF. lever
(4) Heater case upper
(5) Heater grommet
(6) Heater core
(7) Mix door
(8) Heater case lower
(9) Mix rod
(10) Mix link
(11) Mix lever
(12) Foot duct (RH)
(13) Foot duct (CTR)
(14) Foot duct (LH)
(15) Foot lever lower
(16) Foot door
(17) Vent door
(18) DEF. door
(19) Foot lever upper

Tightening torque: N·m (kg-m, ft-lb)
T: 7.35±1.96 (0.750±0.200, 5.421±1.446)

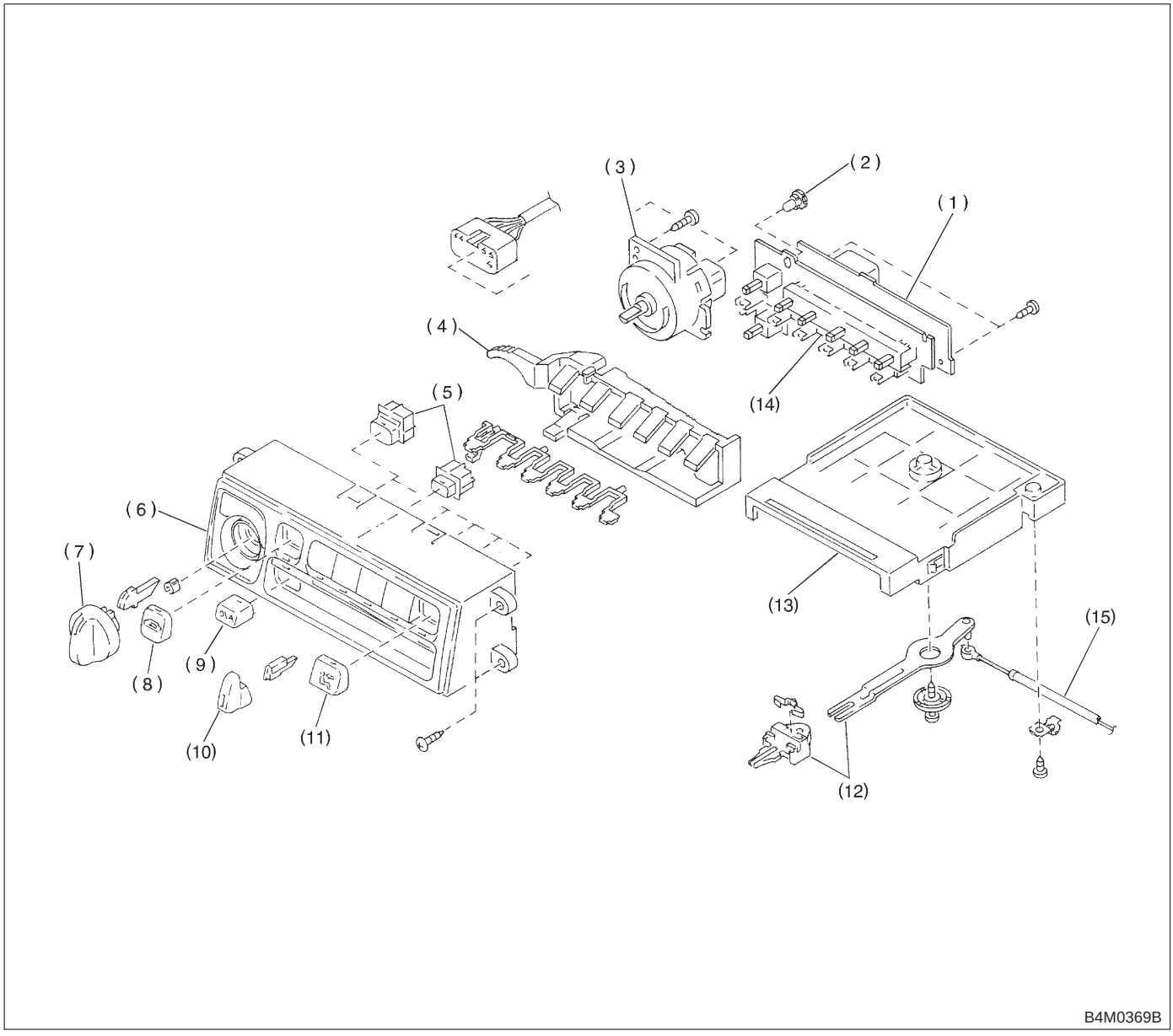
3. Intake Unit



(1) Intake unit case upper
(2) Lever (A)
(3) Link
(4) Door (A)
(5) Bell mouth-intake
(6) Intake unit case lower
(7) Blower motor ASSY
(8) Hose
(9) Actuator rod
(10) Actuator motor
(11) Actuator bracket

Tightening torque: N·m (kg-m, ft-lb)
T: 7.35±1.96 (0.750±0.200, 5.421±1.446)

4. Control Unit



(1) Back plate
(2) Bulb
(3) Fan switch ASSY
(4) Illumi. plate
(5) Switch base
(6) Control panel
(7) Fan switch knob
(8) RECIRC switch
(9) A/C switch
(10) Temp. switch knob
(11) Mode switch
(12) Temp. lever ASSY
(13) Base plate
(14) Control amp.
(15) Temp. control cable

1. Supplemental Restraint System “Airbag”

CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
● Be careful not to damage Airbag system wiring harness when servicing the instrument panel, heater unit, blower motor and control unit.

Airbag system wiring harness is routed near the instrument panel, heater unit, blower motor and control unit.

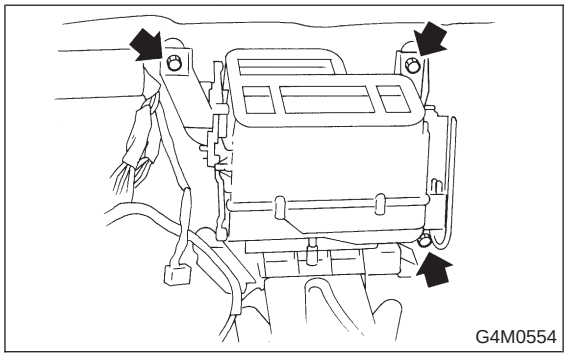
2. Heater Unit

A: REMOVAL AND INSTALLATION

1) Disconnect GND cable from battery.
2) Remove heater hoses (inlet, outlet) in engine compartment.

NOTE:
Drain as much coolant from heater unit as possible, and plug disconnected hose with cloth. <Ref. to 2-5 [W1A0].>

3) Remove instrument panel. <Ref. to 5-4 [W1A0].>
4) Remove steering support beam. <Ref. to 5-1 [C600].>
5) Remove evaporator. (With A/C model) <Ref. to 4-7 [W14A0].>
6) Remove heater unit.



7) Installation is in the reverse order of removal.

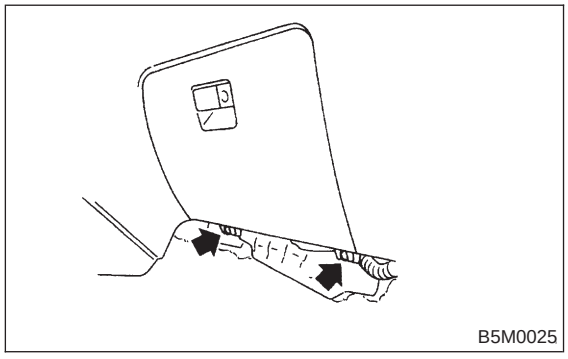
Fitted length of heater hose over pipe:
25 — 30 mm (0.98 — 1.18 in)

8) Pour coolant. <Ref. to 2-5 [W1B0].>

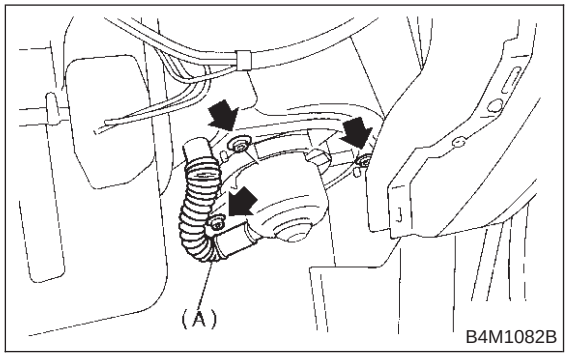
3. Blower Motor Assembly

A: REMOVAL AND INSTALLATION

1) Disconnect GND cable from battery.
2) Remove glove box and pocket back panel. <Ref. to 5-4 [W1A0].>
3) Disconnect blower motor harness connector.



4) Disconnect aspirator pipe (A).
5) Remove blower motor mounting screw.



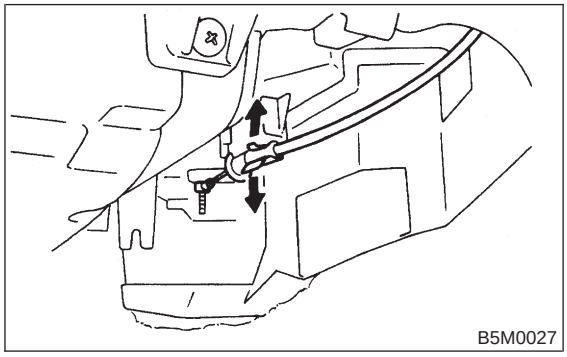
6) Remove blower motor assembly.
7) Installation is in the reverse order of removal.

4. Control Unit

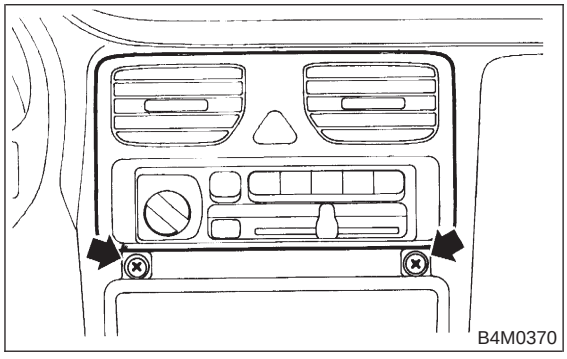
A: REMOVAL AND INSTALLATION

1) Disconnect GND cable from battery.
2) Set temperature control lever to “FULL COLD” position.
3) Remove temperature control cable from heater unit.

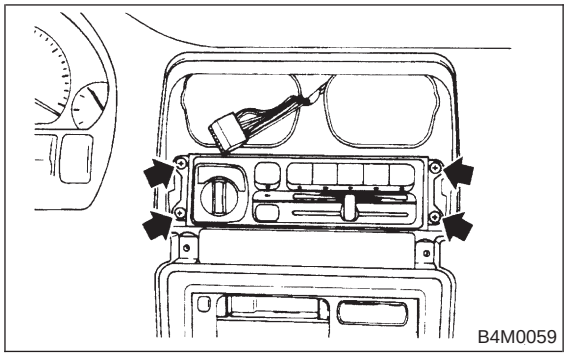
NOTE:
Do not attempt to move link of heater unit during installation.



4) Remove cup holder.
5) Remove center panel and then disconnect connector.



6) Remove control unit assembly and disconnect connector.



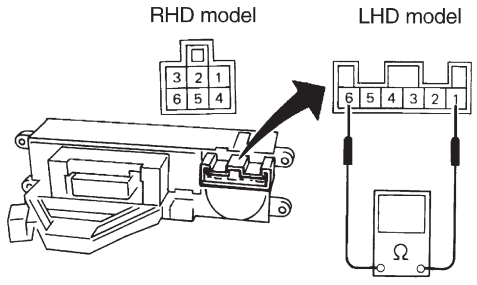
7) Installation is in the reverse order of removal.

NOTE:
Before control unit installation, set temperature control lever to “FULL COLD” position.

B: INSPECTION

1. FAN SWITCH

Check continuity between terminals at each switch position.



Switch position	Terminals					
	1	2	3	4	5	6
1	○	○				○
2	○		○			○
3	○			○		○
4	○				○	○
	GND					IGN

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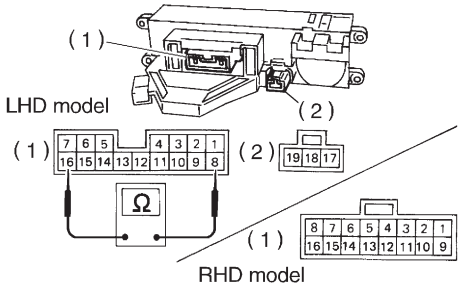
2. CONTROL UNIT

Check circuit continuity between each terminal, when push control switch is turned ON.



Ter-minal No.	Mode selector switch					RECIRC switch		A/C switch	illumi.
	VENT	BI-LEV	HEAT	DEF/ HEAT	DEF	RECIRC	FRESH		
1									
2									
3									○
4									
5					○				
6			○	○					
7	○	○							
8	○	○	○	○	○	○	○		
9							○		
10						○			
11									○
12	○	○	○	○	○				
13									
14				○	○				
15		○	○						
16	○								
17								○	
18								○	
19								○	

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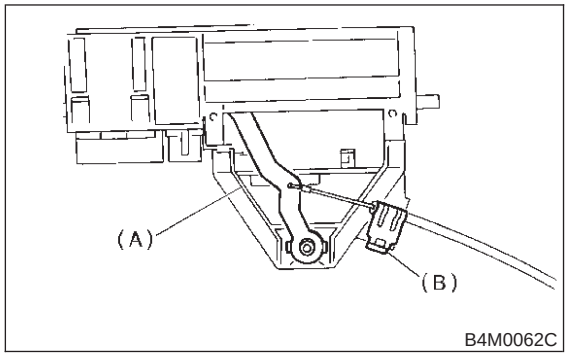
C: ADJUSTMENT

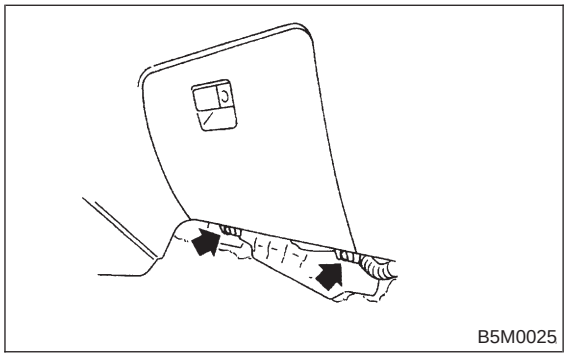
1) Operate temperature control lever to “FULL COLD” position.
2) Install control cable to lever (A). While pushing outer cable, secure control cable with clip (B).



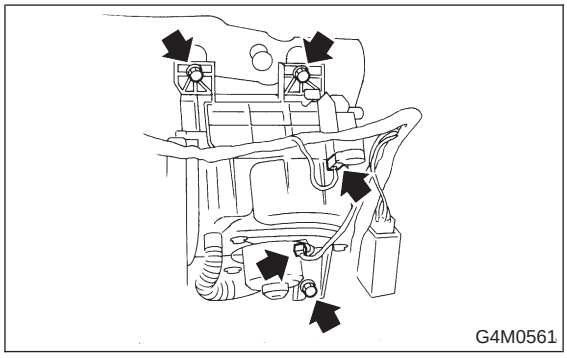
5. Intake Door Motor

A: REMOVAL AND INSTALLATION

1) Disconnect GND cable from battery.
2) Remove glove box and pocket back panel. <Ref. to 5-4 [W1A0].>

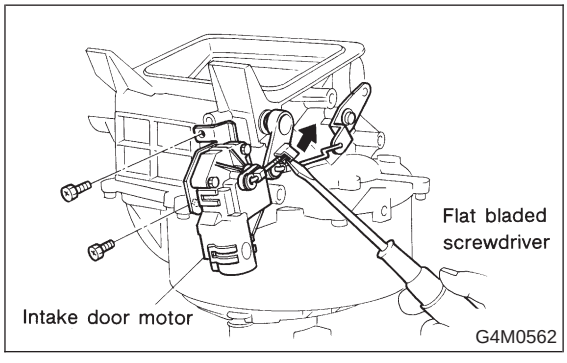


3) Remove heater duct or evaporator. (With A/C model). <Ref. to 4-7 [W14A0].>
4) Remove intake unit from the vehicle.



5) Remove screws which secure intake door motor to intake unit.

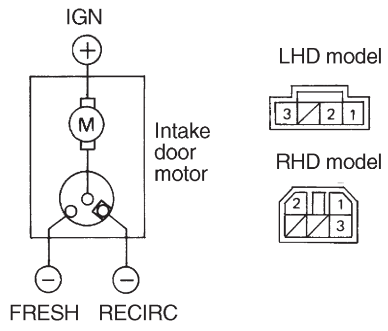
NOTE:
Ensure that RECIRC switch is set to “ON”.



6) Installation is in the reverse order of removal.

B: INSPECTION

1) When approx. 12 V is applied to the intake door motor terminals, intake door motor operates as follows:



Intake door motor position	Terminal ⊕	Terminal ⊖	Intake door motor operation
FRESH	3	2	Door motor moved to FRESH position.
RECIRC		1	Door motor moved to RECIRC position.

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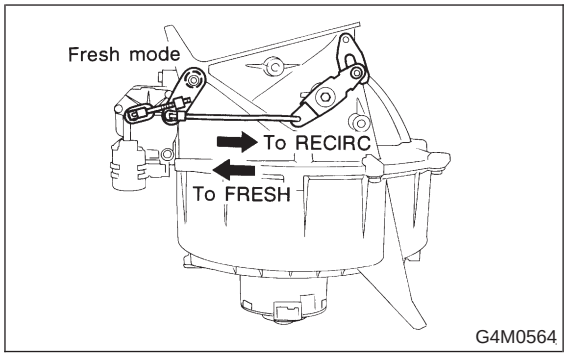
2) Connect harness to intake door motor.

3) Turn ignition switch to “ACC” and RECIRC switch to“ON” then, set to “RECIRC”.

NOTE:
Ensure that intake door motor is set in the “RECIRC” mode.

4) Install intake door motor on intake unit.
5) Secure rod holder to link, and install link to intake unit.
6) Manually set rod in the “RECIRC” mode, and secure to rod holder.
7) Operate mode selector switch to ensure that system changes from intake air to “RECIRC” and from “RECIRC” to intake air in full-stroke range.



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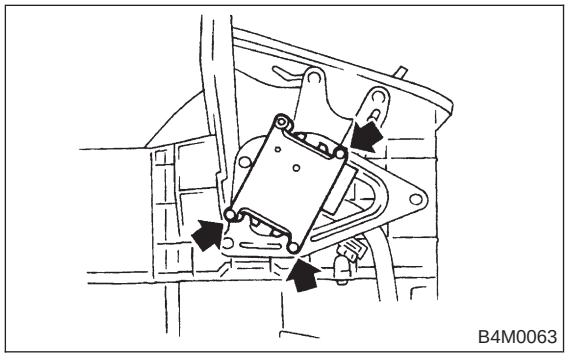
6. Mode Door Motor

A: REMOVAL AND INSTALLATION

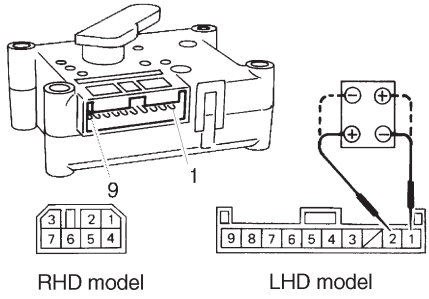
1) Remove instrument panel. <Ref. to 5-4 [W1A0].>
2) Remove mode door motor.



3) Installation is in the reverse order of removal.

B: INSPECTION

1) When approx. 12 V is applied to the mode door motor terminals, mode door motor operates as follows:



Terminal No.		Mode door motor	
2	1		
Polarity of power supply terminals		Mode door motor operation	Direction of linkage rotation
−	+	VENT ⟶ DEF	Clockwise
+	−	DEF ⟶ VENT	Counterclockwise

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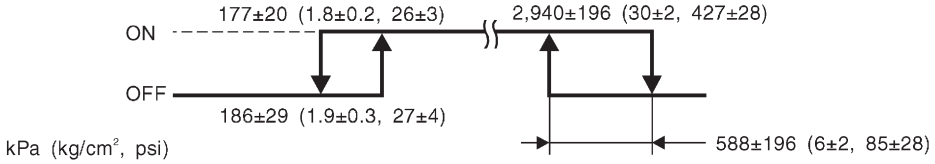
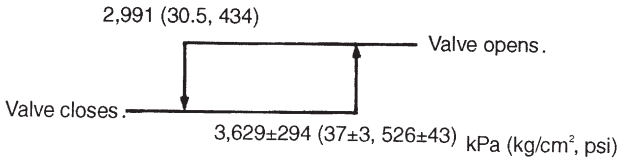
2) Check mode door motor position switch.
When the mode door motor is moved to each mode position by using the mode selector switch, check if continuity exists between each terminal as follows:

Mode selector switch positions	Terminal No.	
VENT	8 or 7	9 (GND)
BI-LEV	6 or 7	
HEAT	5 or 6	
DEF/HEAT	4 or 5	
DEF	3 or 4	

AIR CONDITIONING SYSTEM 4-7

1. Air Conditioning System

Item		Specifications
Type of air conditioner		Reheat air-mix type
Cooling capacity (IMACA)		4.885 kW (4,200 kcal/h, 16,666 BTU/h)
Refrigerant		HFC-134a (CH2FCF3) [0.55 — 0.65 kg (1.21 — 1.43 lb)]
Compressor	Type	5-vane rotary, fix volume (DKV-14D)
	Discharge	140 cm^3 (8.54 cu in)/rev
	Max. permissible speed	7,000 rpm
Magnet clutch	Type	Dry,single-disc type
	Power consumption	45 W
	Type of belt	V-Ribbed 4 PK
	Pulley dia. (effective dia.)	125 mm (4.92 in)
	Pulley ratio	1.064
Condenser	Type	Corrugated fin (Multi-flow)
	Core face area	0.215 m^2 (2.31 sq ft)
	Core thickness	19 mm (0.75 in)
	Radiation area	4.7 m^2 (51 sq ft)
Receiver drier	Effective inner capacity	290 cm^3 (17.70 cu in)
Expansion valve	Type	Internal equalizing
Evaporator	Type	Aℓ-laminate
	Dimensions (W × H × T)	74 × 224 × 235 mm (2.91 × 8.82 × 9.25 in)
Blower fan	Fan type	Sirocco fan
	Outer diameter × width	150 × 75 mm (5.91 × 2.95 in)
	Power consumption	230 W at 12 V
Condenser fan (Sub fan)	Motor type	Magnet
	Power consumption	120 W at 12 V
	Fan outer diameter	320 mm (12.60 in)
Radiator fan (Main fan)	Motor type	Magnet
	Power consumption	120 W at 12 V
	Fan outer diameter	320 mm (12.60 in)
Idling speed with F.I.C.D. in operation	MPFI model	850±100 rpm (700±100 rpm “D” range in AT model)
Dual switch (Pressure switch) High-pressure line		
Compressor relief valve blow-out pressure		

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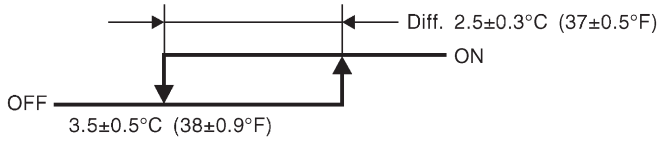
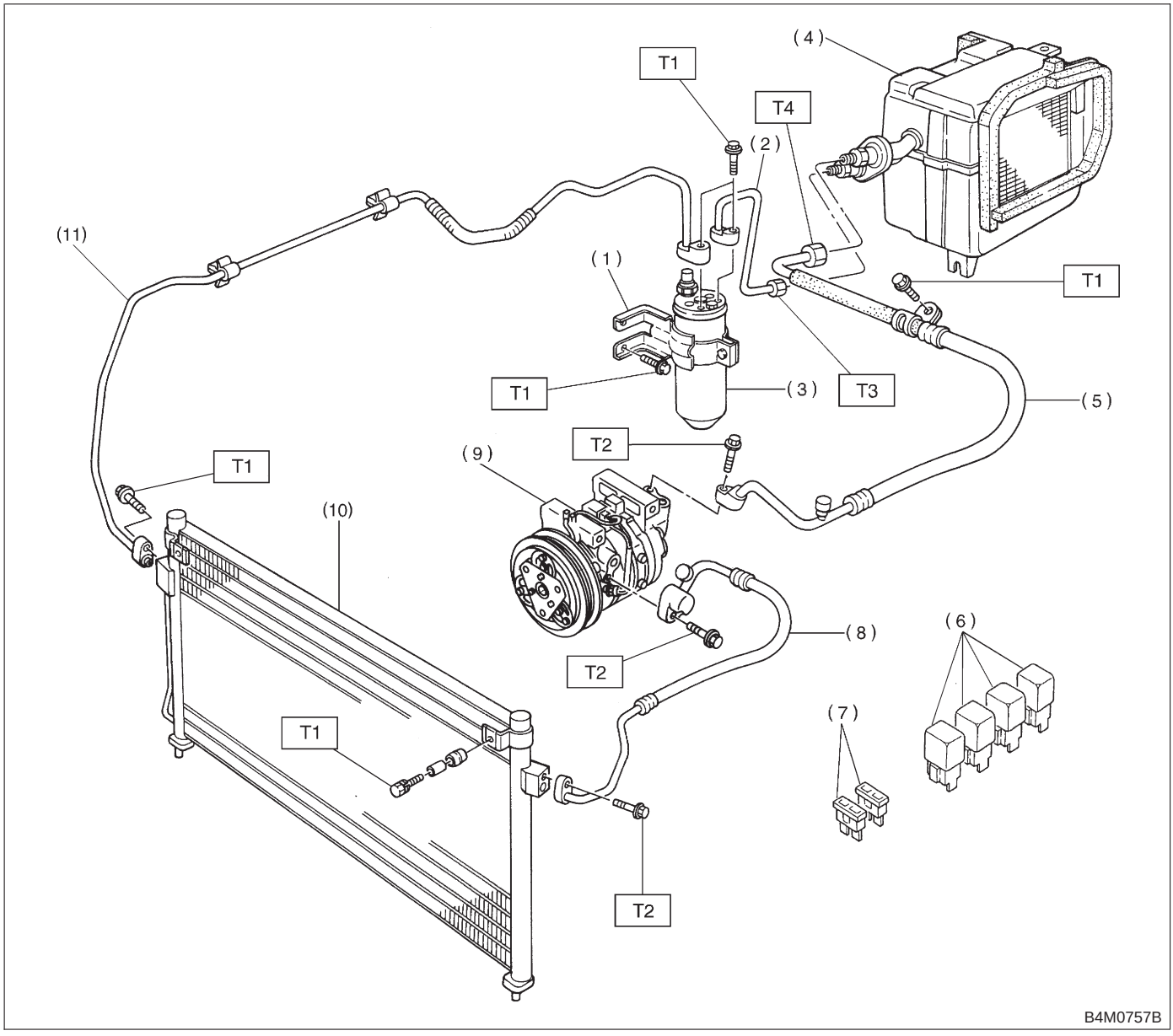
Item	Specifications
Thermo control amplifier working temperature (Evaporator outlet air)	 B4M0756A

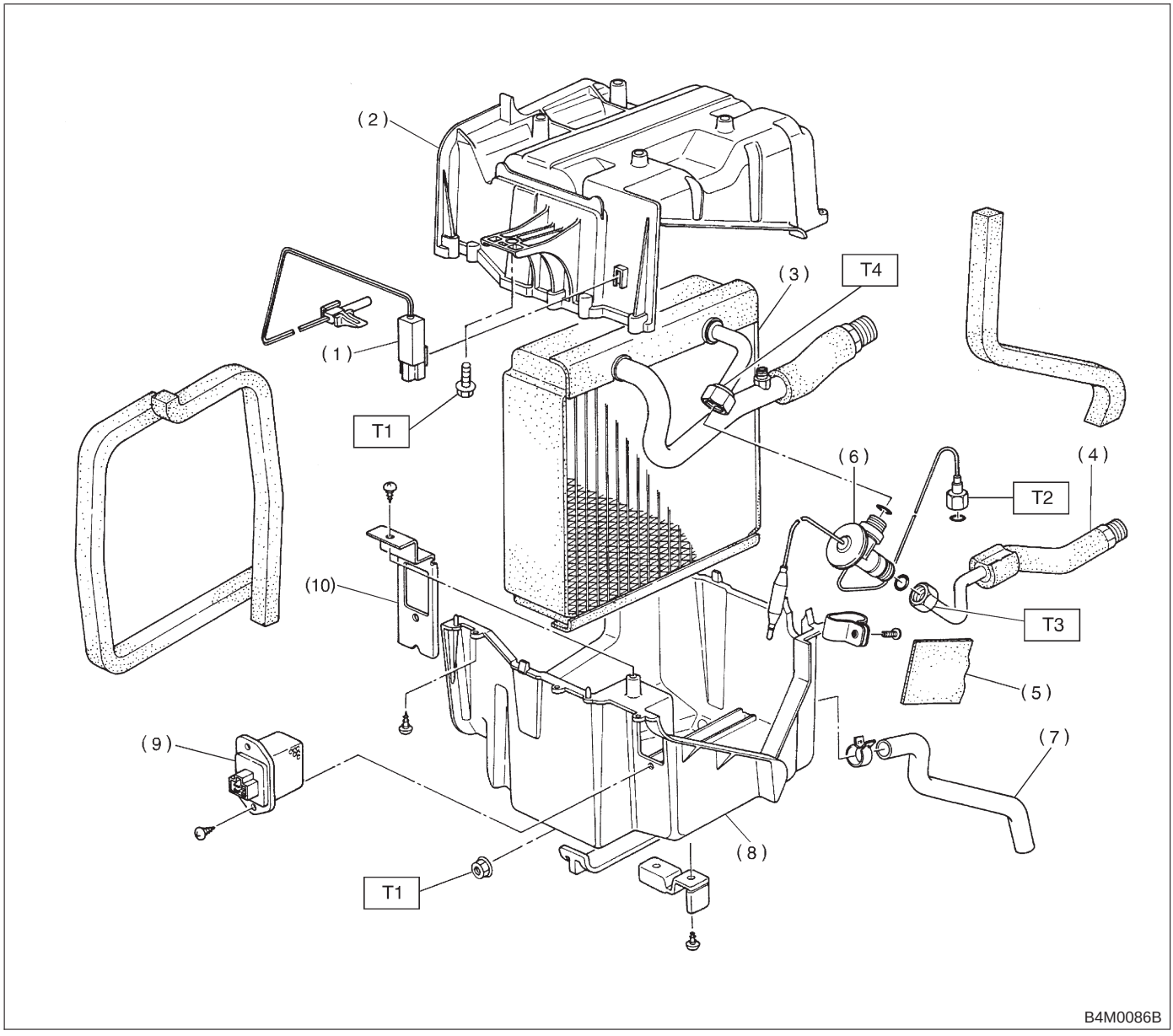
1. Air Conditioning System



(1) Receiver drier bracket
(2) Pipe (Receiver drier — Evaporator unit)
(3) Receiver drier
(4) Evaporator unit
(5) Hose (Low-pressure)
(6) A/C relay
(7) Fuse
(8) Hose (High-pressure)
(9) Compressor
(10) Condenser
(11) Pipe (Condenser-Receiver drier)

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 15±5 (1.5±0.5, 10.8±3.6)
T3: 15±3 (1.5±0.3, 10.8±2.2)
T4: 25±5 (2.5±0.5, 18.1±3.6)

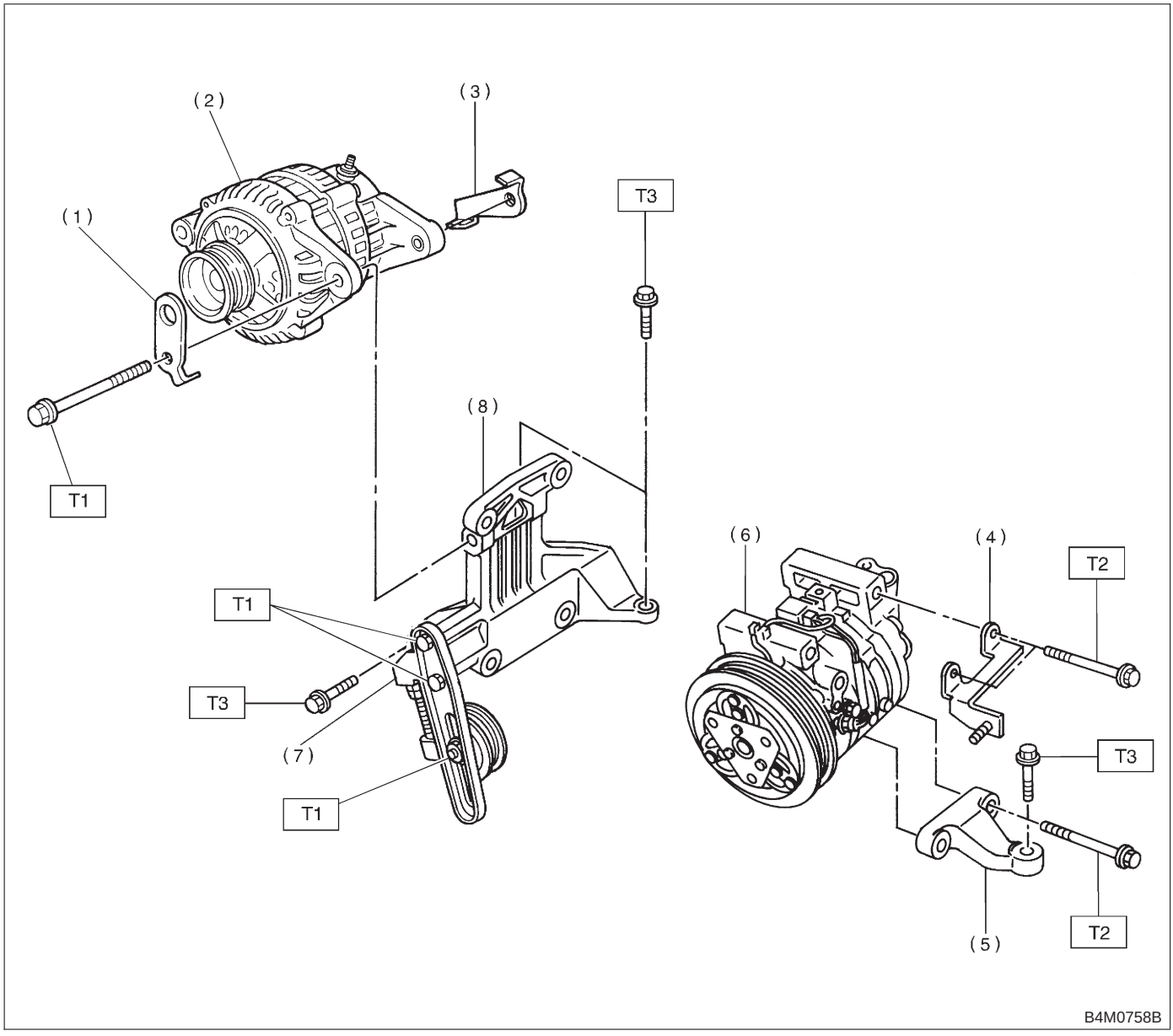
2. Evaporator Unit



(1) Thermo control amplifier
(2) Case upper
(3) Cooling module
(4) Pipe
(5) Seat
(6) Expansion valve
(7) Drain hose
(8) Case lower
(9) Resistor
(10) Resistor bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 10±3 (1.0±0.3, 7.2±2.2)
T3: 15±5 (1.5±0.5, 10.8±3.6)
T4: 20±5 (2.0±0.5, 14.5±3.6)

3. Compressor



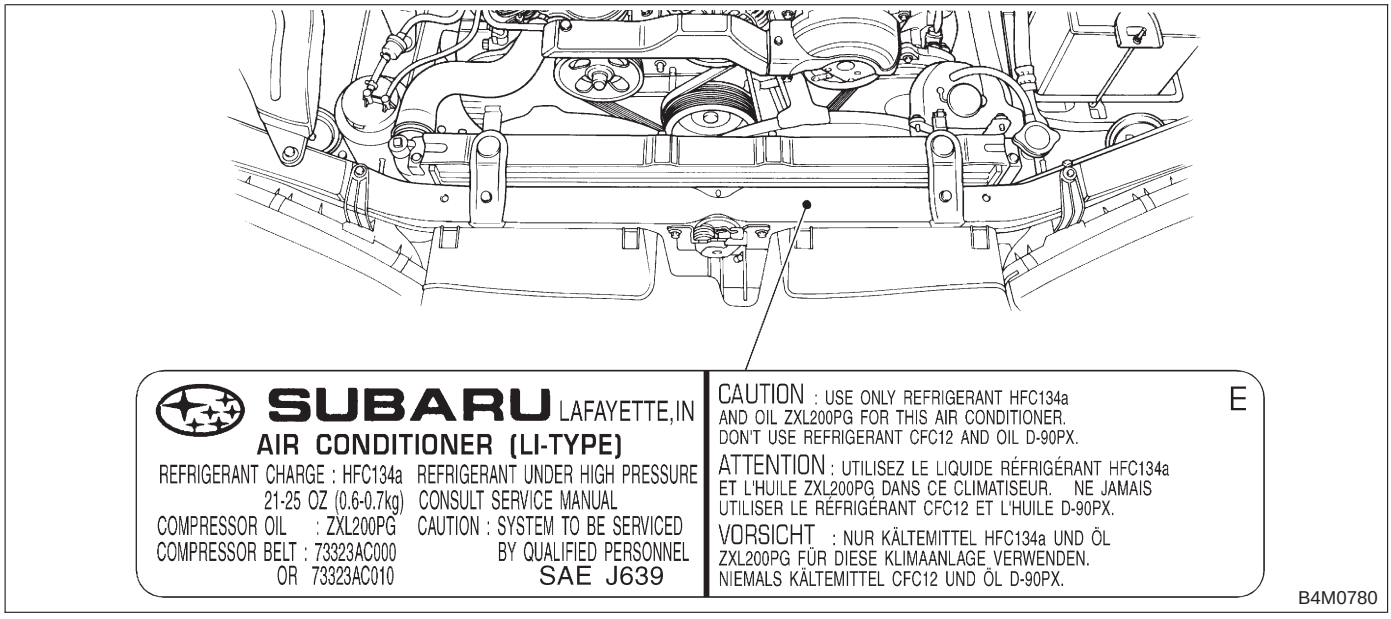
(1) Alternator bracket
(2) Alternator
(3) Alternator bracket nut
(4) Bracket
(5) Compressor bracket lower
(6) Compressor
(7) Idler pulley ASSY
(8) Compressor bracket upper

Tightening torque: N·m (kg-m, ft-lb)
T1: 23.0±4.4 (2.35±0.45, 17.0±3.3)
T2: 29±4 (3.0±0.4, 21.7±2.9)
T3: 35±4 (3.6±0.4, 26.0±2.9)

1. Safety Precautions

A: HFC-134A AIR CONDITIONING SYSTEM

Component parts of the cooling system, refrigerant, compressor oil, and other parts are not the same for the HFC- 134a system and the older CFC-12 system. Do not interchange parts or liquid. Vehicles with HFC-134a air conditioning systems, use only HFC-134a parts that are indicated on a label attached to the vehicle. Before performing any maintenance, verify the type of air conditioning system installed in the vehicle.



B: COMPRESSOR OIL

Do not use any compressor oil that is not specifically designated for the HFC-134a air conditioning system; only use ZXL200PG. Also, do not use HFC-134a compressor oil in the CFC-12 air conditioning system. If compression oils are mixed, poor lubrication will result and the compressor itself may be damaged.

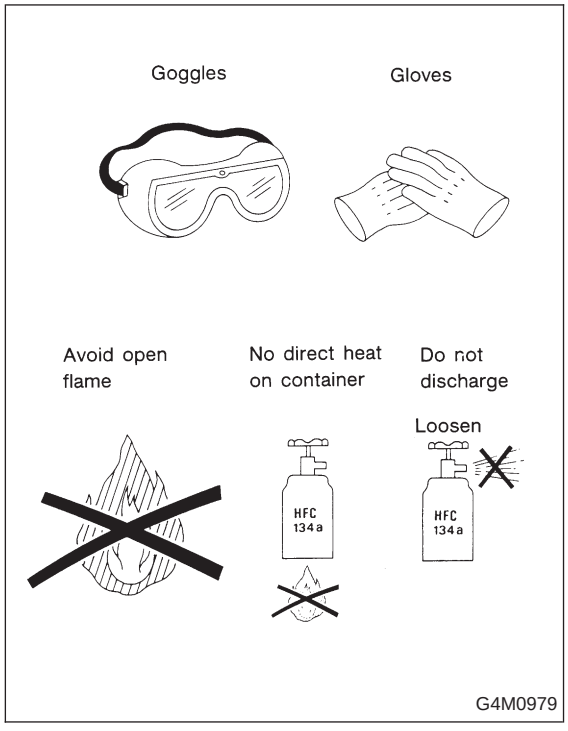
Because HFC-134a compressor oil is very hygroscopic (easily absorbs moisture), when parts of the air conditioning system are being removed, quickly install a blind plug to prevent contact with the outside air. Also, always make sure that the service container for compressor oil is tightly closed except when in use. Store compressor oil in a tightly closed steel container.

C: REFRIGERANT

Do not put CFC-12 refrigerant into a HFC-134a air conditioning system. Also, do not put HFC-134a refrigerant into a CFC-12 air conditioning system. If the wrong refrigerant is used, poor lubrication will result and the compressor itself may be destroyed.

D: HANDLING OF REFRIGERANT

Because refrigerant boils at approx. −30°C (−22°F) at sea level, it is cold enough to give you severe frostbite. Always wear goggles to protect your eyes and gloves to protect your hands. Also, even under the pressures normally found in CFC-12 containers, refrigerant will boil with the addition of heat. This could raise the pressure inside the container to a dangerous level.
Never expose a can of HFC-134a to direct sunlight, or to temperatures over 40°C (104°F). One more thing to remember about HFC-134a is that when it is exposed to an open flame or to hot metal, it forms phosgene, a deadly gas. Do not discharge HFC-134a into the atmosphere on purpose. Always read and follow the precautions on the HFC-134a bottle.



2. Basic Information

1) The combination of moisture and refrigerant forms acid, therefore, moisture should not be allowed to enter the refrigerant.
2) Refrigerant oil readily absorbs moisture, therefore, keep refrigerant oil containers tightly capped.
3) The process of evacuating the system is performed to remove small amounts of moisture. This is accomplished by lowering the pressure inside the system, which allows the moisture to boil off, in much the same way that a pot of water will boil away to nothing given enough time. The evacuation process does not suck the moisture out of the system.
4) A minimum level of vacuum must be reached to satisfactorily evacuate the system. This minimum level of vacuum depends on the temperature inside the system. The chart below shows the level of vacuum required to boil water at various temperatures.
Additionally, the vacuum level shown on a gauge will read approx. 4 kPa (25 mmHg, 1 inHg) less for each 304.8 m (1,000 ft) above sea level, due to the decrease in atmospheric pressure at altitude.
Vacuum level required to boil water (at sea level)

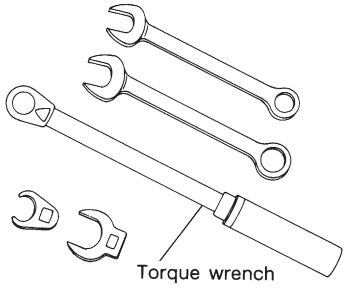
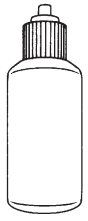
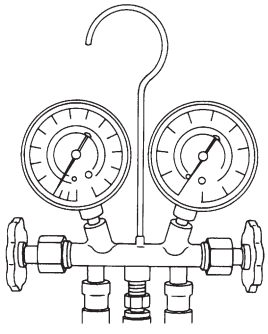
Vacuum level required to boil water (at sea level)	
Temperature °C (°F)	Vacuum kPa (mmHg, inHg)
1.7 (35)	100.9 (757, 29.8)
7.2 (45)	100.6 (754, 29.7)
12.8 (55)	99.9 (749, 29.5)
18.3 (65)	99.2 (744, 29.3)
23.9 (75)	98.5 (739, 29.1)
29.4 (85)	97.2 (729, 28.7)
35 (95)	95.8 (719, 28.3)

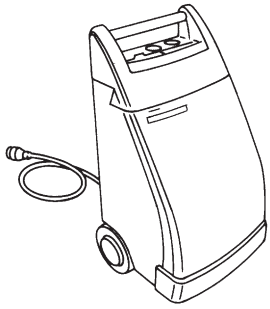
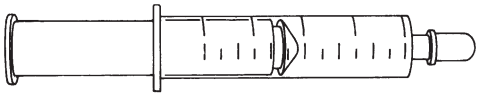
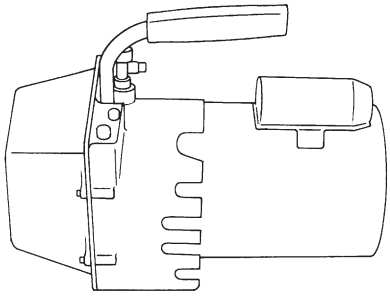
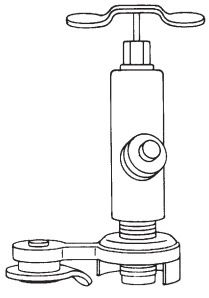
3. Tools and Equipment

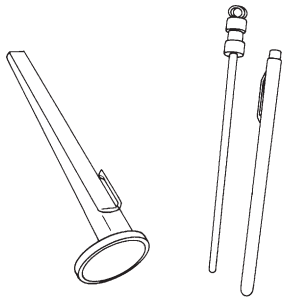
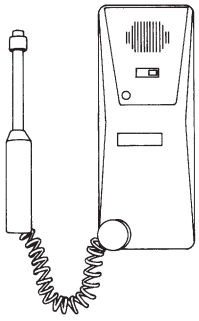
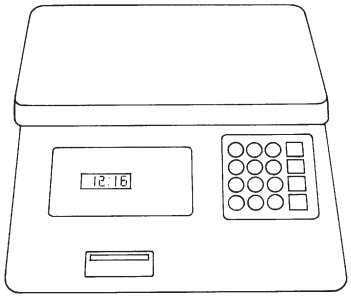
The following section provides information about the tools and equipment that will be necessary to properly service the A/C system.
Since equipment may vary slightly depending on the manufacturer, it is important to always read and follow the manufacturer's instructions.

CAUTION:
When working on vehicles with the HFC-134a system, only use HFC-134a specified tools and parts. Do not mix with CFC-12 tools and parts. If HFC-134a and CFC-12 refrigerant or compressor oil is mixed, poor lubrication will result and the compressor itself may be destroyed. In order to help prevent mixing HFC-134a and CFC-12 parts and liquid, the tool and screw type and the type of service valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

Tools and Equipment	Description
● WRENCH Various **WRENCHES** will be required to service any A/C system. A 7 to 40 N·m (0.7 to 4.1 kg-m, 5 to 30 ft-lb) torque wrench with various crowfoot wrenches will be needed. Open end or flare nut wrenches will be needed for back-up on the tube and hose fittings.	 G4M0571
● APPLICATOR BOTTLE A small **APPLICATOR BOTTLE** is recommended to apply refrigerant oil to the various parts. They can be obtained at a hardware or drug store.	 G4M0572
● MANIFOLD GAUGE SET A **MANIFOLD GAUGE SET** (with hoses) can be obtained from either a commercial refrigeration supply house or from an auto shop equipment supplier.	 G4M0573

Tools and Equipment	Description
● REFRIGERANT RECOVERY SYSTEM A **REFRIGERANT RECOVERY SYSTEM** is used for the recovery and reuse of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.	 G4M0574
● SYRINGE A graduated plastic **SYRINGE** will be needed to add oil back into the system. The syringe can be found at a pharmacy or drug store.	 G4M0575
● VACUUM PUMP A **VACUUM PUMP** (in good working condition) is necessary, and may be obtained from either a commercial refrigeration supply house or an automotive equipment supplier.	 G4M0576
● CAN TAP A **CAN TAP** for the 397 g (14 oz) can is available from an auto supply store.	 G4M0577

Tools and Equipment	Description
● THERMOMETER Pocket **THERMOMETERS** are available from either industrial hardware store or commercial refrigeration supply houses.	 G4M0578
● ELECTRONIC LEAK DETECTOR An **ELECTRONIC LEAK DETECTOR** can be obtained from either a specially tool supply or an A/C equipment supplier.	 G4M0579
● WEIGHT SCALE A **WEIGHT SCALE** such as an electronic charging scale or a bathroom scale with digital display will be needed if a 13.6 kg (30 lb) refrigerant container is used.	 G4M0580

4. O-ring Connections

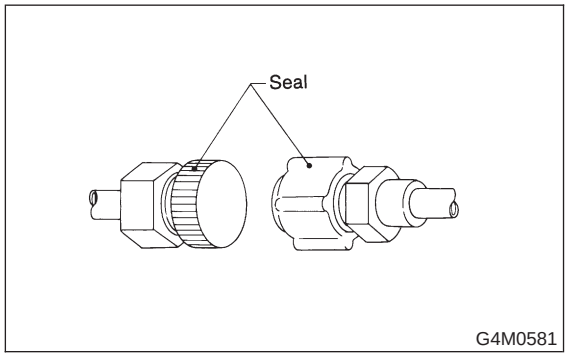
A: GENERAL

The following points should be kept in mind when assembling O-ring connections.
1) Avoid unnecessary handling and contact of O-rings with your hands, since even clean fingers contain body acids, which can contaminate the O-ring surface.
2) Do not handle O-rings with gloves, shop towels, etc., since lint particles may cling to the O-ring, possibly causing a leak upon assembly.
3) Always lubricate O-rings before assembly to allow the O-ring to seat itself properly.
4) Be certain to use torque wrenches when tightening O-ring fittings, because overtightening can not only damage the O-ring, but it can distort the tube end as well.

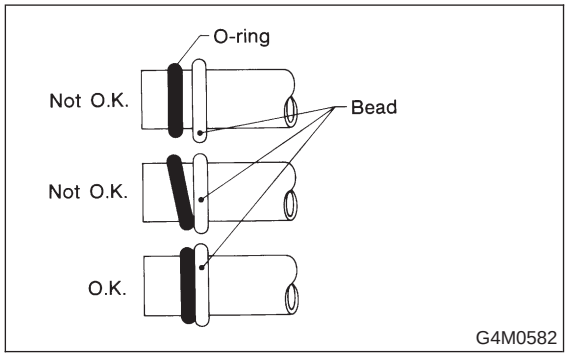
B: REMOVE PROTECTIVE SEALS

1) Just prior to making the connection, remove the protective seals.

CAUTION:
If for any reason you have to stop before making a connection, recap the tube, component or fitting.

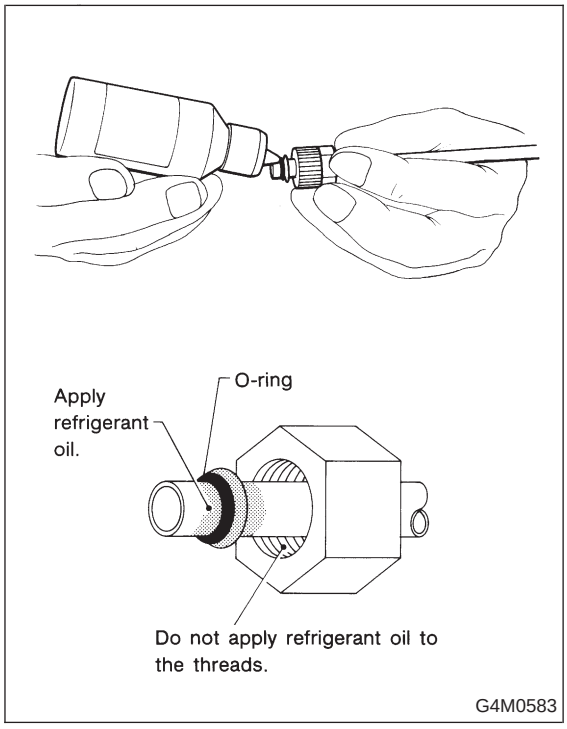


2) Visually inspect the O-ring surface, the O-ring mating surface, the threads and the connection points. If a defective part is found, replace it.
The O-ring must sit square against the tube bead. If necessary, slide the O-ring into proper position with clean hands.



C: LUBRICATE THE COMPONENTS

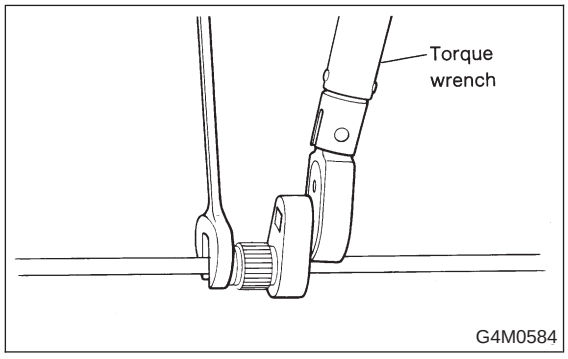
For lubrication of the components, use only refrigerant oil as described in the appropriate service manual. Apply oil from an oil squirt gun or other closed container. Do not use your finger to spread the oil over the O-ring.
Apply a small amount of refrigerant oil to the top and sides of the O-ring. The area covered by oil should include the O-ring and the tube bead.



D: TORQUE THE FITTING

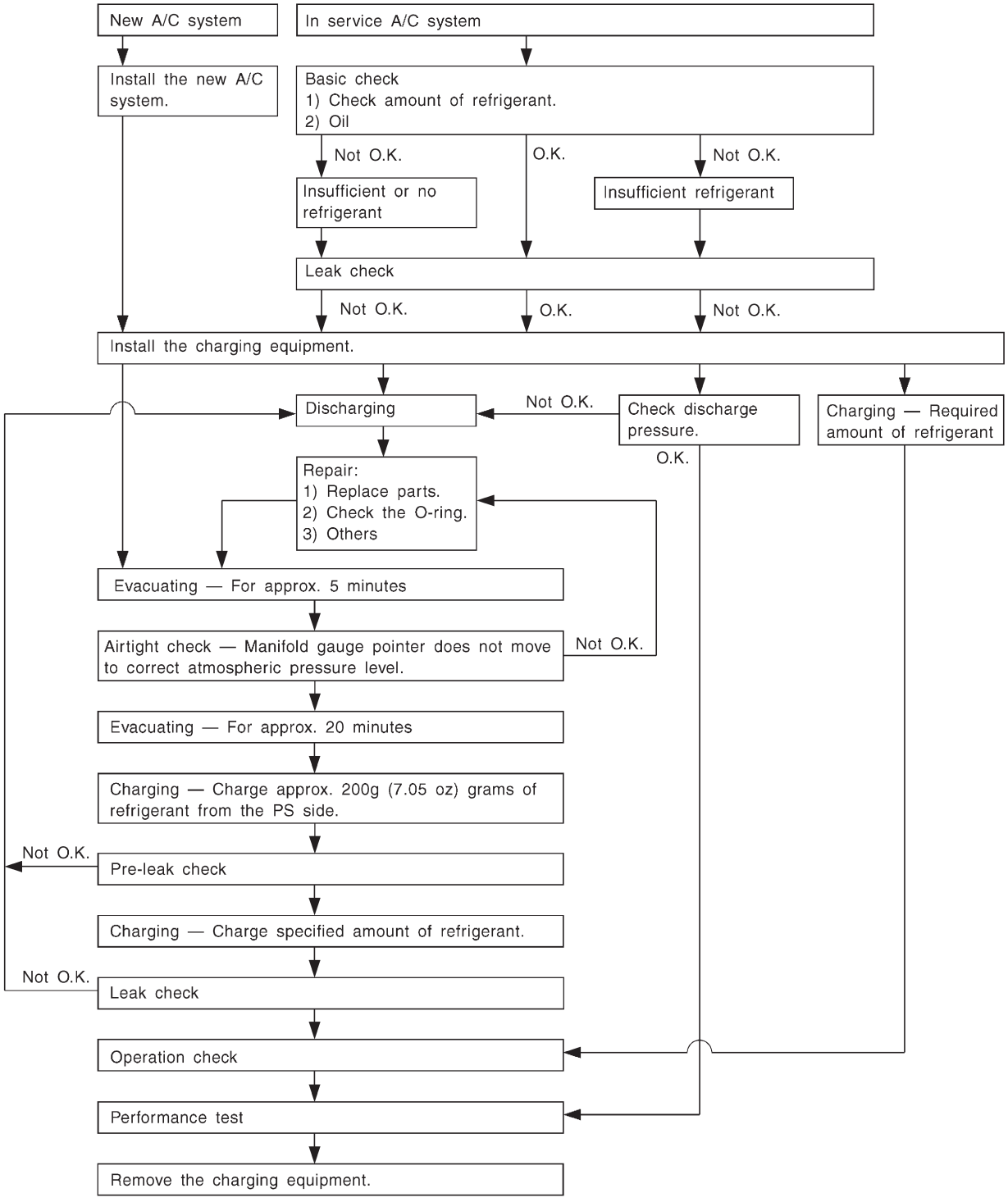
Using a back-up wrench in conjunction with a calibrated torque wrench, torque the connection to the midrange of the specification.
After completion of torquing, use a clean shop towel to remove any excess oil from the connection or any oil that may have dripped on the vehicle body or other parts.

CAUTION:
If a leak is suspected after torquing, do not retighten or retorque the connection. Instead, disassemble the connection, remove the O-ring, and inspect the O-ring, threads, joints and seating surfaces.



5. Refrigerant Service Procedure

A: WORK FLOW



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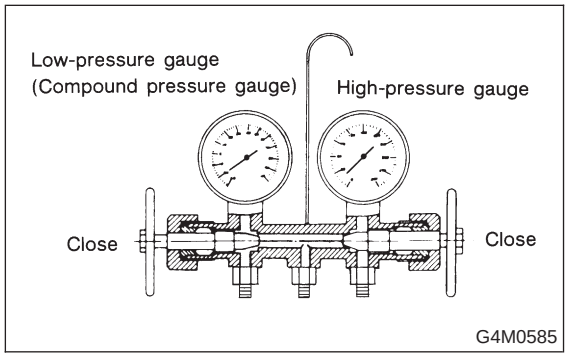
6. Discharge the System

CAUTION:
The following points should be kept in mind when discharging the system.
- **Be certain that goggles and gloves are worn.**
- **Connect refrigerant recovery system to manifold gauge set and remove recycle refrigerant from A/C system.**

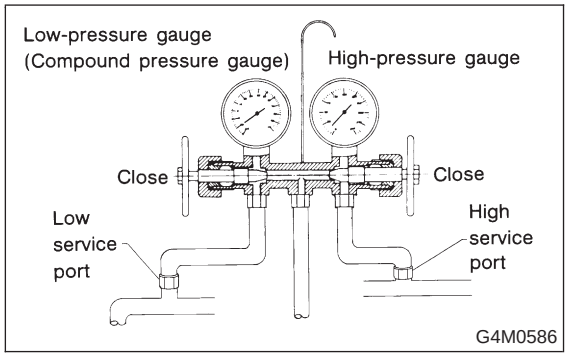
NOTE:
Refer to appropriate refrigerant recovery system instruction manual for operation.

A: CONNECTING THE MANIFOLD GAUGE SET

1) Close the high and low side manifold valves.



2) Turn the A/C system ON and turn the IG switch OFF.
3) Attach the high- and low-pressure manifolds to the high and low services port on the vehicle.



B: PREPARE FOR DISCHARGING

Connect the center manifold hose to the refrigerant recovery system to recycle refrigerant.

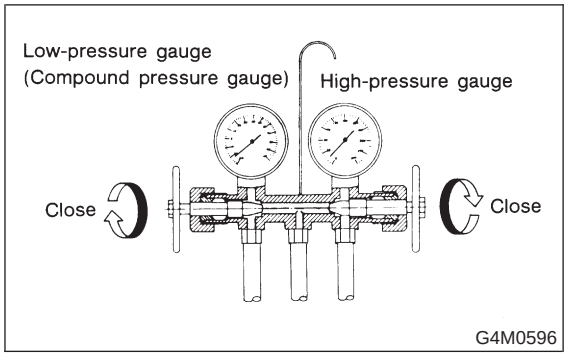
7. Evacuating and Charging

The following points should be kept in mind when evacuating and charging with a manifold gauge set.
1) Be certain that goggles and gloves are worn.
2) If bulk refrigerant [13.6 kg (30 lb) canister] is used, be certain to weigh the charge amount carefully, using the correct equipment, to avoid overcharging the system.
3) The charging procedure described in this section begins by charging liquid refrigerant into the high- pressure side of the system with the engine off. The procedure is completed by charging refrigerant vapor into the low-pressure side of the system with the engine running.

CAUTION:
Never open the high-pressure manifold valve when the engine is running.

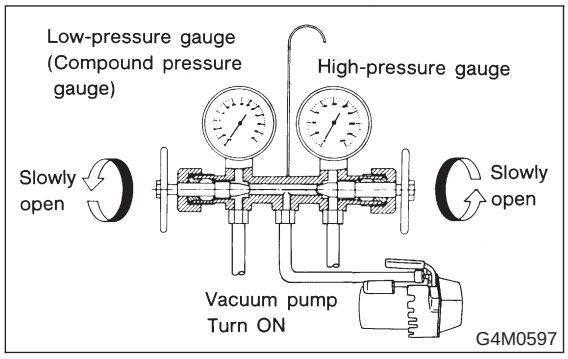
A: CONNECT THE GAUGE SET

1) Close the high- and low-pressure manifold valves.



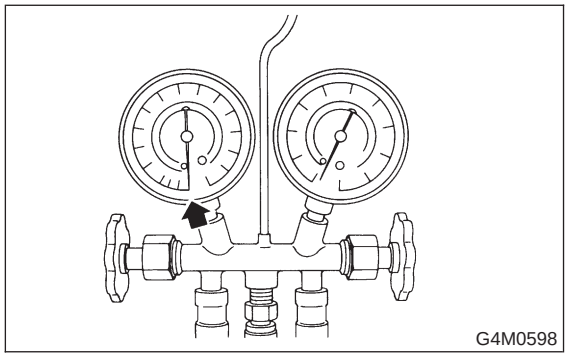
2) Attach the low-pressure manifold hose to the low- pressure service port on the vehicle. Check the low- pressure gauge. If more than 68.6 kPa (0.70 kg/cm^2, 10 psi) is indicated, discharge the system prior to charging.
3) Attach the high-pressure manifold hose to the high- pressure service port on the vehicle.
4) Connect the center hose from the manifold to the vacuum pump.
5) Turn on the vacuum pump.

6) Slowly open the low-pressure manifold valve.



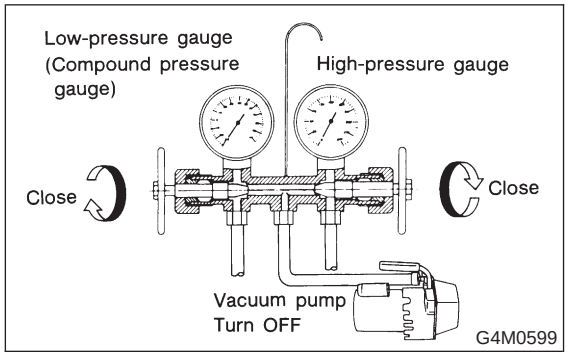
7) When the low-pressure gauge reaches approximately 66.43 kPa (498.3 mmHg, 19.62 inHg), slowly open the high- pressure manifold valve.
8) Maintain a minimum vacuum level of 100.56 kPa (754.4 mmHg, 29.70 inHg) for a minimum of 15 minutes on a new system or 30 minutes for an in-service system.

NOTE:
The gauge will read 4 kPa (25 mmHg, 1 inHg) less for every 304.8 m (1,000 ft) above sea level.



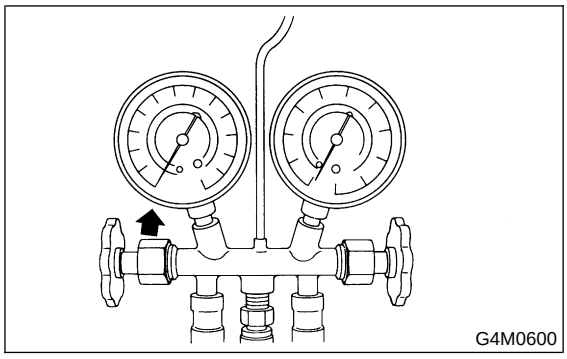
B: PERFORM A VACUUM LEAK TEST

1) After 15 minutes (or more) of evacuation, close the high-pressure manifold valve.
2) Close the low-pressure manifold valve.

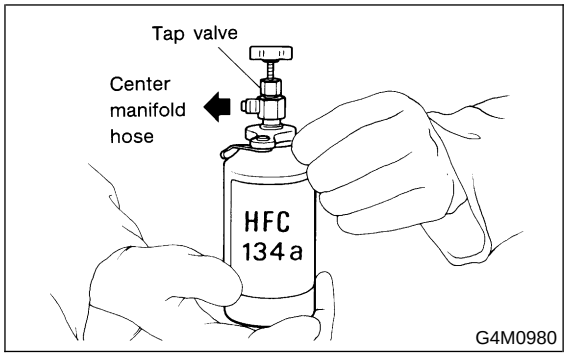


3) Turn off the vacuum pump.

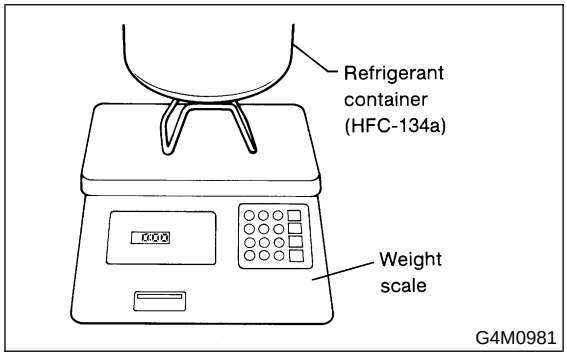
4) Note the low side gauge reading.



5) After 5 minutes, re-check the low-pressure gauge reading.
If the vacuum level has changed more than 4 kPa (25 mmHg, 1 inHg), perform an HFC-134a leak test.
If the vacuum reading is about the same as noted in step 4), continue on to next step.
6) Carefully attach the can tap to the refrigerant can by following the can tap manufacturer's instructions.



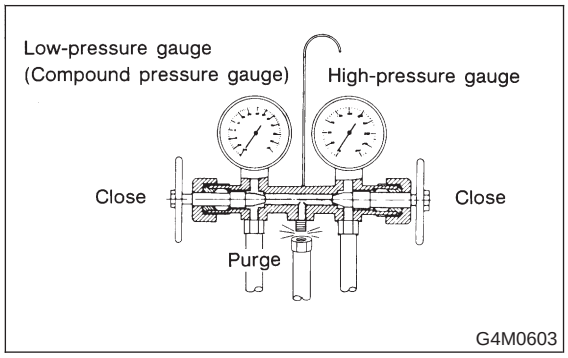
7) Disconnect the center manifold hose from the vacuum pump and connect the hose to the tap valve.
8) If a 13.6 kg (30 lb) container of refrigerant is used a weight scale will be needed. This scale is to determine the amount of refrigerant that is used. Connect the center hose from the manifold to the valve. Place the 13.6 kg (30 lb) container on the scale, valve end down.



C: PURGE THE CENTER HOSE

CAUTION:
Be certain that goggles and gloves are worn.

1) Verify that all three hose connections are tight at the manifold gauge set.

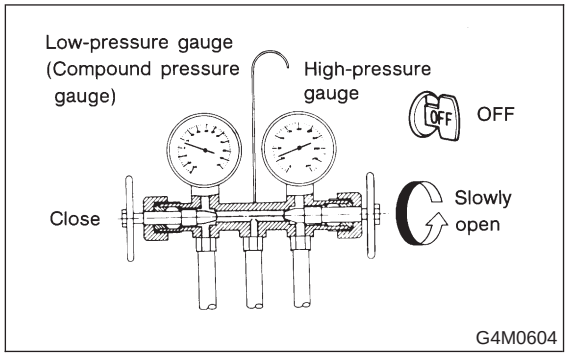


2) Open the valve on the HFC-134a source.
3) Loosen the center hose connection at the manifold and allow the HFC-134a to escape for no more than two or three seconds, then quickly retighten the hose fitting at the manifold.

D: INITIAL CHARGING THROUGH THE HIGH SIDE

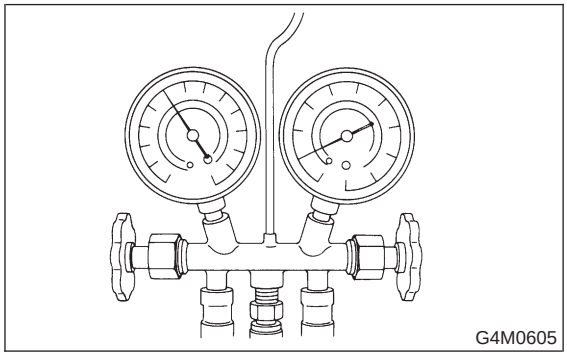
1) Connect a tachometer to the engine.
2) With the engine off, start charging by slowly opening the high-pressure manifold valve.

NOTE:
The initial charge rate can be increased by immersing the can in lukewarm [Below 38°C (100°F)] water for a short time.



E: CHECK THE GAUGE READINGS

When both the high- and low-pressure gauge readings are about equal, or the HFC-134a source is empty, or the system has been filled to specifications, close the high- pressure manifold valve.

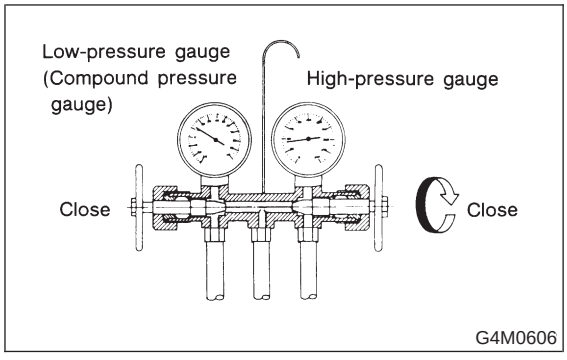


F: ADD ADDITIONAL CANS

If the HFC-134a source is exhausted, first close the high- pressure manifold valve, second, close the can tap valve, then slowly purge the refrigerant from the service hose by loosening the fitting at the can tap.

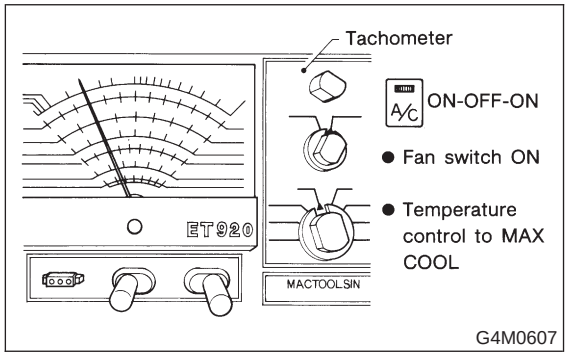
G: COMPLETE CHARGING THROUGH THE LOW SIDE

1) Verify that the high-pressure manifold valve is closed (should have already been closed).
2) Verify that the low-pressure manifold valve is closed (should have already been closed).



3) With the A/C switch off and the windows rolled down, start the engine and run at idle rpm.
4) Set the A/C controls on maximum cool and set the blower speed on the highest setting.

5) Quickly turn the A/C switch on-off-on-off a few times to prevent initial compressor damage due to “load shock.” Finish this operation with the A/C switch in the ON position.

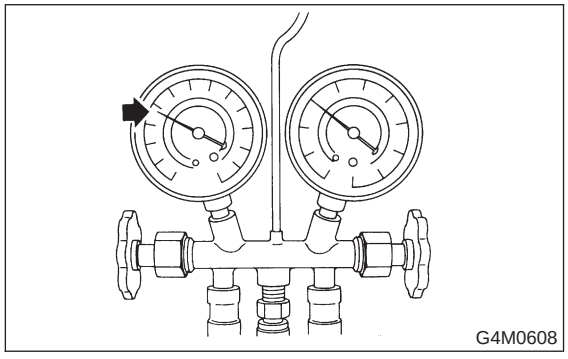


6) Raise engine rpm to approximately 1,500 rpm.

H: CHARGE THE SYSTEM

1) With the refrigerant source connected and the service hose purged, slowly open the low-pressure manifold valve, while checking the low-pressure gauge reading.

CAUTION:
The refrigerant source must be positioned for vapor (valve up).



2) Keep the low side pressure below 276 kPa (2.81 kg/cm^2, 40 psi) by using the low-pressure manifold valve to regulate the flow of refrigerant into the system.
3) When the system is fully charged, close the low- pressure manifold valve.
4) Close the valve at the refrigerant source.
● Refrigerant capacity

		Unit: kg (lb)
Refrigerant	Minimum	Maximum
HFC-134a	0.55 (1.21)	0.65 (1.43)

I: COMPLETE ALL SYSTEM CHECKS

1) Evaluate the system performance. <Ref. to 4-7 [W10A0].>
2) Perform leak detection test. <Ref. to 4-7 [W8A0].>

CAUTION:
● Always perform leak checking in an environment free of refrigerant pollution.
● Do not disconnect the high- or low-pressure hoses from the vehicle before leak checking.

J: DISCONNECT THE MANIFOLD GAUGE SET

Remove the high- or low-pressure hoses from the service ports and install the service port caps.

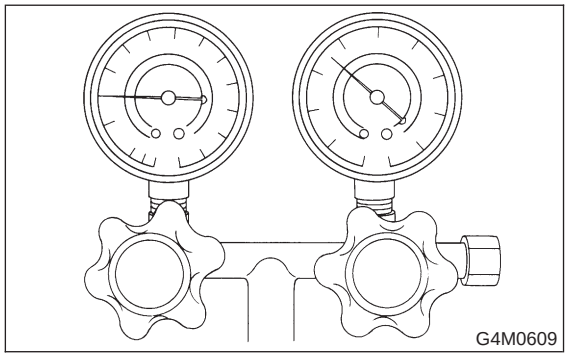
8. Leak Testing

A: INSPECTION

The following points should be kept in mind when conducting a refrigerant leak test.
1) The A/C system to be tested must have an adequate refrigerant charge to begin with.
2) The area where the leak test is conducted must be free of wind and drafts, with still air being the ideal condition.
3) The atmosphere where the leak test is conducted must be free of refrigerant contamination.
4) Operate the A/C system for approx. 10 minutes, then turn the engine off an begin the leak test.
5) Refrigerant gas is heavier than air, therefore always hold the probe below the connection being tested.
6) When checking for a leak along a length of hose or tube, the leak detector probe must be moved slowly, approx. 25 mm (1 in) per second making sure probe does not come in contact with the component being tested.
7) When checking for a leak at a certain point, the leak detector probe must be held at that point for at least 5 seconds.

1. CHECK THE SYSTEM PRESSURE

With gauges connected to the A/C system, operate the A/C and confirm that the high side pressure is above 690 kPa (7.03 kg/cm^2, 100 psi). If not, evacuate and charge the system before leak checking (refer to evacuation and charging sections).


G4M0609

2. CLEAN CONNECTIONS BEFORE TESTING

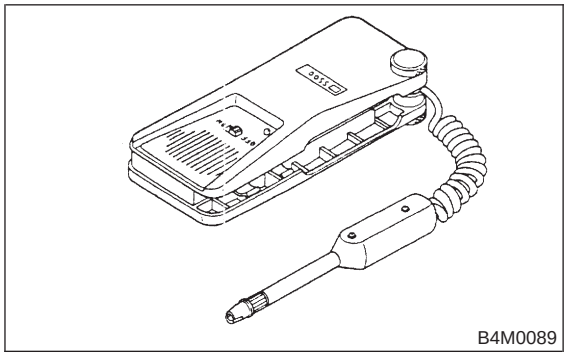
Before testing, use a clean shop towel to wipe off refrigerant oil, dirt, or foreign material from all of the connections and components to be tested.

NOTE:
Since refrigerant oil absorbs refrigerant, excess oil on or near a connection may falsely signal a leak.

3. CALIBRATE LEAK DETECTOR

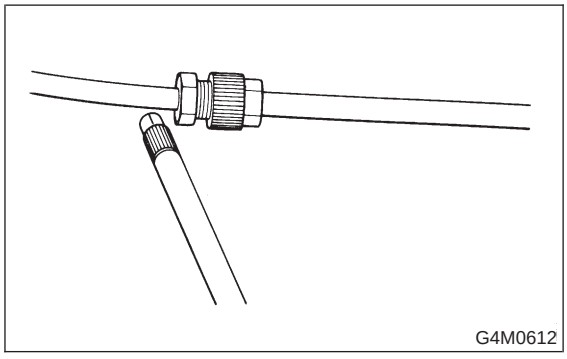
Refer to the manufacturer's instructions for the particular type of detector used and calibrate the instrument.

CAUTION:
Always make sure that the probe tip filter is clean and free of contamination.

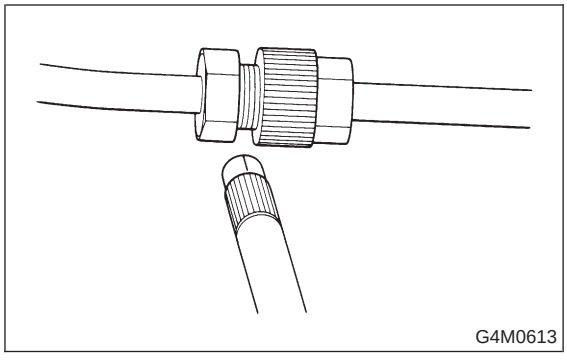

B4M0089

4. LEAK TEST (HIGH-PRESSURE SIDE)

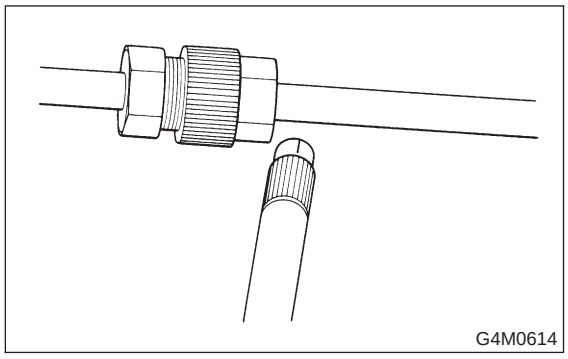
Operate the A/C system for approx. 10 minutes, then turn the engine off and begin the leak test.
1) Begin at the connection of the high-pressure tube to the evaporator, and work your way along the high- pressure side of the system to the compressor. There are three places to check on each tube connection.
2) Check the area.
● Check the area where the fitting joins the tube.


G4M0612

● Check the area where the two parts of the fitting join each other.


G4M0613

● Check the area where the nut joins the tube.



3) Check the area of the sight glass and pressure switch (dual switch), and also check the seams of the receiver drier.
4) Check the connections of the tubes to the condenser, and also check any welded joints on the condenser.

CAUTION:
An oily area on the fins of the condenser may indicate a leak.

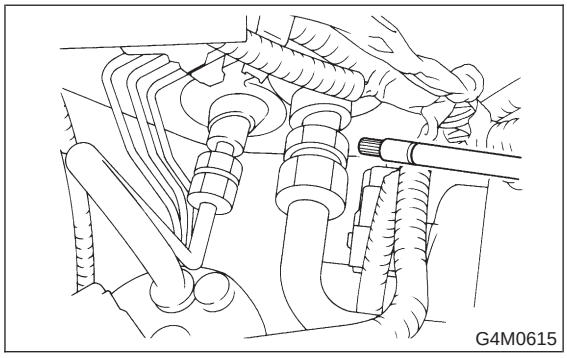
5) Check the area where the hoses attach to the compressor.
6) Check around the machined portions of the compressor (where the compressor sections join each other).
7) If equipped, check the thermal limiter on the compressor housing.
8) Check the compressor shaft seal by probing near the center of the compressor clutch pulley.

NOTE:
Some shaft seals have a very slight amount of normal leakage [approximately 28 g (1.0 oz) per year].

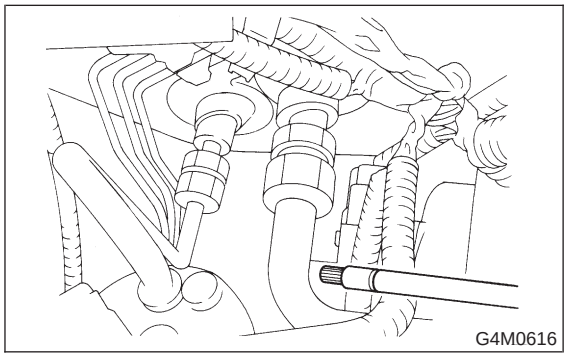
5. LEAK TEST (LOW-PRESSURE SIDE)

1) Begin at the connection of the low-pressure tube to the evaporator, and work your way along the low-pressure of the system to the compressor. There are three places to check on each tube connection.
2) Check the area.

(1) Check the area where the fitting joins the tube.



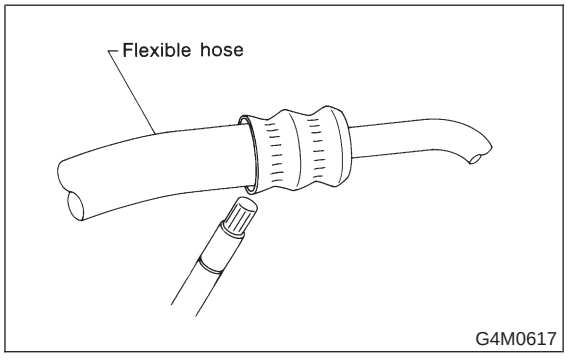
(2) Check the area where the two parts of the fitting join each other.
(3) Check the area where the nut joins the tube.



6. CHECK THE FLEXIBLE HOSES

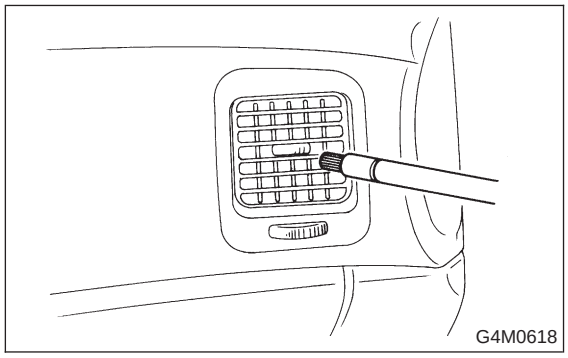
Visually inspect the rubber portions of the flexible hoses for cracking. Probe the rubber section, including the ends of any insulators or protectors which may cover sections of the rubber hose, and near the ends where the rubber meets the metal collar.

NOTE:
Be certain to move the probe slowly [approximately 25 mm (1 in) per second] when probing along any length of hose or tube.



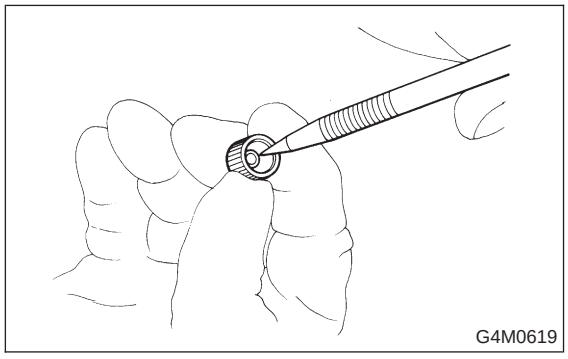
7. CHECK THE EVAPORATOR ASSEMBLY

1) Use one or both of the following methods to check the evaporator assembly.
2) Remove the drain hose from the case drain nipple. Hold the probe at the end of the case drain nipple for at least 10 seconds. Be certain to reconnect the drain hose when finished.
3) With the ignition key in the “ACC” position, run the blower on high speed for 1 minute, then turn the blower off. Place the probe in the center instrument panel vent, an turn the blower on low speed for 1 to 2 seconds, then turn the blower off. Leave the probe in the vent for at least 10 seconds.



8. CHECK THE SERVICE PORT CAPS

Visually inspect the inside of the service port caps. Make sure the rubber seal is in place on the inside of the caps. Disconnect the gauges from the vehicle and install the service port caps.



9. Lubrication

A: ADJUSTMENT

1. SYSTEM OIL STABILIZATION

1) Prior to opening the refrigerant system for repairs (except compressor seizure) the system must be stabilized for correct oil replenishment.
2) Follow these procedures:
(1) Engine speed set to 1,500 rpm
(2) A/C “ON”
(3) Air source to recirculate
(4) Blower in 4th or high speed position
● Make sure the air entering the evaporator is above 26.7°C (80°F).
● The discharge (high) side pressure must be above 588 kPa (6 kg/cm^2, 85 psi).
(5) Operate the A/C for 10 minutes.

2. SYSTEM DISCHARGE

Slowly, discharge the system starting with the high-pressure side until the pressure drops below 345 kPa (3.52 kg/cm^2, 50 psi), then open the low-pressure side.

B: REPLACEMENT

1. OIL REPLACEMENT

1) After stabilization and discharge, replace the component, adding the appropriate amount of oil (ZXL200PG) to the new component before installation.

Evaporator	114 mℓ (3.9 US fl oz, 4.0 Imp fl oz)
Receiver drier	5 mℓ (0.2 US fl oz, 0.2 Imp fl oz)
Condenser	2 mℓ (0.07 US fl oz, 0.07 Imp fl oz)
Hose	1 mℓ (0.03 US fl oz, 0.04 Imp fl oz)

2) If the compressor is replaced (after stabilization):
(1) Drain and measure the oil from the original compressor.
(2) Drain the oil from the replacement compressor and refill with the same amount that was drained from the original [20 mℓ (0.7 US fl oz, 0.7 Imp fl oz) minimum]. Always use ZXL200PG for the replacement oil.

10. Performance Test

A: INSPECTION

1. VEHICLE SET UP

In order to obtain meaningful test results, the vehicle must be set up to meet the following conditions.

- Vehicle in shade
- No wind
- All vehicle doors closed
- Front windows opened
- Hood opened
- Engine speed set at 1,500 rpm.
- A/C ON
- Temperature control lever — Maximum cold
- Air source — Recirculation
- Blower speed — 4th position (High)
- Operate A/C for 10 minutes (Minimum) before taking measurement.

2. MEASUREMENTS

After 10 minutes (Minimum) of A/C operation and using accurate test equipment, take the following measurements (in order).

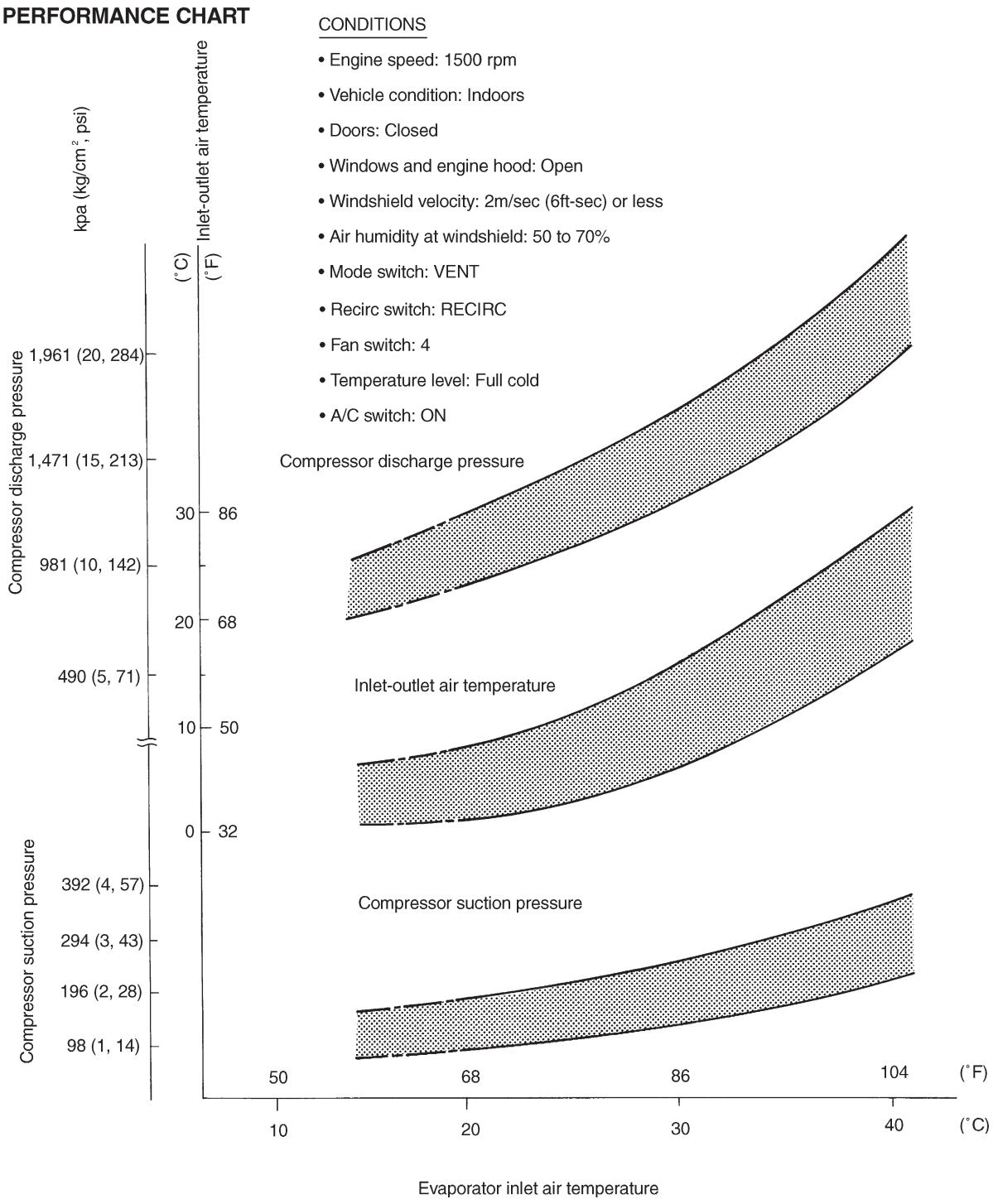
1) Evaporator intake air temperature at recirculation door.
2) Evaporator discharge air temperature at center grill.
3) Condenser (Ambient) intake air temperature measured 0.9 m (3 ft) in front and in line with the center of the condenser.
4) Suction (Low) side pressure
5) Discharge (High) side pressure

NOTE:
If only one thermometer is available; 1)take the ambient measurement first; then 2)the intake air; and 3)discharge air temperature.

3. MEASUREMENT STANDARD BY VERSES

Compare temperature and pressure measurements with the established standards shown in the following charts.

PERFORMANCE CHART



B4M0371A

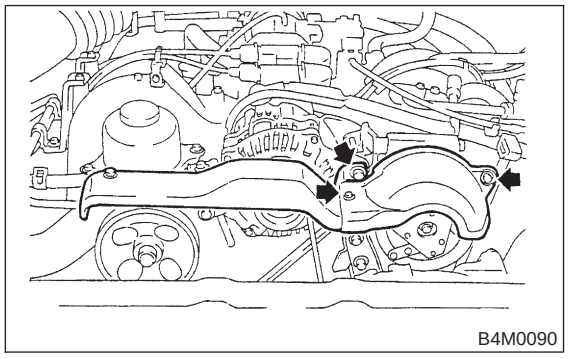
11. Compressor

A: INSPECTION

1. COMPRESSOR CLUTCH

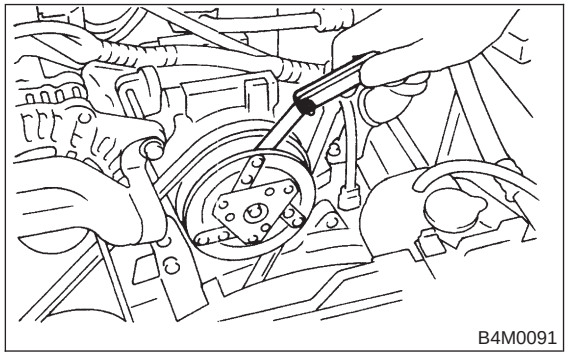
NOTE:
● Compressor is a swash plate type. When trouble occurs, replace compressor as a single unit.
● Compressor clutch trouble is often caused by clutch slippage and noise. Check and take corrective measures, as required.

1) Remove belt cover.


B4M0090

2) Compressor clutch trouble is often caused by clutch slippage and noise. Check and take corrective measures, as required.

Clearance:
0.3 — 0.6 mm (0.012 — 0.024 in)

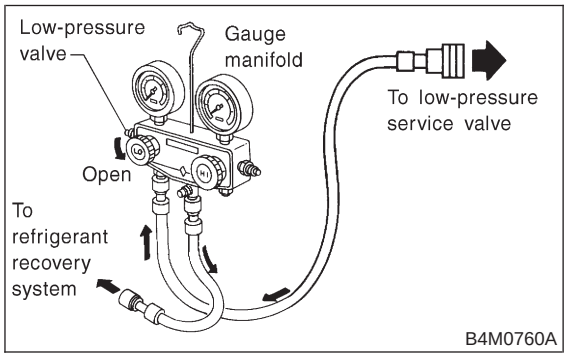

B4M0091

3) Check that voltage applied to magnetic coil is at least 10.5 volts.
4) When noise is noted, check that it originates in either compressor or pulley bearing.

B: REMOVAL

1) Disconnect ground cable from battery.
2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
(1) Fully close low-pressure valve of manifold gauge.
(2) Connect low-pressure charging hose of manifold gauge to low-pressure service valve.
(3) Open low-pressure manifold gauge valve slightly, and slowly discharge refrigerant from system.

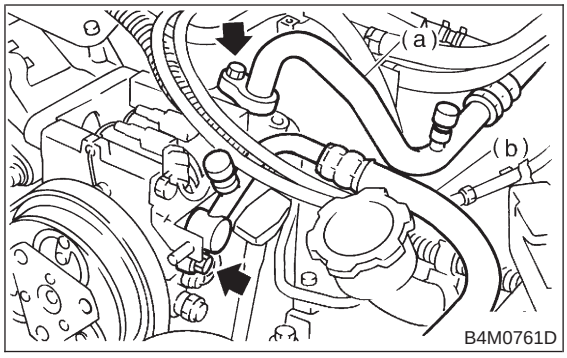
CAUTION:
Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.



B4M0760A

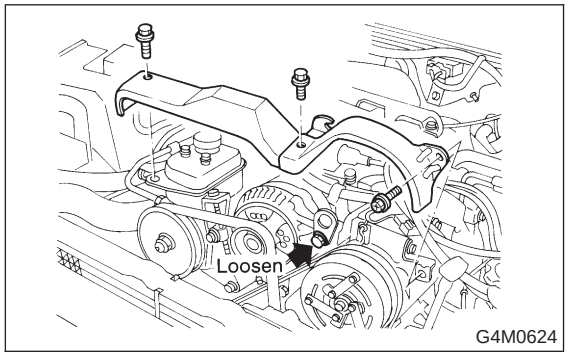
3) Remove low-pressure hose (a) and high-pressure hose (b).

CAUTION:
● Be careful not to lose O-ring of low-pressure hose.
● Plug the opening to prevent foreign matter from entering.

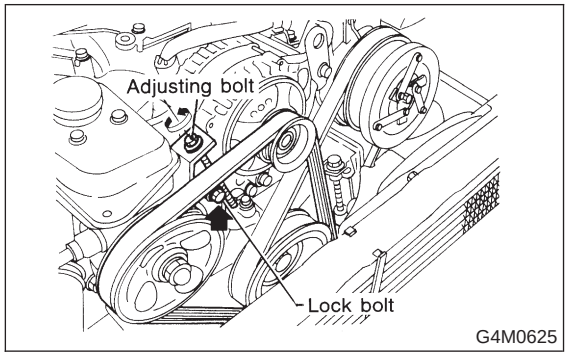


B4M0761D

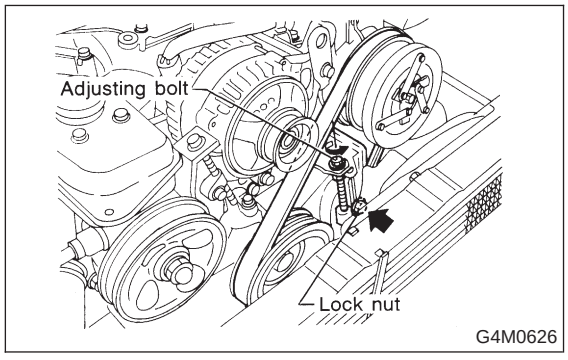
4) Remove compressor belt cover and alternator belt cover:
Remove bolts which secure belt covers.



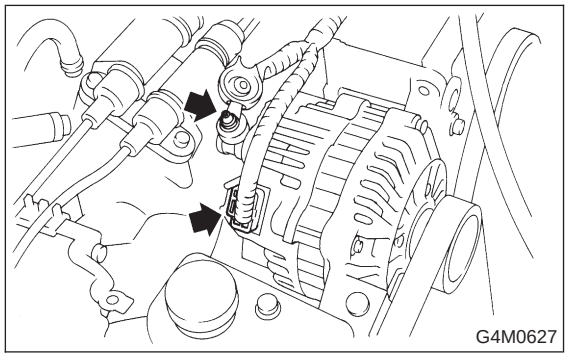
5) Remove alternator V-belt:
(1) Loosen lock bolt on alternator bracket.
(2) Turn adjusting bolt and remove V-belt.



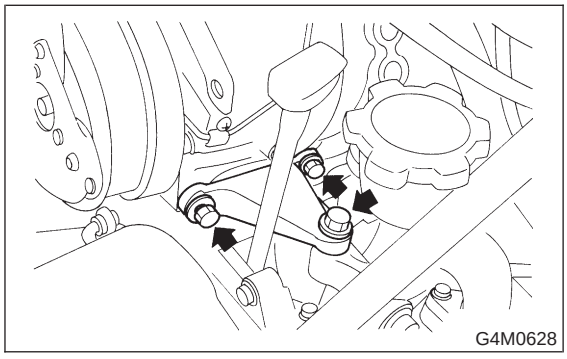
6) Remove compressor V-belt:
(1) Loosen lock nut on idler pulley.
(2) Turn adjusting bolt and remove V-belt.



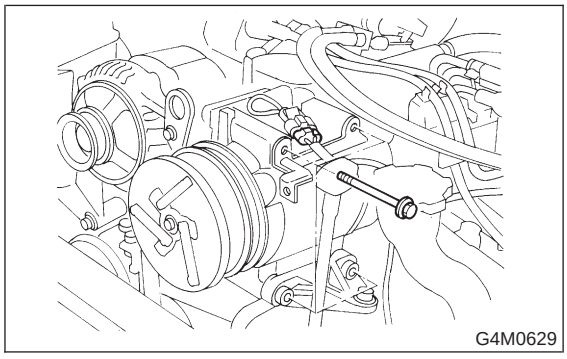
7) Disconnect alternator harness.



8) Disconnect compressor harness:
Disconnect compressor harness from body harness.
9) Lower bracket:
Remove bolts which secure lower compressor bracket.

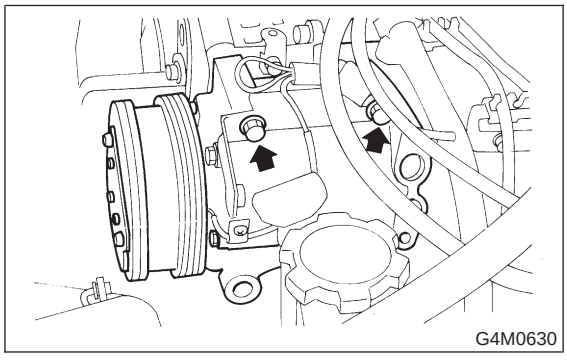


10) Remove compressor:
(1) Remove bolt which secure compressor.
(2) Remove compressor from bracket.



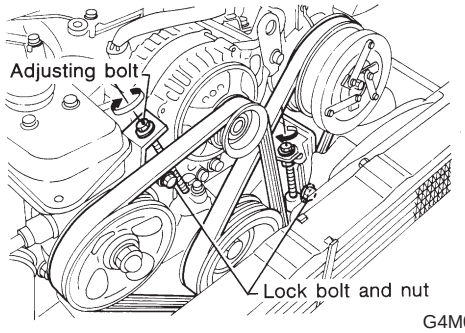
C: INSTALLATION

1) Install compressor:
Install compressor on bracket.



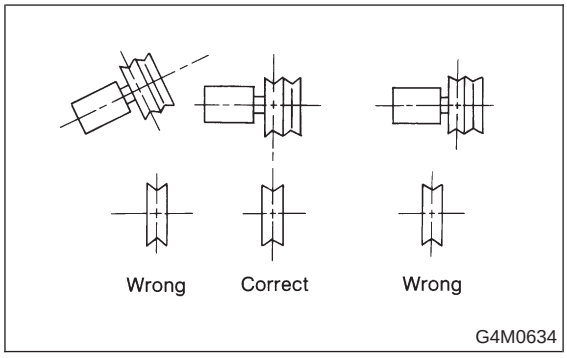
2) Connect compressor harness.
3) Connect alternator harness.
4) Install compressor V-belt (Rear):
After adjusting belt tension, tighten tension pulley lock nut securely.

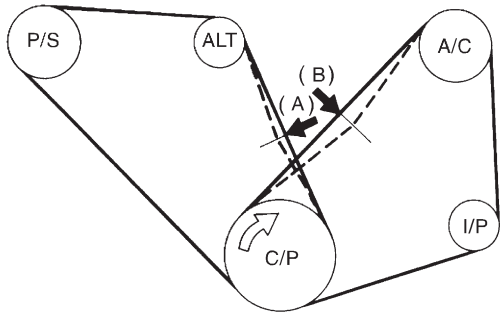
5) Install alternator V-belt:
After adjusting V-belt tension, tighten alternator bracket lock bolt securely.



6) Check drive belt tension and adjust it if necessary by changing alternator position and/or idler pulley position.

CAUTION:
● Ensure that the V-belt is aligned correctly. If it is not, check for loose bolts.
● The V-belt should not be too tight or too loose.
A belt which is too tight may break bearing or cause gas to leak from the shaft seal. A belt which is too loose slips, thereby causing the belt cut.
● After completing the compressor installation and testing the system operation, check and adjust the tension of both V-belts again.

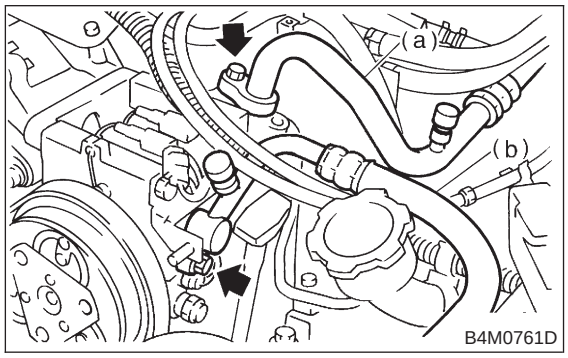


Pulley arrangement	Tension mm (in)/98N (10 kg, 22 lb)	
	(A)	(B)
	*New belt: 7.0 – 9.0 (0.276 – 0.354) Existing belt: 9.0 – 11.0 (0.354 – 0.433)	*New belt: 7.5 – 8.5 (0.295 – 0.335) Existing belt: 9.0 – 10.0 (0.354 – 0.394)
Figures in table refer to the number of grooves in pulleys. C/P: Crankshaft pulley ALT: Alternator pulley P/S: Power steering oil pump pulley A/C: Air conditioner compressor pulley I/P: Idler pulley	*When replacing belts with new ones, adjust tensions to specification and then readjust to the same specification after running engine for 5 minutes.	

B4M1098A

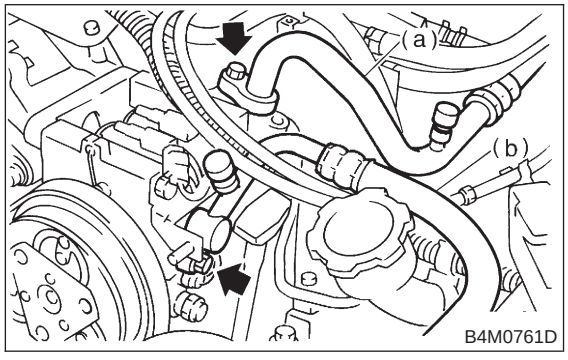
7) Install high-pressure hose (b).
Connect high-pressure hose with compressor.

CAUTION:
Be sure to apply compressor oil to the periphery of O-ring.



8) Install low-pressure hose (a).
Connect low-pressure hose with compressor.

CAUTION:
Be sure to apply compressor oil to the periphery of O-ring.

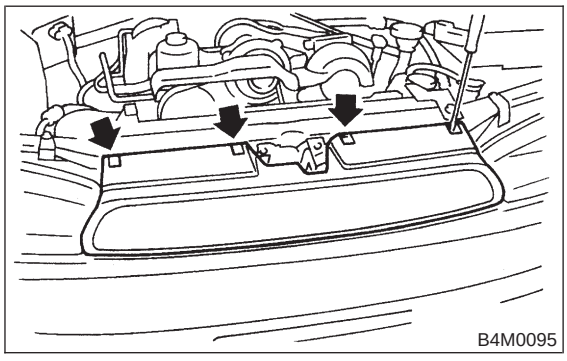


9) Install belt cover.
10) Connect ground cable to negative terminal of battery.
11) Charge refrigerant. <Ref. to 4-7 [W7H0].>

12. Condenser

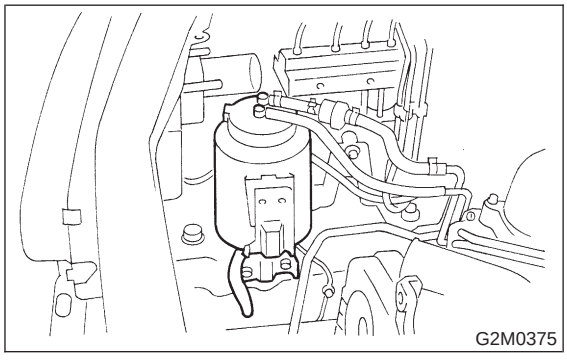
A: REMOVAL AND INSTALLATION

1) Disconnect battery negative terminal.
2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
3) Remove front grille.

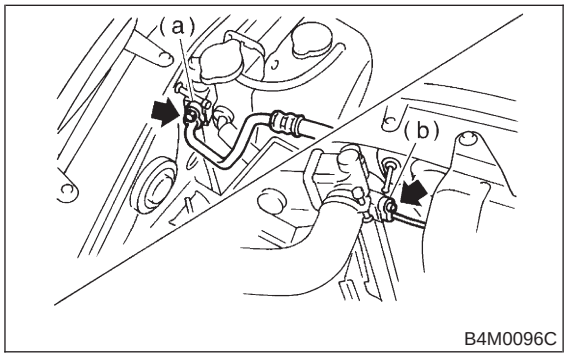


4) Remove canister from bracket.

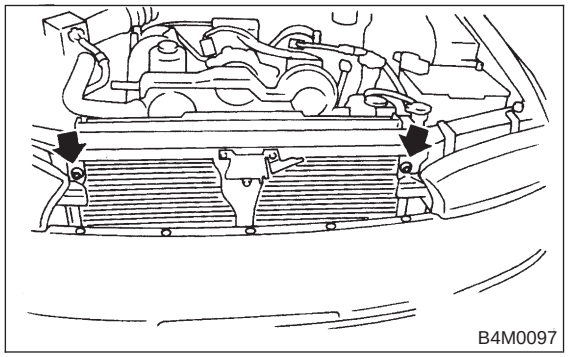
CAUTION:
- **Do not disconnect hose from canister.**
- **Insert air vent hose of canister into the hole on body.**



5) Remove the radiator upper bracket of both side.
6) Disconnect high-pressure hose (a) and high-pressure pipe (b) from condenser.



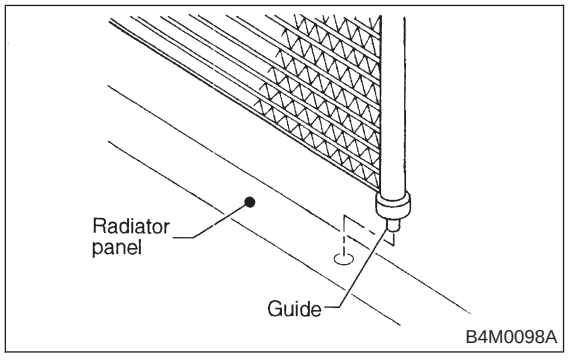
7) Remove the two bolts which secure condenser. While lifting condenser, remove it through space between radiator and radiator panel.



8) The condenser should be installed in the reverse order in which it was removed. When installing the condenser, pay attention to the following:

CAUTION:
Before connecting the pipe, be sure to apply oil to the periphery of O-ring.

NOTE:
After installing condenser, ensure that guide on lower side of condenser is inserted into hole in radiator panel. Tighten attaching bolts.



9) Charge refrigerant. <Ref. to 4-7 [W7H0].>

B: INSPECTION

1) Make sure the condenser fins are free from dust and insects. If the fins are clogged, clean by blowing air or water through them.

NOTE:
To prevent dust and water from getting into the condenser, this work must be done when the condenser is installed in an actual vehicle.

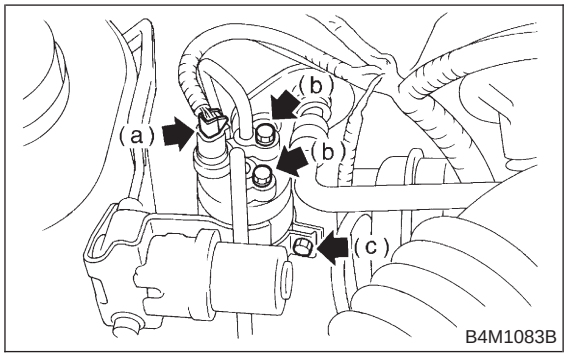
2) Check the condenser to see if it shows any sign of oil. If oil ooze or gas leak occur from the condenser, replace it with a new one.

13. Receiver Drier

A: REMOVAL AND INSTALLATION

1) Disconnect battery negative terminal.
2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
3) Disconnect pressure switch harness (a).
4) Disconnect pipes (b).
5) Remove mounting bolt (c) and remove receiver drier.

CAUTION:
The receiver drier contains a desiccant. Be sure to put a blind plug in the detached receiver drier to protect it from moisture.

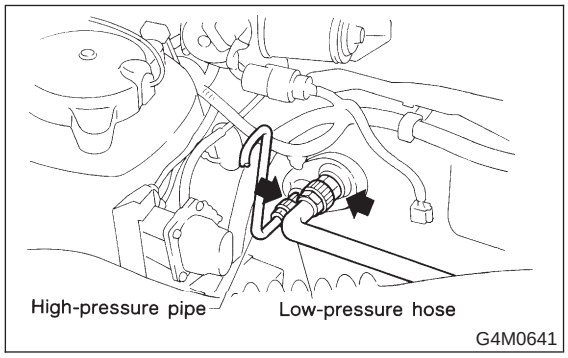


6) Install the receiver drier in the reverse order of removal.
7) Charge refrigerant. <Ref. to 4-7 [W7H0].>

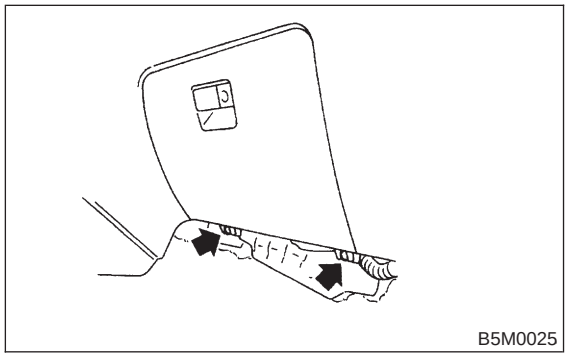
14. Evaporator Unit

A: REMOVAL AND INSTALLATION

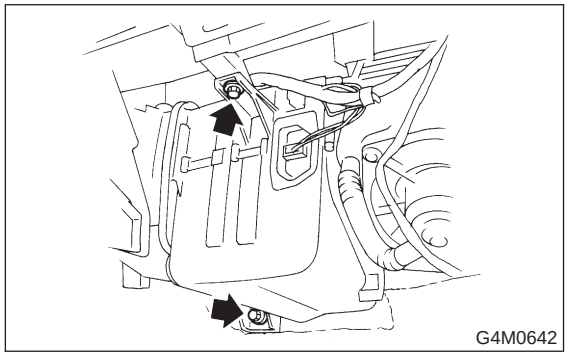
1) Disconnect battery negative terminal.
2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
3) Disconnect discharge pipe, suction pipe and grommets



4) Remove glove box and pocket back panel. <Ref. to 5-4 [W1A0].>



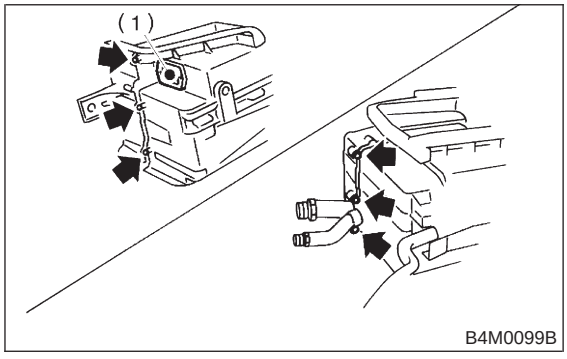
5) Disconnect the harness connector from evaporator.
6) Disconnect drain hose.
7) Remove evaporator mounting bolt and nut.



8) Install the evaporator in the reverse order of removal.
9) Charge refrigerant. <Ref. to 4-7 [W7H0].>

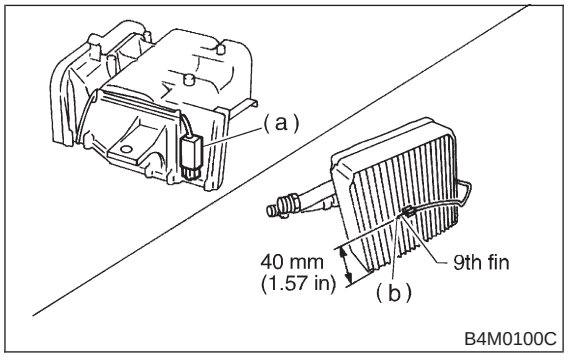
B: DISASSEMBLY AND ASSEMBLY

1) Remove resistor assembly and remove six screws from evaporator case.

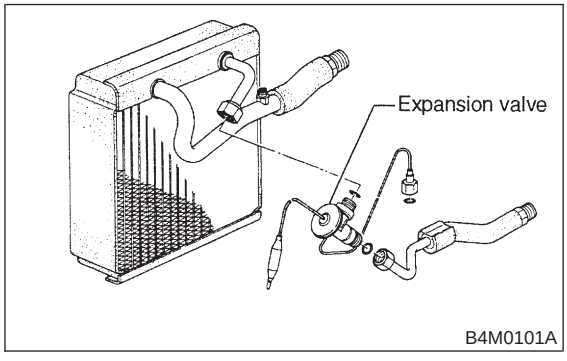


(1) Resistor ASSY

2) Remove thermostat (a) from upper case. (Thermistor (b) is inserted into specified evaporator fin position.) When installing thermostat, be sure to insert thermistor into specified fin position.



3) Disconnect the connection between the expansion valve and pipe from receiver drier.
4) Remove the expansion valve from pipes.



5) To install expansion valve, reverse removal procedures. Properly wrap capillary tube of expansion valve with seal.
6) Check to see if the evaporator fins are clogged. If they are, clean them with compressed air.

CAUTION:
Water must never be used to clean the evaporator.

7) Check parts that have been removed for cracks or scratches, and repair or replace them with new ones, if necessary.
8) Reassemble the evaporator in the reverse order of disassembly.

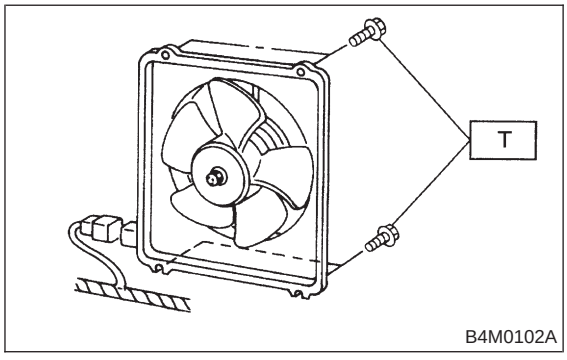
NOTE:
Confirm that the O-ring is inserted in the specified position.

15. Condenser Fan Assembly

A: REMOVAL AND INSTALLATION

1) Disconnect battery negative terminal.
2) Disconnect harness connector from fan motor.
3) Remove condenser fan bolt from radiator.
4) Pull condenser fan assembly.
5) Install the condenser fan assembly in the reverse order of removal.

Tightening torque:
T: 7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)



16. Flexible Hose

A: REMOVAL AND INSTALLATION

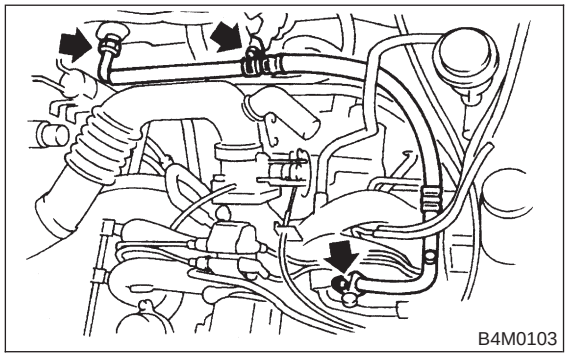
1) Disconnect battery negative terminal.
2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
3) Remove low-pressure hose:

CAUTION:
With the following cautions, replace flexible hoses with new ones if they are damaged or swollen.
● The flexible hoses should be free from twists and tension after they have been connected.
● The flexible hoses must not be bent or twisted forcibly.

(1) Remove hose attaching bolts.

CAUTION:
Plug the opening to prevent foreign matter from getting in.

(2) Disconnect the connector at evaporator unit.

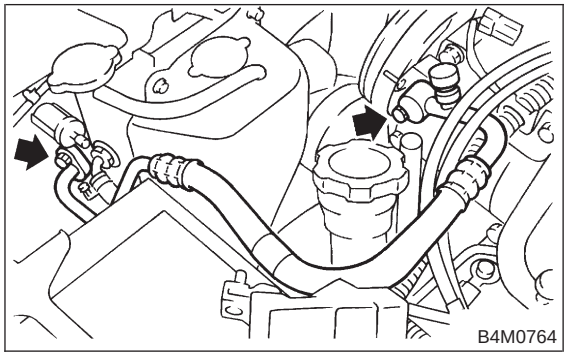

B4M0103

4) Remove high-pressure hose:

CAUTION:
With the following cautions, replace flexible hoses with new ones if they are damaged or swollen.
● The flexible hoses should be free from twists and tension after they have been connected.
● The flexible hoses must not be bent or twisted forcibly.

(1) Disconnect hose attaching bolt (compressor side).
(2) Disconnect hose attaching bolt (condenser side).

CAUTION:
Plug the opening to prevent foreign matter from getting in.


B4M0764

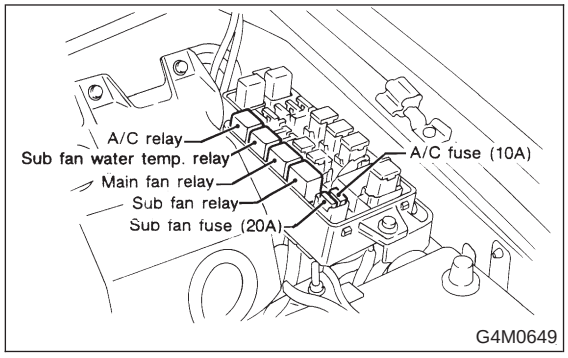
5) Installation is in the reverse order of removal.
6) Charge refrigerant. <Ref. to 4-7 [W7H0].>

17. Relay and Fuse

A: LOCATION

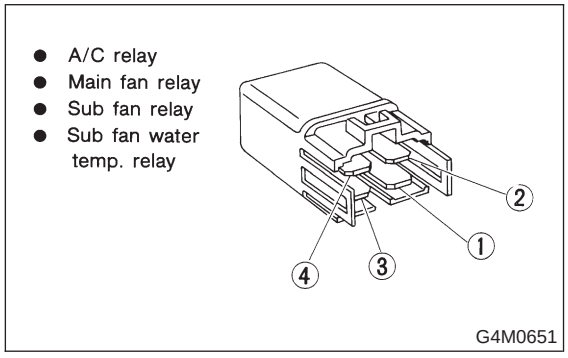
Relays used with A/C system are located as shown in figure.

- A/C relay
- Main fan (radiator fan) relay
- Sub fan (condenser fan) relay
- Sub fan (condenser fan) water temperature relay
- Fuses (10 A and 20 A)

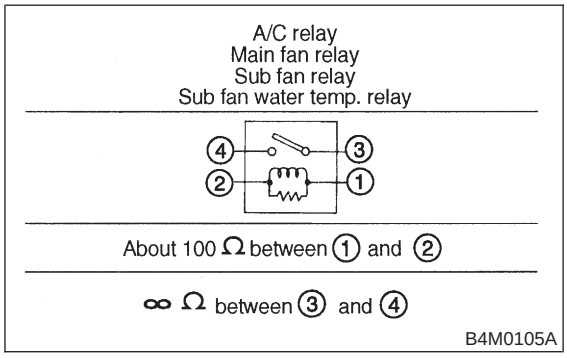


B: INSPECTION

1) Check conduction with a circuit tester (ohm range) according to the following table in figure.



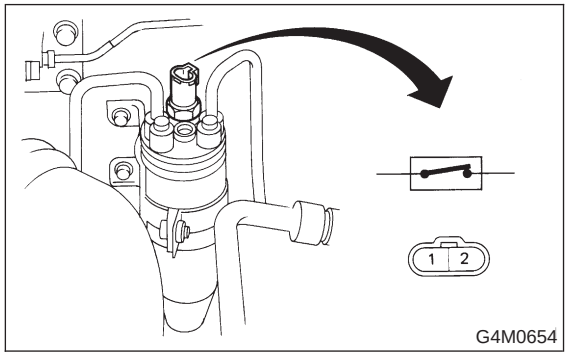
2) Replace relays which do not meet specifications.



18. Pressure Switch (Dual Switch)

A: INSPECTION

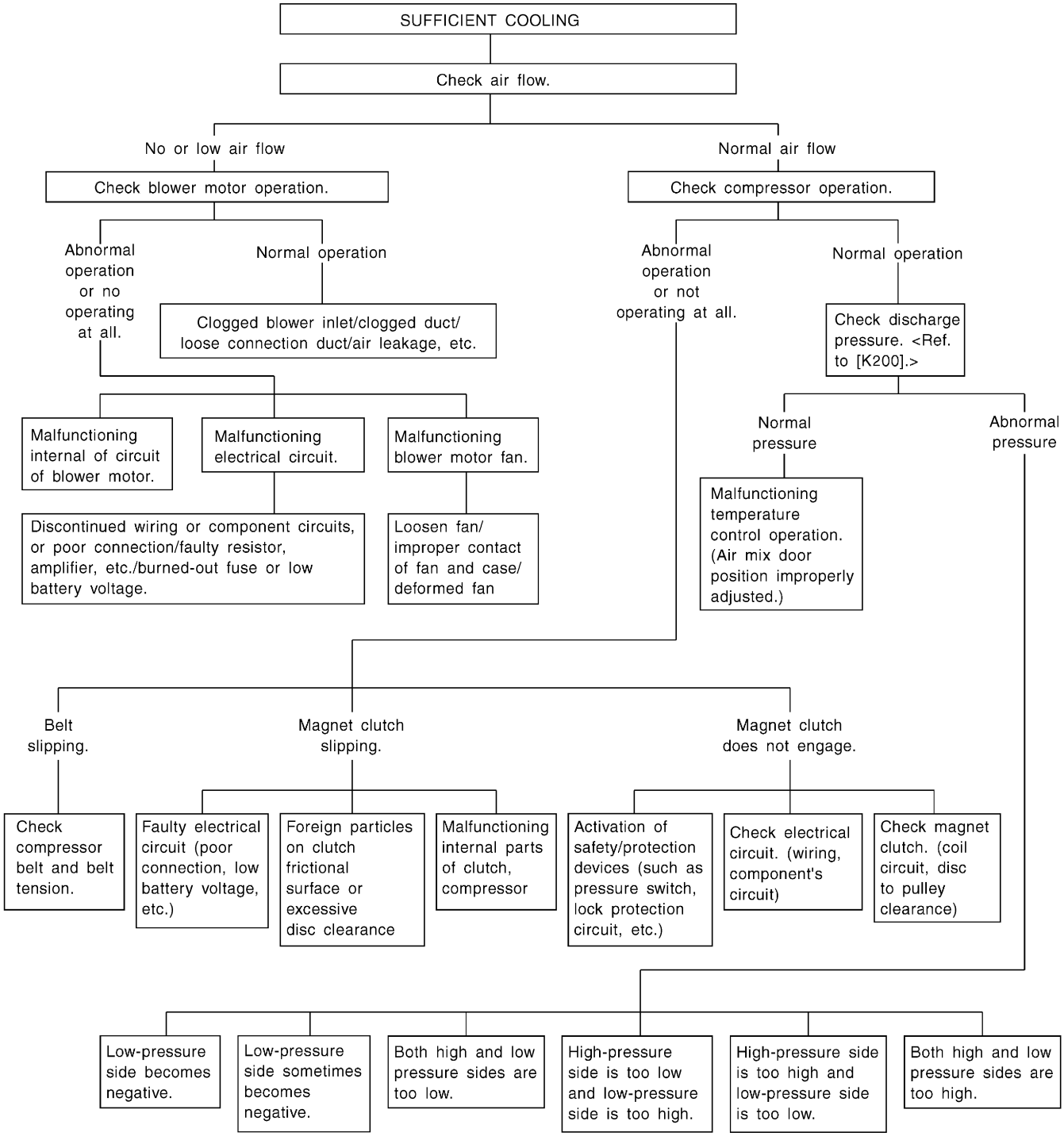
NOTE:
Pressure switch is attached to receiver dryer.



1) Remove cap from high-pressure line service valve, and connect gauge manifold to service valve.
2) Disconnect pressure switch harness connector, and check pressure switch for proper ON-OFF operation. Use a circuit tester.

	Terminal	Operation	High-pressure side line pressure kPa (kg/cm^2, psi)
High and low pressure switch	(1)—(2)	Turns OFF.	Increasing to 2,648±196 (27±2, 384±28)
			Decreasing to 177±20 (1.8±0.2, 26±3)
		Turns ON.	Increasing to 186±29 (1.9±0.3, 27±4)
			Decreasing to $1,471^{+196}/_{-98}$ ($15^{+2}/_{-1}$, $213^{+28}/_{-14}$

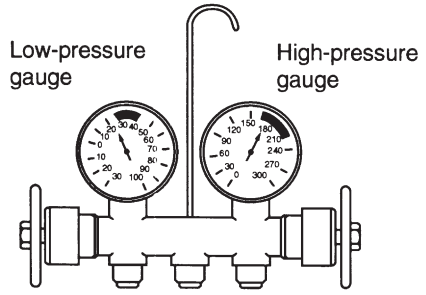
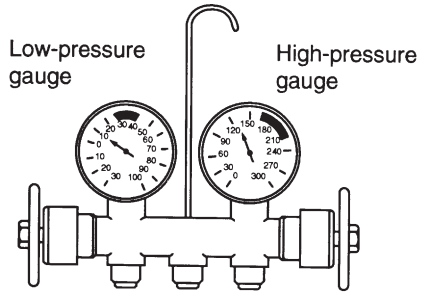
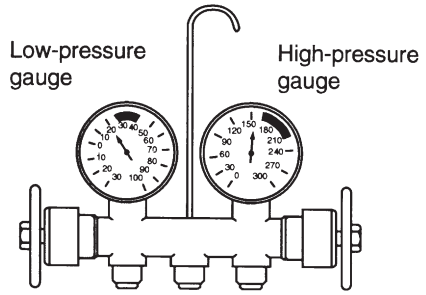
1. Air Conditioning System Diagnosis

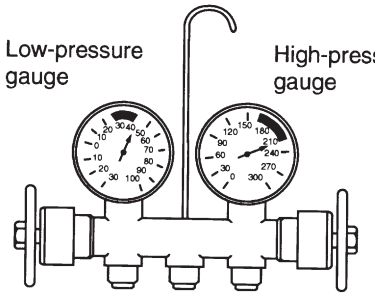
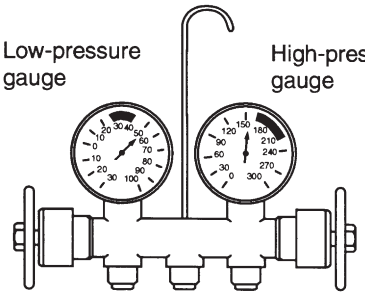
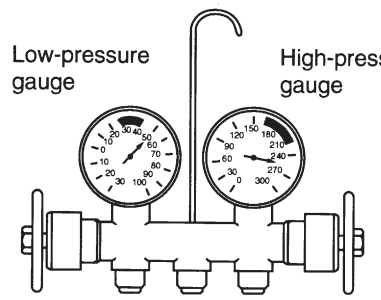
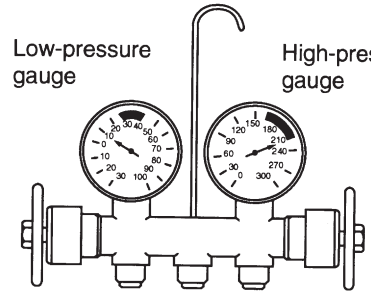


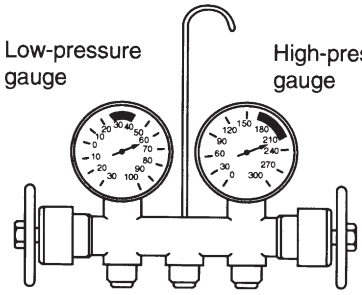
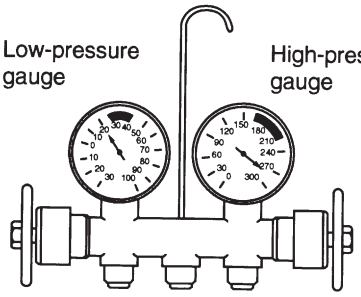
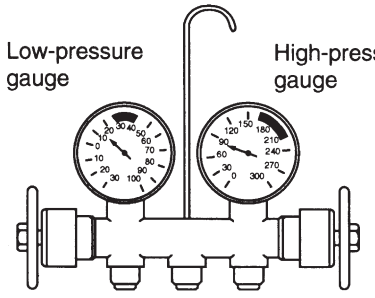
EPA0119

2. Performance Test Diagnosis

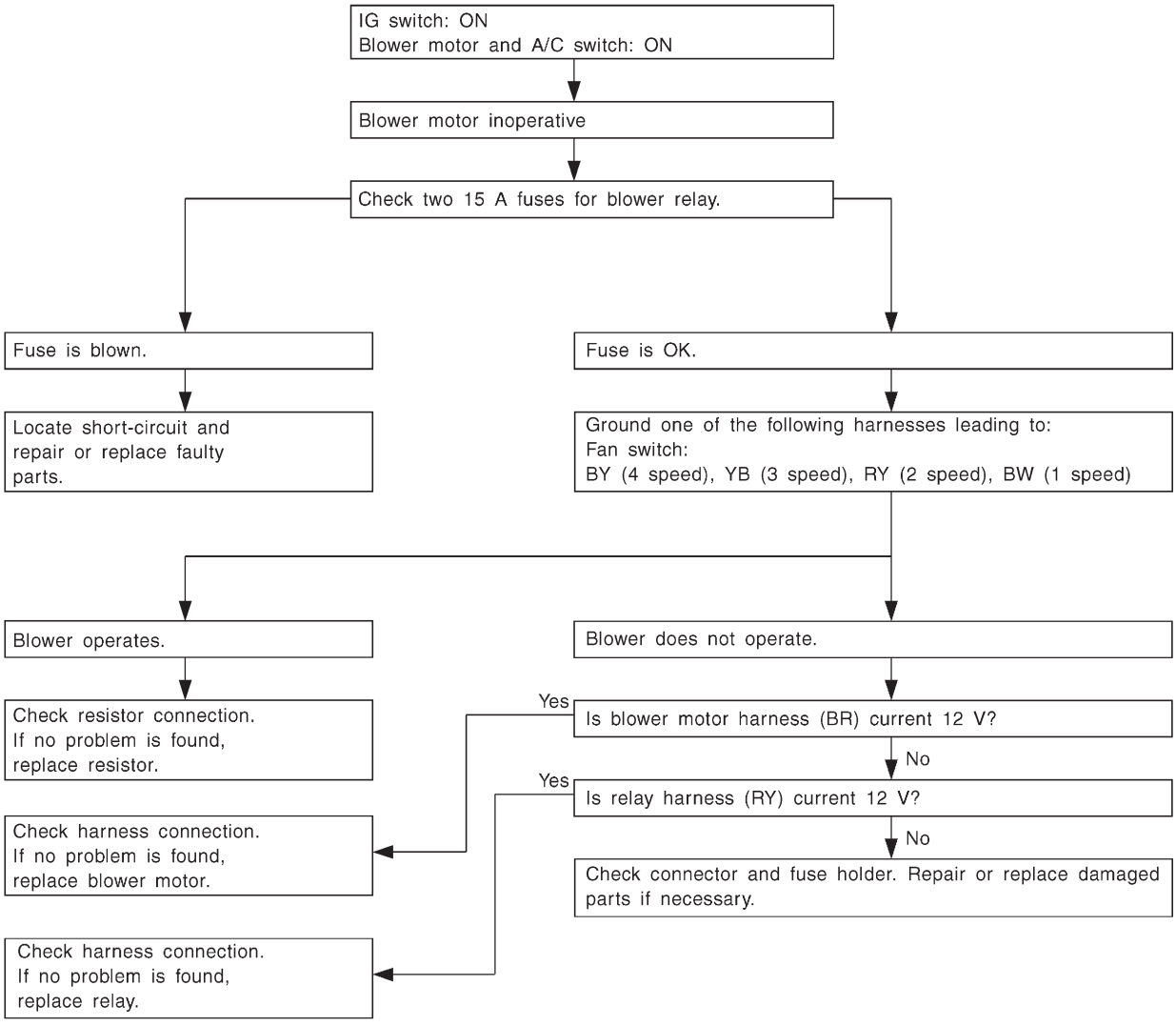
If various conditions caused to other air conditioning system, the characteristics revealed on manifold gauge reading are shown in the following:
As to the method of a performance test, refer to the item of “Performance Test”.
Each shaded area on the following tables indicates a reading of the normal system when the temperature of outside air is 32.5°C (91°F).

Condition		Probable cause	Corrective action
INSUFFICIENT REFRIGERANT CHARGE  G4M0673	Insufficient cooling	Refrigerant is small, or leaking a little.	(1) Perform leak test. (2) Repair leak. (3) Charge system. **Evacuate, as necessary, and recharge system.**
ALMOST NO REFRIGERANT  G4M0674	No cooling action	Serious refrigerant leak.	**Stop compressor immediately.** (1) Perform leak test. (2) Discharge system. (3) Repair leak(s). (4) Replace receiver drier if necessary. (5) Check oil level. (6) Evacuate and recharge system.
FAULTY EXPANSION VALVE  G4M0675	Slight cooling; Sweating or frosted expansion valve inlet.	Expansion valve restricts refrigerant flow. ● Expansion valve is clogged. ● Expansion valve is inoperative. ● Valve stuck closed. ● Thermal bulb has lost charge.	If valve inlet reveals sweat or frost: (1) Discharge system (2) Remove valve and clean it. Replace it if necessary. (3) Evacuate system (4) Charge system. If valve does not operate: (1) Discharge system. (2) Replace valve. (3) Evacuate and charge system.

Condition		Probable cause	Corrective action
 G4M0676  G4M0677	Insufficient cooling; Sweated suction line. No cooling; Sweating or frosted suction line.	Expansion valve allows too much refrigerant through evaporator. Faulty seal of O-ring in expansion valve.	Check valve for operation. If suction side does not show a pressure decrease, replace valve. (1) Discharge system. (2) Remove expansion valve and replace O-ring. (3) Evacuate and replace system.
AIR IN SYSTEM  G4M0678	Insufficient cooling	Air mixed with refrigerant in system.	(1) Discharge system. (2) Replace receiver drier. (3) Evacuate and charge system.
MOISTURE IN SYSTEM  G4M0679	After operation for a while, pressure on suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As warning of this, reading shows 39 kPa (0.4 kg/cm^2, 6 psi) vibration.	Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.	(1) Discharge system. (2) Replace receiver drier (twice if necessary). (3) Evacuate system completely (repeat 30-minute evacuating three times.). (4) Recharge system.

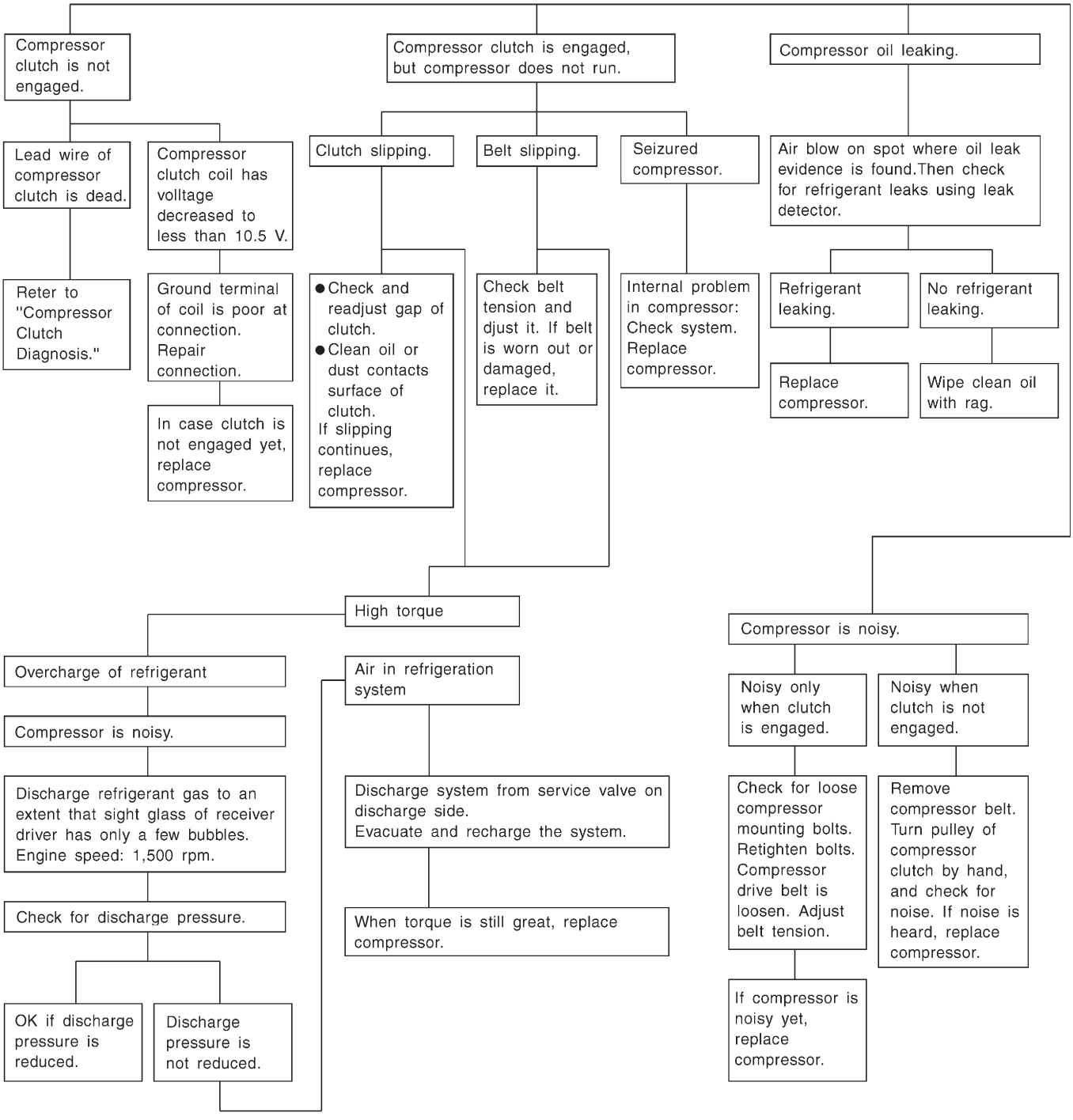
Condition		Probable cause	Corrective action
FAULTY CONDENSER  G4M0680	No cooling action; Engine may overheat. Suction line is very hot.	Condcondenser is often found not functioning well.	● Check condenser cooling fan. ● Check condenser for dirt accumulation. ● Check engine cooling system for overheat. ● Check for refrigerant overcharge. **If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.**
HIGH-PRESSURE LINE BLOCKED  G4M0681	Insufficient cooling; Frosted high-pressure liquid line.	Drier is clogged, or restriction in high- pressure line.	(1) Discharge system. (2) Remove receiver drier or strainer and replace it. (3) Evacuate and charge system.
FAULTY COMPRESSOR  G4M0682	Insufficient cooling	Internal problem is in compressor, or damaged gasket and valve.	(1) Discharge system. (2) Remove and check compressor. (3) Repair or replace compressor. (4) Check oil level. (5) Replace receiver drier. (6) Evacuate and charge system.

3. Blower Motor Diagnosis



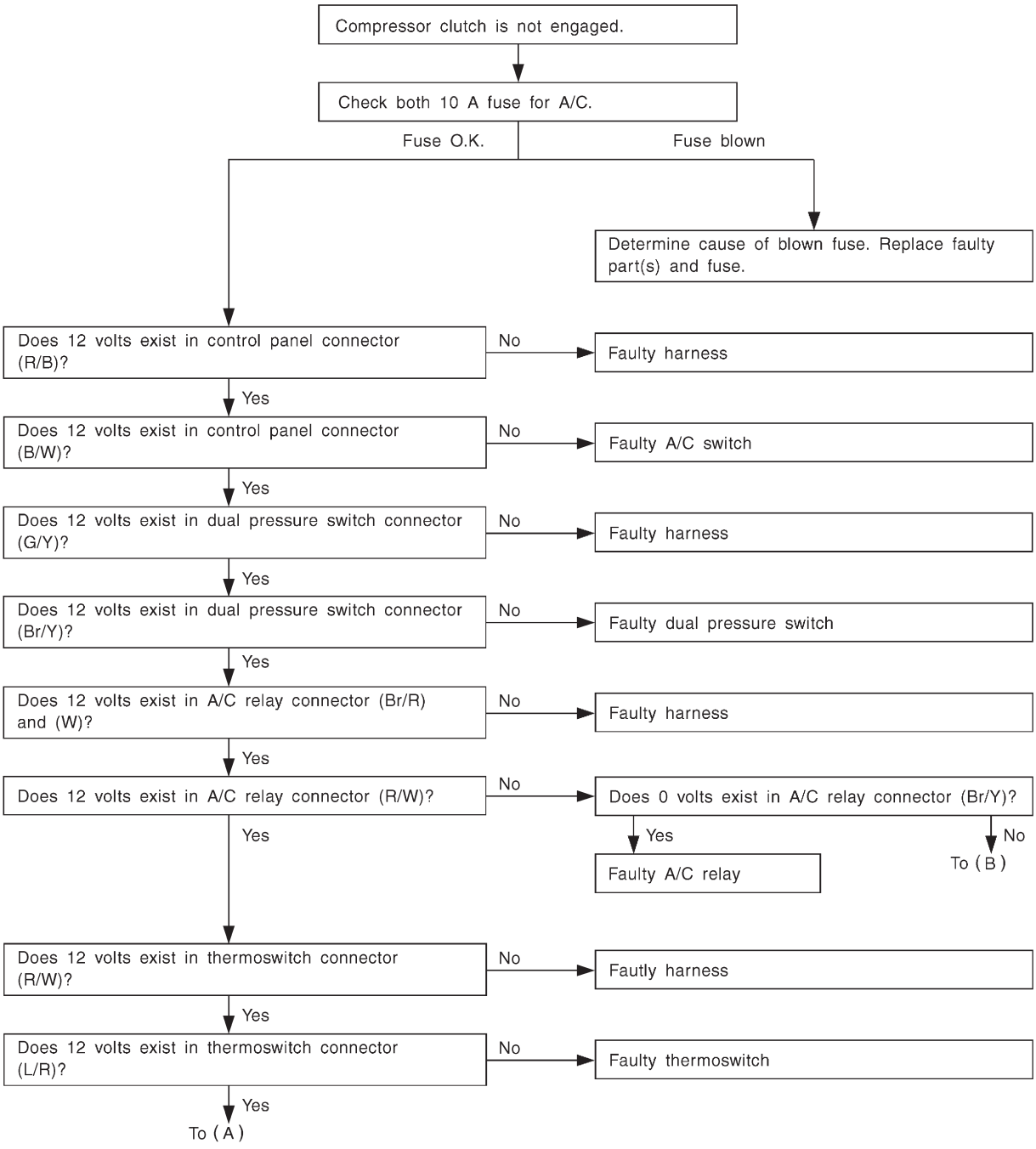
B4M1103A

4. Compressor Diagnosis

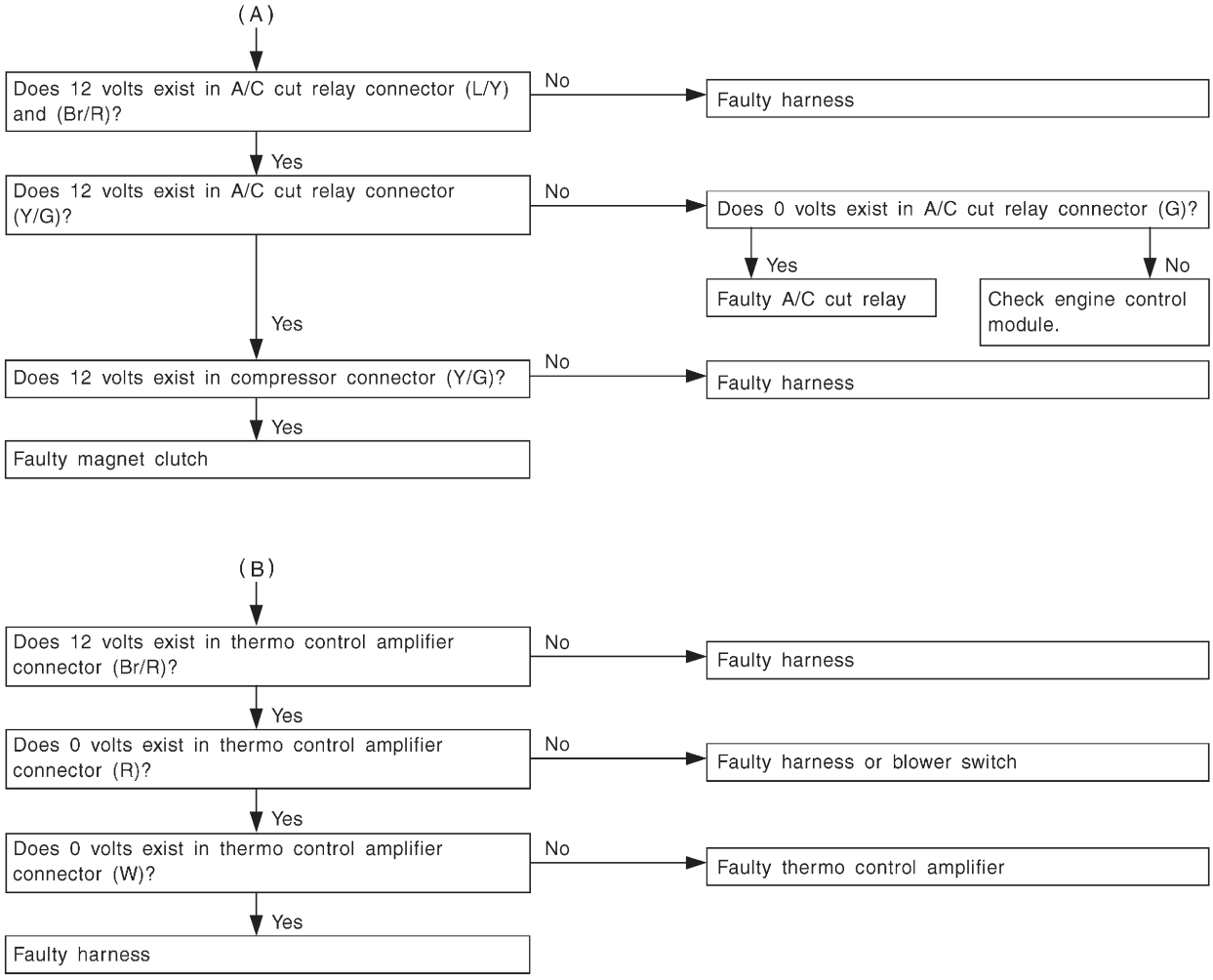


B4M1104A

5. Compressor Clutch Diagnosis

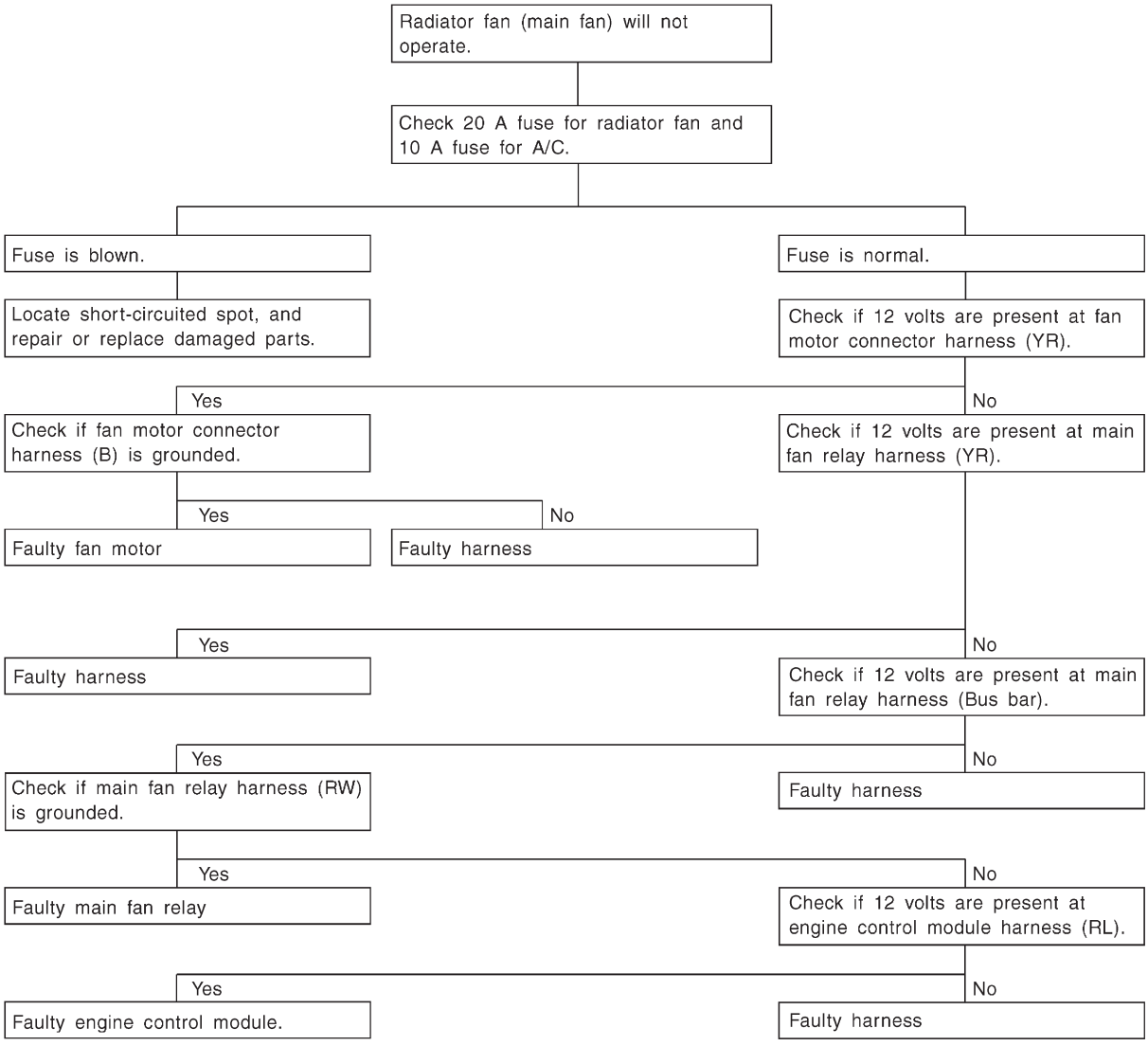


B4M1105A


(A)
Does 12 volts exist in A/C cut relay connector (L/Y) and (Br/R)?
No
Faulty harness
Yes
Does 12 volts exist in A/C cut relay connector (Y/G)?
No
Does 0 volts exist in A/C cut relay connector (G)?
Yes
No
Faulty A/C cut relay
Check engine control module.
Yes
Does 12 volts exist in compressor connector (Y/G)?
No
Faulty harness
Yes
Faulty magnet clutch
(B)
Does 12 volts exist in thermo control amplifier connector (Br/R)?
No
Faulty harness
Yes
Does 0 volts exist in thermo control amplifier connector (R)?
No
Faulty harness or blower switch
Yes
Does 0 volts exist in thermo control amplifier connector (W)?
No
Faulty thermo control amplifier
Yes
Faulty harness

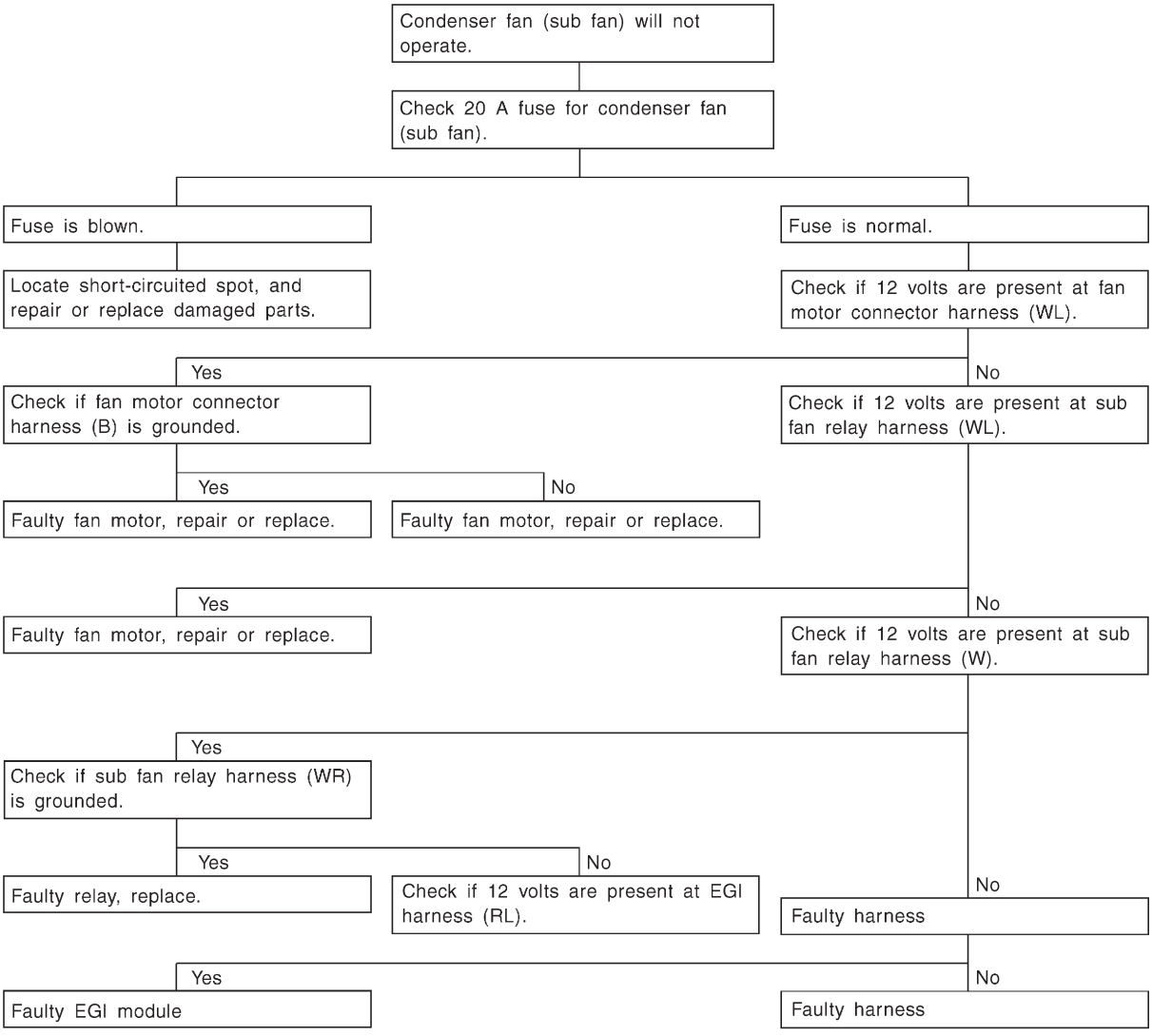
B4M1106A

6. Radiator Fan (Main Fan) Diagnosis



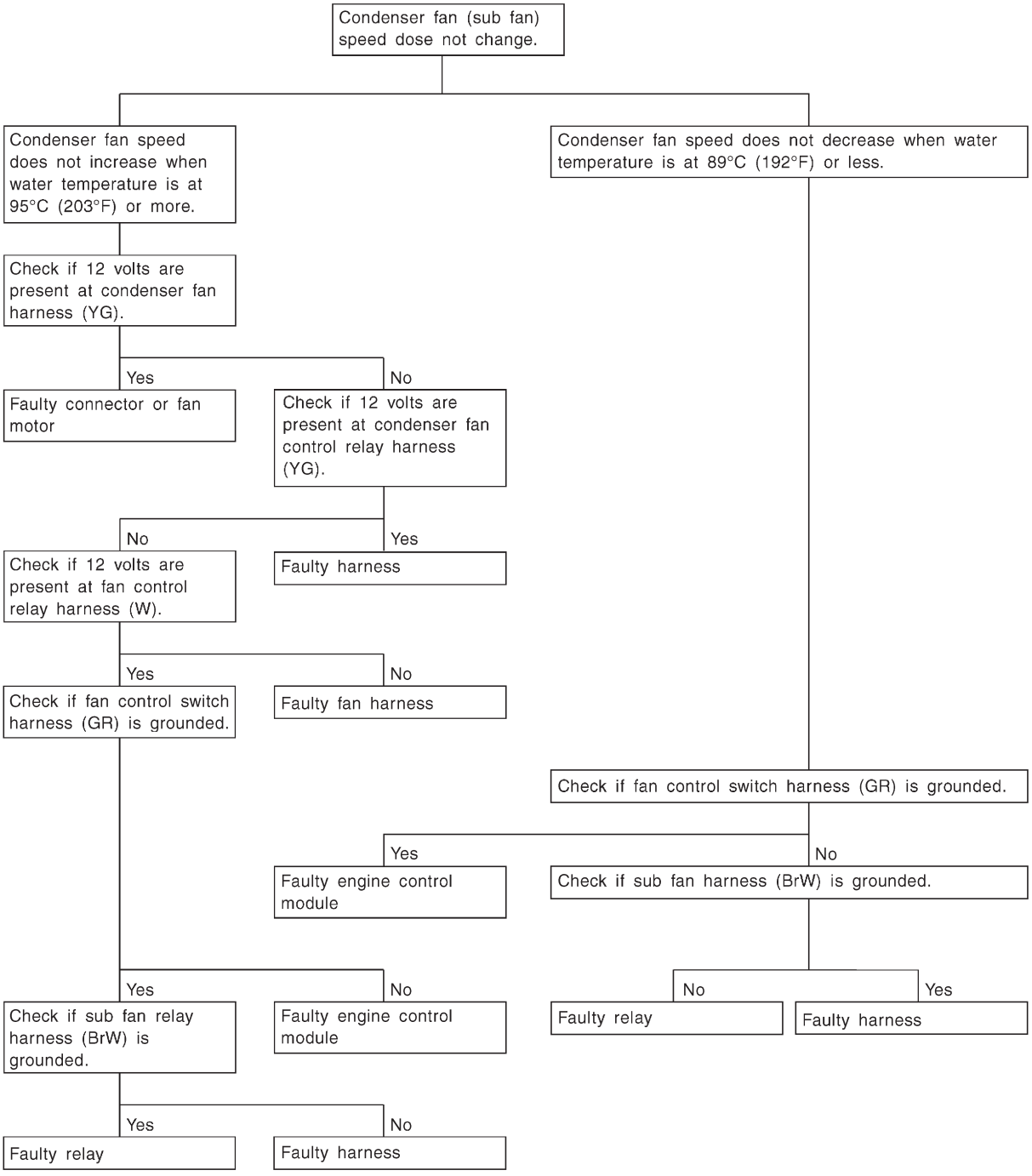
B4M1107A

7. Condenser Fan (Sub Fan) Diagnosis (I)



B4M1108A

8. Condenser Fan (Sub Fan) Diagnosis (II)



B4M1109A

BODY AND EXTERIOR 5-1

1. Supplemental Restraint System “Airbag”

Airbag system wiring harness is routed on and along body panels.

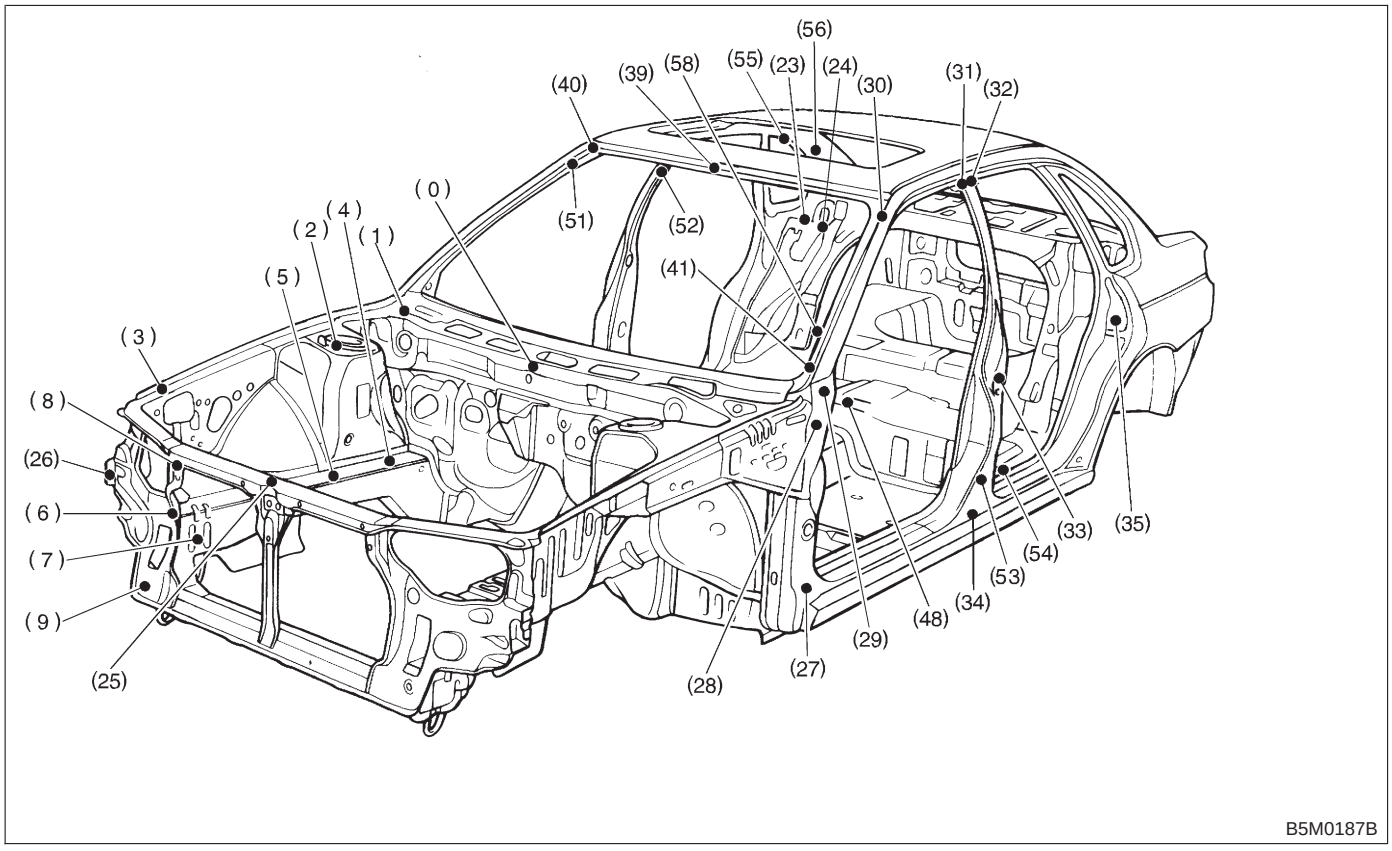
CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
● Be careful not to damage Airbag system wiring harness when repairing the body panel.

2. Body Datum Points

Various master repair locations are established as datum points used during body repairs. In addition, guide holes, locators and indents are provided to facilitate panel replacement and achieve alignment accuracy.

NOTE:
Left and right datum points are all symmetrical to each other.

A: ENGINE COMPARTMENT AND ROOM

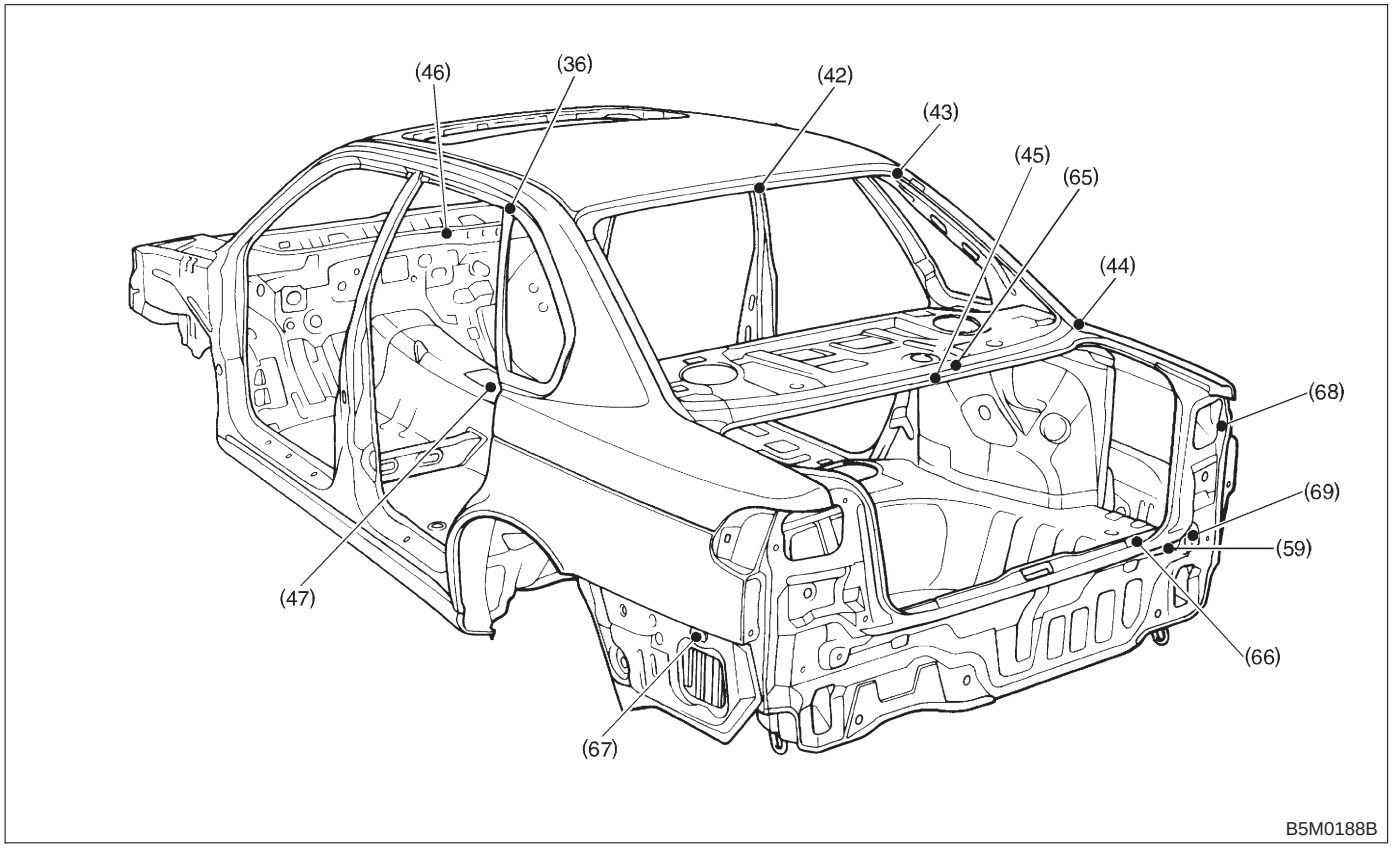


(0) Cowl panel weather attaching hole 6 mm (0.24 in) dia.
(1) Hood hinge front attaching hole M8
(2) Strut mount attaching hole (Front center) 9.5 mm (0.374 in) dia.
(3) Front fender attaching hole (Tip) M6
(4) Rear upper surface of front side frame 12 mm (0.47 in) dia.
(5) Middle upper surface of front side frame 20 mm (0.79 in) dia.
(6) Front side frame front upper surface 14 × 16 mm (0.55 × 0.63 in) dia. oblong hole
(7) Side frame of front side frame 12 mm (0.47 in) dia.
(8) Headlight attaching hole at radiator side panel 6.2 × 9 mm (0.244 × 0.35 in) dia.
(9) Radiator panel side (LWR) gauge hole 23 mm (0.91 in) dia.
(23) Rear strut mount attaching hole (Side) 10 mm (0.39 in) dia.
(24) Rear strut mount attaching hole (Center) 12 mm (0.47 in) (0.244 × 0.35 in) dia.
(25) Radiator panel (UPR) middle hole 6 mm (0.24 in) dia.
(26) Front fender attaching hole at radiator panel side M6
(27) Front fender attaching hole at front pillar lower portion M6
(28) Hinge middle hole at front pillar center 10 mm (0.39 in) dia.
(29) Front fender attaching hole at front pillar center portion M6
(30) Retainer attaching square hole at front pillar 7 × 7 mm (0.28 × 0.28 in)
(31) Retainer attaching hole at center pillar (Front) 3.5 mm (0.138 in) dia.
(32) Retainer attaching hole at center pillar (Rear) 3.5 mm (0.138 in) dia.

(33) Lower side of rear door hinge M8
(34) Center pillar (LWR) gauge hole 27 mm (1.06 in) dia.
(35) Rear quarter outer corner patch attaching hole 5.2 mm (0.205 in) dia.
(39) Front rail center notch
(40) Front glass upper locating notch RH: 6.5 mm (0.256 in) dia., LH: 6.5 × 10 mm (0.256 × 0.39 in) dia. oblong hole
(41) Stud bolt lower locating notch
(48) Front center of rear floor pan 8 mm (0.31 in) dia.
(51) Front upper pillar (Inner) 7 mm (0.28 in) dia.
(52) Front seat belt adjust plate attaching hole 12 mm (0.47 in) dia.
(53) Rear door hinge middle hole 10 mm (0.39 in) dia.
(54) Rear floor, near door 8 mm (0.31 in) dia.
(55) Trim upper attaching hole at 6 light 8 mm (0.31 in) dia.
(56) Trim lower attaching hole at 6 light 8 mm (0.31 in) dia.
(58) Rear floor, near floor strut 15 × 20 mm (0.59 × 0.79 in) dia. oblong hole

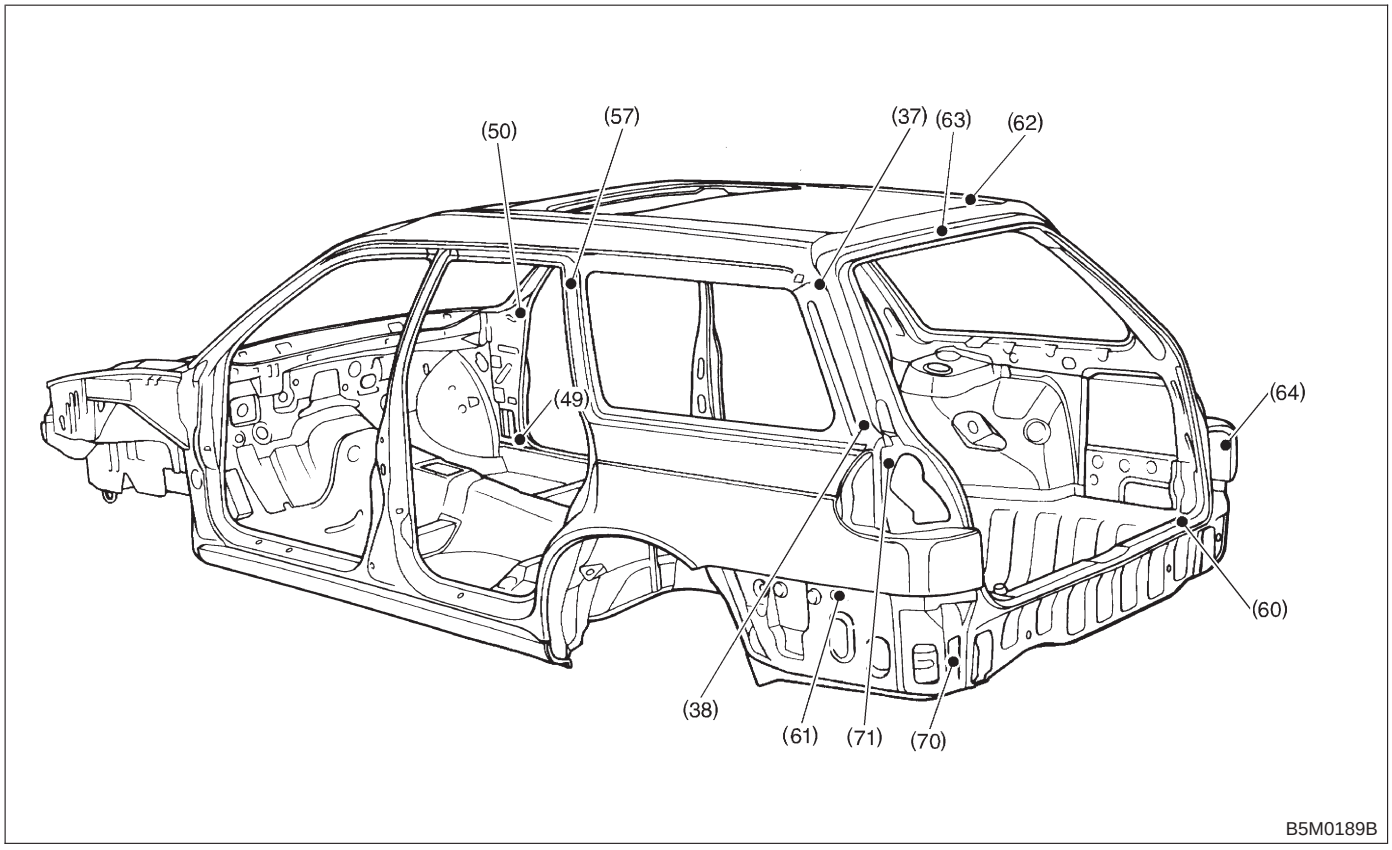
B: LUGGAGE COMPARTMENT AND ROOM

1. SEDAN



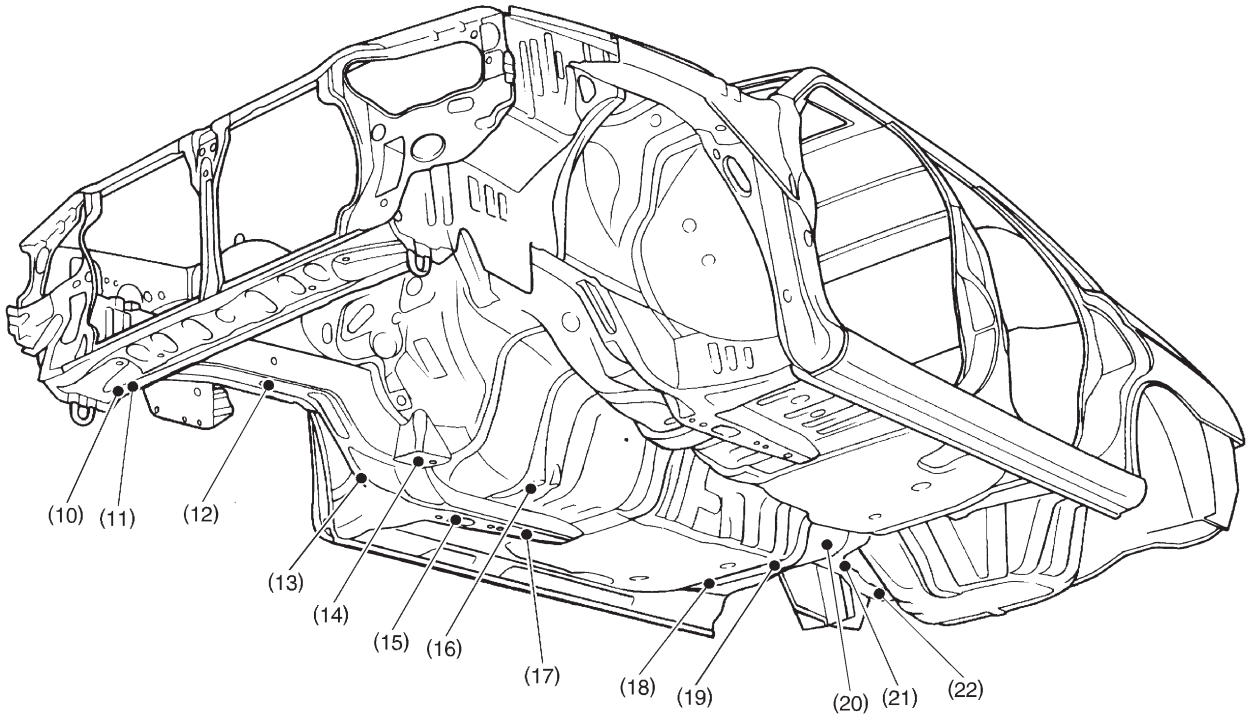
(36) 6 light upper retainer attaching square hole 7 × 7 mm (0.28 × 0.28 in)
(42) Rear rail center notch
(43) Rear glass upper locating hole RH: 6.5 mm (0.256 in) dia., LH: 6.5 × 10 mm (0.256 × 0.39 in) dia. oblong hole
(44) Rear glass molding attaching square hole 8 × 8 mm (0.31 × 0.31 in)
(45) Rear panel drain locater concave part
(46) Front panel gauge hole 10 mm (0.39 in) dia.
(47) Tunnel center M8
(59) Rear bumper attaching hole 45 mm (1.77 in) dia.
(65) Rear wiper attaching hole M6
(66) Trim attaching hole at rear skirt (UPR) 7 mm (0.28 in) dia.
(67) Rear bumper side attaching hole 6 mm (0.24 in) dia.
(68) Rear combination light mounting hole 8 mm (0.31 in) dia.
(69) Rear bumper beam attaching hole RH: 8 mm (0.31 in) dia., LH: 8 × 12 mm (0.31× 0.47 in) dia. oblong hole

2. WAGON



(37) D pillar cover attaching hole 12 × 8 mm (0.47 × 0.31 in) dia.
(38) Shoulder mole attaching hole 8 mm (0.31 in) dia.
(49) Front pillar (LWR) gauge hole 10 mm (0.39 in) dia. (On both Sedan and Wagon)
(50) Front pillar (UPR) gauge hole 16 mm (0.63 in) dia. (On both Sedan and Wagon)
(57) Retainer attaching square hole at C pillar (UPR) 7 × 7 mm (0.28 × 0.28 in)
(60) Trim attaching hole at rear skirt (UPR) 15 mm (0.59 in) dia.
(61) Rear bumper side attaching hole 6 mm (0.24 in) dia.
(62) Rear seat belt bolt hole 13 mm (0.51 in) dia.
(63) Rear rail locator concave part
(64) Buffer attaching hole (UPR) M6
(70) Rear quarter end (LWR) gauge hole 20 mm (0.79 in) dia.
(71) Rear combination light mounting hole 7 mm (0.28 in) dia.

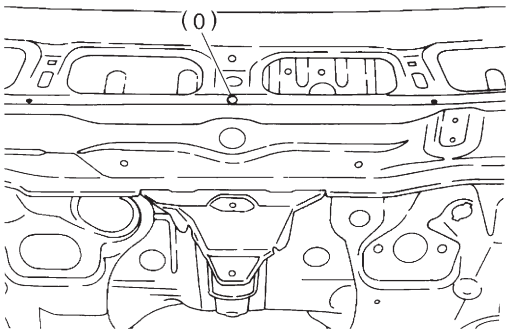
C: UNDERBODY



B5M0190B

(10) Radiator panel (LWR) frame gauge hole 10 mm (0.39 in) dia.
(11) Front side frame front lower surface 20 mm (0.79 in) dia.
(12) Front side frame center lower surface 20 mm (0.79 in) dia.
(13) Front suspension attaching hole M14
(14) Suspension attaching bracket M14
(15) Front side frame rear lower center surface 20 mm (0.79 in) dia.
(16) Transmission mount attaching hole M10
(17) Front side frame rear lower surface 15 mm (0.59 in) dia.
(18) Rear frame front M12
(19) Rear frame front hole 25 mm (0.98 in) dia.
(20) Rear crossmember attaching hole M12
(21) Rear frame center hole 7 mm (0.28 in) dia.
(22) Rear frame rear concave part 15 mm (0.59 in) dia.

D: DATUM POINT LOCATION



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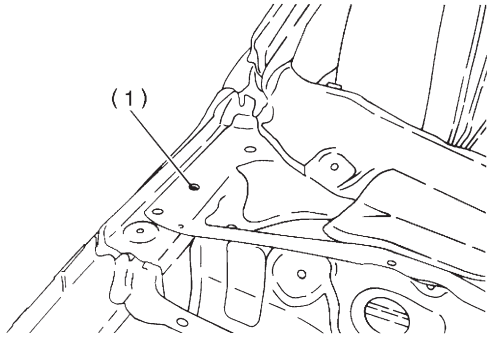

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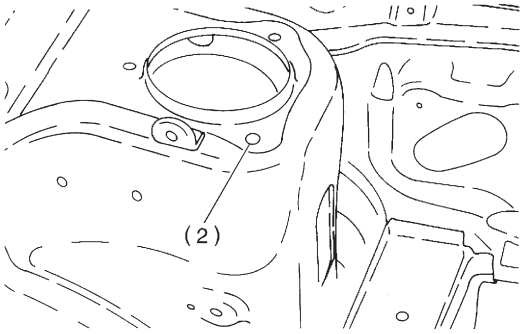

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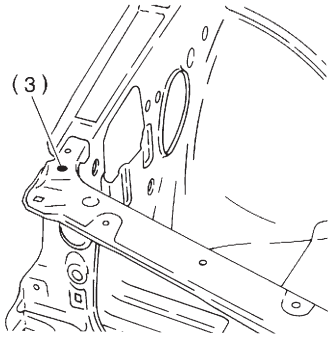

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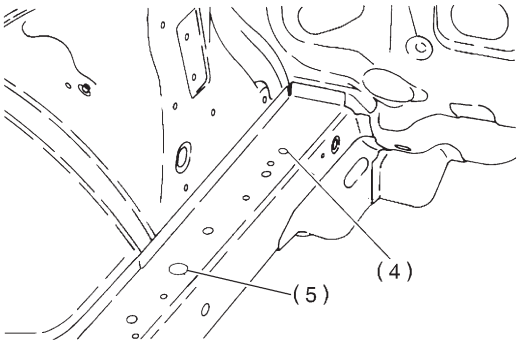

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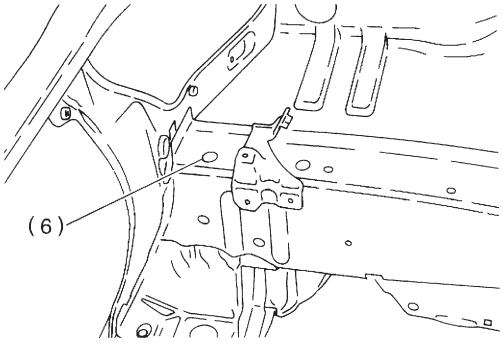

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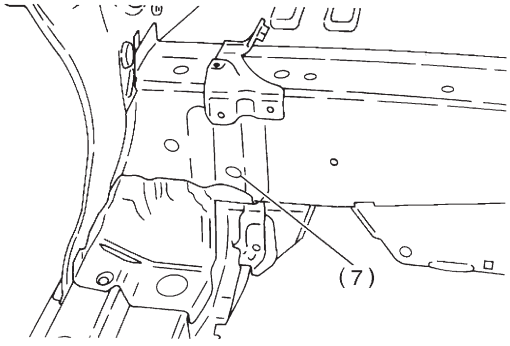

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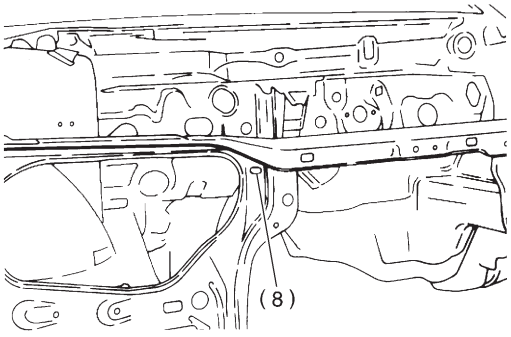

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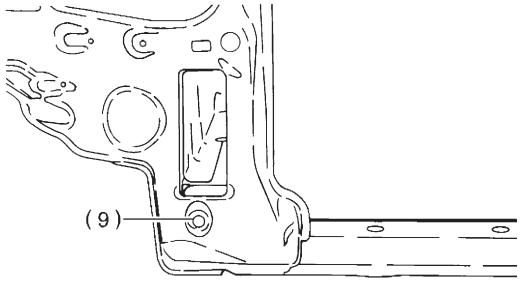

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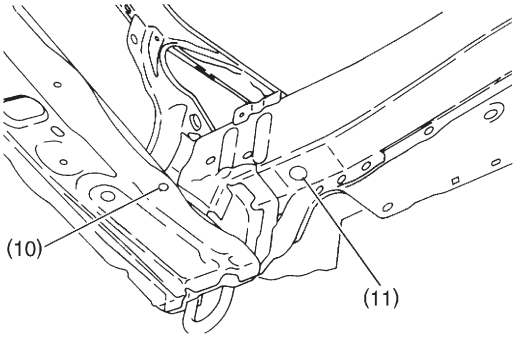

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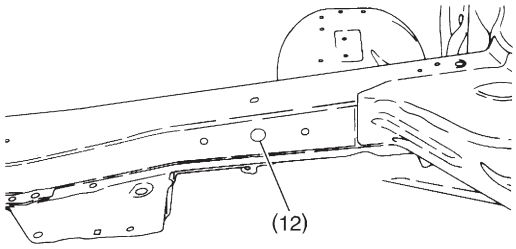

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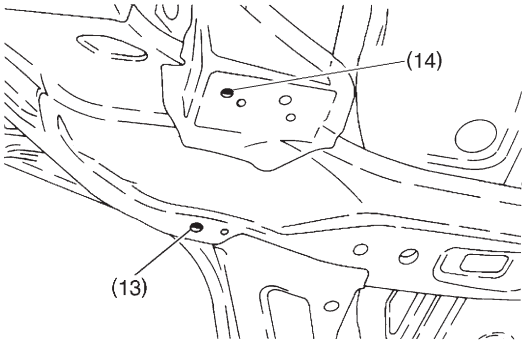

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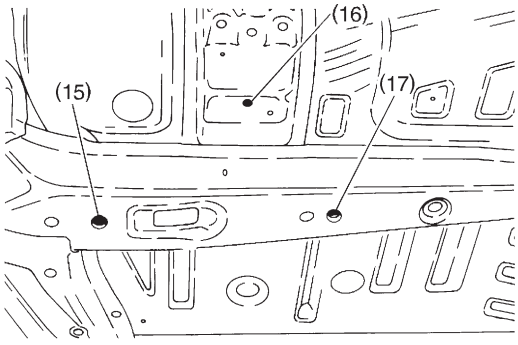

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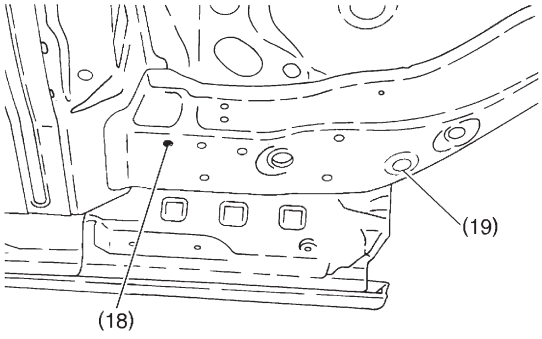

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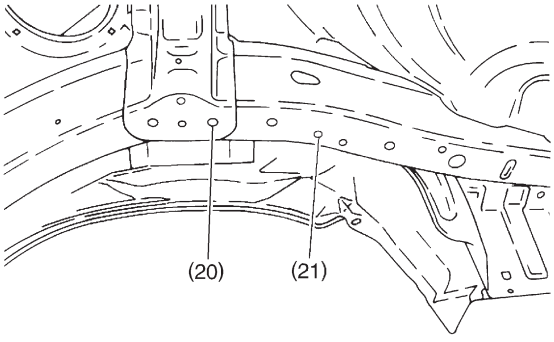

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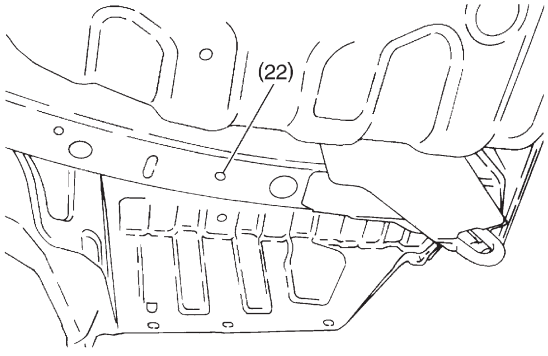

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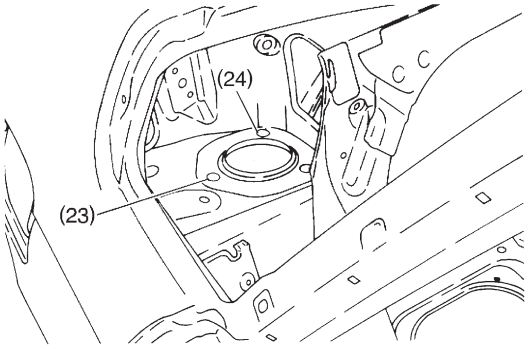

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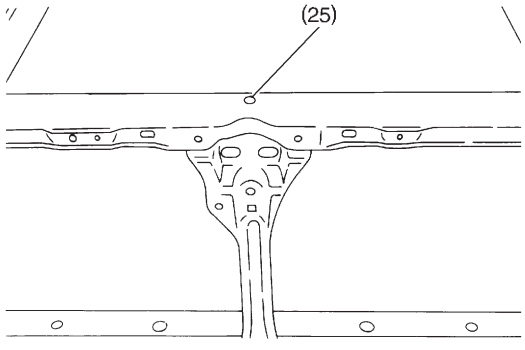

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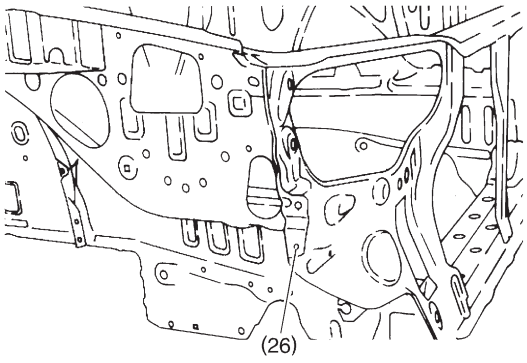

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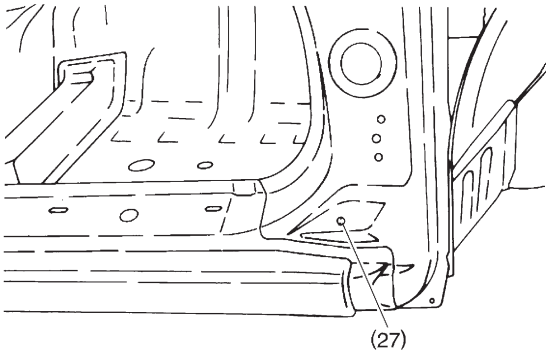

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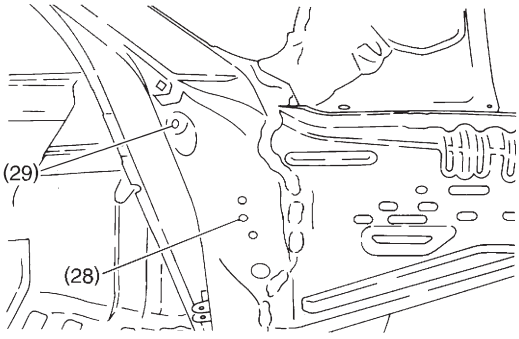

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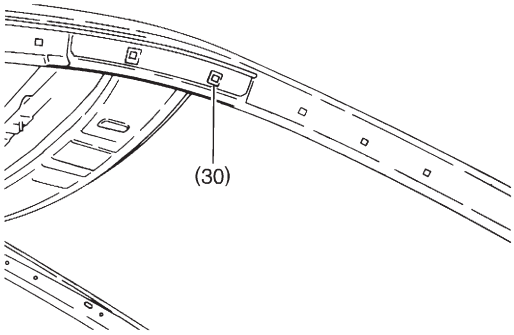

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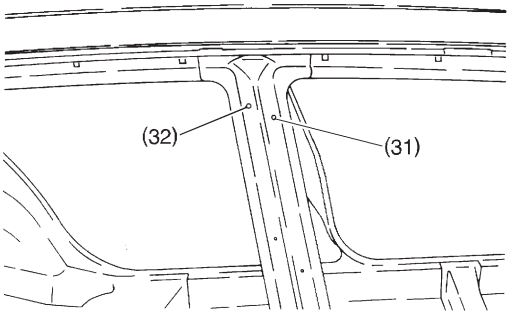

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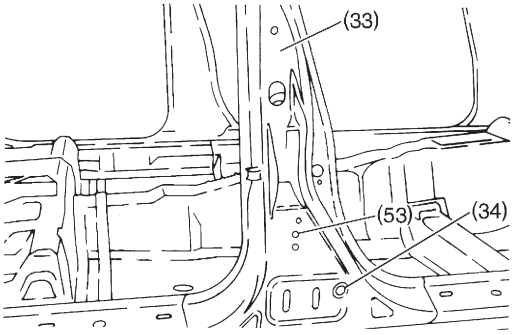

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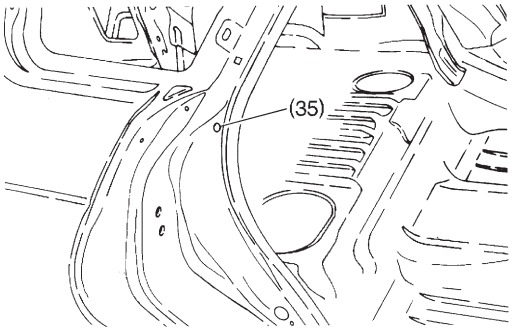

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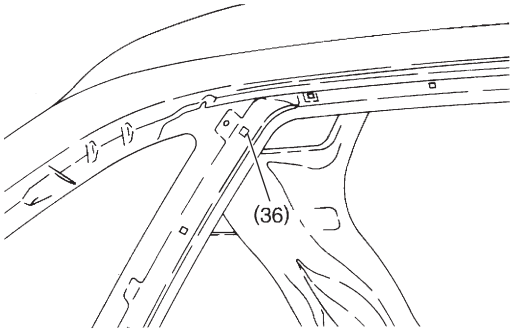

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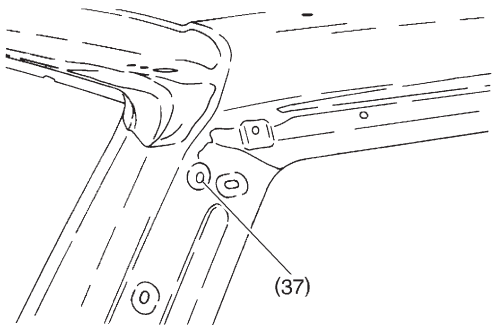

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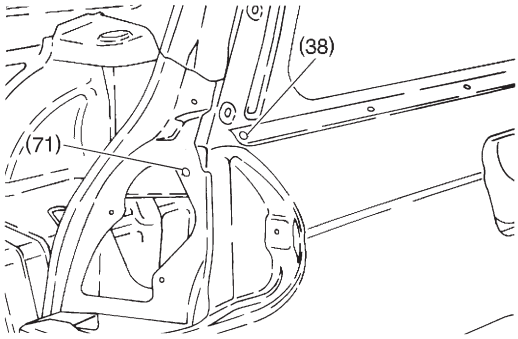

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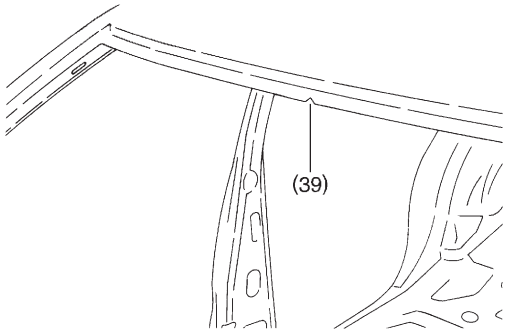

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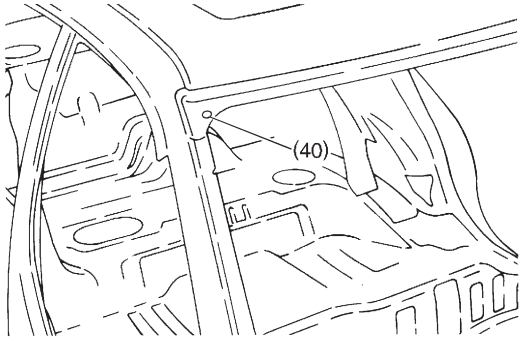

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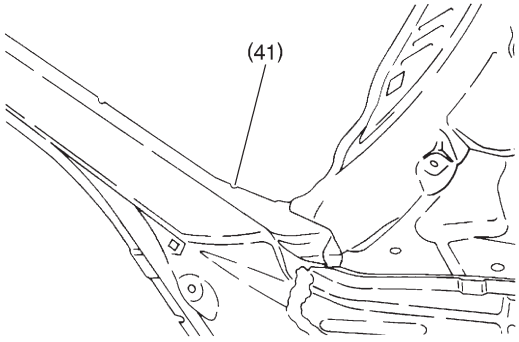

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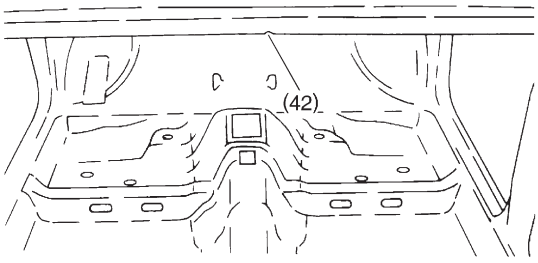

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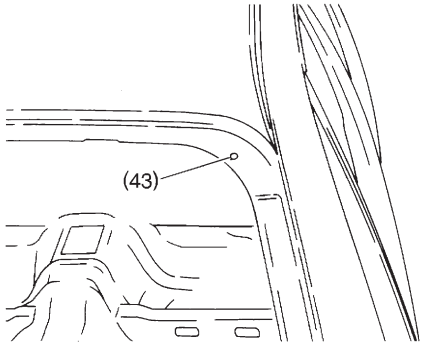

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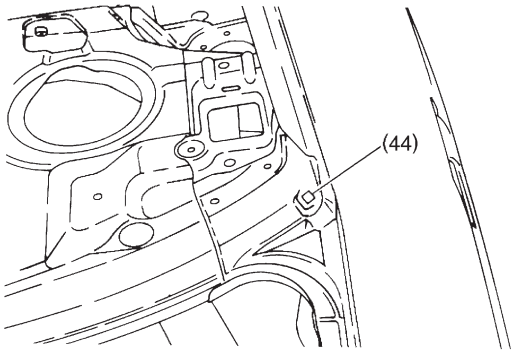

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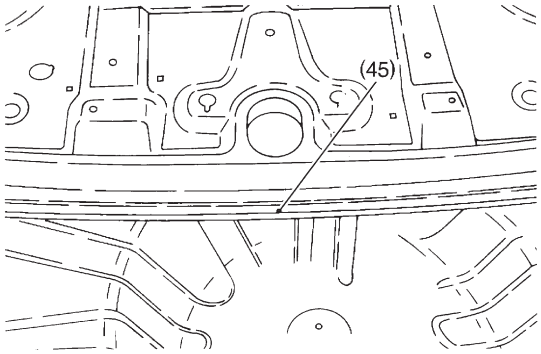

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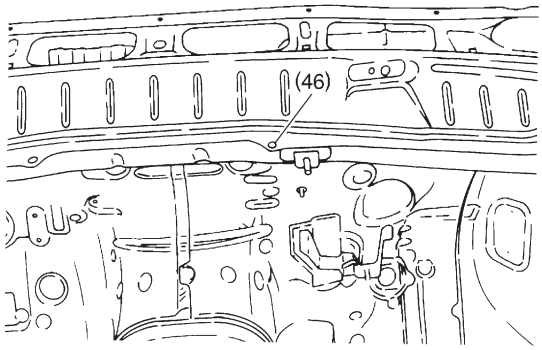

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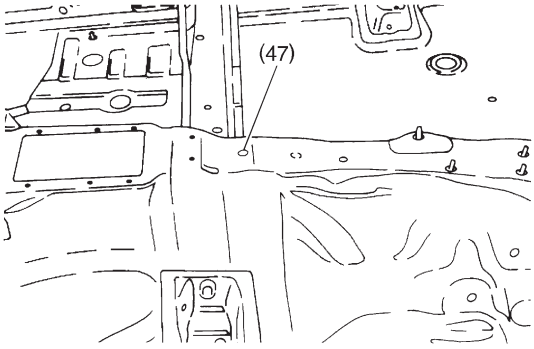

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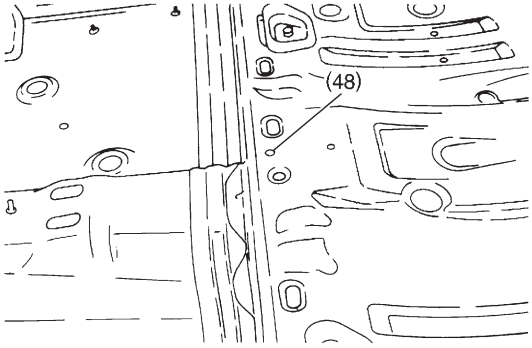

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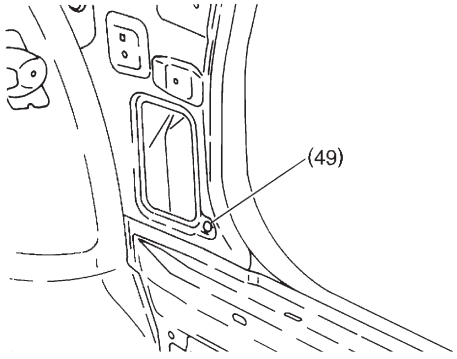

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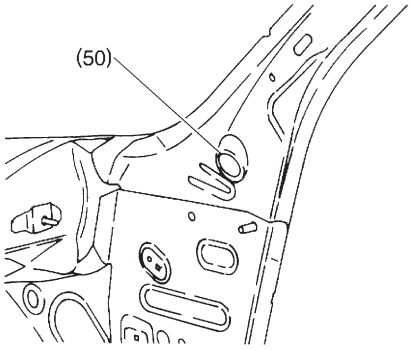

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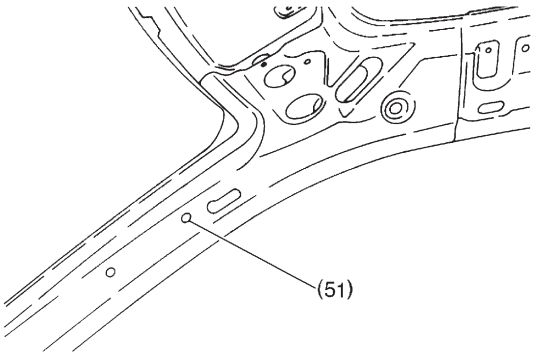

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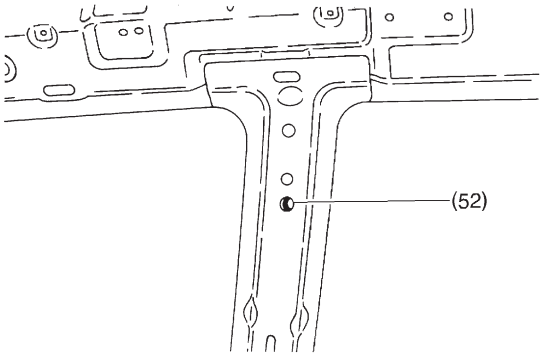

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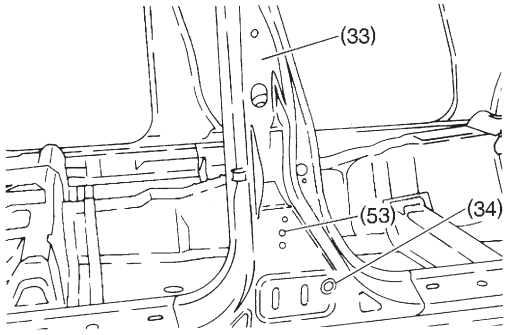

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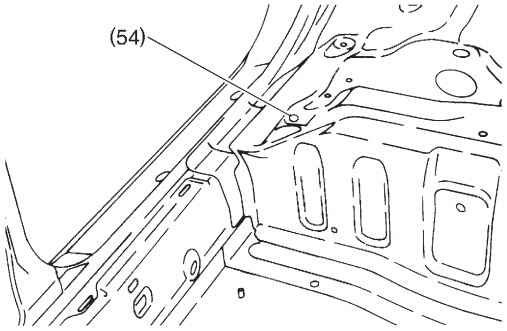

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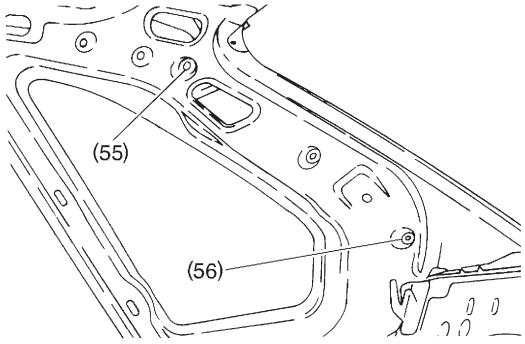

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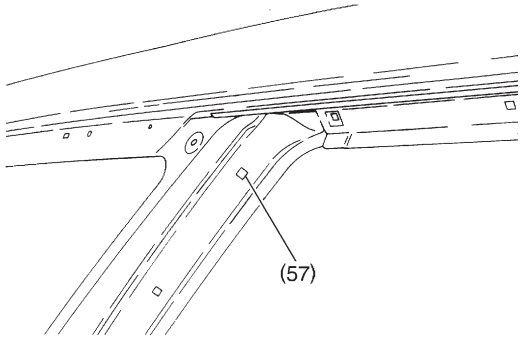

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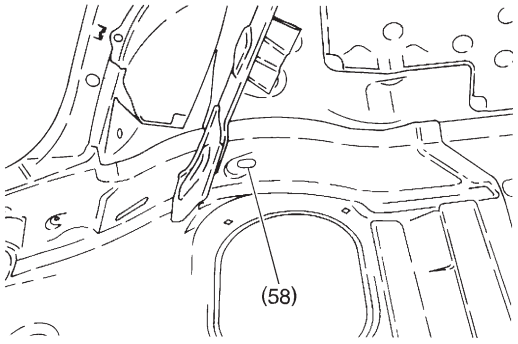

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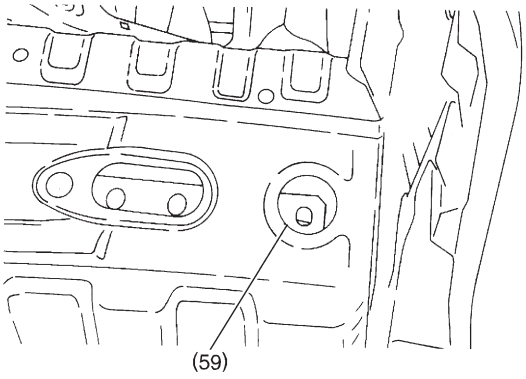

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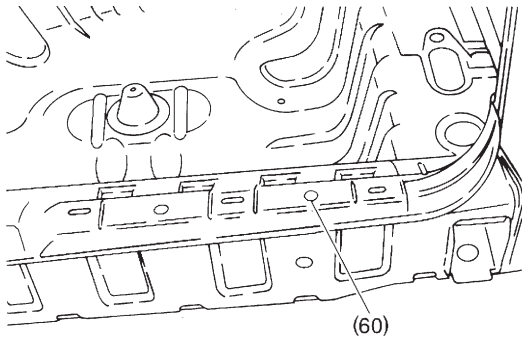

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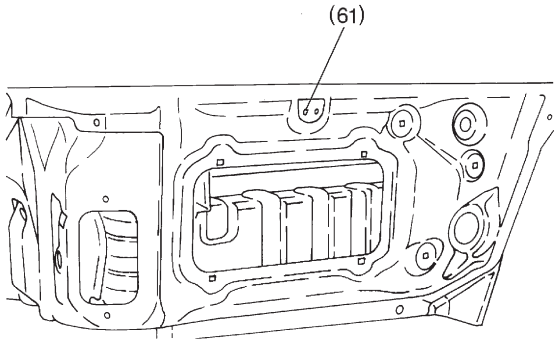

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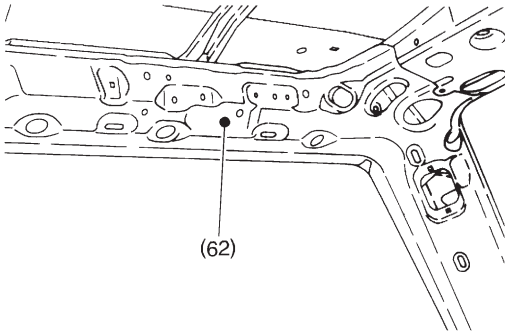

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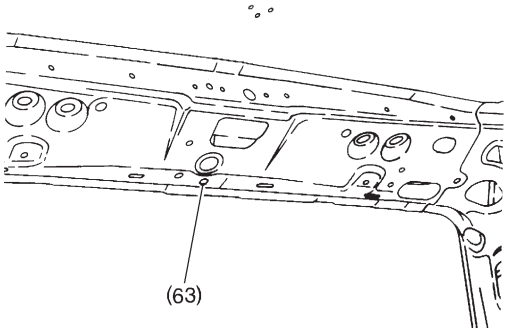

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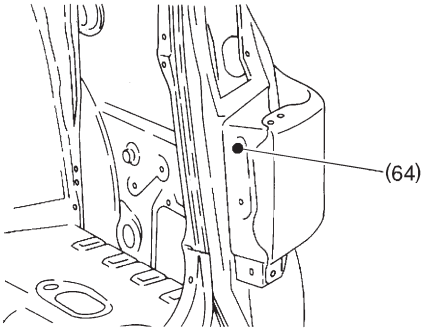

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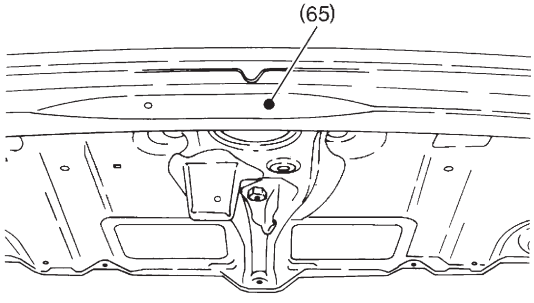

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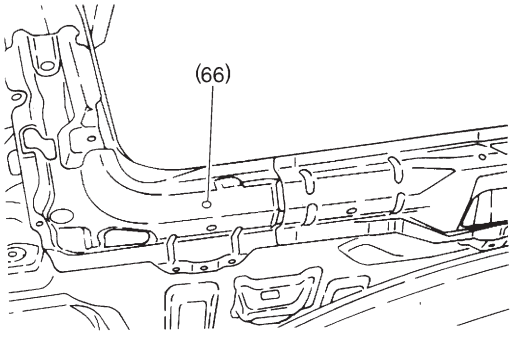
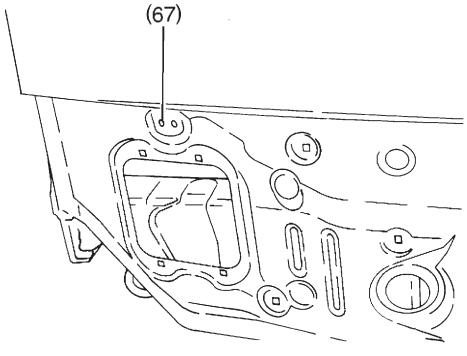
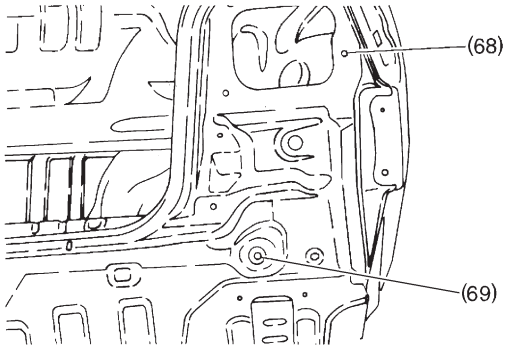


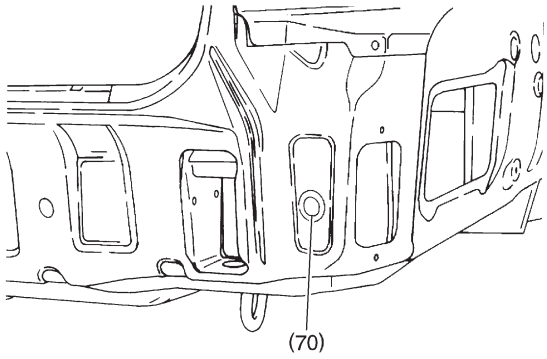
B5M0245B



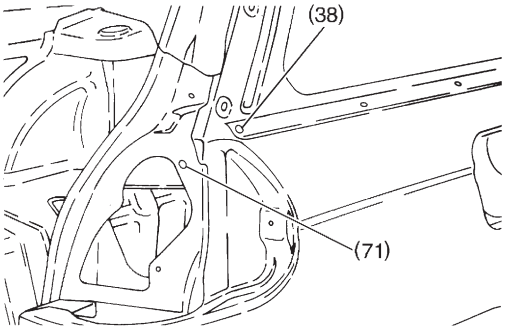
B5M0246B



B5M0247B



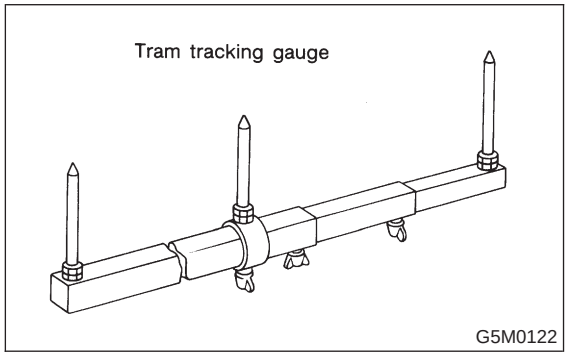
B5M0248B



B5M0249B

3. Datum Dimensions

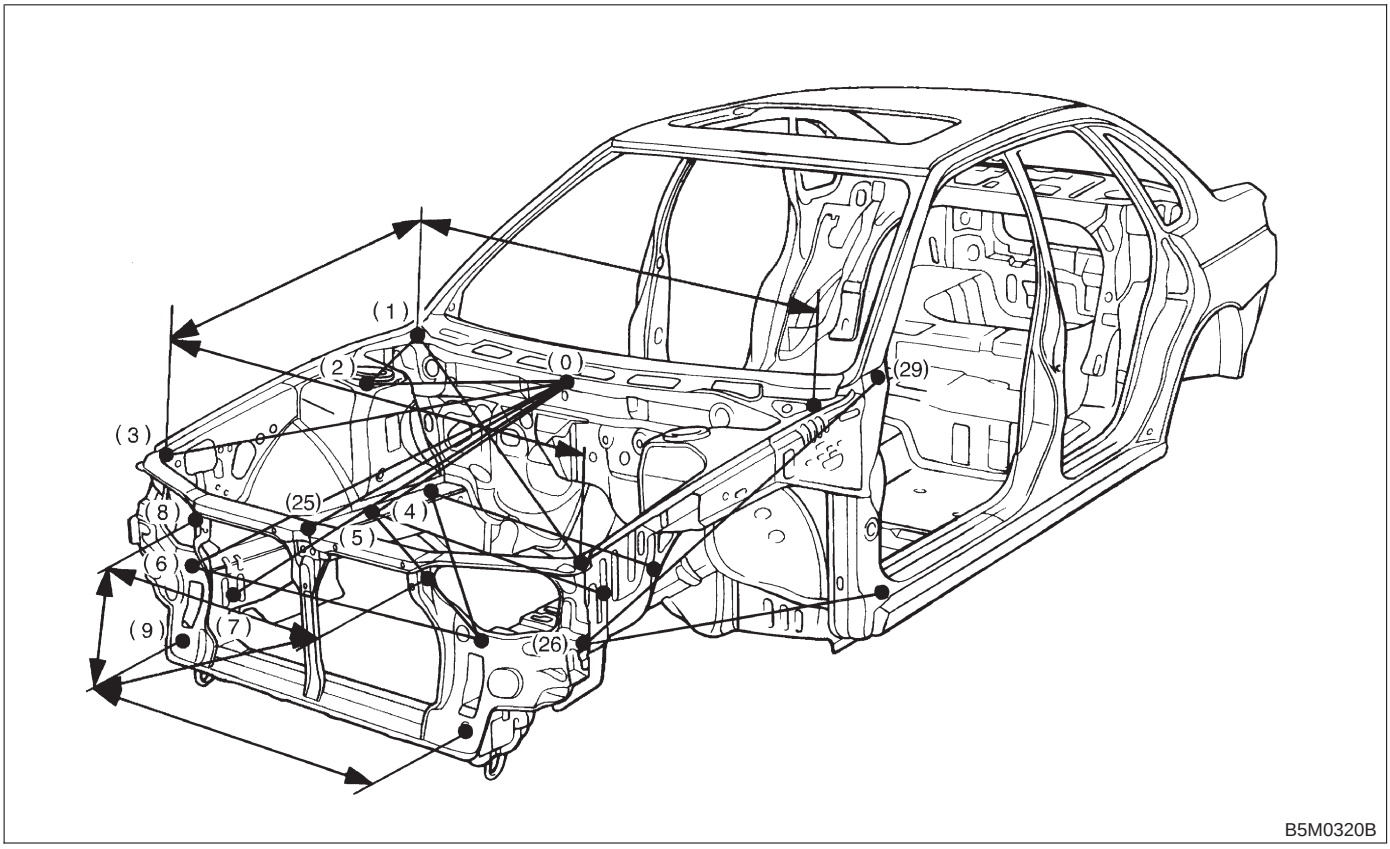
Use a tram tracking gauge to measure all dimensions. If a measuring tape is used, be extremely careful because it tends to deflect or twist, which results in a false reading.



G5M0122

NOTE:
- A suffix character “R” or “L” refers to the right or the left.
- All dimensions refer to the distance between the centers of holes measured in a straight line.
- Each dimension indicates a projected dimension between hole centers.

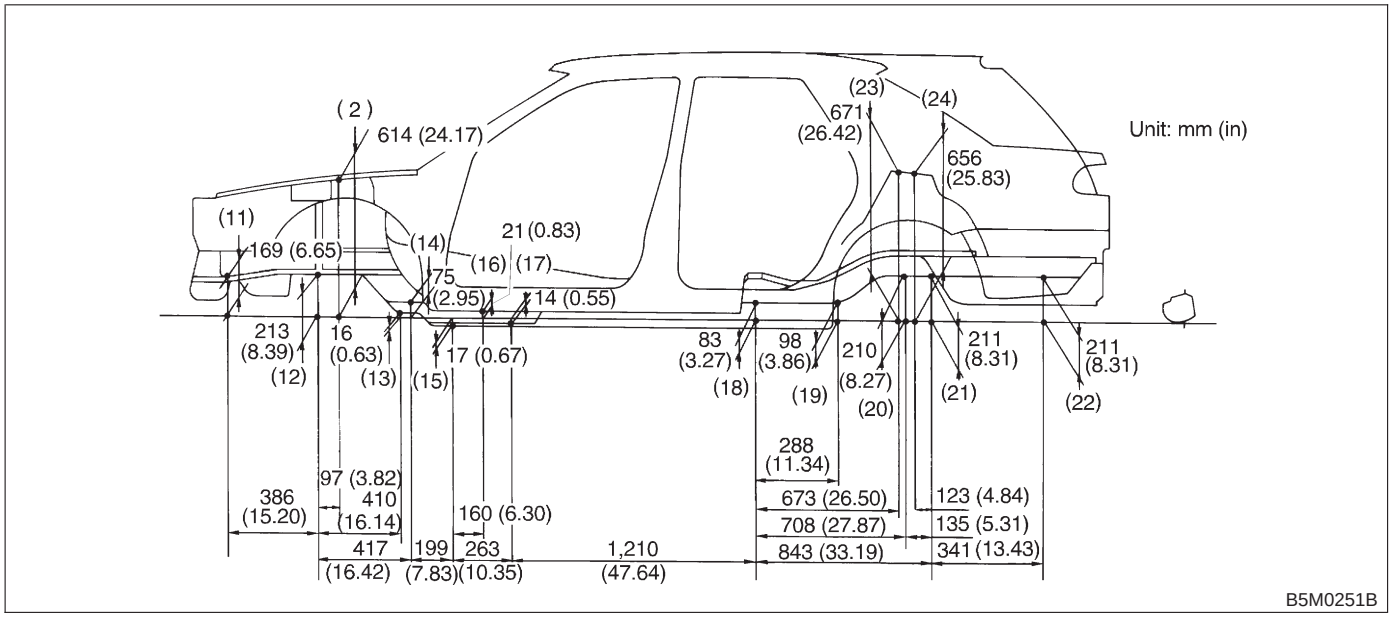
A: FRONT STRUCTURE

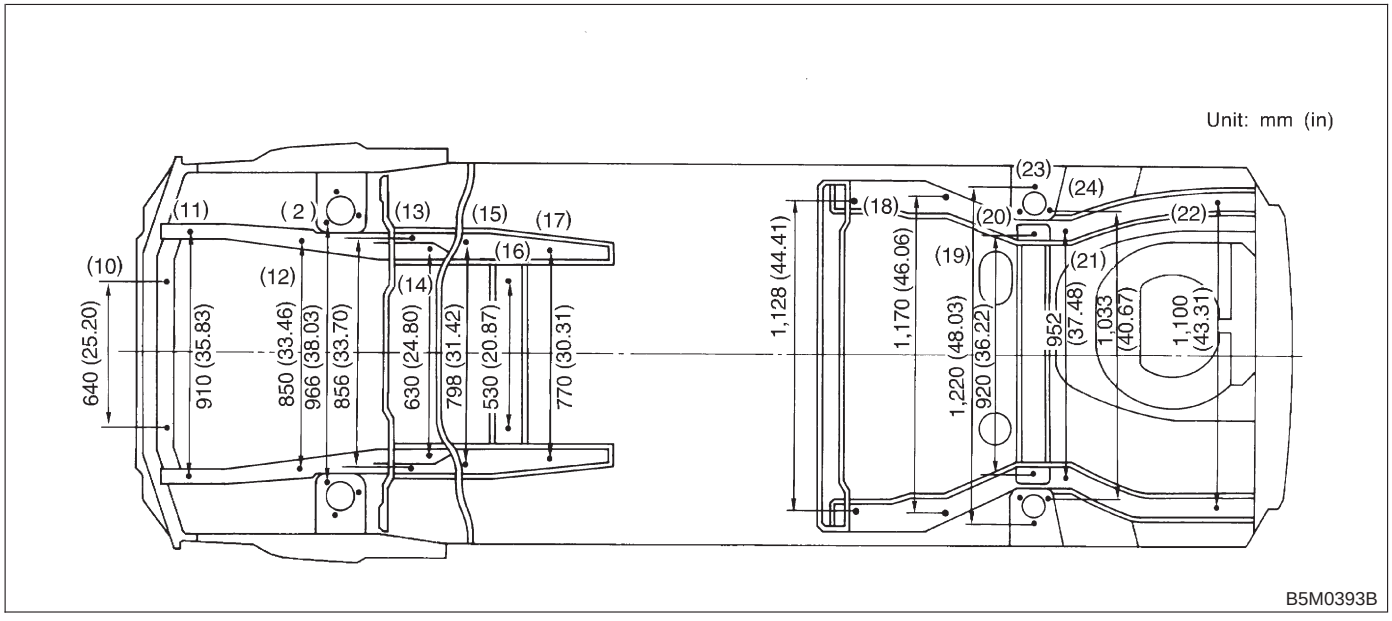


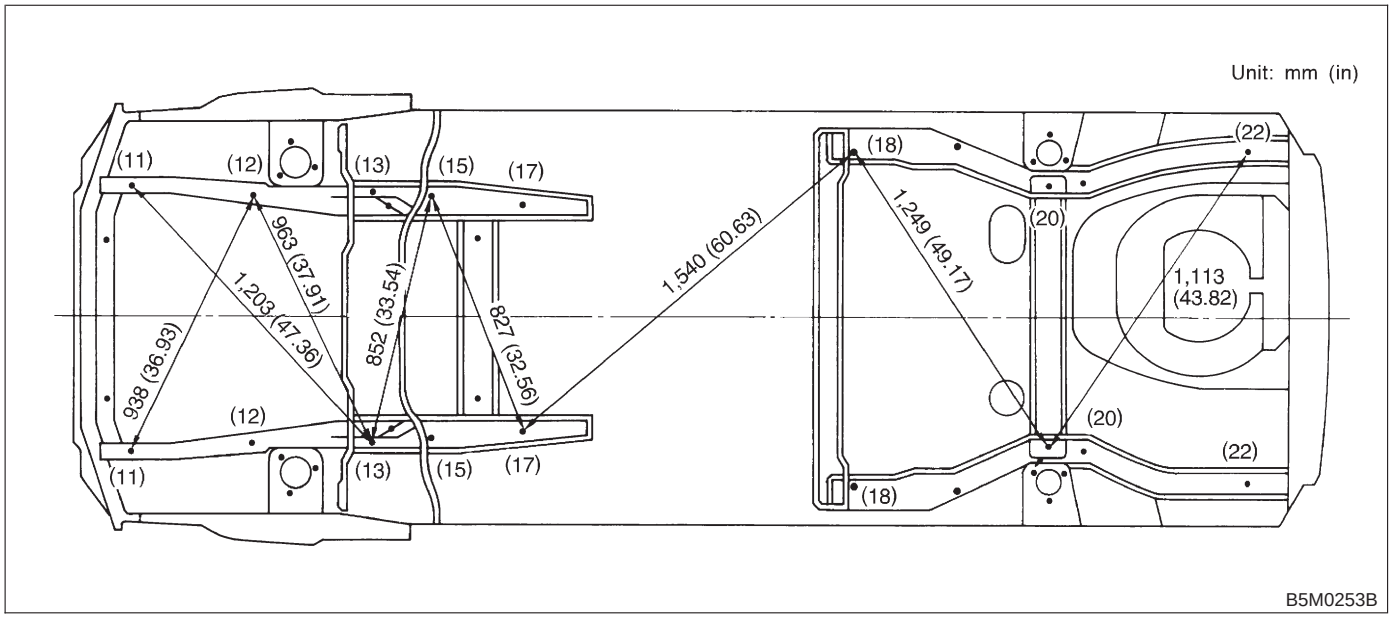
B5M0320B

Point to point	Dimension	Point to point	Dimension
(0) to (2) RH	522 (20.55)	(1) RH to (3) RH	845 (33.27)
(0) to (2) LH	522 (20.55)	(1) LH to (3) LH	845 (33.27)
(0) to (6) RH	980 (38.58)	(8) RH to (8) RH	347 (13.66)
(0) to (6) LH	980 (38.58)	(8) LH to (8) LH	347 (13.66)
(0) to (7) RH	966 (38.03)	(1) RH to (1) LH	1,408 (55.43)
(0) to (7) LH	966 (38.03)	(1) RH to (3) LH	1,623 (63.90)
(0) to (3) RH	1,008 (39.68)	(3) RH to (1) LH	1,623 (63.90)
(0) to (3) LH	1,008 (39.68)	(3) RH to (3) LH	1,364 (53.70)
(0) to (25)	863 (33.98)	(4) RH to (4) LH	803 (31.61)
(1) RH to (2) RH	373 (14.69)	(9) RH to (9) LH	924 (36.38)
(1) LH to (2) LH	373 (14.69)	(9) RH to (8) LH	892 (35.12)
(2) RH to (2) LH	966 (38.03)	(8) RH to (9) LH	892 (35.12)
(5) RH to (5) LH	850 (33.46)	(8) RH to (8) LH	730 (28.74)
(5) RH to (6) LH	1,011 (39.80)	(26) RH to (29) LH	1,191 (46.89)
(6) RH to (5) LH	1,011 (39.80)	(26) LH to (29) RH	1,191 (46.89)
(6) RH to (6) LH	914 (35.98)	(26) RH to (27) LH	1,144 (45.04)
(4) RH to (6) LH	1,115 (43.90)	(26) LH to (27) RH	1,144 (45.04)
(6) RH to (4) LH	1,115 (43.90)		
Unit: mm (in)			

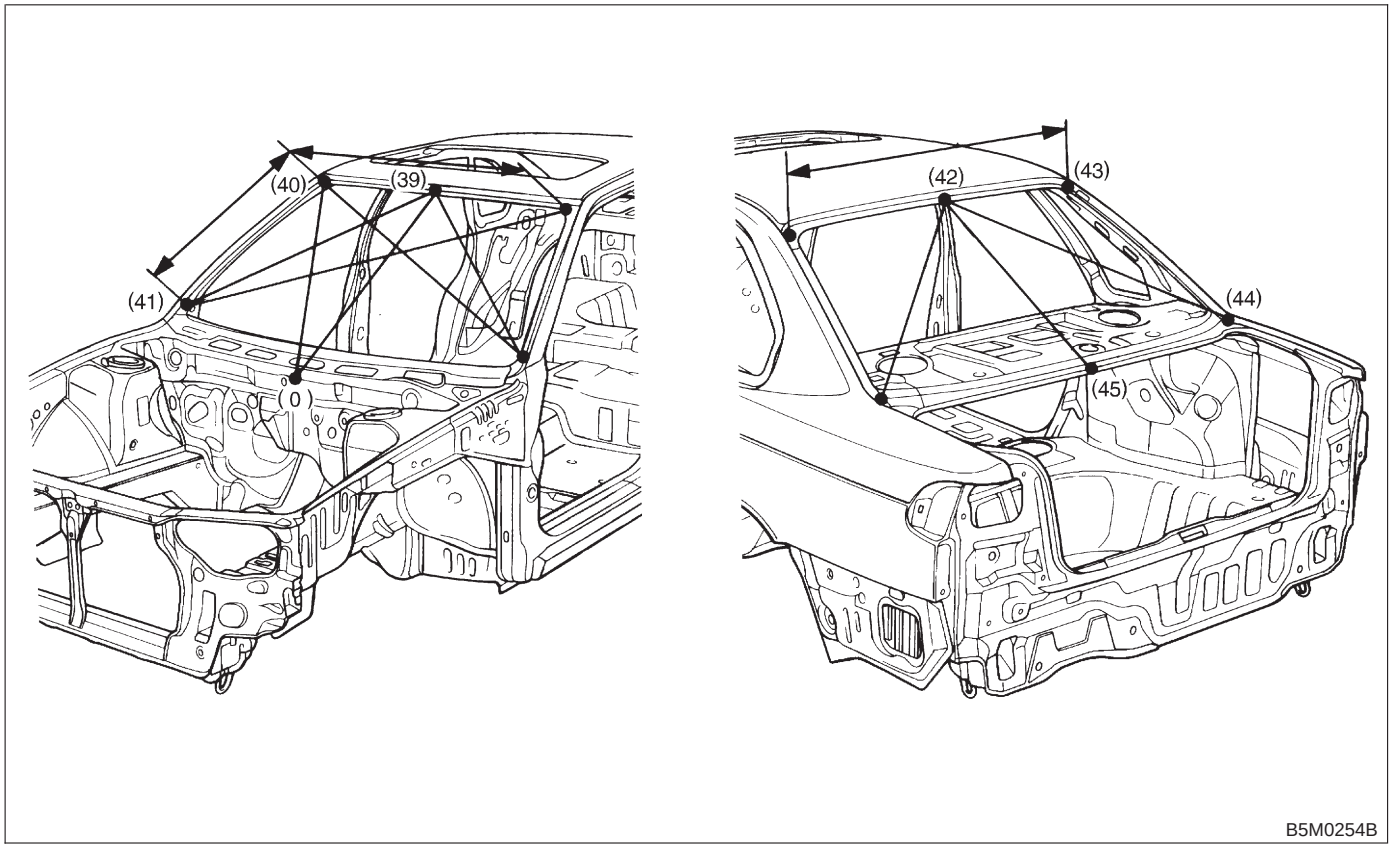
B: CENTER STRUCTURE





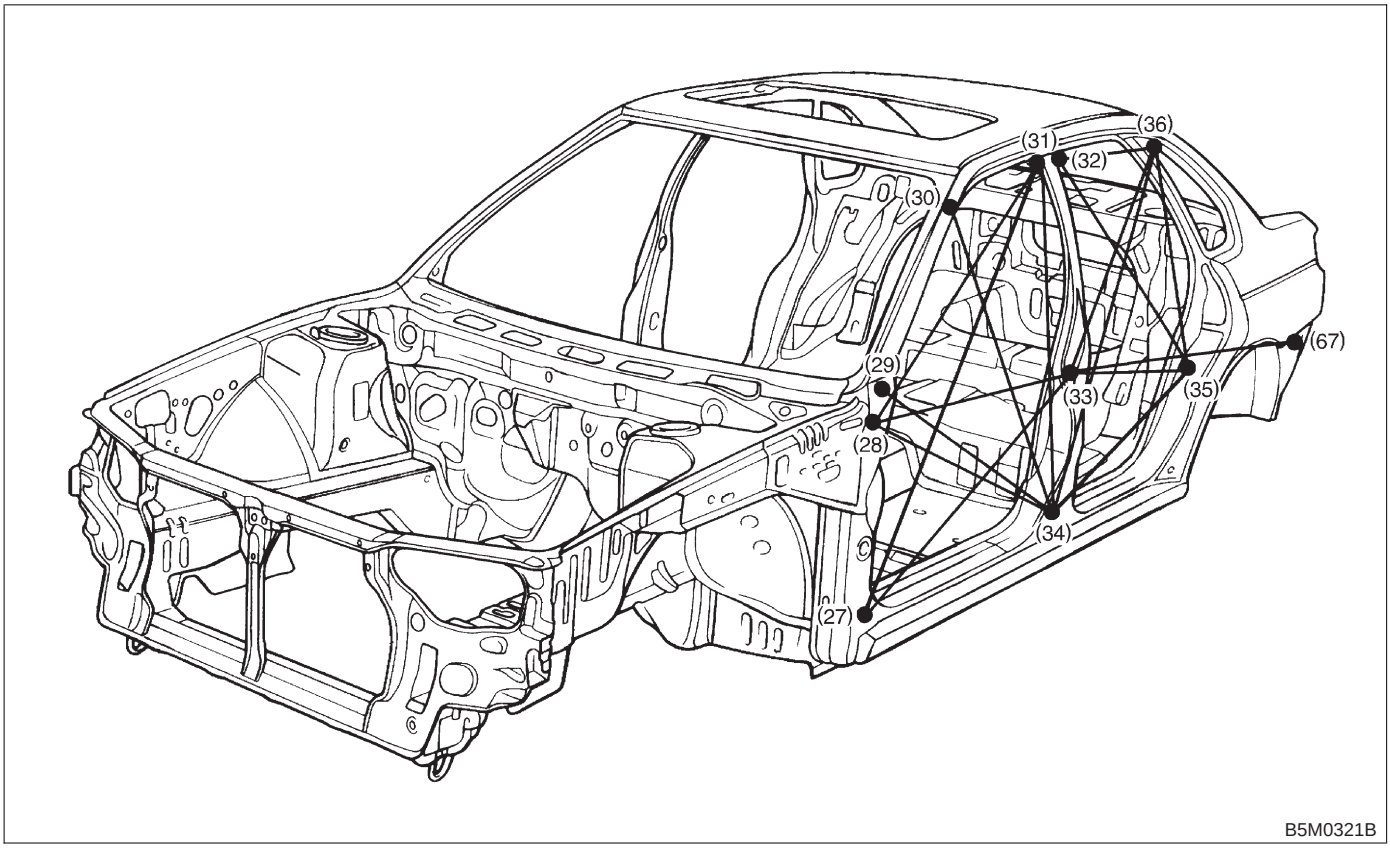

Unit: mm (in)
(11)
(12)
(13)
(15)
(17)
(18)
(20)
(22)
963 (37.91)
1,203 (47.36)
938 (36.93)
852 (33.54)
827 (32.56)
1,540 (60.63)
1,249 (49.17)
1,113
(43.82)
B5M0253B

C: FRONT WINDSHIELD AND REAR WINDOW



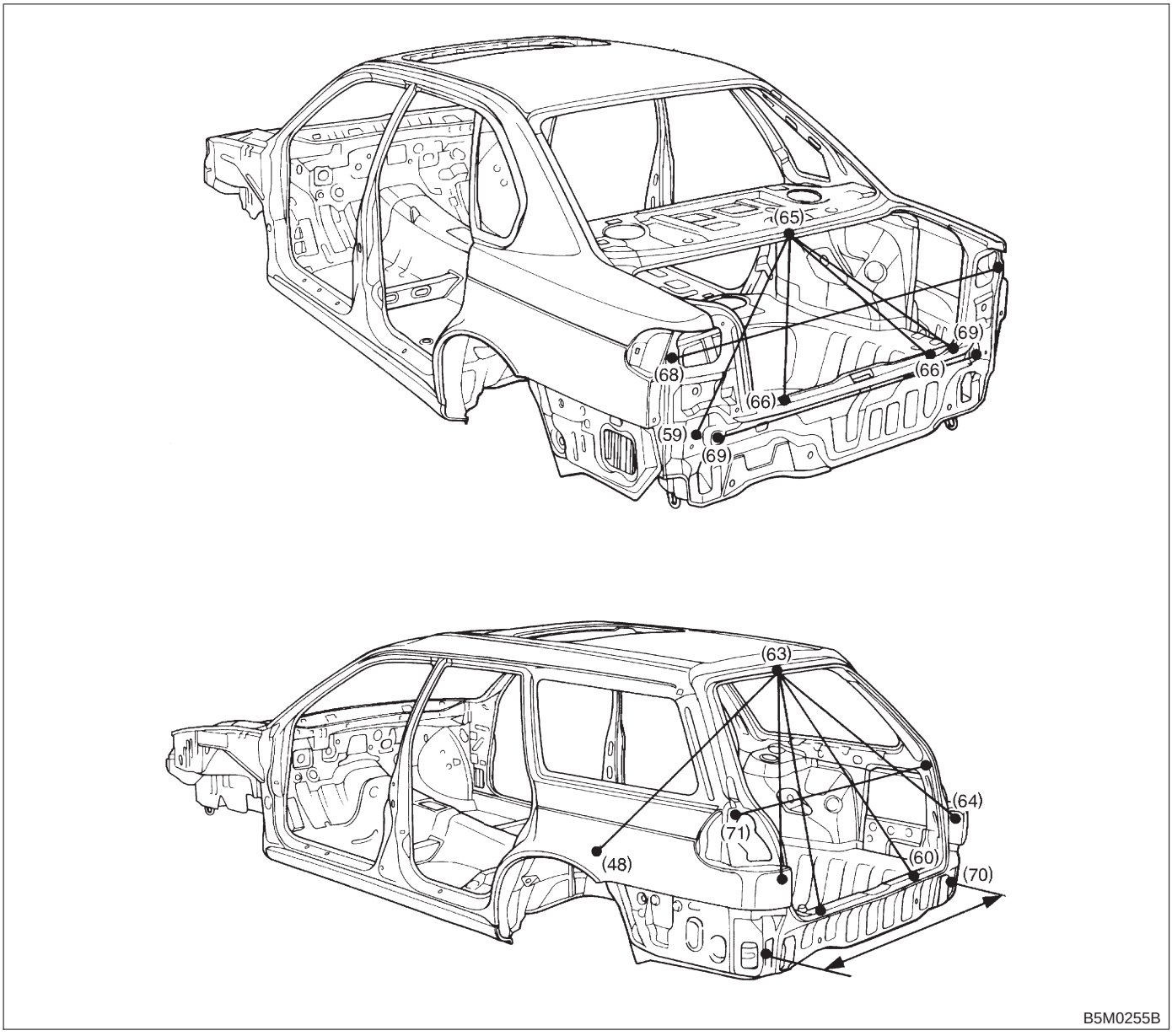
Point to point	Dimension	Point to point	Dimension
(0) to (39)	934 (36.77)	(40) RH to (41) RH	700 (27.56)
(0) to (40) RH	1,133 (44.61)	(40) LH to (41) LH	700 (27.56)
(0) to (40) LH	1,133 (44.61)	(41) RH to (41) LH	1,396 (54.96)
(39) to (41) RH	940 (37.01)	(42) to (44) RH	871 (34.29)
(39) to (41) LH	940 (37.01)	(42) to (44) LH	871 (34.29)
(40) RH to (40) LH	1,076 (42.36)	(42) to (45)	760 (29.92)
(40) RH to (41) LH	1,411 (55.55)	(43) RH to (43) LH	986 (38.82)
(41) RH to (40) LH	1,411 (55.55)	(44) RH to (44) LH	1,216 (47.87)
Unit: mm (in)			

D: DOORS



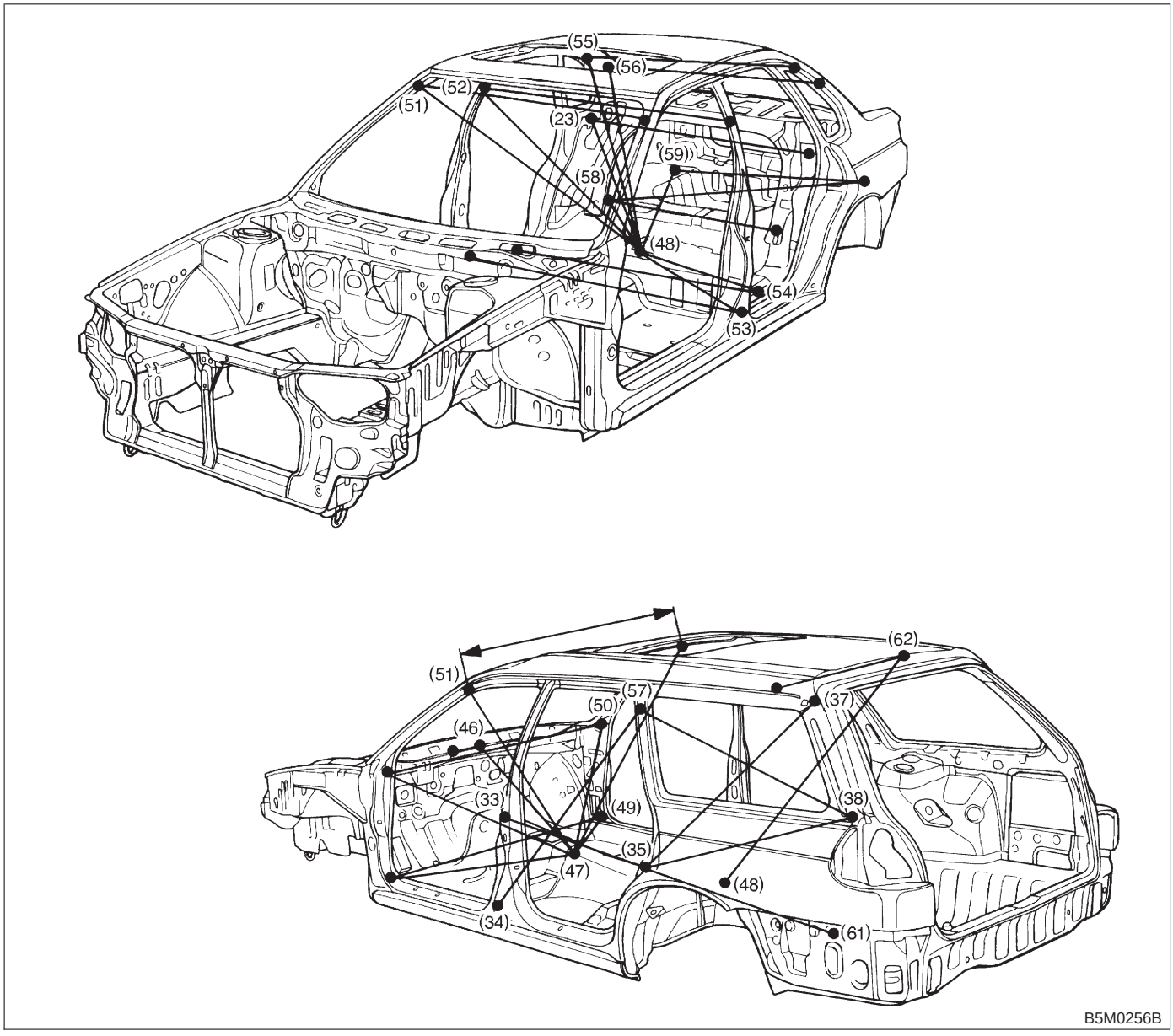
Point to point	Dimension	Point to point	Dimension
(27) RH to (31) RH	1,445 (56.89)	(30) LH to (34) LH	974 (38.35)
(27) LH to (31) LH	1,445 (56.89)	(31) RH to (34) RH	931 (36.65)
(27) RH to (33) RH	1,087 (42.80)	(31) LH to (34) LH	931 (36.65)
(27) LH to (33) LH	1,087 (42.80)	(34) RH to (35) RH	1,101 (43.35)
(27) RH to (34) RH	921 (36.26)	(34) LH to (35) LH	1,101 (43.35)
(27) LH to (34) LH	921 (36.26)	(34) RH to (36) RH	1,193 (46.97)
(28) RH to (31) RH	1,246 (49.06)	(34) LH to (36) LH	1,193 (46.97)
(28) LH to (31) LH	1,246 (49.06)	(32) RH to (35) RH	870 (34.25)
(28) RH to (33) RH	1,043 (41.06)	(32) LH to (35) LH	870 (34.25)
(28) LH to (33) LH	1,043 (41.06)	(33) RH to (35) RH	891 (35.08)
(28) RH to (34) RH	1,029 (40.51)	(33) LH to (35) LH	891 (35.08)
(28) LH to (34) LH	1,029 (40.51)	(35) RH to (36) RH	471 (18.54)
(29) RH to (34) RH	1,020 (40.16)	(35) LH to (36) LH	471 (18.54)
(29) LH to (34) LH	1,020 (40.16)	(33) RH to (67) RH	1,773 (69.80)
(30) RH to (34) RH	974 (38.35)	(33) LH to (67) LH	1,773 (69.80)
Unit: mm (in)			

E: TRUNK LID AND REAR GATE



Point to point	Dimension	Point to point	Dimension
(68) RH to (68) LH	1,346 (52.99)	(64) RH to (64) LH	1,213 (47.76)
(69) RH to (69) LH	1,080 (42.52)	(63) to (64) RH	990 (38.98)
(65) to (59) RH	771 (30.35)	(63) to (64) LH	990 (38.98)
(65) to (59) LH	785 (30.91)	(63) to (60) RH	1,003 (39.49)
(65) to (66) RH	592 (23.31)	(63) to (60) LH	1,003 (39.49)
(65) to (66) LH	604 (23.78)	(60) RH to (64) LH	984 (38.74)
(48) to (60) RH	1,707 (67.20)	(60) LH to (64) RH	984 (38.74)
(48) to (60) LH	1,707 (67.20)	(71) RH to (71) LH	1,393 (54.84)
(48) to (63)	1,466 (57.72)	(70) RH to (70) LH	1,320 (51.97)
Unit: mm (in)			

F: COMPARTMENT

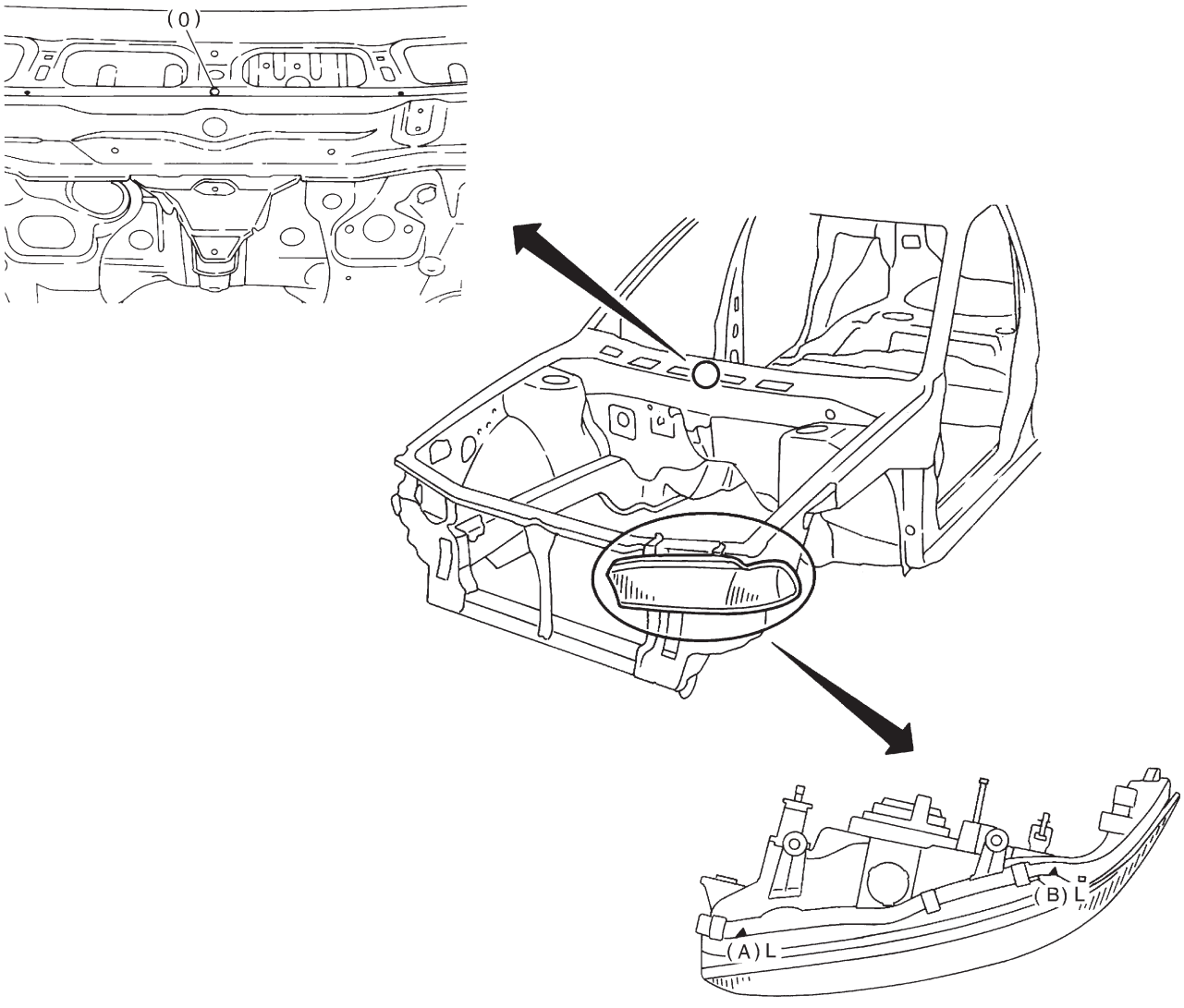


Point to point	Dimension	Point to point	Dimension	Point to point	Dimension
(48) to (51) RH	1,315 (51.77)	(51) RH to (51) LH	1,148 (45.20)	(47) to (51) RH	992 (39.06)
(48) to (51) LH	1,315 (51.77)	(52) RH to (52) LH	1,153 (45.39)	(47) to (51) LH	998 (39.29)
(48) to (52) RH	1,033 (40.67)	(53) RH to (53) LH	1,534 (60.39)	(48) to (62) RH*	1,327 (52.24)
(48) to (52) LH	1,033 (40.67)	(54) RH to (54) LH	1,220 (48.03)	(48) to (62) LH*	1,327 (52.24)
(48) to (53) RH	866 (34.09)	(23) RH to (54) LH	1,520 (59.84)	(62) RH to (62) LH*	1,000 (39.37)
(48) to (53) LH	866 (34.09)	(23) LH to (54) RH	1,520 (59.84)	(35) RH to (37) RH*	805 (31.69)
(48) to (54) RH	612 (24.09)	(55) RH to (55) LH	1,307 (40.83)	(35) LH to (37) LH*	805 (31.69)
(48) to (54) LH	612 (24.09)	(56) RH to (56) LH	1,206 (47.48)	(35) RH to (38) RH*	928 (36.54)
(48) to (55) RH	1,120 (44.09)	(23) RH to (23) LH	1,210 (47.64)	(35) LH to (38) LH*	928 (36.54)
(48) to (55) LH	1,120 (44.09)	(58) RH to (58) LH	1,000 (39.37)	(49) RH to (49) LH*	1,399 (55.08)
(48) to (56) RH	1,201 (47.28)	(58) RH to (59) LH	1,435 (56.50)	(50) RH to (50) LH*	1,378 (54.25)
(48) to (56) LH	1,201 (47.28)	(59) RH to (58) LH	1,435 (56.50)	(34) RH to (57) RH*	1,207 (47.52)
(48) to (23) RH	1,065 (41.93)	(59) RH to (59) LH	1,115 (43.90)	(34) LH to (57) LH*	1,207 (47.52)
(48) to (23) LH	1,065 (41.93)	(47) to (46)	840 (33.07)	(35) RH to (57) RH*	461 (18.15)
(48) to (58) RH	747 (29.41)	(47) to (49) RH	905 (35.63)	(35) LH to (57) LH*	461 (18.15)
(48) to (58) LH	747 (29.41)	(47) to (49) LH	913 (35.94)	(33) RH to (61) RH*	1,773 (69.80)
(48) to (59) RH	1,621 (63.82)	(47) to (50) RH	981 (38.62)	(33) LH to (61) LH*	1,773 (69.80)
(48) to (59) LH	1,621 (63.82)	(47) to (50) LH	988 (38.90)		
Unit: mm (in) *: Wagon only					

4. Datum Points and Dimensions Concerning On-Board Aiming Adjustment

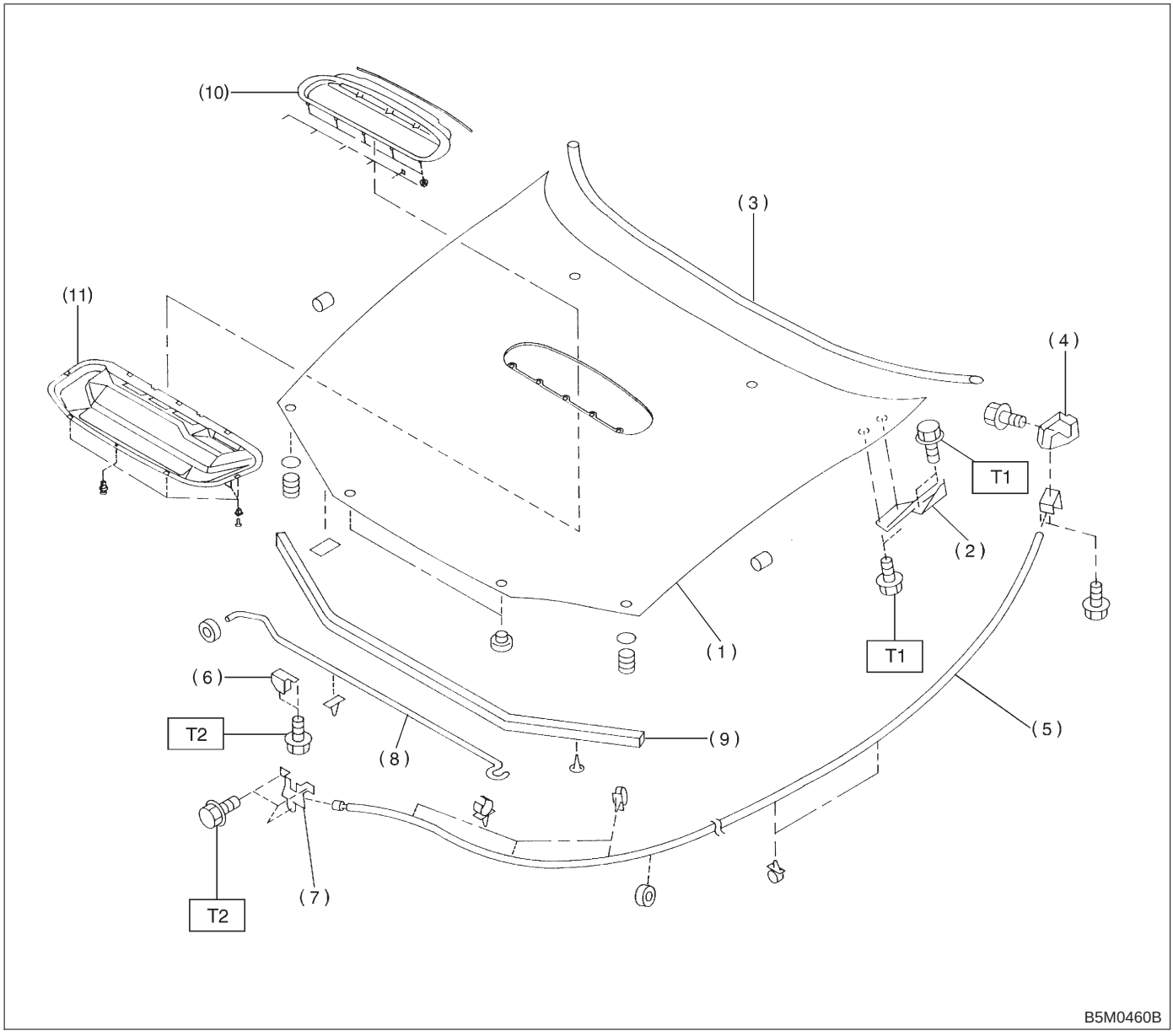
If headlight aiming is misaligned due to damaged body panel, repair headlight mating surface using body and headlight datum points as a guide.

NOTE:
It is recommended to conduct On-Board Aiming Adjustment with headlights turned off.
If turned on during the adjustment, the duration should be within two minutes.



Point to point	Dimension	Point to point	Dimension
(0) to (A) LH	1,015 (39.96)	(0) to (B) LH	1,057 (41.61)
(0) to (A) RH	1,015 (39.96)	(0) to (B) RH	1,057 (41.61)
Unit: mm (in)			

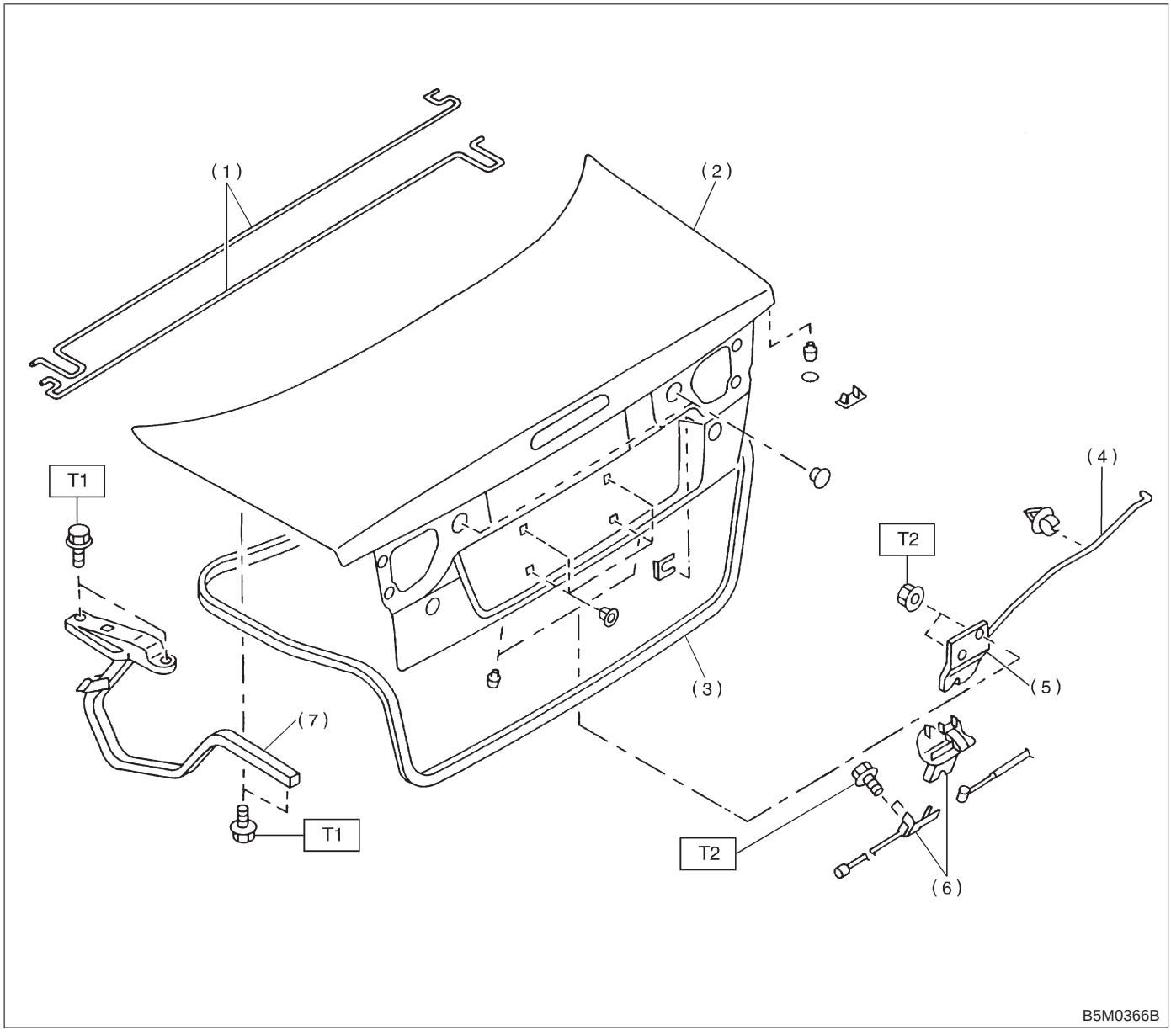
1. Front Hood and Hood Lock



(1) Front hood
(2) Hinge (RH, LH)
(3) Front hood seal
(4) Lever ASSY
(5) Cable
(6) Striker
(7) Hood lock ASSY
(8) Front hood stay
(9) Front hood seal CTR
(10) Hood duct (Outback and GT model)
(11) Hood inner (Outback and GT model)

Tightening torque: N·m (kg-m, ft-lb)
T1: 14±9 (1.4±0.9, 10.1±6.5)
T2: 32±1 (3.3±0.1, 23.9±0.7)

2. Trunk Lid

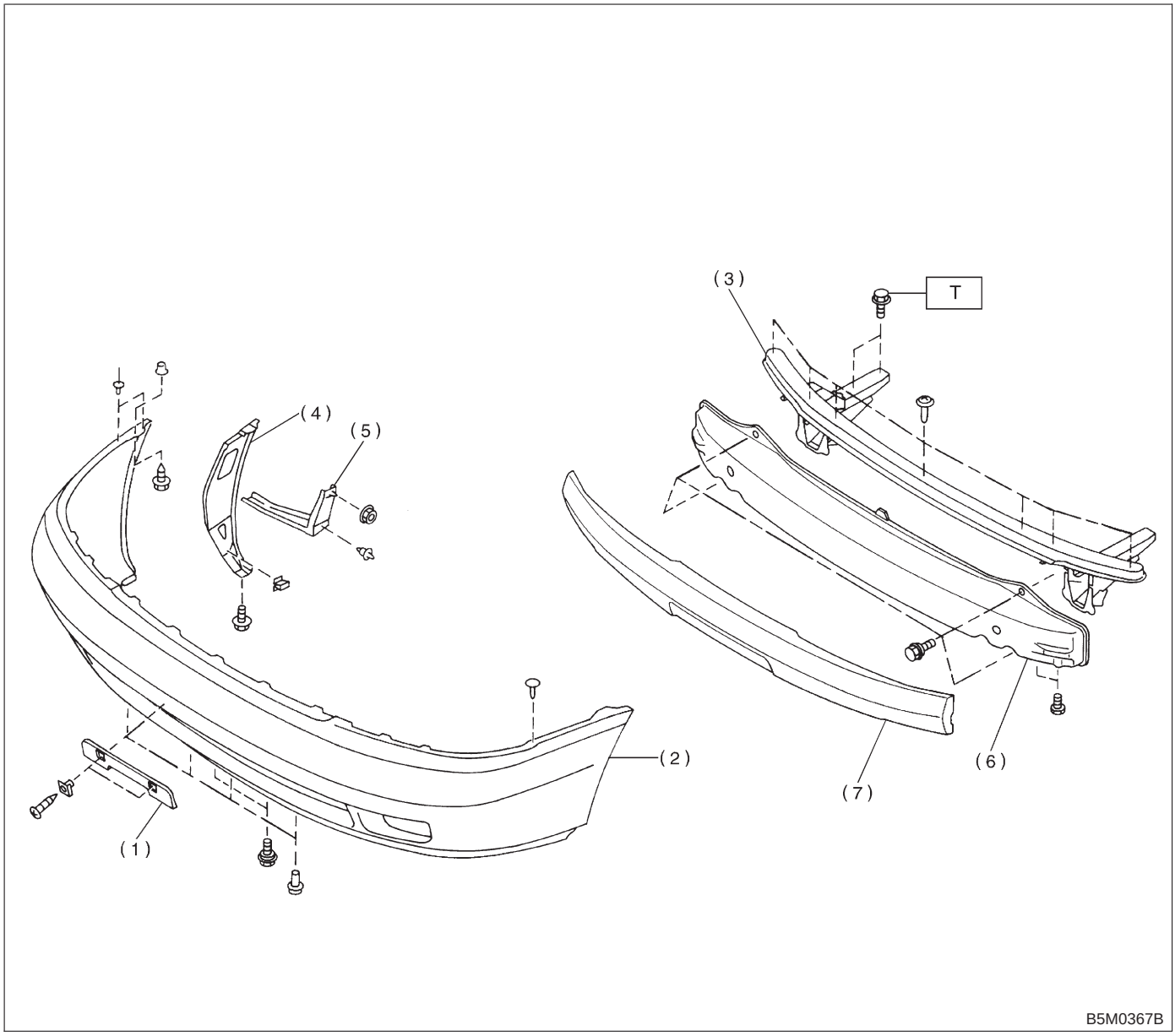


(1) Torsion bar
(2) Trunk lid
(3) Weatherstrip
(4) Rod
(5) Trunk lid lock ASSY
(6) Striker
(7) Hinge ASSY

Tightening torque: N·m (kg-m, ft-lb)
T1: 14±4 (1.4±0.4, 10.1±2.9)
T2: 18±5 (1.8±0.5, 13.0±3.6)

3. Front Bumper

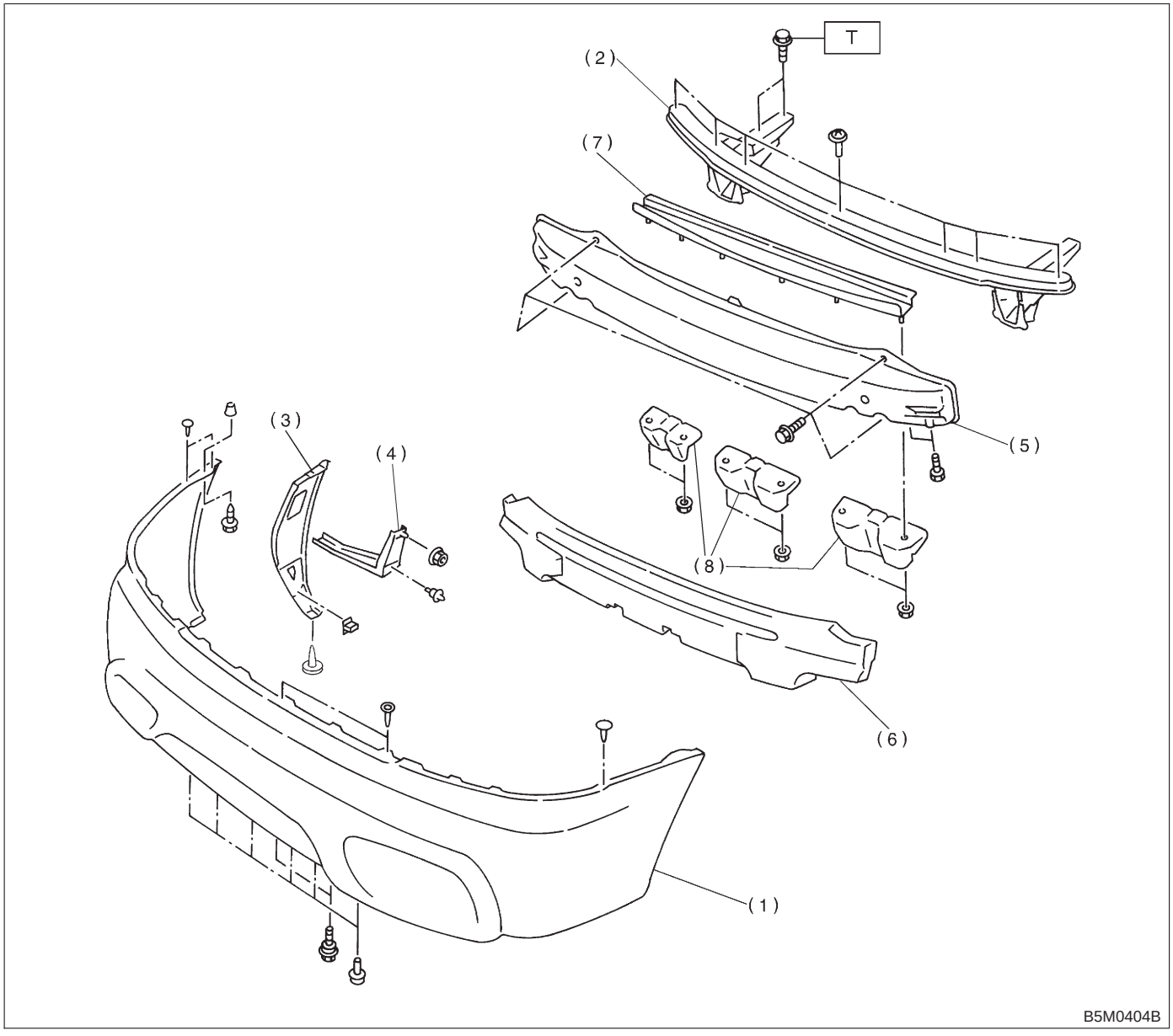
A: EXCEPT OUTBACK MODEL



(1) Licence plate bracket
(2) Bumper face
(3) Front bumper beam
(4) Bracket
(5) Stay
(6) Back beam (Front)
(7) E-A foam (Front)

Tightening torque: N·m (kg-m, ft-lb)
T: 93±25 (9.5±2.5, 69±18)

B: OUTBACK MODEL

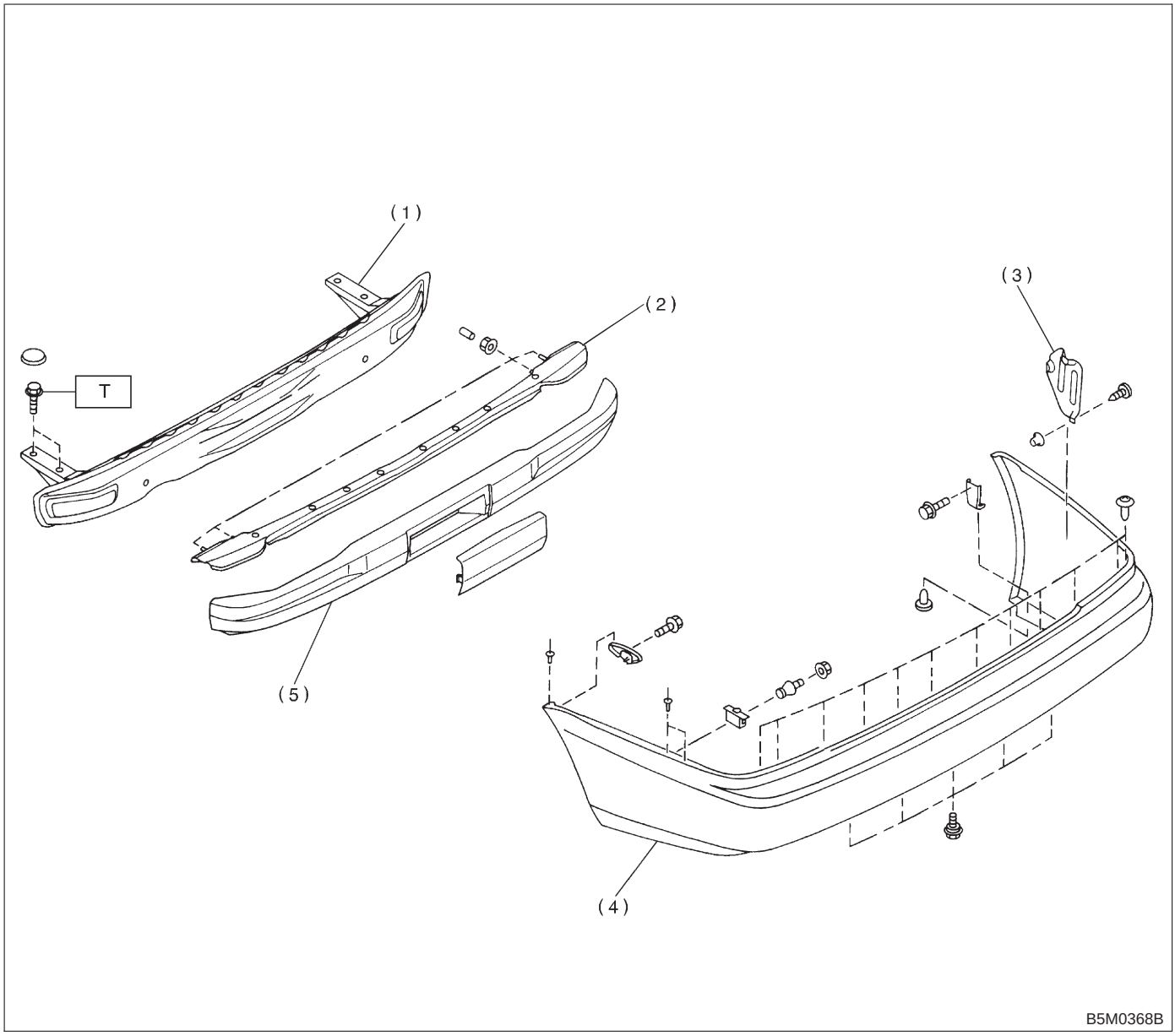


(1) Bumper face
(2) Front bumper beam
(3) Bracket
(4) Stay
(5) Back beam (Front)
(6) E-A foam (Front)
(7) Holder
(8) Back beam bracket

Tightening torque: N·m (kg-m, ft-lb)
T: 93±25 (9.5±2.5, 69±18)

4. Rear Bumper

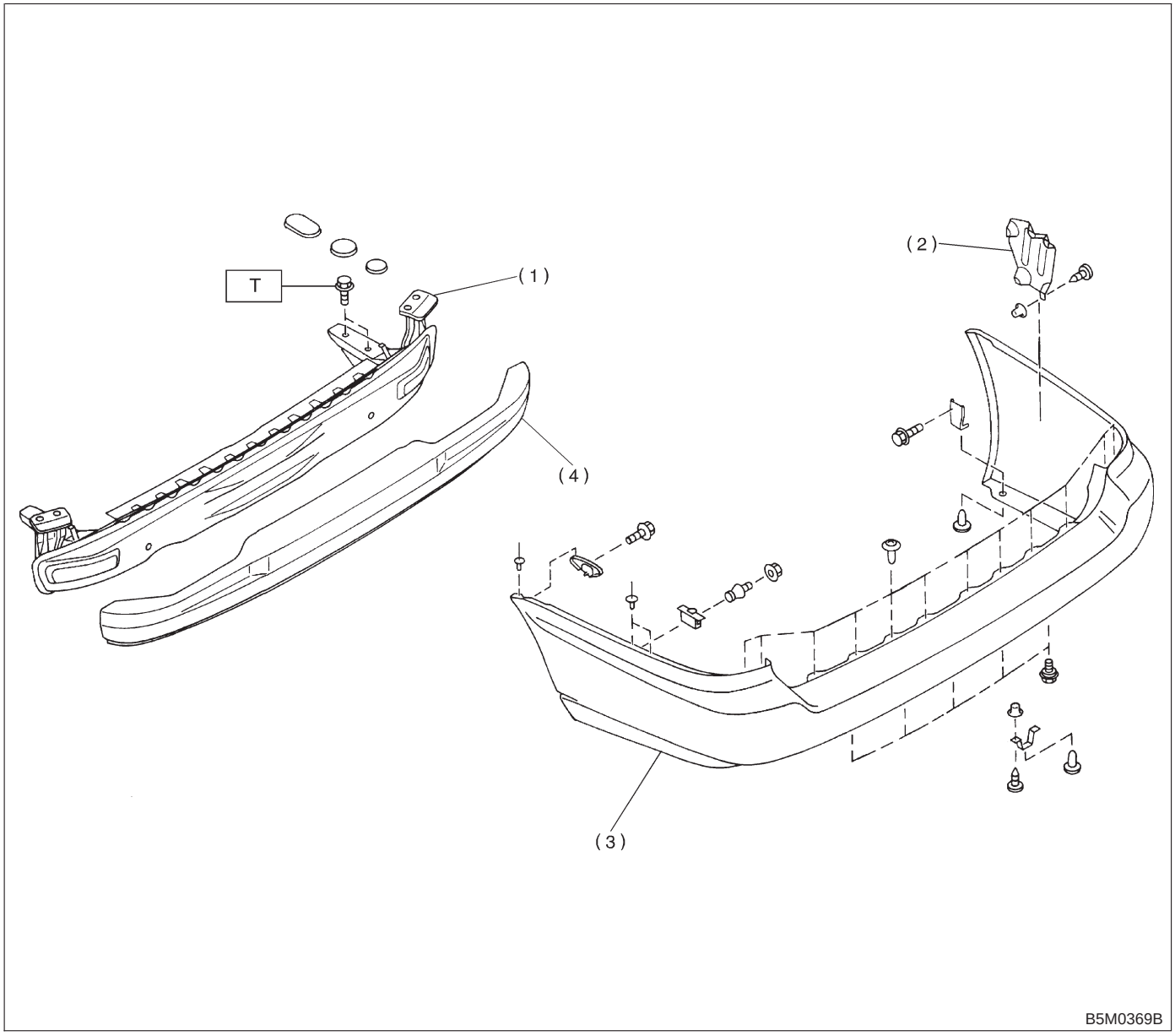
A: SEDAN



(1) Bumper beam (LWR)
(2) Bumper beam (UPR)
(3) Bracket (Side)
(4) Bumper surface
(5) E-A foam (Rear)

Tightening torque: N·m (kg-m, ft-lb)
T: 93±25 (9.5±2.5, 69±18)

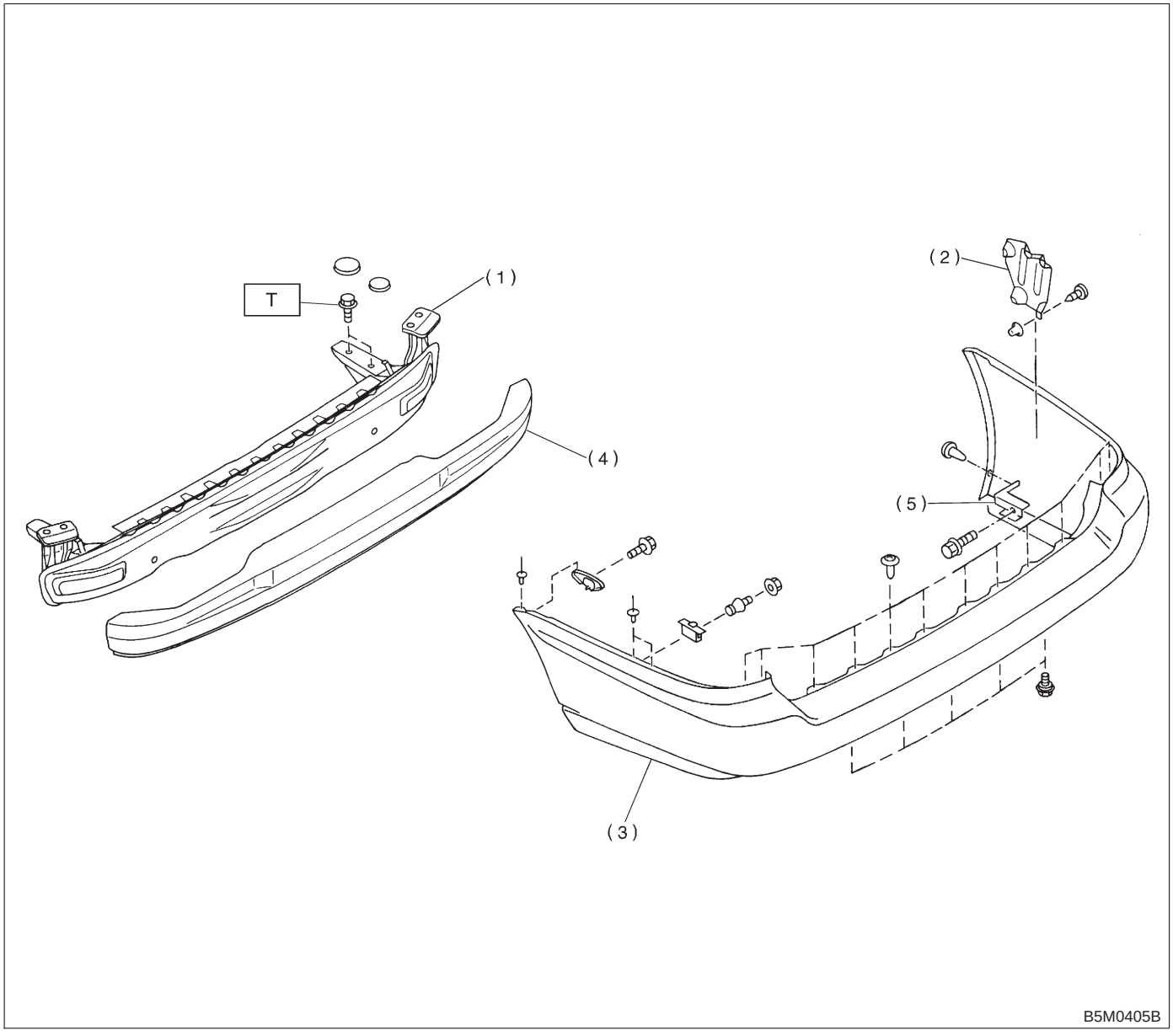
B: WAGON



(1) Bumper beam
(2) Bracket (Side)
(3) Bumper surface
(4) E-A foam (Rear)

Tightening torque: N·m (kg-m, ft-lb)
T: 93±25 (9.5±2.5, 69±18)

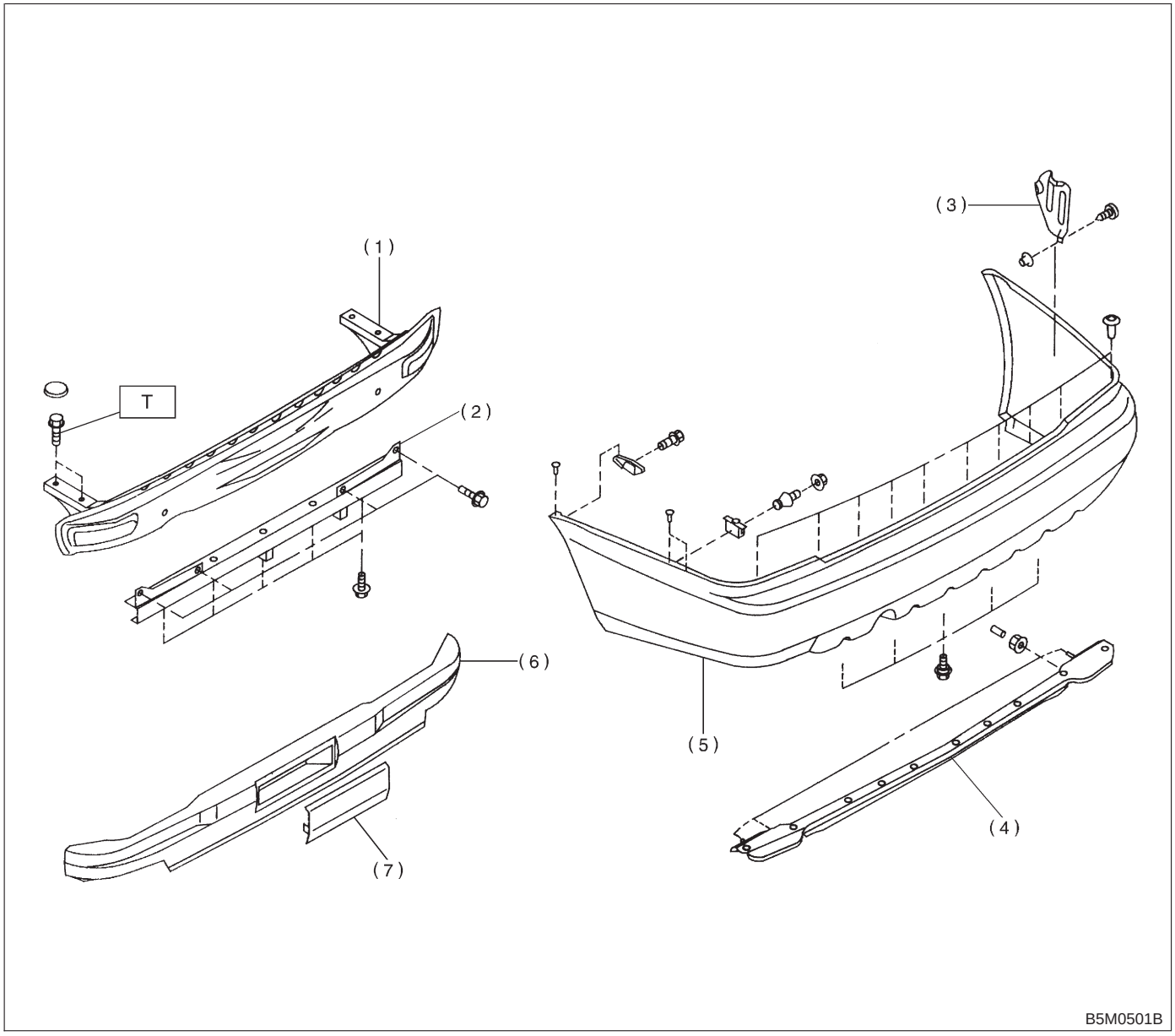
C: OUTBACK MODEL



(1) Bumper beam
(2) Bracket (Side)
(3) Bumper surface
(4) E-A foam (Rear)
(5) Lower bracket (Side)

Tightening torque: N·m (kg-m, ft-lb)
T: 93±25 (9.5±2.5, 69±18)

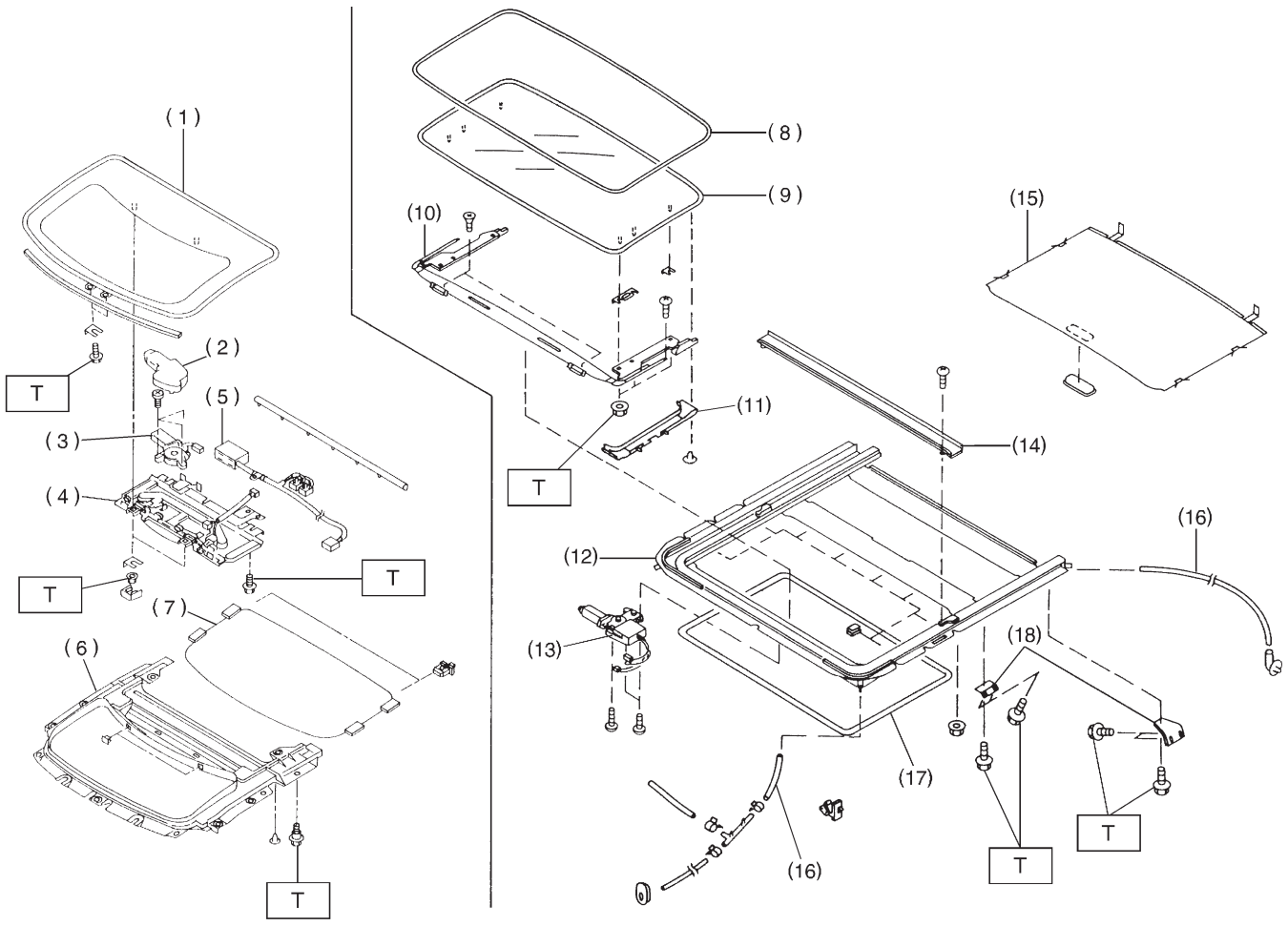
D: SUS MODEL



(1) Beam complete rear
(2) Beam lower complete rear
(3) Bracket side rear
(4) Beam upper rear
(5) Bumper face
(6) E-A foam
(7) E-A honeycomb

Tightening torque: N·m (kg-m, ft-lb)
T: 95±25 (9.5±2.5, 69±18)

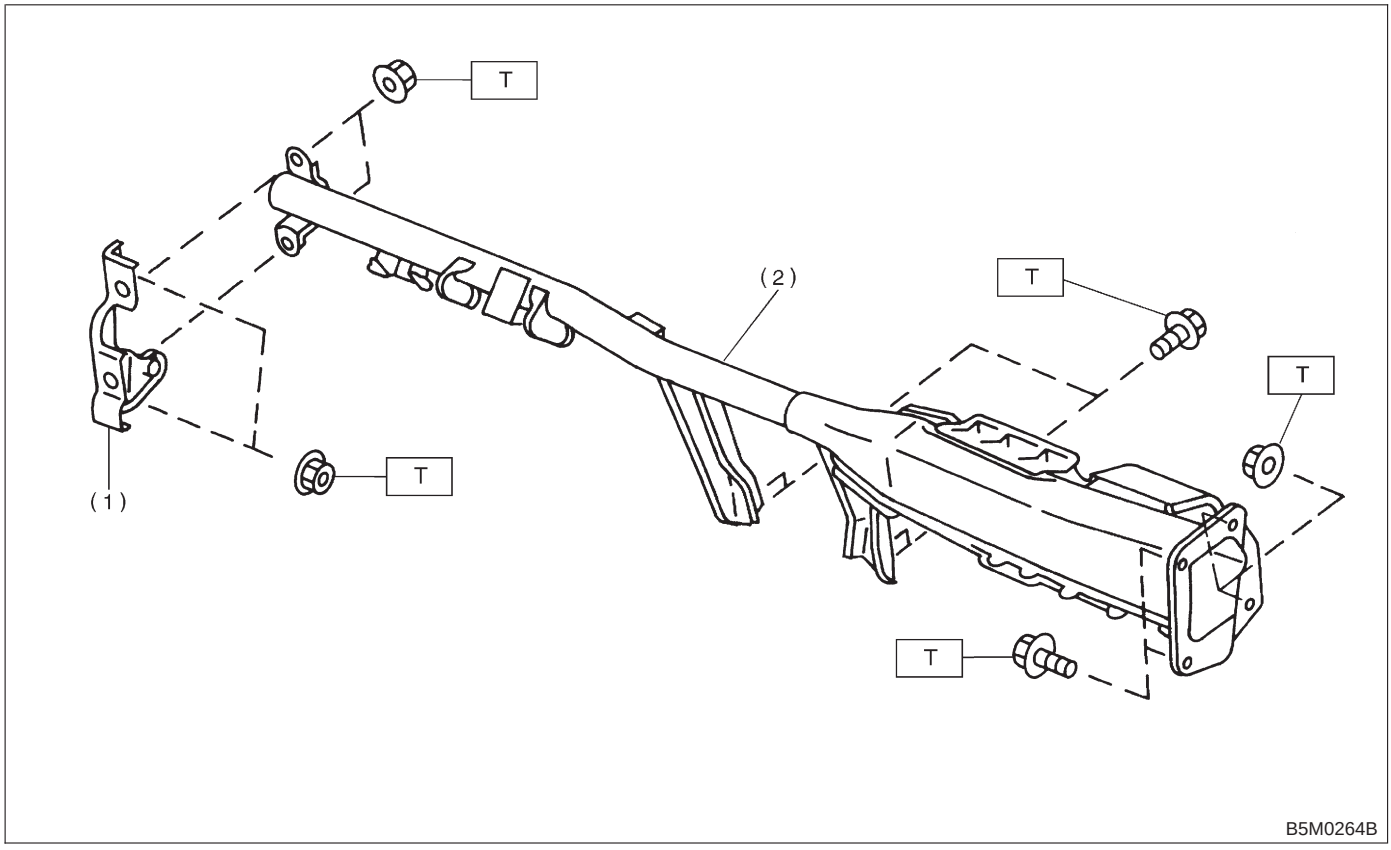
5. Sunroof



(1) Sunroof panel
(2) Motor cover
(3) Motor ASSY
(4) Tilt up ASSY
(5) Control module ASSY
(6) Frame ASSY
(7) Sunroof trim
(8) Weatherstrip
(9) Sunroof panel
(10) Deflector and guide rail ASSY
(11) Guide rail cover
(12) Frame ASSY
(13) Motor ASSY
(14) Drain ASSY
(15) Sunroof trim
(16) Drain tube
(17) Garnish (Sedan only)
(18) Set bracket

Tightening torque: N·m (kg-m, ft-lb)
T: 7.4±2.0 (0.75±0.2, 5.4±1.4)

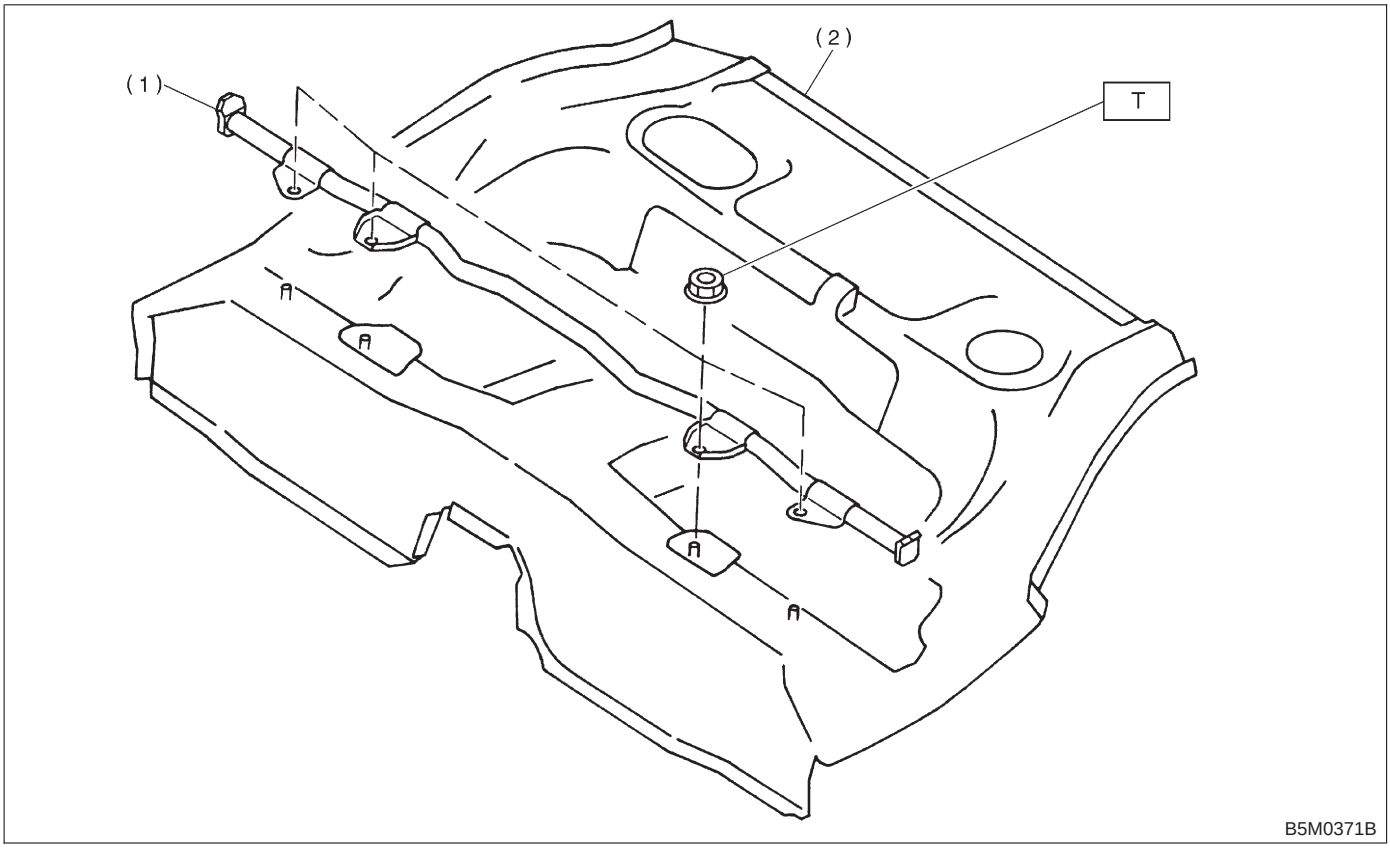
6. Steering Support Beam



(1) Bracket
(2) Steering beam

Tightening torque: N·m (kg-m, ft-lb)
T: 32±10 (3.3±1.0, 23.9±7)

7. Guard Pipe



(1) Guard pipe
(2) Rear floor panel

Tightening torque: N·m (kg-m, ft-lb)
T: 32±10 (3.3±1.0, 23.9±7)

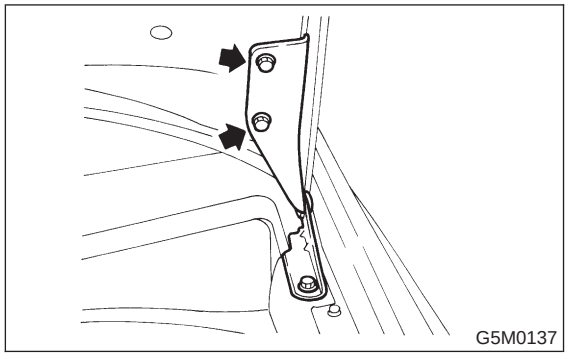
1. Hood

A: REMOVAL AND INSTALLATION

NOTE:
The hood lock has a dual locking design which consists of a main lock and a safety lock mechanism. When the release knob located at the front pillar on the driver's side is pulled back, the main lock is released through the cable attached to the knob.
The safety lock can be released by pushing the lever protruding above the front grill while opening the hood.

1. HOOD

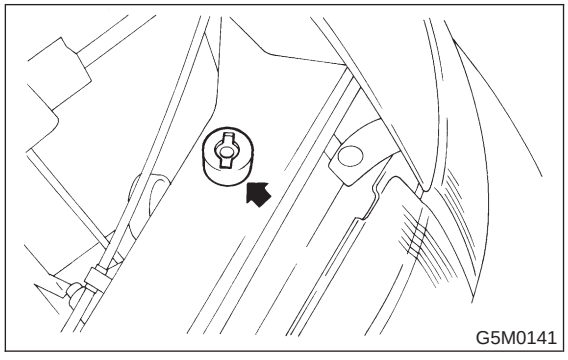
1) Open front hood, and remove washer hose.
2) Remove attaching bolts.



3) Detach front hood from hinges.
4) Installation is in the reverse order of removal.

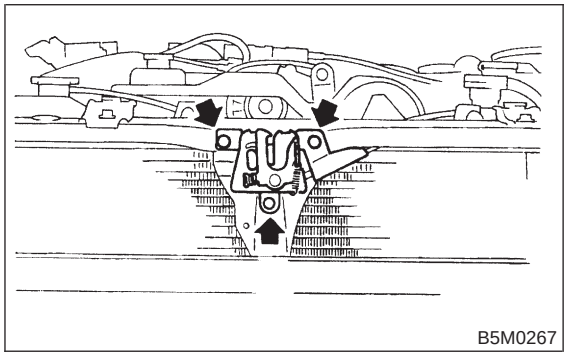
CAUTION:
With buffer protruding about 18 mm (0.71 in) beyond radiator panel, make sure that:
● No clearance exists between buffer and inner hood.
● Hood main lock is applied when hood is released at a height of approximately 10 mm (0.39 in) above the closed position.

NOTE:
Align the center of striker with lock during installation. Make sure safety lever is properly caught by striker under the hood's own weight.



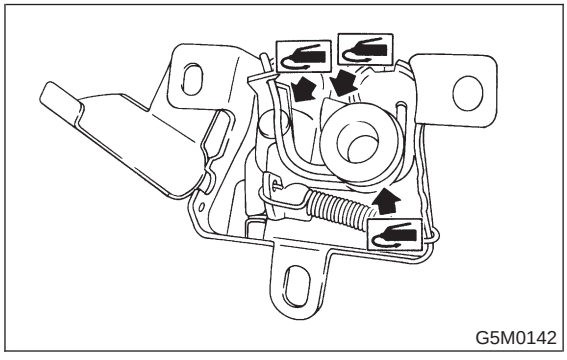
2. HOOD LOCK

1) Open front hood and remove front grille.
2) Remove bolts which secure lock assembly to radiator panel, and remove lock assembly.



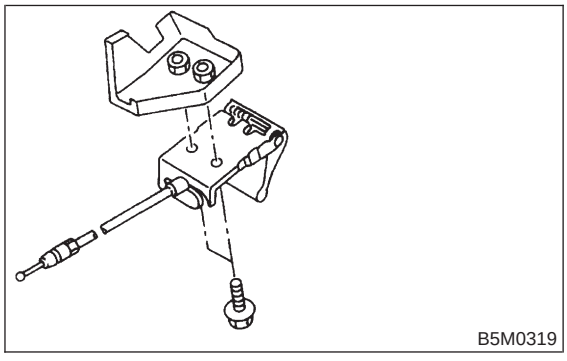
3) Disconnect release cable from lock assembly.
4) Installation is in the reverse order of removal.

NOTE:
● Route hood lock release cable and hold with clips.
● After installing release cable, ensure it operates smoothly.
● Apply grease to sliding surfaces of parts.



3. RELEASE CABLE

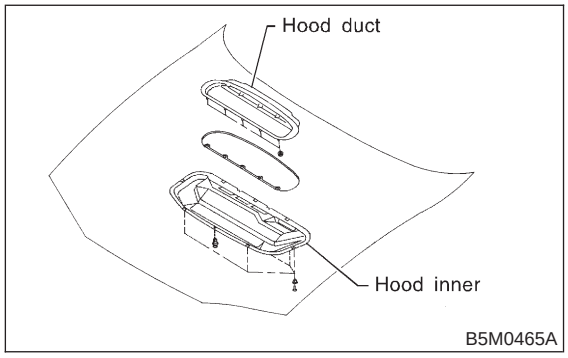
1) Remove front grille.
2) Remove release cable from opener lever in passenger compartment.
3) Remove release cable from lock assembly.



4) Remove cable clip from engine compartment.
5) Installation is in the reverse order of removal.

4. HOOD DUCT

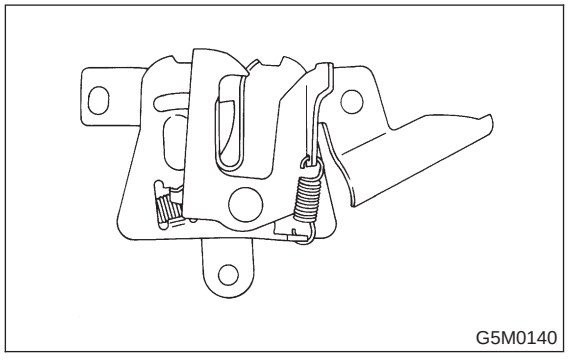
1) Open front hood.
2) Remove attaching tapping screws and screw rivet, then remove hood inner.
3) Remove attaching nuts, then remove hood duct.



4) Installation is in the reverse order of removal.

B: POINTS TO CHECK

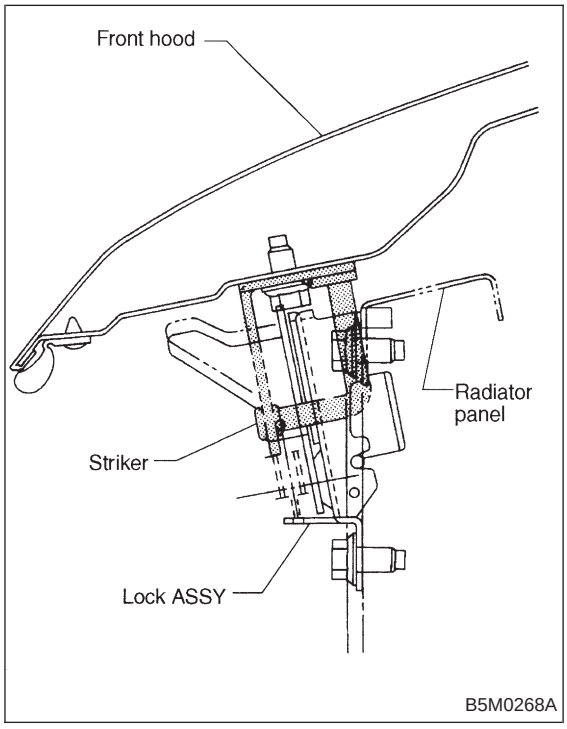
1) Check striker for bending or abnormal wear.
2) Check safety lever for improper movement.
3) Check other levers and spring for rust formation and unsmooth movement.



C: ADJUSTMENT

1) Fore-aft and left-right adjustments
Loosen striker mounting bolts and adjust fore-and-aft position of striker.

CAUTION:
Do not adjust striker position using the lock. Doing so may result in a misaligned front grille.



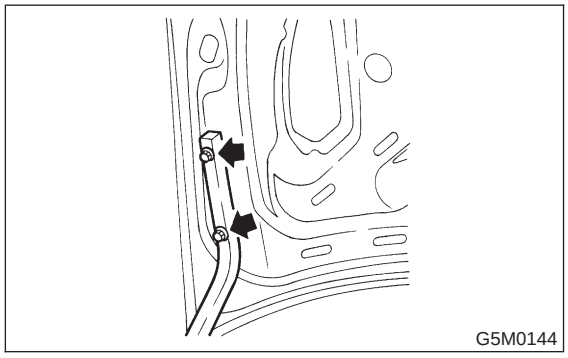
2) Up-down adjustment
Make up-and-down adjustment of striker only when hood does not properly contact buffer or hood is not flush with fender, or when release cable does not properly operate. Adjustment can be made by adjusting the stroke length of striker after lock assembly mounting screws are removed.

2. Trunk Lid

A: REMOVAL AND INSTALLATION

1. TRUNK LID

1) Open trunk lid.
2) Remove trunk lid mounting bolts and detach trunk lid from hinges.

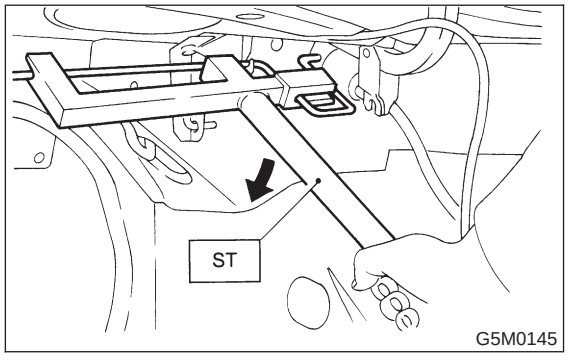


3) Installation is in the reverse order of removal.

2. TORSION BAR

1) Open trunk lid. Remove torsion bars from hinge links using ST.
ST 927780000 REMOVER

CAUTION:
Be careful because torsion bar quickly swings back when released.



2) Remove the left and right torsion bars.

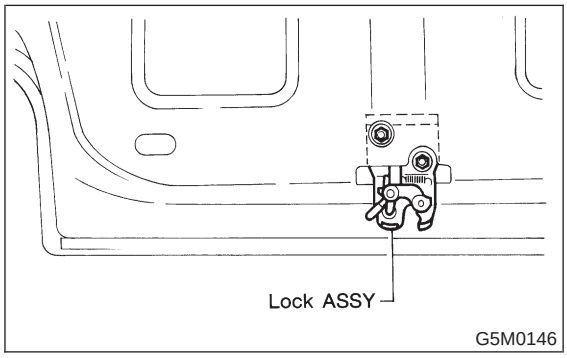
WARNING:
Be careful because trunk lid drops under its own weight when torsion bars are removed.

3) Installation is in the reverse order of removal.

NOTE:
Apply a coat of grease to the rotary section of hinges and contact surfaces of torsion bars.

3. TRUNK LID LOCK ASSEMBLY AND KEY CYLINDER

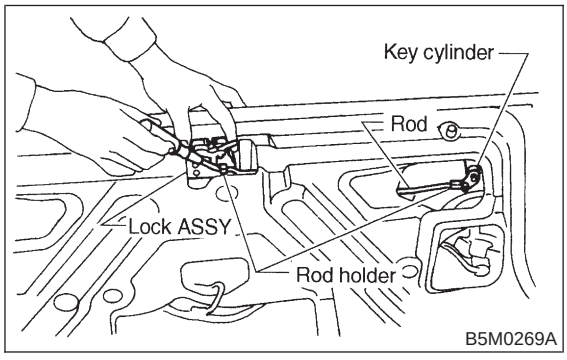
1) Remove rod of lock assembly from rod holder of key lock assembly.



2) Remove nuts which hold lock assembly and remove lock assembly.

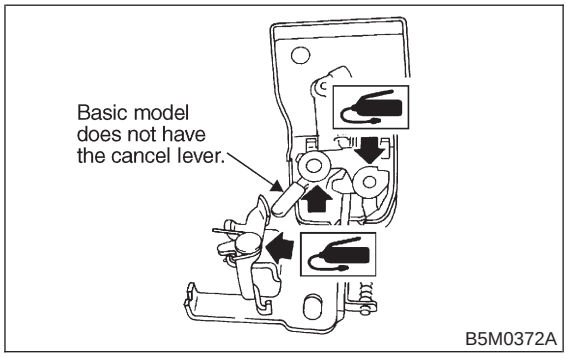
NOTE:
- Always remove rear skirt trim panel beforehand, if so equipped.
- Be careful not to bend opener cable.

3) Remove rod holder and detach key cylinder from trunk lid.



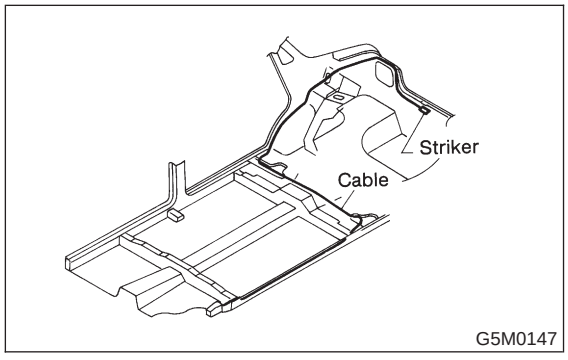
4) Installation is in the reverse order of removal.

NOTE:
Apply grease to sliding surfaces of lock assembly and striker.



4. TRUNK LID OPENER

1) Remove rear seats, center pillar lower cover, floor mat, rear arch cover and side sill cover (on the driver's side).
2) Remove all clips which hold cable.
3) Disconnect cable from pull handle assembly.
4) Remove bolts and detach pull handle assembly.
5) Loosen bolts which hold lock assembly, and remove it.
6) Remove striker from trunk lid.



7) Disconnect cable from striker.

NOTE:
- Be careful not to bend or break cable.
- Basic model vehicles do not have trunk lid opener system.

8) Installation is in the reverse order of removal.

CAUTION:
- **When installing cover to pull handle assembly, observe the following:**
  - **Be careful not to catch harness.**
  - **Engage pull handle assembly pawls firmly.**

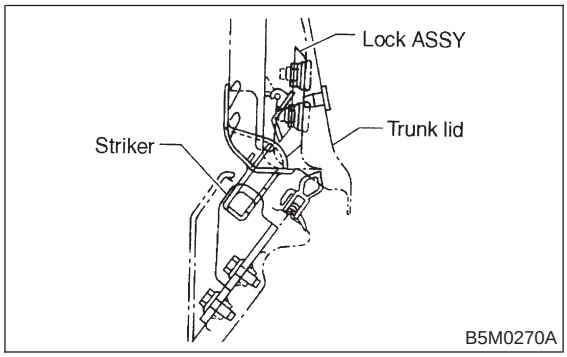
NOTE:
After installing opener cable, ensure it moves smoothly.

B: ADJUSTMENT

1. TRUNK LID

1) To adjust left-right lid positioning, loosen bolts which hold trunk lid to hinges.

2) To adjust up-down lid alignment, place washer(s) between trunk lid and hinges or move trunk lock assembly up or down.

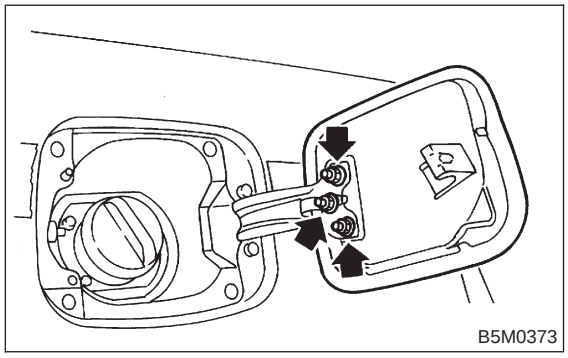


3. Fuel Flap

A: REMOVAL AND INSTALLATION

1. FUEL FLAP

1) Remove bolts which hold hinge to fuel flap, and detach fuel flap.

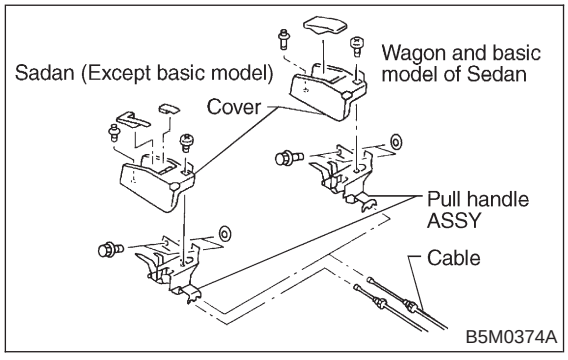


2) Installation is in the reverse order of removal.

CAUTION:
Make sure the clearance between fuel flap and vehicle body is equal at all points.

2. FUEL FLAP OPENER

1) Remove rear seats, center pillar lower cover, floor mat, rear arch cover/rear quarter trim (Wagon), and side sill cover (on the driver's side).
2) Remove all clips which hold cable.
3) Disconnect cable from pull handle.



4) Detach pull handle by removing bolts.
5) Detach fuel lock holder by turning it.
6) Installation is in the reverse order of removal.

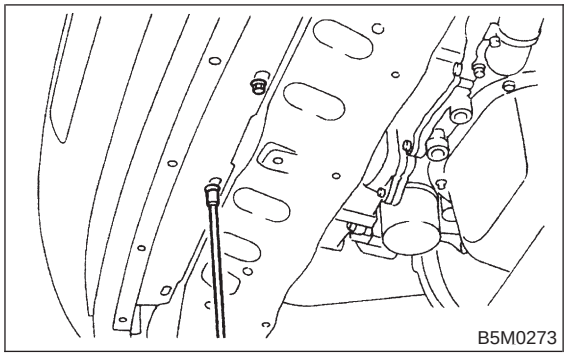
CAUTION:
● When installing cover to pull handle assembly, observe the following:
● Be careful not to catch harness.
● Engage pull handle assembly pawls firmly.
● After installing opener cable, ensure it moves smoothly.

4. Front Bumper

A: REMOVAL AND INSTALLATION

1. EXCEPT OUTBACK MODEL

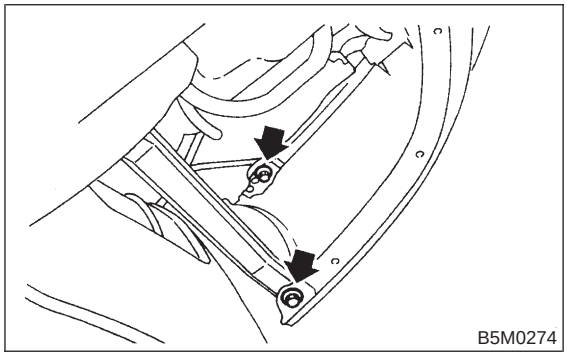
1) Disconnect the ground cable from the battery.
2) Remove two bolts from lower center of bumper.



3) Remove mud guard. <Ref. to 5-1 [W9A1].>

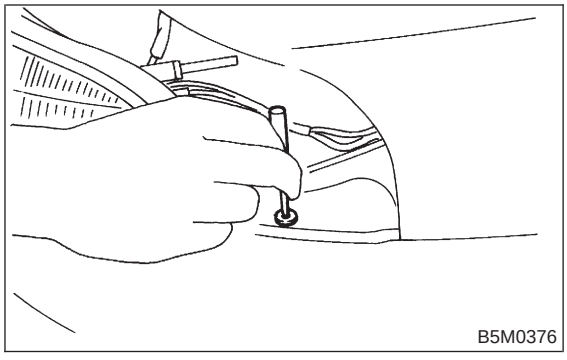
NOTE:
It is not necessary to remove the entire mud guard. Remove clips from the front section of mud guard, if necessary.

4) Remove the canister. <Ref. to 2-1 [W3A0].>
5) Remove two bolts from side of bumper.

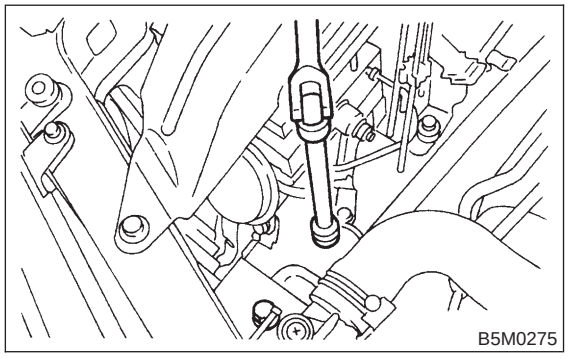


6) Remove front grill. <Ref. to 5-1 [W12A0].>
7) Remove headlight. <Ref. to 6-2 [W4B2].>
8) Remove clips from both sides of front bumper.

NOTE:
When removing, push the pin at the center of clip with a thin screwdriver.

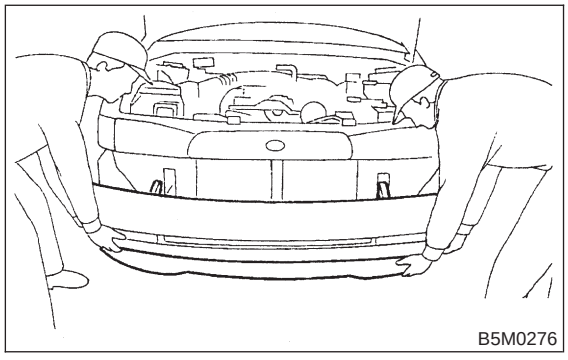


9) Remove bolts (engine compartment side) from bumper stays.



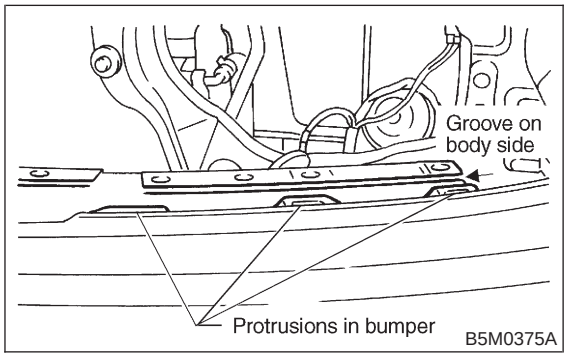
10) Remove front bumper assembly.

NOTE:
Front bumper surface is accessible for removal after removing the following parts:
Two bolts (on the lower center of bumper), mud guard, bolts (on the side of bumper), front grille, headlight, clips (on both sides of front bumper), clips (on the upper section of bumper), and clips (on the lower section of bumper).



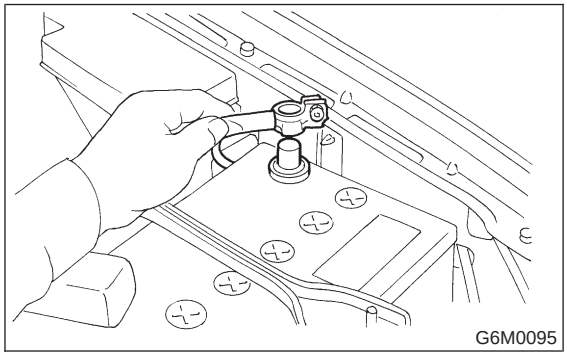
11) Installation is in the reverse order of removal.

CAUTION:
● Be extremely careful to prevent scratches on bumper face as it is made of resin.
● Be careful not to scratch the body when removing or installing the bumper.
● When installing canister, insert air vent hose of canister into the hole on body.
● To facilitate installation of front bumper, insert the protrusion inside bumper into the groove of body.

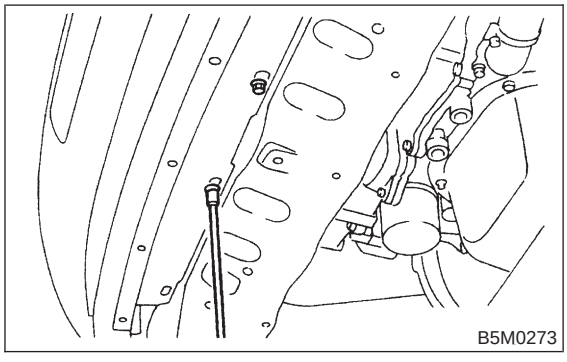


2. OUTBACK MODEL

1) Disconnect the ground cable from the battery.



2) Remove two bolts from lower center of bumper.

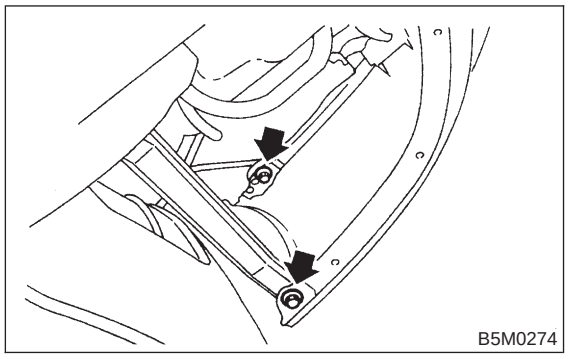


3) Remove mud guard. <Ref. to 5-1 [W9A2].>

NOTE:
It is not necessary to remove the entire mud guard. Remove clips from the front section of mud guard, if necessary.

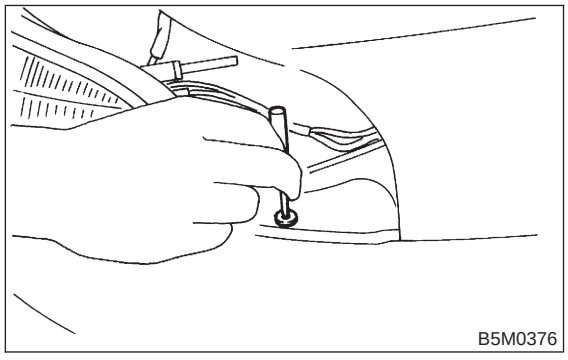
4) Remove the canister. <Ref. to 2-1 [W3A0].>

5) Remove two bolts from side of bumper.

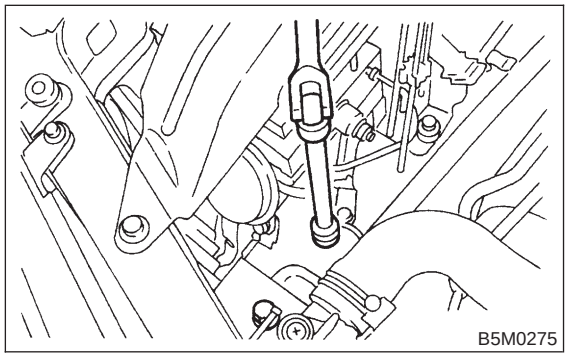


6) Remove front grill. <Ref. to 5-1 [W12A0].>
7) Remove headlight. <Ref. to 6-2 [W4B2].>
8) Remove fog lamps.
9) Remove clips from both sides of front bumper.

NOTE:
When removing, push the pin at the center of clip with a thin screwdriver.

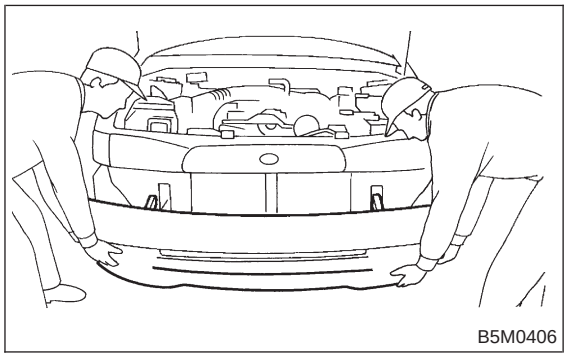


10) Remove bolts (engine compartment side) from bumper stays.



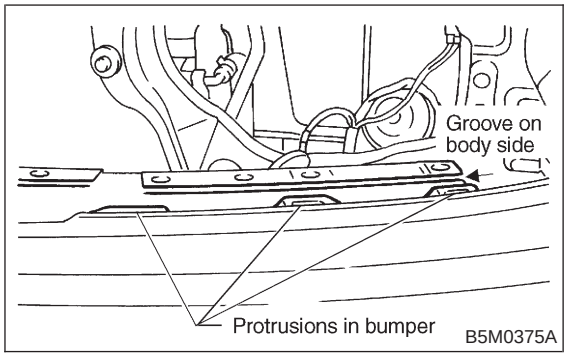
11) Remove front bumper assembly.

NOTE:
Front bumper surface is accessible for removal after removing the following parts:
Two bolts (on the lower center of bumper), mud guard, bolts (on the side of bumper), front grille, headlight, clips (on both sides of front bumper), clips (on the upper section of bumper), and clips (on the lower section of bumper).



12) Installation is in the reverse order of removal.

CAUTION:
- **Be extremely careful to prevent scratches on bumper face as it is made of resin.**
- **Be careful not to scratch the body when removing or installing the bumper.**
- **When installing canister, insert air vent hose of canister into the hole on body.**
- **To facilitate installation of front bumper, insert the protrusion inside bumper into the groove of body.**

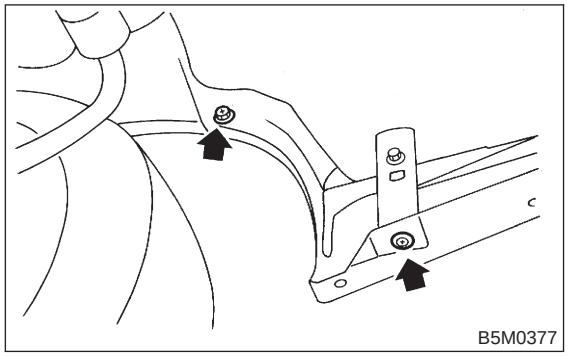


5. Rear Bumper

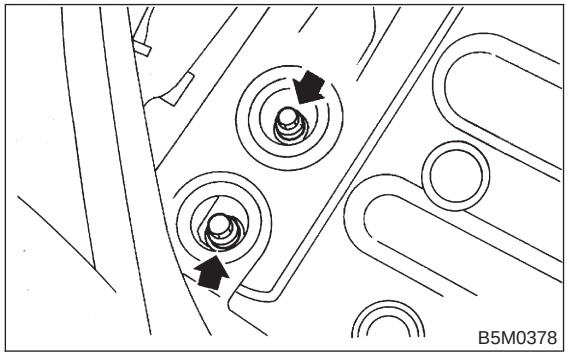
A: REMOVAL AND INSTALLATION

1. SEDAN

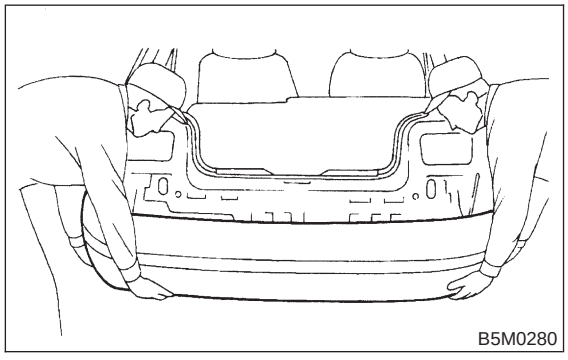
1) Remove one bolt and one clip from side of bumper.



2) Open trunk lid. Remove trunk trim panel clips and detach trim.
3) Remove rear bumper beam (upper) attaching nut.
4) Remove bolts from bumper stays.



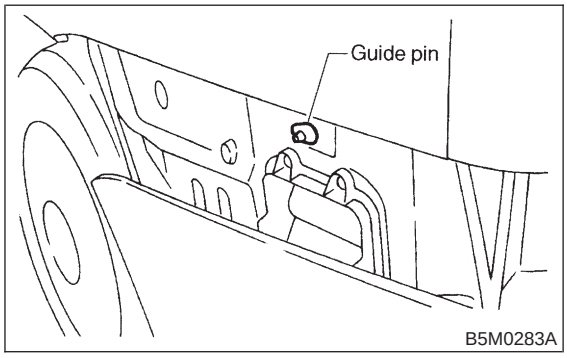
5) Remove rear bumper assembly.

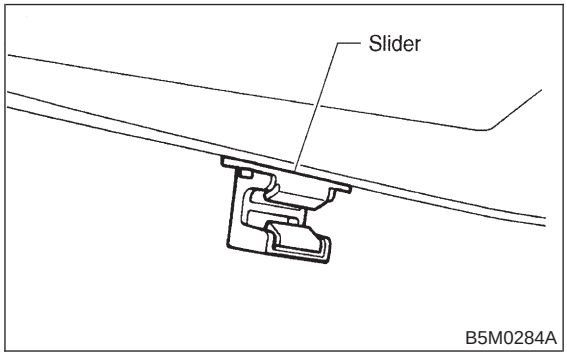


6) Installation is in the reverse order of removal.

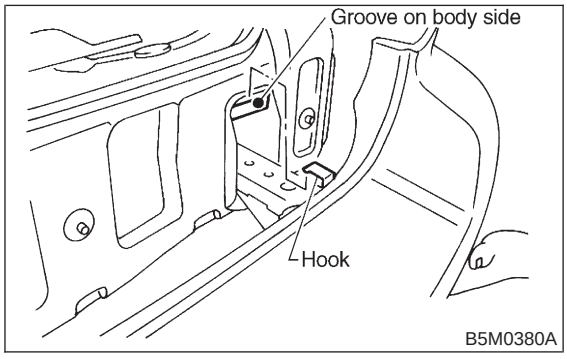
CAUTION:
● Be extremely careful to prevent scratches on bumper face as it is made of resin.
● Be careful not to scratch the body when removing or installing bumper.

● To facilitate installation of rear bumper, attach slider to the guide pin.



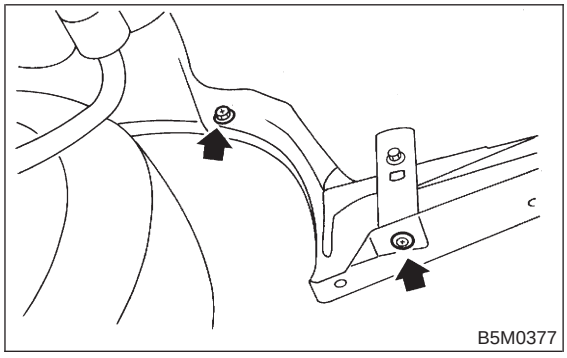


● To facilitate installation of rear bumper, insert the bumper hook into the body groove.



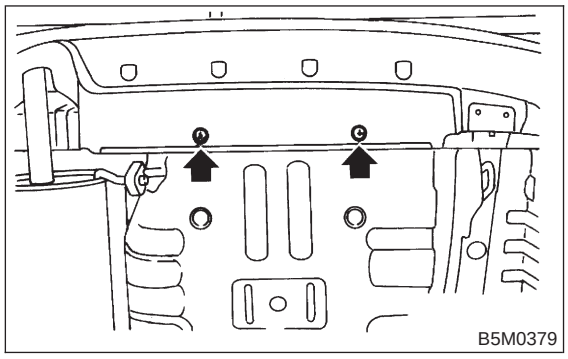
2. WAGON

1) Remove one bolt and one clip from side of bumper.

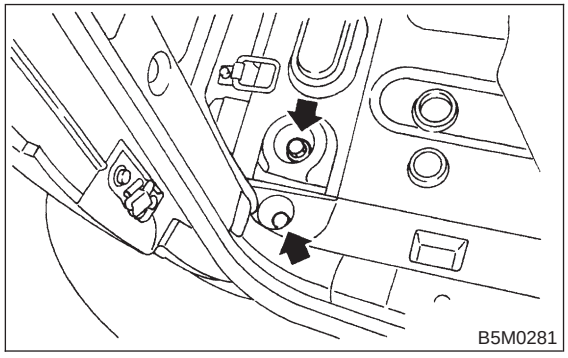


2) Open rear gate. Remove rear quarter trim lid.

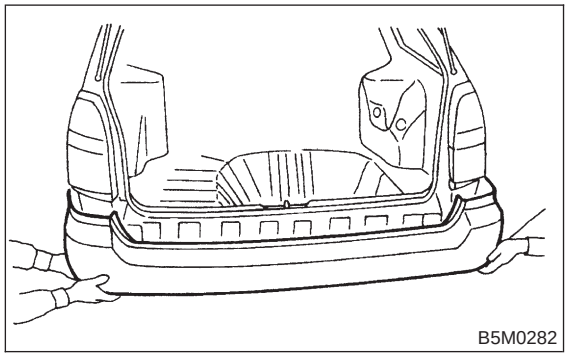
3) Remove two clips from lower center of bumper.



4) Remove bolts from bumper stays.



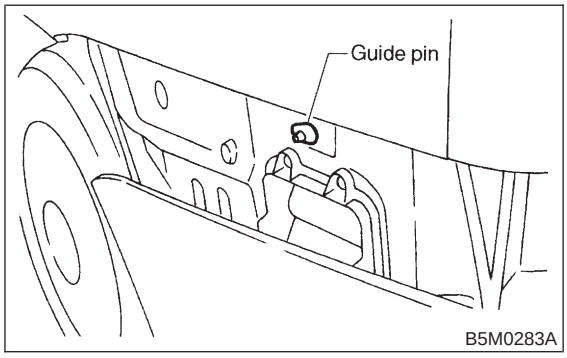
5) Remove rear bumper assembly.

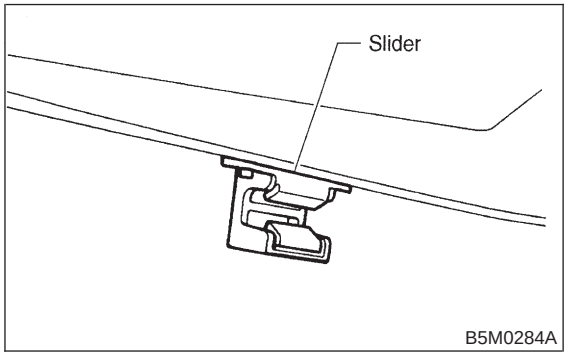


6) Installation is in the reverse order of removal.

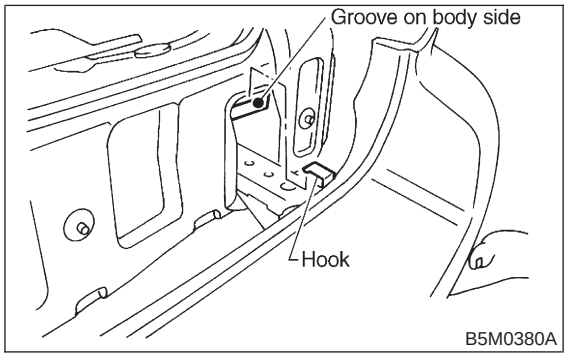
CAUTION:
● Be extremely careful to prevent scratches on bumper face as it is made of resin.
● Be careful not to scratch the body when removing or installing bumper.

● To facilitate installation of rear bumper, attach slider to the guide pin.



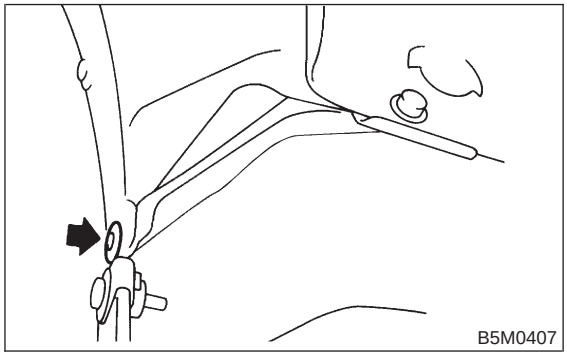


● To facilitate installation of rear bumper, insert the bumper hook into the body groove.



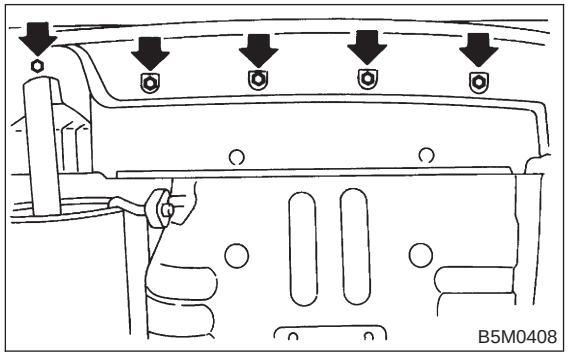
3. OUTBACK MODEL

1) Remove one clip from side of bumper.

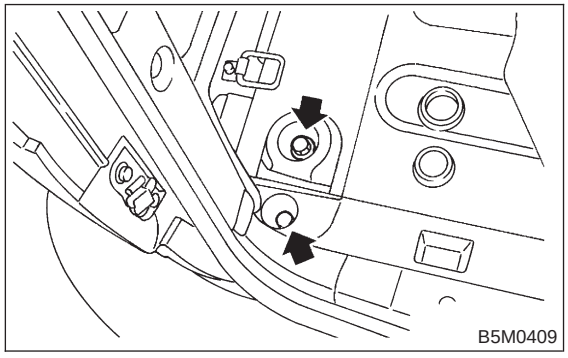


2) Open rear gate and remove rear quarter trim lid.

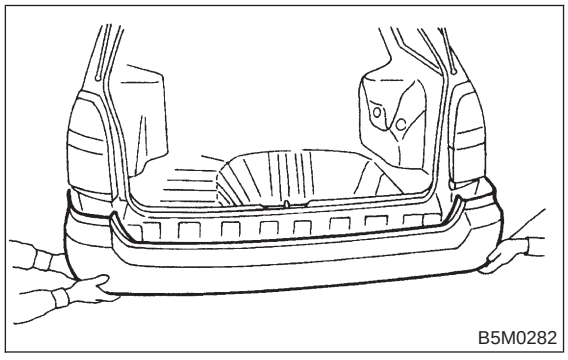
3) Remove five bolts from lower center of bumper.



4) Remove bolts from bumper stays.



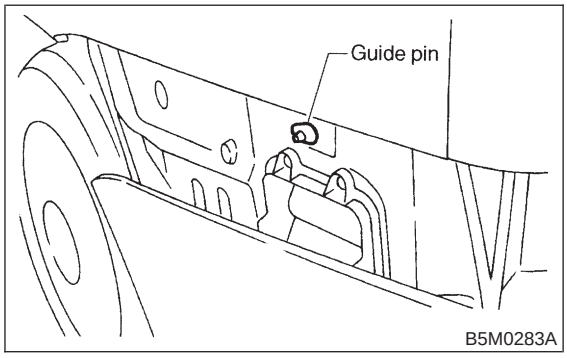
5) Remove rear bumper assembly.

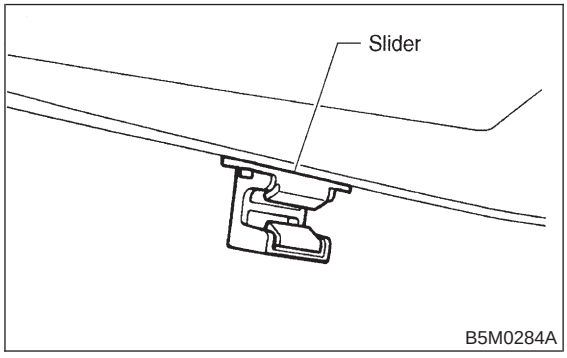


6) Installation is in the reverse order of removal.

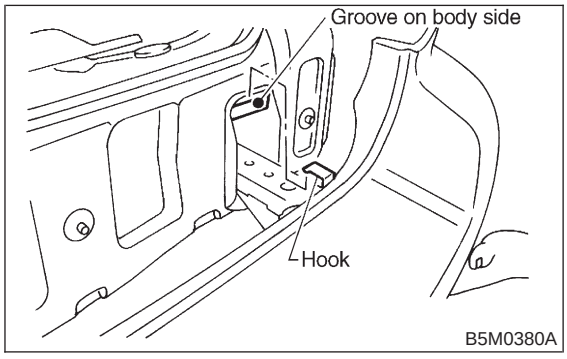
CAUTION:
● Be extremely careful to prevent scratches on bumper face as it is made of resin.
● Be careful not to scratch the body when removing or installing bumper.

● To facilitate installation of rear bumper, attach slider to the guide pin.



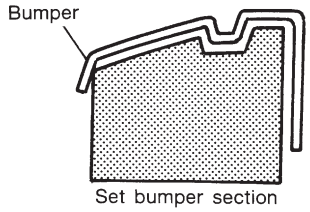


● To facilitate installation of rear bumper, insert the bumper hook into the body groove.



6. Coating Method for PP Bumper

A: PROCESS STEPS

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Bumper mounting</td><td>Set bumper on paint work table if required. Use paint work table conforming to inner shape of bumper when possible.</td><td> 

G5M0164</td></tr>
<tr><td>2</td><td>Masking</td><td colspan="2">Mask specified part (black base) with masking tape. Use masking tape for PP (e.g., Nichiban No. 533, etc.).</td></tr>
<tr><td>3</td><td>Degreasing, cleaning</td><td colspan="2">Clean all parts to be painted with white gasoline, normal alcohol, etc. to remove dirt, oil, fat, etc.</td></tr>
<tr><td>4</td><td>Primer paint</td><td colspan="2">First, apply one coat of primer to all parts to be painted, using air gun. Use primer (clear).</td></tr>
<tr><td>5</td><td>Drying</td><td colspan="2">Dry at normal temperature [10 to 15 min. at 20°C (68°F)].
In half-dried condition, PP primer paint is dissolved by solvent, e.g. thinner, etc. Therefore, if dust or dirt must be removed, use ordinary alcohol, etc.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Top coat paint (I)</td><td>Solid color</td><td>Metallic color</td></tr>
<tr><td>Use section (block) paint for top coat.
• Paint in use (for each color):
Solid paint
Hardener PB
Thinner T-301
• Mixing ratio:
Main agent vs. hardener = 4:1
• Viscosity: 10 — 13 sec/20°C (68°F)
• Film thickness: 35 — 45μ
• Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td><td>Use section (block) paint for top coat.
• Paint in use (for each color):
Metallic paint
Hardener PB
Thinner T-306
• Mixing ratio:
Main agent vs. hardener = 10:1
• Viscosity: 10 — 13 sec/20°C (68°F)
• Film thickness: 15 — 20μ
• Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td></tr>
<tr><td>7</td><td>Drying</td><td>Not required.</td><td>Dry at normal temperature [10 min. or more at 20°C (68°F)].
In half-dried condition, avoid dust, dirt.</td></tr>
<tr><td>8</td><td>Top coat paint (II)</td><td>Not required.</td><td>Apply a clear coat to parts with top coat paint (I), three times, at 5 — 7 minutes intervals.
• Paint in use:
Metallic paint
Hardener PB
Thinner T-301
• Mixing ratio: Clear vs. hardener = 6:1
• Viscosity: 14 — 16 sec/20°C (68°F)
• Film thickness: 25 — 30μ
• Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td></tr>
<tr><td>9</td><td>Drying</td><td colspan="2">60°C (140°F), 60 min. or 80°C (176°F), 30 min.
If higher than 80°C (176°F), PP may be deformed. Keep maximum temperature of 80°C (176°F).</td></tr>
<tr><td>10</td><td>Inspection</td><td colspan="2">Paint check</td></tr>
<tr><td>11</td><td>Masking removal</td><td colspan="2">Remove masking in process No. 2.</td></tr>
</table>

7. Repair Instructions for Colored PP Bumper

All PP bumpers are provided with a grained surface, and if the surface is damaged, it cannot normally be restored to its former condition. Damage limited to shallow scratches that cause only a change in the lustre of the base material or coating, can be almost fully restored. Before repairing a damaged area, explain this point to the customer and get an understanding about the matter.
Repair methods are outlined below, based on a classification of the extent of damage.

A: MINOR DAMAGE CAUSING ONLY A CHANGE IN THE LUSTRE OF THE BUMPER DUE TO A LIGHT TOUCH

It is almost restorable as follows:

Process No.	Process name	Job contents	
1	Cleaning	Clean the area to be repaired using water.	
2	Sanding	Grind the repairing area with #500 sand paper in a “feathering” motion.	
3	Finish	Resin section	Coated section
		Repeatedly apply wax to the affected area using a soft cloth (such as flannel). Recommended wax: NITTO KASEI Soft 99 TIRE WAX BLACK, or equivalent.	Perform either the same operation as for the resin section or process No. 18 and subsequent operations in the “3.” section, depending on the degree and nature of damage. Polish the waxed area with a clean cloth after 5 to 10 minutes.
		Polish the waxed area with a clean cloth after 5 to 10 minutes.	

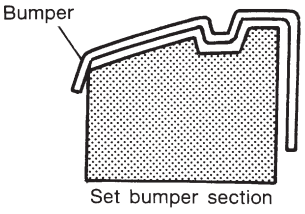
B: DEEP DAMAGE CAUSED BY SCRATCHING FENCES, ETC.

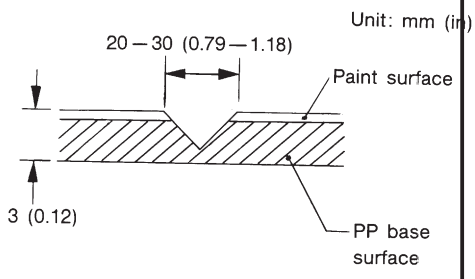
A dent cannot be repaired but a whitened or swelled part can be removed.

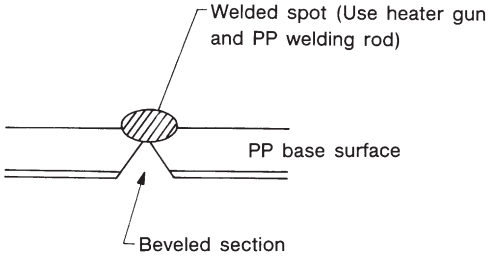
Process No.	Process name	Job contents	
1	Cleaning	Clean damaged area with water.	
2	Removal of damaged area	Cut off protruding area, if any, due to collision, using a putty knife.	
3	Sanding	Grind the affected area with #100 to #500 sand paper.	
4	Finish	Resin section	Coated section
		Same as process No. 3 in the “1.” section.	Perform process No. 12 and subsequent operations in the “3.” section.

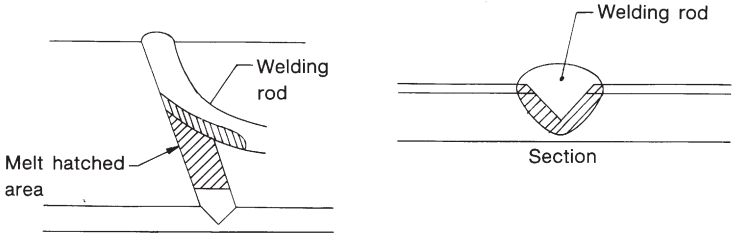
C: DEEP DAMAGE SUCH AS A BREAK OR HOLE THAT REQUIRES FILLING

Much of the peripheral grained surface must be sacrificed for repair, and the degree of restoration is not really worth the expense. (The surface, however, will become almost flush with adjacent areas.)
Recommended repair kit: PP Part Repair Kit (NRM)

Process No.	Process name	Job contents	
1	Bumper removal	Remove bumper as required.	
2	Parts removal	Place bumper on a paint work table as required.	
3	Bumper placement	Place bumper on a paint work table as required. It is recommended that contour of work table accommodates internal shape of bumper.	 G5M0164
4	Surface preparation	Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (NRM No. 900 precleno, white gasoline, or alcohol).	

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>5</td><td>Cutting</td><td>If nature of damage are cracks or holes, cut a guide slit of 20 to 30 mm (0.79 to 1.18 in) in length along the crack or hole up to the bumper's base surface. Then, bevel or "vee- out" the affected area using a knife or grinder.</td><td> 

G5M0165</td></tr>
<tr><td>6</td><td>Sanding (I)</td><td colspan="2">Grind beveled surface with sand paper (#40 to #60) to smooth finish.</td></tr>
<tr><td>7</td><td>Cleaning</td><td colspan="2">Clean the sanded surface with the same solvent as used in process No. 4.</td></tr>
<tr><td rowspan="3">8</td><td rowspan="3">Temporary welding</td><td colspan="2">Grind the side just opposite the beveled area with sand paper (#40 to #60) and clean using a solvent.
Temporarily spot-weld the side, using a PP welding rod and heater gun.</td></tr>
<tr><td colspan="2"> 

G5M0166</td></tr>
<tr><td colspan="2">NOTE:
● Do not melt welding rod until it flows out. This results in reduced strength.
● Leave the welded spot unattended until it cools completely.</td></tr>
<tr><td rowspan="3">9</td><td rowspan="3">Welding</td><td colspan="2">Using a heater gun and PP welding rod, weld the beveled spot while melting the rod and damaged area.
 

G5M0167</td></tr>
<tr><td colspan="2">NOTE:
● Melt the sections indicated by hatched area.
● Do not melt welding rod until it flows out, in order to provide strength.
● Always keep the heater gun 1 to 2 cm (0.4 to 0.8 in) away from the welding spot.
● Leave the welded spot unattended until it cools completely.</td></tr>
</table>

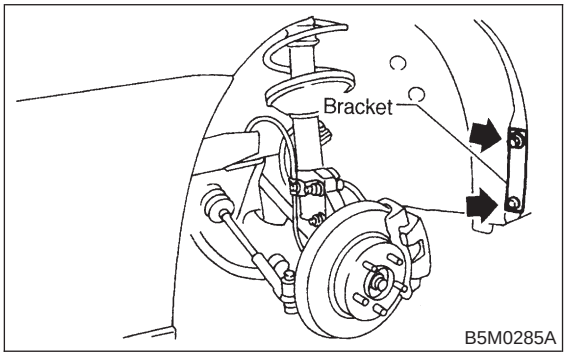
<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Sanding (II)</td><td colspan="2">Remove excess part of weld with a putty knife. If a drill or disc wheel is used instead of the knife, operate it at a rate lower than 1,500 rpm and grind the excess part little by little. A higher rpm will cause the PP substrate to melt from the heat.</td></tr>
<tr><td colspan="2"> 
G5M0168</td></tr>
<tr><td colspan="2">Sand the welded spot smooth with #240 sand paper.</td></tr>
<tr><td>11</td><td>Masking</td><td colspan="2">Mask the black substrate section using masking tape.
Recommended masking tape: Nichiban No. 533 or equivalent</td></tr>
<tr><td>12</td><td>Cleaning/ degreasing</td><td colspan="2">Completely clean the entire coated area, using solvent similar to that used in process No. 4.</td></tr>
<tr><td>13</td><td>Primer coating</td><td colspan="2">Apply a coat of primer to the repaired surface and its surrounding areas. Mask these areas, if necessary.
Recommended primer: Mp/ 364 PP primer
NOTE:
Be sure to apply one coat of primer at a spraying pressure of 245 to 343 kPa (2.5 to 3.5 kg/cm^2, 36 to 50 psi) with a spray gun.</td></tr>
<tr><td>14</td><td>Leave unattended.</td><td colspan="2">Leave the repaired area unattended at 20°C (68°F) for 10 to 15 minutes until primer is half-dry.
NOTE:
If dirt or dust comes in contact with the coated area, wipe it off with a cloth dampended with alcohol. (Do not use thinner since the coated area tends to melt.)</td></tr>
<tr><td>15</td><td>Primer surfacer coating</td><td colspan="2">Apply a coat of primer surfacer to the repaired area two or three times at an interval of 3 to 5 minutes.
Recommended surfacer:
● UPS 300 Flex primer
● No. 303 UPS 300 Exclusive hardener
● NPS 725 Exclusive reducer (thinner)
● Mixing ratio: 2 : 1 (UPS 300: No. 303)
● Viscosity: 12 — 14 sec/20°C (68°F)
● Coated film thickness: 40 — 50µ</td></tr>
<tr><td>16</td><td>Drying</td><td colspan="2">Allow the coated surface to dry for 60 minutes at 20°C (68°F) [or 30 minutes at 60°C (140°F)].</td></tr>
<tr><td>17</td><td>Sanding (III)</td><td colspan="2">Sand the coated surface and its surrounding areas using #400 sand paper and water.</td></tr>
<tr><td>18</td><td>Cleaning/ degreasing</td><td colspan="2">Same as process No. 12.</td></tr>
<tr><td rowspan="2">19</td><td rowspan="2">Top coat</td><td>Solid color</td><td>Metallic color</td></tr>
<tr><td>Use a “block” coating method.
● Recommended paint:
Suncryl (SC)
No. 307 Flex hardener
SC reducer (thinner)
● Mixing ratio: 3 : 1
Suncryl (SC) vs. No. 307 Flex hardener
● Viscosity: 11 — 13 sec/20°C (68°F)
● Coated film thickness: 40 — 50µ
● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td><td>Use a “block” coating method.
● Recommended paint:
Suncryl (SC)
No. 307 Flex hardener
SC Reducer (thinner)
● Mixing ratio: 3 : 1
Suncryl (SC) vs. No. 307 Flex Hardener
● Viscosity: 11 — 13 sec/20°C (68°F)
● Coated film thickness: 20 — 30µ
● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)</td></tr>
<tr><td>20</td><td>Leave unattended.</td><td>Not required.</td><td>Leave unattended at 20°C (68°F) for at least 10 minutes until the top coated area is half-dry.
NOTE:
Be careful to keep dust or dirt from coming in contact with the affected area.</td></tr>
</table>

Process No.	Process name	Job contents	
21	Top coat (II)	Not required.	Apply a clear coat three times at an interval of 3 to 5 minutes. ● Recommended paint: Suncryl (SC) No. 307 Flex hardener SC Reducer (thinner) ● Mixing ratio: 3 : 1 Suncryl (SC) vs. No. 307 Flex Hardener ● Viscosity: 11 — 13 sec/20°C (68°F) ● Coated film thickness: 20 — 30μ ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
22	Drying	Allow the coated surface to dry at 20°C (68°F) for two hours or 60°C (140°F) for 30 minutes. NOTE: Do not allow the temperature to exceed 80°C (176°F) since this will deform the PP substrate.	
23	Inspection	Carefully check the condition of the repaired area.	
24	Masking removal	Remove masking tape applied in process No. 11 and 13.	
25	Parts installation	Install parts on bumper in reverse order of removal.	
26	Bumper installation	Install bumper.	

8. Front Fender

A: REMOVAL AND INSTALLATION

1) Disconnect ground cable from battery.
2) Remove bracket which secures mud guard to front fender.

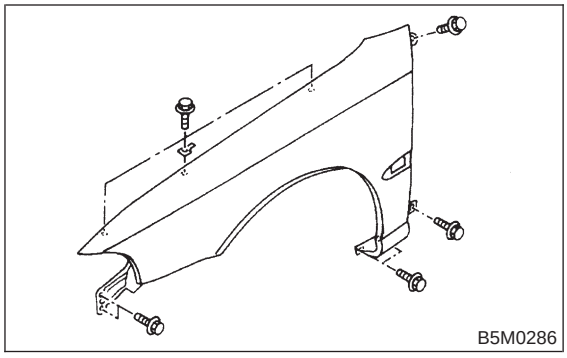


3) Remove mud guard. <Ref. to 5-1 [W9A1].> and <Ref. to 5-1 [W9A2].>

NOTE:
Do not remove the entire mud guard, only the front section of it.

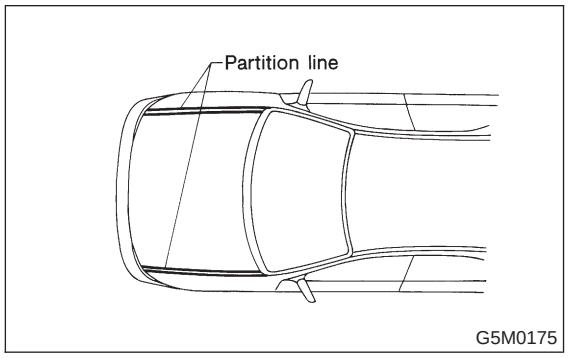
4) Remove headlight. <Ref. to 6-2 [W4B2].>

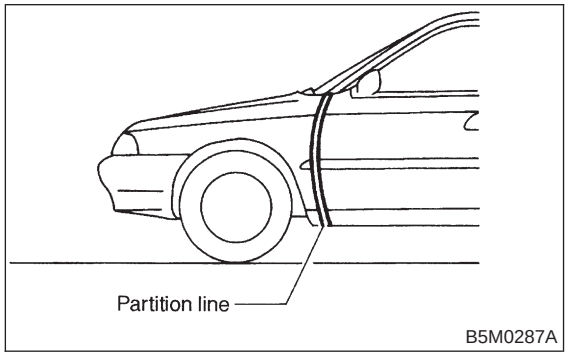
5) Remove bolts which secure front fender. Remove front fender.



6) Installation is in the reverse order of removal.

NOTE:
Check for alignment of front fender with hood and front door with front fender at all points. Adjust, if necessary.



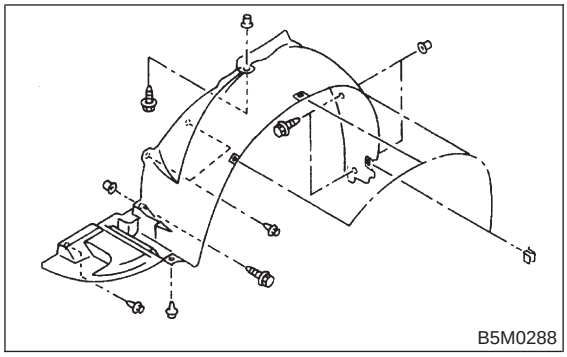


9. Mud Guard and Rear Arch Protector

A: REMOVAL AND INSTALLATION

1. MUD GUARD (EXCEPT OUTBACK MODEL)

1) Jack-up vehicle to remove tire.
2) Remove screws and clips. Move mud guard toward the center of the body and remove mud guard.

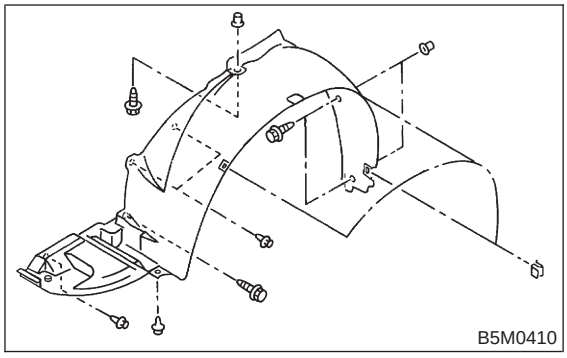


3) Installation is in the reverse order of removal.

CAUTION:
Only use new screws and clips.

2. MUD GUARD (OUTBACK MODEL)

1) Jack-up vehicle to remove tire.
2) Remove screws and clips. Move mud guard toward the center of the body and remove mud guard.

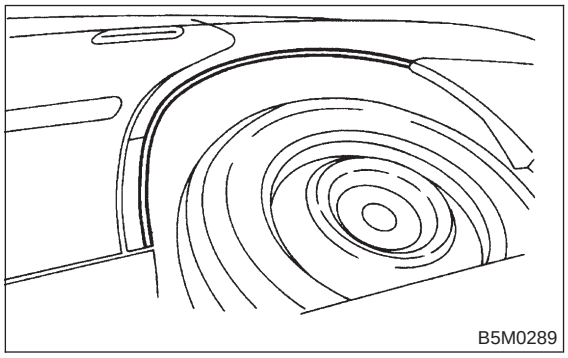


3) Installation is in the reverse order of removal.

CAUTION:
Only use new screws and clips.

3. REAR ARCH PROTECTOR

1) Remove rear arch protector.



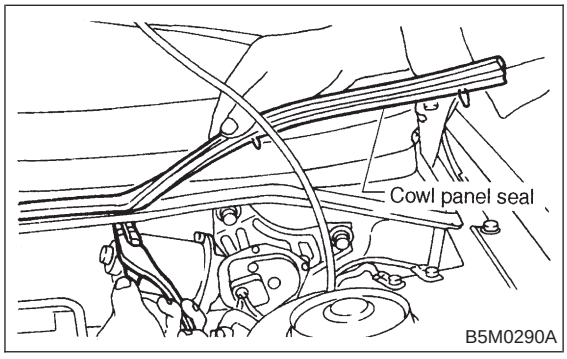
2) Installation is in the reverse order of removal.

CAUTION:
Only use new screws and clips.

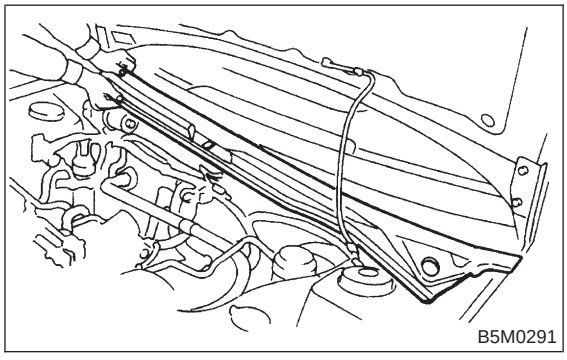
10. Cowl Panel

A: REMOVAL AND INSTALLATION

1) Remove wiper arms.
2) Open front hood.
3) Remove cowl panel seal using a plier.



4) Lift cowl panel and detach it from clips attached to body panel.



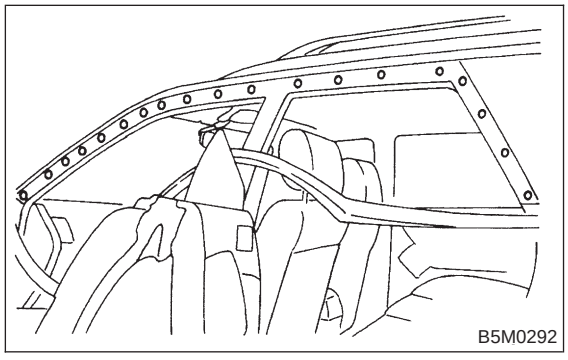
5) Installation is in the reverse order of removal.

NOTE:
When installing cowl panel, first attach a middle clip to the cap attached to body panel. Then tap the cowl panel to attach it to other clips.

11. Molding and Retainer

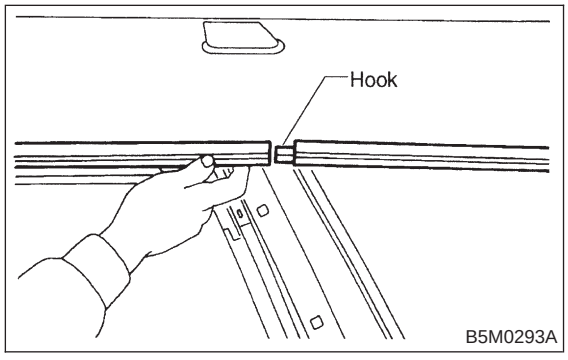
A: REMOVAL AND INSTALLATION

1) Remove weatherstrip.
2) Remove tapping screws.



3) Installation is in the reverse order of removal.

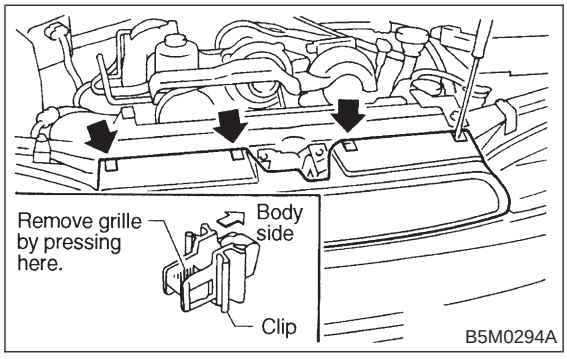
NOTE:
Insert molding and retainer onto hook, then fasten with screws.Insert molding and retainer onto hook, then fasten with screws.



12. Front Grille

A: REMOVAL AND INSTALLATION

1) Remove four upper clips from body panel. To facilitate removal, press portion shown in figure using screwdriver.



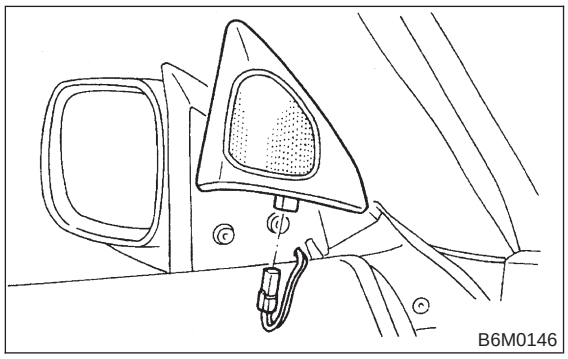
2) Pull front grille to detach it from two lower clips. (Two lower clips remain on headlight.)
3) Installation is in the reverse order of removal.

NOTE:
Attach all clips to grille. Align them with clip hole in body and push them into place.

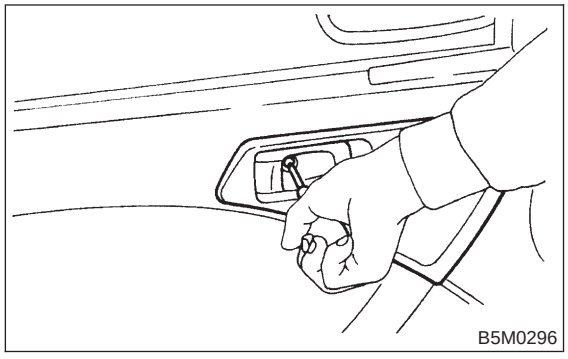
13. Door Mirror

A: REMOVAL AND INSTALLATION

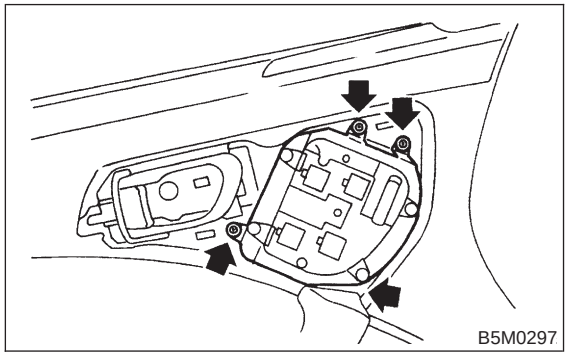
1) Remove the gusset cover.



2) Remove inner remote control switch cover.

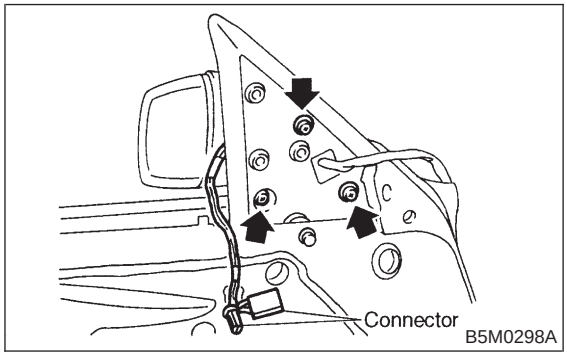


3) Remove front door trim.



4) Remove front door trim.

5) Disconnect the door mirror connector.
6) Remove the door mirror installation screws.

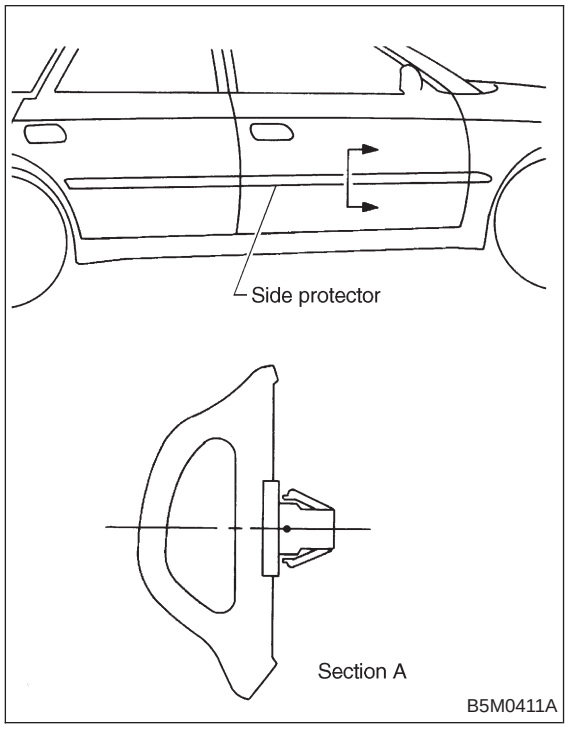


7) Installation is in the reverse order of removal.

14. Side Protector

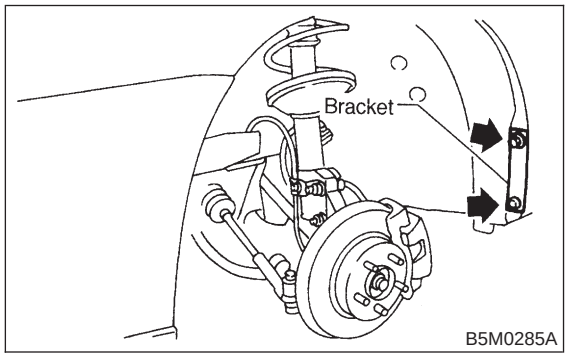
A: REMOVAL AND INSTALLATION

Side protector consists of three parts; front fender, front door and rear door.



1. SIDE PROTECTOR FRONT FENDER PORTION

1) Remove bracket which secures mud guard to front fender.



2) Remove mud guard. <Ref. to 5-1 [W9A1].> and <Ref. to 5-1 [W9A2].>

NOTE:
Detach the rear part of mud guard as required for the procedure. It is not necessary to remove the entire mud guard.

3) Use pliers to remove a clip from inside front fender. Remove it from vehicle body but keep it with side protector.
4) Installation is in the reverse order of removal.

CAUTION:
Insert clips firmly and carefully by hand. To avoid damaging clips, do not forcefully push or hit clips.

2. SIDE PROTECTOR FRONT DOOR AND REAR DOOR PORTIONS

1) Remove trim panel. <Ref. to 5-2 [W2A2].>
2) Use pliers to remove clips from inside of doors. Remove them from vehicle body but keep them with side protector.

NOTE:
Front door portion has five clips, rear door portion has four clips.

3) Installation is in the reverse order of removal.

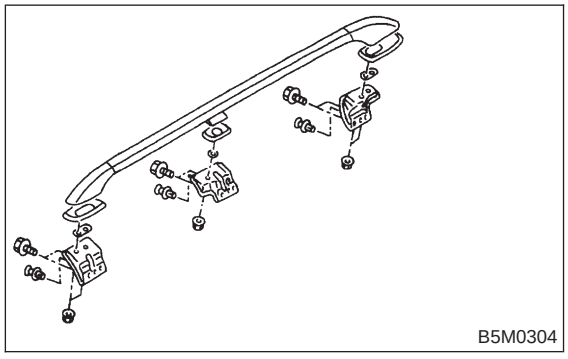
CAUTION:
Insert clips firmly and carefully by hand. To avoid damaging clips, do not forcefully push or hit clips.

NOTE:
To install side protector front door and rear door portions, insert the first clip into the base hole [9 mm (0.35 in) dia.], and then insert other clips.

15. Roof Rail

A: REMOVAL AND INSTALLATION

1) Remove roof trim, rear quarter trim, pillar trim, etc. <Ref. to 5-3 [W5A0].>
2) Remove flange bolts.
3) Remove flange nuts.
4) Remove roof rail.



5) Installation is in the reverse order of removal.

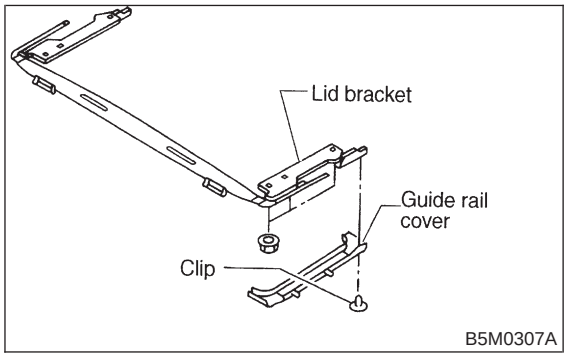
CAUTION:
To prevent deformation, be sure to install roof rail in steps 4), 3), 2) and 1), in that order.

16. Sunroof

A: REMOVAL AND INSTALLATION

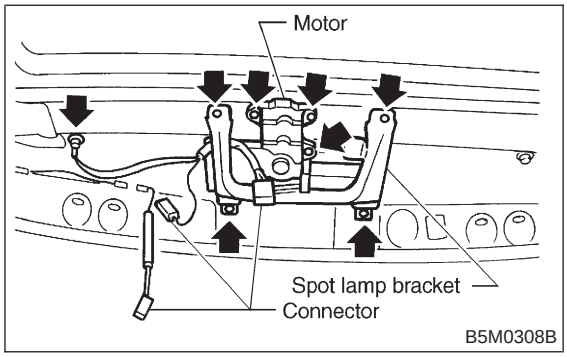
1. SEDAN AND WAGON REAR (EXCEPT OUTBACK)

1) Glass lid assembly:
(1) Completely open sun shade. (Push it back far.)
(2) Remove a clip and detach guide rail cover.
(3) Remove six nuts from the left and right lid bracket.
(4) Working inside, slightly raise glass lid assembly until it is disengaged from lid bracket.

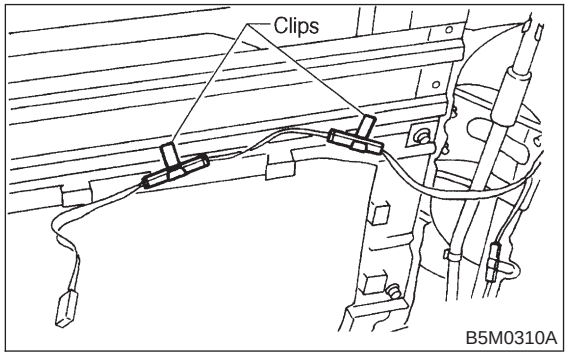


(5) Hold both ends of glass lid assembly and remove it at an angle.
(6) Installation is in the reverse order of removal.

2) Sunroof motor and relay:
(1) Remove center pillar trim upper. <Ref. to 5-3 [W5A3].>
(2) Remove front pillar trim upper. <Ref. to 5-3 [W5A4].>
(3) Remove assist grip on left side.
(4) Remove sunvisor with hook.
(5) Remove sunroof switch.
(6) Remove rearview mirror.
(7) While rolling up roof trim, disconnect harness clips and connector.
(8) While rolling up roof trim, remove spot lamp bracket and sunroof motor.
(9) Installation is in the reverse order of removal.



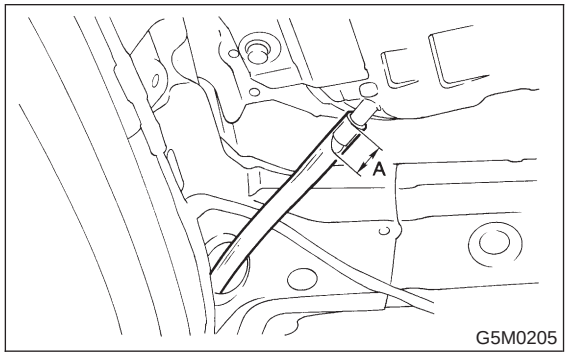
3) Sunroof frame:
(1) Remove sunroof switch, center and rear room lamps.
(2) Remove roof trim, rear quarter trim, pillar trim, etc. <Ref. to 5-3 [W5A0].>
(3) Remove glass lid assembly.
(4) Remove two harness support clips.



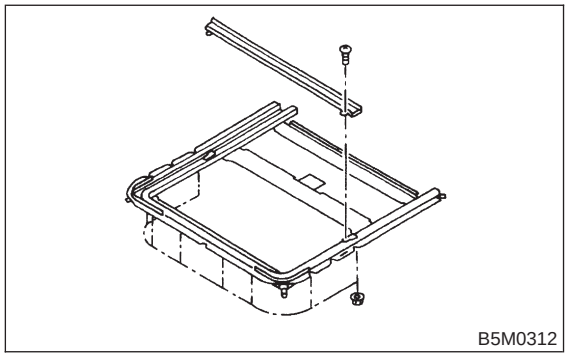
(5) Disconnect harness clips and connector of sunroof motor.
(6) Disconnect front and rear drain tubes.

CAUTION:
When installing drain tube, insert it securely into drain pipe.

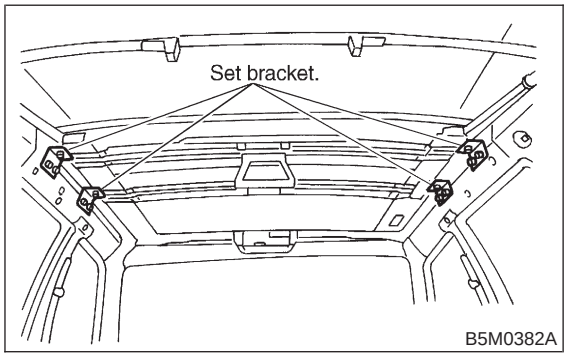
Length A:
15 mm (0.59 in) or more



(7) Remove eight nuts.



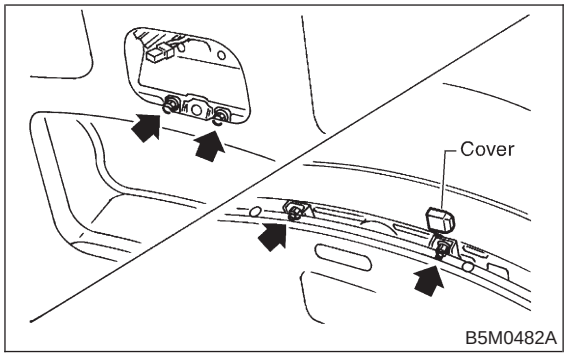
(8) Remove set bracket mounting bolts.
(9) Remove sunroof frame.



(10) Installation is in the reverse order of removal.

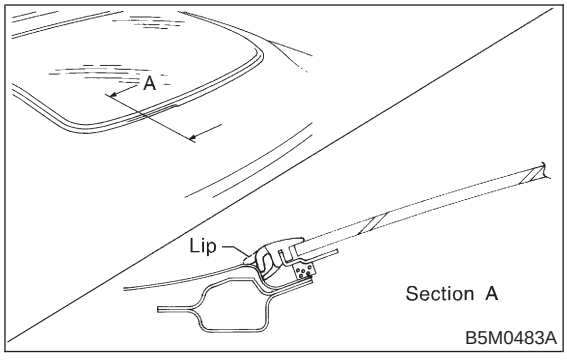
2. WAGON FRONT (OUTBACK)

1) Sunroof panel:
(1) Tilt up the front sunroof (Most upper position).
(2) Disconnect ground cable from battery.
(3) Remove sunroof switch then remove two bolts.
(4) Remove cover then remove two nuts from tilt up assembly.
(5) Take off the sunroof panel from body.

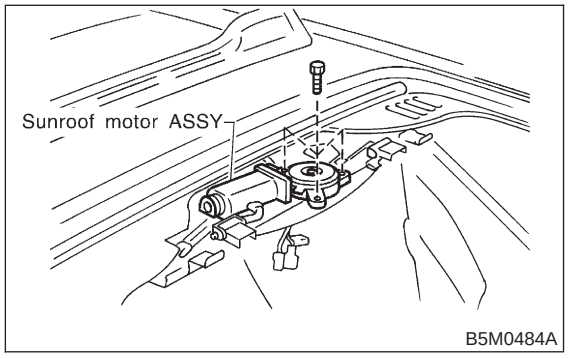


(6) Installation is in the reverse order of removal.

CAUTION:
When installing sunroof panel, ensure not to pinch its panel end lip.



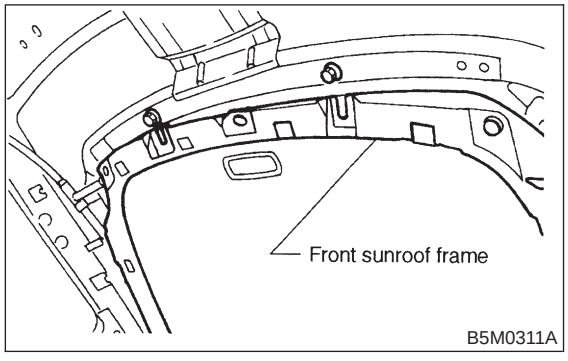
2) Sunroof motor assembly:
(1) Remove sunroof panel. <Ref. to 5-1 [W16A2].>
(2) Remove motor cover.
(3) Disconnect connector then remove sunroof motor assembly.



(4) Installation is in the reverse order of removal.

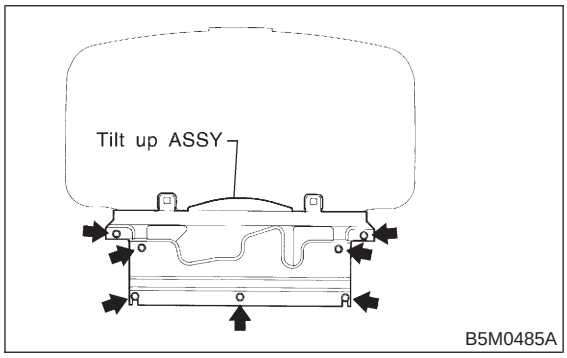
3) Sunroof flame:
(1) Remove sunroof panel. <Ref. to 5-1 [W16A2].>
(2) Remove roof trim panel. <Ref. to 5-3 [W5A9].>
(3) Remove sunroof flame.

NOTE:
To facilitate installation, leave the two front mounting bolts on the body.



(4) Installation is in the reverse order of removal.

4) Tilt up assembly:
(1) Remove sunroof flame. <Ref. to 5-1 [W16A2].>
(2) Remove tilt up assembly.



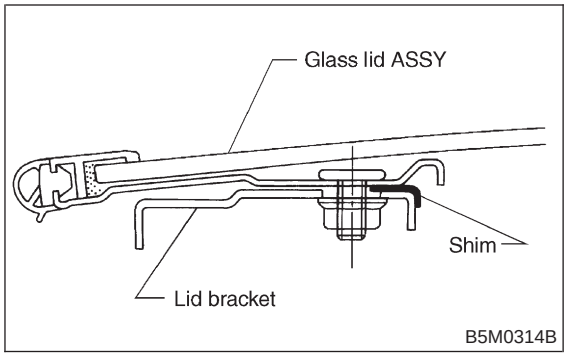
(3) Installation is in the reverse order of removal.

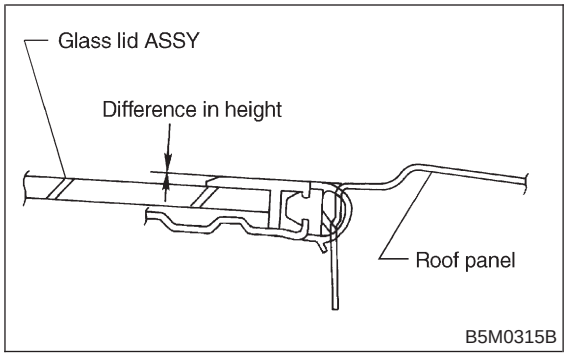
B: ADJUSTMENT

1. SEDAN AND WAGON REAR (EXCEPT OUTBACK)

1) Alignment of height between glass lid assembly and roof panel:
(1) Remove guide rail cover.
(2) Loosen nuts and adjust height by adding (Max: two pieces) and extracting (Max: one piece) shim(s) (Standard: one piece) between glass lid assembly and lid bracket.

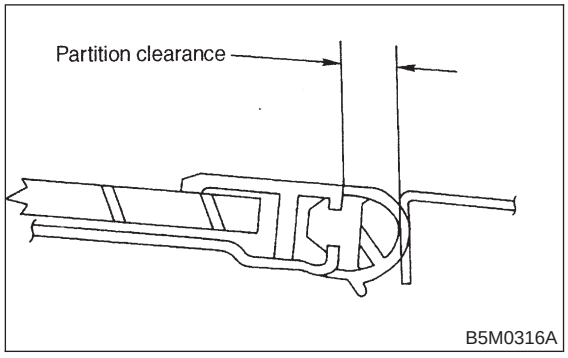
Difference in height between glass lid assembly and roof panel:
0±0.5 mm (0±0.020 in)



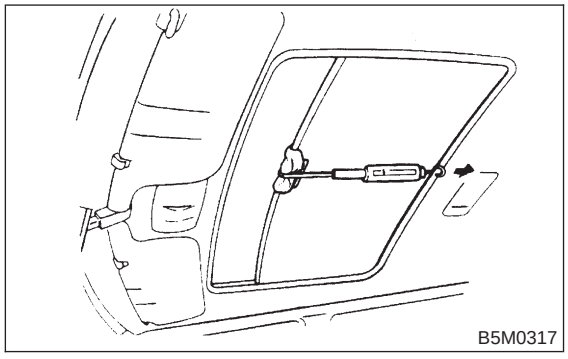


2) Alignment of glass lid assembly with roof panel:
(1) Remove guide rail cover.
(2) Loosen nuts and move glass lid assembly to either side to adjust front, rear, right, and left side partitions.

Partition clearance:
7.0±0.5 mm (0.276±0.020 in)



3) Checking for movement of glass lid assembly itself:
(1) Before installing sunroof motor, check glass lid assembly for movement.
(2) Place a cloth on glass lid assembly and sun shade, and attach a spring scale to glass lid assembly edge using the cloth.



(3) Pull spring scale to measure force required to move glass lid assembly.

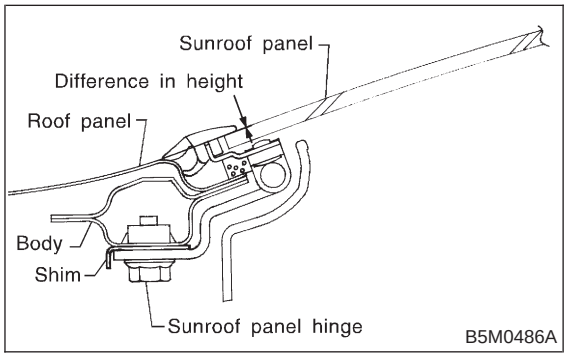
Force required to move glass lid assembly and sun shade trim:
Less than 196 N (20 kg, 44 lb)

Considerable effort is required to start glass lid assembly moving, so take scale reading while glass lid assembly is moving smoothly.
(4) If force required exceeds specifications, check the following points:
- Glass lid assembly, sun shade and deflector and guide rail assembly for improper installation
- Cable for seizure

2. WAGON FRONT (OUTBACK)

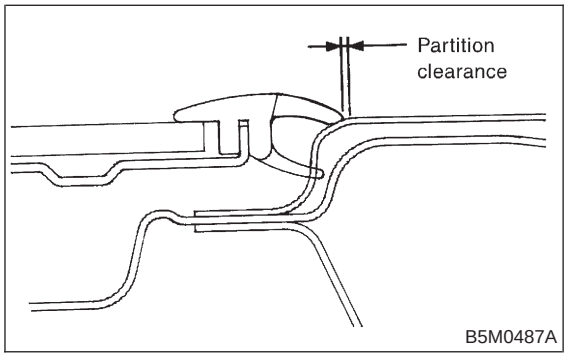
1) Alignment of height between sunroof panel and roof panel
Loosen sunroof panel installation bolts and nuts then adjust height by adding (Max: two pieces) and extracting (Max: one piece) shim(s) (Standard: one piece) between sunroof panel hinge and body.

Difference in height between sunroof panel and roof panel:
0±1.0 mm (0±0.039 in)



2) Alignment of partition clearance
Loosen sunroof panel installation bolts and nuts then move glass to either side to adjust front, rear, right, and left side partitions.

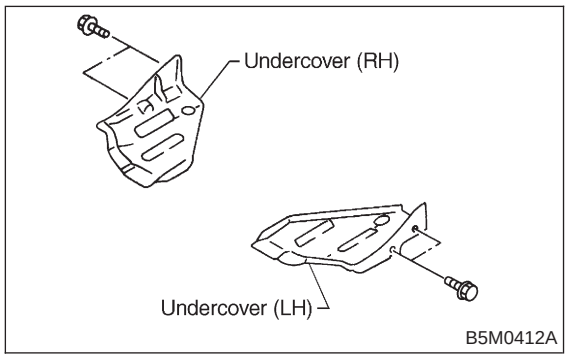
Partition clearance:
1±1.0 mm (0.04±0.039 in)



17. Undercover

A: REMOVAL AND INSTALLATION

1) Remove undercover mounting bolts.



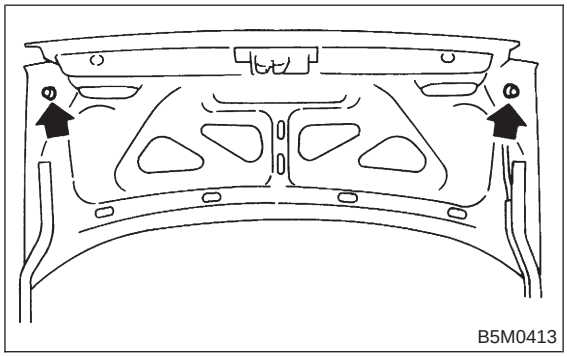
2) Installation is in the reverse order of removal.

NOTE:
Undercover is bolted along with mud guard.

18. Rear Spoiler

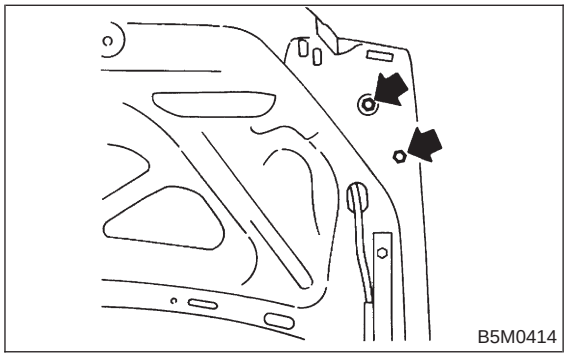
A: REMOVAL AND INSTALLATION

1) Open trunk lid.
2) Disconnect high-mount stop light connector located inside the trunk lid.
3) Remove rubber caps.



4) Remove rear spoiler mounting nuts.

CAUTION:
When removing nuts, be careful not to drop them inside rear gate.



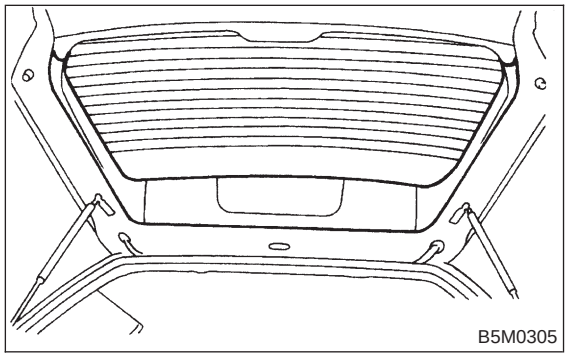
5) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

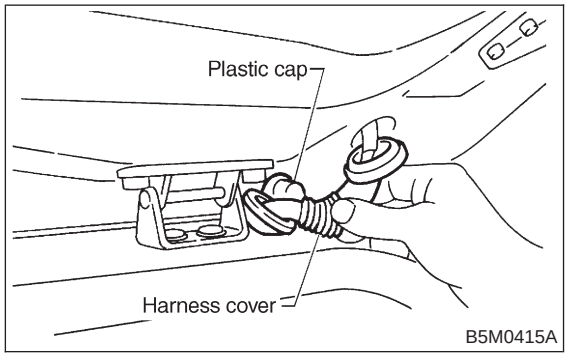
19. Roof Spoiler

A: REMOVAL AND INSTALLATION

1) Open rear gate and remove rear gate trim upper and side.

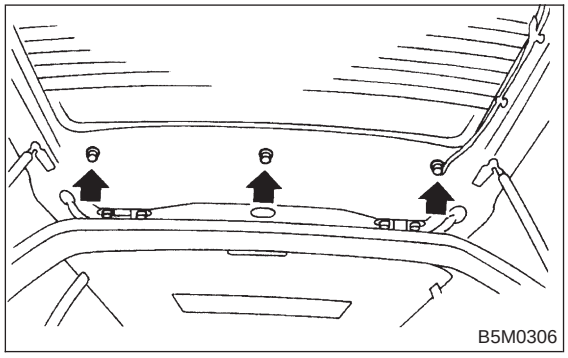


2) Remove high-mount stop light. <Ref. to 6-2 [W6A4].>
3) Remove plastic caps and harness covers.



4) Remove roof spoiler mounting nuts.

CAUTION:
● When removing nuts, be careful not to drop them inside rear gate.
● Be careful since two-sided tape is placed between roof spoiler and body panel.



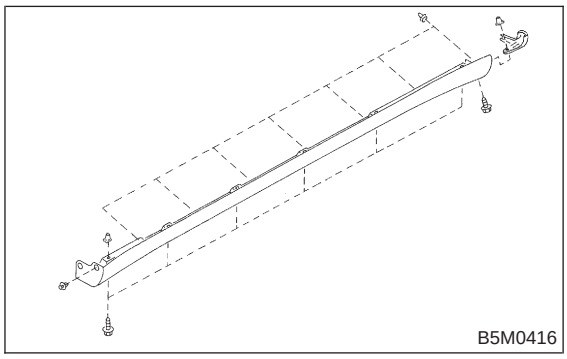
5) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

20. Side Spoiler

A: REMOVAL AND INSTALLATION

1) Remove tapping screws, clip and end cover.

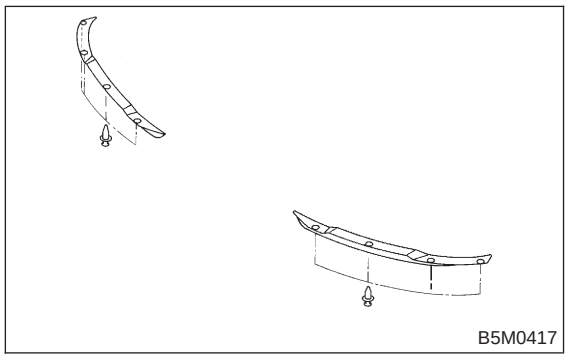


2) Installation is in the reverse order of removal.

21. Front Under Spoiler

A: REMOVAL AND INSTALLATION

1) Remove clips.

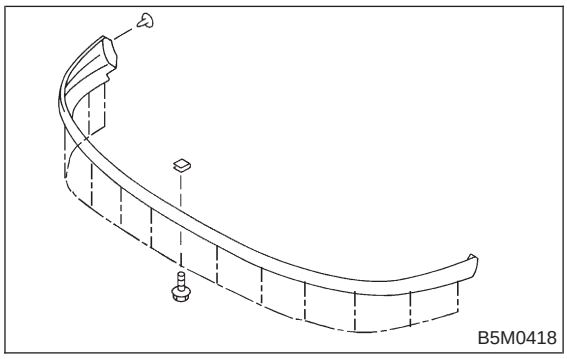


2) Installation is in the reverse order of removal.

22. Airdam Skirt

A: REMOVAL AND INSTALLATION

1) Remove airdam skirt mounting bolts and clips.

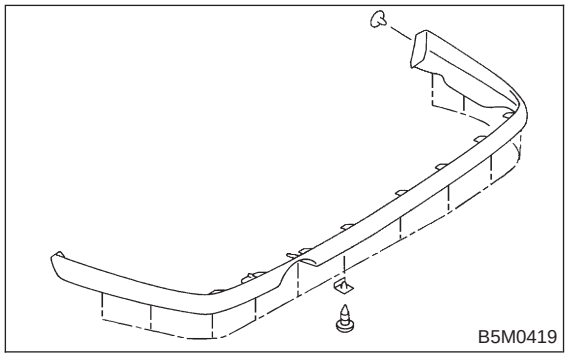


2) Installation is in the reverse order of removal.

23. Rear Under Spoiler

A: REMOVAL AND INSTALLATION

1) Remove tapping screws and clips.



2) Installation is in the reverse order of removal.

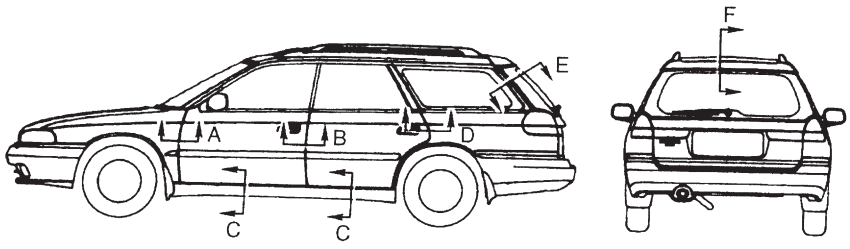
NOTE:
- 12 tapping screws are used for Sedan.
- 14 tapping screws are used for Wagon.

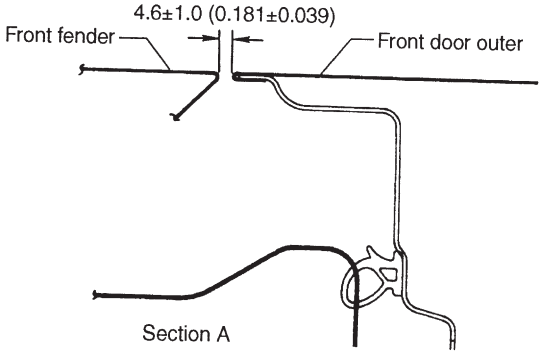
1. Sunroof

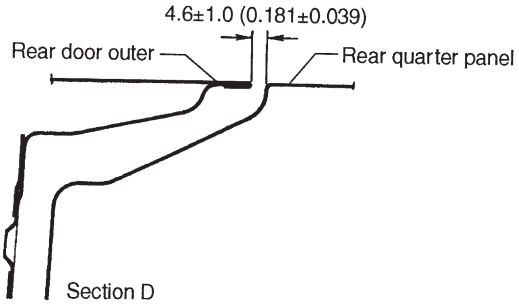
Entry of water into compartment	(1) Check roof panel and glass lid assembly for improper or poor sealing. (2) Check drain tube for clogging. (3) Check sunroof frame seal and body for improper fit.
Booming noise	(1) Check glass lid assembly and roof panel for improper clearance. (2) Check sun shade and roof trim for improper clearance.
Abnormal motor noise	(1) Check motor for looseness. (2) Check gears and bearings for wear. (3) Check cable for wear. (4) Check cable pipe for deformities.
Failure of sunroof to operate (Motor operates properly.)	(1) Check guide rail for foreign particles. (2) Check guide rail for improper installation. (3) Check parts for mutual interference. (4) Check cable slider for improper clinching. (5) Check cable for improper installation. (6) Check clutch adjustment nut for improper tightness.
Motor does not rotate or rotates improperly. (Use sunroof wrench to check operation.)	(1) Check fuse for blowout. (2) Check switch for improper function. (3) Check motor for incorrect terminal voltage. (4) Check relay for improper operation. (5) Check poor grounding system. (6) Check cords for discontinuity and terminals for poor connections. (7) Check limit switch for improper operation.

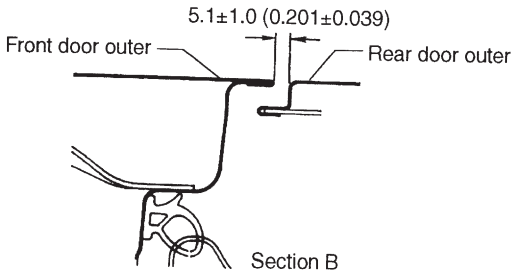
DOORS AND WINDOWS 5-2

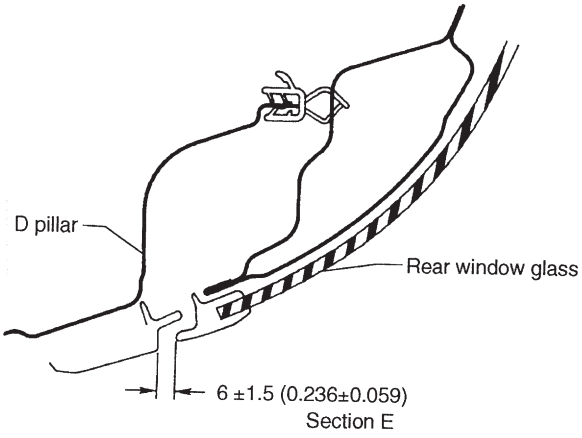
1. Door Alignment

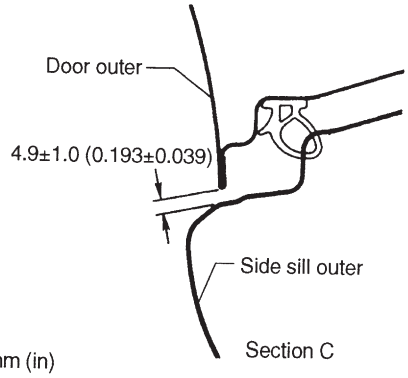


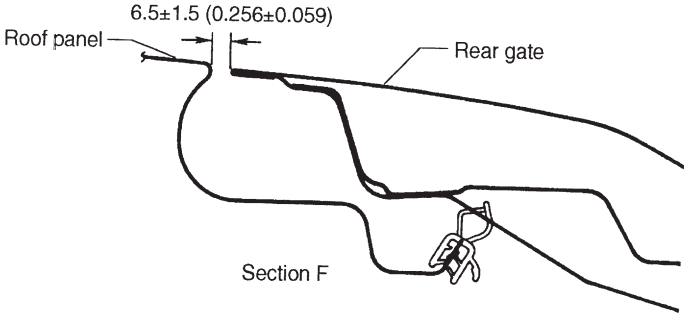








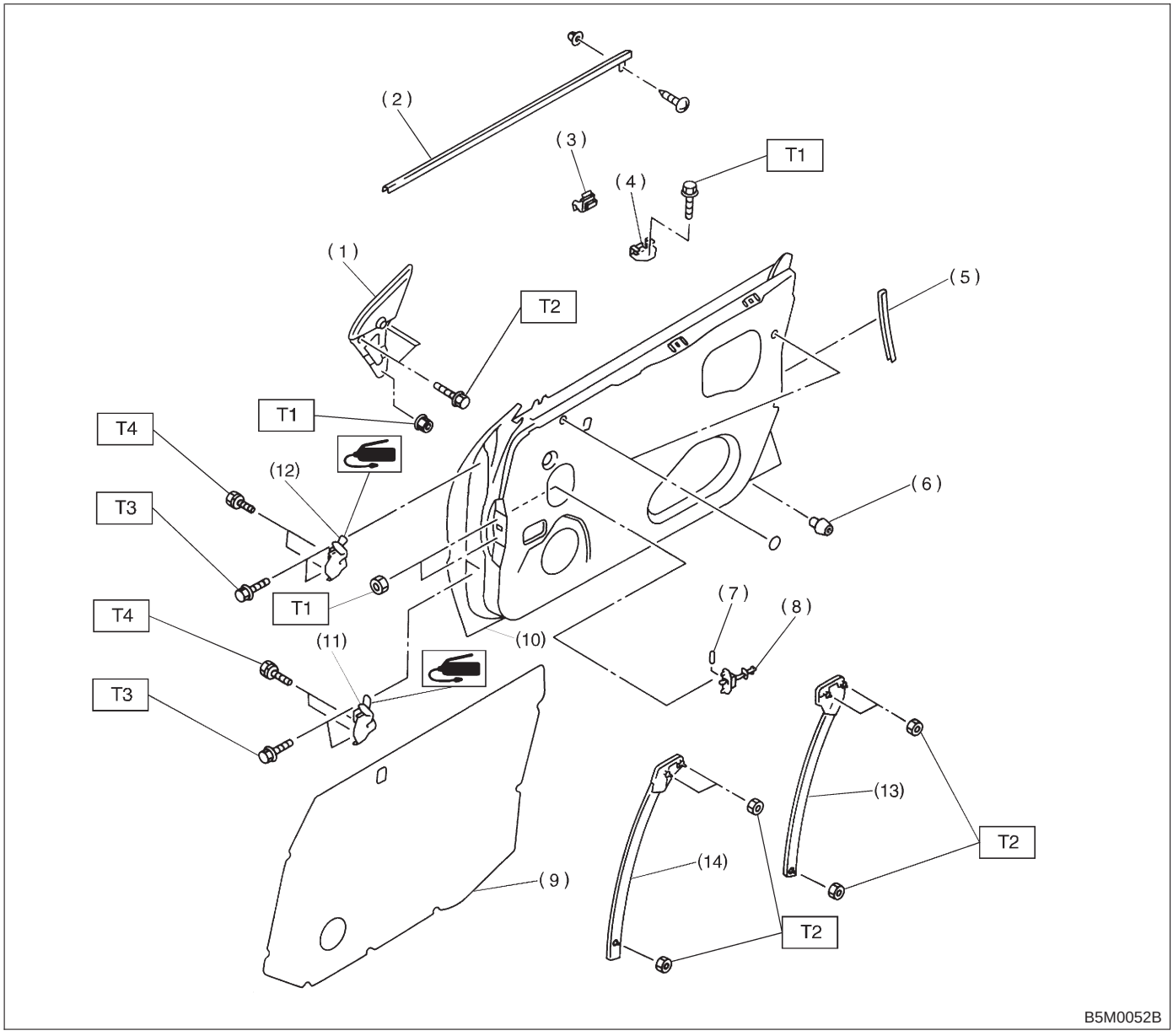




Unit: mm (in)

B5M0051A

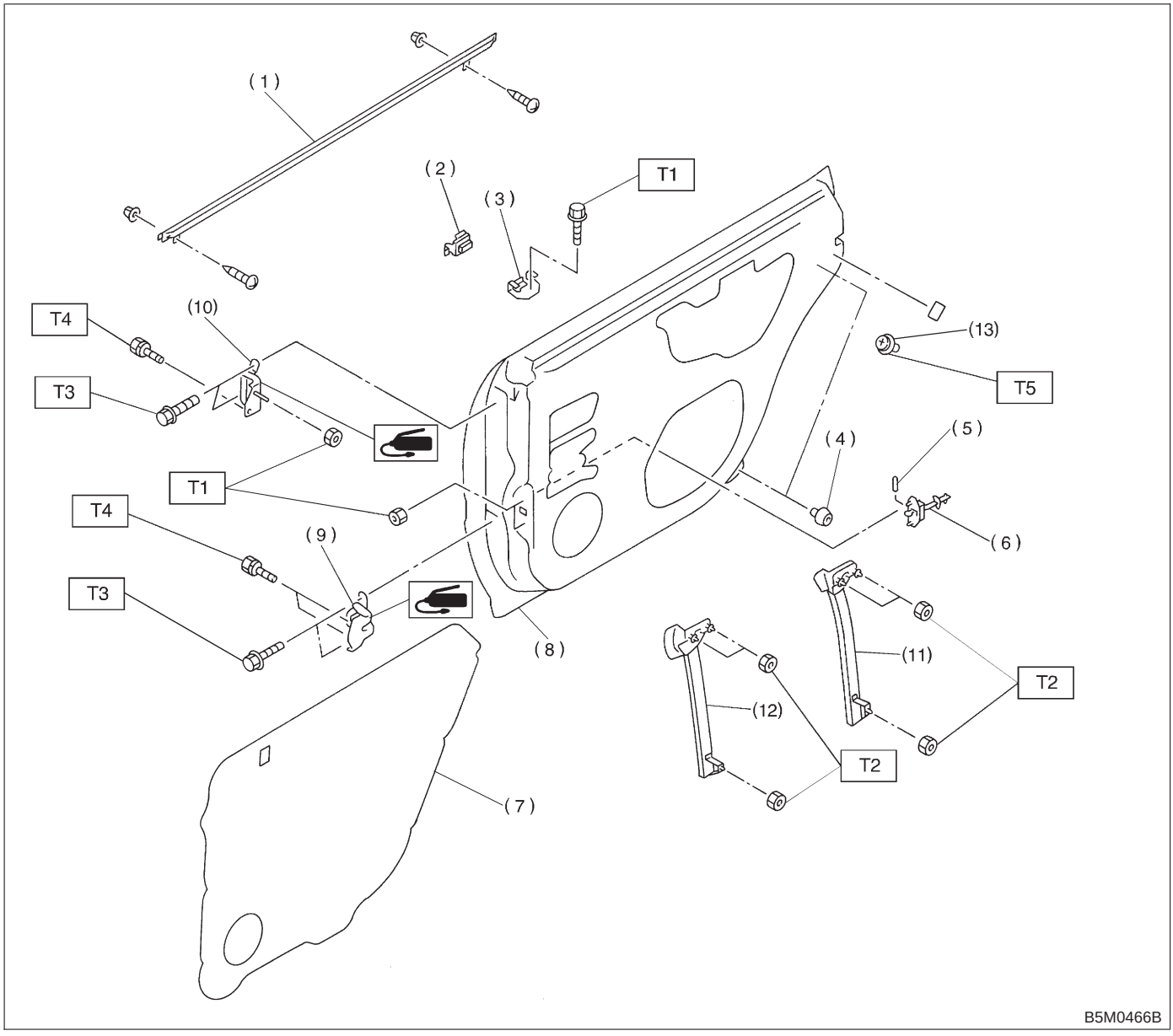
1. Front Door



(1) Gusset
(2) Weatherstrip (Outer)
(3) Stabilizer (Outer)
(4) Stabilizer (Inner)
(5) Protector
(6) Stopper
(7) Knock pin
(8) Checker
(9) Sealing cover
(10) Door panel
(11) Lower hinge
(12) Upper hinge
(13) Door sash (Rear)
(14) Door sash (Front)

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 13±3 (1.3±0.3, 9.4±2.2)
T3: 25±3 (2.5±0.3, 18.1±2.2)
T4: 29±5 (3.0±0.5, 21.7±3.6)

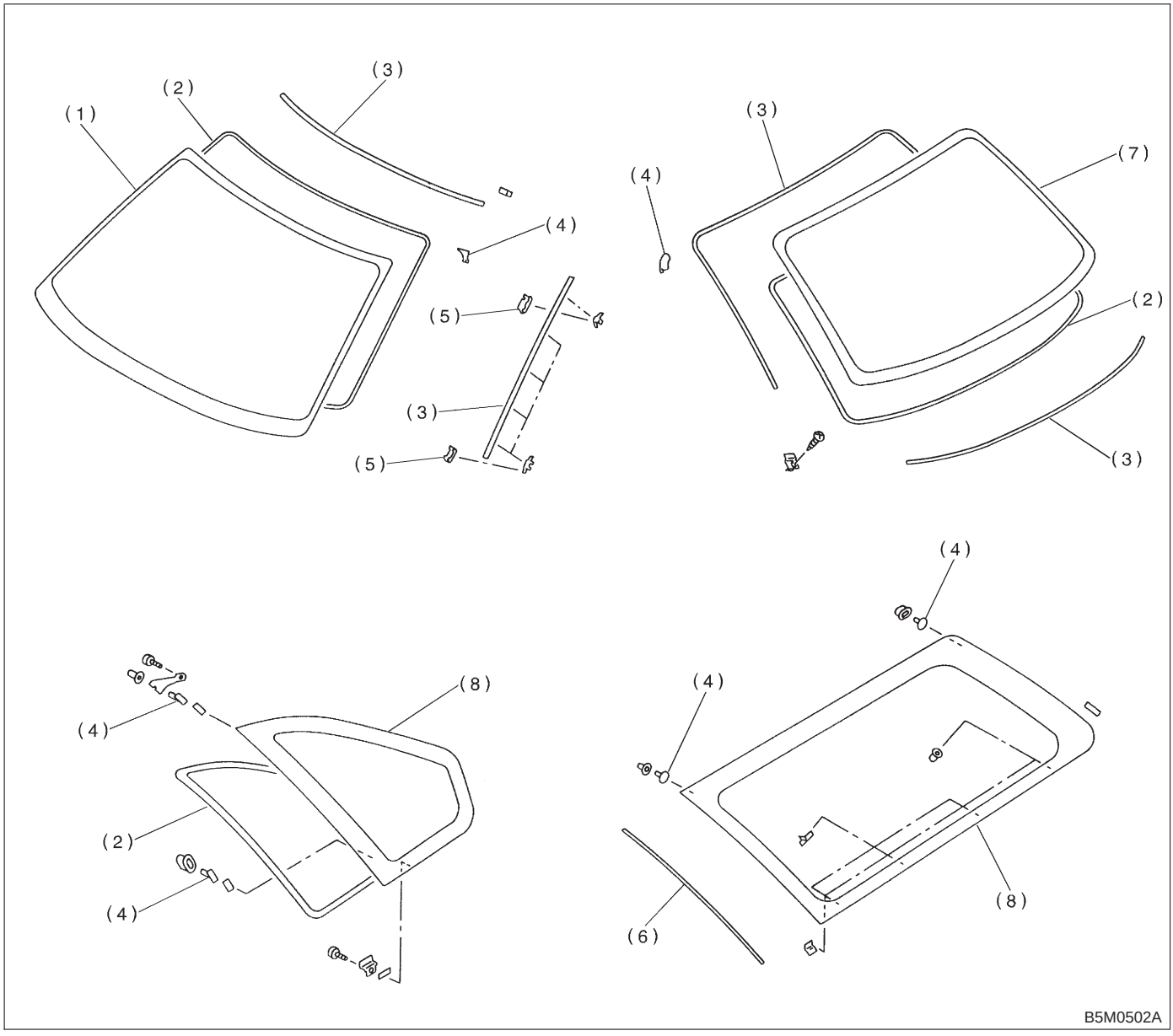
2. Rear Door



(1) Weatherstrip (Outer)
(2) Stabilizer (Outer)
(3) Stabilizer (Inner)
(4) Stopper
(5) Knock pin
(6) Checker
(7) Seating cover
(8) Door panel
(9) Lower hinge
(10) Upper hinge
(11) Door sash (Rear)
(12) Door sash (Front)
(13) Rear door catcher

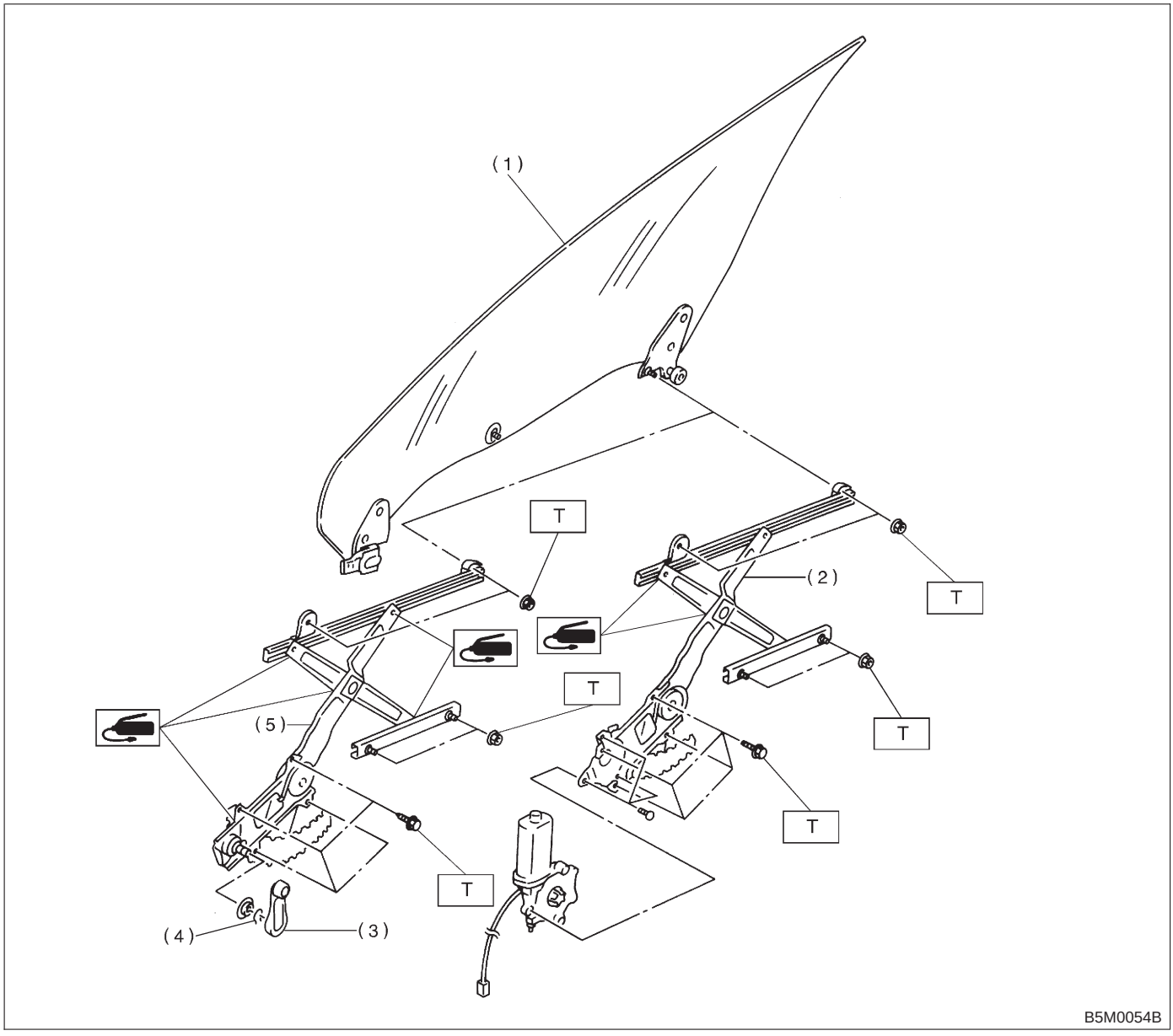
Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 14±4 (1.4±0.4, 10.1±2.9)
T3: 25±3 (2.5±0.3, 18.1±2.2)
T4: 29±5 (3.0±0.5, 21.7±3.6)
T5: 37±10 (3.8±1.0, 27.5±7.2)

3. Fixed Glass



(1) Windshield glass
(2) Dam rubber
(3) Molding
(4) Locate pin
(5) Fastener
(6) Garnish
(7) Rear window glass
(8) Rear quarter glass

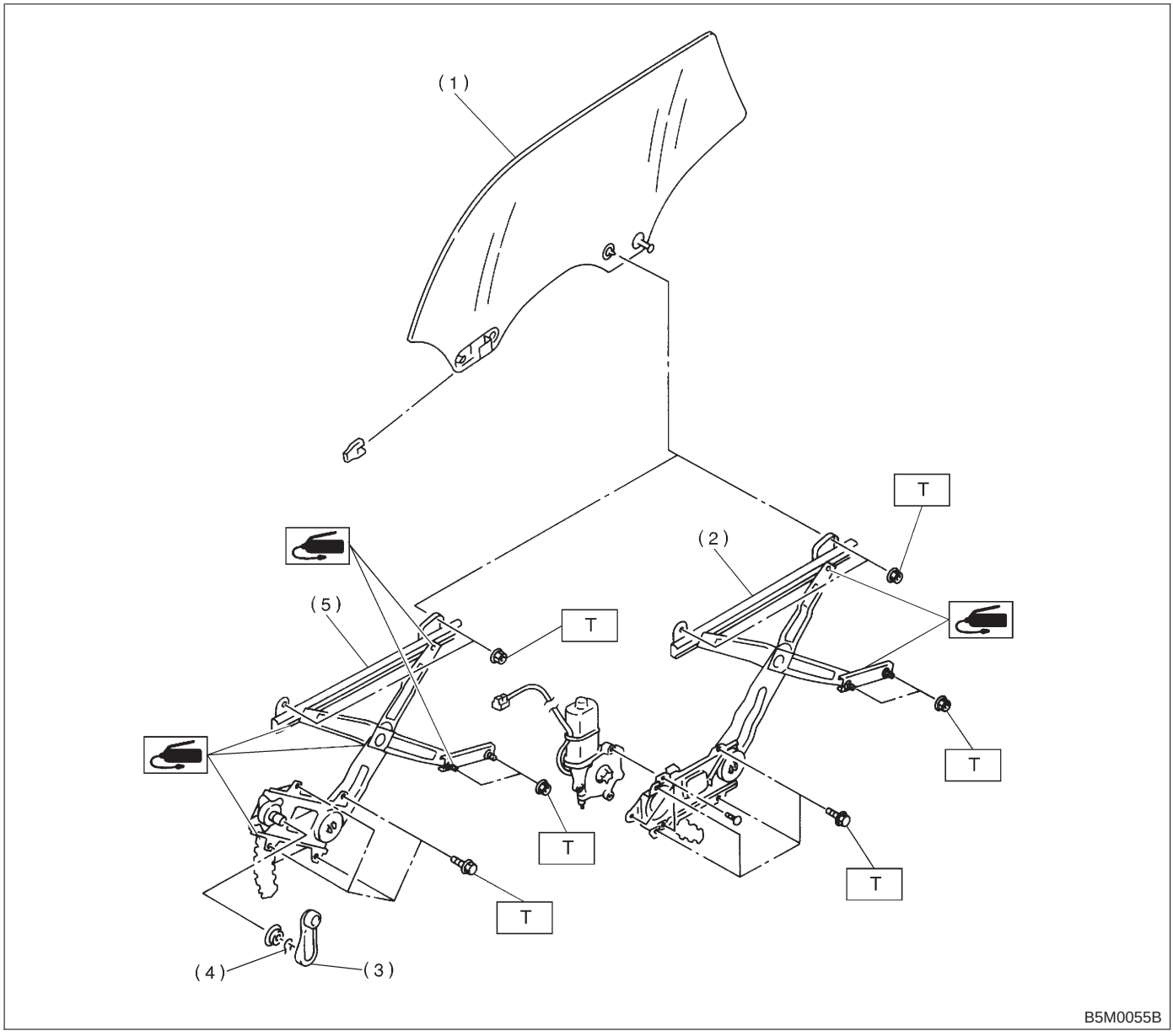
4. Front Door Glass



(1) Glass
(2) Regulator and motor ASSY
(3) Regulator handle (Except power window)
(4) Retainer spring
(5) Regulator ASSY

Tightening torque: N·m (kg-m, ft-lb)
T: 7.4±2.0 (0.75±0.2, 5.4±1.4)

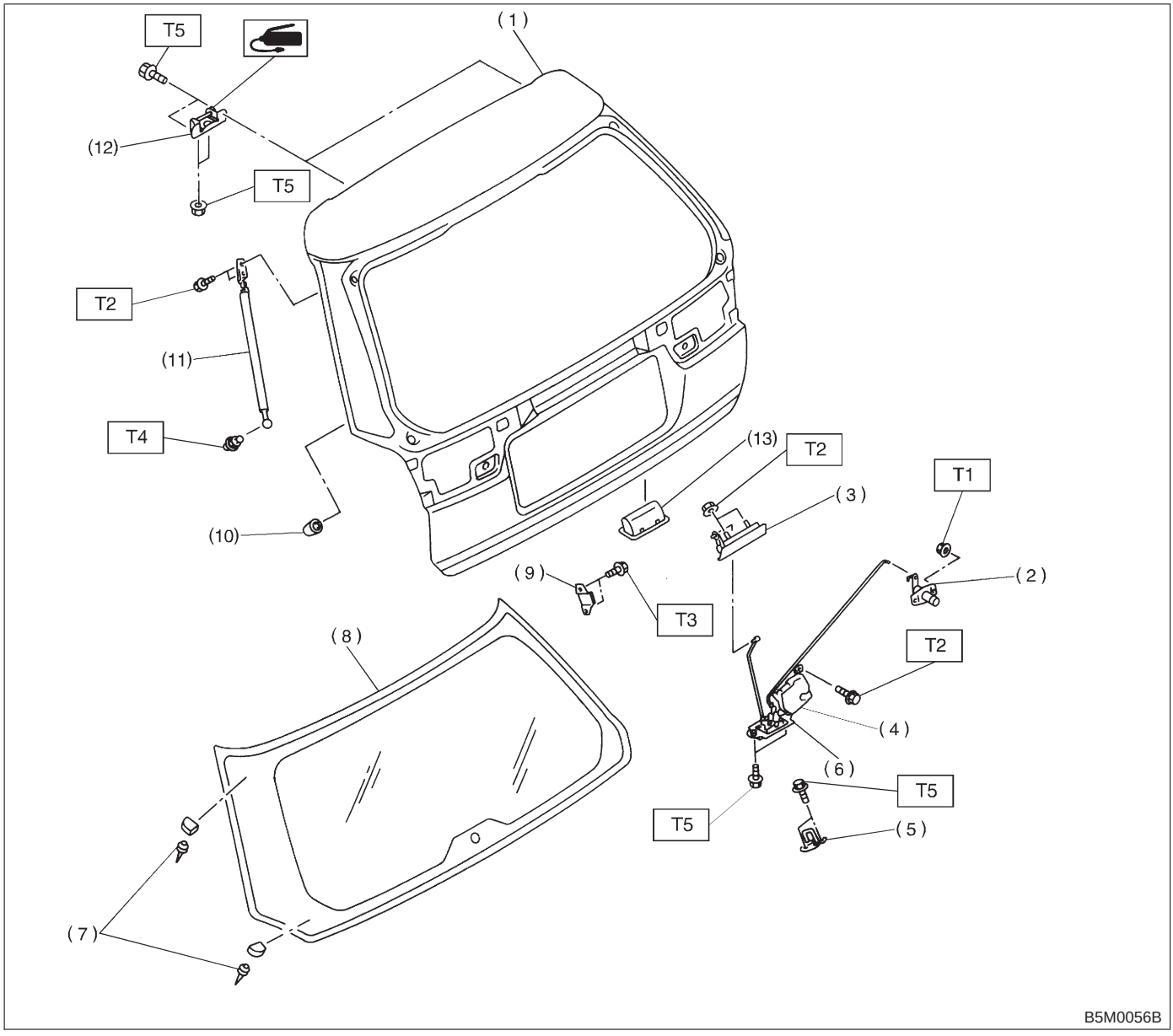
5. Rear Door Glass



(1) Glass
(2) Regulator and motor ASSY
(3) Regulator handle (Except power window)
(4) Retainer spring
(5) Regulator ASSY

Tightening torque: N·m (kg-m, ft-lb)
T: 7.4±2.0 (0.75±0.2, 5.4±1.4)

6. Rear Gate and Glass

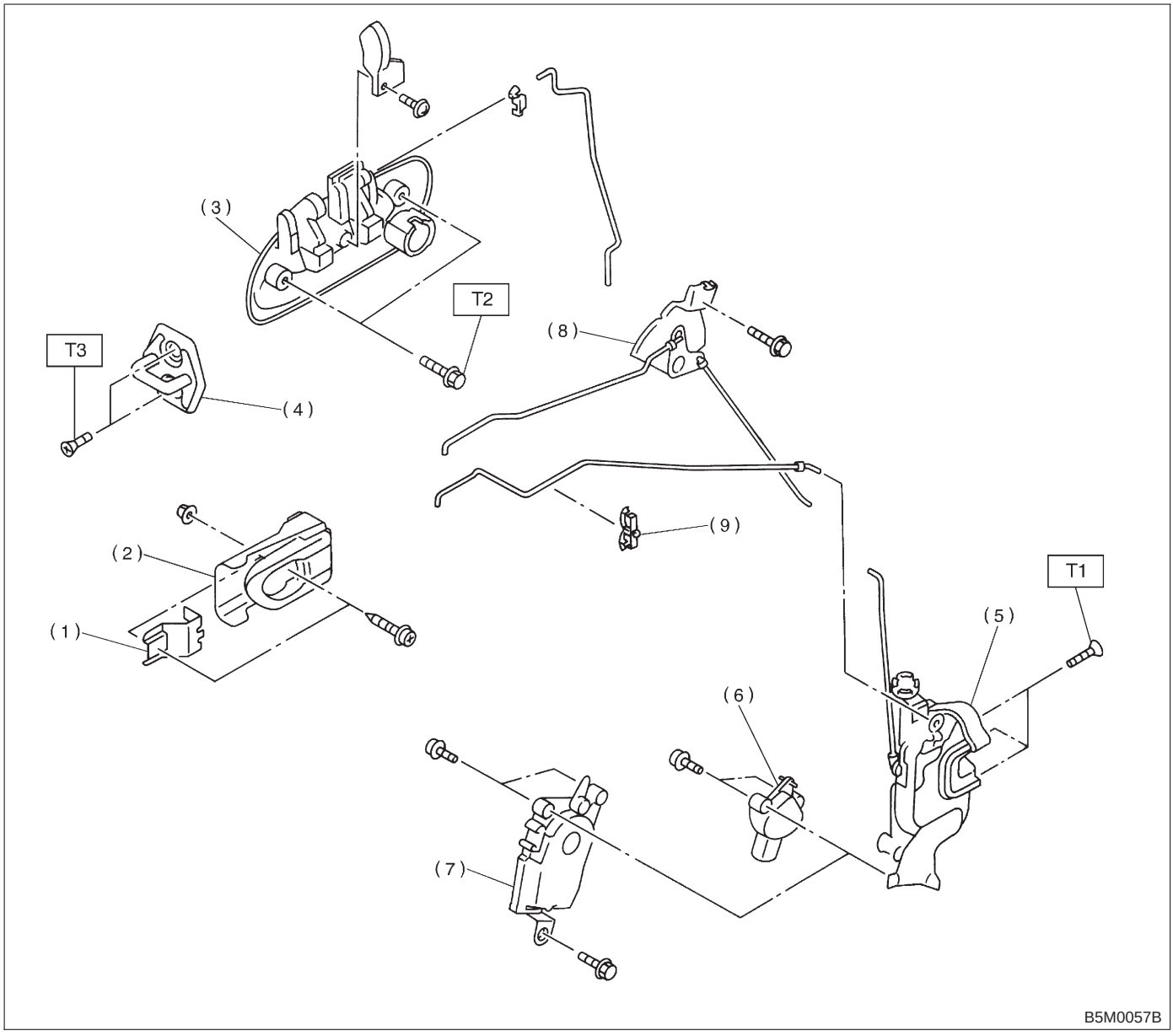


(1) Rear gate
(2) Key cylinder
(3) Outer handle
(4) Door lock actuator
(5) Striker
(6) Latch
(7) Glass pin
(8) Glass
(9) Buffer
(10) Stopper
(11) Gas stay
(12) Hinge
(13) Rear gate handle

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 13±3 (1.3±0.3, 9.4±2.2)
T4: 14±4 (1.4±0.4, 10.1±2.9)
T5: 25±5 (2.5±0.5, 18.1±3.6)

7. Door Lock Assembly

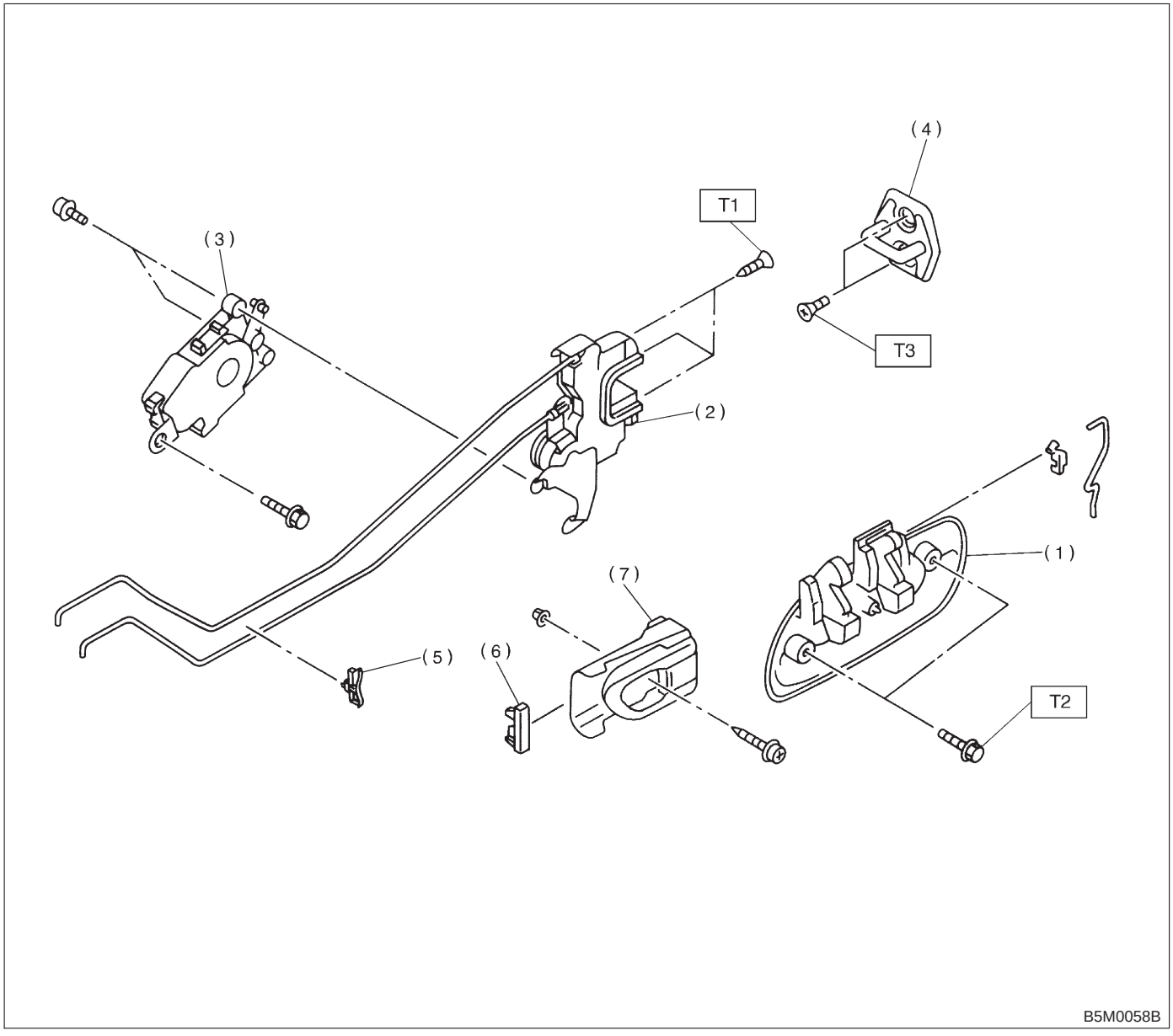
A: FRONT DOOR



(1) Holder remote
(2) Inner remote ASSY
(3) Door outer handle
(4) Striker
(5) Door latch
(6) Switch ASSY
(7) Auto-door lock actuator
(8) Bell crank
(9) Rod holder

Tightening torque: N·m (kg-m, ft-lb)
T1: 6.4±2.0 (0.65±0.2, 4.7±1.4)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 14±4 (1.4±0.4, 10.1±2.9)

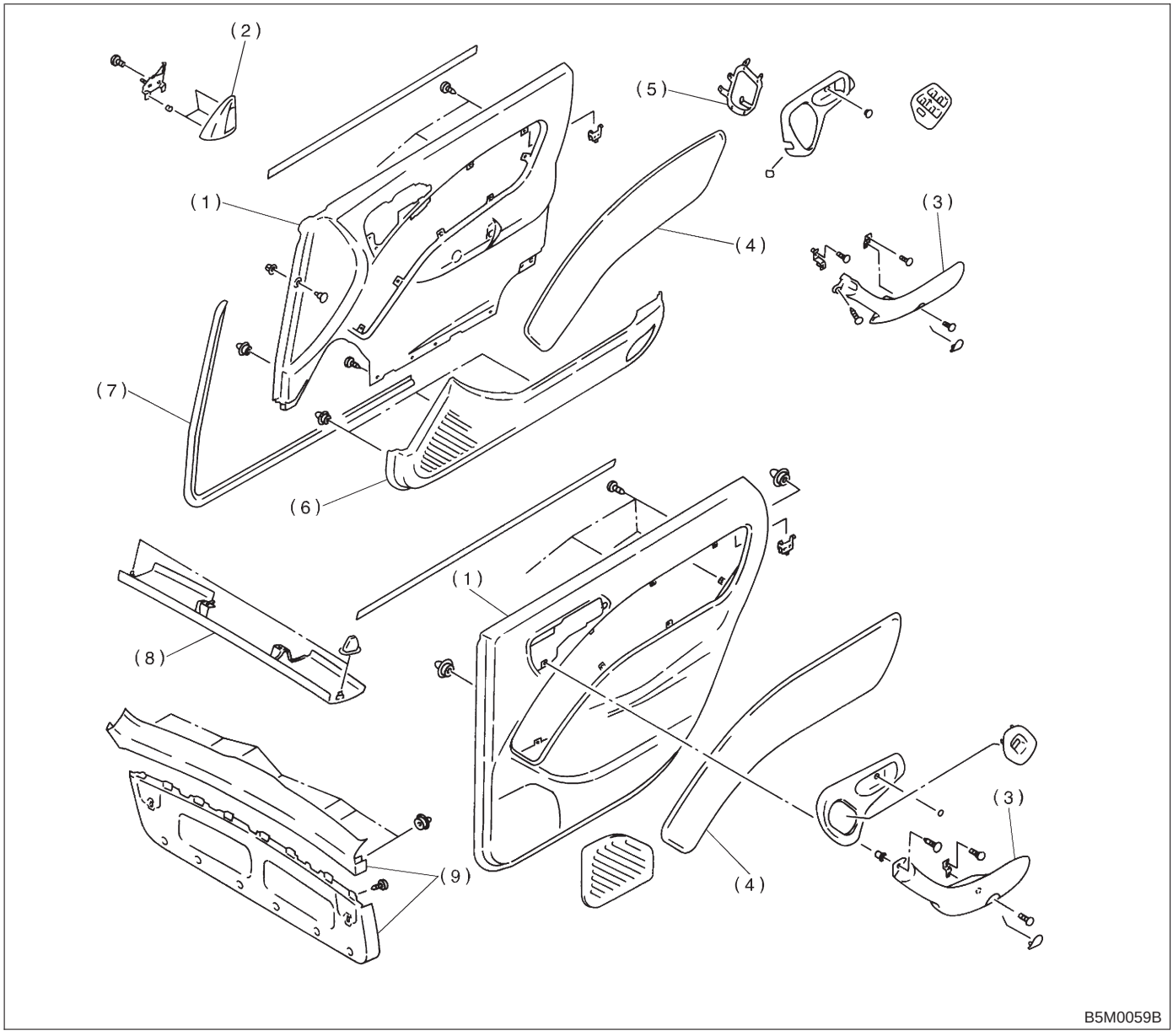
B: REAR DOOR



(1) Door outer handle
(2) Door latch
(3) Door lock actuator
(4) Striker
(5) Rod holder
(6) Holder remote
(7) Inner remote ASSY

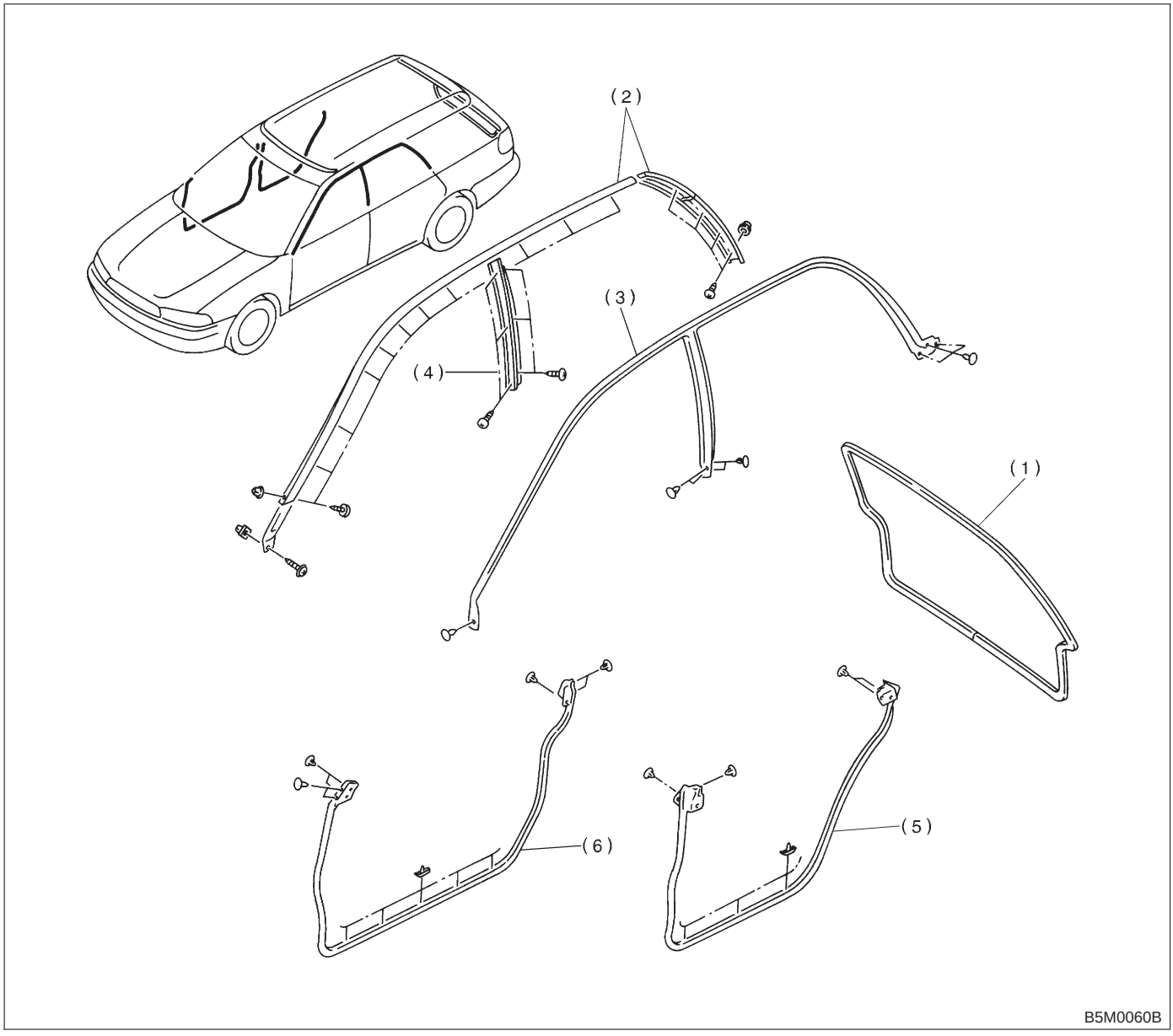
Tightening torque: N·m (kg-m, ft-lb)
T1: 6.4±2.0 (0.65±0.2, 4.7±1.4)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 14±4 (1.4±0.4, 10.1±2.9)

8. Door Trim



(1) Trim panel
(2) Gusset cover
(3) Arm rest
(4) Ornament
(5) Bracket
(6) Pocket
(7) Weatherstrip
(8) Rear gate upper trim
(9) Rear gate lower trim

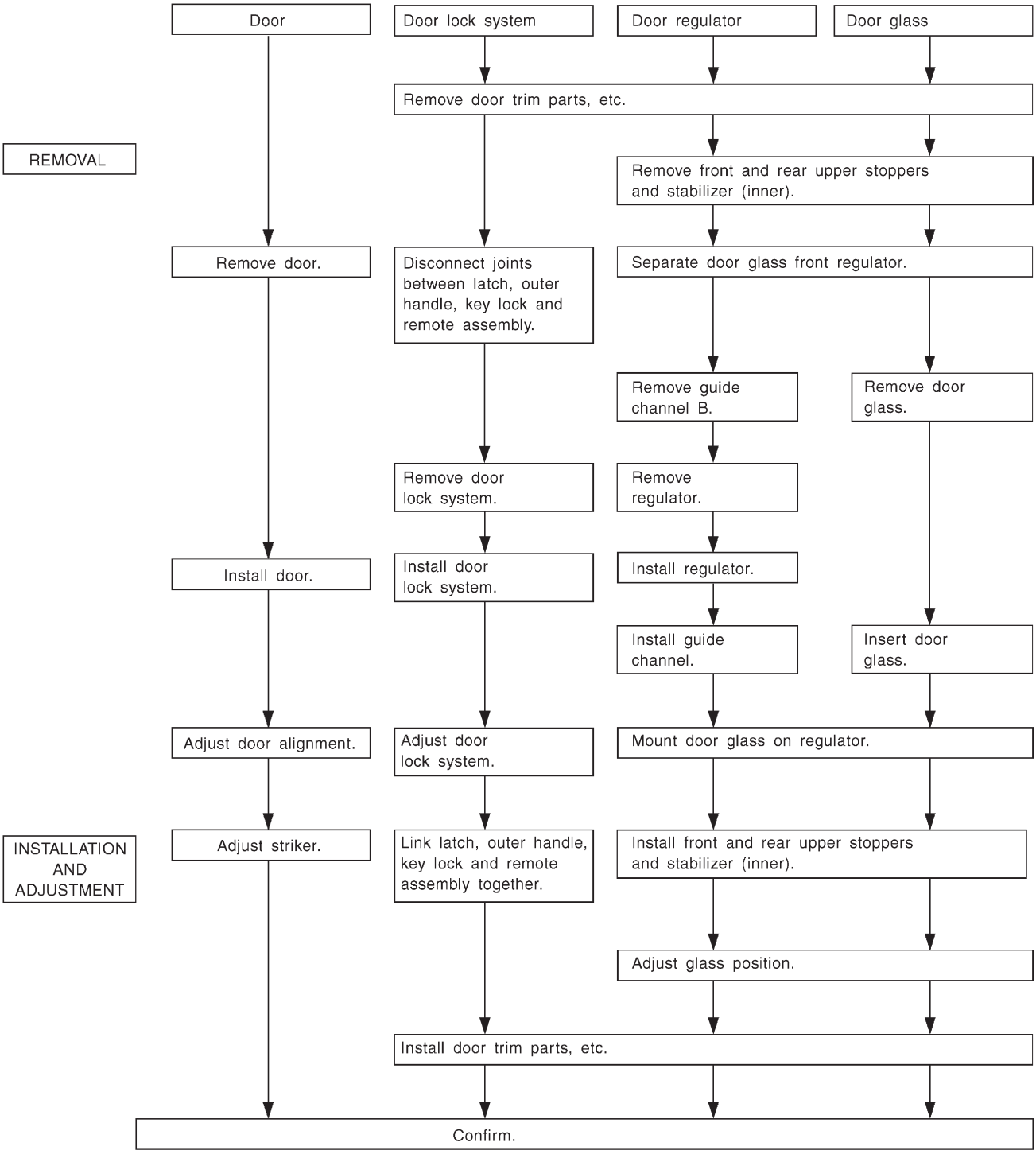
9. Weatherstrip



(1) Rear gate weatherstrip
(2) Retainer and molding
(3) Upper and side weatherstrip
(4) Retainer (Center)
(5) Weatherstrip (Rear door)
(6) Weatherstrip (Front door)

1. Procedure Chart for Removing and Installing Door and Related Parts

NOTE:
This flow chart shows the main procedures for removing and installing the door and its related parts. For details, refer to the text.



B5M0448A

2. Door

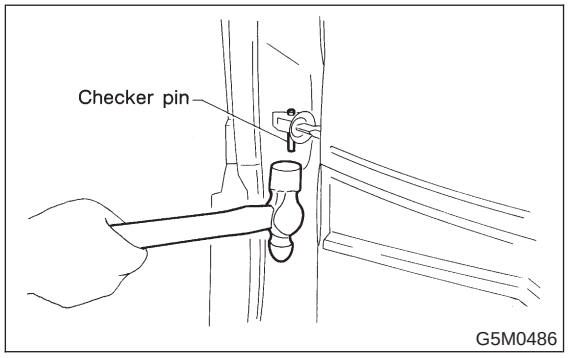
A: REMOVAL AND INSTALLATION

1. DOOR ASSEMBLY

1) Remove lower trim and disconnect connectors from body harness.

2) Place a cloth or a wood block under door to prevent damage, and support it with a jack.

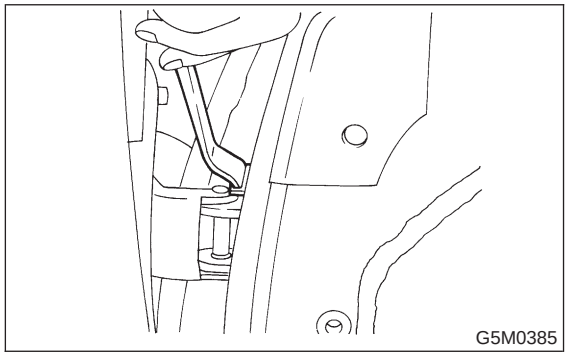
3) Remove checker pin by driving it upward. Be careful not to damage door and body.



4) Remove bolts (M8) securing upper and lower hinges to door, and remove door from hinges.

Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)

5) Remove hinges by loosening hinges mounting bolt (M8) off of body.



CAUTION:
Work carefully to avoid damaging door.

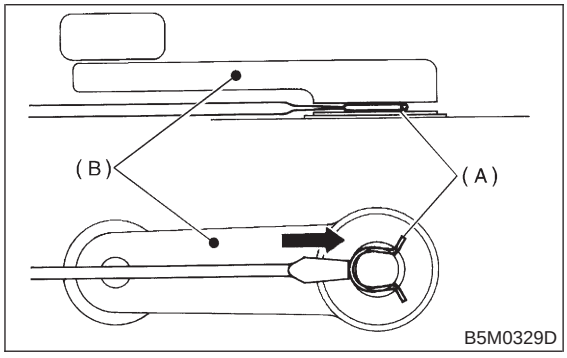
6) Installation is in the reverse order of removal.

Tightening torque:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)

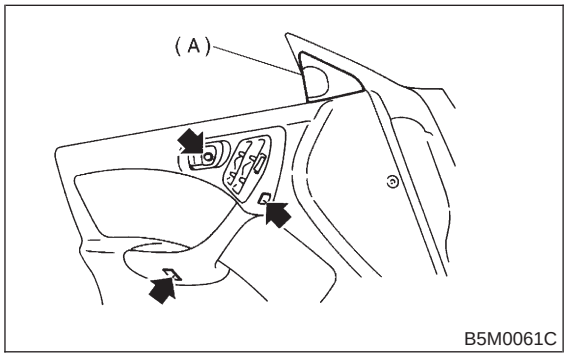
NOTE:
Apply grease to moving parts of door hinges.

2. TRIM PANEL

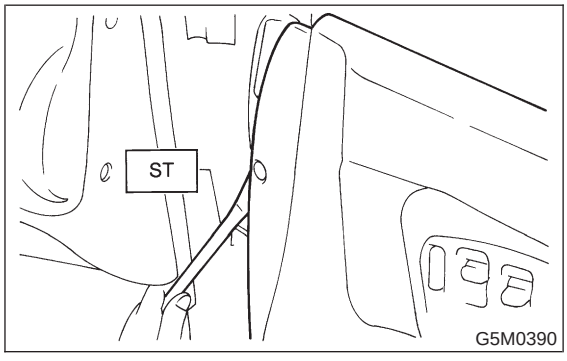
1) Press retainer spring (A) with a thin flat bladed screwdriver and then remove regulator handle (B). (models without power window)



2) Remove gusset cover (A) and three screws.



3) Using ST, disengage the clip.
ST 925580000 PULLER



4) Remove trim panel and then disconnect connector. (models with power window)

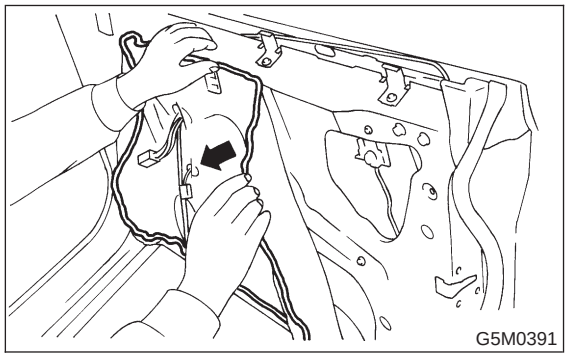
CAUTION:
Be careful not to break clip by applying undue force.

5) Installation is in the reverse order of removal.

3. SEALING COVER

1) Remove trim panel. <Ref. to 5-2 [W2A2].>
2) Remove speaker, remote assembly and disconnect connectors.
3) Remove sealer with a spatula.

CAUTION:
Be careful because cover may break if sealer is removed forcefully.

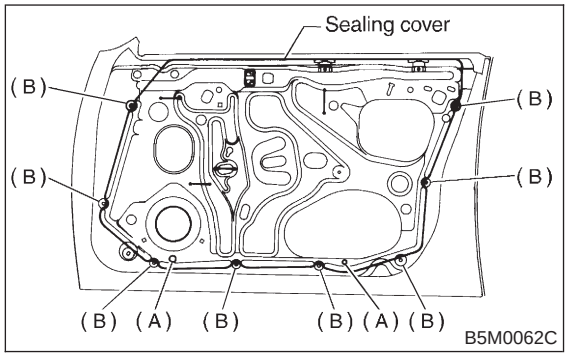


4) Installation is in the reverse order of removal.

NOTE:
● Confirm that sealer is properly applied without breaks. Then install sealing cover.
● When repairing or replacing sealing cover, use "CEMEDINE 5430L" as sealer. It may be overlaid on existing sealer.

Sealer:
CEMEDINE 5430L

CAUTION:
● Any breaks in sealer can cause water leakage or entry of air and dust. Be sure sealer is applied in a continuous line.
● Do not stop up drain hole (A) with sealer.
● Do not stop up install hole with (B) sealing cover.

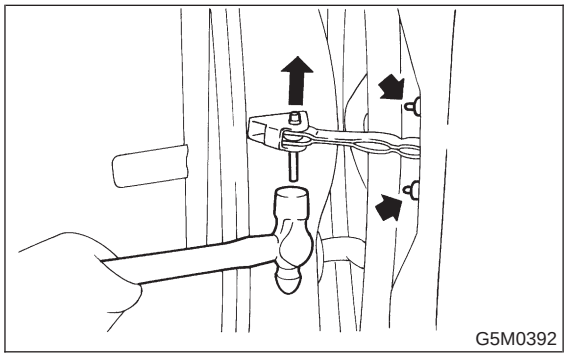


● Make sure sealing cover bonded areas are free from wrinkles or openings.

4. CHECKER

1) Remove trim panel. <Ref. to 5-2 [W2A2].>
2) Remove sealing cover. <Ref. to 5-2 [W2A3].>
3) Apply a cloth to door and body to prevent damaging them, and remove checker pin by driving it upward.

CAUTION:
Be careful not to damage door and body.

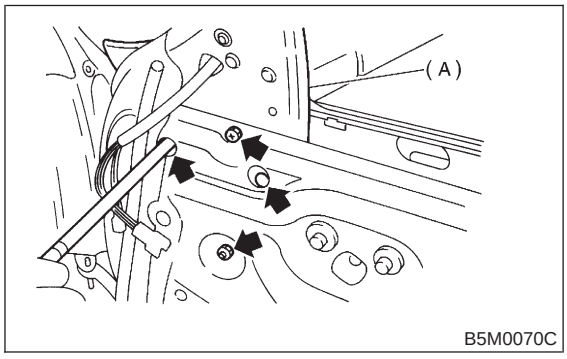


4) Completely close door glass.
5) Loosen two nuts securing checker, and take out checker through access hole in underside.
6) Installation should be made in the reverse order of removal.

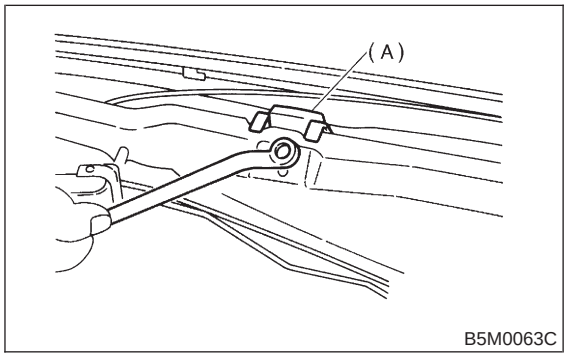
Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

5. DOOR GLASS

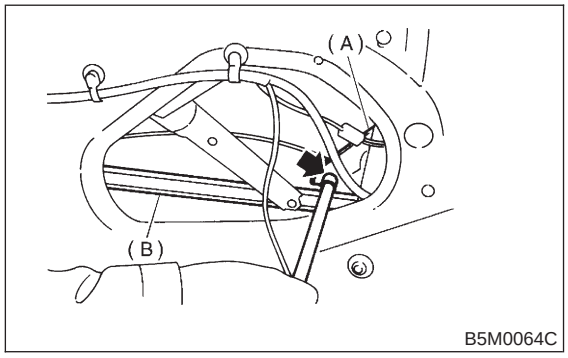
1) Remove trim panel. <Ref. to 5-2 [W2A2].>
2) Remove sealing cover. <Ref. to 5-2 [W2A3].>
3) Disconnect door mirror connector and then remove gusset (A). <Ref. to 5-2 [W2A10].>



4) Remove inner remote. <Ref. to 5-2 [W2A6].>
5) Remove inner stabilizer (A).



6) Remove nut and then separate glass holder (A) from guide channel A (B).

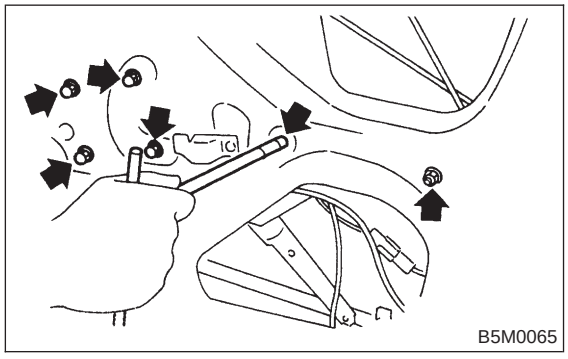


NOTE:
When removing nut, move door window lower glass connecting section to service hole of door panel.

7) Remove window glass upward.

CAUTION:
After removing window glass, do not move regulator.

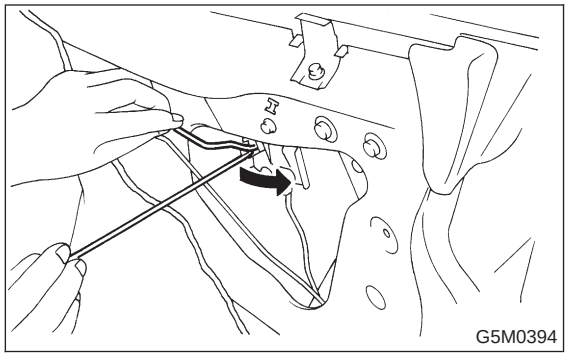
8) Remove regulator installing bolt and guide channel B installing nut.



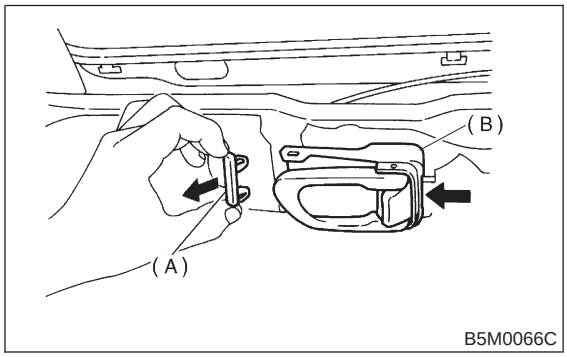
9) Remove regulator through lower service hole of door panel.
10) Installation is in the reverse order of removal.

6. INNER REMOTE

1) Remove trim panel. <Ref. to 5-2 [W2A2].>
2) Remove sealing cover. <Ref. to 5-2 [W2A3].>
3) Disconnect joints of two rods.



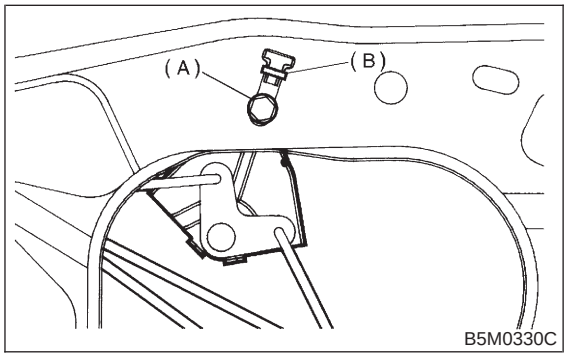
4) Unlatch rod holder.
5) Remove remote holder (A) and then remove inner remote assembly (B).



6) Installation is in the reverse order of removal.

NOTE:
- After passing two rods through holder, attach remote assembly to inner panel.
- Latch rod holder.

7) Lock the door and then loosen bolt (A).
8) Lower bell-crank (B) and then tighten bolt (A).

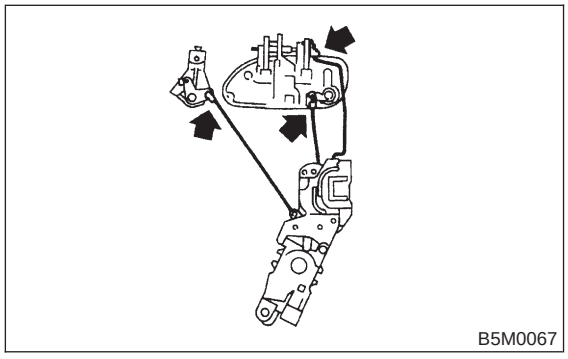


NOTE:
If rear door is equipped with child safety lock, check that child lock lever moves without dragging.

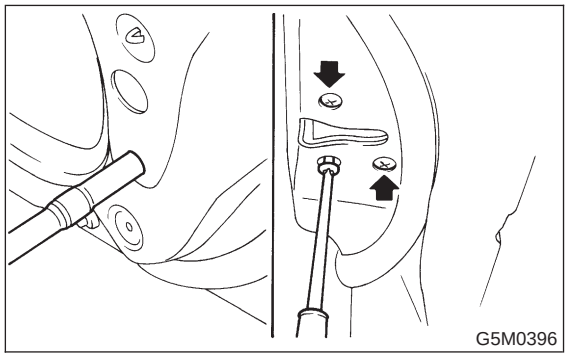
7. DOOR LATCH

1) Remove trim panel. <Ref. to 5-2 [W2A2].>
2) Remove inner remote assembly. <Ref. to 5-2 [W2A6].>
3) Remove sealing cover around latch service hole. <Ref. to 5-2 [W2A3].>
4) Completely close door glass.
5) Remove latch and actuator assembly:

(1) Turn rod holder to disconnect joint between key lock and rod.
(2) Turn rod holder to disconnect joint between outer handle and rod.
(3) Turn rod holder to disconnect joint between crank and rod.


B5M0067

6) Loosen screws securing both latch and actuator, then remove latch and actuator assembly through service hole in bottom.


G5M0396

7) Installation is in the reverse order of removal.

Tightening torque:
6.4±2.0 N·m (0.65±0.2 kg-m, 4.7±1.4 ft-lb)

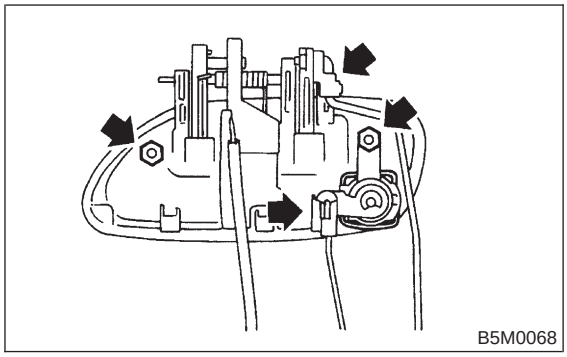
NOTE:
- Check operation of each part.
- Check each sliding part for proper lubrication.

CAUTION:
After installation, be sure lock mechanism operates normally.

8. OUTER HANDLE

1) Remove trim panel. <Ref. to 5-2 [W2A2].>
2) Remove sealing cover. <Ref. to 5-2 [W2A3].>
3) Detach door latch rod from outer handle and key lock.
4) Loosen nut securing outer handle and then remove outer handle from outside.

CAUTION:
Be careful not to damage door.

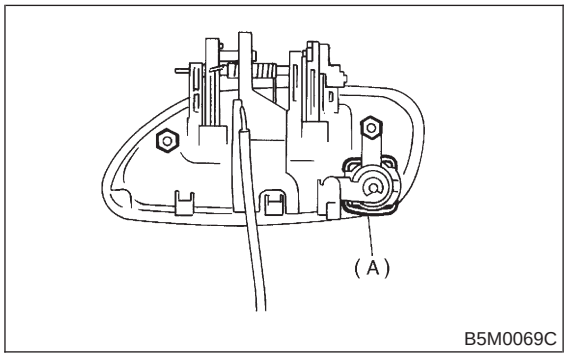

B5M0068

5) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

9. KEY LOCK

1) Remove trim panel. <Ref. to 5-2 [W2A2].>
2) Remove sealing cover. <Ref. to 5-2 [W2A3].>
3) Completely close door glass.
4) Remove outer handle. <Ref. to 5-2 [W2A8].>
5) Loosen spring (A) securing key lock.



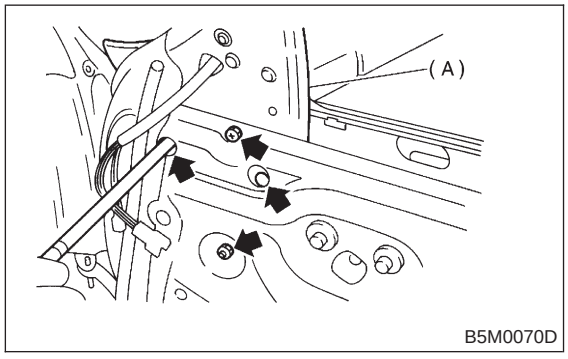
B5M0069C

6) Remove key lock from outer handle.
7) Installation is in the reverse order of removal.

NOTE:
Install so that key slot in key lock comes to center of hole in outer handle.

10. GUSSET

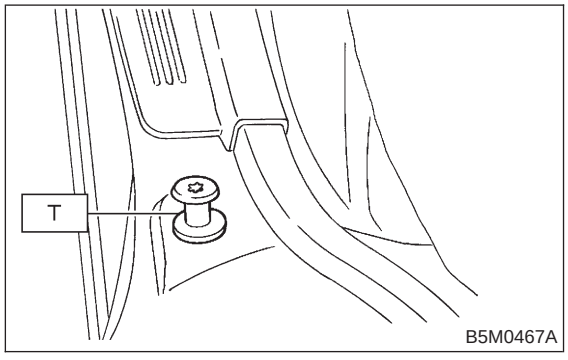
1) Be sure window is all the way down.
2) Remove trim panel. <Ref. to 5-2 [W2A2].>
3) Remove door rearview mirror.
4) Remove sealing cover. <Ref. to 5-2 [W2A3].>
5) Remove bolts and nuts which secure gusset (A).
6) Lift out gusset (A).



7) Installation is in the reverse order of removal.

11. REAR DOOR CATCHER

1) Open the rear door.
2) Using TORX®BIT (Tamper resistant type), remove rear door catcher.



3) Installation is in the reverse order of removal.

Tightening torque:
37±10 N·m (3.8±1.0 kg-m, 27.5±7.2 ft-lb)

B: ADJUSTMENT

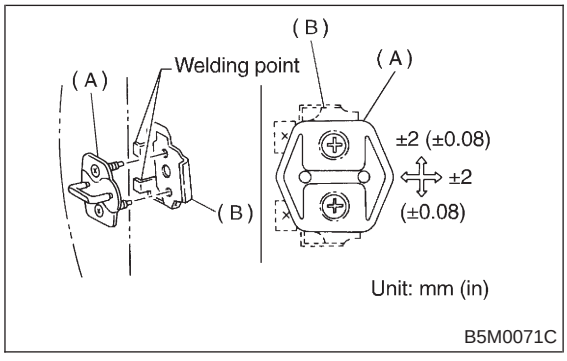
1. DOOR ASSEMBLY

1) Using ST, loosen bolts securing upper and lower hinges to body, and adjust fore-and-aft and vertical alignment of door.
ST 925610000 DOOR HINGE WRENCH
2) Loosen mounting screws approximately one rotation. Adjust striker (A) position by lightly tapping with hammer. (To adjust, utilize the shape of striker nut plate support (B).)

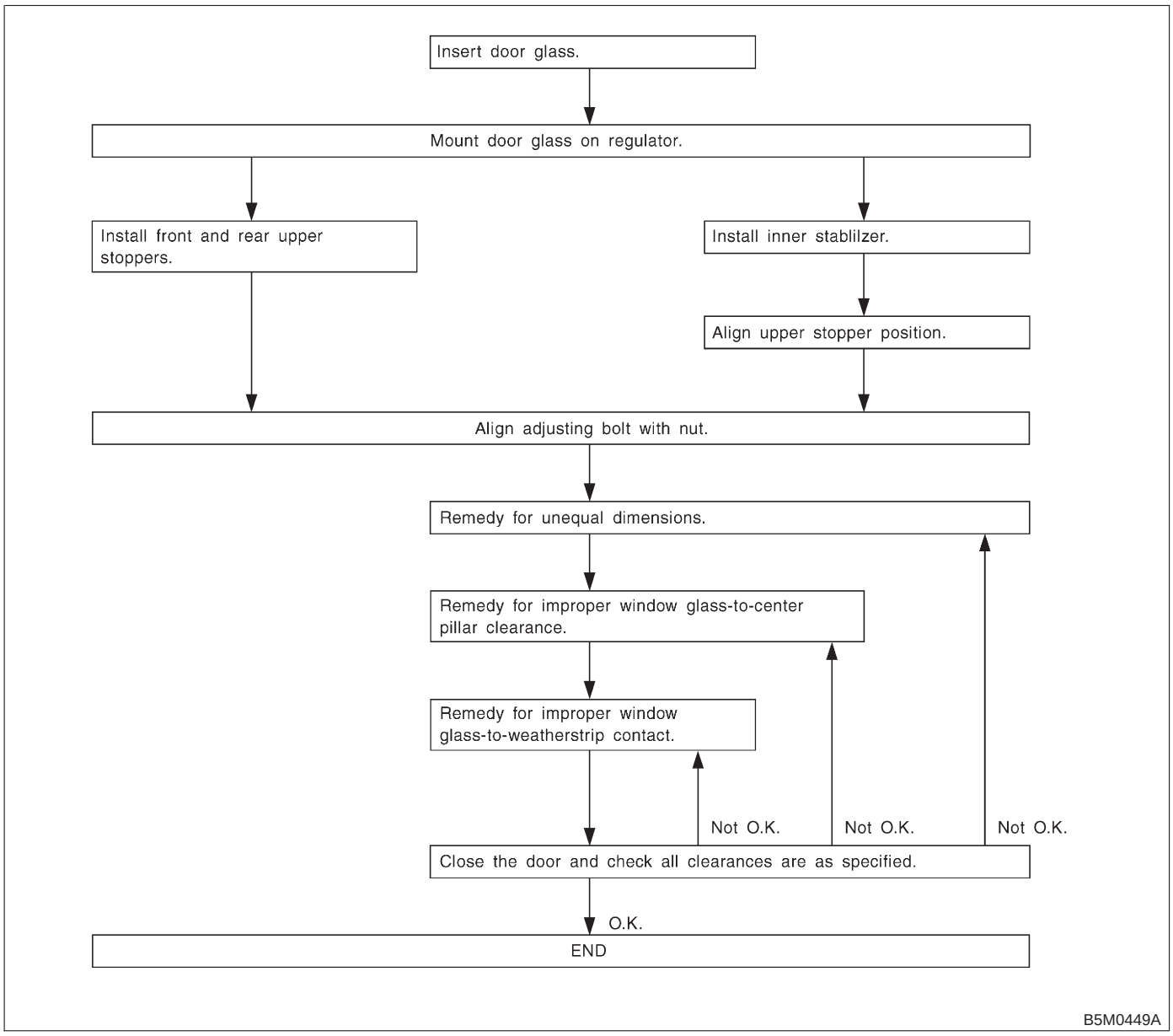
CAUTION:
● Use cloth to prevent damaging body or other parts.
● Do not directly tap striker plastic portion.
● Do not apply impact on spot-welded striker nut plate.

Hinge tightening torque (body side):
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)

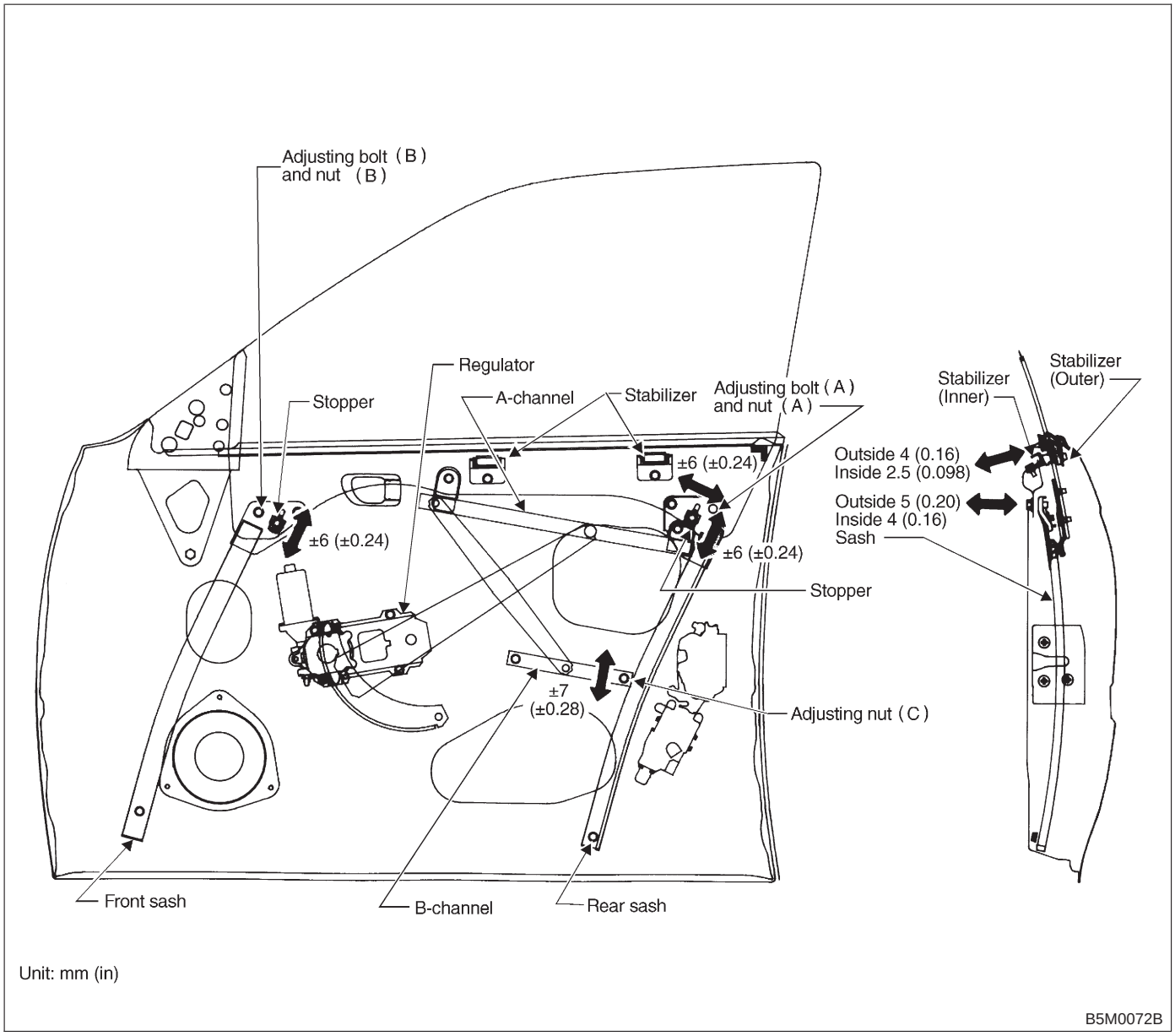
Striker tightening torque:
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)



2. PROCEDURE CHART FOR ADJUSTING DOOR GLASS



3. FRONT DOOR GLASS



● Door glass fit adjustment

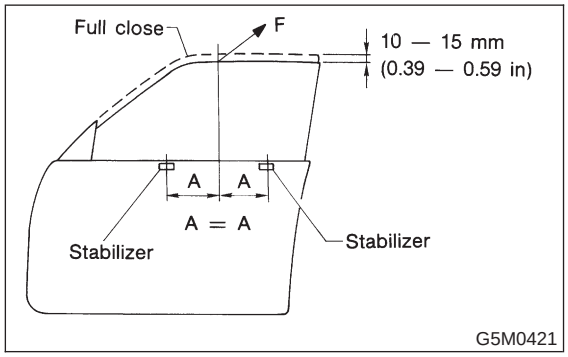
Before adjusting door glass alignment, ensure adjusting bolts for stabilizers, upper stoppers and sashes are loose and glass is raised so that it is in contact with upper and side weatherstrip.

1) Temporarily tighten one of the two rear sash adjusting bolts, at midpoint of oblong hole on inner panel.

2) Temporarily tighten B channel regulator at a position slightly lower than midpoint of oblong hole on inner panel.

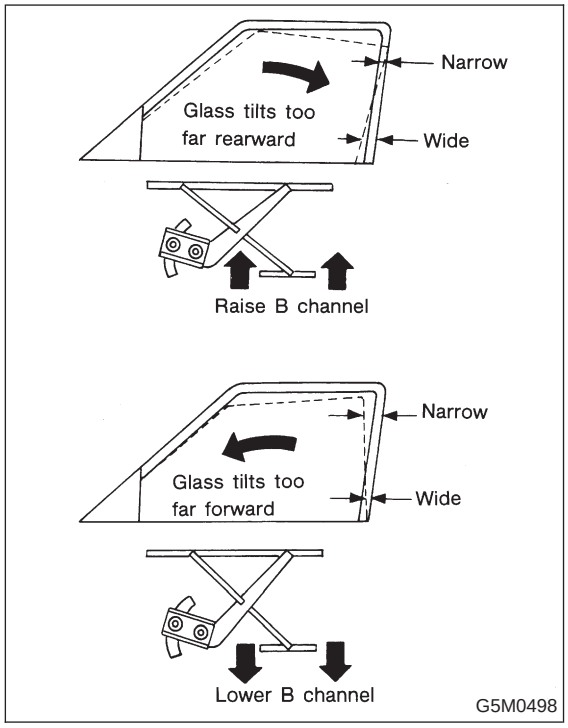
3) Lower door glass 10 to 15 mm (0.39 to 0.59 in) from fully closed position. While applying outward pressure (load) to upper edge of glass above mid-point of two outer stabilizers, press inner stabilizer until it just touches the glass, then secure it.

Load: F
Front door glass 39 N (4 kg, 9 lb)
Rear door glass 34.3 N (3.5 kg, 7.7 lb)

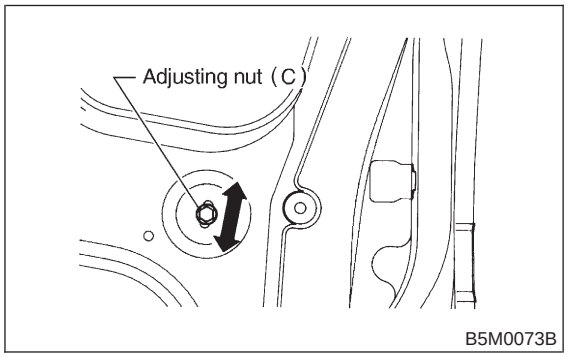


● Remedy for unequal dimensions, between upper, lower and center pillar sides

1) Close front door and raise door glass
2) Make sure of unequal dimensions.

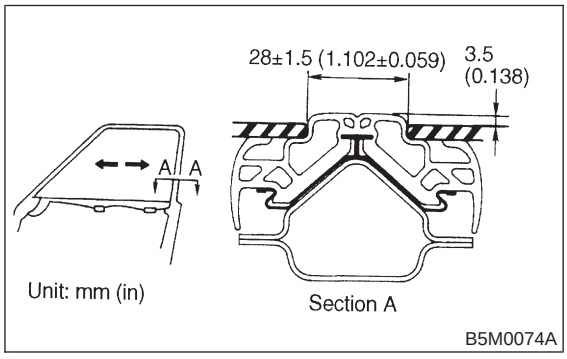


3) If glass tilts to far rearward, loosen adjusting nut (C) and adjust glass to be parallel with center pillar, then after adjustment, tighten adjusting nut (C).

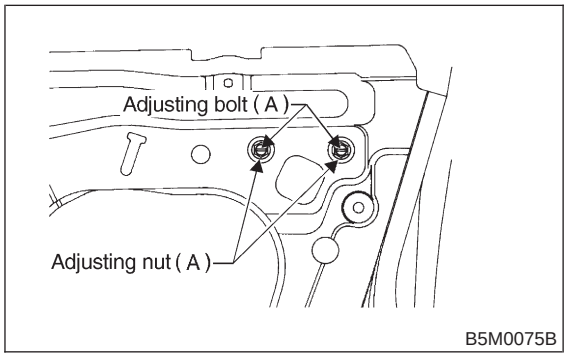


● Remedy for improper glass to center pillar clearance

1) Close front door and raise door glass
2) Make sure of improper clearance.



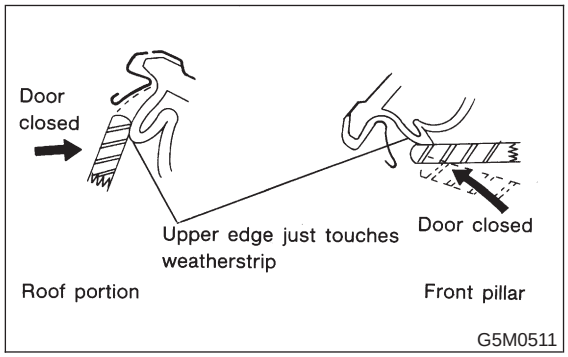
3) If clearance is improper, loosen adjusting nut (A), bolt (A) and adjust glass to center pillar.



● Remedy for improper upper stop point of door glass

1) Loosen front and rear sash stoppers.

2) Increase the upward travel of window glass up to the position where upper edge just touches weatherstrip surface with door closed.

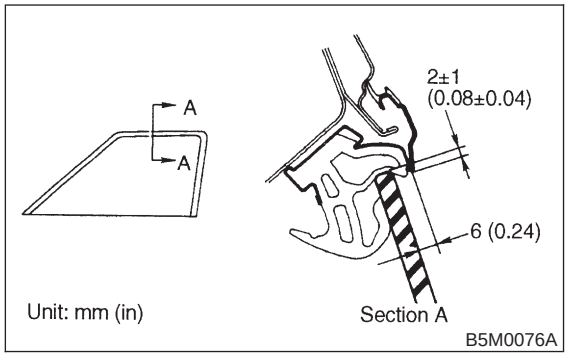


3) After adjustment, temporarily tighten stoppers.

NOTE:
Make sure that each glass stopper is touched.

● Remedy for incorrect contact of door glass to weatherstrip

1) Close front door and raise door glass.
2) If clearance is below specifications, loosen bolt (A) and bolt (B).
3) If clearance is over specifications, tighten bolt (A) and bolt (B).

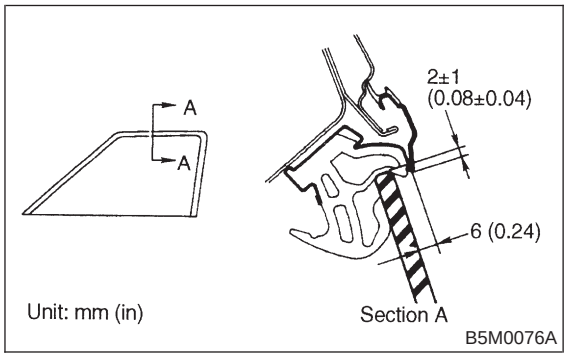


● Fit adjustment

Door glass fit is adjusted by displacing the glass front edge with a stabilizer.

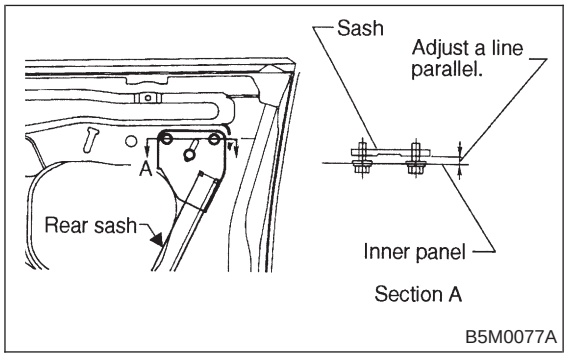
NOTE:
Before adjusting glass fit, visually check to determine relative adjusting positions of retainer and molding (on roof side) and glass surface.

1) Alternately adjust two rear sash adjusting bolts (A) until dimensions (indicated in figure) are obtained.



CAUTION:
Do not loosen two adjusting nuts (A) at the same time, as this moves sash fore and aft, creating unequal glass- to-sash clearance. During adjustment, loosen only one nut and keep the other tightened.

NOTE:
Always adjust two rear sash adjusting bolts (A) by the same amount. Do not adjust the adjusting bolts with sash bracket inclined toward inner panel, as this increases effort required to operate regulator.



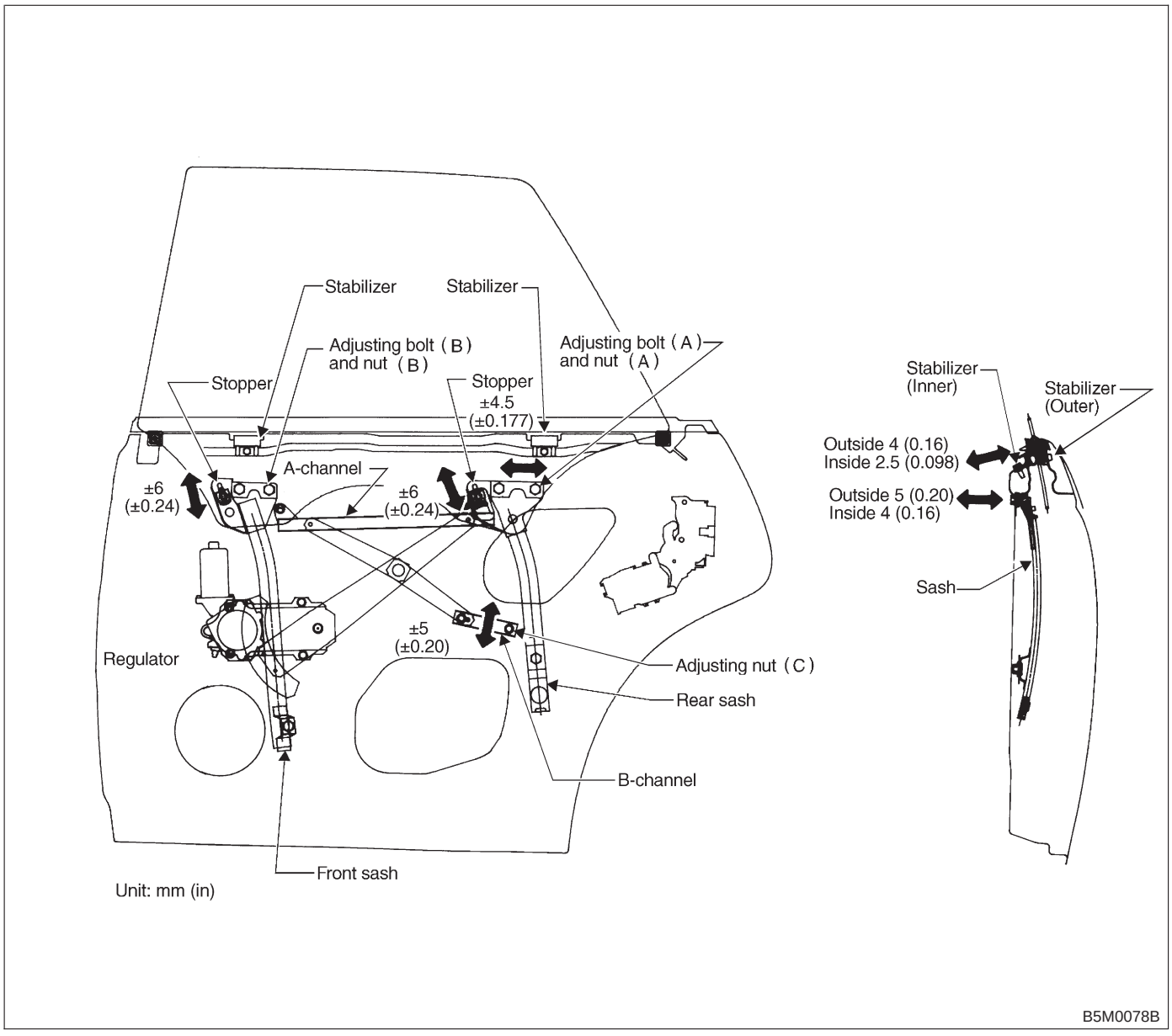
2) Adjust front sash fit using rear sash adjustment procedure outlined above as a guide. Two adjusting bolts must be adjusted by the same amount.

NOTE:
Front and rear sash adjustment procedures are basically the same; however, the amount of adjustment is not always the same due to alignment dispersion of individual doors.
Adjust front and rear sash fit, as equally as possible. Otherwise, effort required to operate regulator may increase.

3) After adjusting front sash-to-glass fit, secure front sash.

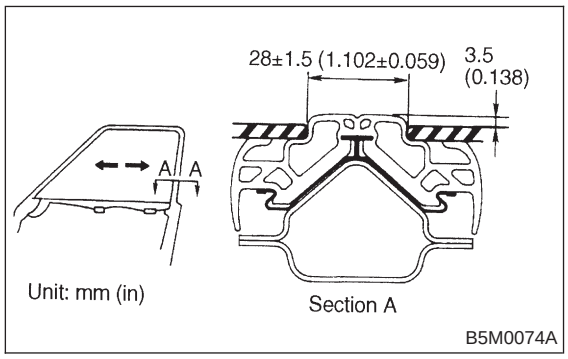
4. REAR DOOR GLASS

Alignment of rear door glass is basically the same as for the front door glass. Due to slight difference in adjustment dimensions for fore-aft, up-down, and in-out alignments, key points for rear door adjustment are described.



● **Fore-aft adjustment**

1) Door glass alignment must be adjusted so that glass- to-center pillar fit is equal at all points.

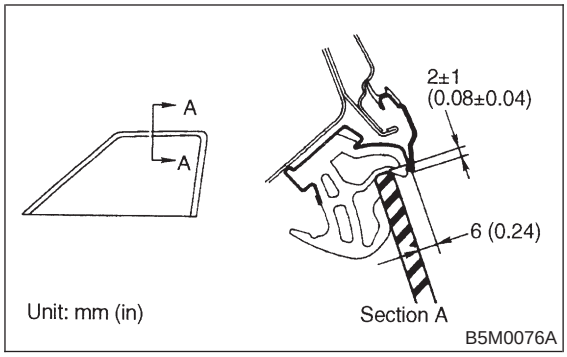


NOTE:
If dimensions are smaller than those indicated, glass will be caught in weatherstrip and may not raise to the fully closed position.

2) After making fore-aft adjustment, raise and lower glass to ensure it is free from any binding.

● **Fit adjustment**

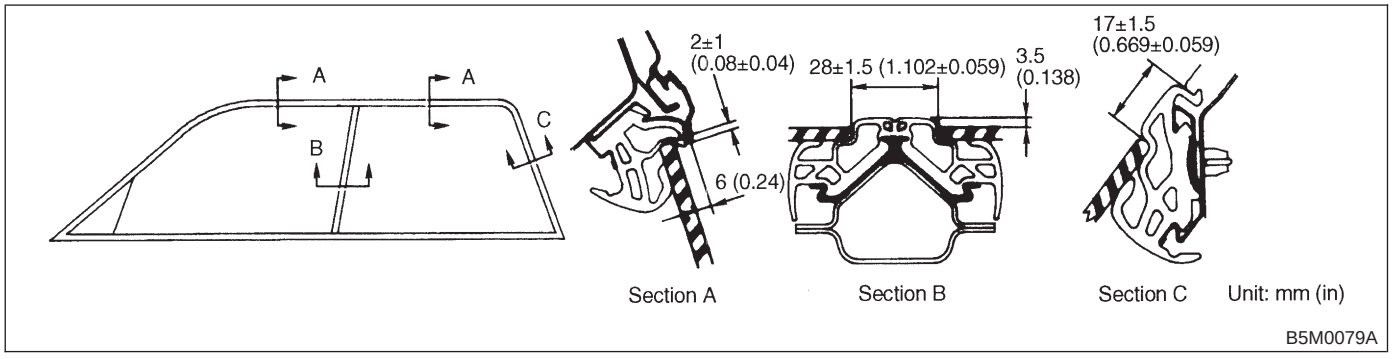
Increasing contact pressure causes rear door glass to be caught in center pillar upper and lower weatherstrip; this will cause premature weather-strip wear.



C: INSPECTION

1. FRONT AND REAR DOOR GLASS

1) Close front door and make sure of all clearances.



2) If any clearance is not correct, adjust affected parts. Re-check all clearances.

CAUTION:
● Repeatedly adjust parts until all clearances are correct.
● After clearance adjustment, make sure that all adjusting bolts and nuts are tightened.

3. Rear Gate

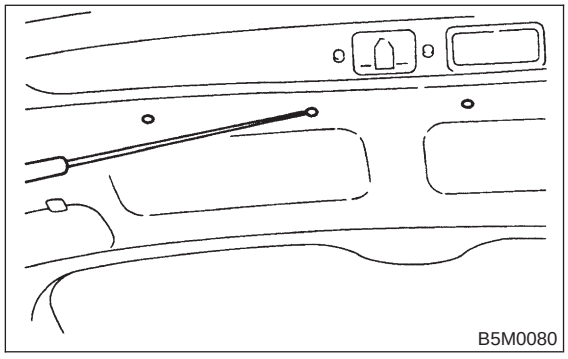
A: REMOVAL AND INSTALLATION

CAUTION:
● Be careful not to scratch coated surfaces of vehicle body and window glass during removal. Place a cloth over the affected area.
● Be careful not to damage trim panels.
● Use an assistant when handling heavy parts.
● Be careful not to damage or lose small parts.

1. REAR GATE ASSEMBLY

1) Remove clips from trim panel and detach trim panel.

CAUTION:
Be careful not to damage clips or their holes.

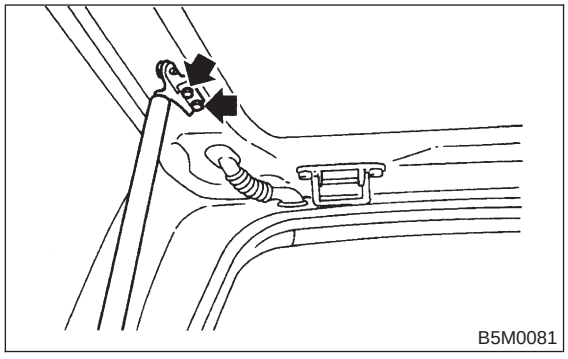


2) Disconnect rear washer hose from wiper motor.
3) Remove high-mount stop light.
4) If disconnected harness is re-used, tie connector with a string and place on the upper side of rear gate for ready use.
5) Remove both rubber ducts and then extract washer hose and harness connector.

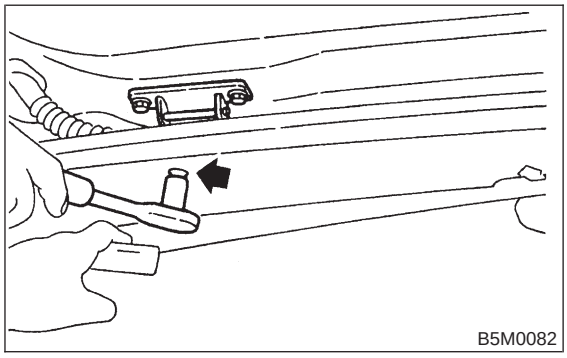
CAUTION:
Do not forcefully pull cords, lead wires, etc. since damage may result; carefully extract them in a wavy motion while holding connectors.

6) Remove both rubber ducts and then extract washer hose and harness connector.
7) Gas stay
   (1) Completely open rear gate.
   (2) Remove bolts which hold gas stay to rear gate.

CAUTION:
● Be careful because rear gate drops while removing bolts. Have an assistant support it while removing bolts.
● Be sure to place a folded cloth between rear gate and body to prevent scratches.

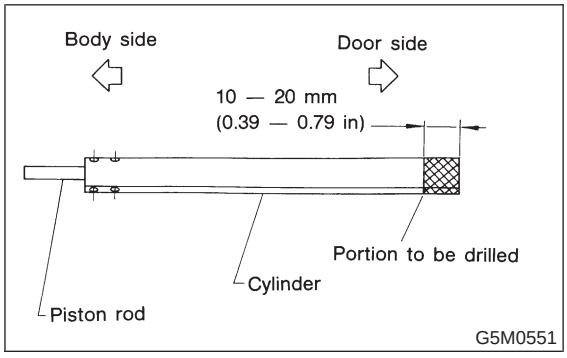


8) Remove the bolts which hold rear gate to hinge and then detach rear gate.

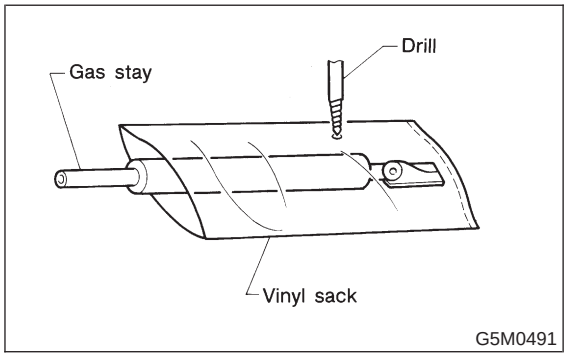


9) General precautions in handling rear gate gas stay.

CAUTION:
● Do not attempt to disassemble gas stay because its cylinder is filled with gas.
● Before discarding gas stay, place it at a slight angle with the cylinder body side facing up and drill a 2 to 3 mm (0.08 to 0.12 in) dia. hole to completely discharge the content. (Gas is odorless, colorless and harmless; however, metal powder may come out of the hole.)



● It is good practice to place a vinyl sack over it before drilling the hole because oil may spurt out. Be careful to prevent vinyl cover from becoming entangled on the drill.



● Be careful not to scratch the exposed section of piston rod or allow oil or paint to come in contact with it.

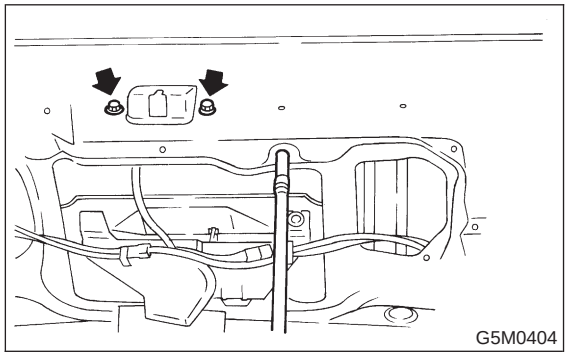
● **Do not attempt to rotate the extended piston rod.**

10) Installation is in the reverse order of removal.

CAUTION:
● **Be sure to add sealer to hinge.**
● **When installing rear gate, be careful not to damage coating on body and rear gate.**

2. LATCH

1) Remove trim panel.
2) Disengage rod from holder (= key cylinder).
3) Remove bolts from auto-door lock actuator.
4) Remove bolts from latch, and detach latch.

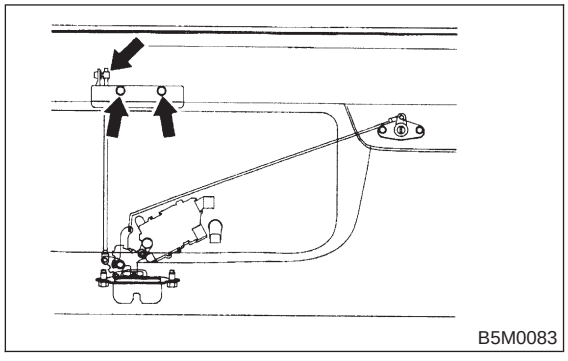


5) Disconnect rear gate switch connector.
6) Disconnect auto-door lock actuator connector.
7) Detach latch.
8) Installation is in the reverse order of removal.

3. OUTER HANDLE

1) Remove trim panel.
2) Disconnect rod from outer handle.
3) Remove two nuts used to hold outer handle to the inside of rear gate, and detach outer handle.

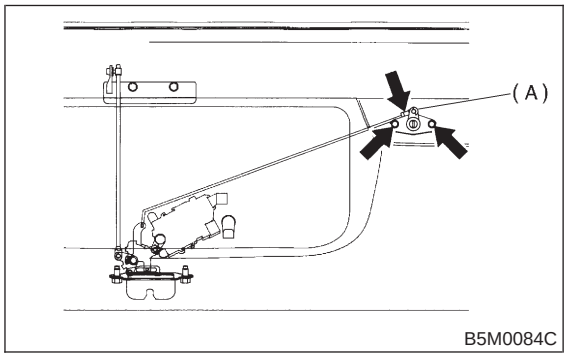
CAUTION:
Be careful not to damage packing when removing outer handle.



4) Installation is in the reverse order of removal.

4. KEY CYLINDER

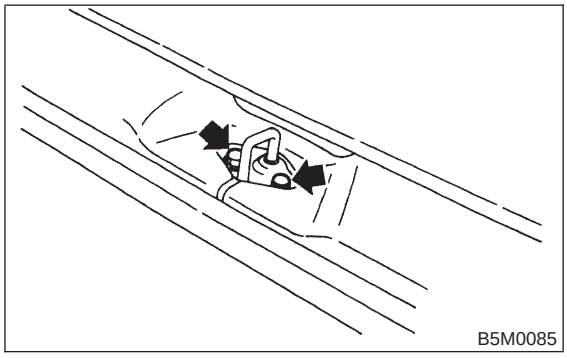
1) Remove trim panel.
2) Disengage rod from holder (A).
3) Remove nut from key cylinder, and detach key cylinder.



4) Installation is in the reverse order of removal.

5. STRIKER

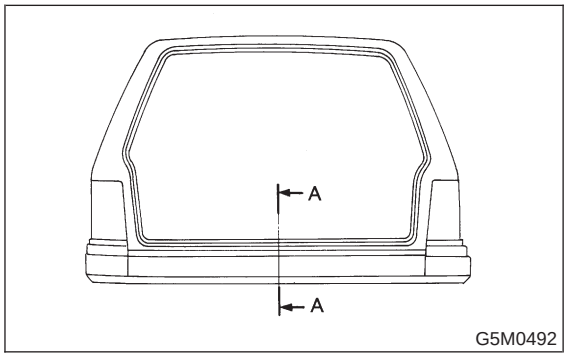
1) Remove two bolts from striker and detach striker.



2) Installation is in the reverse order of removal.

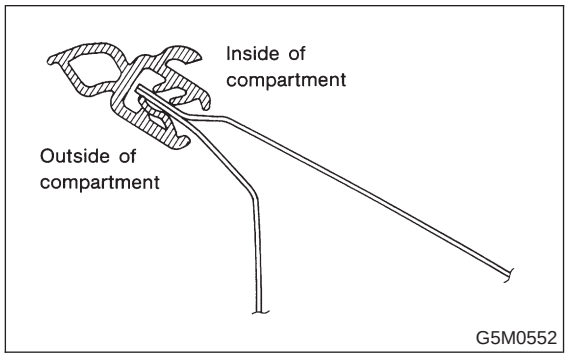
6. WEATHERSTRIP

1) Place weatherstrip so that its joints meet at lower center of vehicle body, and install by inserting flanged portion from below, as shown in section A—A in figure.



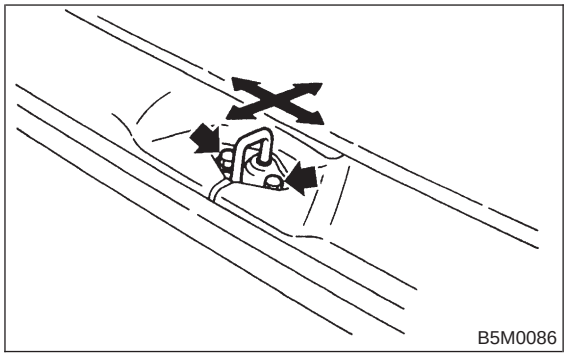
2) Tap along entire length with a rubber hammer to firmly insert body flange into weatherstrip.

CAUTION:
- **Be careful not to install in wrong direction.**
- **Install weatherstrip carefully and firmly.**



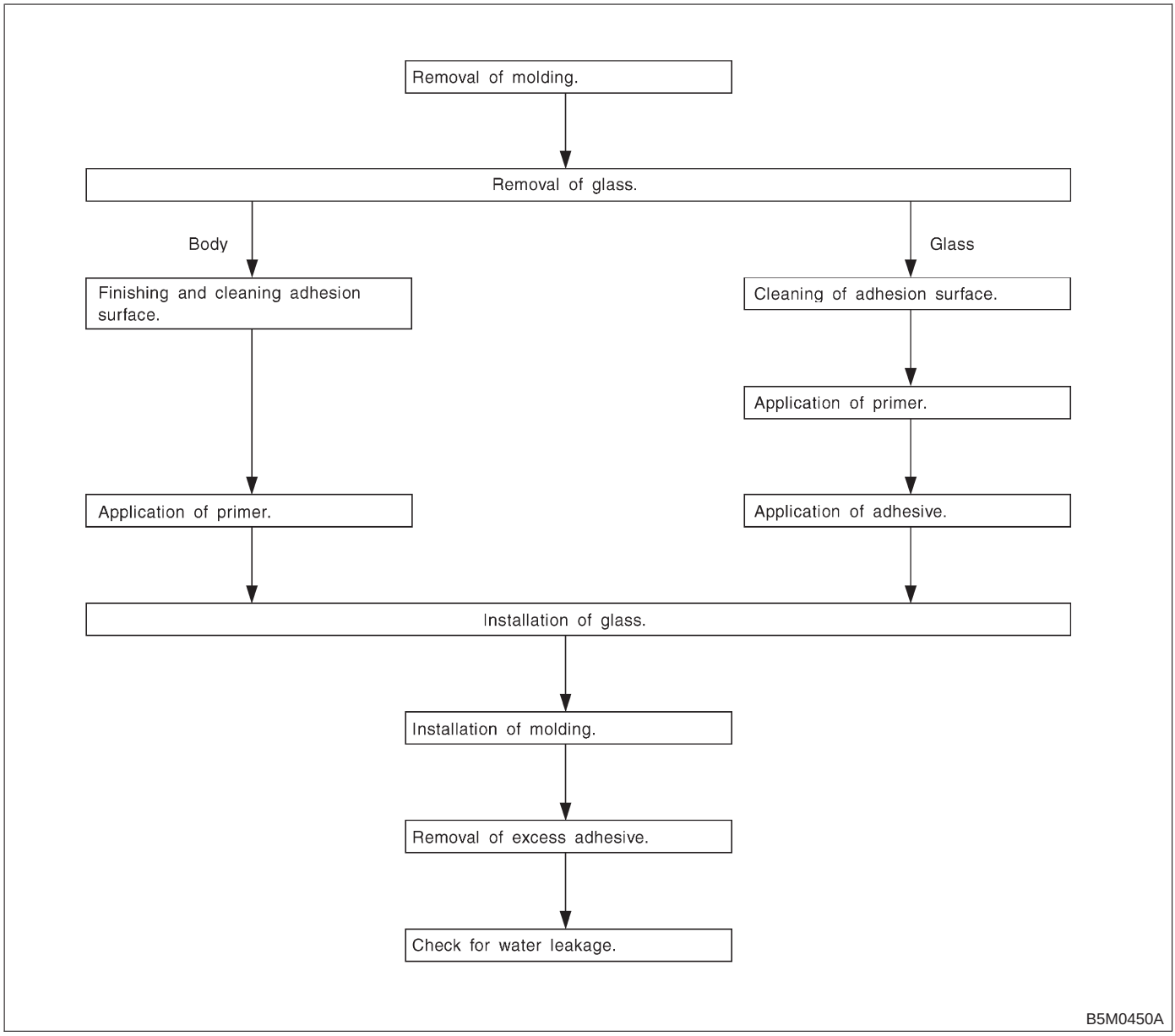
B: ADJUSTMENT

1) Loosen striker screw.
2) For lateral adjustment, align striker and latch at their centers.



4. Procedure Chart for Removing and Installing Window Glass

A: REMOVAL AND INSTALLATION



B: MATERIALS REQUIRED FOR APPLICATION

Description	Remarks
Repair adhesive set ● Cartridge of single liquid urethane adhesive ● Primer for glass and body	Sunstar No. 580 or Essex Chemical Corp's Urethane E Sunstar No. 435-580
Windshield knife or piano wire	For cutting windshield.
Sealant gun	For applying adhesive.
Suction cups	For holding glass.
Putty knife	For finishing adhesion surface and cutting spacer.
Sponge	For applying primer.
Gauze or cloth	For cleaning.
Alcohol or white gasoline	Alcohol or white gasoline For cleaning adhesion surface.
Tape	For preventing damage to painted surface.

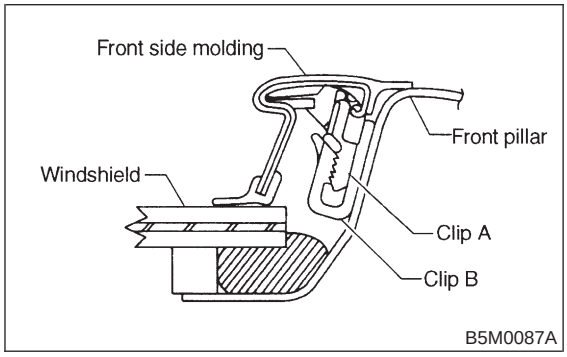
5. Windshield

A: REMOVAL

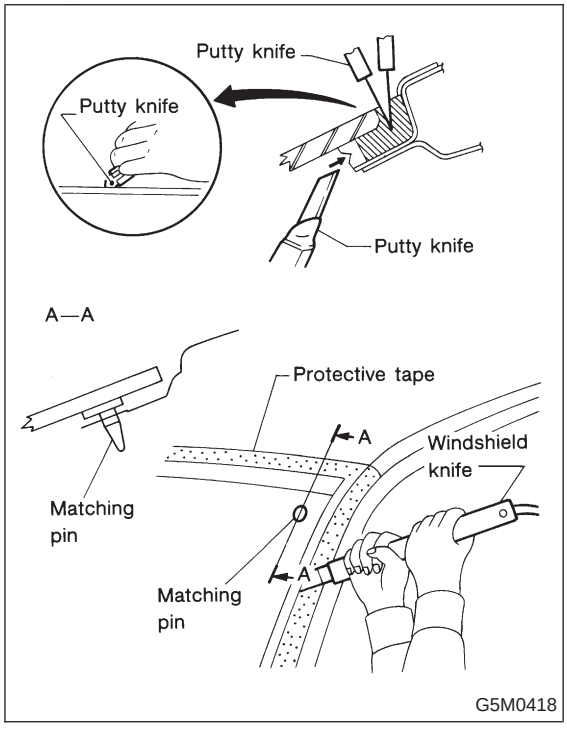
1. USING WINDSHIELD KNIFE

The following procedure for the front windshield can also be applied to other window glass.

1) Remove wiper arm and cowl panel.
2) Remove front side molding and front molding upper.

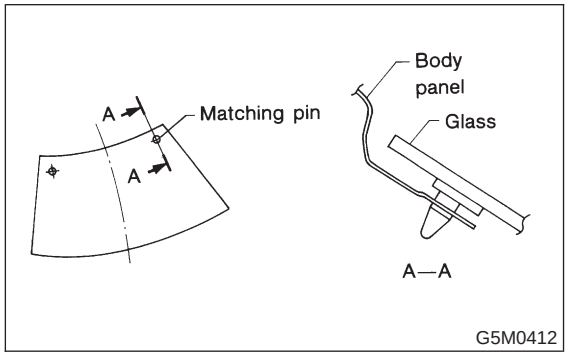


3) Remove glass:
   (1) Put protective tape on body to prevent damage.
   (2) Apply soapy water to the surface of the adhesive agent so the knife blade slides smoothly.
   (3) Cut off excess adhesive agent.
   (4) Put windshield knife into layer of adhesive
   (5) Cut adhesive layer with the windshield knife.



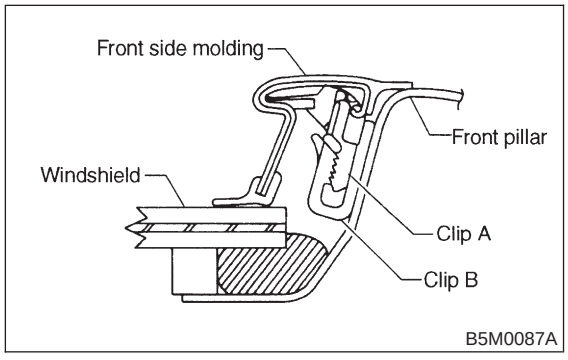
CAUTION:
● Keep knife edge along glass surface and end face.
● When first putting knife into layer of adhesive, select point with wide gap between body and glass.

NOTE:
A matching pin is cemented to corners of glass on compartment side.
Use a piano wire when cutting each pin.

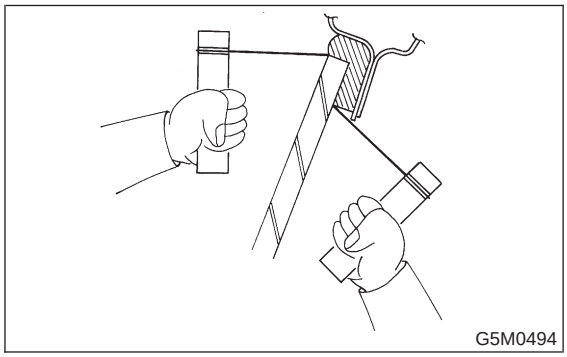


2. USING PIANO WIRE

1) Remove wiper arm and cowl panel.
2) Remove front side molding and front molding upper.



3) Remove glass:
   (1) Put protective tape on body to prevent damage.
   (2) Using drill or putty knife, make through-hole (one place) in adhesive agent.
   (3) Pass piano wire through the hole from inside the compartment, and connect both ends of wire securely to wooden blocks.



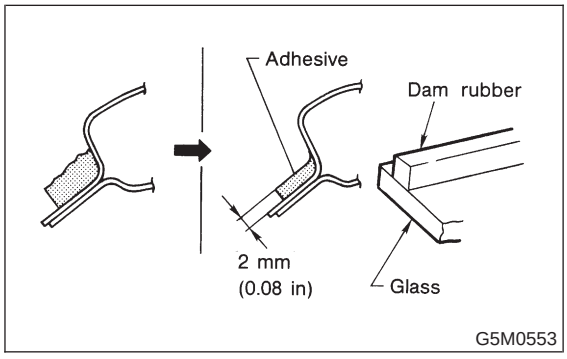
   (4) Cut adhesive layer with the wire by pulling it back and forth.

CAUTION:
When making through-hole into adhesive layer and cutting the adhesive, be careful not to damage interior and exterior parts.

B: INSTALLATION

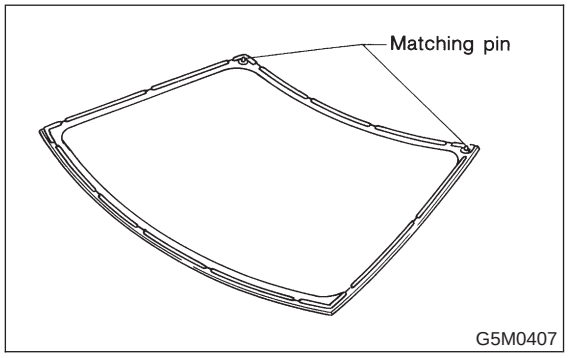
1) After cutting layer of adhesive, remove dam rubber remaining on body.
2) Finishing adhesion surface on body side:
Using a cutter knife etc., cut layer of adhesive sticking firmly to body, and finish it to a smooth surface of about 2 mm (0.08 in) in thickness.

CAUTION:
Take extra care not to cause damage to body paint.



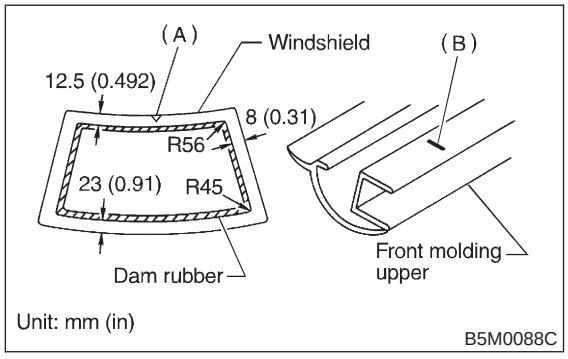
3) Cleaning body surface:
   (1) Thoroughly remove chips, dirt and dust from body surface.
   (2) Clean body wall surface and upper surface of layer of adhesive with a solvent such as alcohol or white gasoline.
4) Positioning glass:
   (1) Mount glass on body.
   (2) Adjust position of glass so that gap between body and glass is uniform on all sides.

(3) Put matching pin on body and glass in several places.



5) Cleaning glass:
(1) Dismount glass from body
(2) Clean surface of glass to be adhered with alcohol or white gasoline.

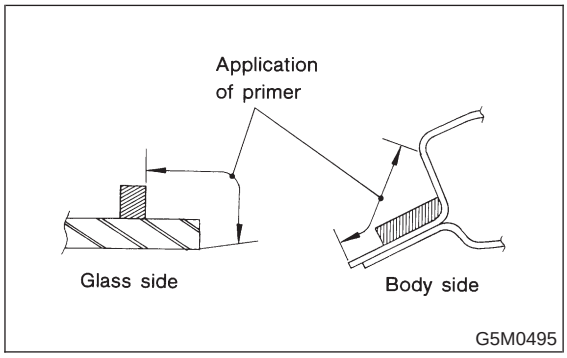
6) Stick dam rubber and install front molding upper:
While aligning ceramic print notch (A) on windshield upper portion with mark (B) in center of upper front molding, install upper front molding on windshield.



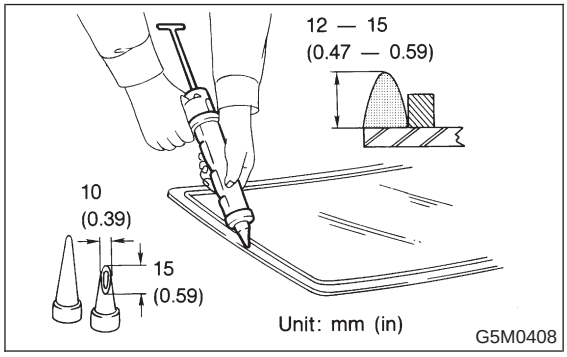
7) Application of primer:
(1) Using a sponge, apply primer to part of glass to be adhered.

(2) Apply primer to part of body to be adhered.

CAUTION:
● Primer is hard to wipe off of body paint, instrument panel, inner trim, etc. So put masking around these areas for protection.
● After application, let 1st primer dry spontaneously for about 10 minutes.
● Do not touch primer-coated surface under any circumstances.

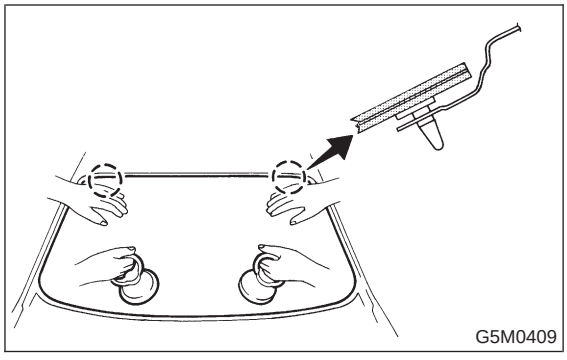


8) Application of adhesive:
(1) Cut nozzle tip of cartridge as shown in figure.



(2) Open cartridge and put it into a gun with nozzle attached.
(3) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.

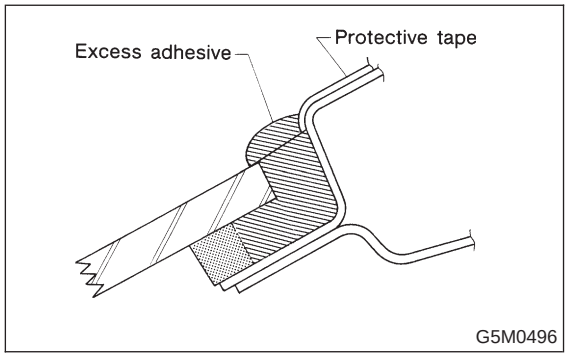
9) Installation of glass:
(1) Hold glass with rubber suction cups.
(2) Mount glass on body with matching pin aligned.



(3) Stick them fast by pressing all sides lightly.

10) Installation of molding:

(1) Remove adhesive overflowing from outside of glass until it becomes level with outer height of glass. Then, add adhesive to portions that need it, and clean with alcohol or white gasoline.



(2) Install front side molding.

CAUTION:
Do not open and close door after moldings have been installed. When opening and closing door for unavoidable reason, lower door glass and gently move door.

11) Water leakage test:
Test for water leakage about one hour after installation.

CAUTION:
- **Move vehicle very gently.**
- **Do not squirt strong hose stream on vehicle.**

12) Spontaneous drying:
After completing all operations, leave vehicle alone for 24 hours.

CAUTION:
When delivering vehicle to user, tell him that vehicle should not be subjected to heavy shocks for at least three days.

13) Install cowl panel and wiper arm.

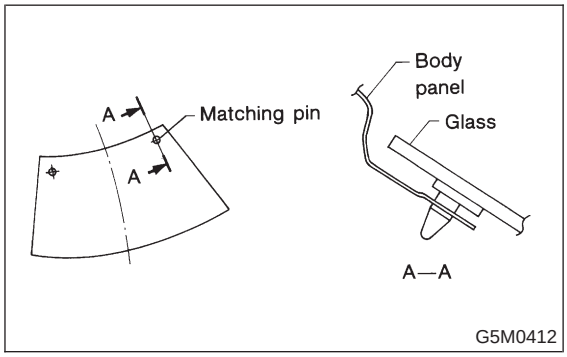
6. Rear Window Glass

A: REMOVAL

1. SEDAN

1) Disconnect connector from rear defogger terminal.
2) Remove glass in the same manner as in windshield.

NOTE:
A matching pin is cemented to the corners of glass on compartment side. Use a piano wire when cutting each pin.



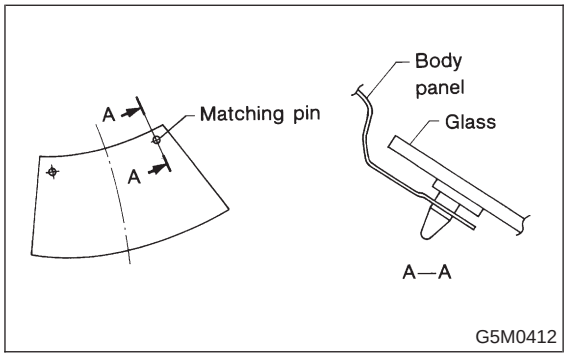
2. WAGON

NOTE:
It is impossible to remove the molding from the glass.
If molding is broken, replace rear glass.

1) Remove rear wiper and rear gate trim.
2) Disconnect connector from rear defogger terminal.
3) Remove glass in the same manner as in windshield.

CAUTION:
In case of using a piano wire, when re-installing the old rear window glass, be careful not to damage molding.

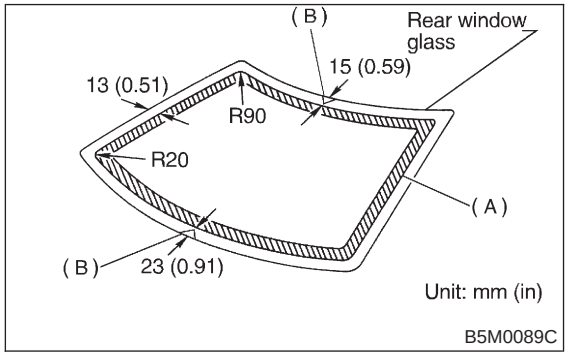
NOTE:
A matching pin is cemented to corners of glass on compartment side. Use a piano wire when cutting each pin.



B: INSTALLATION

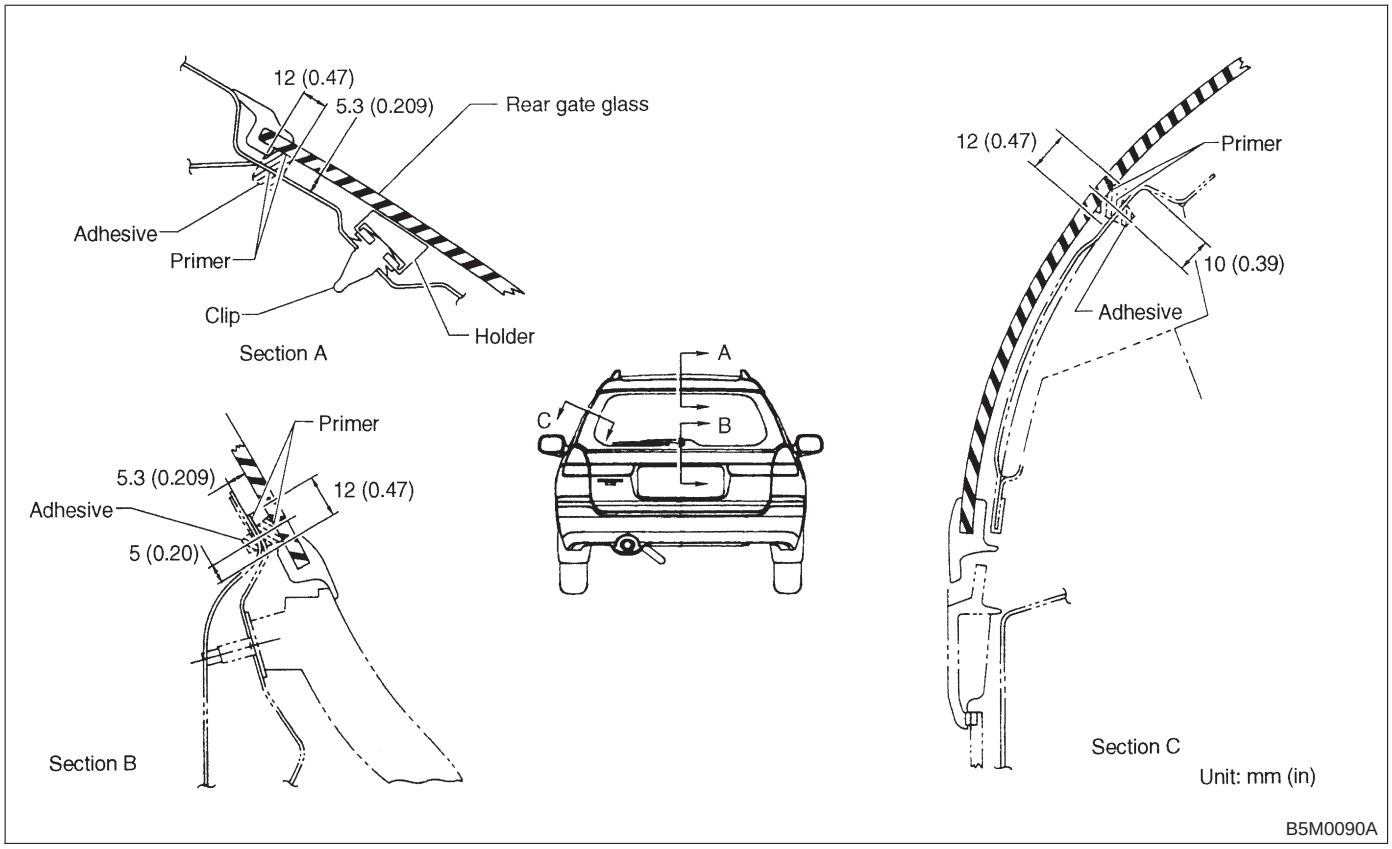
1. SEDAN

1) Install glass in the same manner as in windshield.
2) Stick dam rubber (A).
3) While aligning ceramic print notch (B) on rear window glass with marks in the center of upper and lower moldings, install the two moldings on rear window glass.



4) Make rear defogger connections.
5) After installation, test for water leakage after about one hour, and leave vehicle alone for 24 hours.

2. WAGON

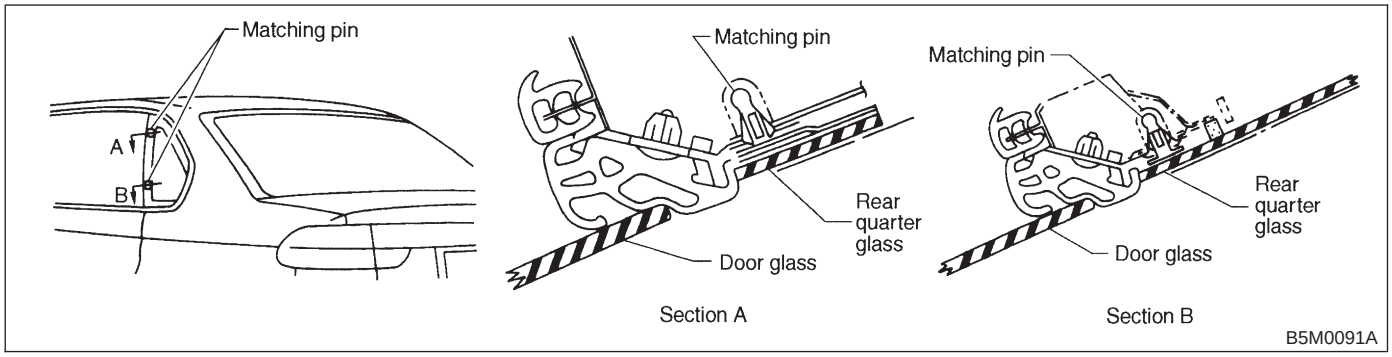


1) Install rear gate trim.
2) Install glass in the same manner as in windshield.
3) About one hour after installation, test for water leakage. Leave vehicle for 24 hours before using it.
4) Connect rear defogger connections.
5) Install high-mount stop light and rear wiper.

7. Rear Quarter Glass

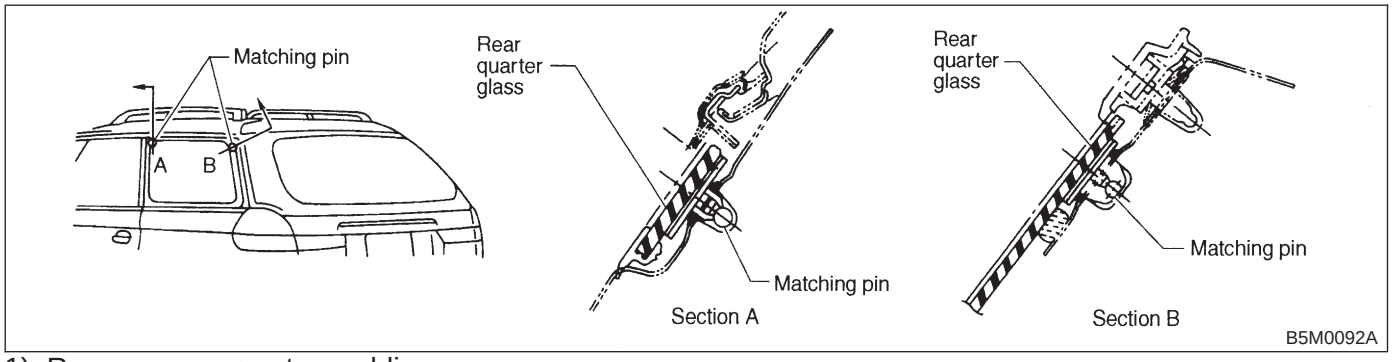
A: REMOVAL

1. SEDAN



1) Remove rear quarter molding.
2) Remove glass in the same manner as in windshield.

2. WAGON

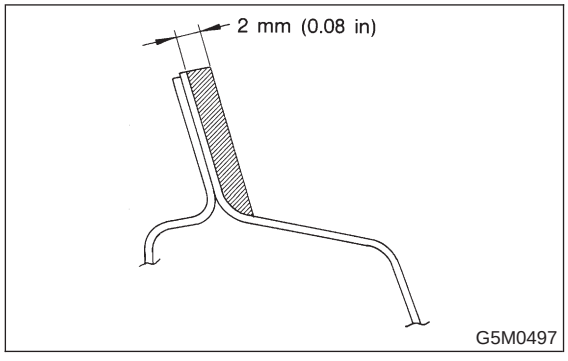


1) Remove rear quarter molding.
2) Remove glass in the same manner as in windshield.

B: INSTALLATION

1) Finish surface of adhesive layer on body.
Using a putty knife, etc., cut layer of adhesive stick firmly to body and finish it into a smooth surface of about 2 mm (0.08 in) in thickness.

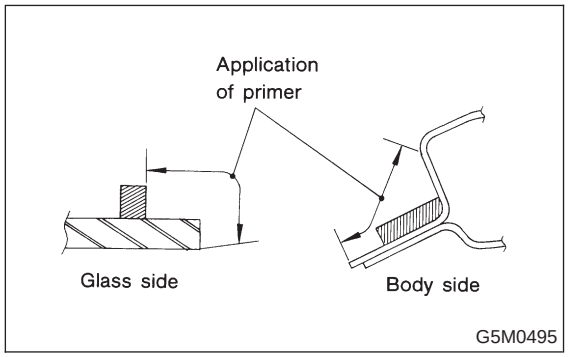
CAUTION:
Be careful not to damage body finish.



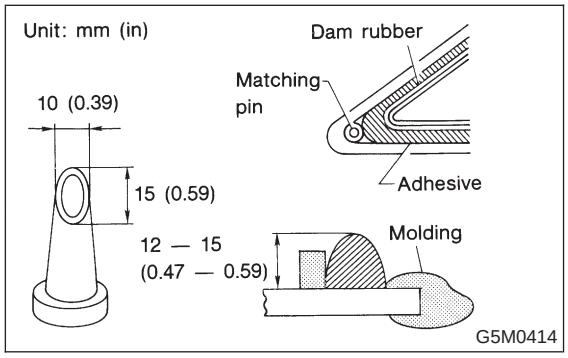
2) Cleaning of body surface:
   (1) Remove chips, dirt and dust from body surface.
   (2) Clean body wall surface and upper surface of adhesive layer with a solvent such as alcohol or white gasoline.
3) Cleaning glass:
   (1) Remove dirt and dust from surface of glass to be adhered.
   (2) Clean surface of glass to be adhered with alcohol or white gasoline.
4) Application of primer:
   (1) Using a sponge, apply primer to surface of glass to be adhered.

(2) Apply primer to surface of body to be adhered.

CAUTION:
● If primer has dropped on body finish, it is hard to wipe it off. So protect with masking.
● Primer must not project from black frame of glass.
● After applying primer, let it dry spontaneously for about 10 minutes.



5) Application of adhesive:
(1) Cut nozzle tip as shown in figure.



(2) Open cartridge and put it into a gun with nozzle attached.
(3) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.

6) Installation of glass:
(1) Hold glass with rubber suction cups.
(2) Mount glass on body with matching pin aligned.
(3) Stick them fast by pressing all sides lightly.

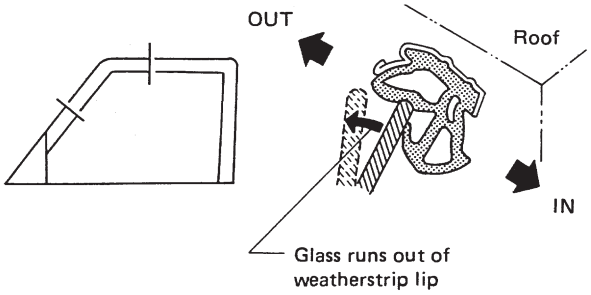
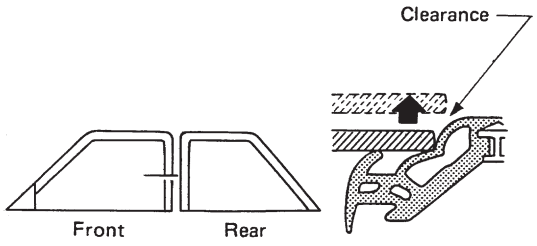
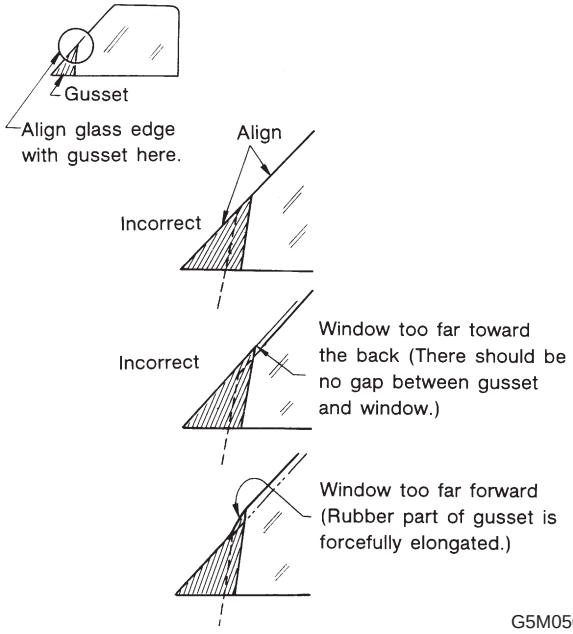
7) Water leakage test:
After installing glass, test for water leakage after about one hour.

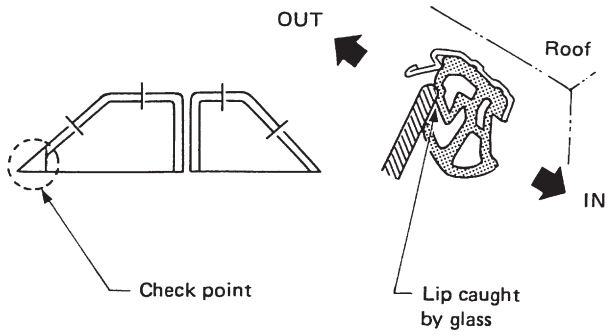
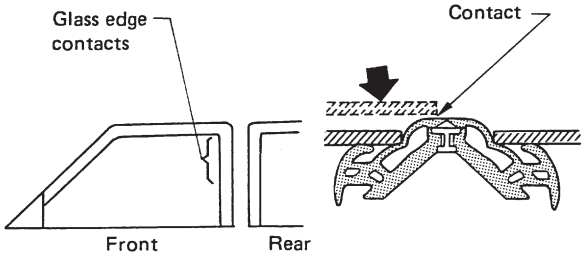
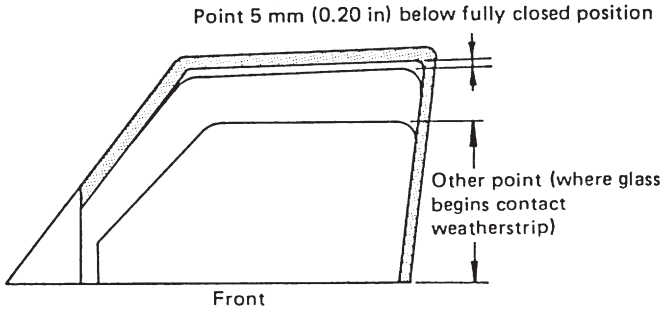
CAUTION:
● Move vehicle slowly.
● When opening and closing door, lower door glass and move door gently.
● Do not squirt strong hose stream on vehicle.

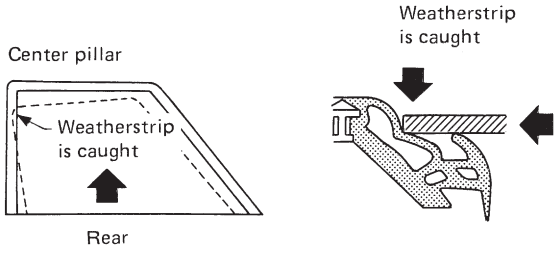
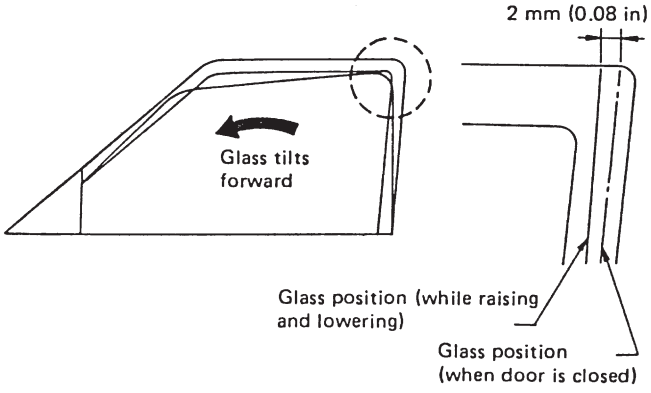
8) Spontaneous drying:
After completing all operations, leave vehicle alone for 24 hours.

CAUTION:
When delivering vehicle to user, tell him or her that vehicle should not be subjected to heavy shocks for at least three days.

1. Door Glass

	Condition	Apparent cause/Correction
Glass in fully closed position	1) Glass runs out of weatherstrip lip when considerable hand pressure is applied to it from inside.  G5M0502 (This condition may cause wind/booming noise during high-speed operation.)	● Insufficient upward travel of glass Increase upward travel of glass.
	2) Clearance exists between glass and weatherstrip when light hand pressure is applied to it at center and rear pillar locations.  G5M0503 (This condition may cause wind noise and/or water leakage.)	● Insufficient glass-to-door weather-strip contact Check stabilizer and glass for proper contact. Increase contact using upper sash adjustment bolt. ● Improper adjustment of striker in in-out direction Close door and check for alignment of striker with vehicle body.
	3) Adjust door glass so that it is aligned with door rearview mirror gusset.  G5M0504	● Window is not properly adjusted in up-down/fore-aft direction. Adjust window. If necessary, move B channel regulator to eliminate window tilt. ● Gusset is not properly adjusted in fore-aft direction. Adjust gusset after loosing all bolts and nuts witch tightening it.

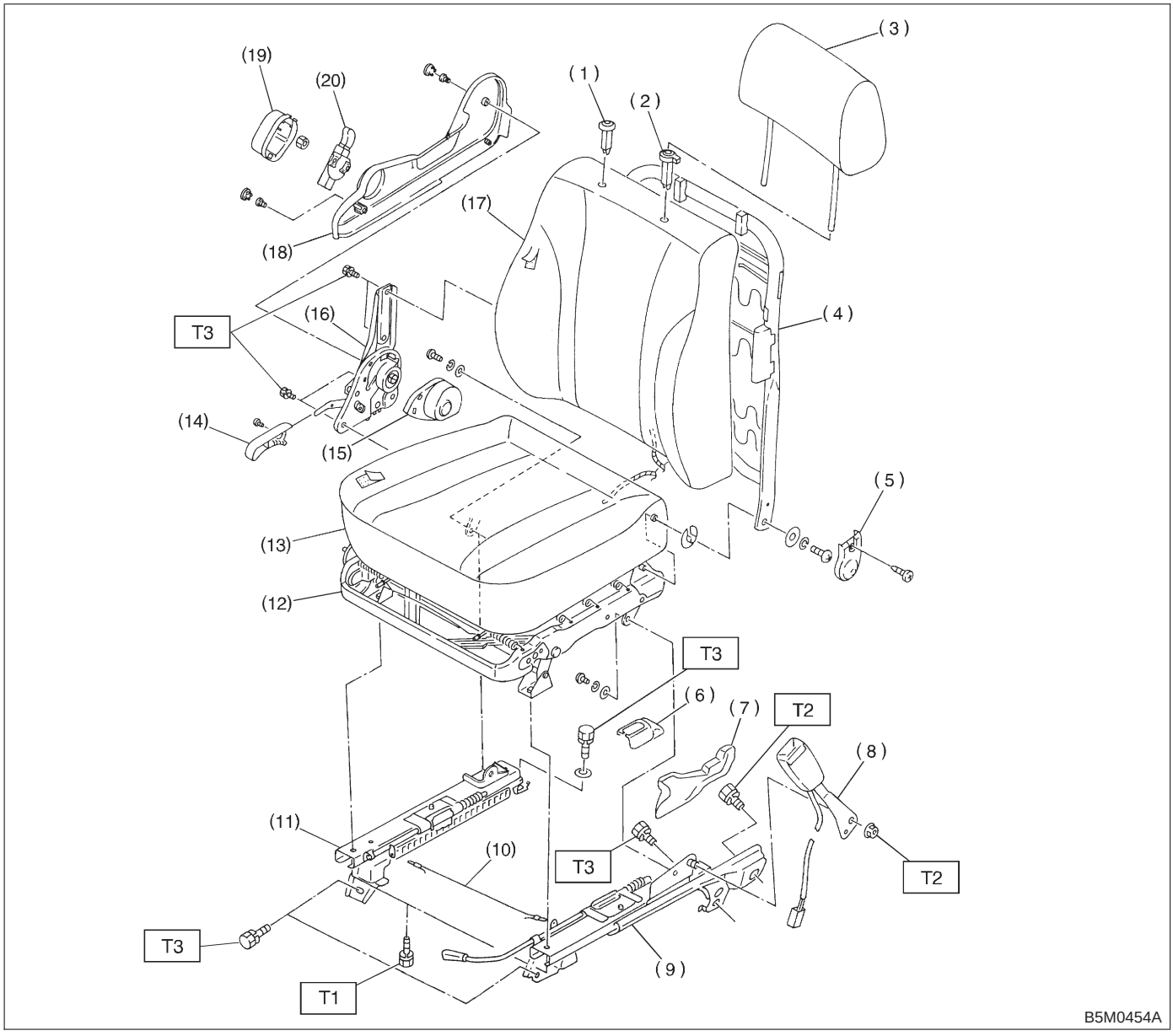
	Condition	Apparent cause/Correction
Door in fully closed/ open position	1) Glass rides over weatherstrip lip when door is closed.  G5M0505 (This condition increases wind/booming noise, leakage and/or effort required to close door.)	● Improper up-down and in-out glass alignments Adjust glass for up-down and in-out alignments (incl. rear sash, upper stopper adjustment, etc.). If necessary, correct glass tilt by moving B channel regulator.
	2) Edge of glass contacts retainer when door is fully closed.  G5M0506	● Improper glass-to-center pillar weatherstrip or excessive glass contact to weatherstrip ● Excessive adjusting in contact to weatherstrip Causes rear edge of glass to tilt inboard closer to center pillar. Adjust rear sash adjustment bolt to reduce glass contact to weatherstrip.
Raise or lower window glass	1) Considerable effort or time is required to operate regulator. Standard operating effort: ● Entire up-down travel except for point 5 mm (0.20 in) below fully closed position: 29.4 N (3.0 kg, 6.6 lb) ● Point 5 mm (0.20 in) below fully closed position: 44.1 N (4.5 kg, 9.9 lb)  G5M0507	● Sliding resistance increased due to high stabilizer-to-glass contact pressure. Reduce contact by mounting inner stabilizer to inside of the vehicle. ● High glass-to-windshield contact pressure Reduce contact using upper sash adjustment bolt. ● Unequal contact adjustment stroke between front and rear sashes Set to equal stroke. ● Tilt of rear sash adjustment bolt mounting bracket Correct tilt of bracket so it is parallel to inner panel.

	Condition	Apparent cause/Correction
Raise or lower window glass	2) Center pillar weatherstrip is caught by rear window glass when glass is raised.  G5M0508	● Improper fore-aft or in-out alignment of window glass Lower B channel regulator to tilt window glass back.
	3) Window glass tilts forward by more than 2 mm (0.08 in).  G5M0509 Excessive tilt of glass forward is due to excessive glass ″contact'' which causes reaction of center pillar weatherstrip. Glass can be tilted forward due to increase in reaction of shoulder weatherstrip or free play between sash and roller. Taking these symptoms into account, glass should be aligned.	● Excessive glass contact pressure or improper in-out alignment (1) Lower B channel regulator to tilt window glass rearward. (2) Reduce contact pressure using upper sash adjustment bolt.

MEMO:

SEATS, SEAT BELTS, AND INTERIOR 5-3

1. Front Seat

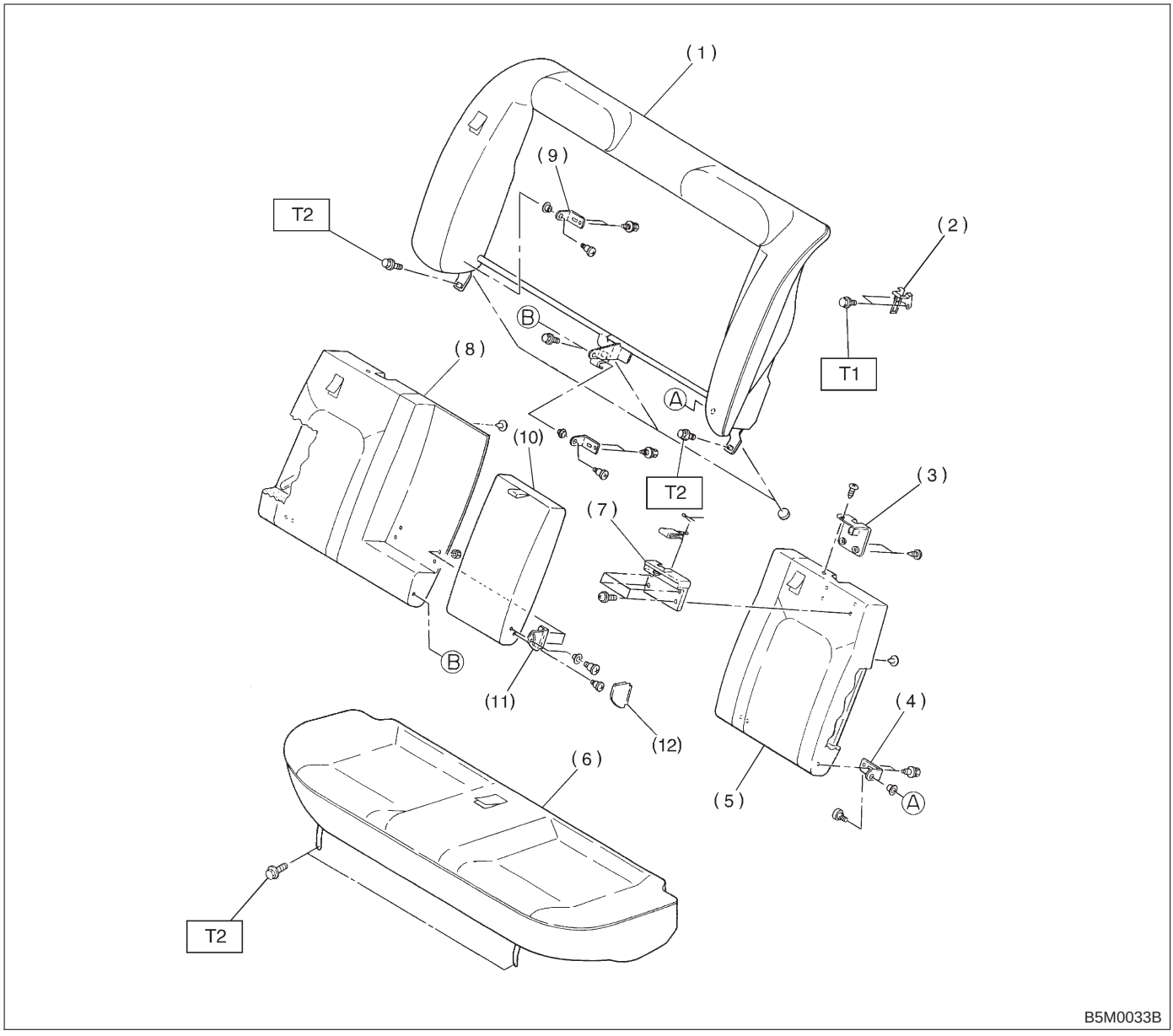


(1) Headrest free bushing
(2) Headrest lock bushing
(3) Headrest ASSY
(4) Front backrest frame ASSY
(5) Protector
(6) Cover (Bolt) (outer)
(7) Cover (Bolt) (inner)
(8) Inner belt ASSY
(9) Inner slide rail ASSY
(10) Connect wire
(11) Outer slide rail ASSY
(12) Front cushion frame ASSY
(13) Cushion ASSY
(14) Reclining lever
(15) Hinge spring cover
(16) Reclining hinge ASSY
(17) Backrest ASSY
(18) Hinge cover
(19) Tilt lever cover
(20) Tilt lever ASSY

Tightening torque: N·m (kg-m, ft-lb)
T1: 23±5 (2.3±0.5, 16.6±3.6)
T2: 29±7 (3.0±0.7, 21.7±5.1)
T3: 52±10 (5.3±1.0, 38±7)

2. Rear Seat

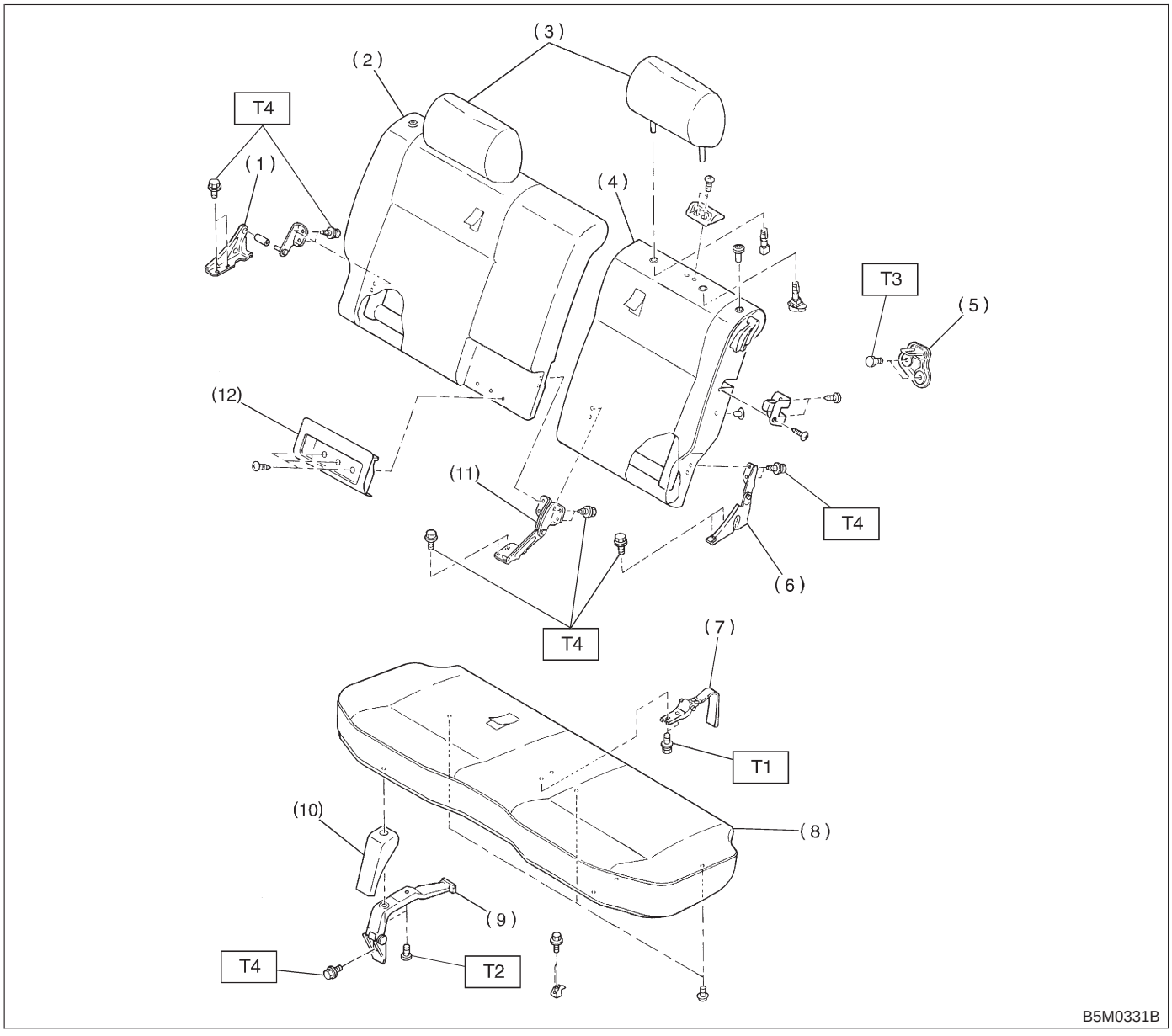
A: SEDAN



(1) Backrest
(2) Striker
(3) Lock cover
(4) Bracket (LH)
(5) Backrest (LH)
(6) Cushion
(7) Lock ASSY
(8) Backrest (RH)
(9) Bracket (RH)
(10) Arm rest
(11) Hinge
(12) Cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 10±3 (1.0±0.3, 7.2±2.2)
T2: 25±7 (2.5±0.7, 18.1±5.1)

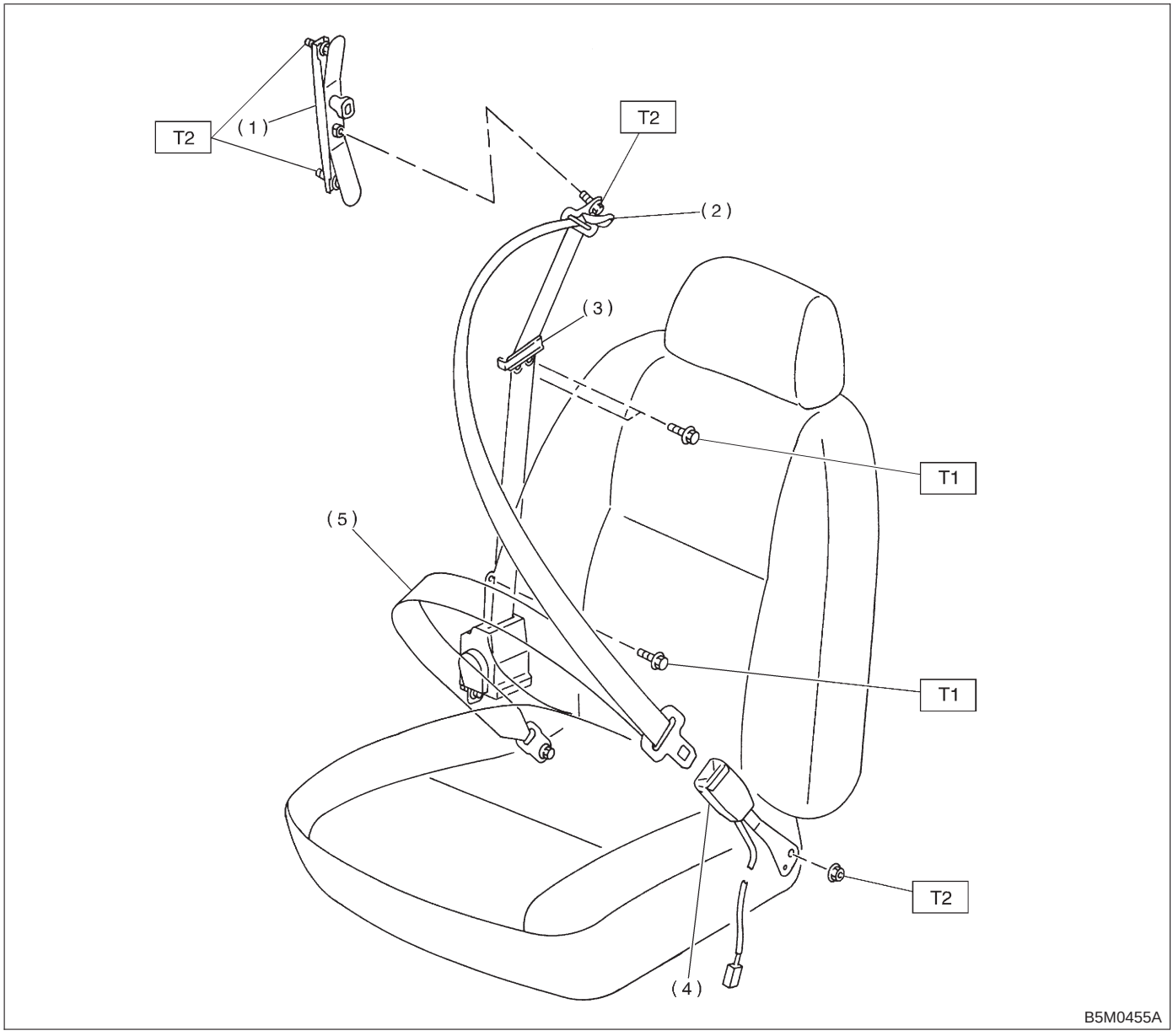
B: WAGON



(1) Hinge bracket (RH)
(2) Backrest (RH)
(3) Pillow
(4) Backrest (LH)
(5) Striker
(6) Hinge bracket (LH)
(7) Lock hinge
(8) Rear cushion
(9) Hinge
(10) Hinge cover
(11) Backrest center hinge
(12) Pocket

Tightening torque: N·m (kg-m, ft-lb)
T1: 2±1 (0.2±0.1, 1.4±0.7)
T2: 5.9±1.5 (0.6±0.15, 4.3±1.1)
T3: 10±3 (1.0±0.3, 7.2±2.2)
T4: 25±7 (2.5±0.7, 18.1±5.1)

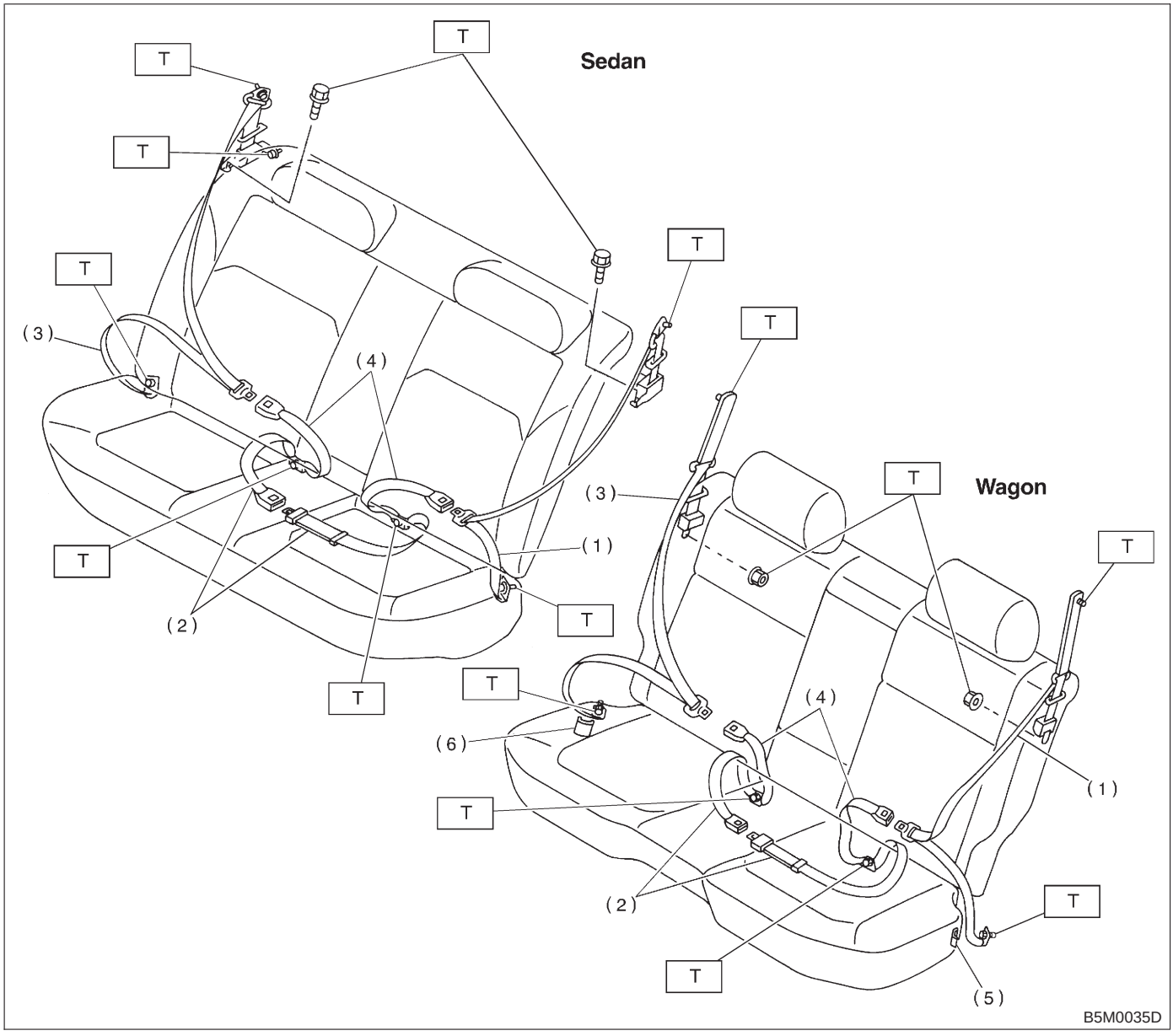
3. Front Seat Belt



(1) Adjuster anchor ASSY
(2) Through anchor cover
(3) Webbing guide
(4) Inner belt ASSY
(5) Outer belt ASSY

Tightening torque: N·m (kg-m, ft-lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 35±13 (3.6±1.3, 26±9)

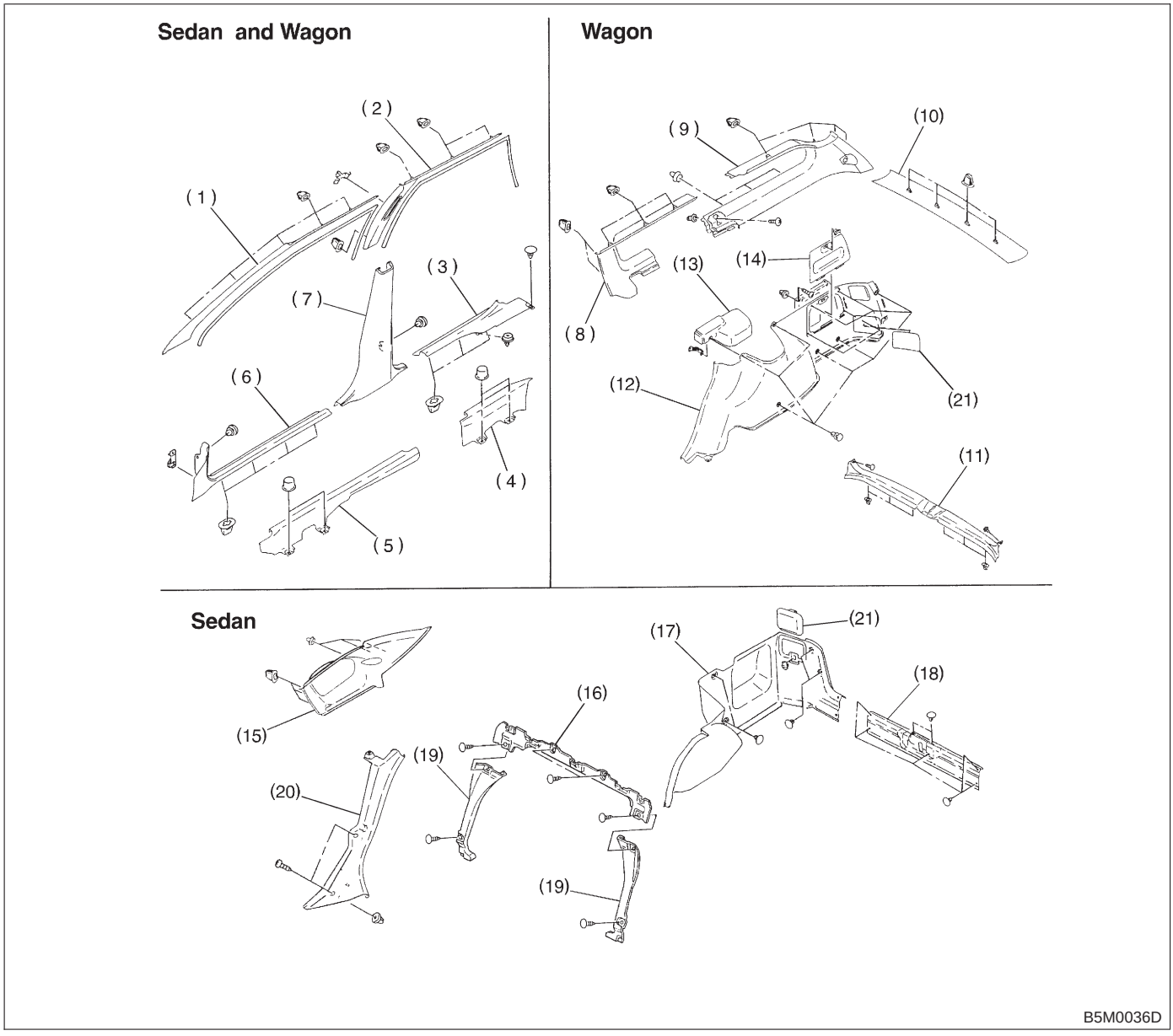
4. Rear Seat Belt



(1) Outer seat belt (LH)
(2) Center seat belt
(3) Outer seat belt (RH)
(4) Inner seat belt
(5) Lap anchor cover (LH)
(6) Lap anchor cover (RH)

Tightening torque: N·m (kg-m, ft-lb)
T: 35±13 (3.6±1.3, 26±9)

5. Inner Trim

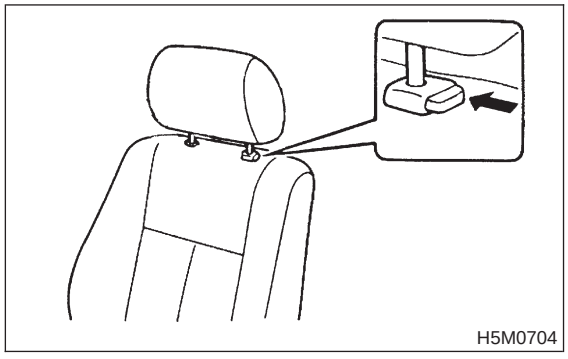


(1) Front pillar upper trim
(2) Center pillar upper trim
(3) Side sill rear upper cover
(4) Side sill rear lower cover
(5) Side sill front lower cover
(6) Front pillar lower trim
(7) Center pillar lower trim
(8) Rear quarter upper front trim
(9) Rear quarter upper rear trim
(10) Rear rail trim
(11) Edge rear trim
(12) Rear quarter pillar lower trim
(13) Cap strut
(14) Lid pocket
(15) Rear pillar upper
(16) Rear upper bulk
(17) Trunk side trim
(18) Trunk rear trim
(19) Rear side bulk trim
(20) Rear pillar lower trim
(21) Lamp cover

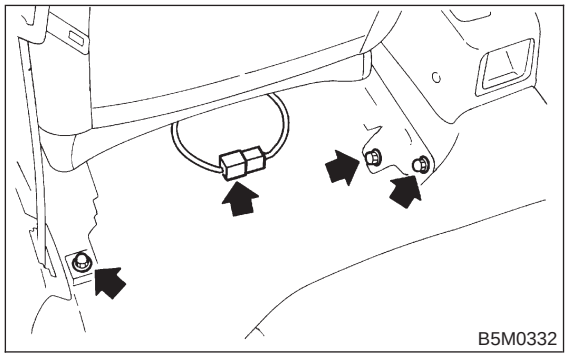
1. Front Seat

A: REMOVAL

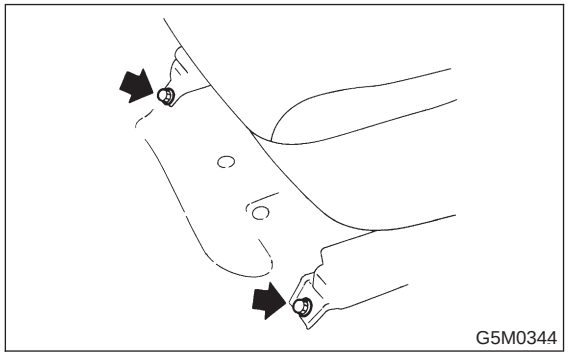
1) While operating knob (located on top of backrest), lift headrest out with hand placed between backrest and headrest.



2) Pull reclining lever back to fold backrest all the way forward. While pulling slide adjuster lever, move seat all the way forward.
3) Disconnect connector under driver's seat.
4) Disconnect side airbag connector. (Side airbag equipped vehicle) <Ref. to 5-5 [M2F2].>
5) Remove bolt cover at rear end of slide rail.
6) Remove bolts securing seat rear.



7) While pulling slide adjuster lever, slide seat all the way back.
8) Remove bolts securing front of seat.

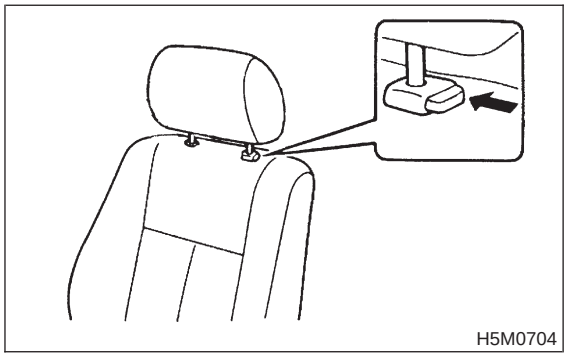


9) Remove front seat from vehicle, then install headrest.

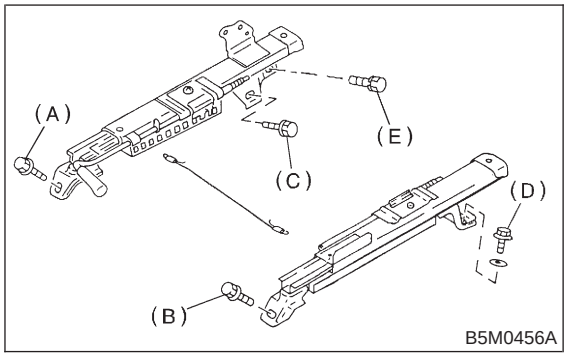
CAUTION:
● Be careful not to scratch seat when removing it from vehicle.
● After the front seat has been removed from side airbag equipped vehicle, store it as instructed in section 5-5 AIRBAG REPAIR SECTION. <Ref. to 5-5 [W3A0].>

B: INSTALLATION

1) While operating knob (located on top of backrest), lift headrest out with hand placed between backrest and headrest.



2) Pull reclining lever back to fold backrest all the way forward. Pull slide adjuster lever and move lower slide rail all the way backward.
3) Position seat in compartment and align the holes on the seat with the holes on the vehicle body side.
4) Secure the front of seat using inward and outward bolts (A) and (B) in that order.
5) While pulling slide adjuster lever, move seat all the way forward.
6) Secure the rear of seat using inward and outward bolts (C) and (D) in that order.
7) Install bolt (E).



8) Connect connector under driver's seat.
9) Connect side airbag connector. (Side airbag equipped model)

CAUTION:
Check that all lock plate pawls are completely and equally inserted into the holes in the slide rail brackets.

10) After installation, ensure that all mechanisms operate properly and lock.
11) If any mechanism does not function properly, loosen bolts (C), (D) and (E), slide seat as required, insert all lock plate pawls into holes in slide rail brackets, and tighten bolts (C), (D) and (E) in that order.
12) Install bolt cover on rear end of slide rail.
13) Install headrest on backrest.

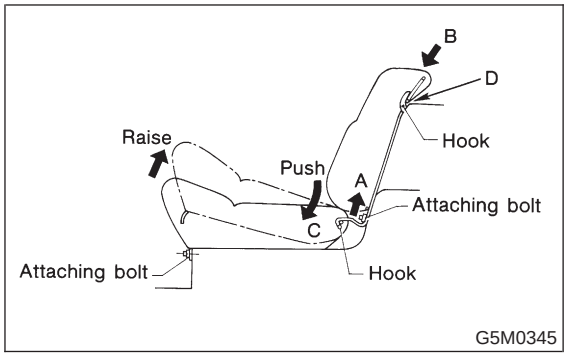
NOTE:
Tighten bolts in the designated order.

2. Rear Seat

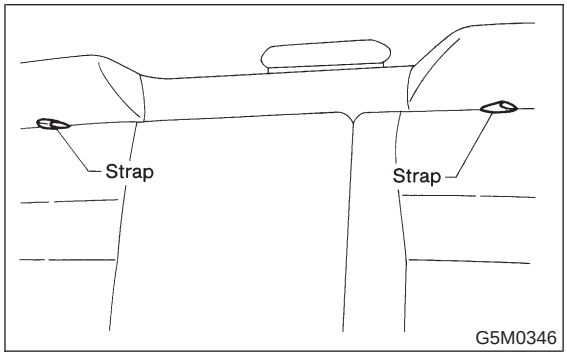
A: REMOVAL

1. SEDAN

1) Remove bolts securing hinges (located at front of cushion) to body.
2) Slightly raise front of cushion while pushing down on cushion in the direction of “C”. With cushion held in that position, move it forward until it is unhooked.



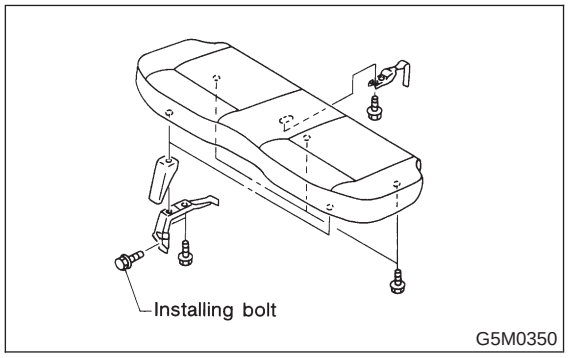
3) Remove bolts securing lower portion of backrest to body.
4) Pull strap (located in center of fold-down backrest) to release lock, and fold backrest onto cushion. (Fold-down type)



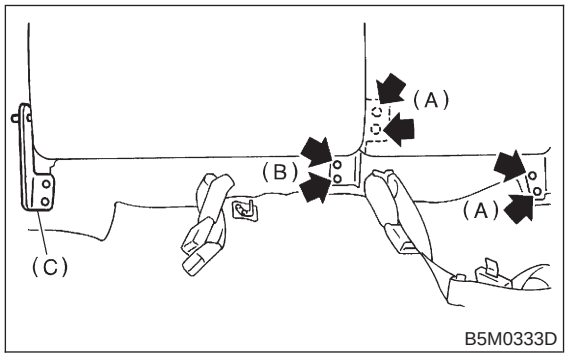
5) Lift rear seat backrest in direction “A” until it is released

2. WAGON

1) Remove bolts securing hinges (located at front of seat) to body.



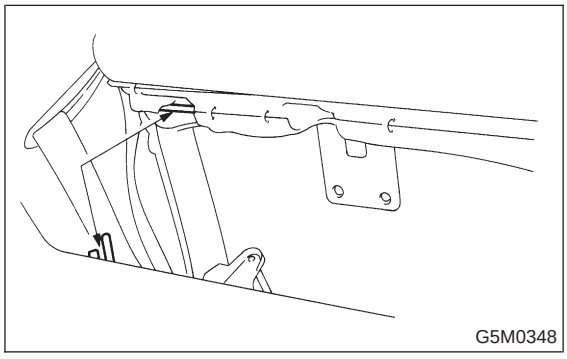
2) Pull strap (located in middle rear portion of cushion) to release lock. Lift cushion out and away from body.
3) Pull knobs (located at each side of backrest's upper portion) up to release lock, and fold backrest all the way forward.
4) Remove the bolt (A) and then remove backrest. (LH side)
5) Remove the bolt (B) and then remove backrest (RH side) from hinge bracket (C).



B: INSTALLATION

1. SEDAN

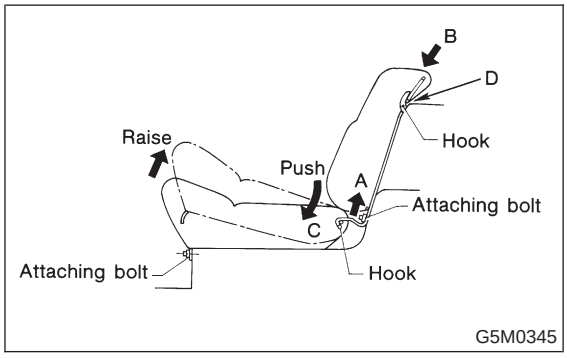
1) Before installing backrest, ensure that trim panel, insulator and seat belt are properly installed.
2) Transfer outer seat belt webbing to front of backrest and fold backrest forward. Attach seat wire to upper hooks (2 places), and move pillow in the direction of "B" until backrest is aligned with lower mounting holes in body.



3) Engage backrest's folding mechanism with striker.
4) Secure lower center and both sides of backrest to body with bolts.
5) Slightly raise front section of cushion while pushing down on cushion in the direction of "C". With cushion held in that position, attach rear section of cushion to hooks at lower frame location.

CAUTION:
● Before installing seat, ensure that seat belt is placed on cushion.
● Confirm that winding of three-point type seat belt can operate regularly.

6) Secure front of cushion to body with bolts.



2. WAGON

Installation is in the reverse order of removal.

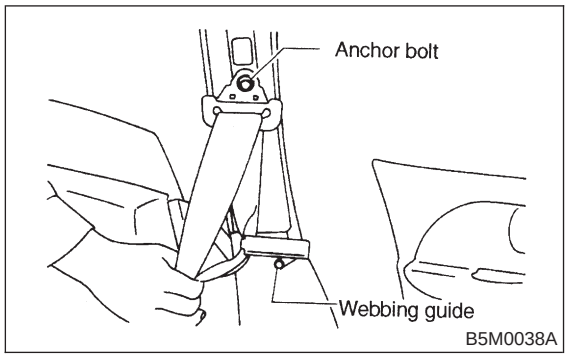
CAUTION:
● Do not allow center seat belt to get under cushion when folding cushion.
● Ensure that side seat belt tongue is free from cushion and trim panel.
● Lift front of cushion to ensure that cushion is properly locked.

3. Front Seat Belt

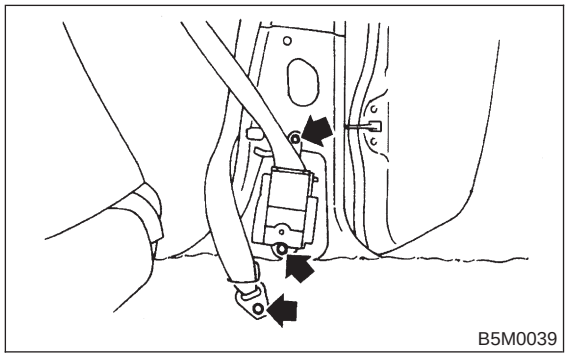
A: REMOVAL AND INSTALLATION

1. OUTER BELT

1) Remove through anchor cover cap.
2) Remove shoulder anchor bolt.

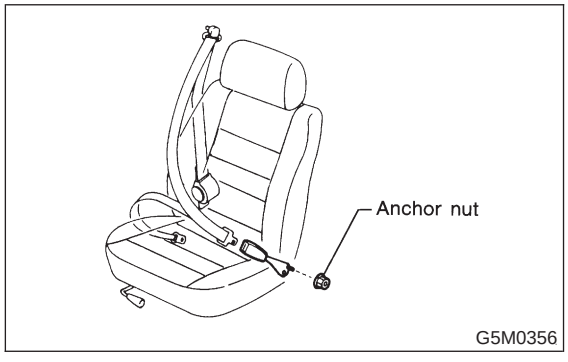


3) Remove side sill rear upper cover and front pillar lower trim.
4) Remove center pillar lower trim.
5) Remove webbing guide.
6) Roll up floor mat at the bottom of center pillar.
7) Remove lap anchor bolt.
8) Remove outer belt assembly.
9) Installation is in the reverse order of removal.



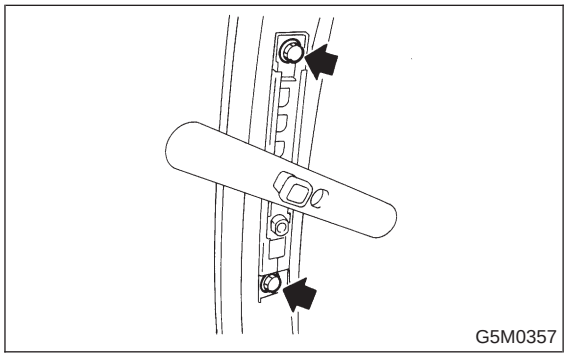
2. INNER BELT

1) Remove anchor nut.
2) Installation is in the reverse order of removal.



3. ADJUSTABLE SHOULDER ANCHOR

1) Remove shoulder anchor bolt.
2) Remove lower center pillar trim.
3) Remove front and center pillar upper trim.
4) Remove adjustable shoulder anchor assembly.



5) Installation is in the reverse order of removal.

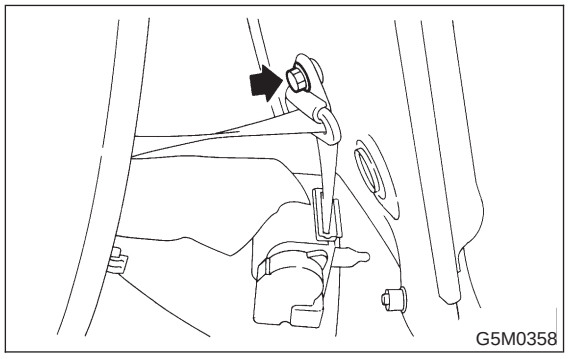
CAUTION:
● The left and right ELR's are not mutually interchangeable because different sensors are used.
● Be careful not to twist belts during installation.

4. Rear Seat Belt

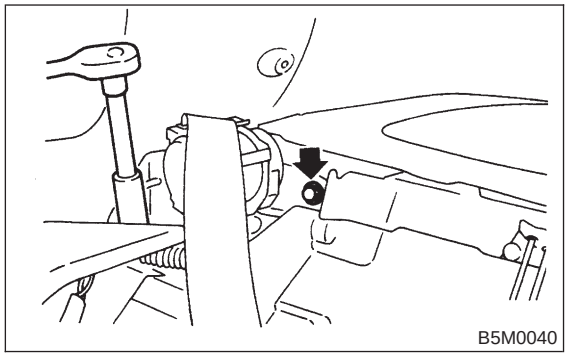
A: REMOVAL AND INSTALLATION

1. SEDAN

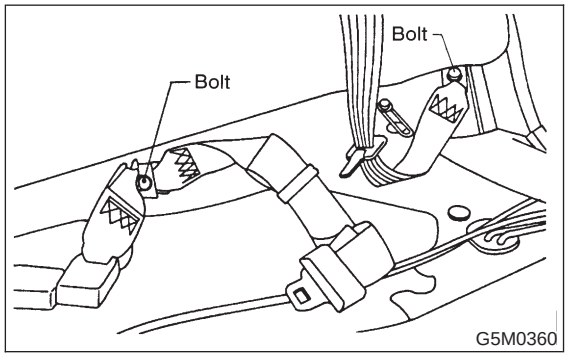
1) Remove rear cushion from vehicle.
2) Remove rear backrest from vehicle.
3) Remove rear pillar upper trim.
4) Remove outer anchor bolts.



5) Remove ELR.



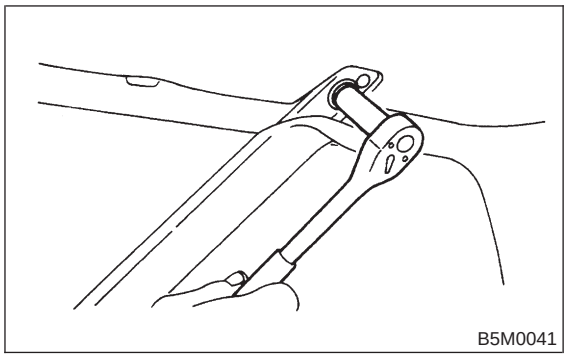
6) Remove anchor bolt of outer belt and then remove outer belt assembly.
7) Remove inner belt.



8) Installation is in the reverse order of removal.

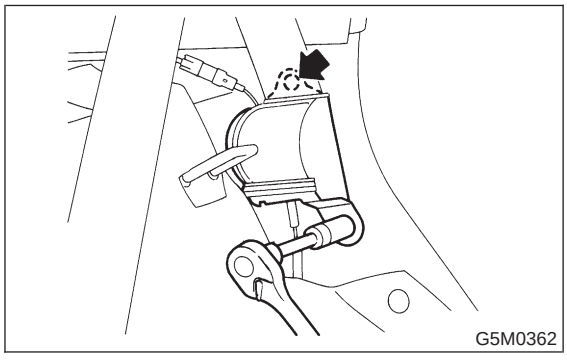
2. WAGON

1) Raise rear cushion.
2) Remove shoulder anchor bolt.

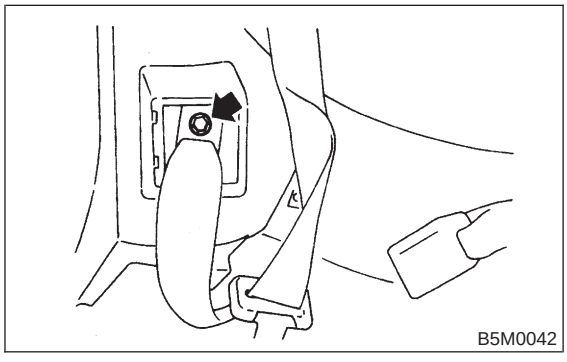


3) Remove cap strut.
4) Remove rear quarter upper front trim.
5) Remove ELR assembly.

CAUTION:
Remove outer seat belt and center seat belt in similar manner used to remove those from Sedan.



6) Remove lap anchor cover and then remove lower anchor bolt.



7) Remove outer belt assembly.
8) Installation is in the reverse order of removal. Ensure that seat belt is properly reeled on and off after installation of ELR.

CAUTION:
- **Be extremely careful not to confuse center seat anchor plate with outer seat anchor plate during installation.**
- **Ensure that seat belts are free from twisting after installation.**

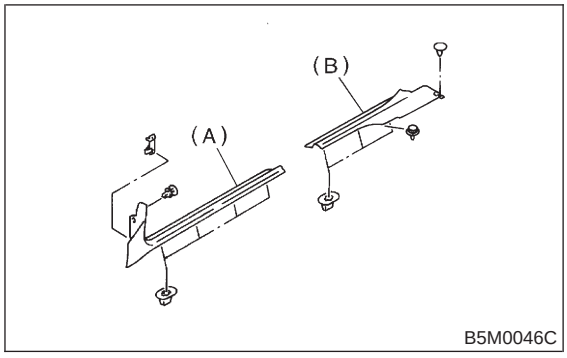
● Ensure that tongues, buckles and belts are properly placed on seat.

5. Inner Trim Panel

A: REMOVAL AND INSTALLATION

1. SIDE SILL COVER

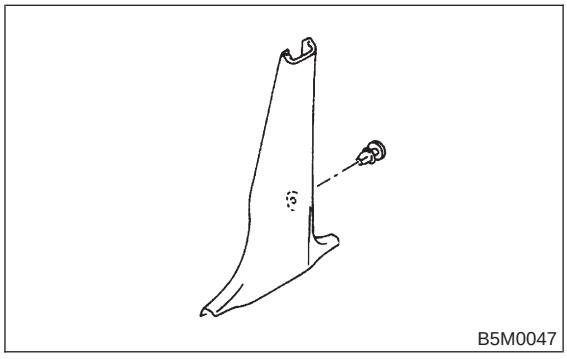
1) Remove front pillar lower trim (A).
2) Remove side sill rear upper cover trim (B).



3) Installation is in the reverse order of removal.

2. CENTER PILLAR LOWER

1) Remove center pillar lower trim.

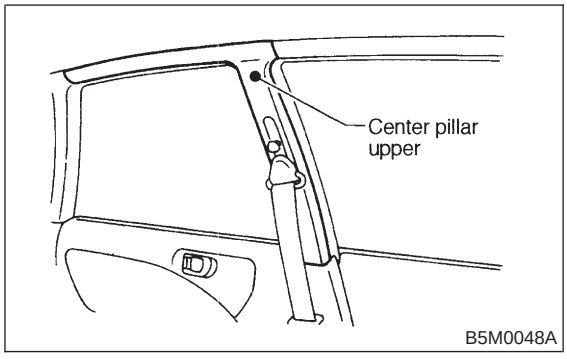


2) Installation is in the reverse order of removal.

3. CENTER PILLAR UPPER

NOTE:
<Ref. to 5-3 [C500].>

1) Remove front pillar upper trim.
2) Remove upper anchor of front seat belt.
3) Remove center pillar upper trim panel.



4) Installation is in the reverse order of removal.

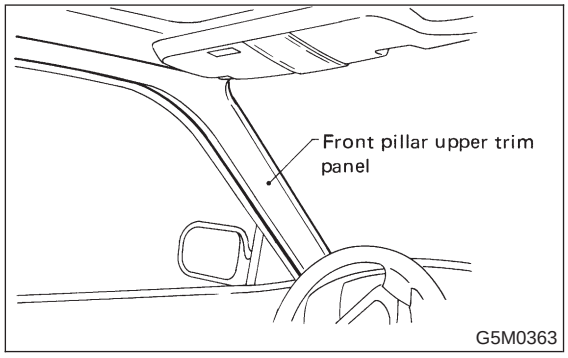
CAUTION:
● The left and right ELR's are not mutually interchangeable because different sensors are used.
● Be careful not to twist belts during installation.

4. FRONT PILLAR UPPER

NOTE:
<Ref. to 5-3 [C500].>

1) Remove front pillar upper trim panel.

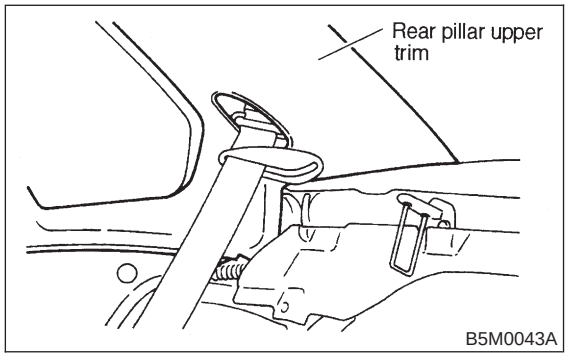
CAUTION:
Be sure to securely hook pawls of front pillar upper trim panel on body flange.



2) Installation is in the reverse order of removal.

5. REAR PILLAR UPPER

1) Remove rear seat cushion and backrest.
2) Remove rear seat belt. (Lower anchor bolt)
3) Remove rear pillar upper trim panel. <Ref. to 5-3 [C500].>



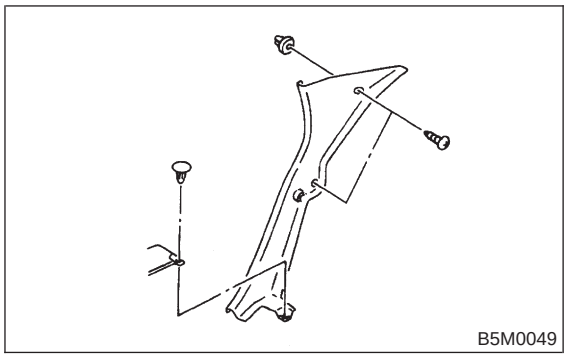
4) Installation is in the reverse order of removal.

CAUTION:
Be sure to securely hook pawls of rear pillar upper trim panel on body flange.

6. REAR PILLAR LOWER

NOTE:
<Ref. to 5-3 [C500].>

1) Remove side sill rear upper cover trim.
2) Remove rear pillar lower trim.

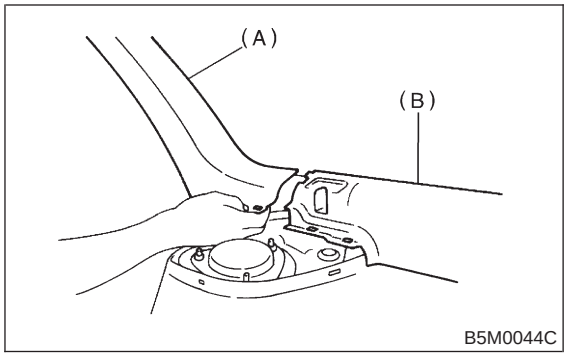


3) Installation is in the reverse order of removal.

7. REAR QUARTER PILLAR UPPER

NOTE:
<Ref. to 5-3 [C500].>

1) Remove rear seat belt. (Upper anchor bolt)
2) Remove cap strut.
3) Remove rear quarter upper front trim (A).
4) Remove rear quarter upper rear trim (B).



5) Installation is in the reverse order of removal.

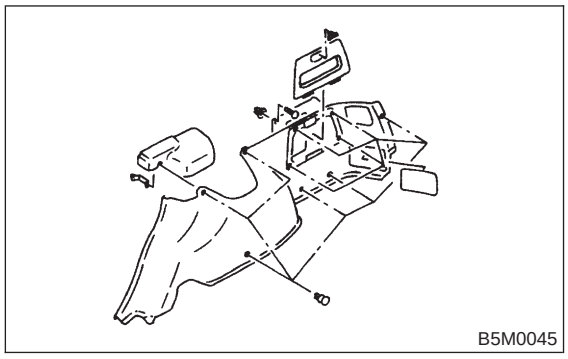
CAUTION:
Be sure to securely hook pawls of rear quarter pillar trim panel on body flange.

8. REAR QUARTER PILLAR LOWER

NOTE:
<Ref. to 5-3 [C500].>

1) Set rear seat cushion up.
2) Remove side sill rear upper cover.
3) Remove rear seat belt. (Upper anchor and lower anchor bolts)
4) Remove side skirt trim.
5) Remove cap strut.
6) Remove rear quarter upper rear trim.

7) Remove rear quarter pillar lower trim.



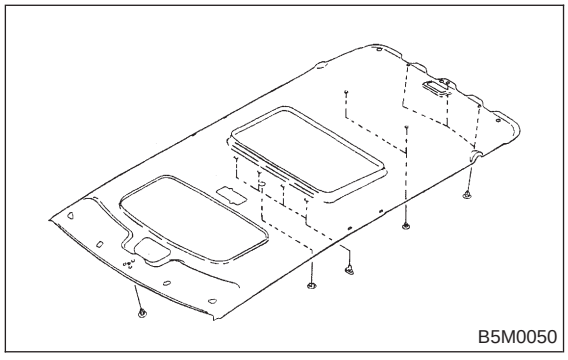
8) Installation is in the reverse order of removal.

CAUTION:
Be careful not to ride trim panel over harness, insulators, etc.

9. ROOF TRIM

NOTE:
<Ref. to 5-3 [C500].>

1) Remove room mirror, room light, sun visor and assist grip.
2) Remove front pillar upper, center pillar upper, rear quarter upper and rear rail trim.
3) Using ST, remove clips and then detach roof trim.
ST 925580000 PULLER



4) Installation is in the reverse order of removal.

CAUTION:
When removing clip, use great care to prevent damaging the roof trim.

10. FLOOR MAT AIRBAG

1) Supplemental Restraint System “Airbag”
Airbag system wiring harness is routed near floor mat.

CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
● Be careful not to damage Airbag system wiring harness when servicing floor mat.

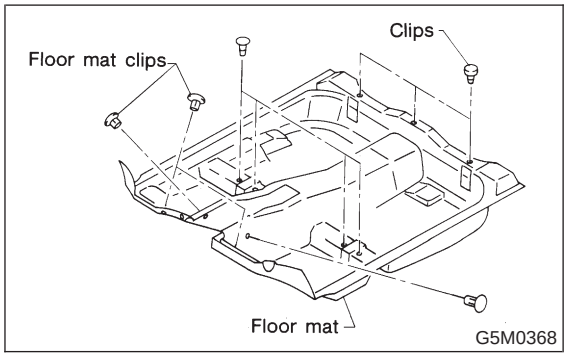
2) The following procedure is applicable to all models:

NOTE:
<Ref. to 5-3 [C500].>

(1) Remove front seats.
(2) Remove rear seat cushion.
(3) Remove console box.
(4) Remove front pillar lower trim panel.
(5) Remove center pillar lower trim panel.
(6) Remove side sill cover.
(7) Remove fuel opener cover.
(8) Remove clip under front seat.
(9) Remove clip in toe board area.

NOTE:
When pulling out edge, do not pull mat alone; pull mat together with edge.
Pry off two steel clips on side sill front cover and one on side sill rear cover using screwdriver.

(10) Remove mat hook.
(11) Remove mat from toe board area.
(12) Remove mat from heater module.
(13) Roll mat, and take it out of opened rear door.



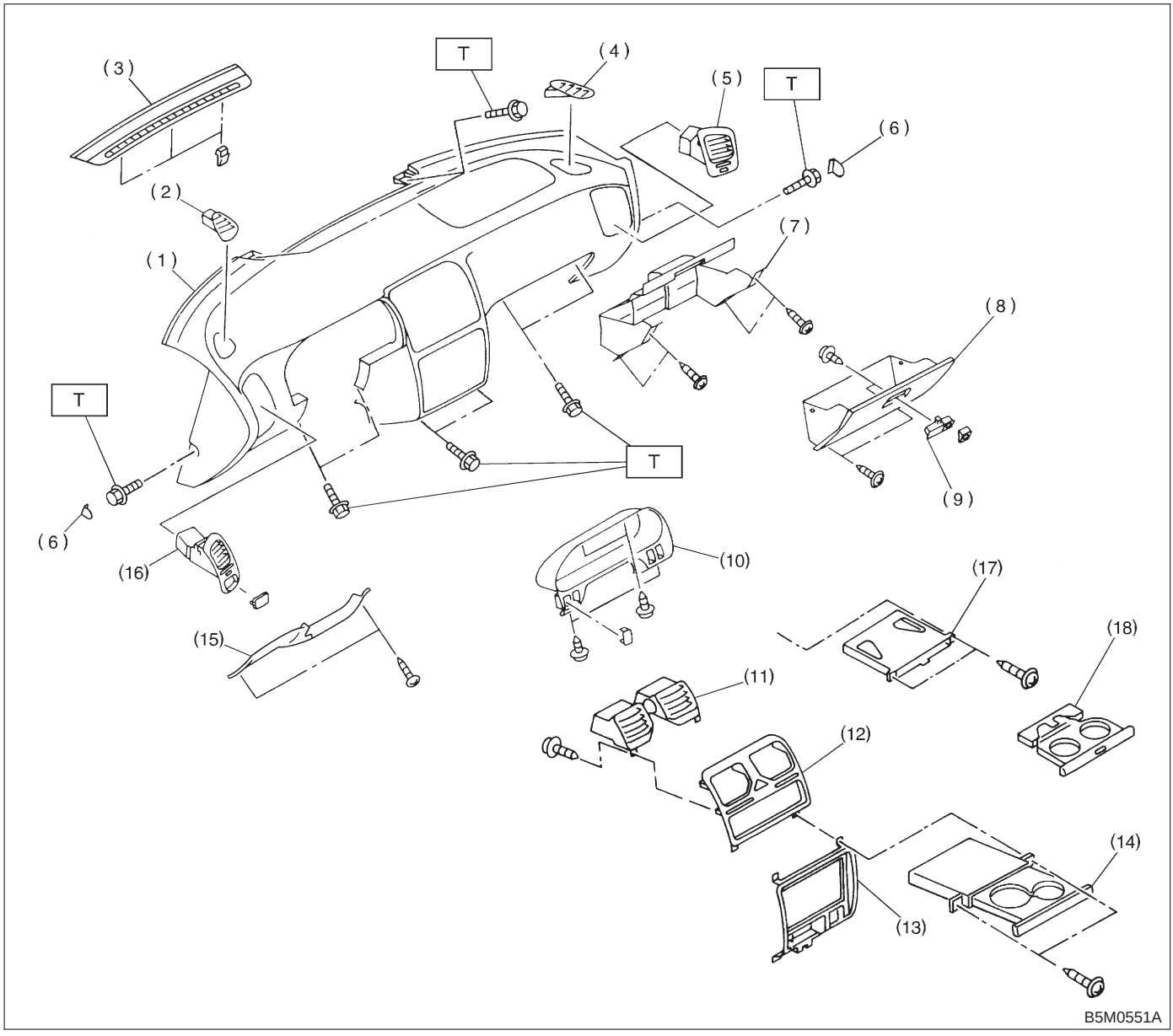
(14) Installation is in the reverse order of removal.

NOTE:
● Secure mat firmly with hook and velcro tape.
● Insert mat edge firmly into the groove of side sill cover.

MEMO:

INSTRUMENT PANEL 5-4

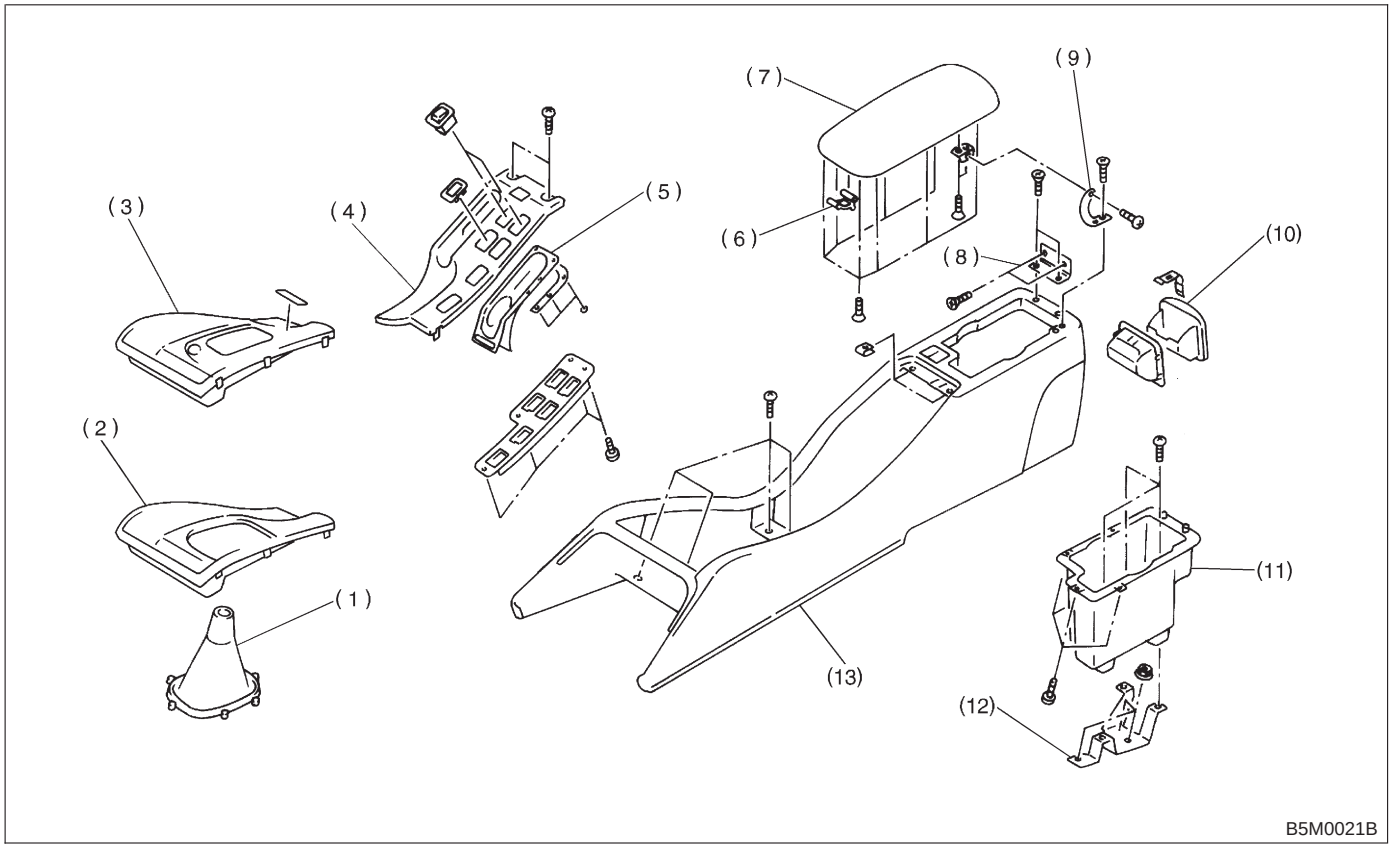
1. Instrument Panel



(1) Pad and frame
(2) Grille SD def. (D)
(3) Front def. grille
(4) Grille SD def. (P)
(5) Grille vent (P)
(6) Cover
(7) Cover back panel
(8) Pocket ASSY
(9) Lock ASSY
(10) Meter visor
(11) Grille CTR vent.
(12) Panel CTR upper
(13) Panel CTR lower
(14) Cup holder ASSY
(15) Panel lower cover
(16) Grille SD vent. (D)
(17) Cup holder BRKT
(18) Cup holder

Tightening torque: N·m (kg-m, ft-lb)
T: 7±1 (0.7±0.1, 5.1±0.7)

2. Console Box



(1) Shift boot
(2) Front cover (MT)
(3) Front cover (AT)
(4) Console cover
(5) Strip
(6) Lock
(7) Lid
(8) Hinge
(9) Arm
(10) Ash tray ASSY
(11) Console pocket
(12) Console BRKT
(13) Console box

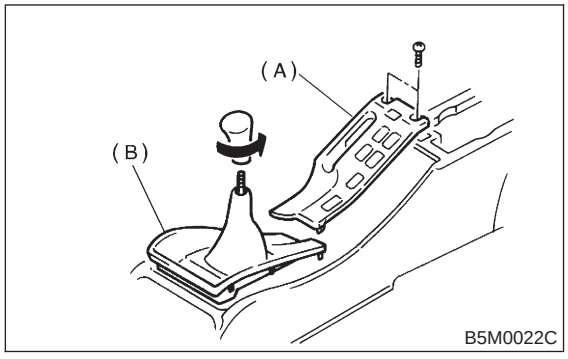
1. Instrument Panel AIRBAG

A: REMOVAL

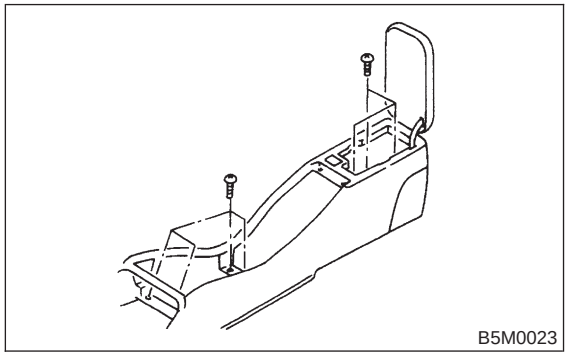
Airbag system wiring harness is routed near combination meter.

CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
● Be careful not to damage Airbag system wiring harness when servicing the combination meter.

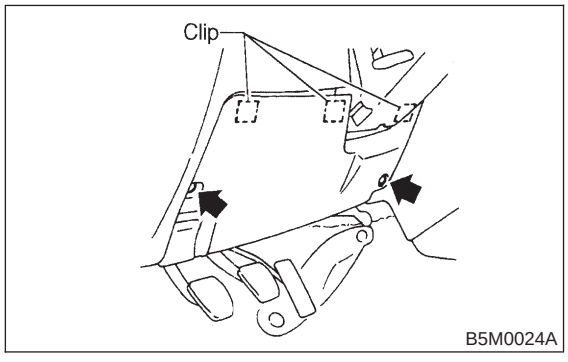
1) Disconnect GND cable from battery.
2) Remove shift knob (MT model).
3) Remove console cover (A) and front cover (B).



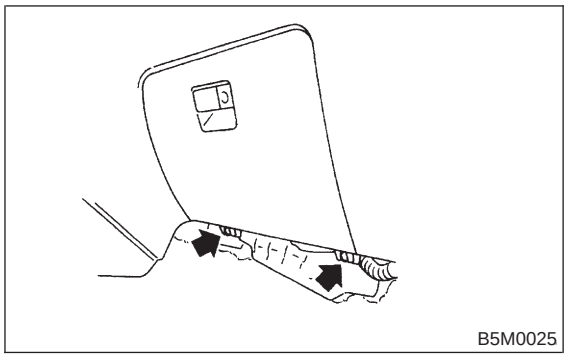
4) Remove console box.



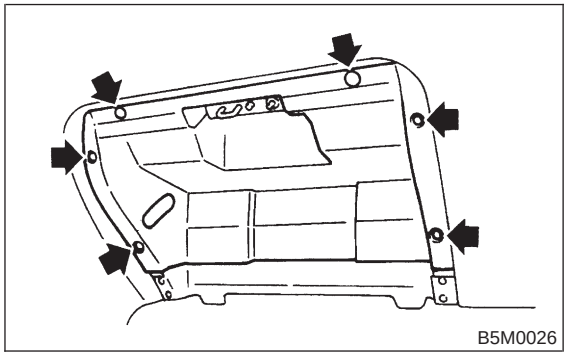
5) Remove lower cover and then disconnect connector.



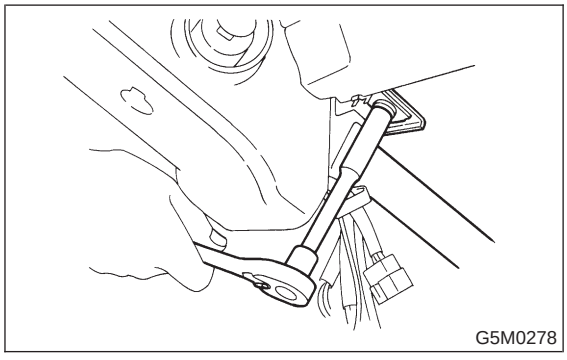
6) Remove glove box.



7) Remove cover back panel.

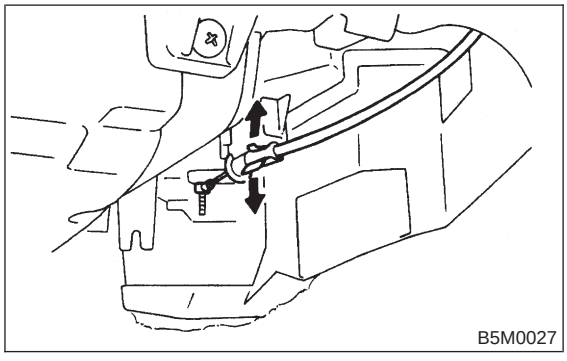


8) Remove two bolts and lower steering column.

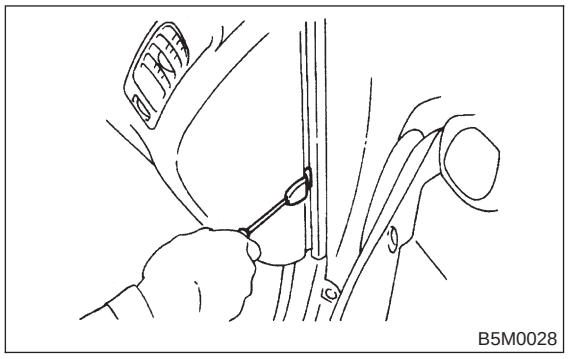


9) Set temperature control lever to Max. COLD position, and then disconnect temperature control cable from link of heater module.

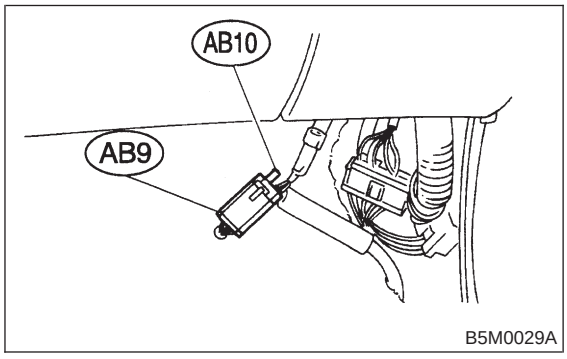
NOTE:
Do not move lever and link when installing.



10) Remove bolt cover and bolt of both side.



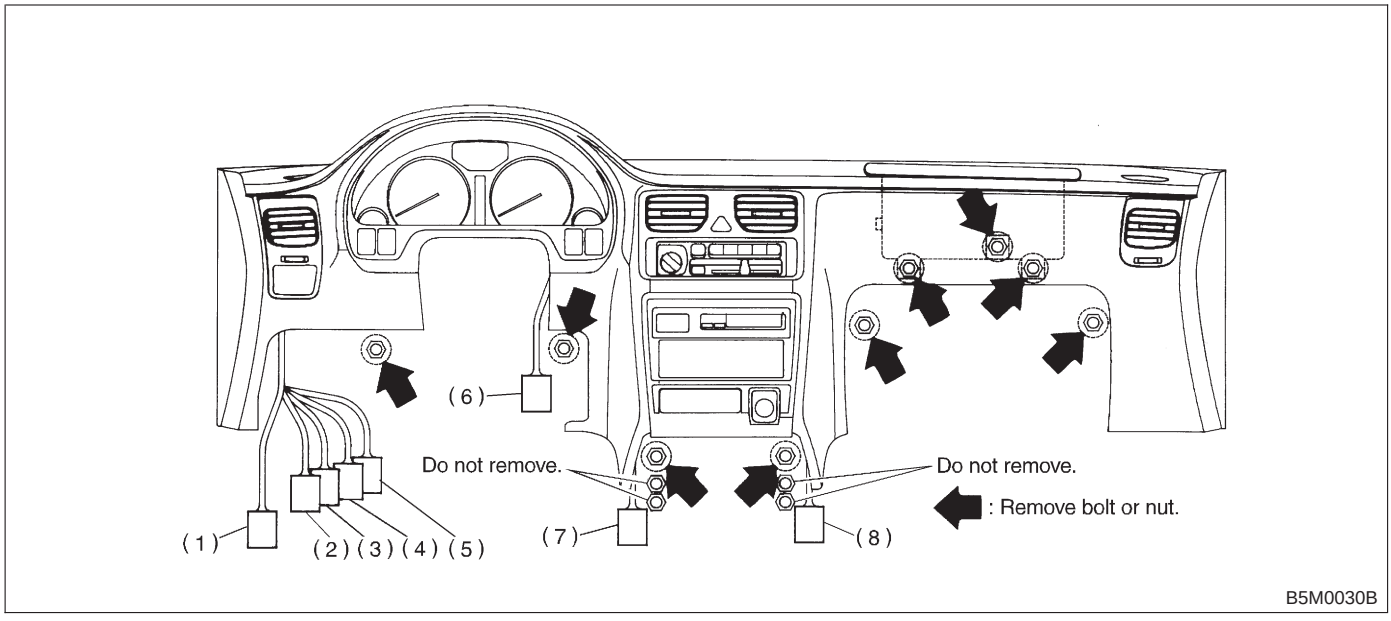
11) Remove front side sill cover RH and then disconnect airbag connector (AB9) and (AB10) (Airbag model). <Ref. to 5-5 [M200].>



12) Disconnect harness connectors and then remove the installing bolt.

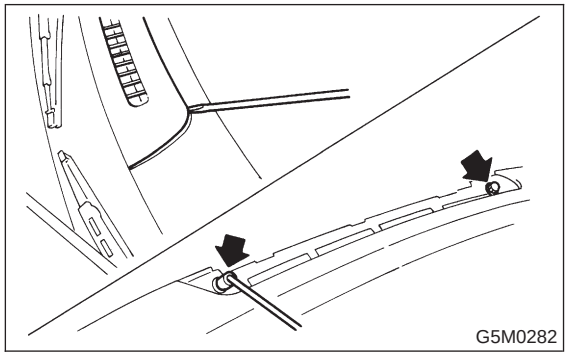
CAUTION:
Be sure to hold socket section and not harness when disconnecting.

NOTE:
Put matching mark, if necessary, for easy re-assembly.



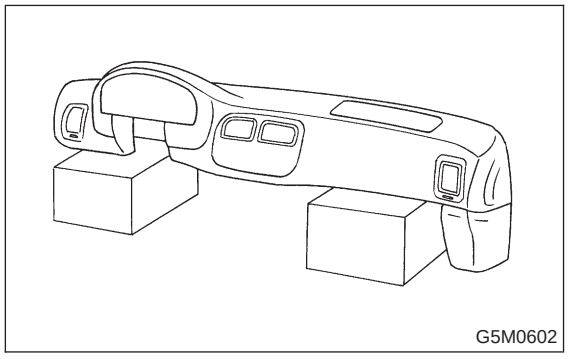
(1) 15P/Gray
(2) 22P/Brown
(3) 22P/White
(4) 20P/Blue
(5) 22P/Black
(6) 4P/Sky blue
(7) 1P/Black
(8) 1P/Black

13) Remove front defroster grille and two bolts.



14) Remove instrument panel carefully from the body.

CAUTION:
- **Take care not to scratch the instrument panel and related parts.**
- **When storing removed instrument panel with passenger airbag module, place it standing up on the floor.**

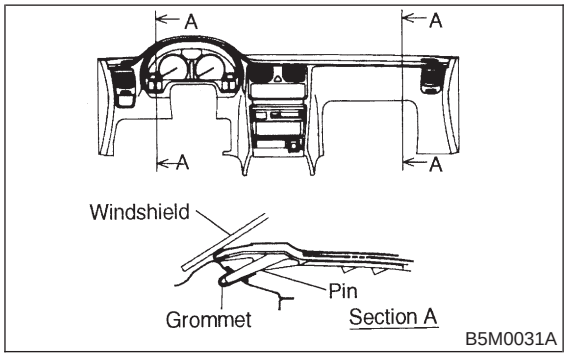


B: INSTALLATION

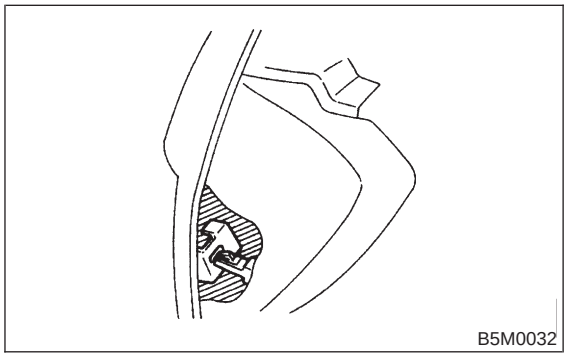
Installation is in the reverse order of removal.

CAUTION:
- **Be careful not to snag the harness.**
- **Make sure to connect harness connectors.**
- **Take care not to scratch the instrument panel and related parts.**

NOTE:
- When setting instrument panel into position, push two pins into grommet on body panel.

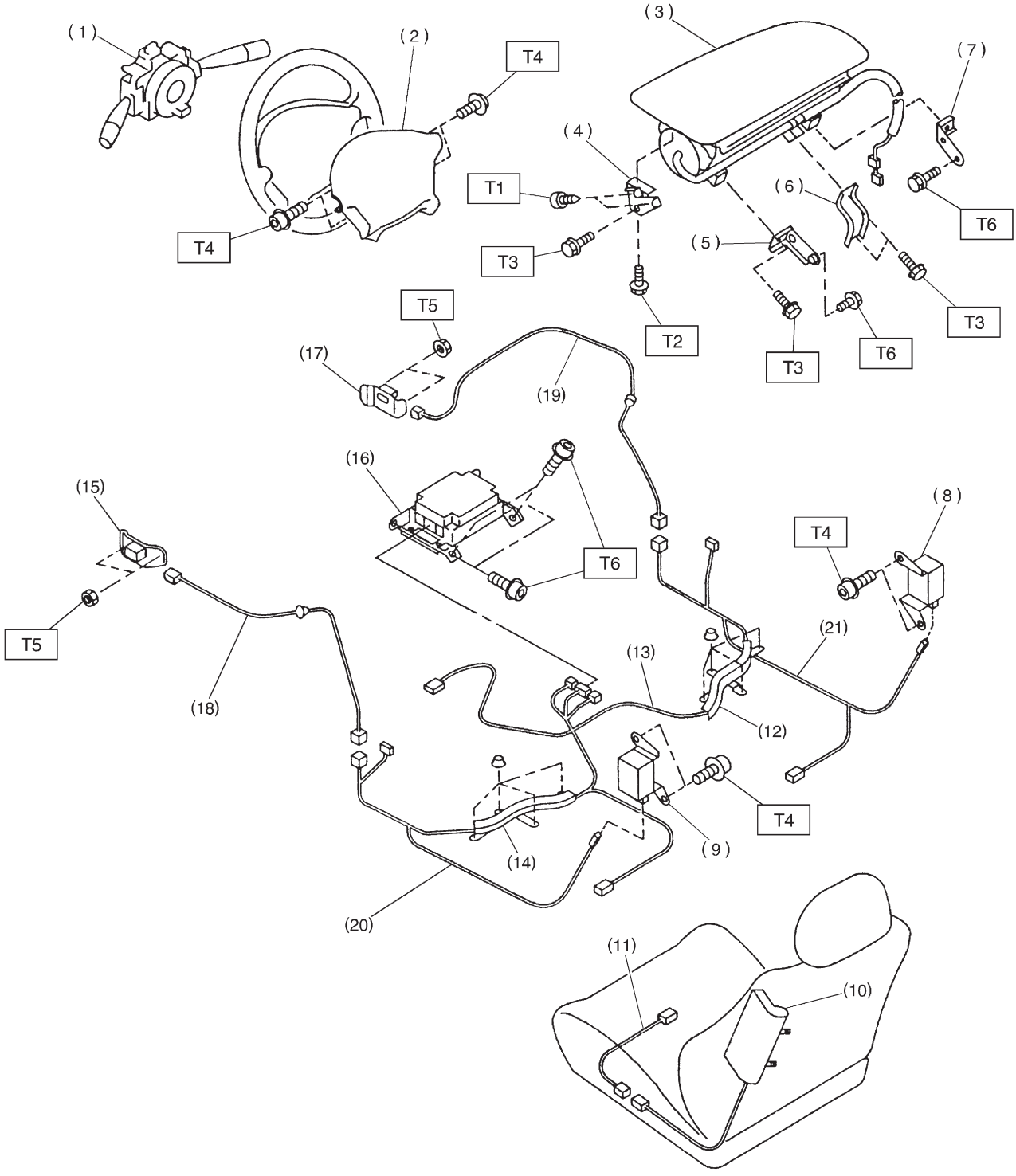


- Set clips located at both inside ends of instrument panel onto body side.



SUPPLEMENTAL RESTRAINT SYSTEM 5-5

1. SRS Airbag



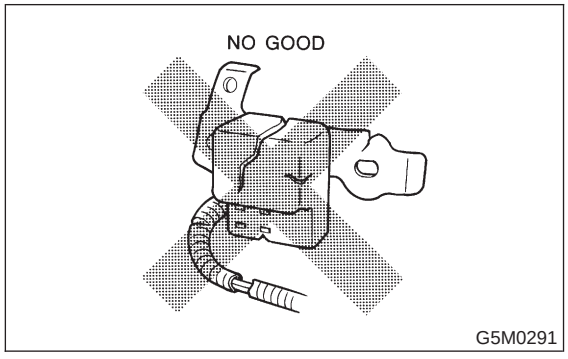
B5M0513A

(1) Combination switch ASSY with roll connector
(2) Airbag module ASSY (Driver)
(3) Airbag module ASSY (Passenger)
(4) BRKT SD A
(5) BRKT P AB (LH)
(6) BRKT B
(7) BRKT P AB (RH)
(8) Side airbag sensor (RH)
(9) Side airbag sensor (LH)
(10) Airbag module ASSY (Side)
(11) Extension harness
(12) Protector RH
(13) Airbag main harness
(14) Protector LH
(15) Front sub sensor (LH)
(16) Airbag control module
(17) Front sub sensor (RH)
(18) Front sub sensor harness (LH)
(19) Front sub sensor harness (RH)
(20) Side airbag harness (LH)
(21) Side airbag harness (RH)

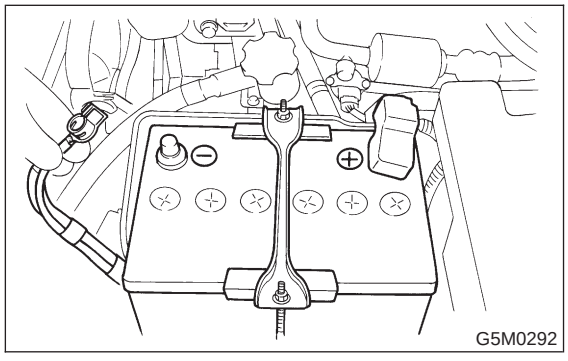
Tightening torque: N·m (kg-m, ft-lb)
T1: 1.8±0.5 (0.18±0.05, 1.3±0.4)
T2: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T3: 7.4±0.5 (0.75±0.05, 5.4±0.4)
T4: 10±2 (1.0±0.2, 7.2±1.4)
T5: 20±4 (2.0±0.4, 14.5±2.9)
T6: 32±10 (3.3±1.0, 23.9±7.2)

1. Precaution

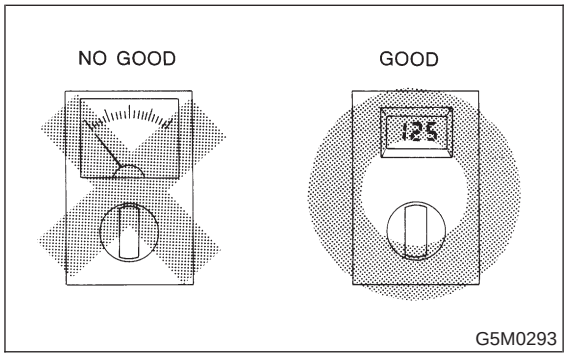
● If any of the airbag system parts such as sensors, airbag module, airbag control module and harness are damaged or deformed, replace with new genuine parts.

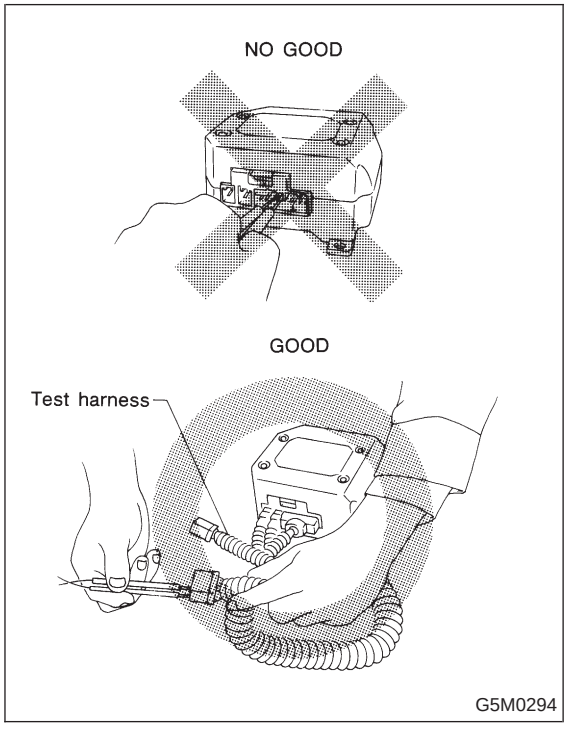


● When servicing, be sure to turn the ignition switch off, disconnect the negative (−) battery terminal then the positive (+) terminal in advance, and wait for more than 20 seconds before starting work.

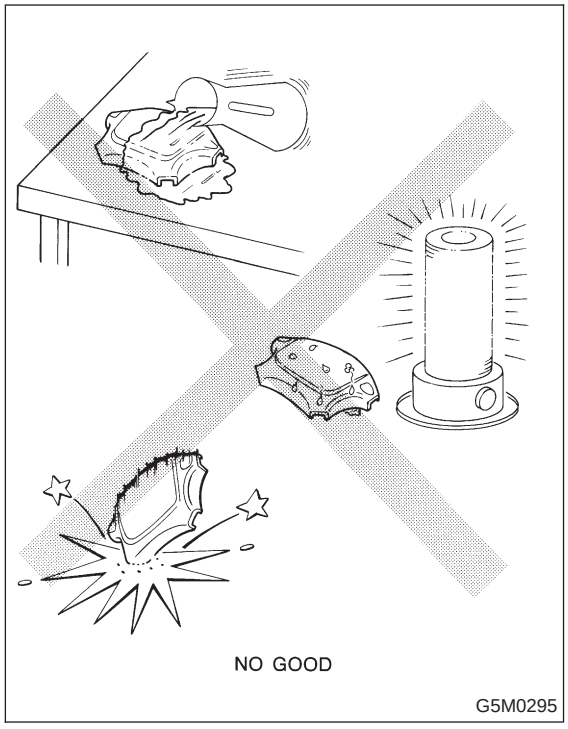


● When checking the system, be sure to use a digital circuit tester. Use of an analog circuit tester may cause the airbag to activate erroneously. Do not directly apply the tester probe to any connector terminal of the airbag. When checking, use a test harness.

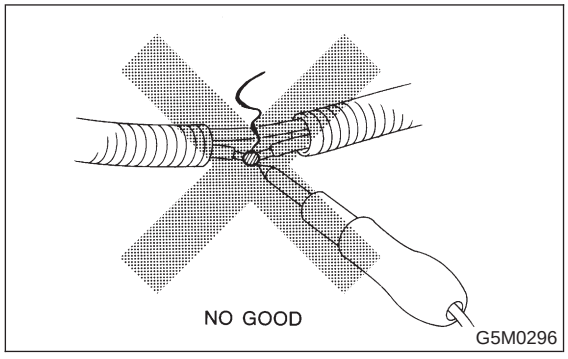




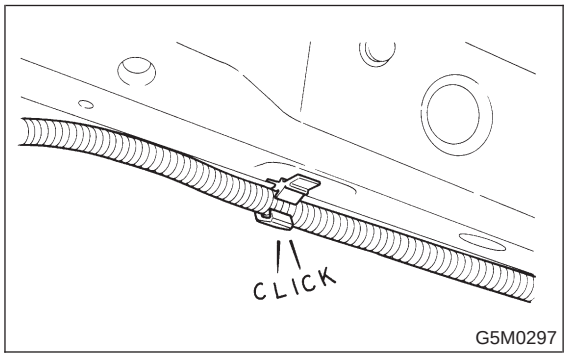
● Do not drop the airbag modulator parts, subject it to high temperatures over 90°C (194°F), or apply oil, grease, or water to it; otherwise, the internal parts may be damaged and its reliability greatly lowered.



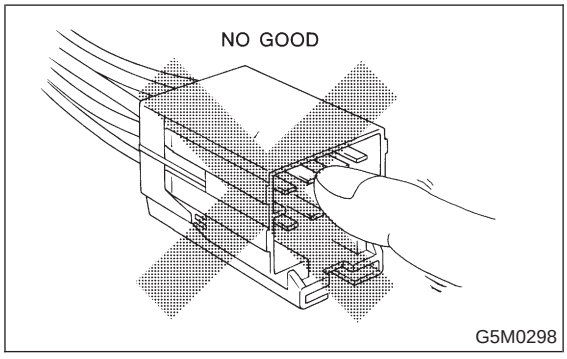
● If any damage or open is found on the SRS airbag system wire harness, do not attempt to repair using soldering, etc. Be sure to replace the faulty harness with a new genuine part.



● Install the wire harness securely with the specified clips so as to avoid interference or jamming with other parts.



● Before connecting the airbag system to ground, make sure that the grounding terminal is free from paint and contamination.
● Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.



● When connecting or disconnecting airbag connector, make sure ignition switch is OFF.

2. Inspection and Replacement Standards

A: VEHICLES WHICH BECOME INVOLVED IN A COLLISION

If the vehicle equipped with an SRS airbag system is damaged in a collision, the airbag system parts must be checked and replaced in accordance with the following standards:

- After faulty parts are replaced, the warning light operation must be checked.
- When the ignition switch is turned ON, it lights up for about 7 seconds and then it goes out for at least 30 seconds.
- The trouble code stored in memory must be erased after the check.

B: AIRBAG MODULE (DRIVER AND PASSENGER)

1. INSPECTION STANDARD

- The vehicle damaged in a frontal collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T400].>

2. REPLACEMENT STANDARD

- Airbag is deployed.
- The pad surface is scratched or cracked.
- Harness and/or connector is deformed or cracked, their circuits are broken, lead wire is exposed, etc.
- Mounting bracket is cracked or deformed.
- The module surface is fouled with foreign matter. (grease, oil, water, cleaning solvent, etc.)
- Airbag module dropped to the floor/ground.
- Airbag module determined as faulty during self-diagnosis.

C: AIRBAG MODULE (SIDE)

1. INSPECTION STANDARD

- The vehicle damaged in a side collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T400].>

2. REPLACEMENT STANDARD

- Airbag is deployed.
- The front seat assembly is dameged or deformed.
- Harness and/or connector is deformed or cracked, their circuits are broken, lead wire is exposed, etc.
- Mounting bracket is cracked or deformed.
- Airbag module determined as faulty during self-diagnosis.

D: MAIN HARNESS

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T400].>

2. REPLACEMENT STANDARD

- Harness circuit is broken, lead wire is exposed, corrugated tube is cracked, etc.
- Connector is scratched or cracked.
- The designated trouble code is output during self-diagnosis.

E: AIRBAG CONTROL MODULE

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T400].>

2. REPLACEMENT STANDARD

- Control module is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched or cracked.
- Control module dropped to the floor/ground.
- Control module determined as faulty during diagnostics.
- Airbag is deployed.

F: COMBINATION SWITCH

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T400].>

2. REPLACEMENT STANDARD

Combination switch or steering roll connector is deformed or cracked.

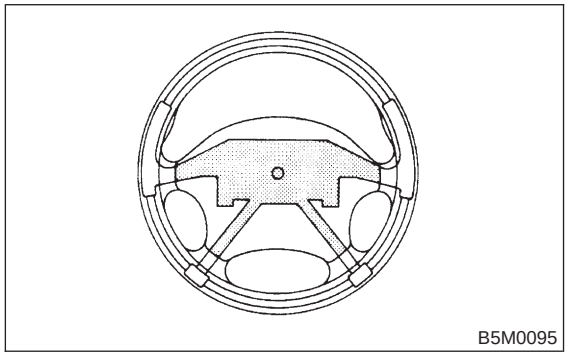
G: STEERING WHEEL

1. INSPECTION STANDARD

A vehicle damaged in a collision (regardless of whether or not airbag is deployed).

2. REPLACEMENT STANDARD

- Check steering wheel insert for cracks or deformities.
- Check to ensure that new airbag module is properly installed in steering wheel.
- After installing airbag module, check to ensure that it is free of interference with steering wheel and that clearance between the two is equal at all points.



H: STEERING COLUMN ASSEMBLY

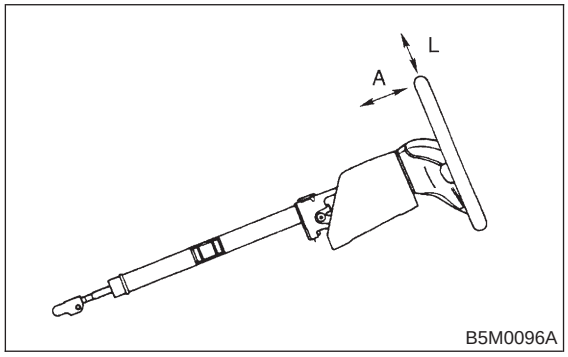
1. INSPECTION STANDARD

A vehicle damaged in a collision (regardless of whether or not airbag is deployed).

2. REPLACEMENT STANDARD

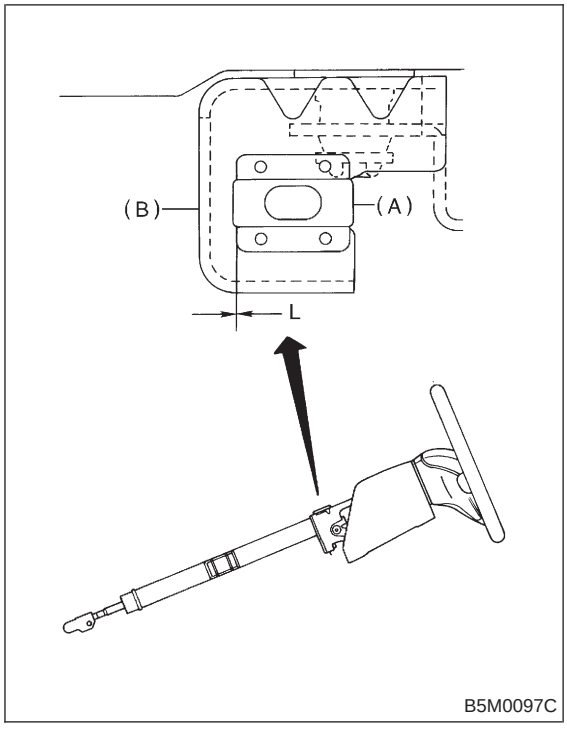
- Check steering wheel free play in axial and radial directions.

Specifications:
Axial free play A
Less than ±6 mm (0.24 in)
Radial free play L
Less than ±7 mm (0.28 in)



- Check to ensure that clearance between capsule (A) (at steering column) and cutout portion of column bracket (B) on steering column upper side is within specifications.

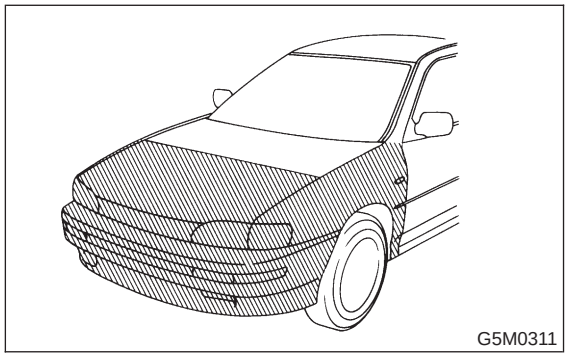
Clearance between capsule and cutout portion of column bracket: L
Less than 0.5 mm (0.020 in)



I: FRONT SUB SENSOR

1. INSPECTION STANDARD

● Check the front section (Refer to shaded area of vehicle in figure) for damage, regardless of whether or not airbag is deployed.



● The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T400].>

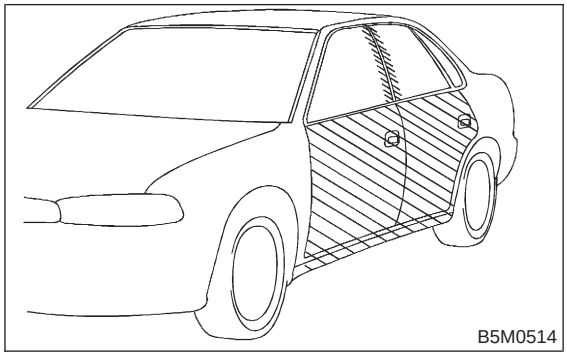
2. REPLACEMENT STANDARD

● Bracket is deformed.
● Housing is cracked or deformed.
● The label (that identifies the manufacturing number) is peeled or deteriorated.
● Harness circuit is broken, lead wire is exposed, corrugated tube is cracked, etc.
● Front sub sensor determined as faulty as a result of Diagnostics.
● Airbag is deployed.
● Front sub sensor dropped to the floor/ground.

J: SIDE AIRBAG SENSOR

1. INSPECTION STANDARD

● Check the side section (Refer to shaded area of vehicle in figure) for damage, regardless of whether or not airbag is deployed.



● The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T400].>

2. REPLACEMENT STANDARD

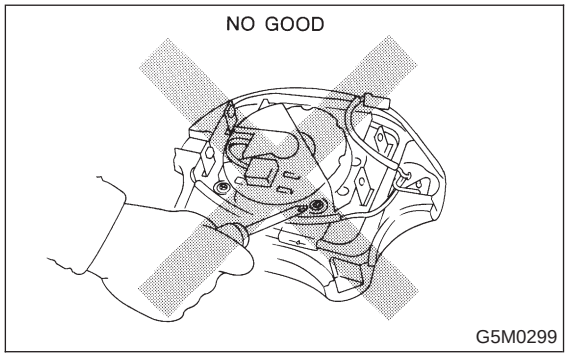
● Bracket is deformed.
● Housing is cracked or deformed.
● The label (that identifies the manufacturing number) is peeled or deteriorated.
● Harness circuit is broken, lead wire is exposed, corrugated tube is cracked, etc.
● Side airbag sensor determined as faulty as a result of Diagnostics.
● Airbag is deployed.
● Side airbag sensor dropped to the floor/ground.

3. Airbag Module

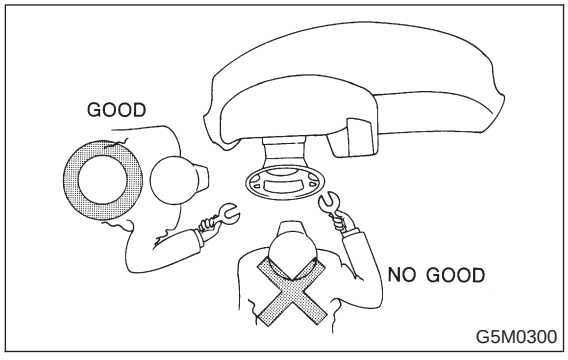
A: REMOVAL AND INSTALLATION

CAUTION:

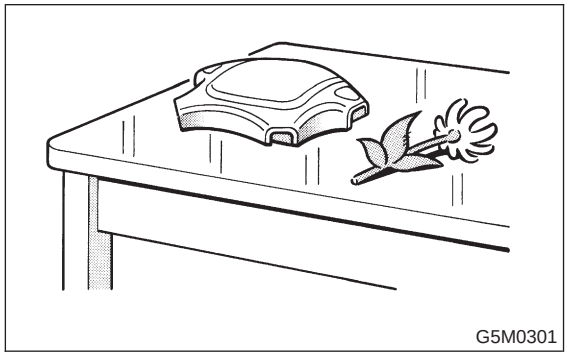
● The airbag module (driver, passenger and side) must not be disassembled. The airbag module cannot be used again once inflated.



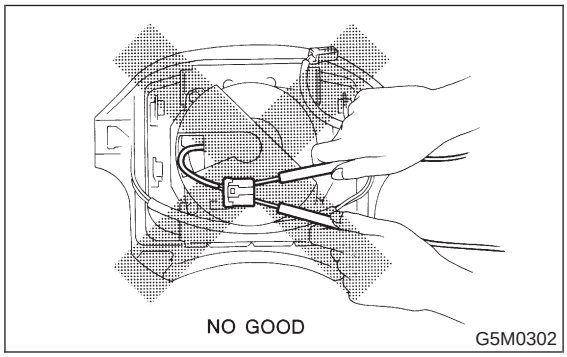
● When removing and installing the airbag module (driver, passenger and side), the operator should stand, as much as possible, on the side of the airbag module.



● After removal, the airbag module (driver, passenger and side) should be kept away from heat and light sources, and stored on a clean, flat surface to prevent from any damage to its lower structure.



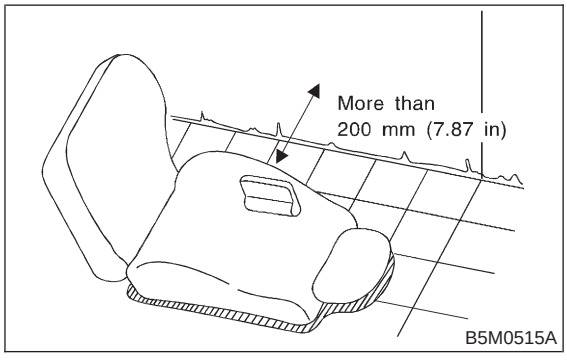
● Do not check airbag module (driver, passenger and side) continuity with airbag removed from the vehicle body.



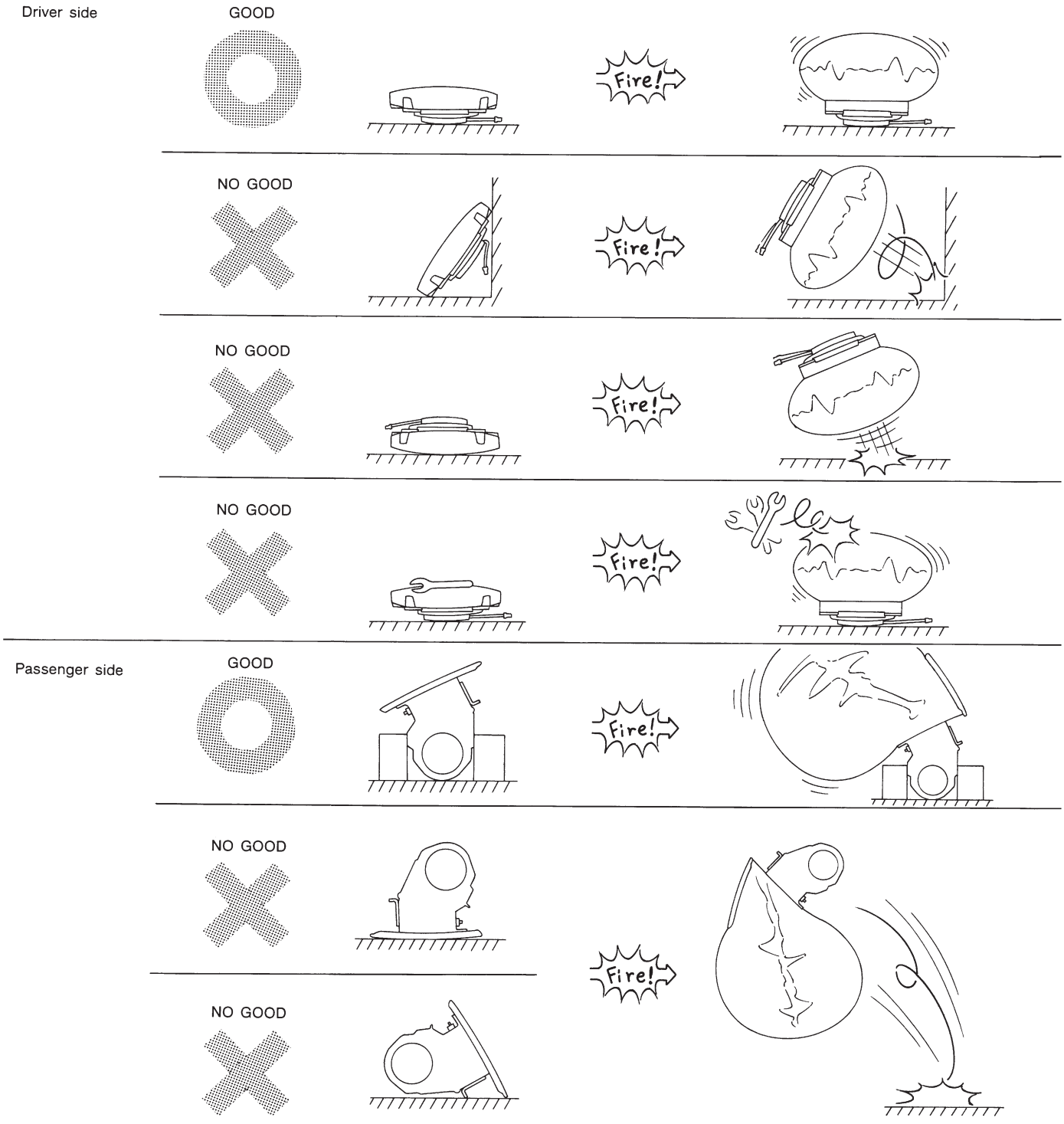
● Replace airbag module (driver, passenger and side) with a new one, should any of the following conditions develop:

- **Pad surface is scratched or cracked.**
- **Connector harness is damaged.**
- **Inflator side structure of module is cracked or deformed.**
- **Module is excessively stained with water, oil, etc.**
- **Module was accidentally dropped.**
- **The front seat assembly is damaged or deformed.**

● The removed front seat with the airbag module must be kept on its back. At this time, keep the module side at least 200 mm (7.87 in) away from walls or other objects.



● When storing a removed airbag module (driver and passenger), be sure to place it in parallel with floor with the pad facing up. Do not place it against a wall, or place anything on the pad; otherwise, a dangerous condition may be created if the module malfunctions.

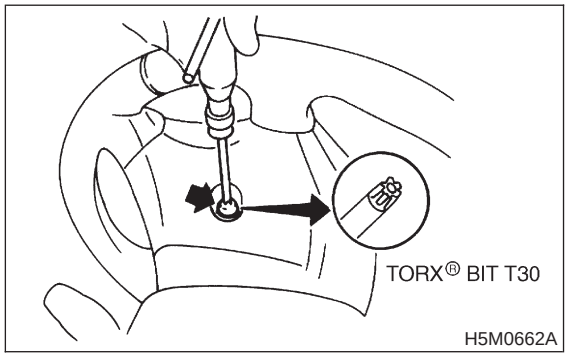


G5M0604

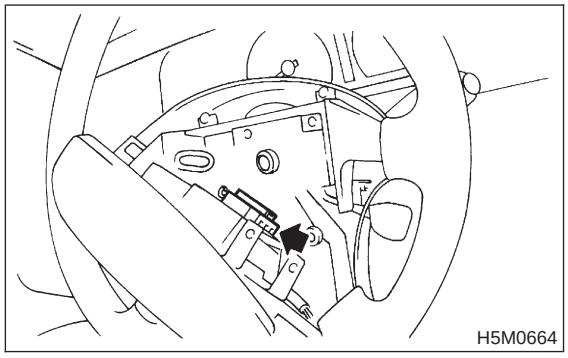
1. DRIVER'S AIRBAG MODULE

1) Set front wheels in straight ahead position.
2) Turn ignition switch off.
3) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.

4) Using TORX® BIT T30, remove two TORX® bolts.



5) Disconnect airbag connector on back of airbag module. <Ref. to 5-5 [M2F2].>

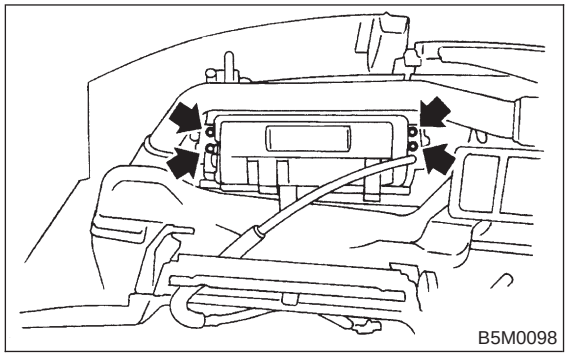


6) Refer to **"CAUTION"** for handling of a removed airbag module. <Ref. to 5-5 [W3A0].>
7) Installation is in the reverse order of removal.

CAUTION:
Do not allow harness and connectors to interfere or get caught with other parts.

2. PASSENGER'S AIRBAG MODULE

1) Remove instrument panel. <Ref. to 5-4 [W1A0].>
2) Remove four bolts and then carefully remove airbag module.



3) Refer to **"CAUTION"** for handling of a removed airbag module. <Ref. to 5-5 [W3A0].>
4) Installation is in the reverse order of removal.

CAUTION:
Do not allow harness and connectors to interfere or get caught with other parts.

3. SIDE AIRBAG MODULE

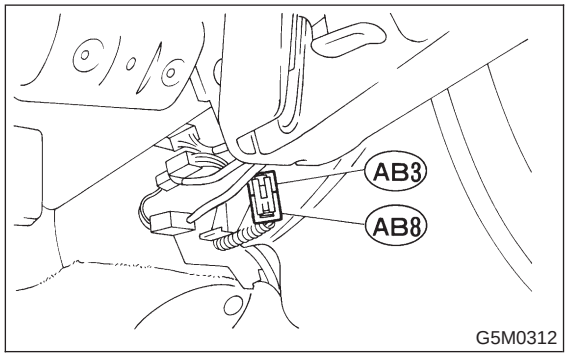
The side airbag module cannot be detached from the front seat assembly. When replacing side airbag module, replace front seat assembly. <Ref. to 5-3 [W1A0].>

4. Main Harness

A: REMOVAL AND INSTALLATION

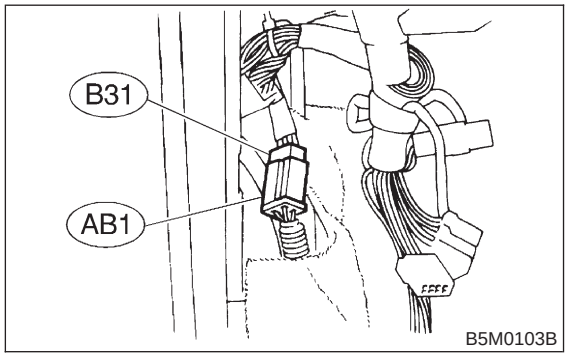
1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove lower cover. <Ref. to 5-4 [W1A0].> Disconnect airbag connector (AB3) and (AB8) below steering column.

CAUTION:
Do not reconnect airbag connector at steering column until main harness are securely re-installed.

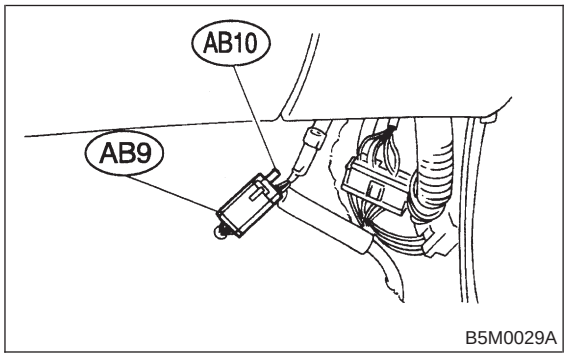


4) Remove console box. <Ref. to 5-4 [W1A0].>
5) Disconnect connector from airbag control module.
6) Disconnect body harness connector (B31) from connector (AB1).

NOTE:
The following procedures for removal are for “LHD model”. The procedures for “RHD model” are symmetrically opposite.

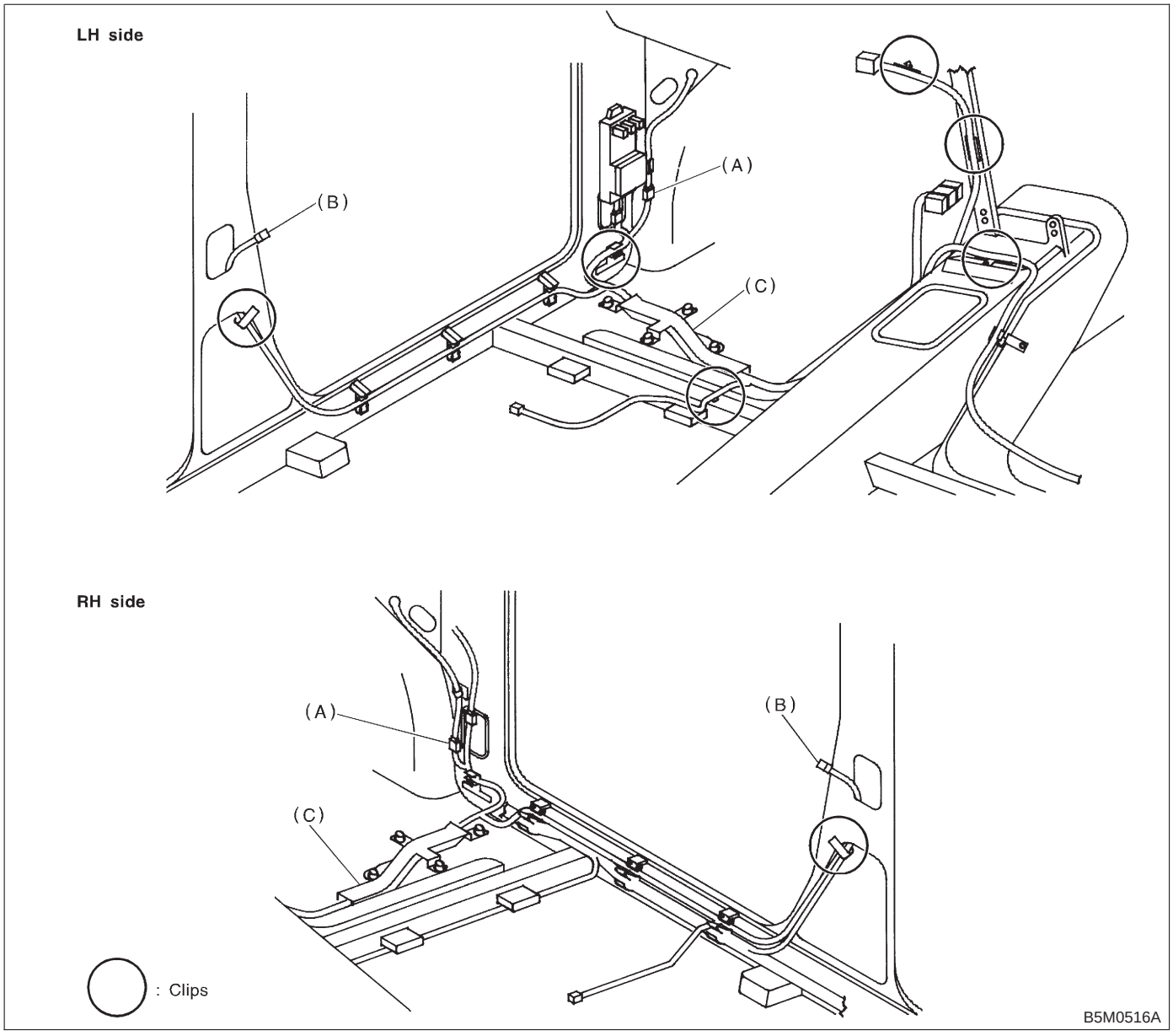


7) Remove front side sill cover and then disconnect airbag connector (AB9) and (AB10). <Ref. to 5-5 [M2F2].>



8) Roll up floor mat and side sill lower cover of both side and then remove main harness.

9) Disconnect front sub sensor connector (A), side airbag sensor connector (B) (side airbag equipped model) and then remove protector (C).
10) Detach clips and then remove airbag main harness.

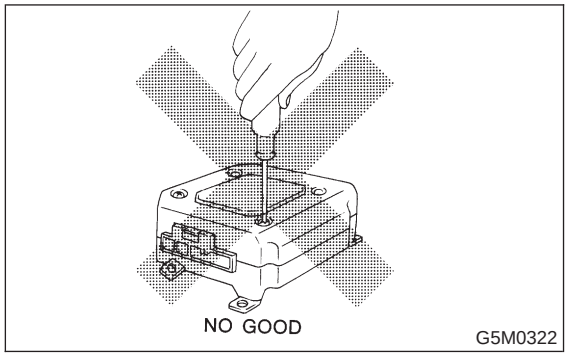


11) Installation is in the reverse order of removal.

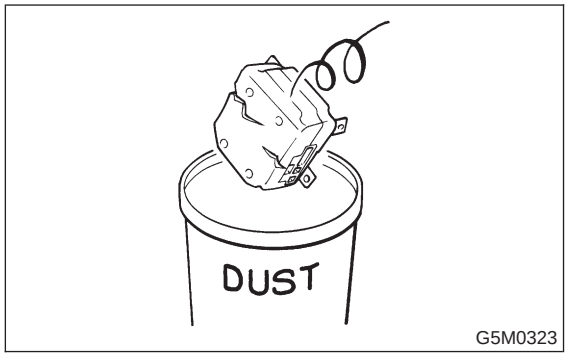
5. Airbag Control Module

A: REMOVAL AND INSTALLATION

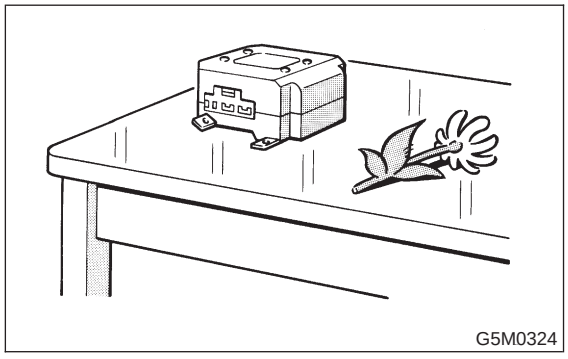
CAUTION:
● Do not disassemble the airbag control module.



● If the airbag control module is deformed, or if water damage is suspected, replace the airbag control module with a new genuine part.

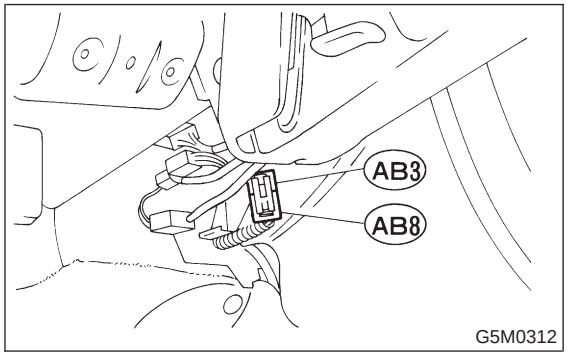


● After removal, keep the airbag control module on a dry, clean surface away from heat and light sources, and moisture and dust.



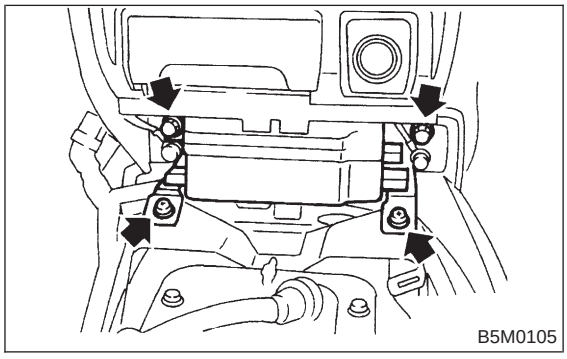
1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove lower cover. <Ref. to 5-4 [W1A0].> Disconnect airbag connector (AB3) and (AB8) below steering column.

CAUTION:
Do not reconnect airbag connector at steering column until airbag control module is securely re-installed.



4) Remove console box. <Ref. to 5-4 [W1A0].>
5) Disconnect connector from airbag control module.
6) Using TORX® BIT T40 (Tamper resistant type), remove two TORX® bolts. Discard the old TORX® bolts.

CAUTION:
Use new TORX® bolts during re-assembly.



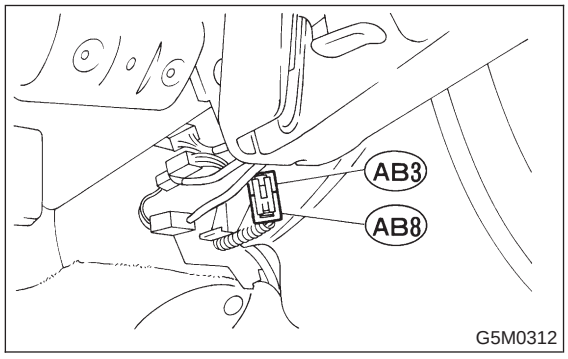
7) Installation is in the reverse order of removal.

6. Combination Switch

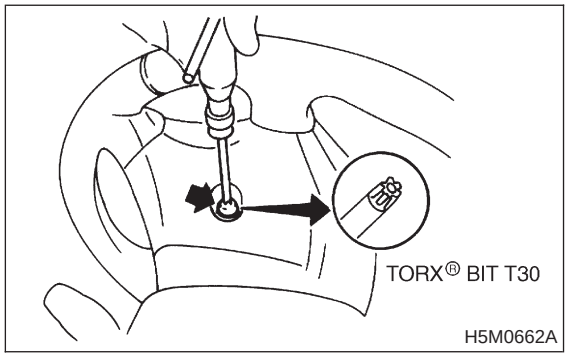
A: REMOVAL

1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove lower cover. <Ref. to 5-4 [W1A0].> Disconnect airbag connector (AB3) and (AB8) below steering column.

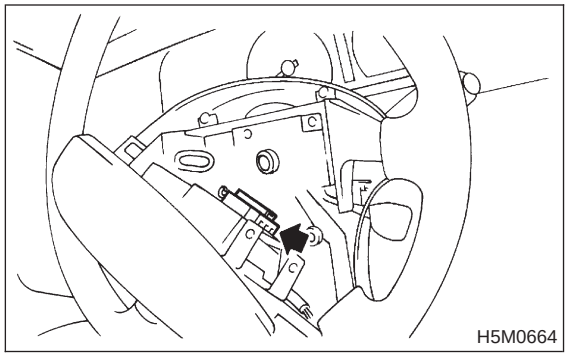
CAUTION:
Do not reconnect airbag connector at steering column until combination switch is securely re-installed.



4) Disconnect combination switch connectors from body harness connector.
5) Set front wheels in straight ahead position. Using TORX® BIT T30, remove two TORX® bolts.

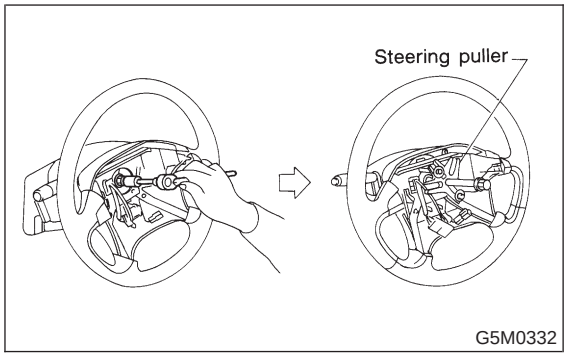


6) Disconnect airbag connector on back of airbag module. <Ref. to 5-5 [M2F2].> Remove airbag module, and place it with pad side facing upward. <Ref. to 5-5 [W3A0].>

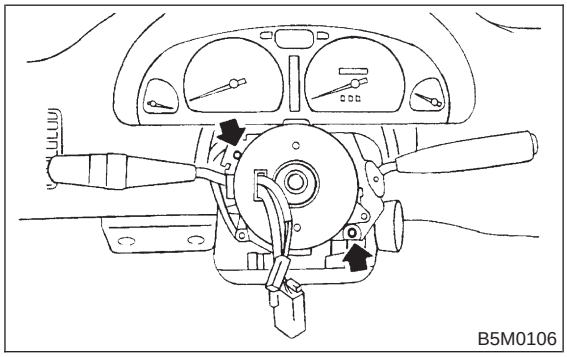


7) Using steering puller, remove steering wheel.

CAUTION:
Do not allow connector to interfere when removing steering wheel.



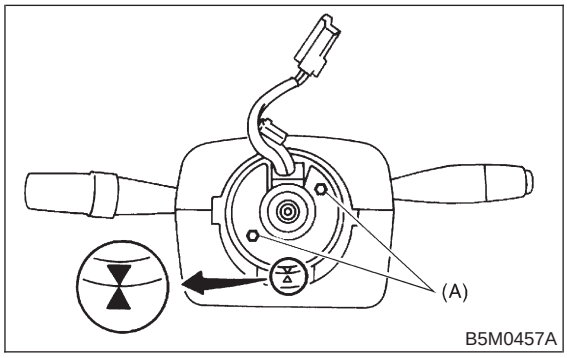
8) Remove steering column covers.
9) Removing two retaining screws, remove combination switch.



B: ADJUSTMENT

1. CENTERING ROLL CONNECTOR

Before installing steering wheel, make sure to center roll connector built into combination switch.
1) Make sure that front wheels are positioned straight ahead.
2) Install steering gearbox, steering shaft and combination switch properly. Turn roll connector pin (A) clockwise until it stops.
3) Then, back off roll connector pin (A) approximately 2.65 turns until "▲" marks aligned.

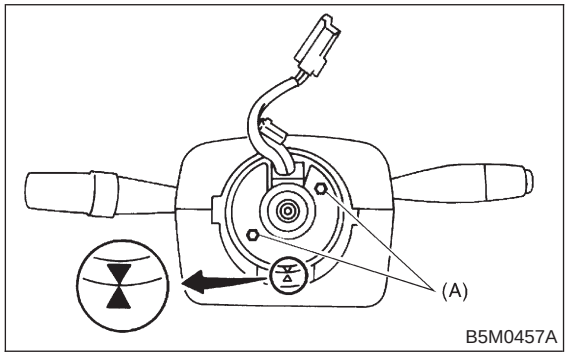


C: INSTALLATION

CAUTION:
Failure to do this might damage roll connector.

1) Before installing combination switch, check to ensure that combination switch is off and front wheels are set in the straight ahead position.
2) Install column cover and center roll connector.
3) Install steering wheel in neutral position. Carefully insert roll connector pin (A) into hole on steering wheel.

NOTE:
If steering wheel angle requires fine adjustment, adjust tie-rod. <Ref. to 4-3 [W3F0].> and <Ref. to 4-3 [W4F0].>

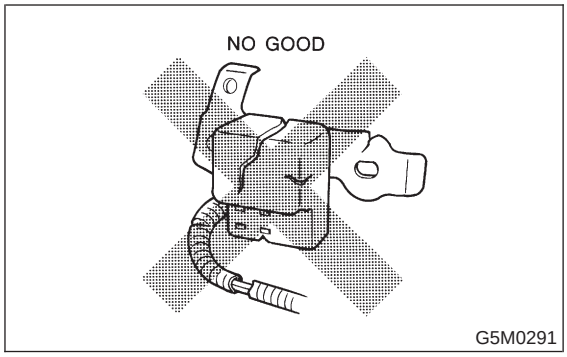


4) Install airbag module and lower cover in the reverse order of removal.

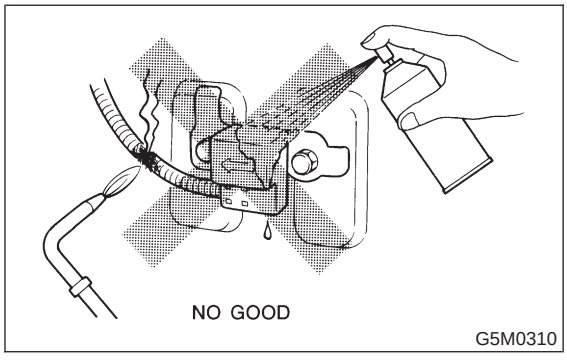
7. Front Sub Sensor

A: REMOVAL AND INSTALLATION

CAUTION:
● If the front end of the vehicle body is damaged by a collision, be sure to check the left and right front sub sensors, even if the airbag was not inflated. If any damage to the sensor or any deformation of the sensor mount is found, replace with a new genuine part.



● When painting or performing sheet metal work on the front part of vehicle body, including the front wheel apron, front fender and front side frame, take utmost care not to apply dryer heat, painting mist, or the flame of the welding burner directly to the front sub sensors and wire harness of the airbag system.

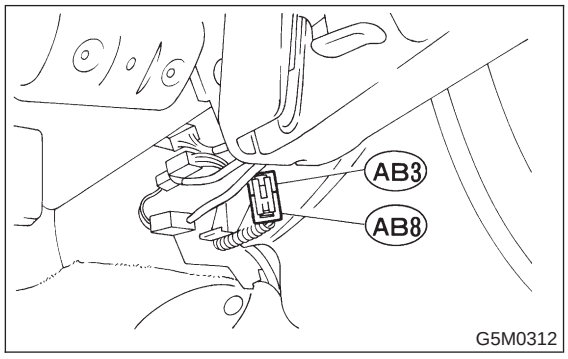


1. FRONT SUB SENSOR HARNESS

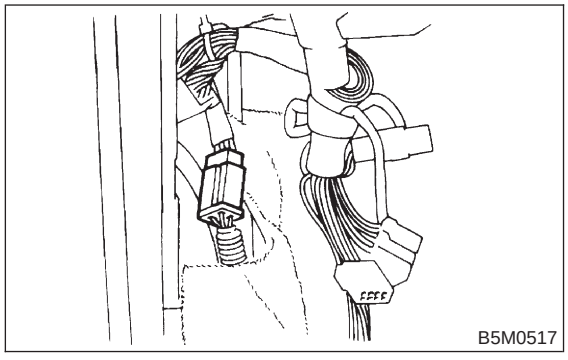
1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove lower cover. <Ref. to 5-4 [W1A0].>

4) Disconnect airbag connector (AB3) and (AB8) below steering column.

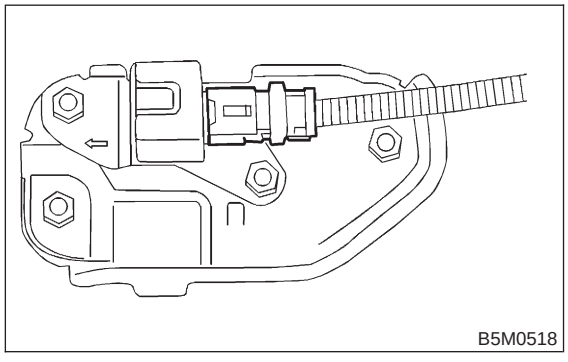
CAUTION:
Do not reconnect airbag connector at steering column until front sub sensors are securely re-installed.



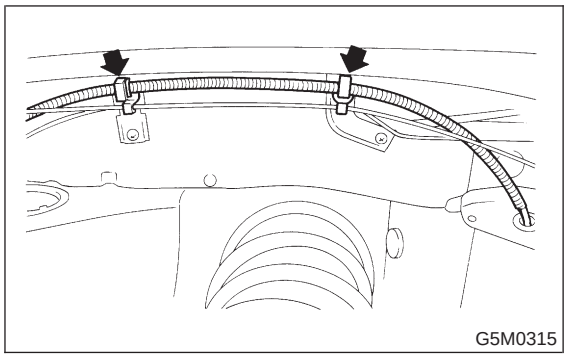
5) Remove front side sill cover and then disconnect front sub sensor connector. <Ref. to 5-5 [M2F2].>



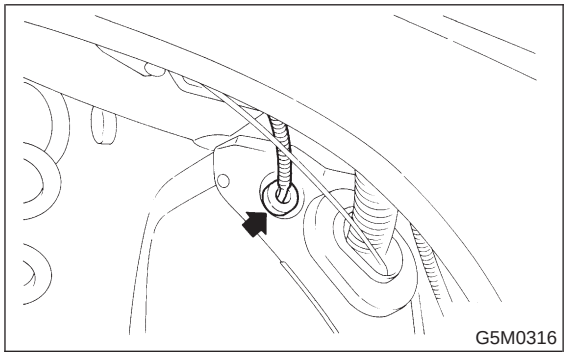
6) Remove front wheel and mud guard.
7) Disconnect connector from front sub sensor assembly. <Ref. to 5-5 [M2F3].>



8) Remove wiring harness clips.

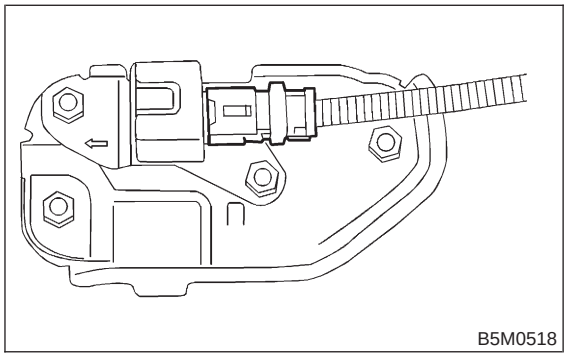


9) Remove grommet and then detach front sub sensor harness.

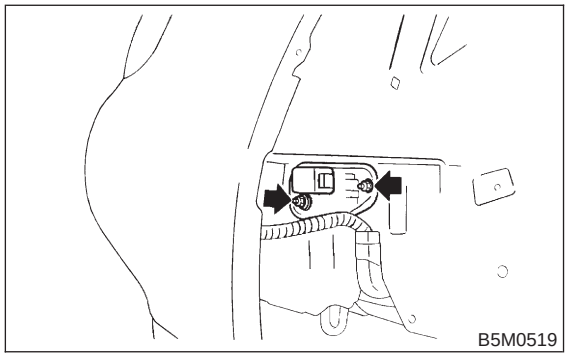


2. FRONT SUB SENSOR ASSEMBLY

1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove front wheel and mud guard.
4) Disconnect connector from front sub sensor assembly. <Ref. to 5-5 [M2F3].>



5) Remove front sub sensor.



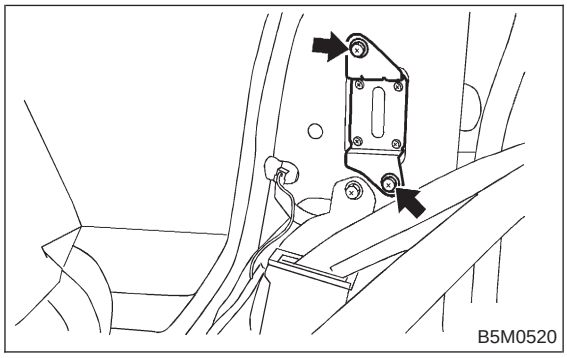
6) Installation is in the reverse order of removal.

8. Side Airbag Sensor

A: REMOVAL AND INSTALLATION

CAUTION:
● If the side of the vehicle body is damaged by a collision, be sure to check the left and right side airbag sensors, even if the airbag was not inflated. If any damage to the sensor or any deformation of the sensor mount is found, replace with a new genuine part.
● When painting or performing sheet metal work on the side part of vehicle body, including the side sill, center pillar, front and rear doors, take utmost care not to apply dryer heat, painting mist, or the flame of the welding burner directly to the side airbag sensors and wire harness of the airbag system.

1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove center pillar lower. <Ref. to 5-3 [W5A2].>
4) Remove two TORX® bolts and then detach side airbag sensor while disconnecting connector. <Ref. to 5-5 [M2F3].>



5) Installation is in the reverse order of removal.

ENGINE ELECTRICAL SYSTEM 6-1

1. Engine Electrical

A: SPECIFICATIONS

1. 2200 cc MODEL

Item			Designation	
Starter	Type		Reduction type	
	Model		MT TN128000-8311	AT TN128000-8321
	Manufacturer		NIPPONDENSO TENNESSEE	
	Voltage and output		12 V — 1.0 kW	12 V — 1.4 kW
	Direction of rotation		Counterclockwise (when observed from pinion)	
	Number of pinion teeth		8	9
	No-load characteristics	Voltage	11 V	
		Current	90 A or less	
		Rotating speed	3,000 rpm or more	2,900 rpm or more
	Load characteristics	Voltage	8 V	
		Current	280 A or less	370 A or less
		Torque	9.8 N·m (1.0 kg-m, 7.2 ft-lb)	13.7 N·m (1.4 kg-m, 10.1 ft-lb)
		Rotating speed	900 rpm or more	880 rpm or more
	Lock characteristics	Voltage	5 V	
		Current	800 A or less	1,050 A or less
		Torque	27.5 N·m (2.8 kg-m, 20.3 ft-lb) or more	
Generator	Type		Rotating-field three-phase type, Voltage regulator built-in type	
	Model		LR185-701H	
	Manufacturer		HITACHI AUTOMOTIVE PRODUCTS	
	Voltage and output		12 V — 85 A	
	Polarity on ground side		Negative	
	Rotating direction		Clockwise (when observed from pulley side)	
	Armature connection		3-phase Y-type	
	Output current		1,500 rpm — 35 A or more 2,500 rpm — 62 A or more 5,000 rpm — 82 A or more	
	Regulated voltage		$14.5^{+0.3}/_{-0.4}$ V [20°C (68°F)]	
Ignition coil	Model		FH0047-01R	
	Manufacturer		DEMCO	
	Primary coil resistance		0.73 Ω±10%	
	Secondary coil resistance		12.8 kΩ±15%	
	Insulation resistance between primary terminal and case		More than 10 MΩ	
Spark plug	Type and manufacturer		RC10YC4 ..... CHAMPION	
			Alternate	BKR6E-11 ..... NGK K20PR-U11 ..... NIPPONDENSO
	Thread size	mm	14, P = 1.25	
	Spark gap	mm (in)	1.0 — 1.1 (0.039 — 0.043)	

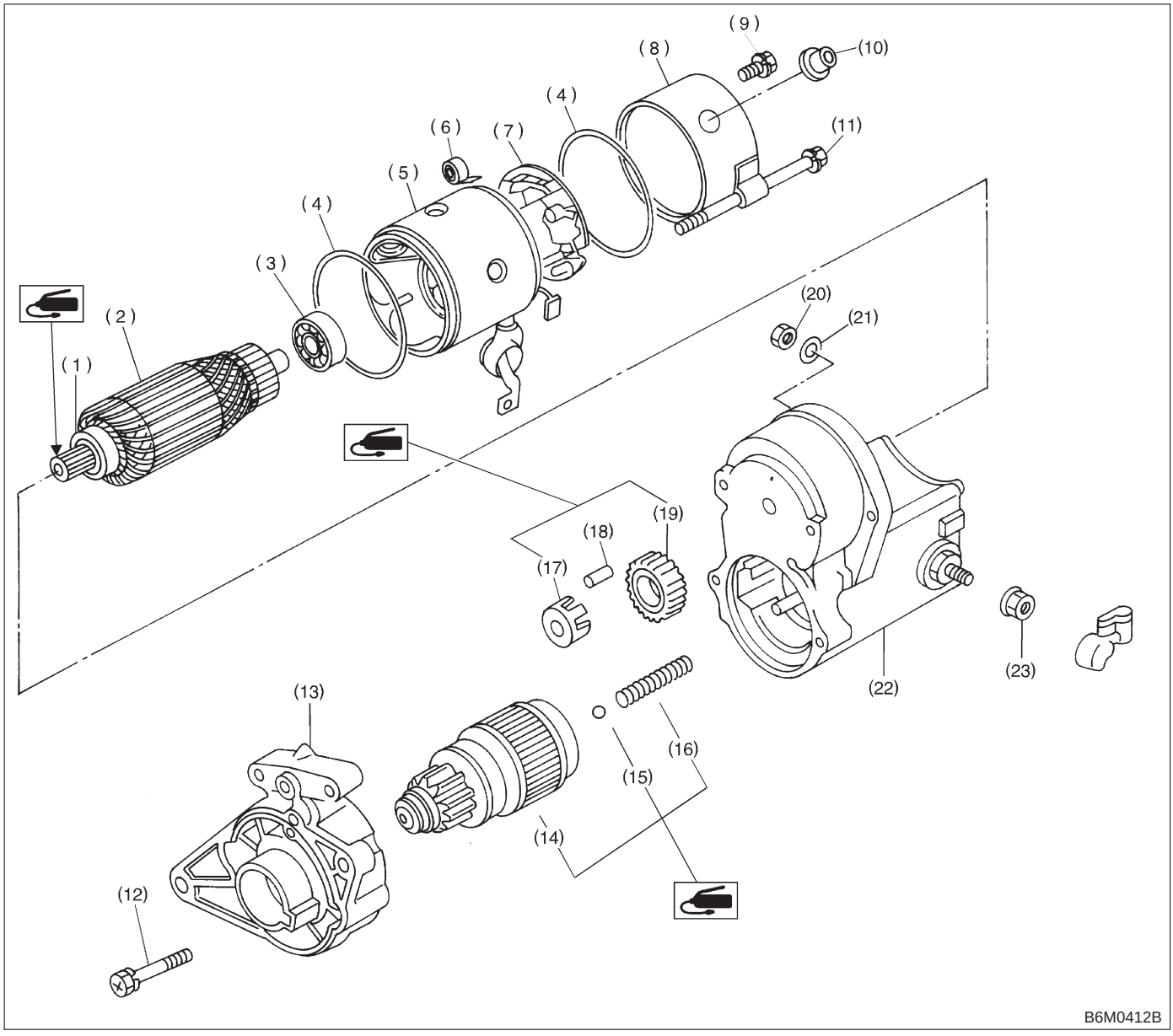
2. 2500 cc MODEL

Item			Designation	
Starter	Type		Reduction type	
	Model		MT TN128000-8311	AT TN128000-8321
	Manufacturer		NIPPONDENSO TENNESSEE	
	Voltage and output		12 V — 1.0 kW	12 V — 1.4 kW
	Direction of rotation		Counterclockwise (when observed from pinion)	
	Number of pinion teeth		8	9
	No-load characteristics	Voltage	11 V	
		Current	90 A or less	
		Rotating speed	3,000 rpm or more	2,900 rpm or more
	Load characteristics	Voltage	8 V	
		Current	280 A or less	370 A or less
		Torque	9.8 N·m (1.0 kg-m, 7.2 ft-lb)	13.7 N·m (1.4 kg-m, 10.1 ft-lb)
		Rotating speed	900 rpm or more	880 rpm or more
	Lock characteristics	Voltage	5 V	
		Current	800 A or less	1,050 A or less
		Torque	27.5 N·m (2.8 kg-m, 20.3 ft-lb) or more	
Generator	Type		Rotating-field three-phase type, Voltage regulator built-in type	
	Model		LR185-701H	
	Manufacturer		HITACHI AUTOMOTIVE PRODUCTS	
	Voltage and output		12 V — 85 A	
	Polarity on ground side		Negative	
	Rotating direction		Clockwise (when observed from pulley side)	
	Armature connection		3-phase Y-type	
	Output current		1,500 rpm — 35 A or more 2,500 rpm — 62 A or more 5,000 rpm — 82 A or more	
	Regulated voltage		$14.5^{+0.3}/_{-0.4}$ V [20°C (68°F)]	
Ignition coil	Model		FH0047-01R	
	Manufacturer		DEMCO	
	Primary coil resistance		0.73 Ω±10%	
	Secondary coil resistance		12.8 kΩ±15%	
	Insulation resistance between primary terminal and case		More than 10 MΩ	
Spark plug	Type and manufacturer		PFR5B-11 ..... NGK	
	Thread size	mm	14, P = 1.25	
	Spark gap	mm (in)	1.0 — 1.1 (0.039 — 0.043)	

1. Starter

A: MT VEHICLES

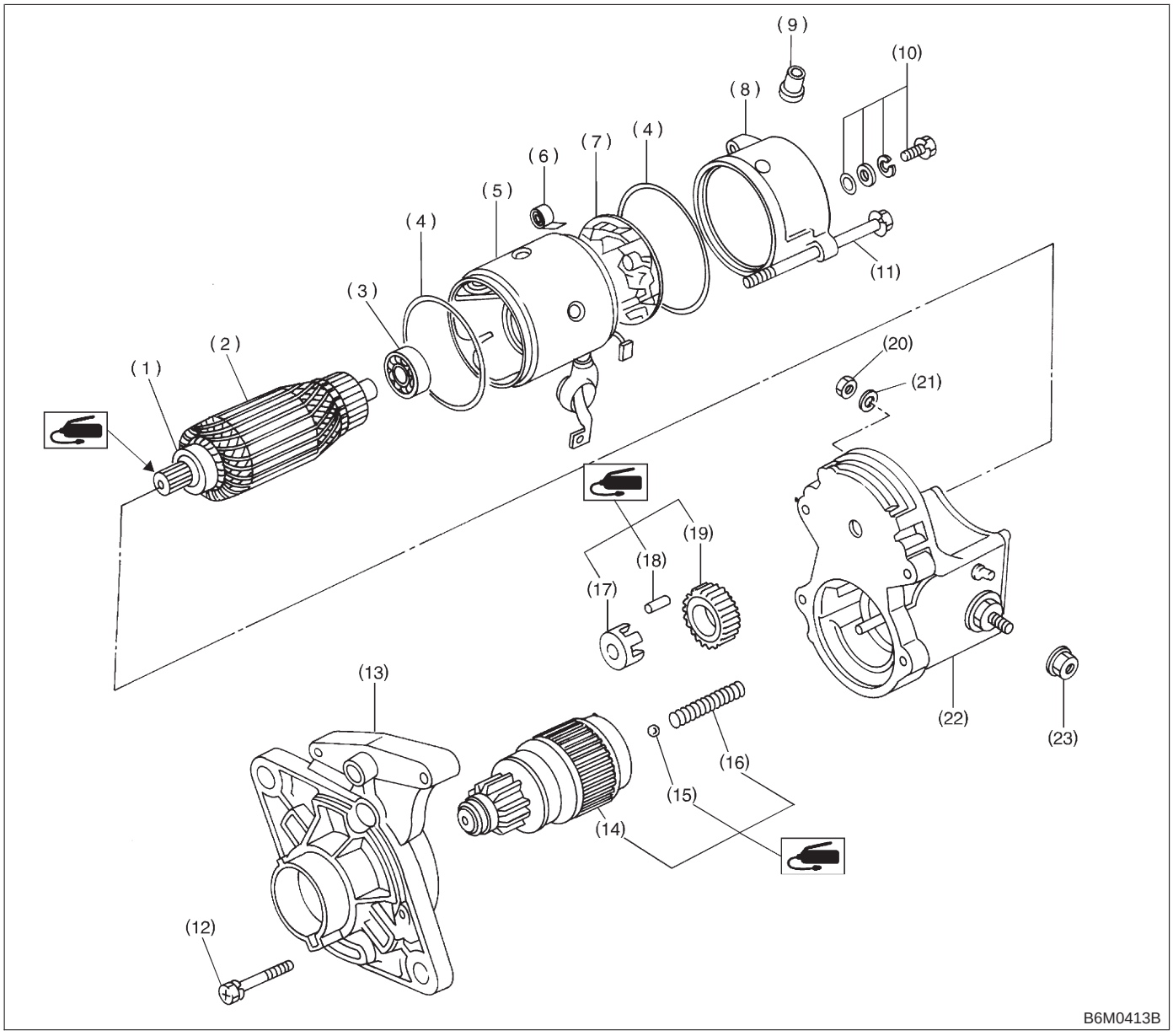
1. MODEL: TN128000-8311



(1) Front ball bearing
(2) Armature
(3) Rear ball bearing
(4) O-ring
(5) Yoke
(6) Brush spring
(7) Brush holder
(8) End frame
(9) Screw & washer
(10) Cover
(11) Through bolt
(12) Screw & washer
(13) Starter housing
(14) Overrunning clutch
(15) Steel ball
(16) Spring
(17) Retainer
(18) Roller
(19) Idle gear
(20) Nut
(21) Spring washer
(22) Magnet switch
(23) Nut

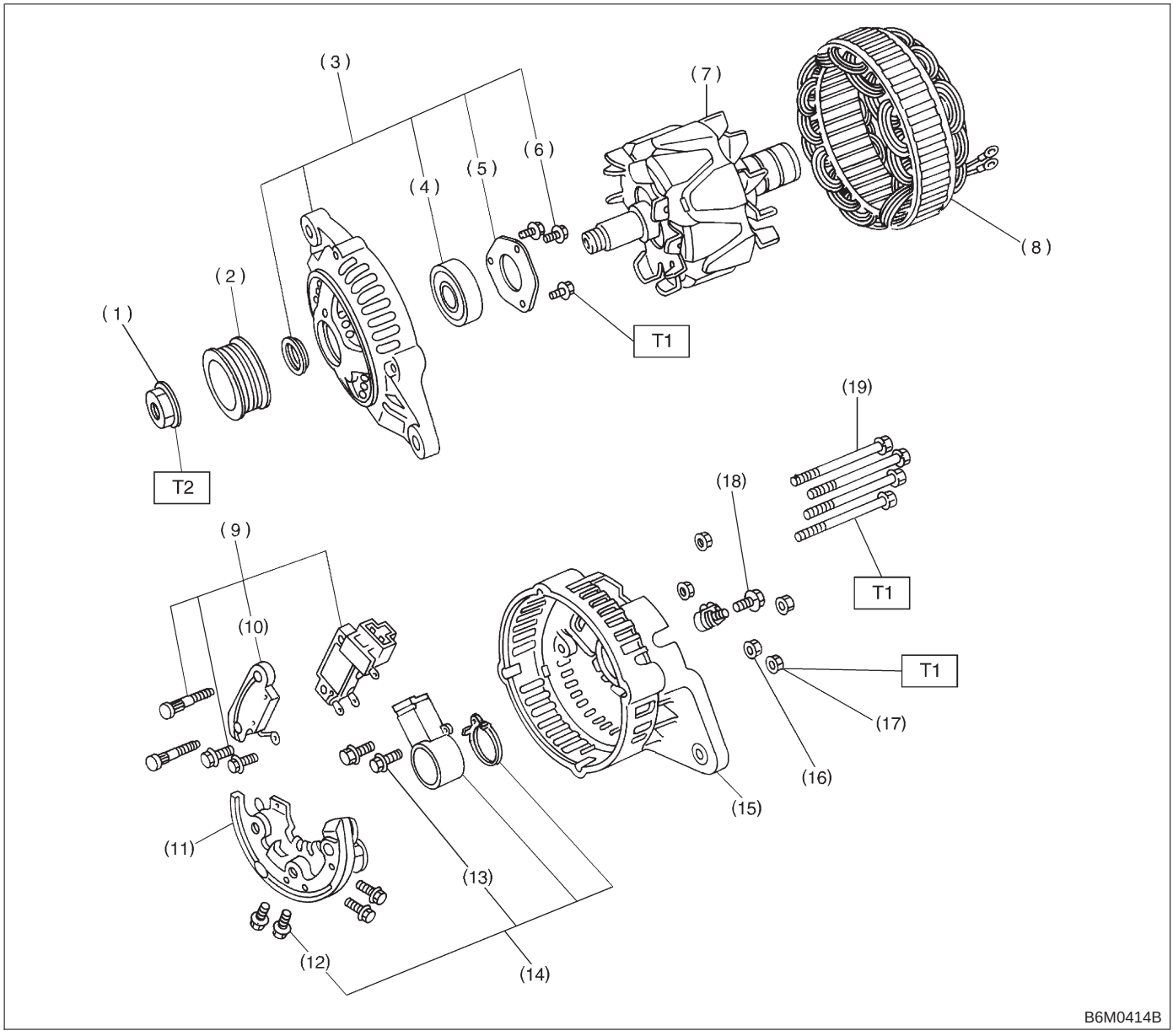
B: AT VEHICLES

1. MODEL: TN128000-8321



(1) Front ball bearing
(2) Armature
(3) Rear ball bearing
(4) O-ring
(5) Yoke
(6) Brush spring
(7) Brush holder
(8) End frame
(9) Cover
(10) Screw & washer
(11) Through bolt
(12) Screw & washer
(13) Starter housing
(14) Overrunning clutch
(15) Steel ball
(16) Spring
(17) Retainer
(18) Roller
(19) Idle gear
(20) Nut
(21) Spring washer
(22) Magnet switch
(23) Nut

2. Generator



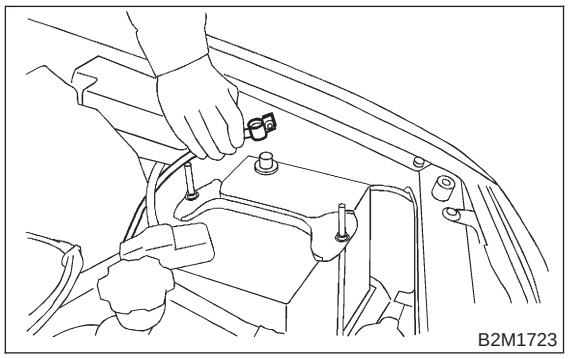
(1) Pulley nut
(2) Pulley
(3) Front cover ASSY
(4) Ball bearing
(5) Bearing retainer
(6) Screw
(7) Rotor
(8) Stator coil
(9) IC regulator ASSY
(10) Condenser
(11) Diode ASSY
(12) Bolt
(13) Bolt
(14) Brush holder ASSY
(15) Rear cover
(16) BAT. terminal
(17) Nut
(18) Bolt
(19) Through bolt

Tightening torque: N·m (kg-m, ft-lb)
T1: 3.1 — 4.4 (0.32 — 0.45, 2.3 — 3.3)
T2: 63.7 — 83.4 (6.5 — 8.5, 47.0 — 61.5)

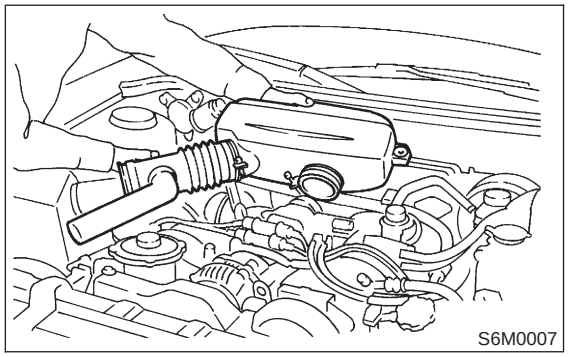
1. Starter

A: REMOVAL AND INSTALLATION

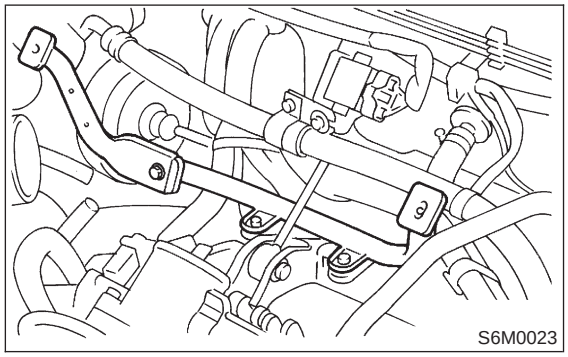
1) Disconnect battery ground cable.


B2M1723

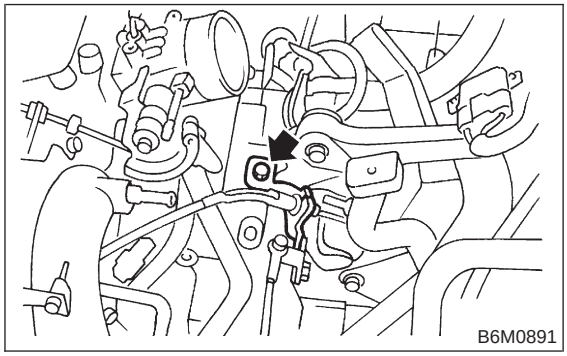
2) Remove air intake chamber. <Ref. to 2-7 [W18A0].>


S6M0007

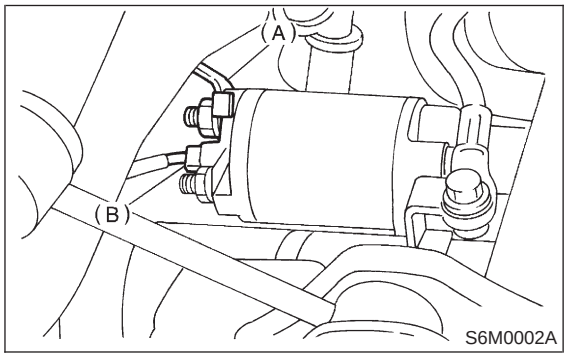
3) Remove air intake chamber stay. (AT vehicles only)


S6M0023

4) Remove bolt which installs hill holder cable bracket. (2200 cc MT model with hill holder)


B6M0891

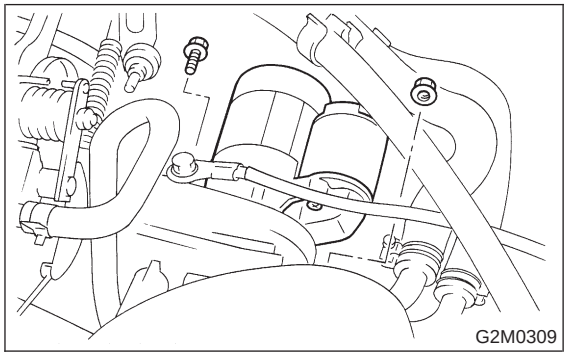
5) Disconnect connector and terminal from starter.



S6M0002A

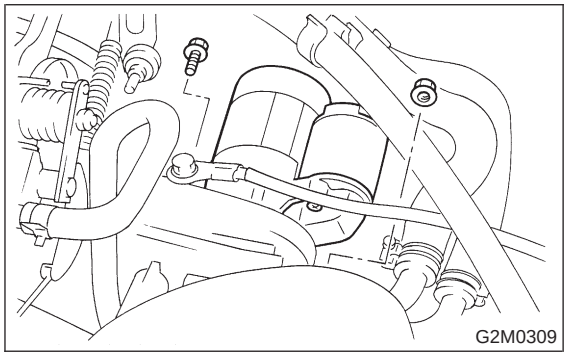
(A) Terminal
(B) Connector

6) Remove starter from transmission.


G2M0309

7) Installation is in the reverse order of removal.

Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 37±2.9 ft-lb)

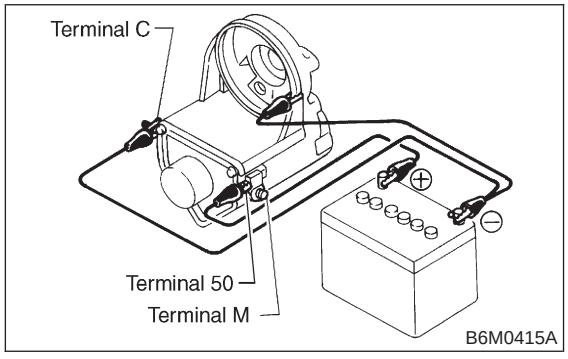

G2M0309

B: TEST

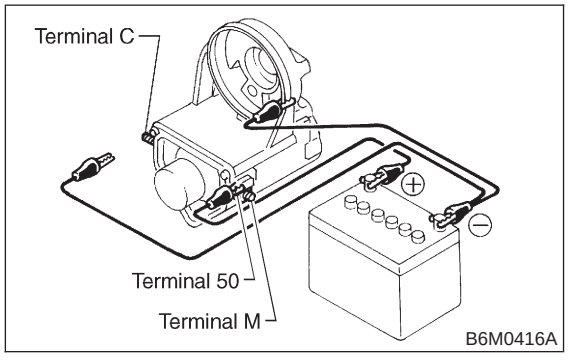
1. MAGNETIC SWITCH

CAUTION:
● The following magnetic switch tests should be performed with specified voltage applied.
● Each test should be conducted within 3 to 5 seconds. Power to be furnished should be one-half the rated voltage.

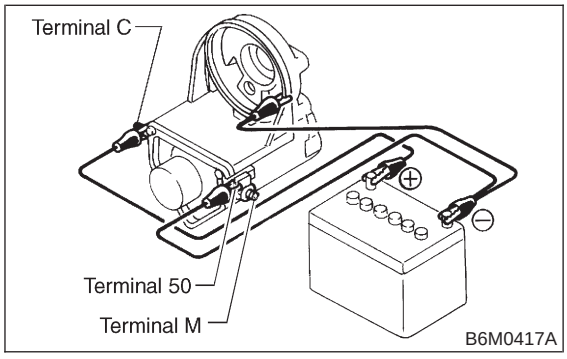
1) Pull-in test
Connect two battery negative leads onto magnetic switch body and terminal C respectively. Then connect battery positive lead onto terminal 50. Pinion should extend when lead connections are made.



2) Holding-in test
Disconnect lead from terminal C with pinion extended. Pinion should be held in the extended position.



3) Return test
Connect two battery negative leads onto terminal 50 and onto switch body respectively. Then connect battery positive lead onto terminal C. Next, disconnect lead from terminal 50. Pinion should return immediately.

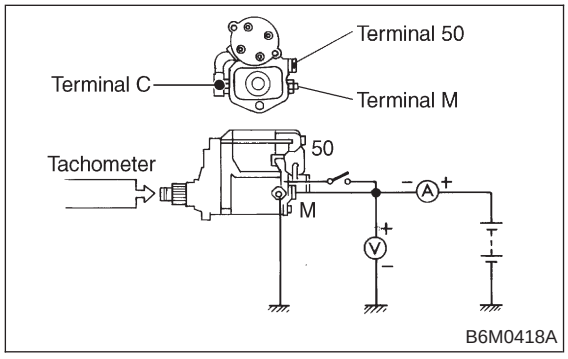


2. PERFORMANCE TEST

The starter is required to produce a large torque and high rotating speed, but these starter characteristics vary with the capacity of the battery. It is therefore important to use a battery with the specified capacity whenever testing the starter.
The starter should be checked for the following three items:
● No-load test
Measure the maximum rotating speed and current under a no-load state.
● Load test
Measure the magnitude of current needed to generate the specified torque and rotating speed.
● Stall test
Measure the torque and current when the armature is locked.

1) No-load test
Run single starter under no-load state, and measure its rotating speed, voltage, and current, using the specified battery. Measured values must meet the following standards:

No-load test (Standard):
Voltage/Current
11 V/90 A, or more
Rotating speed
TN128000-8311: 3,000 rpm, or more
TN128000-8321: 3,350 rpm, or more



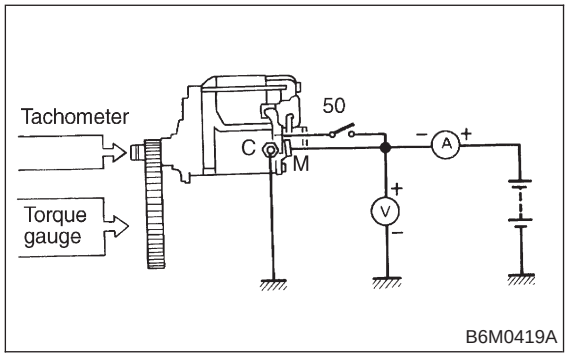
2) Load test (For reference)
Perform this test to check maximum output of starter. Use test bench which is able to apply load (brake) to starter. Measure torque value and rotating speed under the specified voltage and current conditions while controlling braking force applied to starter.

CAUTION:
Change engagement position of overrunning clutch and make sure it is not slipping.

Load test (Standard):

TN128000-8311
Voltage/Load
8 V/9.8 N·m (1.0 kg-m, 7.2 ft-lb)
Current/Speed
280 A max./900 rpm min.

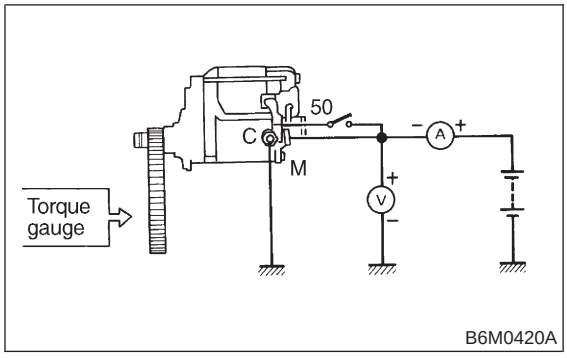
TN128000-8321
Voltage/Load
8 V/13.7 N·m (1.4 kg-m, 10.1 ft-lb)
Current/Speed
370 A, or less/880 rpm, or more



3) Stall test
Using the same test equipment used for load test, apply brake to lock starter armature. Then measure voltage, current, and torque values.
Measured values must meet the following standard.
Stall test (Standard):

TN128000-8311
Voltage/Current
5 V/800 A, or less
Torque
27.5 N·m (2.8 kg-m, 20.3 ft-lb) min.

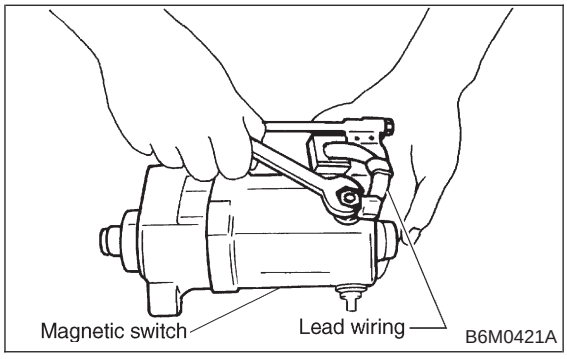
TN128000-8321
Voltage/Current
5 V/1,050 A, or less
Torque
27.5 N·m (2.8 kg-m, 20.3 ft-lb) min.



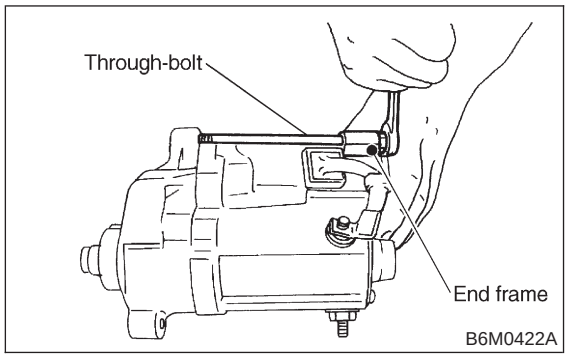
NOTE:
Low rotating speed or excessive current during no-load test may be attributable to high rotating resistance of starter due to improper assembling.
Small current and no torque during stall test may be attributable to excessive contact resistance between brush and commutator; whereas, normal current and insufficient torque may be attributable to shorted commutator or poor insulation.
Starter can be considered normal if it passes no-load and stall tests; therefore, load test may be omitted.

C: DISASSEMBLY

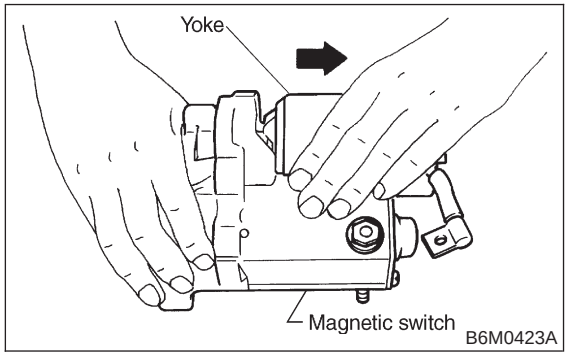
1) Disconnect lead wire from magnetic switch.



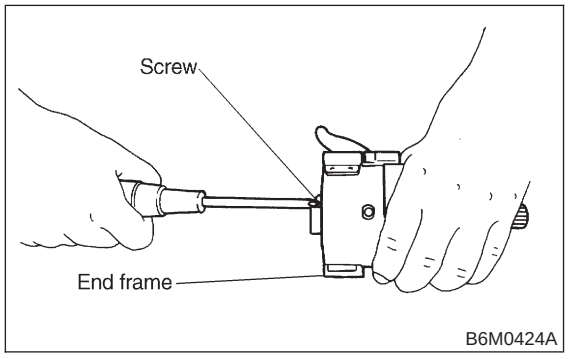
2) Remove through-bolts from end frame.



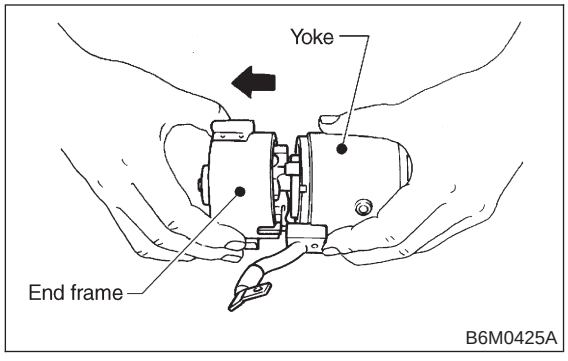
3) Remove yoke from magnetic switch.



4) Remove screws securing end frame to brush holder.

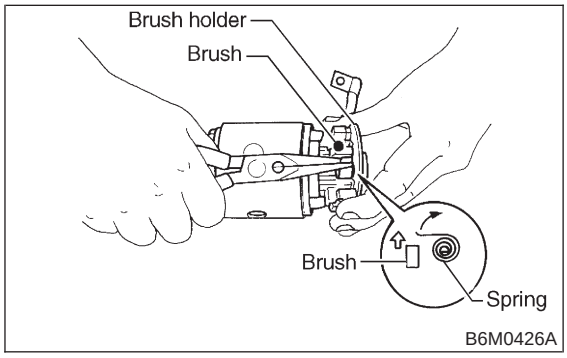


5) Separate yoke from end frame.



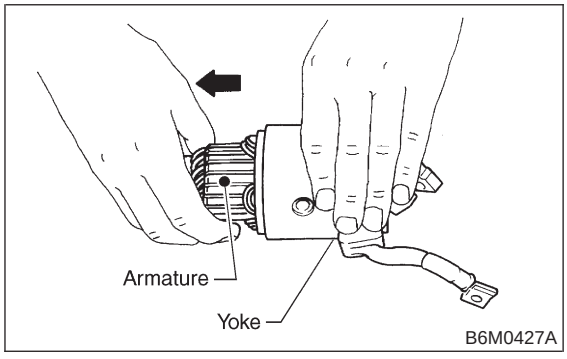
6) Remove brush by lifting up positive (+) side brush spring using long-nose pliers.

CAUTION:
Be careful not to damage brush and commutator.

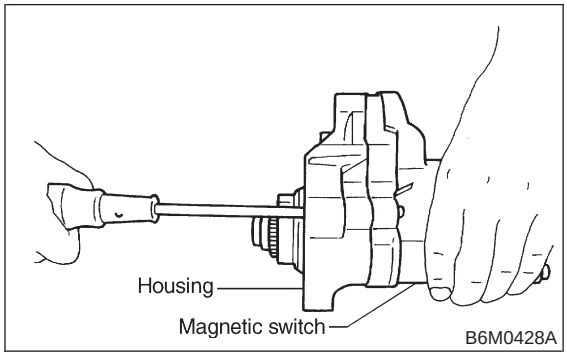


7) Remove armature from yoke.

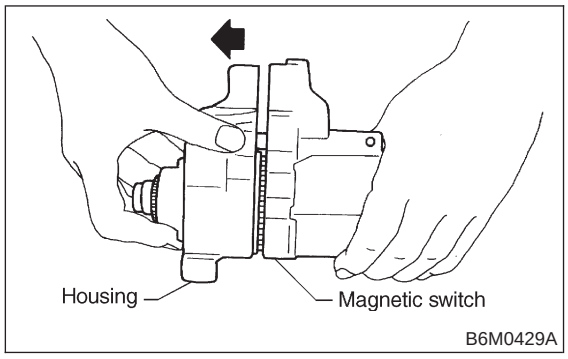
CAUTION:
Be careful not to drop armature.



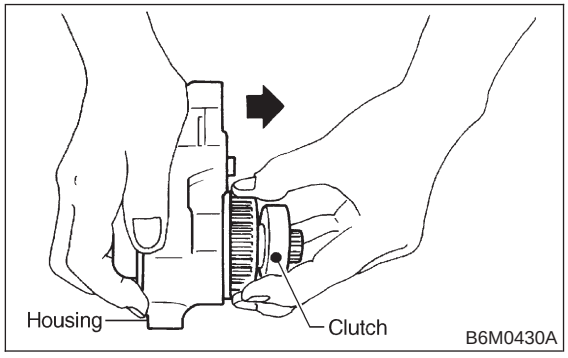
8) Remove screws securing magnetic switch to housing.



9) Remove housing from magnetic switch.

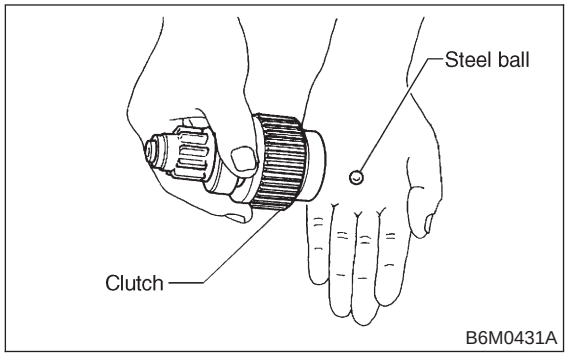


10) Remove clutch from housing.

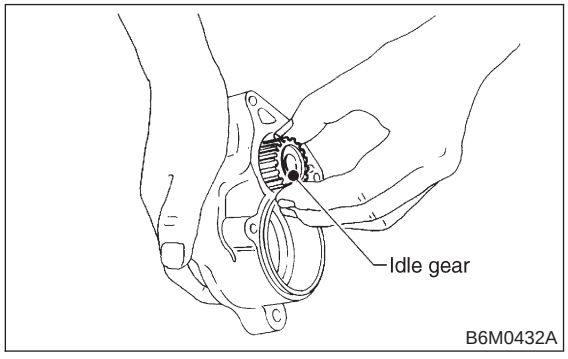


11) Take out steel ball from clutch.

CAUTION:
Be careful not to lose steel ball.

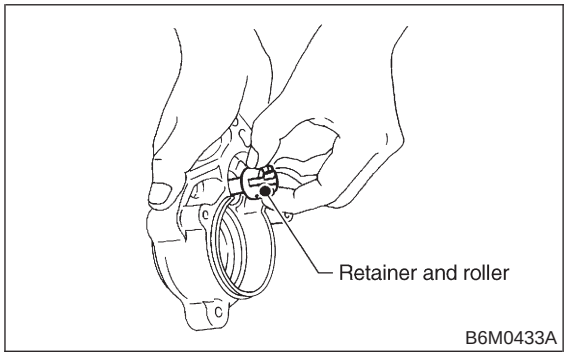


12) Remove idle gear from housing.

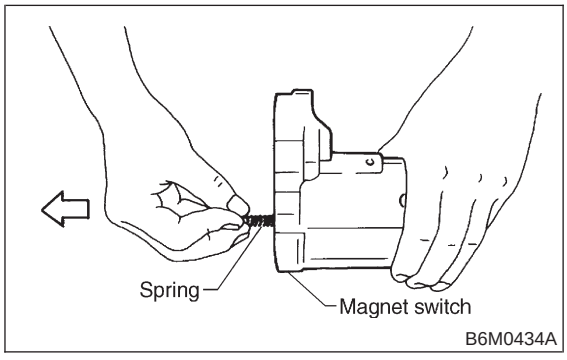


13) Remove retainer and roller from housing.

CAUTION:
Be careful not to drop retainer and roller.



14) Remove coil spring from magnetic switch.

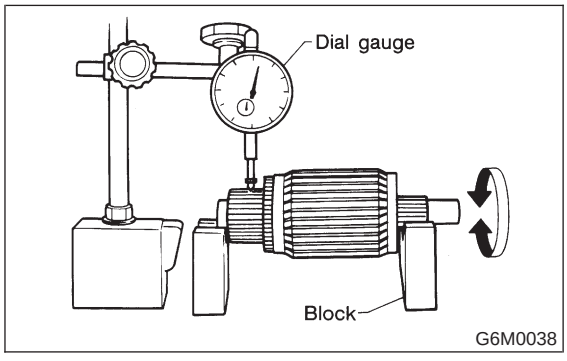


D: INSPECTION

1. ARMATURE

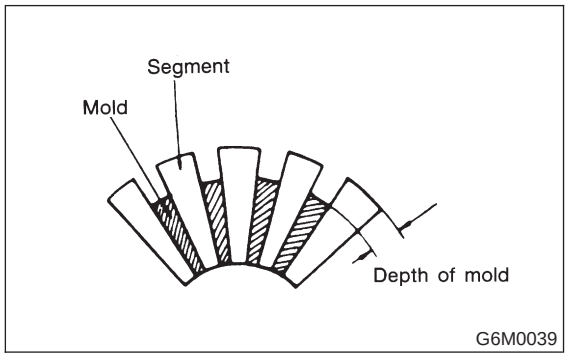
1) Check commutator for any sign of burns of rough surfaces or stepped wear. If wear is of a minor nature, correct it by using sand paper.
2) Run-out test
Check the commutator run-out and replace if it exceeds the limit.

Commutator run-out:
Standard
0.02 mm (0.0008 in), or less
Service limit
Less than 0.05 mm (0.0020 in)

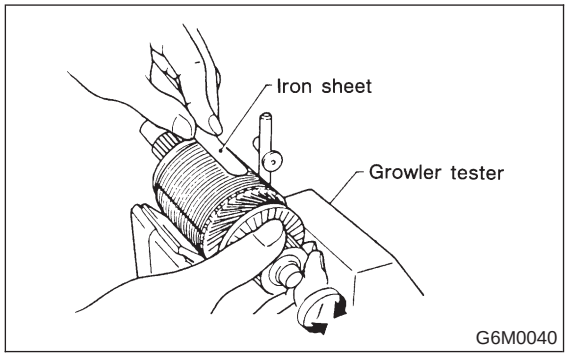


3) Depth of segment mold
Check the depth of segment mold.

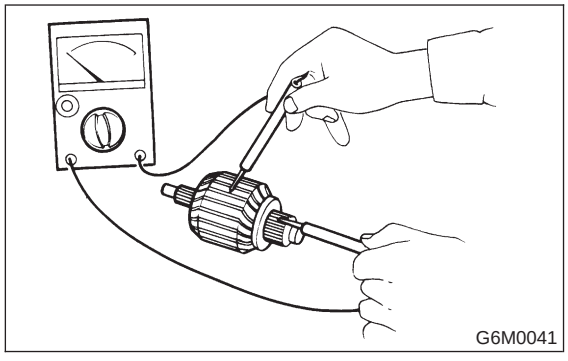
Depth of segment mold:
0.6 mm (0.024 in)
Limit
0.2 mm (0.008 in)



4) Armature short-circuit test
Check armature for short-circuit by placing it on growler tester. Hold a hacksaw blade against armature core while slowly rotating armature. A short-circuited armature will cause the blade to vibrate and to be attracted to core. If the hacksaw blade is attracted or vibrates, the armature, which is short-circuited, must be replaced or repaired.

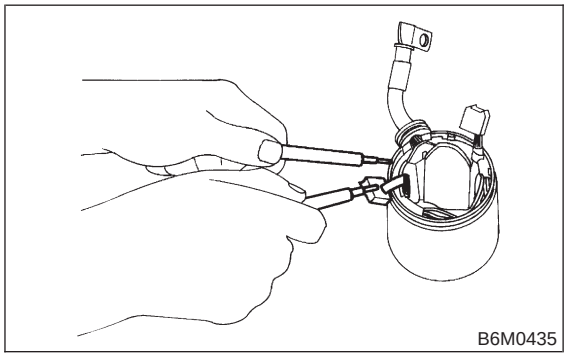


5) Armature ground test
Using circuit tester, touch one probe to the commutator segment and the other to shaft. There should be no continuity. If there is a continuity, armature is grounded.
Replace armature if it is grounded.



2. YOKE

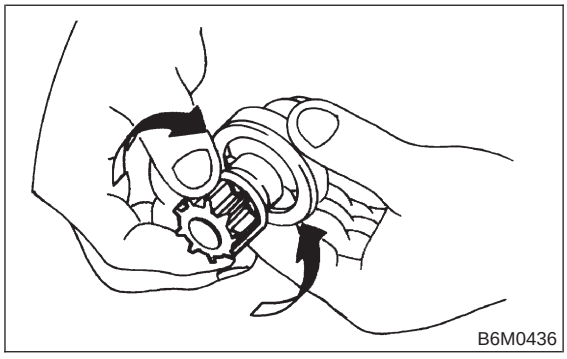
Make sure pole is set in position.



3. OVERRUNNING CLUTCH

Inspect teeth of pinion for wear and damage. Replace if it is damaged. Rotate pinion in direction of rotation (clockwise). It should rotate smoothly. But in opposite direction, it should be locked.

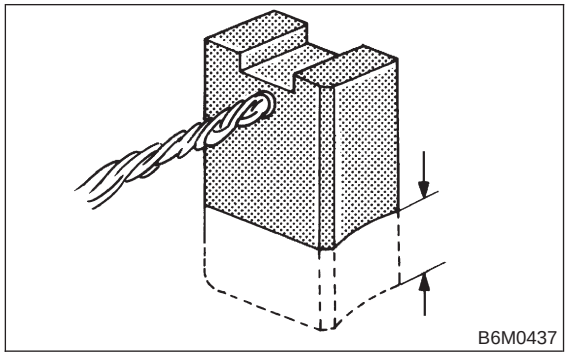
CAUTION:
Do not clean overrunning clutch with oil to prevent grease from flowing out.



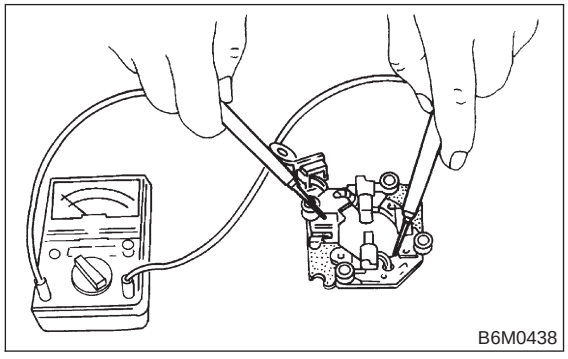
4. BRUSH AND BRUSH HOLDER

1) Brush length
Measure the brush length and replace if it exceeds the service limit.
Replace if abnormal wear or cracks are noticed.

Brush length:
Standard
15 mm (0.59 in)
Service limit
10 mm (0.39 in)


B6M0437

2) Brush movement
Be sure brush moves smoothly inside brush holder.
3) Insulation resistance of brush holder
Be sure there is no continuity between brush holder and its plate.

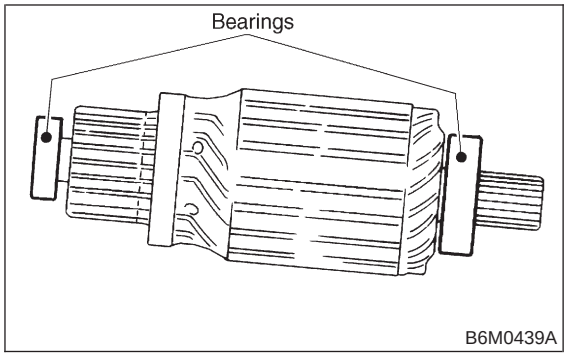

B6M0438

4) Brush spring force
Measure brush spring force with a spring scale. If it is less than the service limit, replace brush spring.

Brush spring force:
Standard
18.6 N (1.9 kg, 4.2 lb) (when new)
Service limit
6.9 N (0.7 kg, 1.5 lb)

5. BEARING

1) Rotate bearing by hand; no binding should exist.
2) Rotate bearing rapidly; no abnormal noise should be heard.



B6M0439A

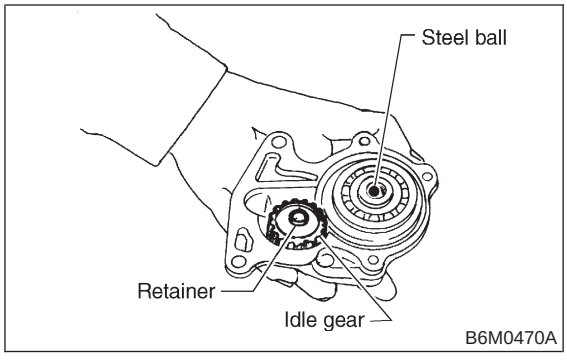
E: ASSEMBLY

Assembly is in the reverse order of disassembly procedures. Observe the following:
1) Before assembling, lubricate disassembled parts at the points shown in “COMPONENT PARTS”. <Ref. to 6-1 [C100].>

Grease:
ESSO BEACON 325
SCHELL ALVANIA GREASE RA or equivalent

2) Assembling magnetic switch, clutch, and housing
To assemble, first install clutch to magnetic switch, then install idle gear, and finally install clutch.

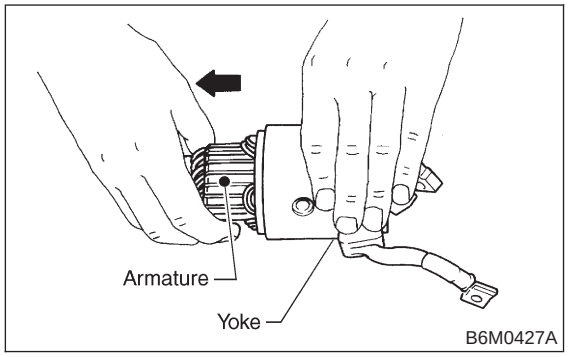
CAUTION:
- **Do not forget to install steel ball and coil spring to clutch.**
- **Attach bearing to idle gear beforehand.**



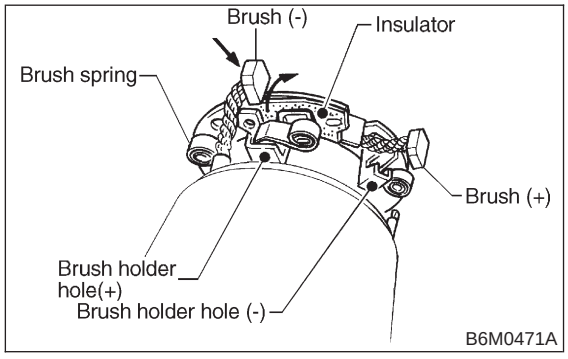
B6M0470A

3) Installing armature to yoke

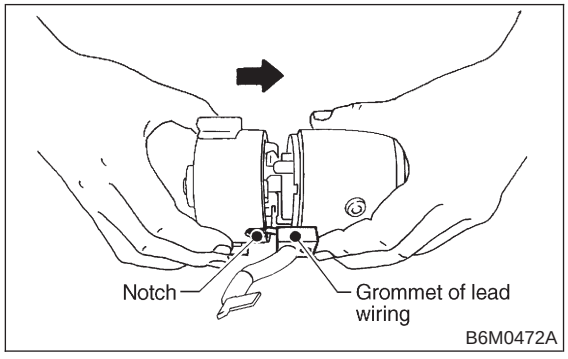
CAUTION:
Do not forget to put felt washer on armature shaft bearing.



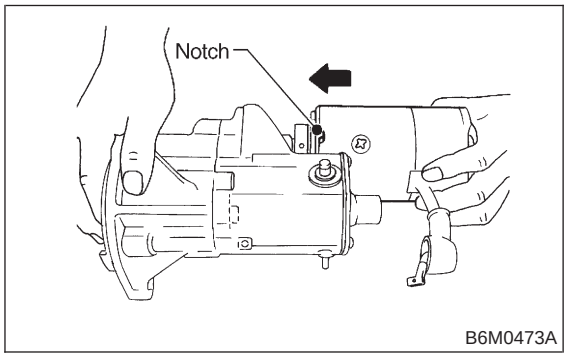
4) Installing brushes
Assemble brush holder to yoke as shown, then assemble two yoke-side brushes to brush holder.



5) Installing end frame
When assembling end frame to yoke, align notched portion of end frame with lead wire grommet.



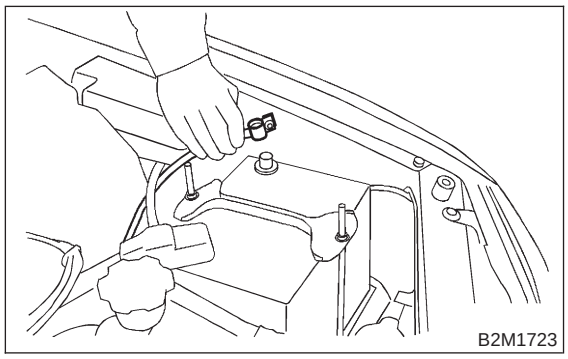
6) Installing yoke
When installing yoke to magnetic switch, align notch of yoke with protrusion of magnetic switch.



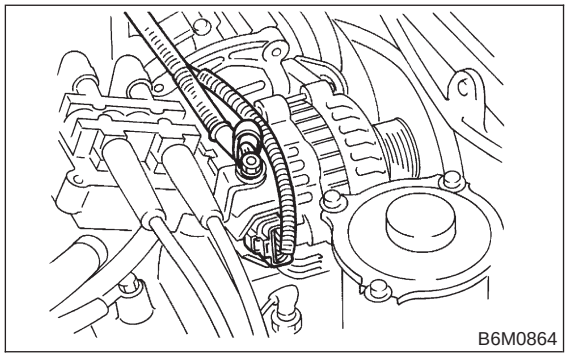
2. Generator

A: REMOVAL AND INSTALLATION

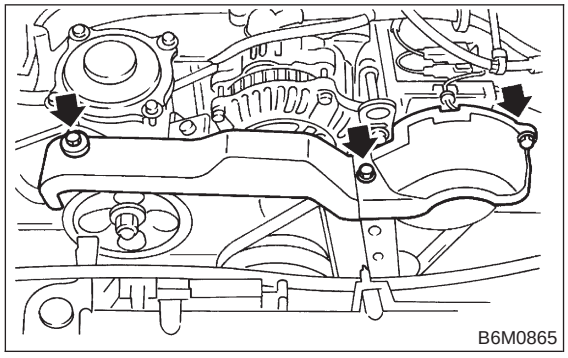
1) Disconnect battery ground cable.


B2M1723

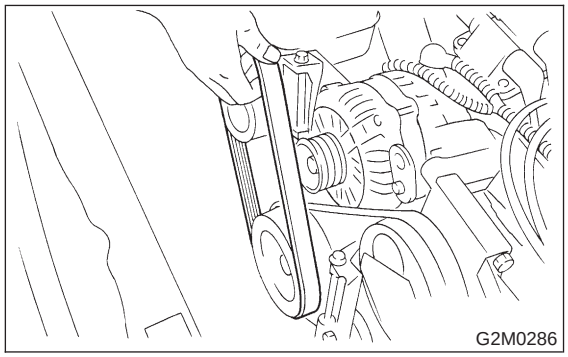
2) Disconnect connector and terminal from generator.


B6M0864

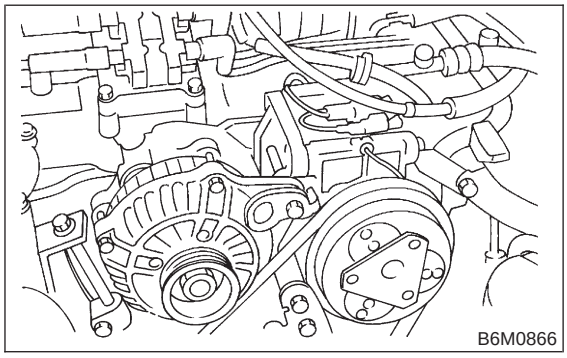
3) Remove V-belt covers.


B6M0865

4) Remove front side V-belt.

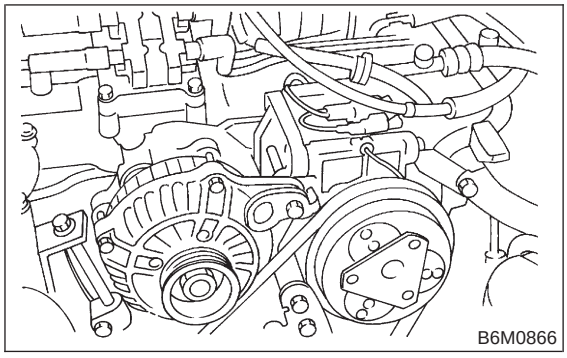

G2M0286

5) Remove bolts which install generator onto bracket.


B6M0866

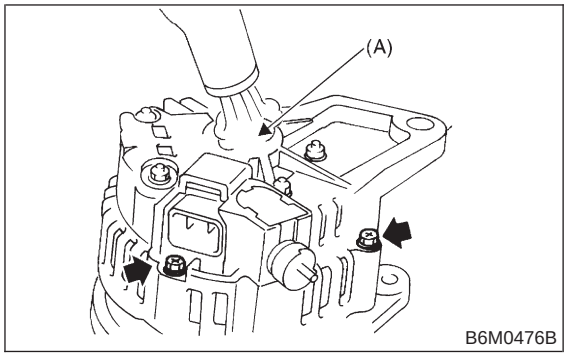
6) Installation is in the reverse order of removal.

CAUTION:
Check and adjust V-belt tension. <Ref. to 1-5 [G2A0].>


B6M0866

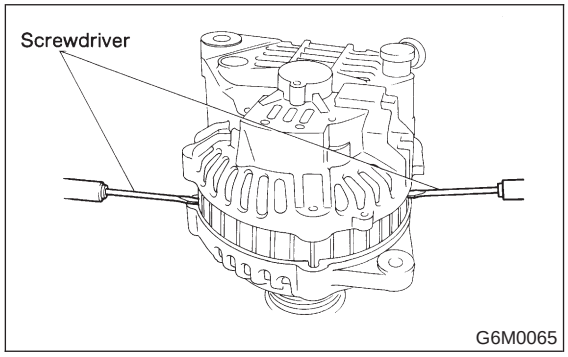
B: DISASSEMBLY

1) Heat the portion (A) of rear cover to 50°C (122°F) with heater drier.

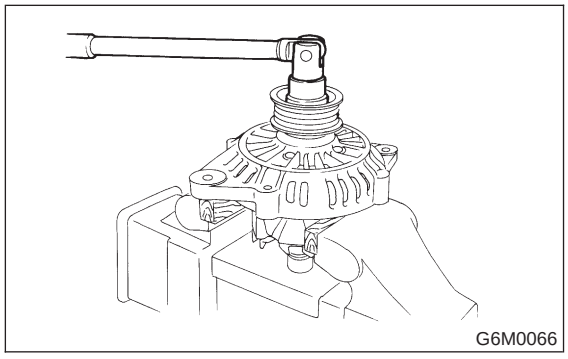


B6M0476B

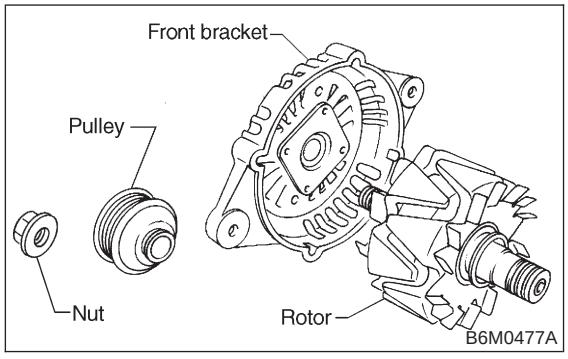
2) Remove the four through bolts. Then insert the tip of a flat-head screwdriver into the gap between the stator core and front bracket. Pry then apart to disassemble.



3) Hold rotor with a vise and remove pulley nut.

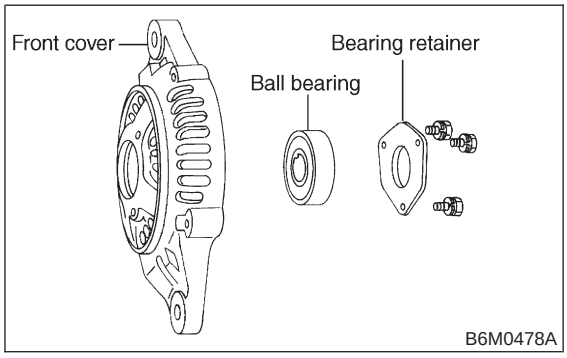


CAUTION:
When holding rotor with vise, insert aluminum plates or wood pieces on the contact surfaces of the vise to prevent rotor from damage.

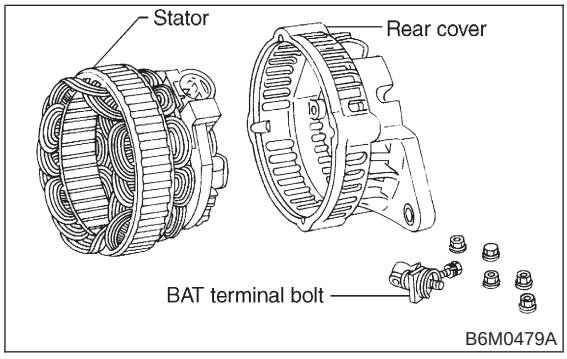


4) Remove rotor from front cover.

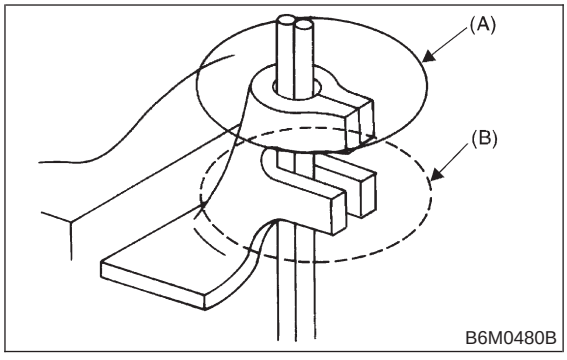
5) Remove three screws from front cover and then bearing retainer and ball bearing.



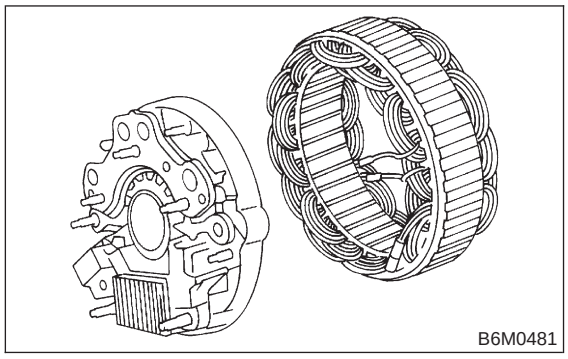
6) Remove bolt which secure battery terminal bolt, and remove rear cover. Remove nuts which secure diode plate, and remove stator and rear cover.



7) Separate diode plate from stator coil.
(1) Cut the connecting position (A) of stator coil to diode.
(2) Unsolder connection (B) and throughout the lead wire of stator coil.

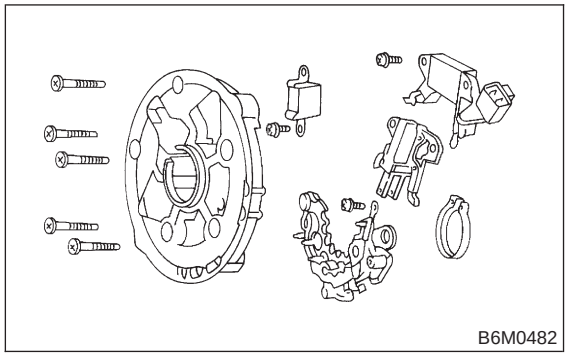


(3) Remove stator coil from diode plate.


B6M0481

8) Remove bolts which secure IC regulator, diode and brush holder.

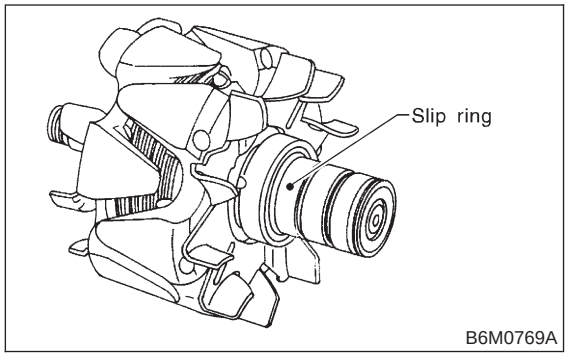
CAUTION:
Do not apply a shock or load to IC regulator cooling fins.


B6M0482

C: INSPECTION

1. ROTOR

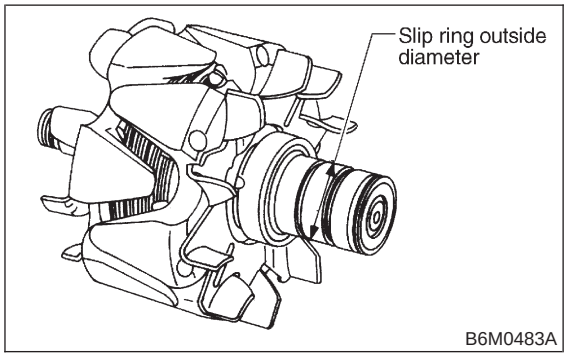
1) Slip ring surface
Inspect slip rings for contamination or any roughness of the sliding surface.
Clean or polish with #500 to #600 emery paper if defective.



B6M0769A

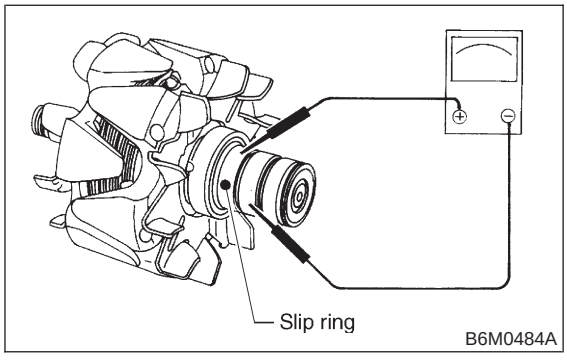
2) Slip ring outside diameter
Measure slip ring outside diameter. If slip ring is worn, replace rotor.

Slip ring outside diameter:
Standard
27 mm (1.06 in)
Limit
26 mm (1.02 in)



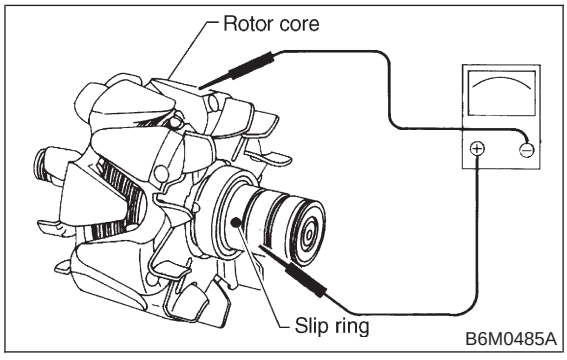
B6M0483A

3) Continuity test
Check continuity between slip rings. If continuity does not exist, replace rotor.



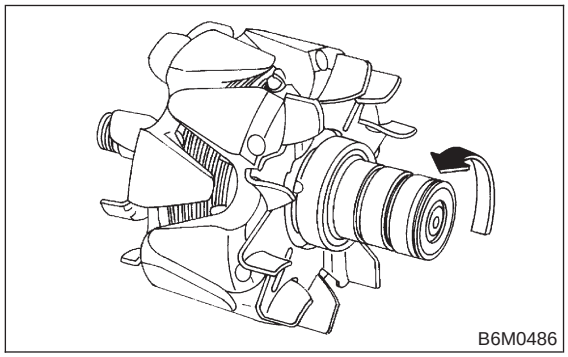
B6M0484A

4) Insulation test
Check continuity between slip ring and rotor core or shaft. If continuity exists, replace rotor.



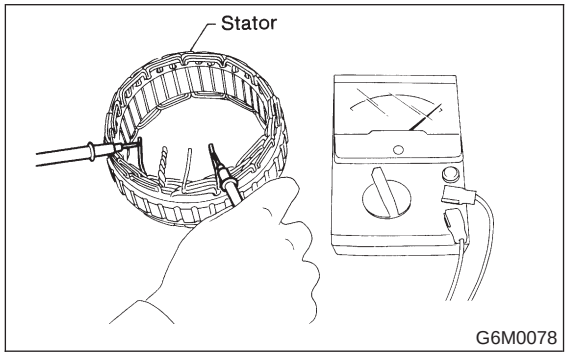
B6M0485A

5) Ball bearing
Check rear ball bearing. Replace it if it is noisy or if rotor does not turn smoothly.

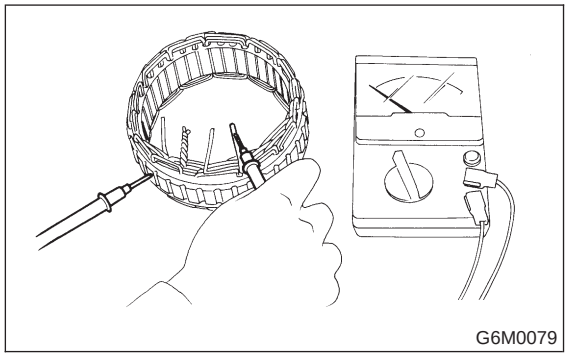


2. STATOR

1) Continuity test
Inspect stator coil for continuity between its terminals. When there is no continuity between individual terminals, cable is broken. Replace stator coil.



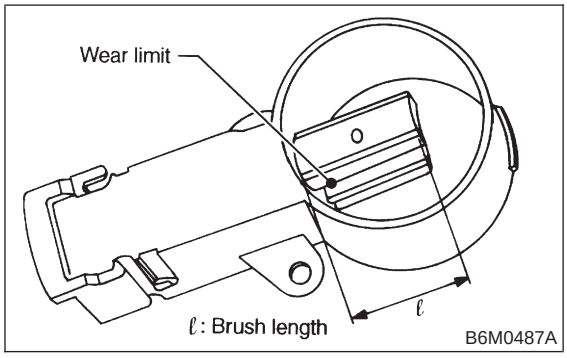
2) Insulation test
Inspect stator coil for continuity between stator core and each terminal. If there is continuity, replace stator coil.



3. BRUSH

Measure brush length. If brush is worn, replace brush holder assembly.

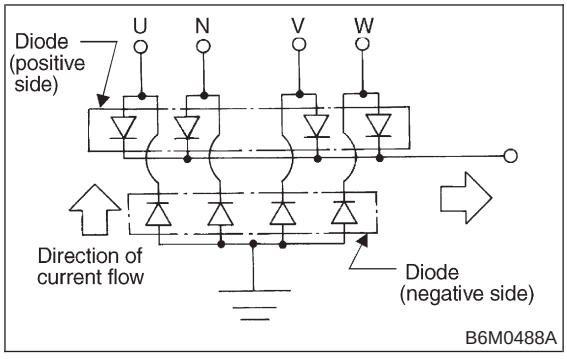
Brush length (ℓ):
Standard
20.5 mm (0.807 in)
Limit
1.5 mm (0.059 in)



4. DIODE ASSEMBLY

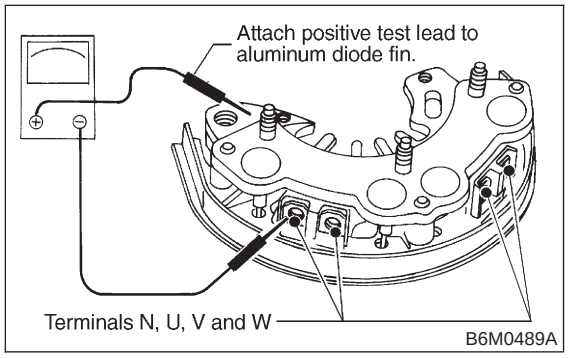
CAUTION:
Never use a high tension insulation tester, such as a meggar as it will damage diodes with its high tension.

The diode consists of eight diodes, four each being located on the positive and negative sides. The diode is necessary to restrict current flow to one direction.
Check all diodes, for continuity. If any diode is faulty, replace diode assembly.



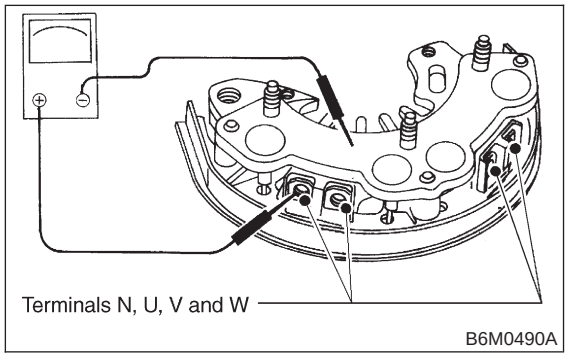
1) Diodes on “+” side
Continuity of proper diodes on “+” side

Terminal N, U, V and W	BAT side	
	(+)	(−)
(+)	—	Continuity must not exist.
(−)	Continuity must exist.	—



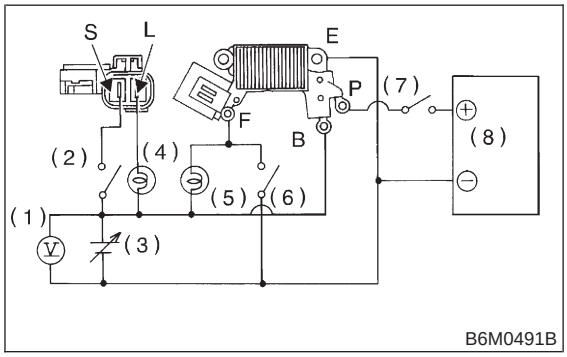
2) Diodes on "–" side
Continuity of proper diodes on "–" side

Terminal N, U, V and W	"E" side	
	(+)	(–)
(+)	—	Continuity must exist.
(–)	Continuity must not exist.	—



5. IC REGULATOR

1) Compose a circuit diagram as shown in figure.



(1) Voltage meter: 0 to 30 V
(2) Switch 1
(3) Variable DC power supply: Variable 0 to 20 V, 1 A or more
(4) Lamp 2
(5) Lamp 1
(6) Switch 3
(7) Switch 2
(8) Plus generator: Power supply 5 to 30 V, 1 kHz

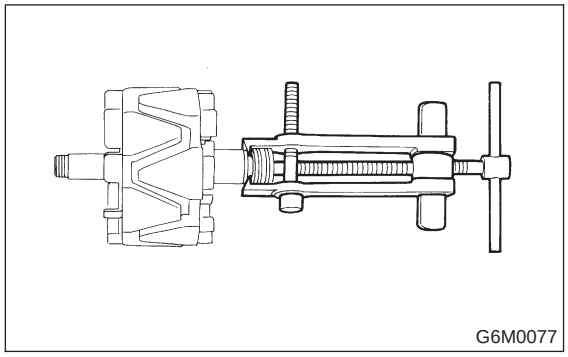
2) Check operation as shown in chart below.

No.	Switch operation			Value of voltage meter	Lamp operation		Remarks
	1	2	3		1	2	
1	ON	OFF	OFF	12 V	DIM	ON	Check initial excitation.
2	ON	ON	OFF	12 V	ON or BLINK	OFF	Check total excitation.
3	ON	ON	OFF	16 V	OFF or DIM-BLINK	OFF	When value of voltage meter is between 12 V and 16 V.
4	OFF	ON	OFF	12 V	ON or BLINK	ON	Check connection for S and B terminals.
5	OFF	ON	ON	18 V	ON	ON	Check for over loading of voltage.

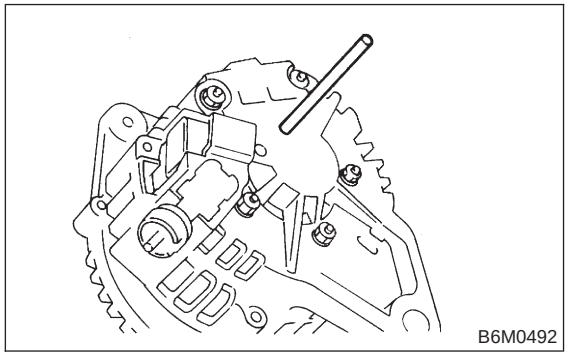
D: ASSEMBLY

Assembly is in the reverse order of disassembly procedures.

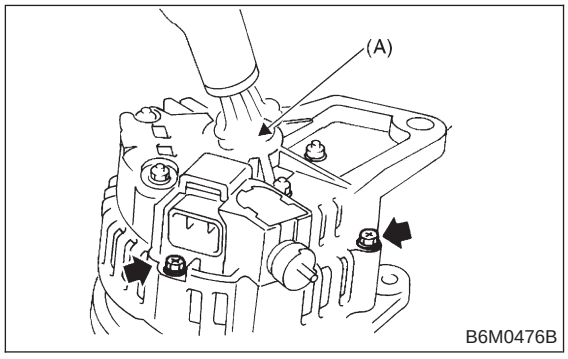
CAUTION:
● When disassembling generator, replace rear ball bearing.


G6M0077

● When soldering starter coil to diode, do not touch lead wire with solder for more than 5 seconds.
● Before installing rear cover, insert pin from outside of rear cover so that holds brush. After installing rear cover, remove pin.


B6M0492

● When installing rear cover, heat portion (A) to 50°C (122°F) with heater drier.



B6M0476B

3. Spark Plug

A: REMOVAL AND INSTALLATION (2200 cc MODEL)

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

Spark plug:
CHAMPION: RC10YC4
(Alternate)
NGK: BKR6E-11
NIPPONDENSO: K20PR-U11

1) Remove spark plug cords by pulling boot, not cord itself.
2) Remove spark plugs.
3) When installing spark plugs on cylinder head, use spark plug wrench.

Tightening torque (Spark plug):
20.6±2.9 N·m (2.10±0.30 kg-m, 15.19±2.14 ft-lb)

CAUTION:
The above torque should be only applied to new spark plugs without oil on their threads. In case their threads are lubricated, the torque should be reduced by approximately 1/3 of the specified torque in order to avoid their over-stressing.

4) Connect spark plug cords.

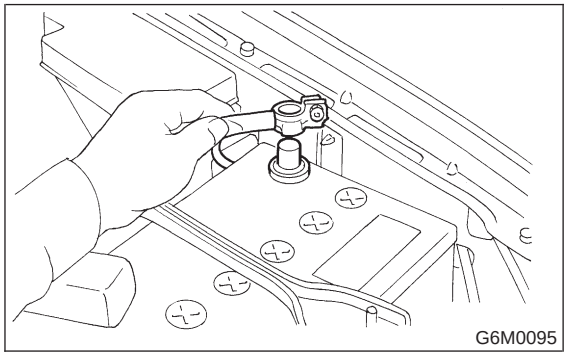
B: REMOVAL AND INSTALLATION (2500 cc EXCEPT OUTBACK MODEL)

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

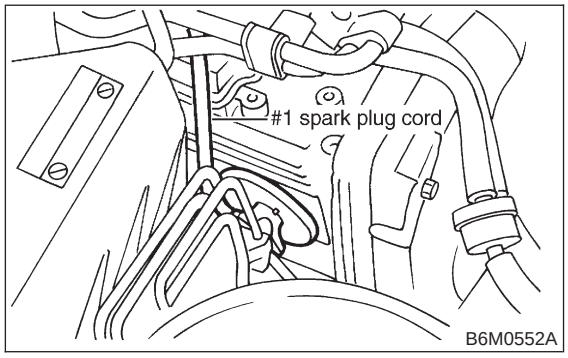
Spark plug:
NGK: PFR5B-11

1. #1 SPARK PLUG

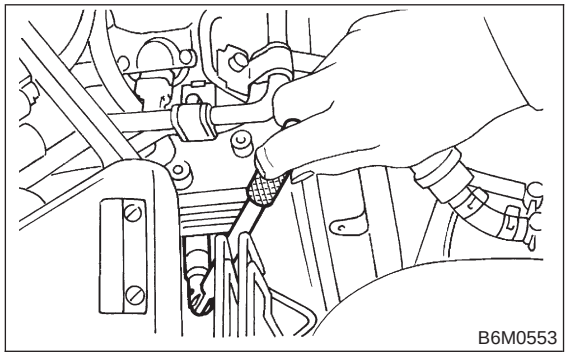
1) Disconnect battery ground cable.


G6M0095

2) Remove #1 spark plug cord by pulling boot, not cord itself.



3) Remove spark plug with the spark plug socket.

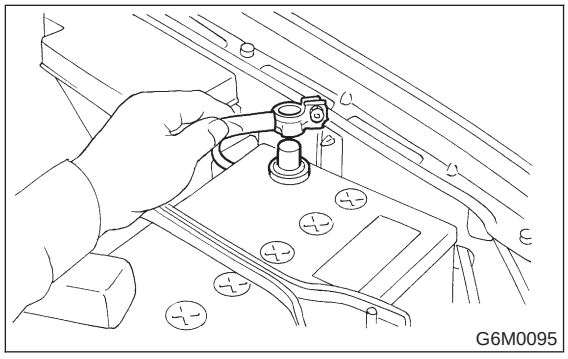


4) Installation is in the reverse order of removal.

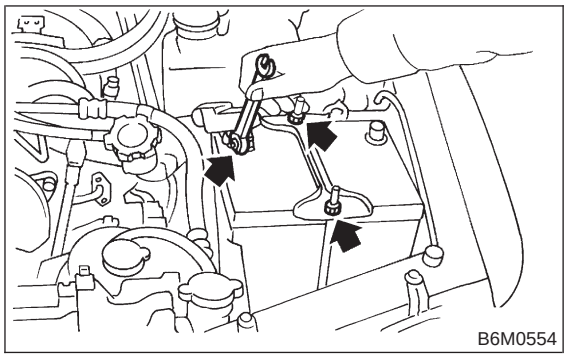
Tightening torque (Spark plug):
20.6±2.9 N·m (2.10±0.30 kg-m, 15.19±2.14 ft-lb)

2. #2 SPARK PLUG

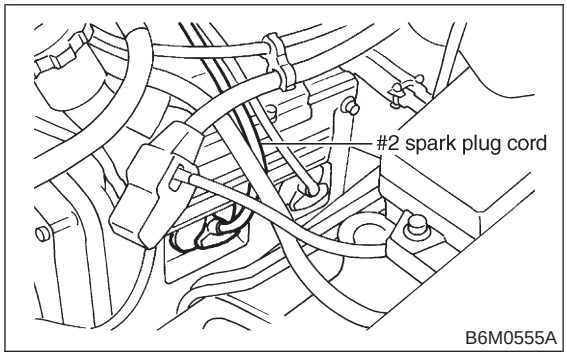
1) Disconnect battery ground cable.



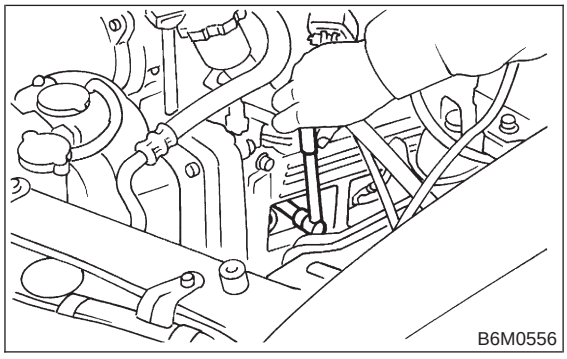
2) Remove battery.



3) Remove #2 spark plug cord by pulling boot, not cord itself.



4) Remove spark plug with the spark plug socket.

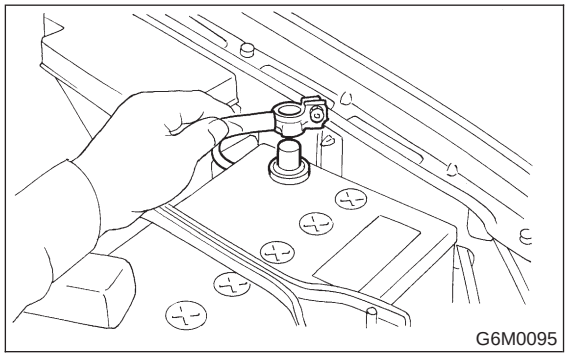


5) Installation is in the reverse order of removal.

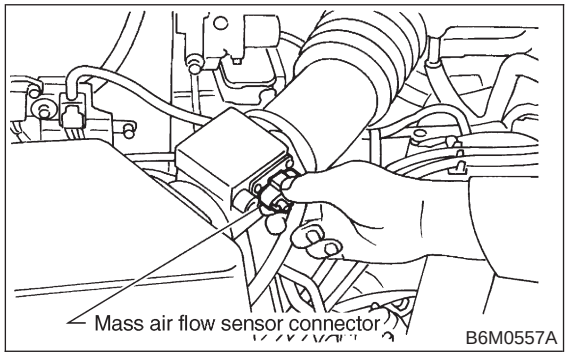
Tightening torque (Spark plug):
20.6±2.9 N·m (2.10±0.30 kg-m, 15.19±2.14 ft-lb)

3. #3 SPARK PLUG

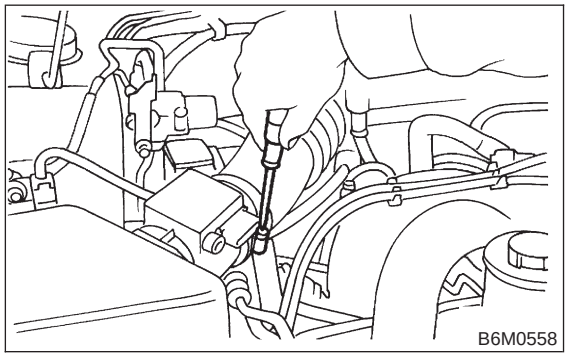
1) Disconnect battery ground cable.



2) Disconnect mass air flow sensor connector.

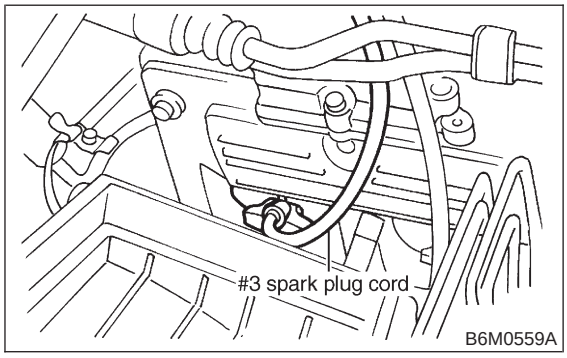


3) Remove four clips securing air cleaner upper cover.
4) Loosen the clamp screw and separate air cleaner upper cover from air intake duct.

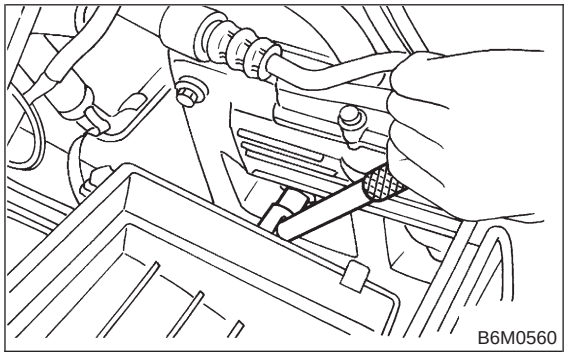


5) Remove air cleaner element.

6) Remove #3 spark plug cord by pulling boot, not cord itself.



7) Remove spark plug with the spark plug socket.

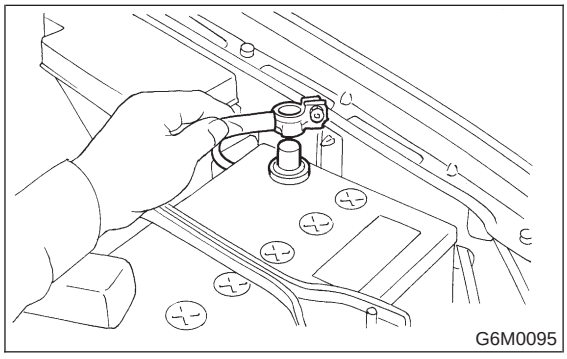


8) Installation is in the reverse order of removal.

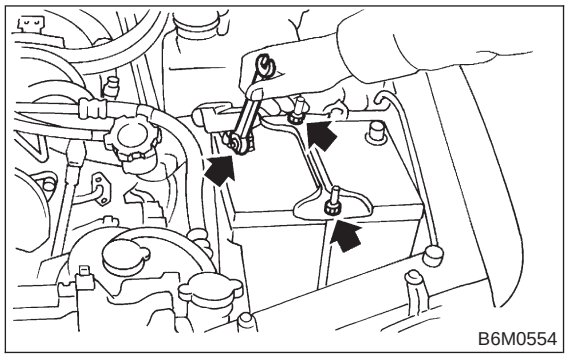
Tightening torque (Spark plug):
20.6±2.9 N·m (2.10±0.30 kg-m, 15.19±2.14 ft-lb)

4. #4 SPARK PLUG

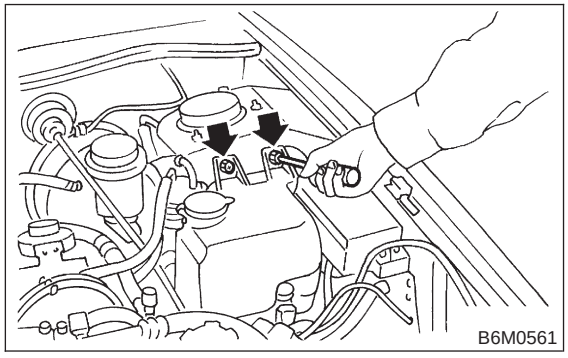
1) Disconnect battery ground cable.



2) Remove battery.

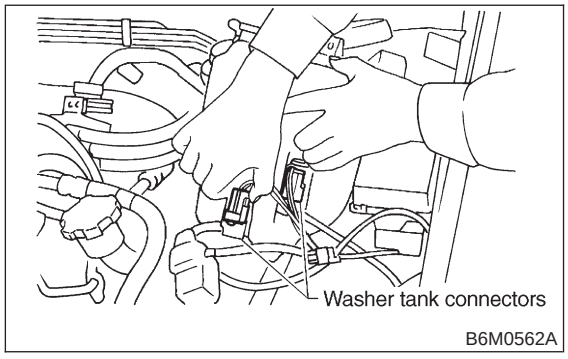


3) Remove washer tank mounting bolts.

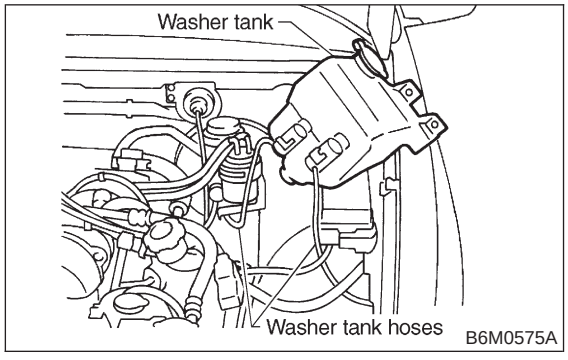


4) Disconnect washer tank connectors.

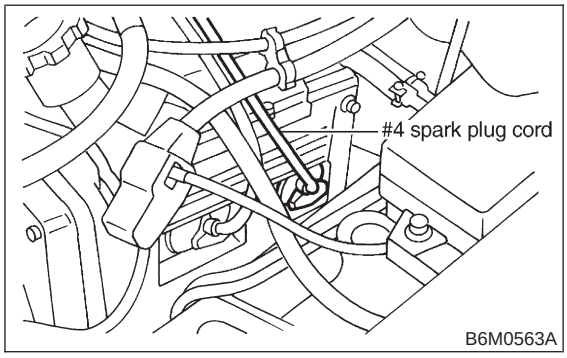
CAUTION:
Do not disconnect washer tank hoses as washer fluid will leak out from washer tank.



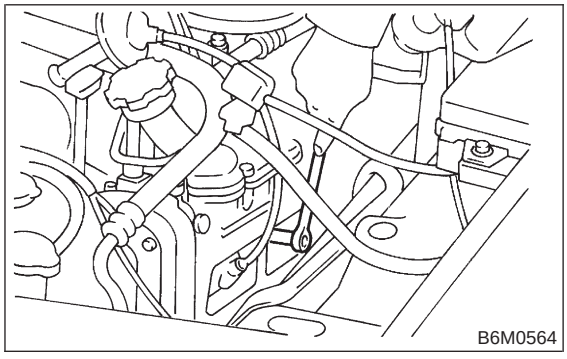
5) Move washer tank upward.



6) Remove #4 spark plug cord by pulling boot, not cord itself.



7) Remove spark plug with the spark plug socket.



8) Installation is in the reverse order of removal.

Tightening torque (Spark plug):
20.6±2.9 N·m (2.10±0.30 kg-m, 15.19±2.14 ft-lb)

CAUTION:
The above torque should be only applied to new spark plugs without oil on their threads. In case their threads are lubricated, the torque should be reduced by approximately 1/3 of the specified torque in order to avoid over-stressing.

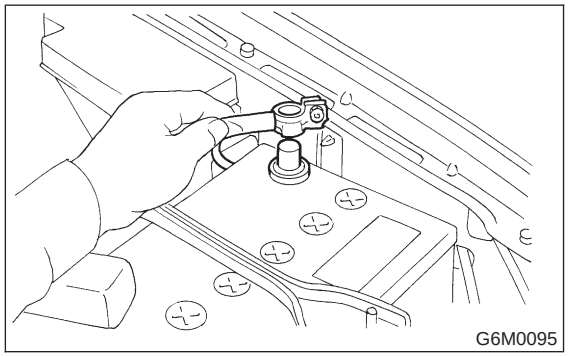
C: REMOVAL (2500 cc OUTBACK MODEL)

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

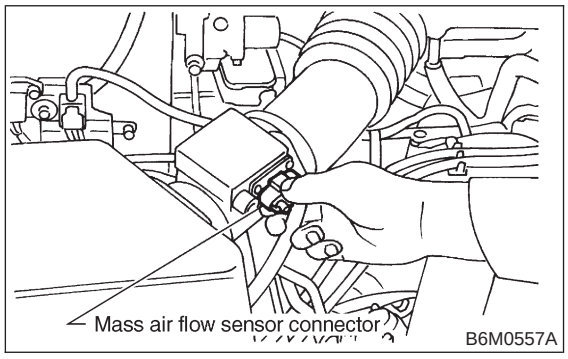
Spark plug:
NGK: PFR5B-11

1. #1 SPARK PLUG

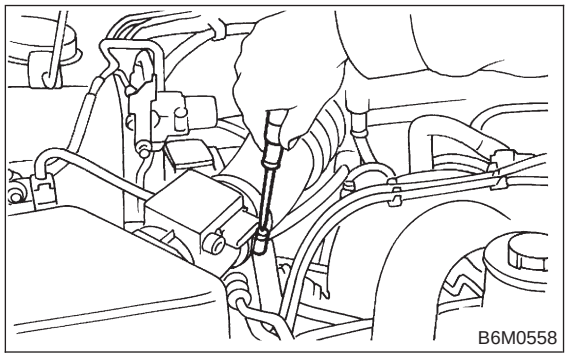
1) Disconnect battery ground cable.



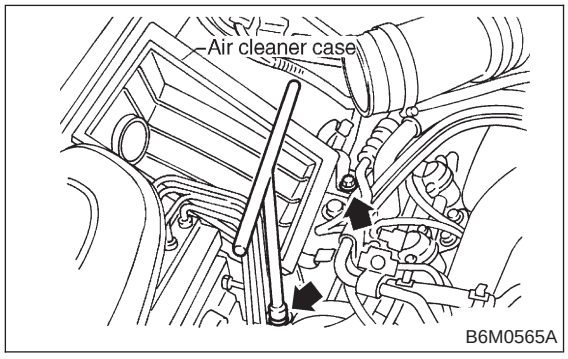
2) Disconnect mass air flow sensor connector.



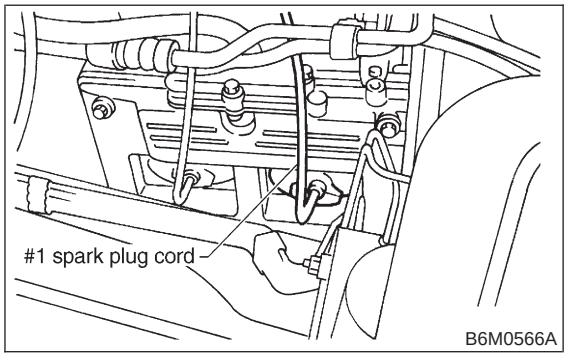
3) Remove four clips securing air cleaner upper cover.
4) Loosen the clamp screw and separate air cleaner upper cover from air intake duct.



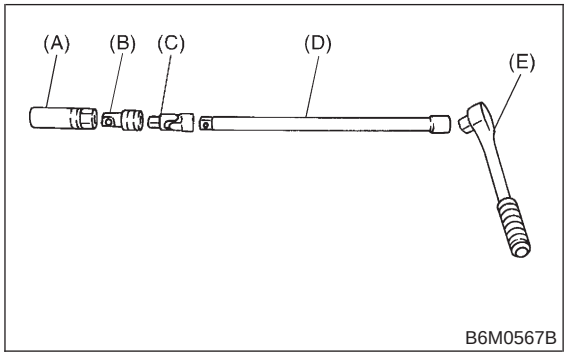
5) Remove air cleaner element and air cleaner case.



6) Remove #1 spark plug cord by pulling boot, not cord itself.



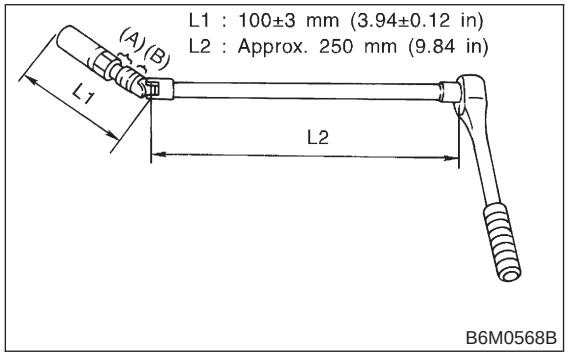
7) After connecting (A) spark plug socket, (B) extension and (C) Universal Joint to each other, securely set them over the spark plug in cylinder head.



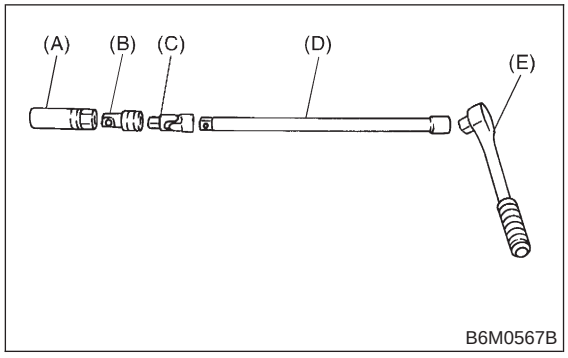
(A) Spark plug socket 16 mm (5/8 in)
(B) Extension
(C) Universal Joint
(D) Extension
(E) Ratchet

8) Cover ABS pipes with a rag to prevent damage.

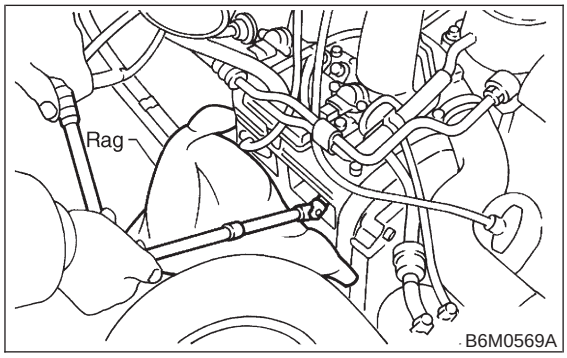
NOTE:
● Length L1 is important in making for easy removal.
● It may be necessary to wrap points (A) and (B) with vinyl tape to prevent them separating while working.
If they do separate, spark plug socket is left on the spark plug and it is very difficult to remove.
● An approximately 250 mm (9.84 in) long extension is recommended to be connected to ratchet.
● For spark plug socket, extension and Universal Joint, it is recommended to use the following tools.
Spark plug socket : PROTO 5020-50
Extension : SNAP-ON FX1
Universal Joint : SNAP-ON FU80B



9) Set (D) extension and (E) ratchet in turn onto the connected tools in plug hole, and remove spark plug using them.

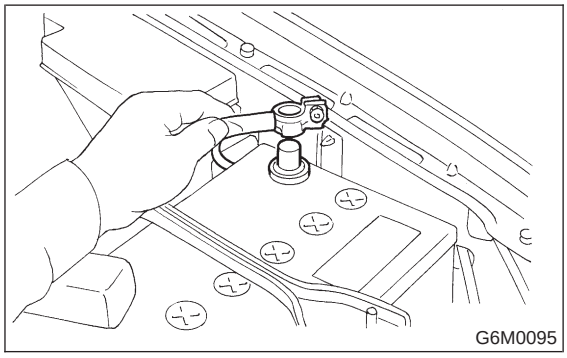


(A) Spark plug socket 16 mm (5/8 in)
(B) Extension
(C) Universal Joint
(D) Extension
(E) Ratchet

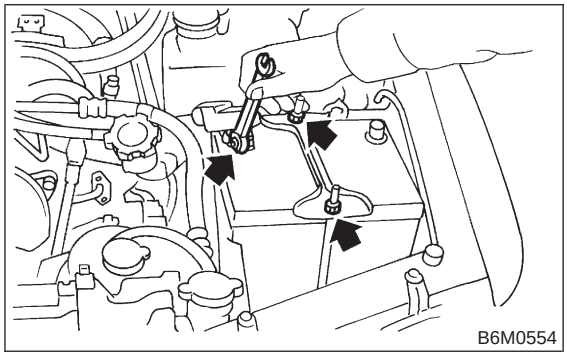


2. #2 SPARK PLUG

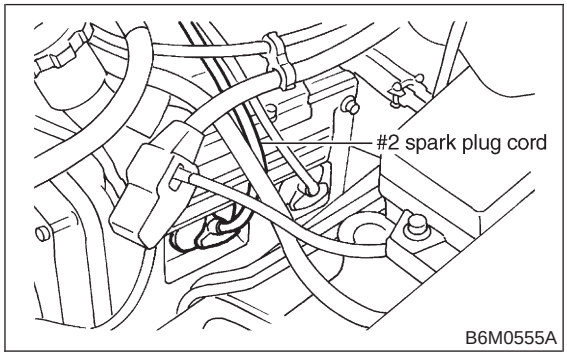
1) Disconnect battery ground cable.



2) Remove battery.



3) Remove #2 spark plug cord by pulling boot, not cord itself.

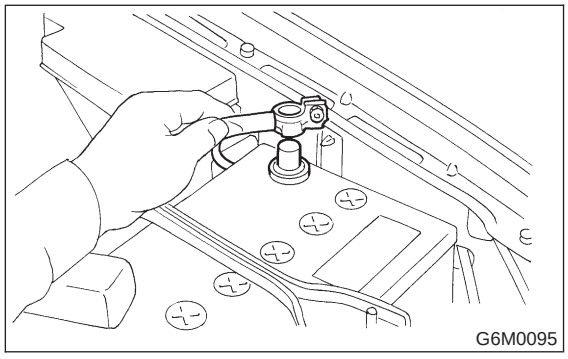


4) For subsequent procedures, refer to the procedure for #1 spark plug. <Ref. to 6-1 [W3C1].>

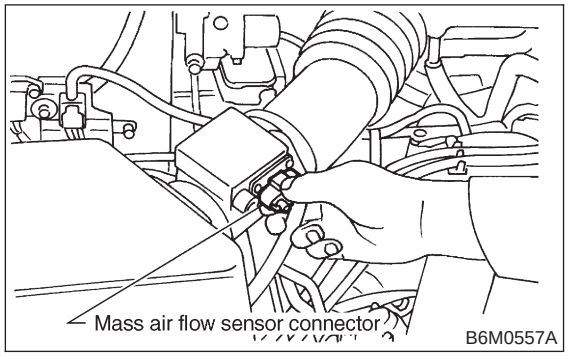
CAUTION:
When removing spark plug, cover the ATF cooling pipes with a rag to prevent damage.

3. #3 SPARK PLUG

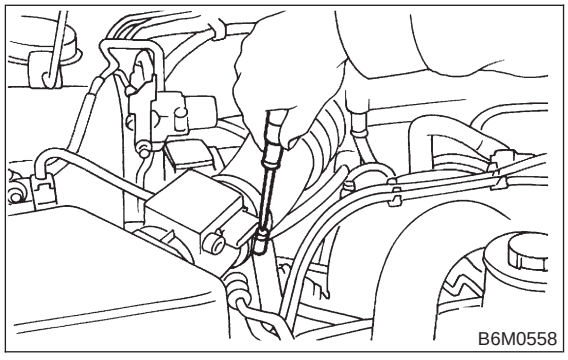
1) Disconnect battery ground cable.



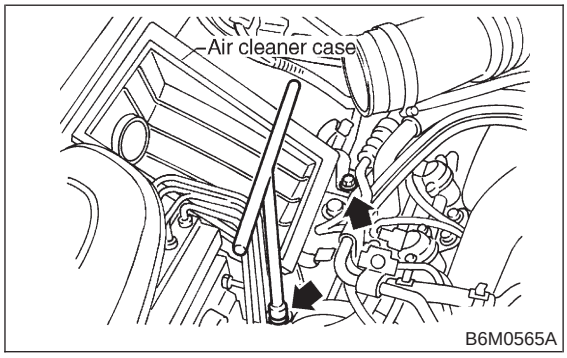
2) Disconnect mass air flow sensor connector.



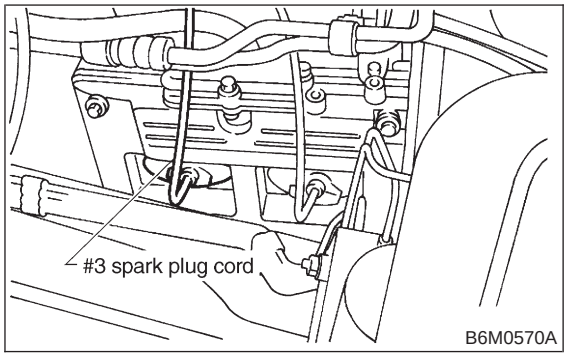
3) Remove four clips securing air cleaner upper cover.
4) Loosen the clamp screw and separate air cleaner upper cover from air intake duct.



5) Remove air cleaner element and air cleaner case.



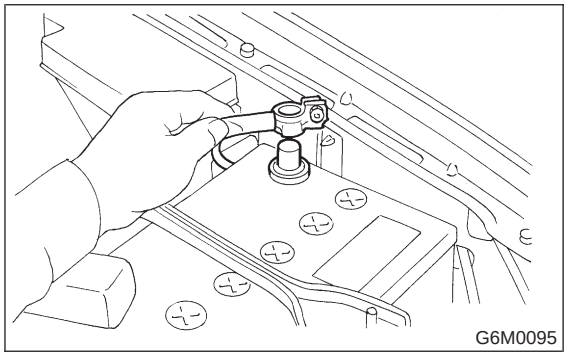
6) Remove #3 spark plug cord by pulling boot, not cord itself.



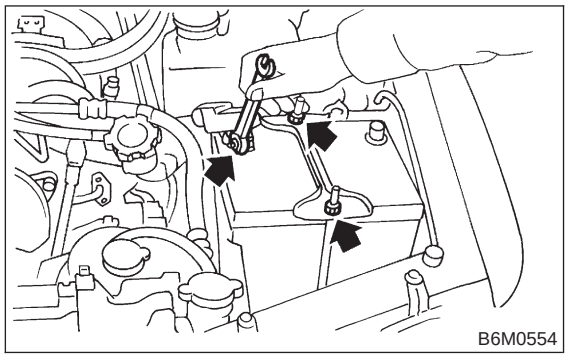
7) For subsequent procedures, refer to the procedure for #1 spark plug. <Ref. to 6-1 [W3C1].>

4. #4 SPARK PLUG

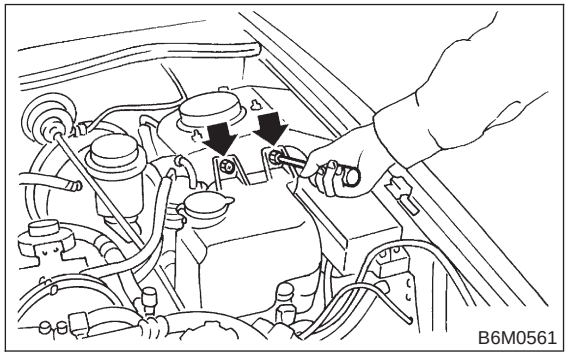
1) Disconnect battery ground cable.



2) Remove battery.

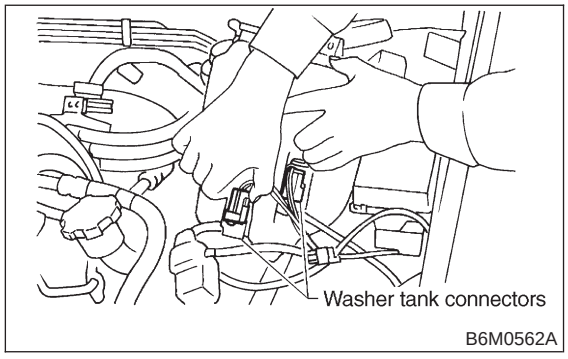


3) Remove washer tank mounting bolts.

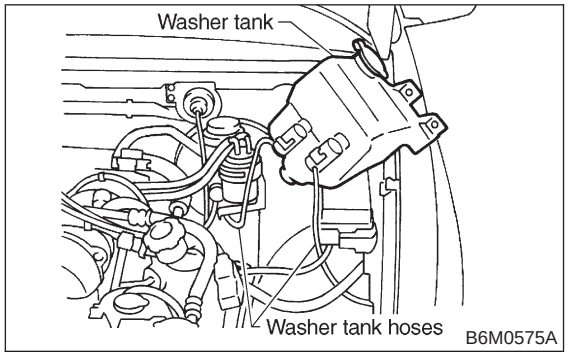


4) Disconnect washer tank connectors.

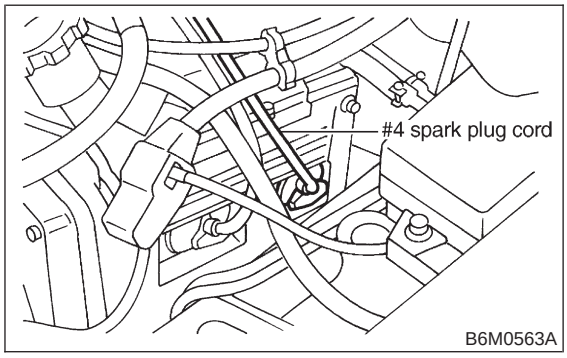
CAUTION:
Do not disconnect washer tank hoses as washer fluid will leak out from washer tank.



5) Move washer tank upward.



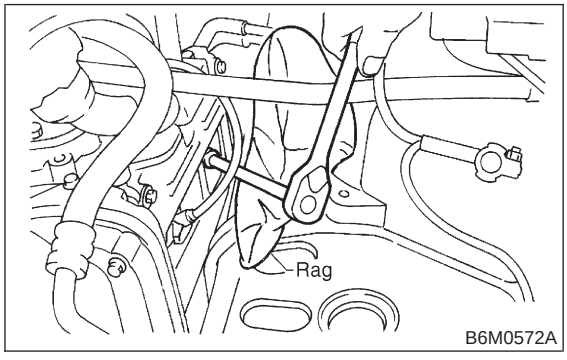
6) Remove #4 spark plug cord by pulling boot, not cord itself.



7) For subsequent procedures, refer to the procedure for #1 spark plug. <Ref. to 6-1 [W3C1].>

CAUTION:
When removing spark plug, cover the ATF coolig pipes with a rag to prevent damage.

NOTE:
For easier removal of spark plug, diagonally insert the tools from the direction of battery stand into plug hole as shown in figure.

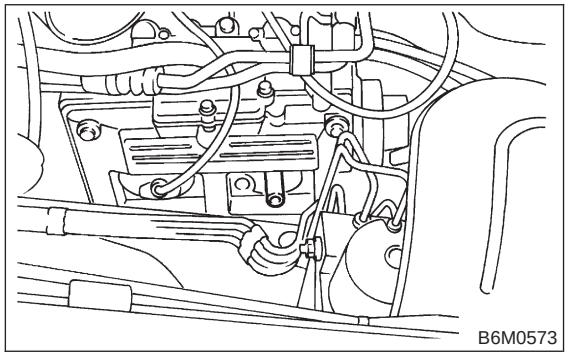


D: INSTALLATION (2500 cc OUTBACK MODEL)

1. #1 SPARK PLUG

1) After setting spark plug in spark plug socket, connect the spark plug socket, extension and Universal Joint to each other. <Ref. to 6-1 [W3C1].>

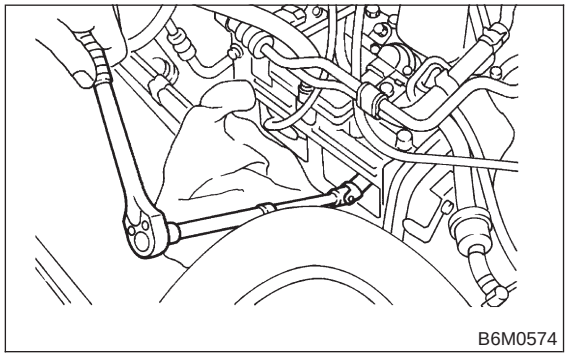
2) Screw spark plug into cylinder head using the connected tools above mentioned. At this point, it is necessary to support the rear end of the tools with fingertips.



3) When spark plug is screwed in two or three turns, temporarily disconnect the tools connected in the first step.
4) Confirm that spark plug is screwed into the cylinder head properly by touching it with finger. If it is difficult to reach it by hand, confirm its condition by using mirror and suchlike.
5) Cover ABS pipes with rag to prevent damage.
6) Re-insert the tools disconnected in three steps before into plug hole, and set them again over the spark plug.
7) Set extension and ratchet in turn onto the connected tools in plug hole, and tighten spark plug to the specified torque.

Tightening torque (spark plug):
20.6±2.9 N·m (2.10±0.30 kg-m, 15.19±2.14 ft-lb)

CAUTION:
The above torque should be only applied to new spark plugs without oil on their threads. In case their threads are lubricated, the torque should be reduced by approximately 1/3 of the specified torque in order to avoid over-stressing.



8) The subsequent procedures are in reverse order of #1 spark plug removal. <Ref. to 6-1 [W3C1].>

2. #2 SPARK PLUG

CAUTION:
When installing spark plug, cover the ATF cooling pipes with a rag to prevent damage.

1) Carry out #1 spark plug installation procedure. <Ref. to 6-1 [W3D1].>
2) Proceed in reverse order of #2 spark plug removal. <Ref. to 6-1 [W3C2].>

3. #3 SPARK PLUG

1) Carry out #1 spark plug installation procedure. <Ref. to 6-1 [W3D1].>
2) Proceed in reverse order of #3 spark plug removal. <Ref. to 6-1 [W3C3].>

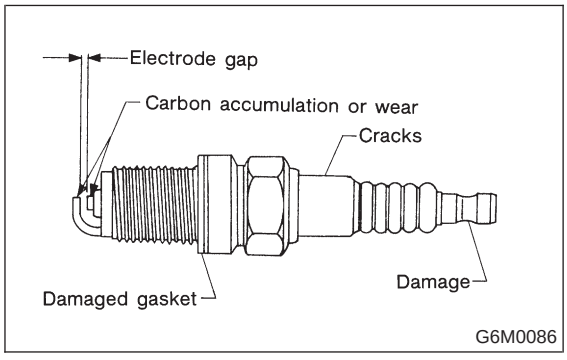
4. #4 SPARK PLUG

CAUTION:
When installing spark plug, cover the ATF cooling pipes with a rag to prevent damage.

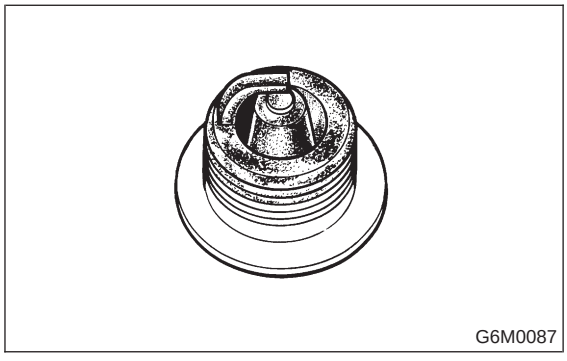
1) Carry out #1 spark plug installation procedure. <Ref. to 6-1 [W3D1].>
2) Proceed in reverse order of #4 spark plug removal. <Ref. to 6-1 [W3C4].>

E: INSPECTION

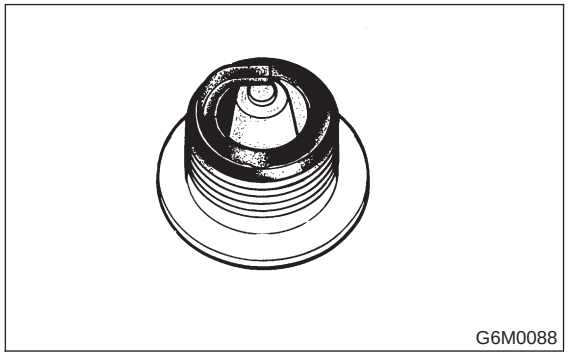
Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.



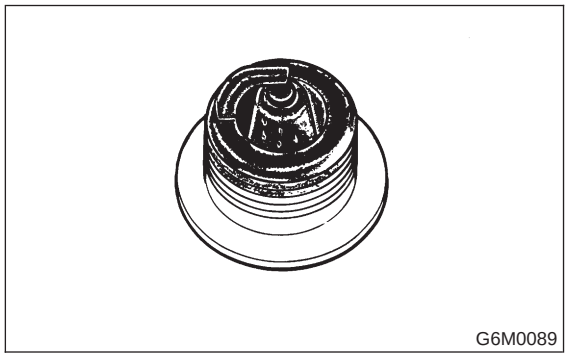
1) Normal
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



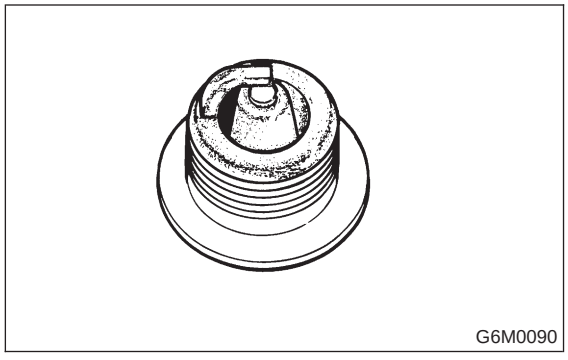
2) Carbon fouled
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.


G6M0088

3) Oil fouled
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If same condition remains after repair, use a hotter plug.


G6M0089

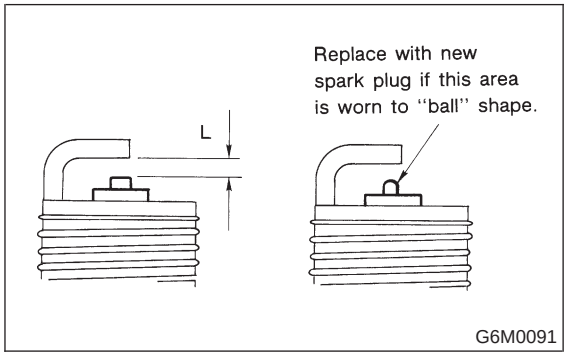
4) Overheating
White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.


G6M0090

F: CLEANING AND REGAPPING

Clean spark plugs in a sand blast type cleaner.
Avoid excessive blasting. Clean and remove carbon or oxide deposits, but do not wear away porcelain.
If deposits are too stubborn, discard plugs.
After cleaning spark plugs, recondition firing surface of electrodes with file. Then correct the spark plug gap using a gap gauge.

Spark plug gap: L
1.0 — 1.1 mm (0.039 — 0.043 in)

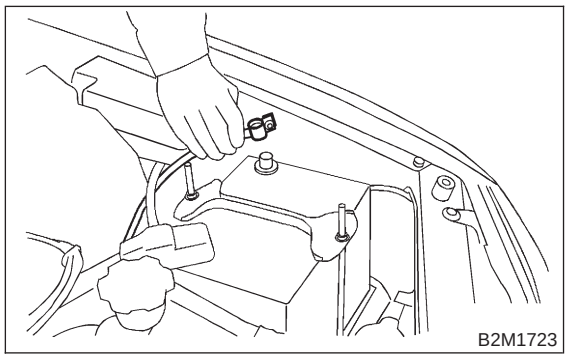


G6M0091

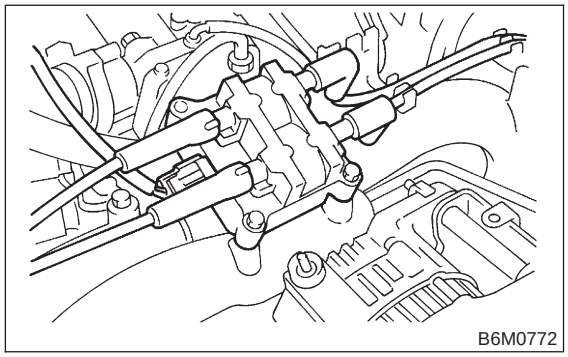
4. Ignition Coil

A: REMOVAL AND INSTALLATION

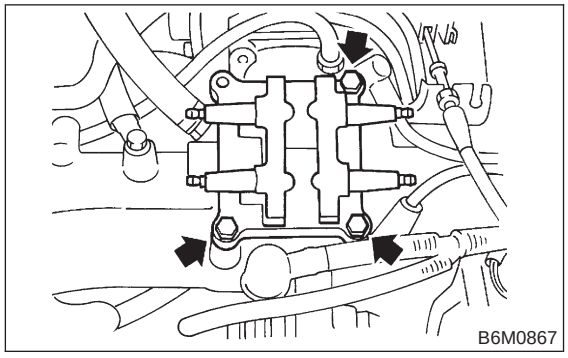
1) Disconnect battery ground cable.



2) Disconnect spark plug cords from ignition coil.
3) Disconnect connector from ignition coil.



4) Remove ignition coil.



5) Installation is in the reverse order of removal.

CAUTION:
Be sure to connect wires to their proper positions. Failure to do so will damage unit.

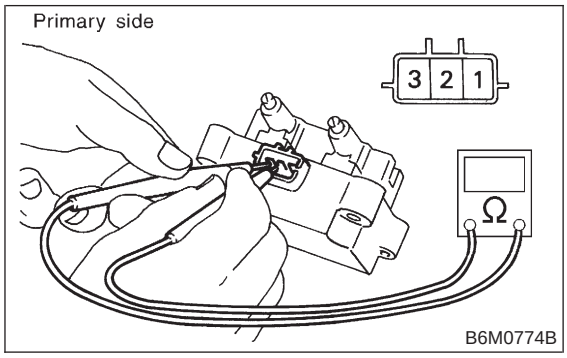
B: INSPECTION

Using accurate tester, inspect the following items, and replace if defective.
1) Primary resistance
2) Secondary coil resistance

CAUTION:
If the resistance is extremely low, this indicates the presence of a short-circuit.

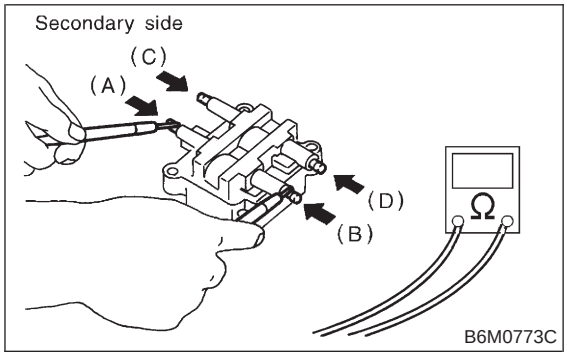
Specified resistance:

[Primary side]
Between terminal No. 1 and No. 2
0.73 Ω±10%
Between terminal No. 2 and No. 3
0.73 Ω±10%



[Secondary side]
Between (A) and (B)
12.8 kΩ±15%
Between (C) and (D)
12.8 kΩ±15%

3) Insulation between primary terminal and case: 10 MΩ or more.



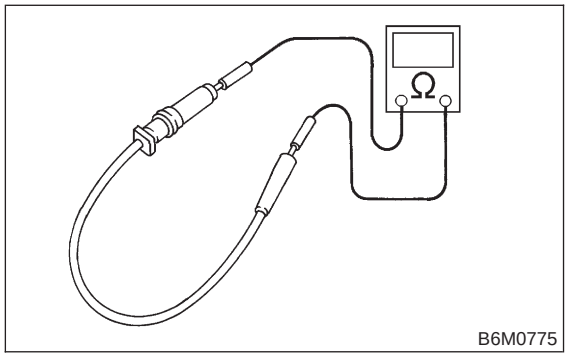
5. Spark Plug Cord

A: INSPECTION

1. 2200 cc MODEL

Check for:
1) Damage to cords, deformation, burning or rust formation of terminals
2) Resistance values of cords

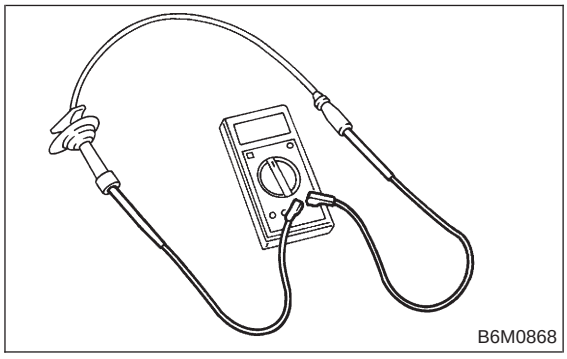
Resistance value:
5.12 — 12.34 kΩ



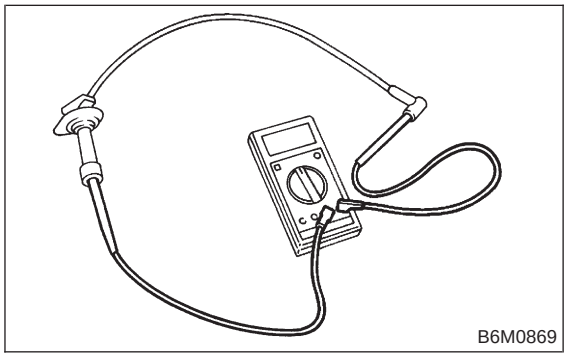
2. 2500 cc MODEL

Check for:
1) Damage to cords, deformation, burning or rust formation of terminals
2) Resistance values of cords

Resistance value:
#1 and #3
6.43 — 15.01 kΩ



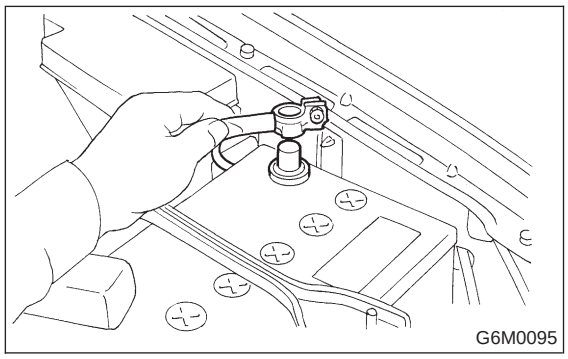
#2 and #4
6.67 — 15.57 kΩ



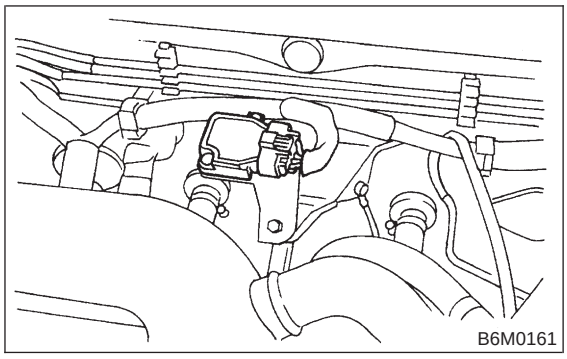
6. Ignitor

A: REMOVAL AND INSTALLATION

1) Disconnect battery ground cable.



2) Disconnect connector from ignitor.

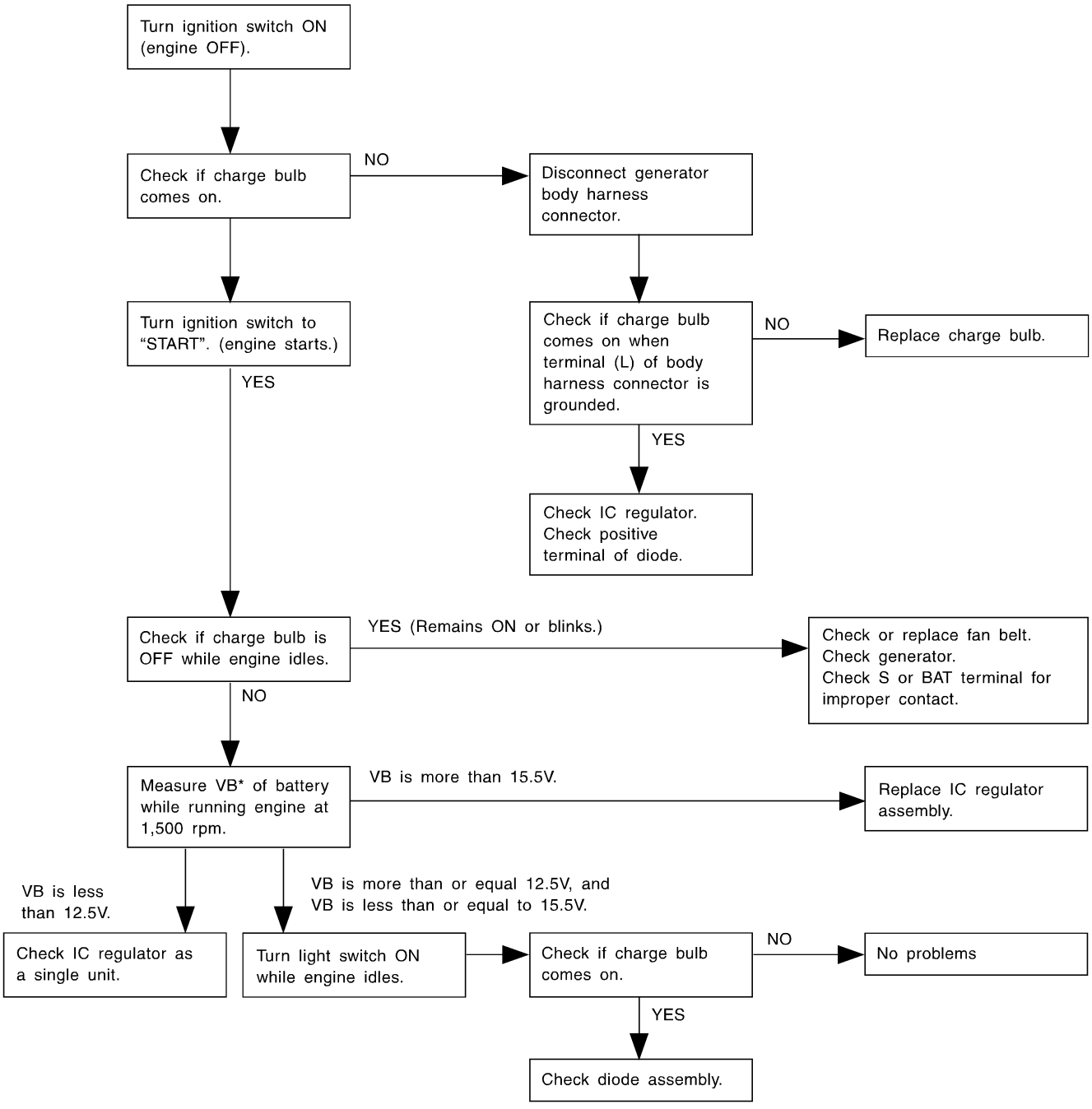


3) Remove screws which hold ignitor onto body.
4) Installation is in the reverse order of removal.

1. Starter

Trouble		Probable cause
Starter does not start.	Magnet switch does not operate. (no clicks are heard.)	Magnet switch poor contact or discontinuity of pull-in coil circuit
		Improper sliding of magnet switch plunger
	Magnet switch operates. (clicks are issued.)	Poor contact of magnet switch's main contact point
		Layer short of armature
		Contaminants on armature commutator
		High armature mica
		Improper grounding of yoke field coil
		Insufficient carbon brush length
		Insufficient brush spring pressure
Starter starts but does not crank engine.	Failure of pinion gear to engage ring gear	Worn pinion teeth
		Improper sliding of overrunning clutch
		Improper adjustment of stud bolt
	Clutch slippage	Faulty clutch roller spring
Starter starts but engine cranks too slowly.		Poor contact of magnet switch's main contact point
		Layer short of armature
		Discontinuity, burning or wear of armature commutator
		Poor grounding of yoke field coil
		Insufficient brush length
		Insufficient brush spring pressure
		Abnormal brush wear
Starter overruns.		Magnet switch coil is a layer short.

2. Generator



*: Terminal voltage

B6M0771

BODY ELECTRICAL SYSTEM 6-2

1. Body Electrical

Battery	Reserve capacity	82 minutes (MT), 100 minutes (AT)
	Cold cranking ampere	430 amperes (MT), 490 amperes (AT)
Fuse		10 A, 15 A, 20 A
Combination meter	Speedometer	Electric pulse type
	Tachometer	Electric impulse type
	Water temperature gauge	Thermistor cross coil type
	Fuel gauge	Resistance cross coil type
	Charge indicator light	12 V — 1.4 W
	Brake fluid level warning/parking brake indicator light	12 V — 1.4 W
	AT oil temperature warning light (AWD only)	12 V — 1.4 W
	ABS warning light	12 V — 1.4 W
	CHECK ENGINE warning light (Malfunction indicator lamp)	12 V — 1.4 W
	Oil pressure warning light	12 V — 1.4 W
	AIRBAG system warning light	12 V — 1.4 W
	Low fuel warning light	12 V — 3 W
	FWD indicator light	12 V — 1.4 W
	Turn signal indicator light	12 V — 1.4 W (2 pieces)
	Seat belt warning light	12 V — 1.4 W
	Door open warning light	12 V — 1.4 W (5 pieces)
	Headlight beam indicator light	12 V — 1.4 W
	Meter illumination light	12 V — 3 W (2 pieces) 12 V — 3.4 W (4 pieces)
Headlight		12 V — 60/55 W (Halogen)
Front clearance light		12 V — 5 W
Turn signal light	Front	12 V — 21 W
	Rear	12 V — 21 W
Tail/Stop light		12 V — 5/21 W
Back-up light		12 V — 21 W
High-mount stop light		12 V — 18 W (SEDAN), 12 V — 13 W (WAGON)
License plate light		12 V — 5 W
Room light		12 V — 8 W
Trunk room light (SEDAN)		12 V — 5 W
Luggage room light (WAGON)		12 V — 13 W
Spot light		12 V — 8 W (2 pieces)
Glove box light		12 V — 3.4 W
Selector lever illumination light (AT model)		12 V — 1.7 W
Front wiper motor	Input	12 V — 54 W or less
Rear wiper motor	Input	12 V — 42 W or less
Front washer motor	Pump type	Centrifugal
	Input	12 V — 36 W or less
Rear washer motor	Pump type	Centrifugal
	Input	12 V — 36 W or less
Horn		12 V — 350 Hz
Accessory socket	Input	12 V — 120 W
Rear window defogger	Input	12 V — 160 W
	Indicator light	12 V — 50 mA
Wiper deicer	Input	12 V — 88 W
	Indicator light	12 V — 50 mA

1. Precaution

● Before disassembling or reassembling parts, always disconnect battery ground cable. When repairing radio, control modules, etc. which are provided with memory functions, record memory contents before disconnecting battery ground cable. Otherwise, these contents are cancelled upon disconnection.
● Reassemble parts in reverse order of disassembly procedure unless otherwise indicated.
● Adjust parts to specifications contained in this manual if so designated.
● Connect connectors and hoses securely during reassembly.
● After reassembly, ensure functional parts operate smoothly.

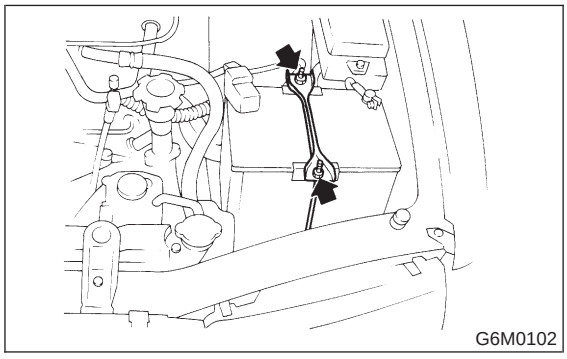
CAUTION:
● Airbag system wiring harness is routed near the electrical parts and switch.
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
● Be careful not to damage Airbag system wiring harness when servicing the ignition key cylinder.

2. Battery

A: REMOVAL AND INSTALLATION

1. BATTERY

1) Disconnect the positive (+) terminal after disconnecting the negative (−) terminal of battery.
2) Remove flange nuts from battery rods and take off battery holder.



3) Remove battery.
4) Installation is in the reverse order of removal.

Tightening torque:
3.4±1.0 N·m (0.35±0.1 kg-m, 2.5±0.7 ft-lb)

NOTE:
● Clean battery cable terminals and apply grease to retard the formation of corrosion.
● Connect the positive (+) terminal of battery and then the negative (−) terminal of the battery.

B: INSPECTION

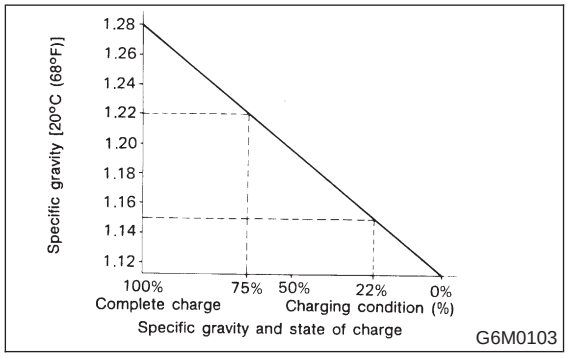
1. BATTERY

WARNING:
● Electrolyte has toxicity; be careful handling the fluid.
● Avoid contact with skin, eyes or clothing. Especially at contact with eyes, blush with water for 15 minutes and get prompt medical attention.
● Batteries produce explosive gasses. Keep sparks, flame, cigarettes away.
● Ventilate when charging or using in enclosed space.
● For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Never lean over a battery.
● Do not let battery fluid contact eyes, skin, fabrics, or paint-work because battery fluid is corrosive acid.
● To lessen the risk of sparks, remove rings, metal watch-bands, and other metal jewelry. Never allow metal tools to contact the positive battery terminal and anything connected to it while you are at the same time in contact with

any other metallic portion of the vehicle because a short circuit will be caused.

1) External parts:
Check for the existence of dirt or cracks on the battery case, top cover, vent plugs, and terminal posts. If necessary, clean with water and wipe with a dry cloth. Apply a thin coat of grease on the terminal posts to prevent corrosion.
2) Electrolyte level:
Check the electrolyte level in each cell. If the level is below MIN LEVEL, bring the level to MAX LEVEL by pouring distilled water into the battery cell. Do not fill beyond MAX LEVEL.
3) Specific gravity of electrolyte:
(1) Measure specific gravity of electrolyte using a hydrometer and a thermometer.
Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following equation:
S_{20} = St + 0.0007 x (t − 20)
S_{20}:Specific gravity corrected at electrolyte temperature of 20°C (68°F)
St :Measured specific gravity
t:Measured temperature °C
Determine whether or not battery must be charged, according to corrected specific gravity.

Standard specific gravity:
1.220 — 1.290 [at 20°C (68°F)]



(2) Measuring the specific gravity of the electrolyte in the battery will disclose the state of charge of the battery. The relation between the specific gravity and the state of charge is as shown in figure.

C: CHARGING

WARNING:
● Do not bring an open flame close to the battery at this time.

CAUTION:
● Prior to charging, corroded terminals should be cleaned with a brush and common baking soda solution.
● Be careful since battery electrolyte overflows while charging the battery.
● Observe instructions when handling battery charger.
● Before charging the battery on vehicle, disconnect battery ground terminal. Failure to follow this rule may damage generator's diodes or other electrical units.

1. NORMAL CHARGING

Charge the battery at current value specified by manufacturer or at approximately 1/10 of battery's ampere hour rating.

2. QUICK CHARGING

Quick charging is a method in which the battery is charged in a short period of time with a relatively large current by using a quick charger.
Since a large current flow raises electrolyte temperature, the battery is subject to damage if the large current is used for prolonged time. For this reason, the quick charging must be carried out within a current range that will not increase the electrolyte temperature above 40°C (104°F). It should be also remembered that the quick charging is a temporary means to bring battery voltage up to a fair value and, as a rule, a battery should be charged slowly with a low current.

CAUTION:
● Observe the items in 1. NORMAL CHARGING. <Ref. to 6–2[W2C1].>
● Never use more than 10 amperes when charging the battery because that will shorten battery life.

3. JUDGMENT OF BATTERY IN CHARGED CONDITION

1) Specific gravity of electrolyte is held at a specific value in a range from 1.250 to 1.290 for more than one hour.
2) Voltage per battery cell is held at a specific value in a range from 2.5 to 2.8 volts for more than one hour.

4. CHECK HYDROMETER FOR STATE OF CHARGE

Hydrometer indicator	State of charge	Required action
Green dot	Above 65%	Load test
Dark dot	Below 65%	Charge battery
Clear dot	Low electrolyte	Replace battery.* (If cranking complaint)

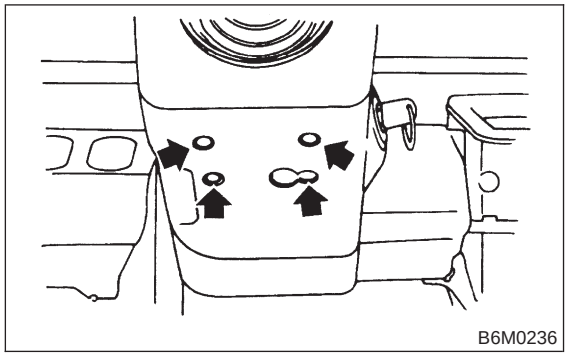
*: Check electrical system before replacement.

3. Ignition Switch

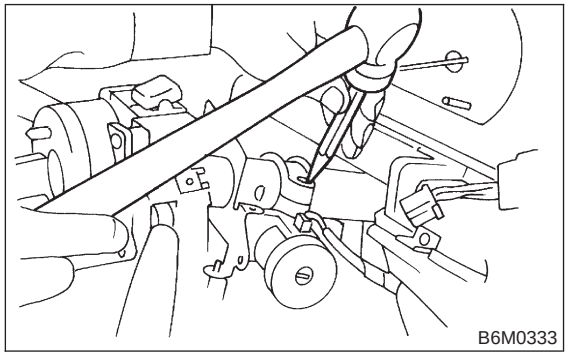
A: REMOVAL AND INSTALLATION

1. IGNITION SWITCH

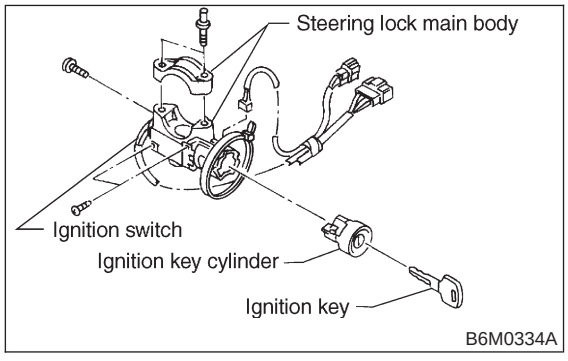
1) Remove screws, separate upper column cover and lower column cover.



2) Remove instrument panel lower cover.
3) Disconnect ignition switch connector from body harness.
4) Using a drift and hammer, hit the torn bolt head to loosen and remove the ignition switch.



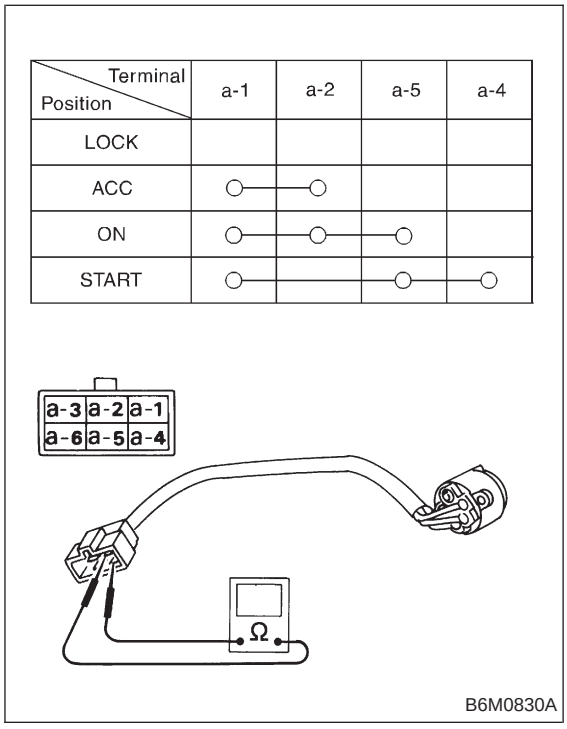
5) When installing, tighten the connecting bolt until its head twists off.



B: INSPECTION

1. IGNITION SWITCH (ON-CAR)

1) Remove instrument panel lower cover.
2) Remove lower column cover.
3) Unfasten holddown clip which secures harness, and disconnect connector of ignition switch from body harness.
4) Turn ignition key to each position and check continuity between terminals of ignition switch connector.



4. Headlight

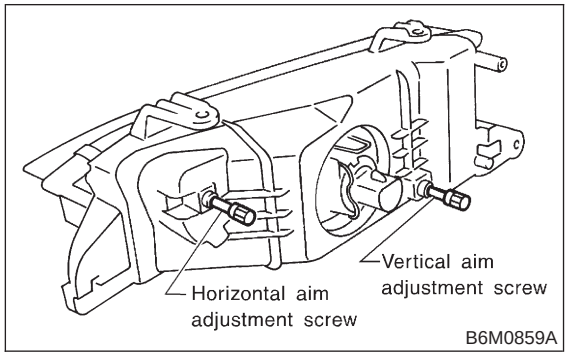
A: ADJUSTMENT

1. HEADLIGHT AIMING

Adjust the headlight aiming by turning the adjusting screws.

CAUTION:
Before checking the headlight aiming, be sure of the following:
● Turn off the light before adjusting headlight aiming. If the light is necessary to check aiming, do not turn on for more than two minutes.
● The area around the headlight has not sustained any accident, damage or other type of deformation.
● Vehicle is parked on level ground.
● The inflation pressure of tires is correct.
● Vehicle's gas tank is fully charged.
● Bounce the vehicle several times to normalize the suspension.
● Make certain that someone is seated in the driver's seat.

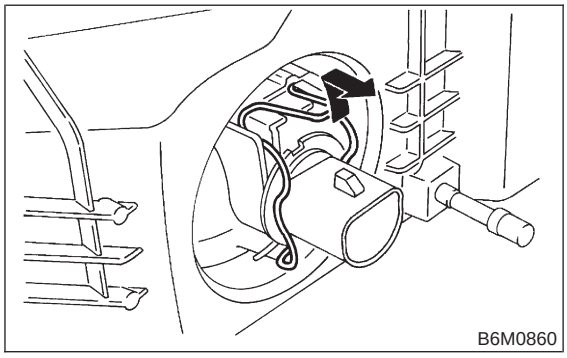
NOTE:
Adjust vertical aim first, then horizontal aim.



B: REMOVAL AND INSTALLATION

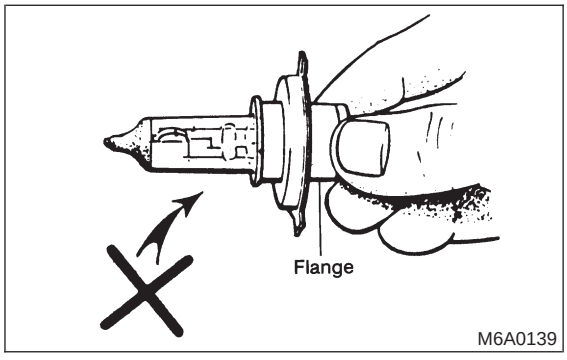
1. HEADLIGHT BULB

1) Disconnect the connector from inside of the engine compartment.
2) Remove the light bulb retaining spring and then remove the bulb.



3) Replace the bulb with a new one and hook the spring.
4) Connect the connector.

CAUTION:
Since the tungsten halogen bulb operates at high temperature, dirt and oil on the bulb surface decreases the bulb's useful life. When replacing the bulb, hold the flange portion and do not touch the glass portion.

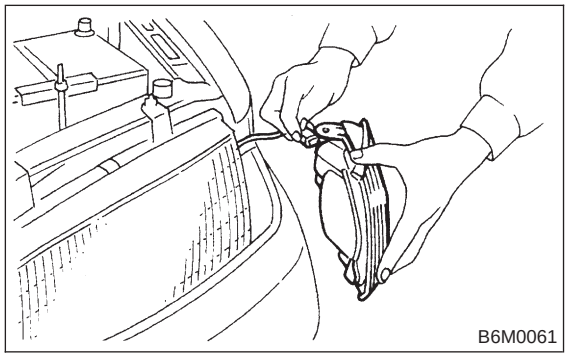


5) Installation is in the reverse order of removal.

2. HEADLIGHT

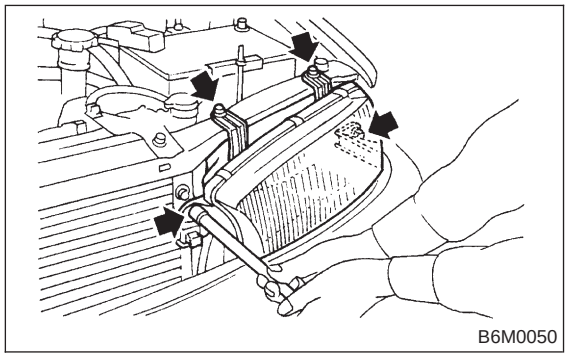
1) Remove front grille and disconnect connectors from headlight.
2) Remove screws which secure front turn signal light.
3) Remove front turn signal light while disconnecting connector.

NOTE:
When installing the front turn signal light, securely fit clip into locating.


B6M0061

4) Remove bolts which secure headlight and remove headlight.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

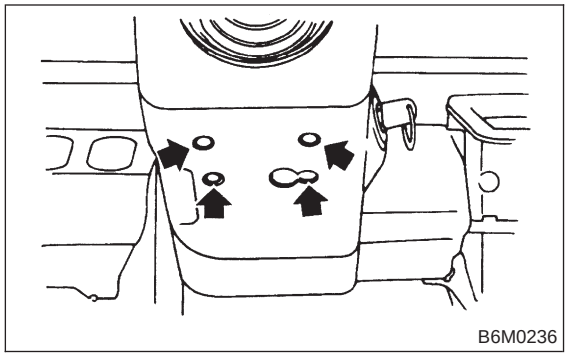

B6M0050

5) Installation is in the reverse order of removal.

3. COMBINATION SWITCH (WITHOUT AIRBAG MODEL)

NOTE:
For the removal procedure of combination switch, refer to procedure for removal of combination switch on airbag equipped model. <Ref. to 5-5 [W6A0].>

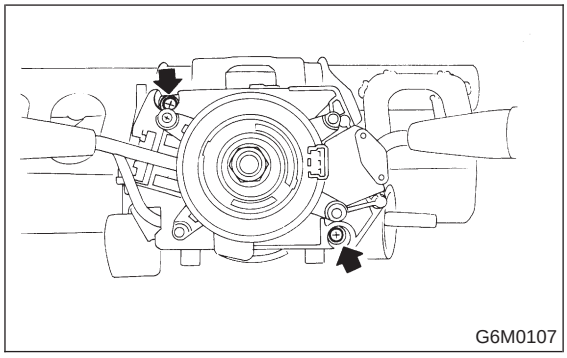
1) Remove steering wheel. <Ref. to 4-3 [W2A0].>
2) Remove screws which secure upper column cover to lower column cover.


B6M0236

3) Remove screws which secure knee protector and remove knee protector.

CAUTION:
When installing knee protector, ensure that harness is not caught by adjacent parts.

4) Disconnect connector from body harness and undo holddown band.
5) Remove screws which secure switch and remove switch.


G6M0107

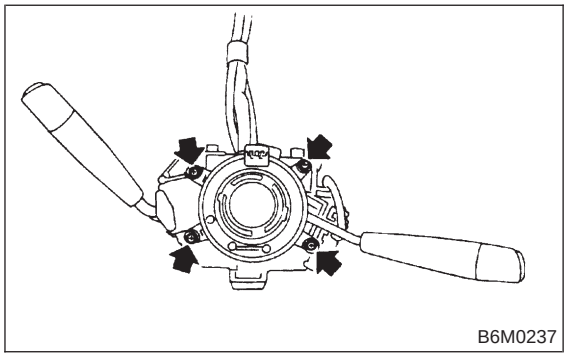
6) Installation is in the reverse order of removal.

CAUTION:
During installation (with key interlock):
● When routing combination switch harness around steering system, do not place it over key interlock release knob.
● After installing lower column cover, ensure that key interlock release knob is accessible.

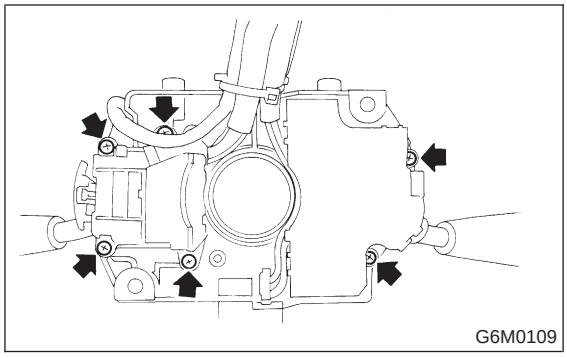
C: DISASSEMBLY AND ASSEMBLY

1. COMBINATION SWITCH

1) Remove screws which secure slip ring to combination switch, and remove slip ring.


B6M0237

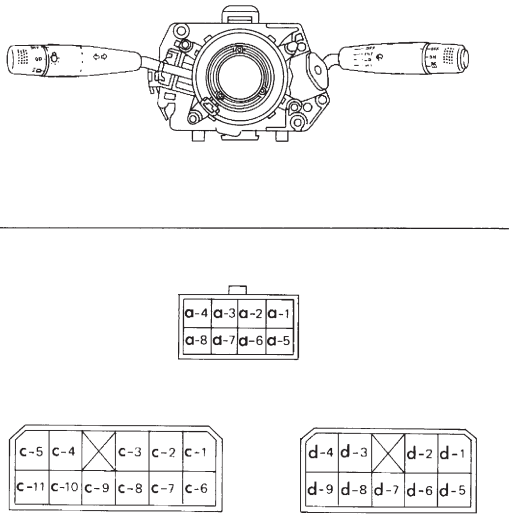
2) Remove screws which secure lighting switch, wiper and washer switch. Remove both switches.
3) Assembly is in the reverse order of disassembly.


G6M0109

D: INSPECTION

1. COMBINATION SWITCH (ON-CAR)

1) Remove instrument panel lower cover.
2) Remove lower column cover.
3) Unfasten holddown clip which secures harness, and disconnect connectors from body harness.
4) Move combination switch to respective positions and check continuity between terminals.



Lighting switch

Terminal / Switch position	c-1	c-2	c-3
OFF			
Tail	○	○	
↕	○	○	
Head	○	○	○

Parking switch

Terminal / Switch position	c-10	c-11	c-9
OFF	○	○	
↕	×		×
ON		○	○

Dimmer and passing switch

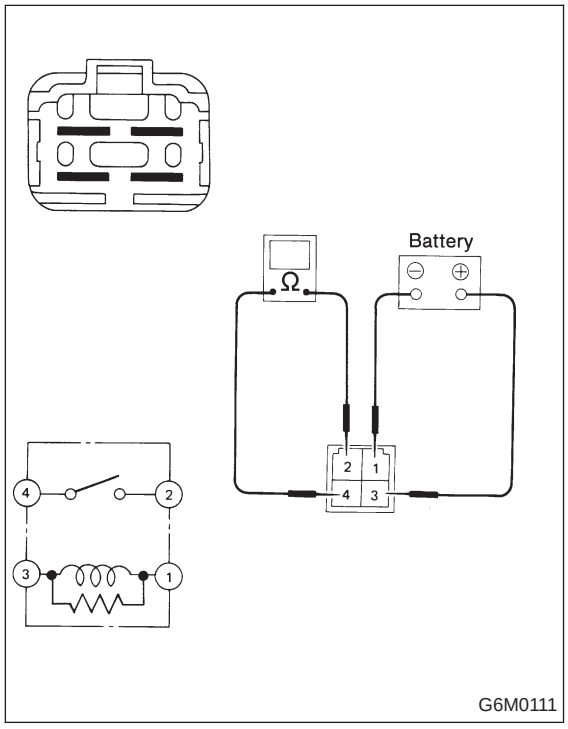
Terminal / Switch position	a-3	a-2	a-1	a-4
Flash	○		○	○
↕	○	○	○	
Low beam	○	○		
↕	○	○	○	
HI-beam	○		○	

B6M0698

2. HEADLIGHT RELAY

Check continuity between terminals as indicated in table, when connecting the battery to terminal No. 1 and No. 3.

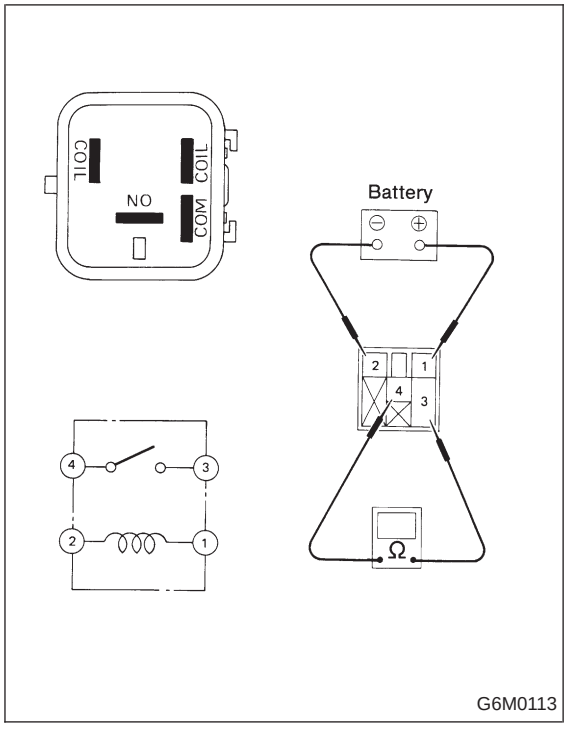
When current flows.	Between terminals No. 2 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 2 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 3	Continuity exists.



3. DAYTIME RUNNING LIGHT RELAY

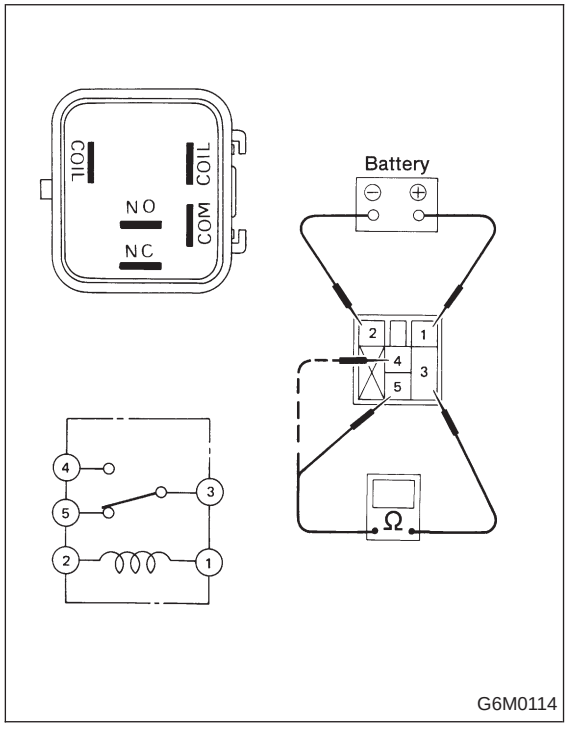
Check continuity between terminals (indicated in table) when terminal No. 1 is connected to battery and terminal No. 2 is grounded.

When current flows.	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.



Check continuity between terminals (indicated in table) when terminal No. 1 is connected to battery and terminal No. 2 is grounded.

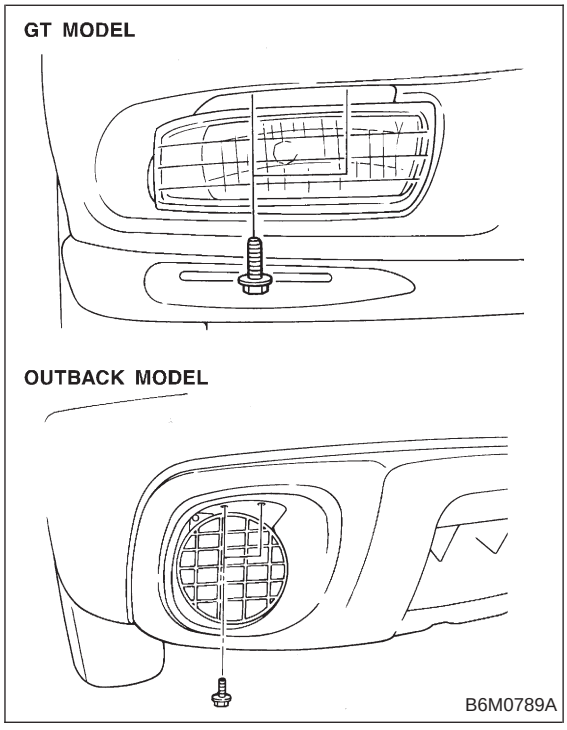
When current flows.	Between terminals No. 3 and No. 5	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 5	Continuity exists.
	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.



5. Front Fog Light

A: REMOVAL AND INSTALLATION

1) Disconnect ground cable from battery.
2) Remove the two bolts, then draw out the front fog light from front bumper.



3) Disconnect the connector.
4) Installation is in the reverse order of removal.

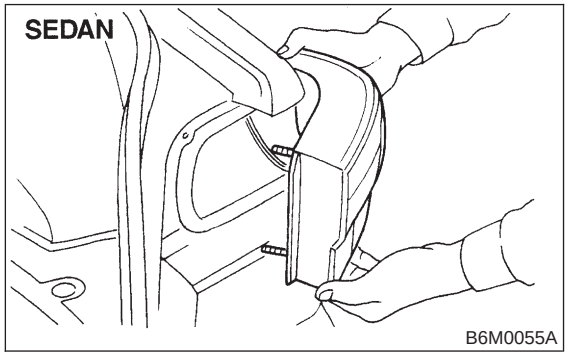
6. Stop and Tail Light

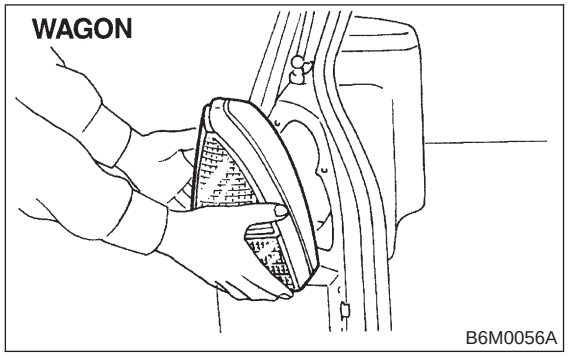
A: REMOVAL AND INSTALLATION

1. REAR COMBINATION LIGHT

1) Remove rear trim.
2) Disconnect connector from rear combination light.
3) Remove nuts which secure rear combination light.

Tightening torque:
2.5±0.5 N·m (0.25±0.05 kg-m, 1.8±0.4 ft-lb)





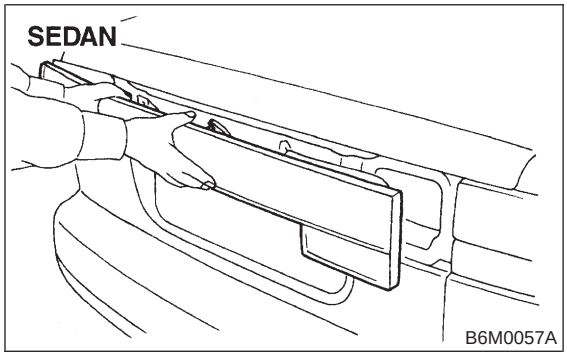
4) Attach adhesive cloth tape to body area around rear combination light.
5) Using a standard screwdriver, carefully pry rear combination light off and away from the vehicle.
6) Installation is in the reverse order of removal.

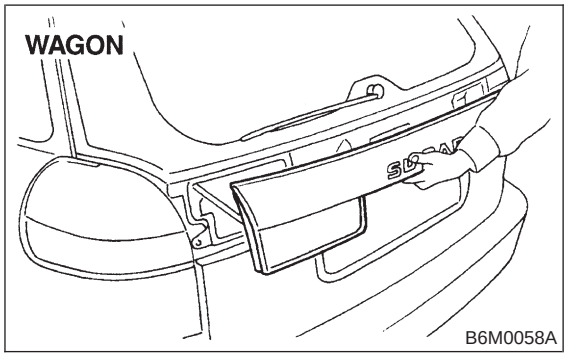
CAUTION:
● Do not pry rear combination light forcefully as this may scratch vehicle body.
● Remove all traces of adhesive tape from body before installation.
● Attach butyl rubber tape to back of rear combination light before installing rear combination light on body for sealing purposes.

2. REAR FINISHER

1) Remove trunk lid trim (SEDAN) or rear gate trim (WAGON).
2) Disconnect connectors from rear finisher.
3) Remove rear wiper motor (WAGON).
4) Remove nuts which secure rear finisher.

Tightening torque:
2.5±0.5 N·m (0.25±0.05 kg-m, 1.8±0.4 ft-lb)



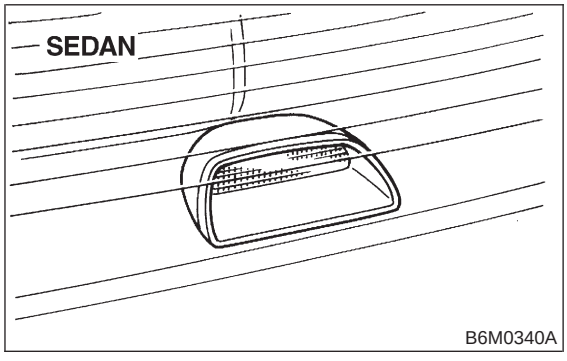


5) Attach adhesive cloth tape to body area around rear finisher.
6) Using a standard screwdriver, carefully pry rear finisher off and away from the vehicle.
7) Installation is in the reverse order of removal.

CAUTION:
Do not pry rear finisher forcefully as this may scratch vehicle body.

3. HIGH-MOUNT STOP LIGHT (SEDAN)

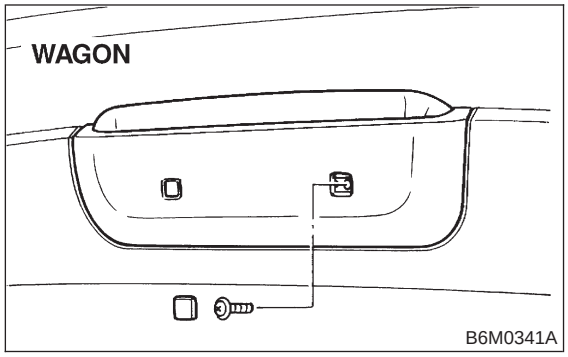
1) Disconnect connector of high-mount stop light from body harness.
2) Remove screws which secure high-mount stop light to rear shelf panel.
3) Remove high-mount stop light.



4) Installation is in the reverse order of removal.

4. HIGH-MOUNT STOP LIGHT (WAGON)

1) Remove high-mount stop light cover from rear gate trim panel.
2) Remove screws which secure high-mount stop light.



3) Remove high-mount stop light while disconnecting connector from body harness.
4) Installation is in the reverse order of removal.

5. STOP LIGHT SWITCH

Remove and install stop light switch. <Ref. to 4-5 [C1A0].> (MT), <Ref. to 4-5 [C1B0].> (AT)

NOTE:
When installing the stop light switch, adjust the pedal height by adjusting the stop light switch position.

6. COMBINATION SWITCH

Remove and install combination switch. <Ref. to 6-2 [W4B3].>

B: DISASSEMBLY AND ASSEMBLY

1. COMBINATION SWITCH

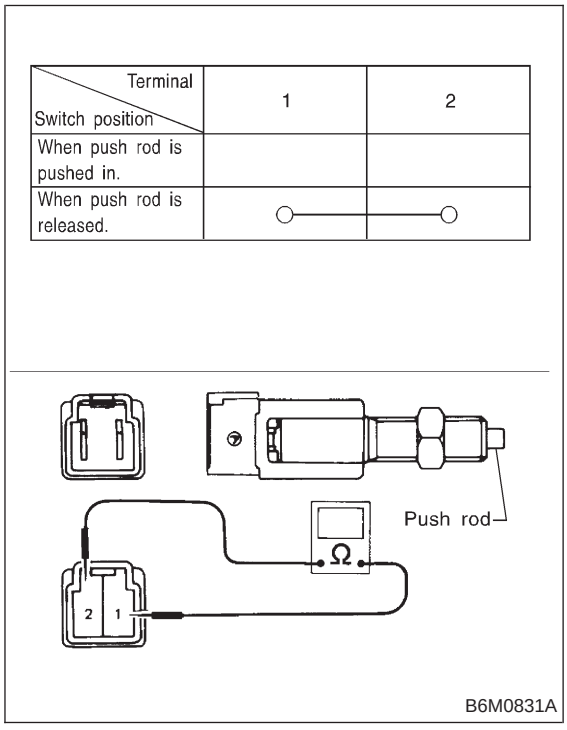
Disassemble and assemble combination switch. <Ref. to 6-2 [W4C1].>

C: INSPECTION

1. STOP LIGHT SWITCH (ON-CAR)

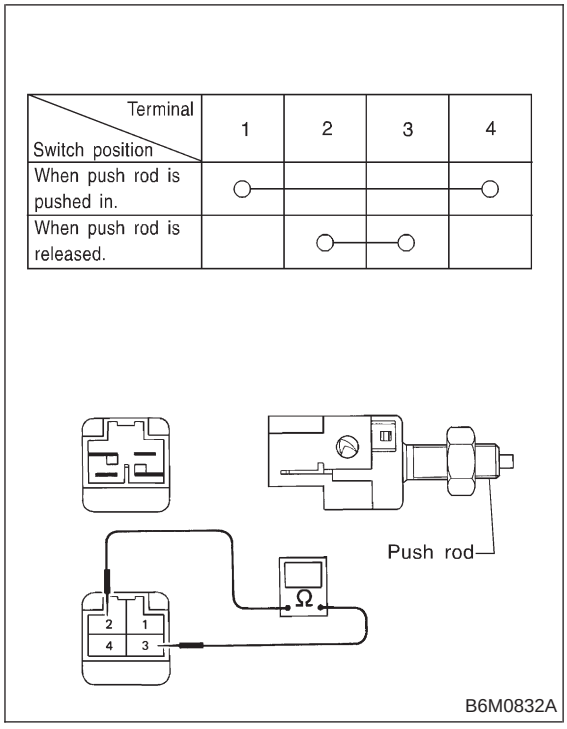
- **Without Cruise Control Model:**

1) Disconnect connector of stop light switch from body harness.
2) Check continuity between terminals when push rod is pushed in 4.0 to 4.5 mm (0.157 to 0.177 in) from end of outer case.



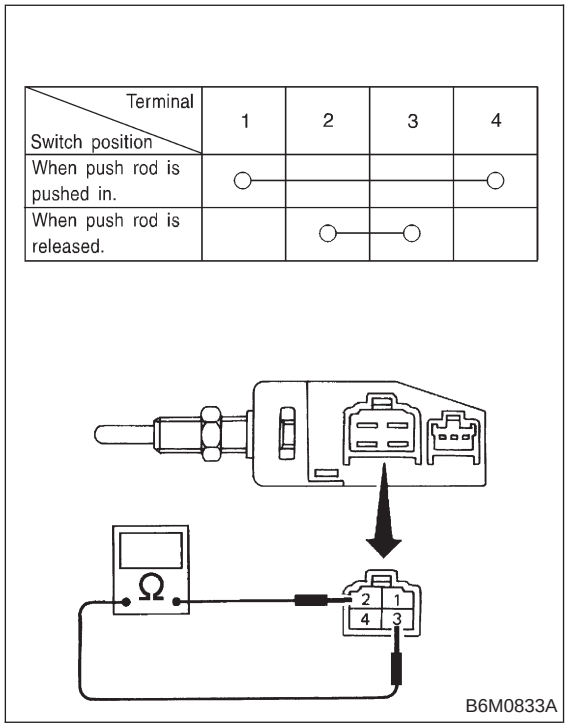
- **With Cruise Control Model:**

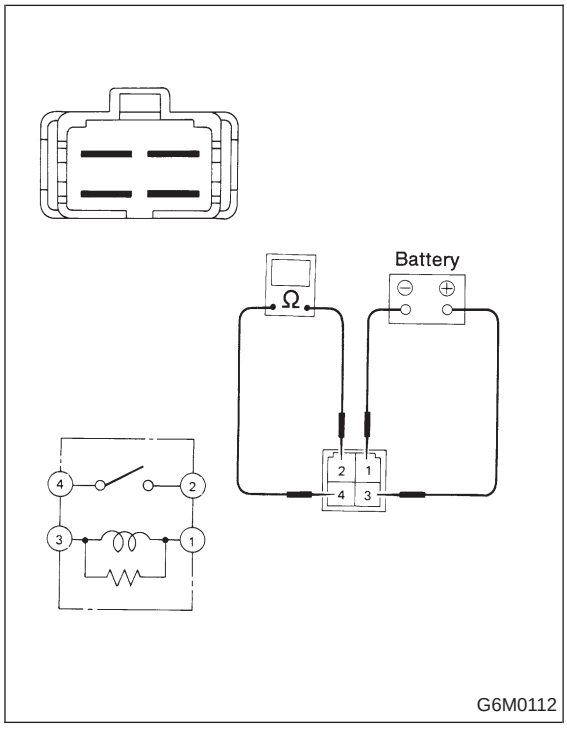
1) Disconnect connector of stop light switch from body harness.
2) Check continuity between terminals when push rod is pushed in 1.5 to 3.0 mm (0.059 to 0.118 in) from end of outer case.



● **With TCS Model:**

1) Disconnect connector of stop light switch from body harness.
2) Check continuity between terminals when push rod is pushed in 1.2 to 3.2 mm (0.047 to 0.126 in) from end of outer case.





2. COMBINATION SWITCH (ON-CAR)

Inspect combination switch. <Ref. to 6-2 [W4D1].>

3. TAIL AND ILLUMINATION RELAY

Check continuity between terminals as indicated in table when connecting battery to terminal No. 1 and No. 3.

When current flows.	Between terminals No. 2 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 2 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 3	Continuity exists.

7. Turn Signal and Hazard Warning Light

A: REMOVAL AND INSTALLATION

1. FRONT TURN SIGNAL LIGHT

Remove and install front turn signal light. <Ref. to 6-2 [W4B2].>

NOTE:
The front turn signal light is united with headlight assembly.

2. REAR COMBINATION LIGHT

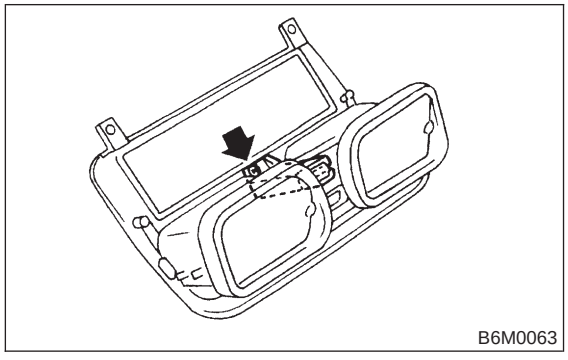
Remove and install rear combination light. <Ref. to 6-2 [W6A1].>

3. COMBINATION SWITCH

Remove and install combination switch. <Ref. to 6-2 [W4B3].>

4. HAZARD SWITCH

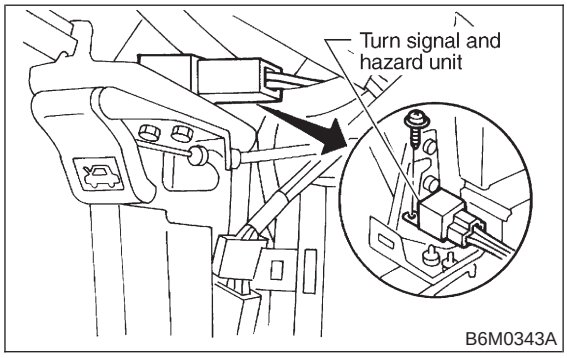
1) Remove center panel from instrument panel. <Ref. to 5-4 [W1A0].>
2) Disconnect connector of hazard switch from body harness.
3) Remove hazard switch from center panel.


B6M0063

4) Installation is in the reverse order of removal.

5. TURN SIGNAL AND HAZARD UNIT

1) Remove instrument panel lower cover.
2) Remove engine hood opener lever bracket.
3) Disconnect connector of turn signal and hazard unit.
4) Remove screw, and then remove turn signal and hazard unit from bracket.



B6M0343A

5) Installation is in the reverse order of removal.

B: DISASSEMBLY AND ASSEMBLY

1. COMBINATION SWITCH

Disassemble and assemble combination switch. <Ref. to 6-2 [W4C1].>

C: INSPECTION

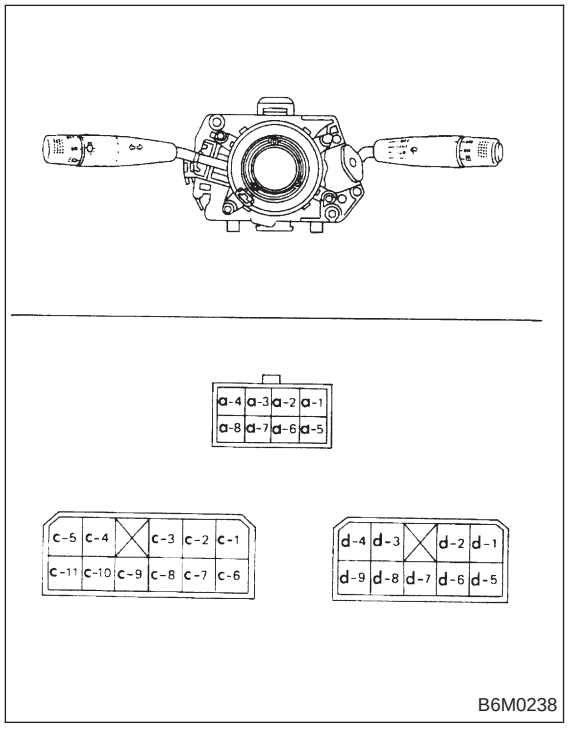
1. COMBINATION SWITCH (ON-CAR)

1) Remove instrument panel lower cover.
2) Remove lower column cover.
3) Unfasten holddown clip which secures harness, and disconnect connectors from body harness.
4) Move combination switch to respective positions and check continuity between terminals.

Turn signal switch

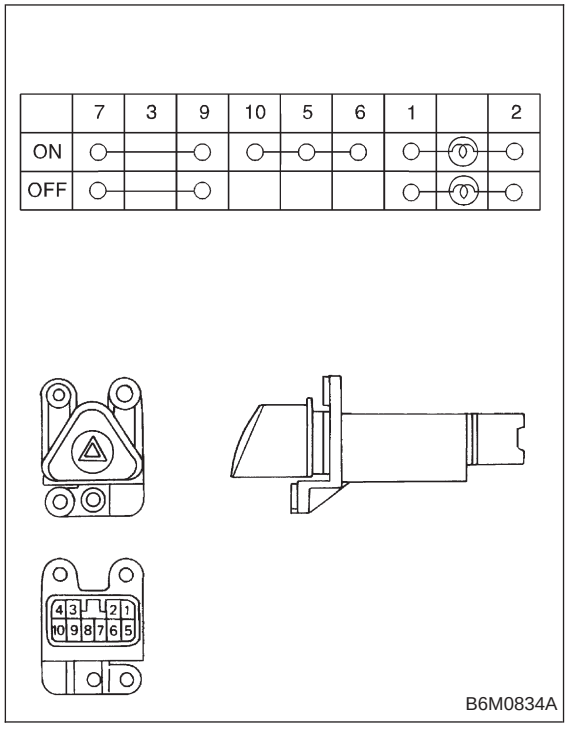
Switch position \ Terminal		a-5	a-7	a-6
Turn	L·L′	○	○	
	↕	×		×
	N			
	↕	×		×
	R·R′		○	○

B6M0702



2. HAZARD SWITCH

Move hazard switch to each position and check continuity between terminals.



8. Back-up Light

A: REMOVAL AND INSTALLATION

1. BACK-UP LIGHT

Remove and install rear finisher. <Ref. to 6-2 [W6A2].>

2. BACK-UP LIGHT SWITCH (MT MODEL)

Remove and install back-up light switch. <Ref. to 3-1 [W5B2].>

3. INHIBITOR SWITCH (AT MODEL)

Remove and install inhibitor switch (R position switch). <Ref. to 3-2 [W3B0].>

B: INSPECTION

1. INHIBITOR SWITCH (AT MODEL)

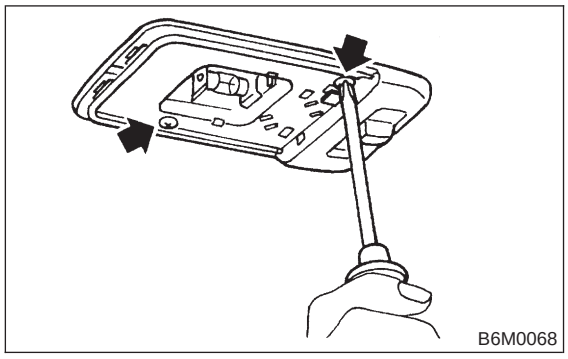
Inspect inhibitor switch. <Ref. to 3-2 [W3A0].>

9. Room Light and Door Switch

A: REMOVAL AND INSTALLATION

1. ROOM LIGHT

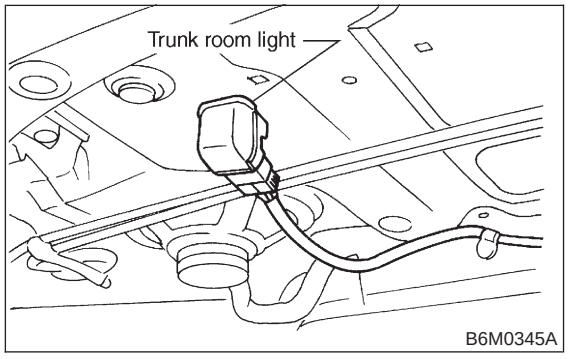
1) Pry room light lens off using a screwdriver.
2) Remove screws which secure room light body.



3) Remove room light body while disconnecting connector.
4) Installation is in the reverse order of removal.

2. TRUNK ROOM LIGHT (SEDAN)

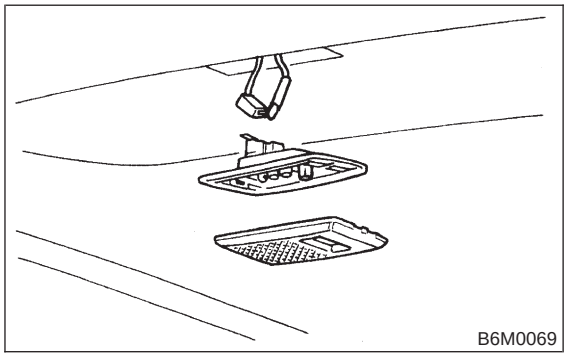
1) Turn trunk room light body by hand and remove it from rear shelf panel.
2) Disconnect connector of trunk room light.



3) Installation is in the reverse order of removal.

3. LUGGAGE ROOM LIGHT (WAGON)

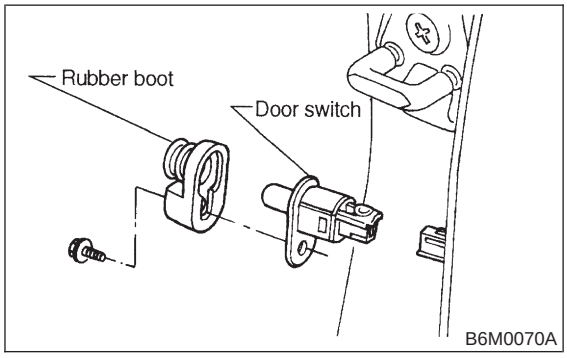
1) Pry luggage room light lens off using a screwdriver.
2) Remove screws which secure luggage room light body.
3) Remove luggage room light body while disconnecting connector.



4) Installation is in the reverse order of removal.

4. DOOR SWITCH

1) Remove rubber boot of door switch.
2) Remove screw which secures door switch to body.



3) Remove door switch while disconnecting connector.
4) Installation is in the reverse order of removal.

5. TRUNK ROOM LIGHT SWITCH (SEDAN)

Remove and install trunk room light switch which is installed in trunk lid lock. <Ref. to 5-1 [W2A3].>

6. LUGGAGE ROOM LIGHT SWITCH (WAGON)

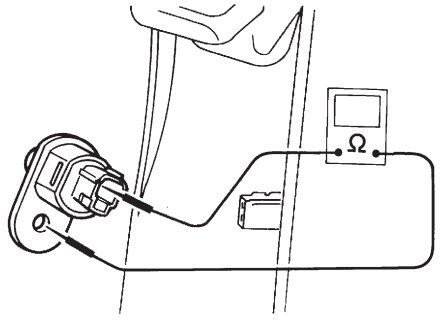
Remove and install luggage room light switch which is installed in rear gate lock. <Ref. to 5-2 [W3A2].>

B: INSPECTION

1. DOOR SWITCH

Move switch and check continuity between terminal of door switch and switch body.

Switch position	Terminal	Switch body
Open (ON)	○	○
Push in (OFF)		



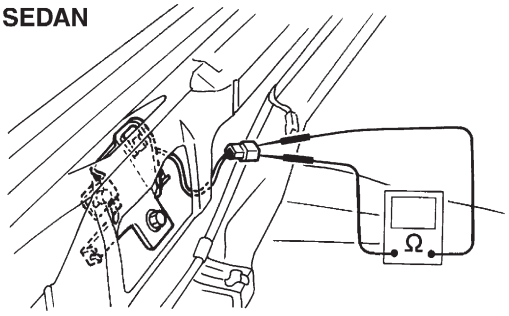
B6M0835A

2. TRUNK ROOM LIGHT SWITCH (SEDAN)

Move switch and check continuity between terminals of trunk room light switch.

Terminal / Switch position	1	2
Open (ON)	○	○
Push in (OFF)		

SEDAN



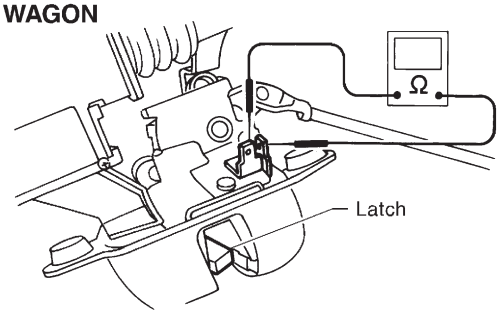
B6M0836A

3. LUGGAGE ROOM LIGHT SWITCH (WAGON)

Move switch and check continuity between terminals of luggage room light switch.

Terminal / Switch position	1	2
Open (ON)	○	○
Push in (OFF)		

WAGON



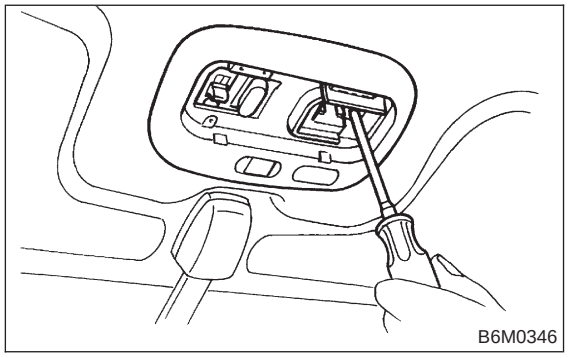
B6M0837A

10. Spot Light

A: REMOVAL AND INSTALLATION

1. SPOT LIGHT AND SWITCH

1) Pry spot light lens off using a screwdriver.
2) Remove screws which secure spot light body.

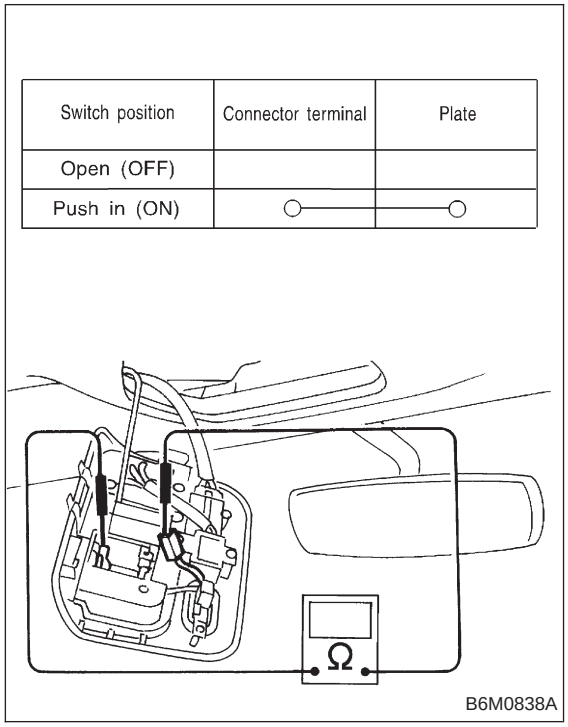


3) Remove spot light body while disconnecting connector(s).
4) Installation is in the reverse order of removal.

B: INSPECTION

1. SPOT LIGHT SWITCH

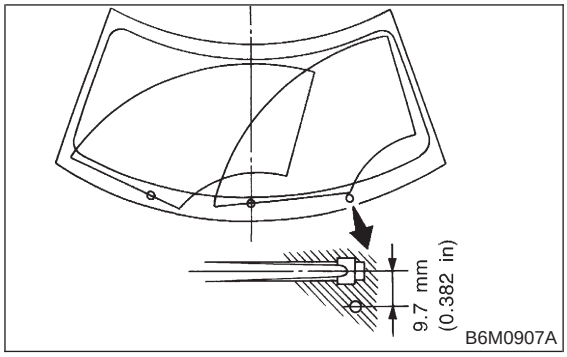
Move switch and check continuity between terminal of spot light switch connector and steel plate as shown.



11. Front Wiper and Washer

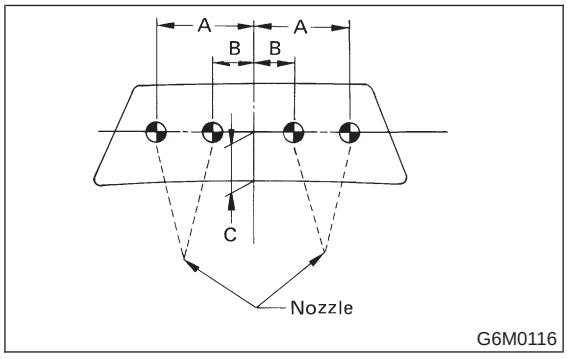
A: ADJUSTMENT

1) Turn the wiper switch to OFF position.
2) Adjust blades in original position as shown in figure by changing wiper arm installation.



3) Stop the vehicle.
4) Adjust washer ejecting point on windshield glass as shown in figure.

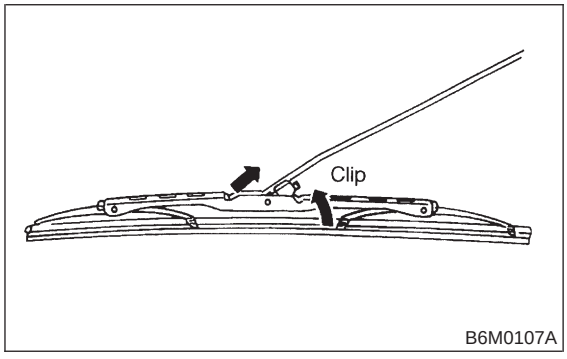
Ejecting point:
A: 375 mm (14.76 in)
B: 150 mm (5.91 in)
C: 380 mm (14.96 in)



B: REMOVAL AND INSTALLATION

1. BLADE

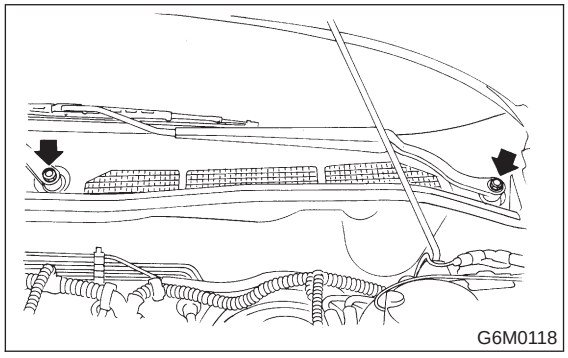
1) Pull out blade following the arrow direction from arm while pushing up locking clip.



2) Installation is in the reverse order of removal.

2. WIPER ARM

1) Open engine hood.
2) Remove cap of wiper arm installation nut.
3) Remove the nut which secures wiper arm.


G6M0118

4) Remove wiper arm.
5) Installation is in the reverse order of removal.

Tightening torque:
14±2 N·m (1.4±0.2 kg-m, 10.1±1.4 ft-lb)

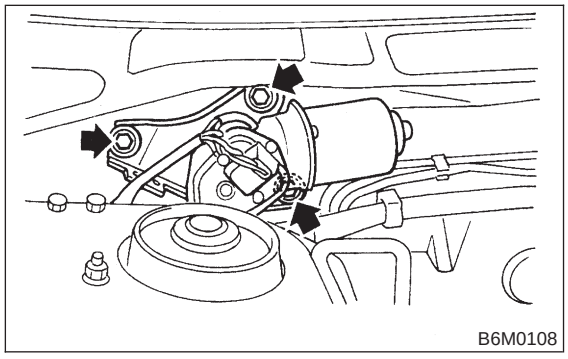
3. WIPER MOTOR AND LINK

1) Detach weatherstrip and cowl panel. <Ref. to 5-1 [W10A0].>

NOTE:
Apply silicone oil or soap water to both sides of cowl net to facilitate removal.

2) Disconnect connector of wiper motor.
3) Remove motor attaching bolts.

Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)

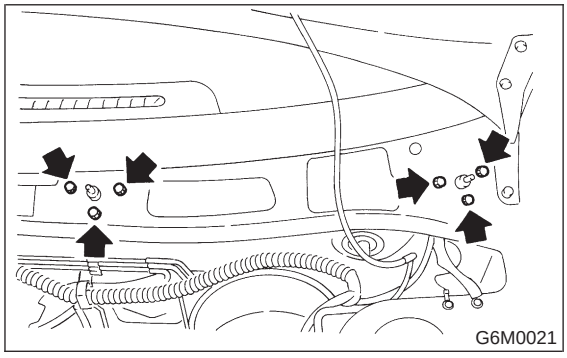

B6M0108

4) Remove wiper link from back side of wiper motor using a screwdriver inserted into service hole in front panel.

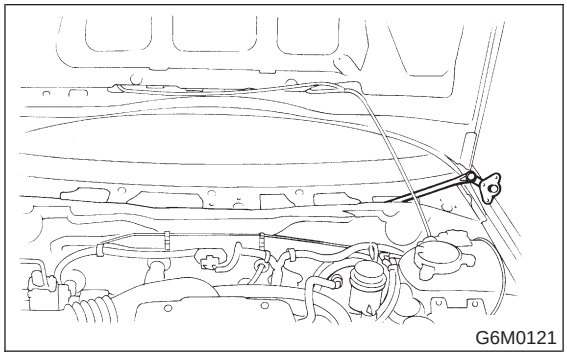
CAUTION:
Do not pry wiper link off forcefully as this may scratch vehicle body.

5) Remove wiper motor.
6) Separate the driver's side wiper link from back side of the passenger's side wiper sleeve unit.
7) Remove nuts which secure sleeve unit.

Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)


G6M0021

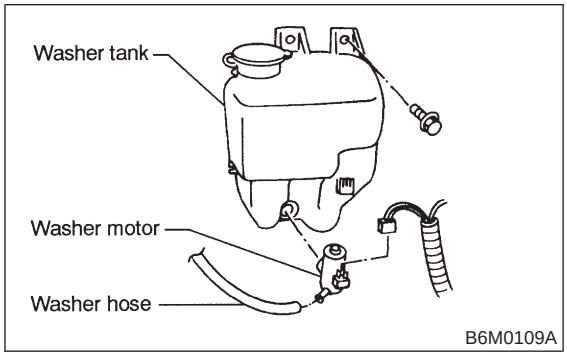
8) Remove wiper link from service hole in front panel.


G6M0121

9) Installation is in the reverse order of removal.

4. WASHER TANK AND WASHER MOTOR

1) Remove washer tank attaching bolts.
2) Disconnect connectors of washer motors.
3) Disconnect washer hoses from each washer motor.
4) Remove washer tank and washer motor as an unit.
5) Separate washer motor from washer tank.



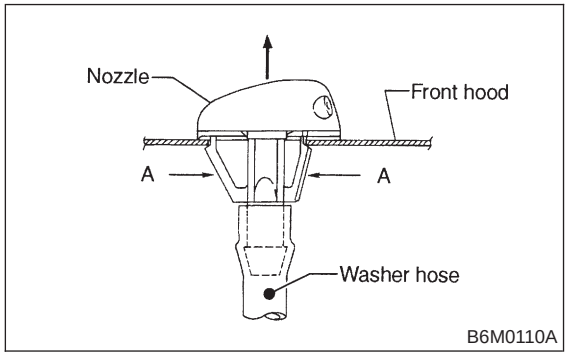
B6M0109A

6) Installation is in the reverse order of removal.

5. NOZZLE

1) Disconnect washer hose from nozzle.

2) Push nozzle clip in direction A as shown in figure.



3) Remove nozzle from engine hood.

CAUTION:
Do not pry nozzle off forcefully as this may scratch vehicle body.

4) Installation is in the reverse order of removal.

6. COMBINATION SWITCH

Remove and install combination switch. <Ref. to 6-2 [W4B3].>

C: DISASSEMBLY AND ASSEMBLY

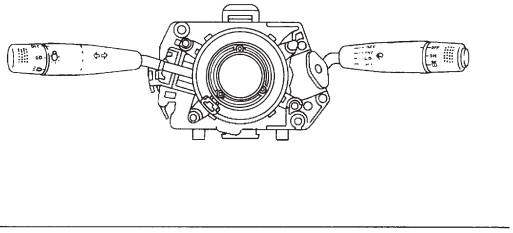
1. COMBINATION SWITCH AND INTERMITTENT UNIT

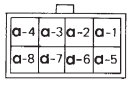
Disassemble and assemble combination switch. <Ref. to 6-2 [W4C1].>

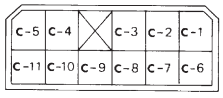
D: INSPECTION

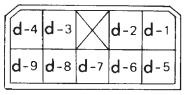
1. COMBINATION SWITCH (ON-CAR)

1) Remove instrument panel lower cover.
2) Remove lower column cover.
3) Unfasten holddown clip which secures harness, and disconnect connectors from body harness.
4) Set wiper switch to each position and check continuity between terminals.









Wiper switch

Switch position \ Terminal		d-9	d-8	d-6	d-7	INT1	INT2
OFF	OFF	○	○				
	↕	×		×			
	MIST		○	○			
INT	OFF	○	○			○	○
	↕	×		×			
	MIST		○	○		○	○
	↕	×		×			
LO	OFF		○	○			
	MIST		○	○			
HI	OFF			○	○		
	MIST		○	○	○		

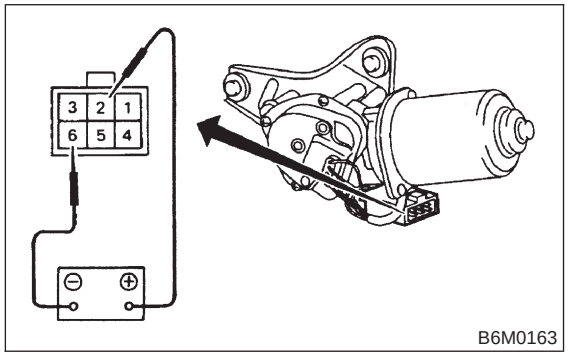
Washer switch

Switch position \ Terminal	d-5	d-2
OFF		
ON	○	○

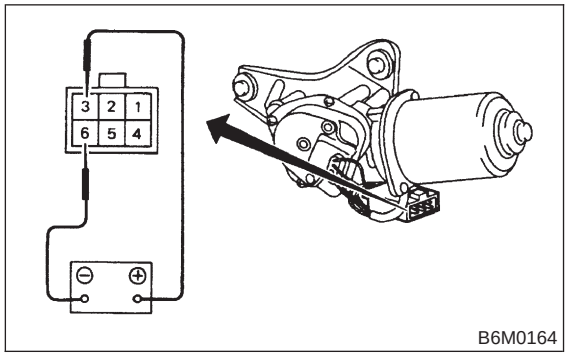
B6M0708

2. WIPER MOTOR

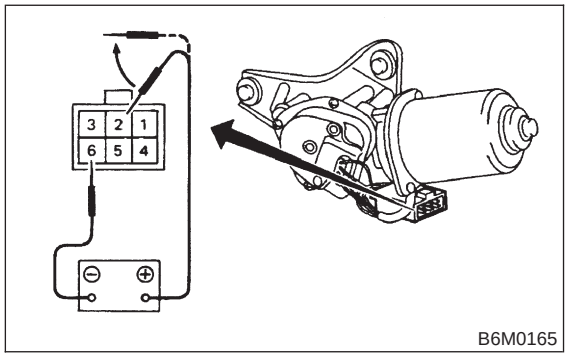
1) Check wiper motor operation at low speed:
Connect battery to wiper motor. Check wiper motor for proper operation at low speed.



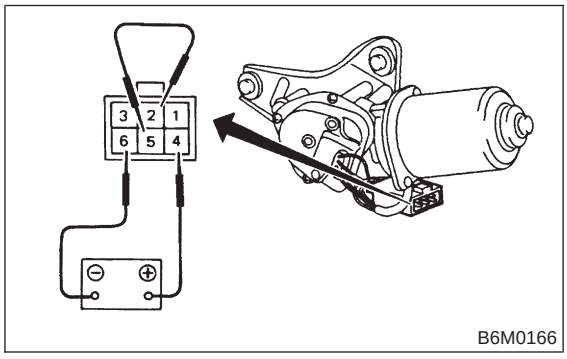
2) Check wiper motor operation at high speed:
Connect battery to wiper motor. Check wiper motor for proper operation at high speed.



3) Check wiper motor for proper stoppage:
Connect battery to wiper motor. After operating wiper motor at low speed, disconnect battery to stop it.

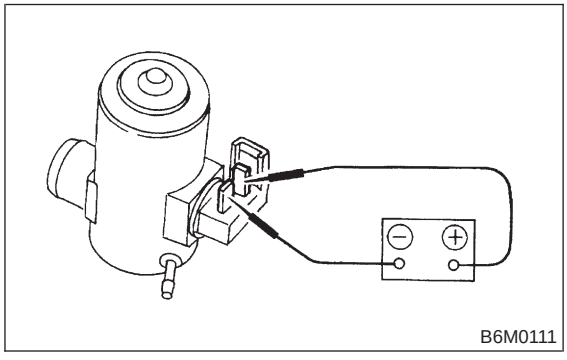


4) Reconnect battery and ensure that wiper motor stops at “AUTO STOP” after operating at low speed.



3. WASHER MOTOR

Apply battery voltage between terminals of washer motor connector and check that washer motor operates.

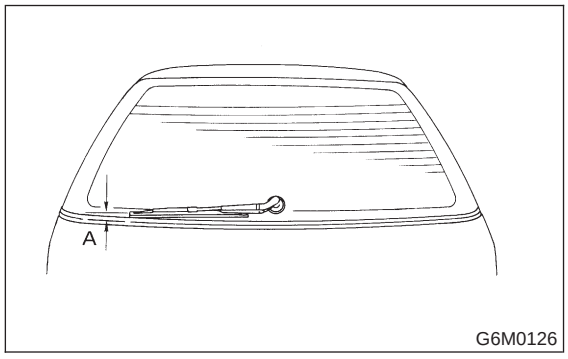


12. Rear Wiper and Washer

A: ADJUSTMENT

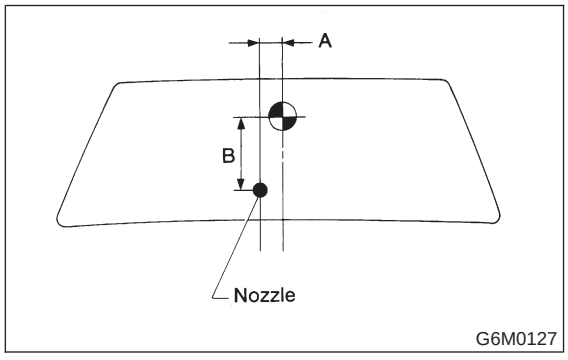
1) Adjust wiper blade in original position as shown in figure by changing wiper arm installation.

Original position:
A: 25 — 35 mm (0.98 — 1.38 in)



2) Adjust washer ejecting point on rear gate window as shown in figure when the vehicle stops.

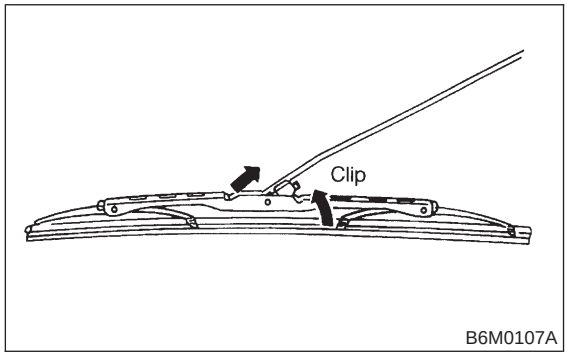
Ejecting point:
A: 25 mm (0.98 in)
B: 200 — 300 mm (7.87 — 11.81 in)



B: REMOVAL AND INSTALLATION

1. BLADE

1) Pull out blade following the arrow direction, from arm while pushing up locking clip.

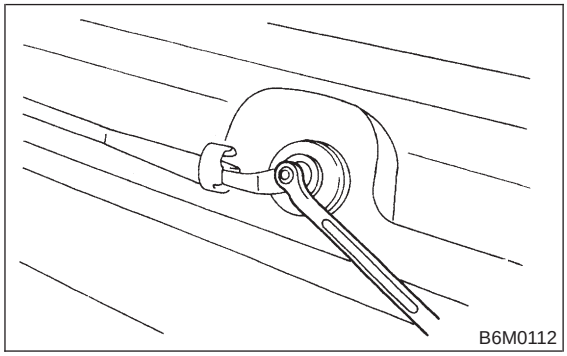


2) Installation is in the reverse order of removal.

2. WIPER ARM

1) Remove head cover.
2) Remove nut and wiper arm.
3) Installation is in the reverse order of removal.

Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)

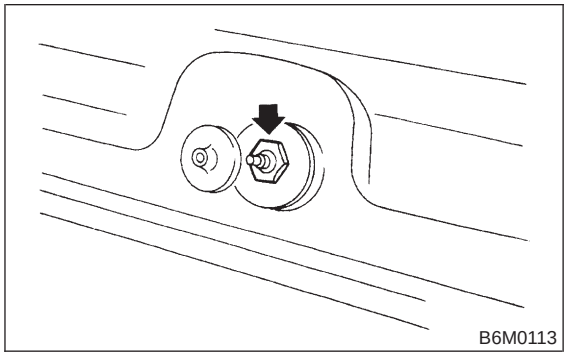


3. WIPER MOTOR

1) Remove cap and special nut.

CAUTION:
Be careful not to strike service tool against nozzle during removal.

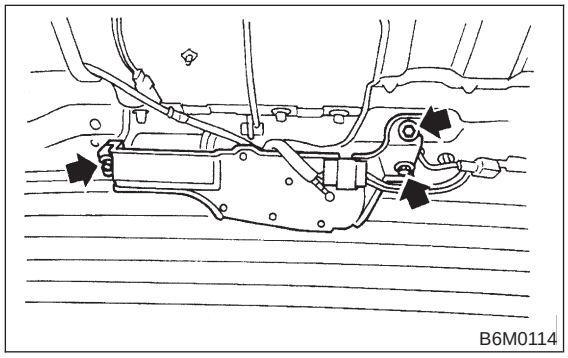
Tightening torque:
7.4±1.5 N·m (0.75±0.15 kg-m, 5.4±1.1 ft-lb)



2) Remove rear gate trim. <Ref. to 5-2 [W3A1].>
3) Undo clips which secure harness, and disconnect connector of wiper motor.
4) Separate washer hoses at joint.

5) Remove attaching screws and take out wiper motor assembly.

CAUTION:
Be careful not to damage O-ring when removing wiper motor assembly.



6) Installation is in the reverse order of removal.

Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)

4. WASHER TANK AND WASHER MOTOR

Remove and install washer tank and washer motor. <Ref. to 6-2 [W11B4].>

5. COMBINATION SWITCH

Remove and install combination switch. <Ref. to 6-2 [W4B3].>

C: DISASSEMBLY AND ASSEMBLY

1. COMBINATION SWITCH

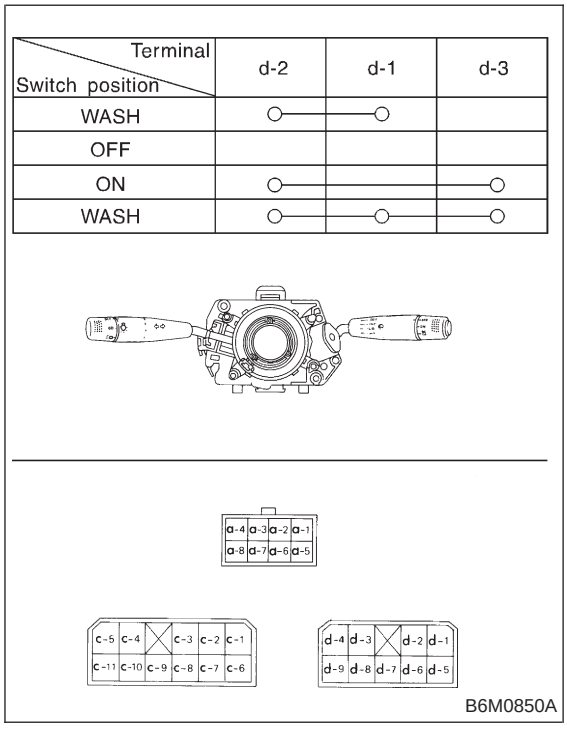
Disassemble and assemble combination switch. <Ref. to 6-2 [W4C1].>

D: INSPECTION

1. COMBINATION SWITCH (ON-CAR)

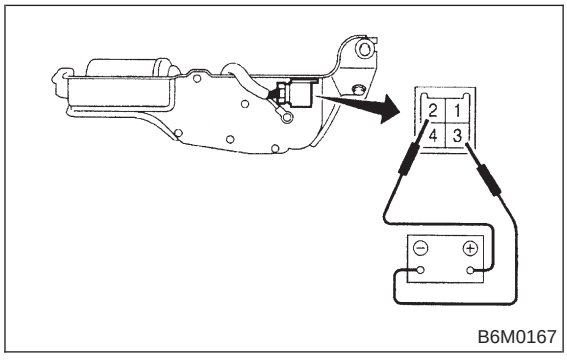
1) Remove instrument panel lower cover.
2) Remove lower column cover.
3) Unfasten holddown clip which secures harness, and disconnect connectors from body harness.

4) Set rear wiper and washer switch to each position and check continuity between terminals.

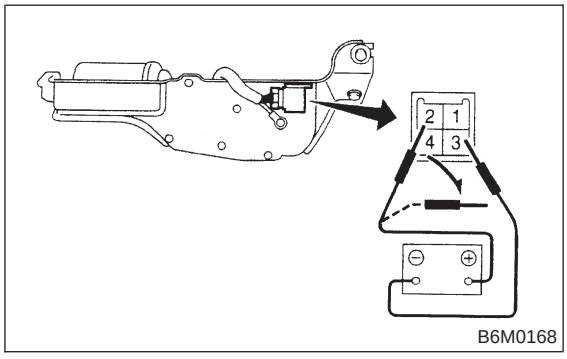


2. WIPER MOTOR

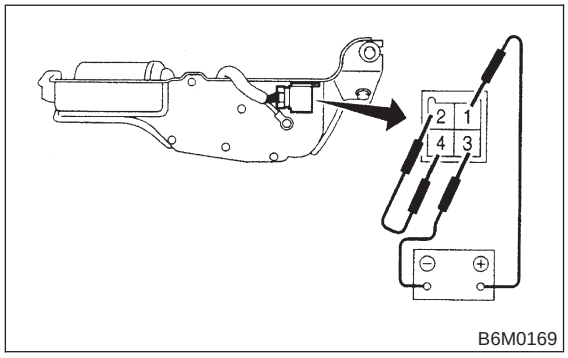
1) Operational check:
Connect battery to wiper motor and check operation of wiper motor.



2) Check wiper motor for proper stoppage:
After operating wiper motor, disconnect battery from wiper motor.



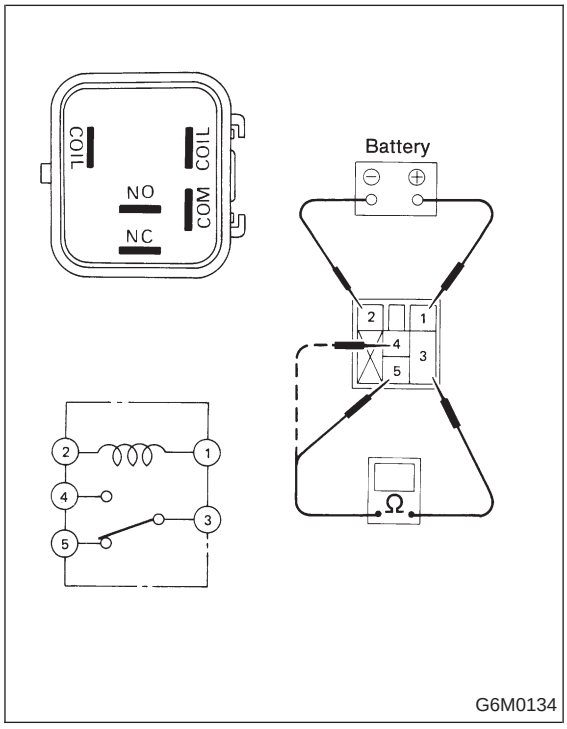
3) Reconnect battery and ensure that wiper motor stops at “AUTO STOP” after it has been operated.



3. REAR WIPER RELAY

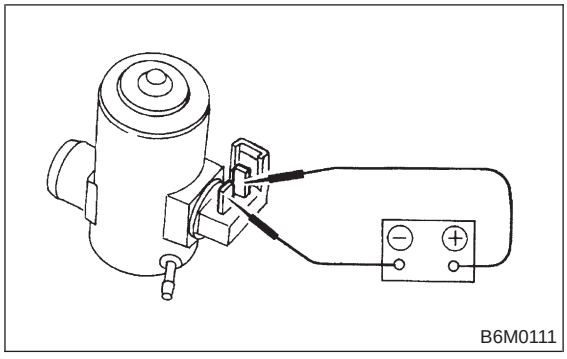
1) Connect battery to terminal No. 1 and ground terminal No. 2.
2) Check continuity between terminals.

When current flows.	Between terminals No. 3 and No. 5	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 5	Continuity exists.
	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.



4. WASHER MOTOR

Apply battery voltage between terminals of washer motor connector and check that washer motor operates.



13. Rear Window Defogger

A: REMOVAL AND INSTALLATION

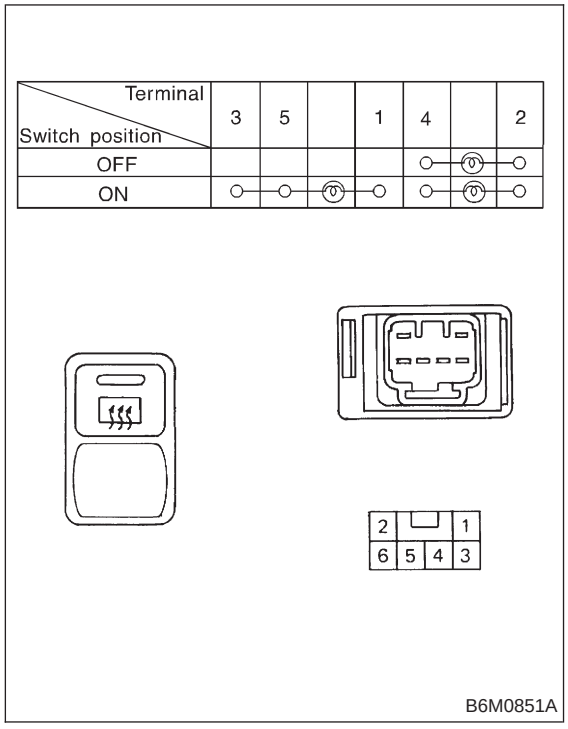
1. DEFOGGER SWITCH

1) Remove screws which secure meter visor.
2) Remove meter visor from instrument panel while disconnecting connectors.
3) Remove rear window defogger switch from meter visor.
4) Installation is in the reverse order of removal.

B: INSPECTION

1. DEFOGGER SWITCH

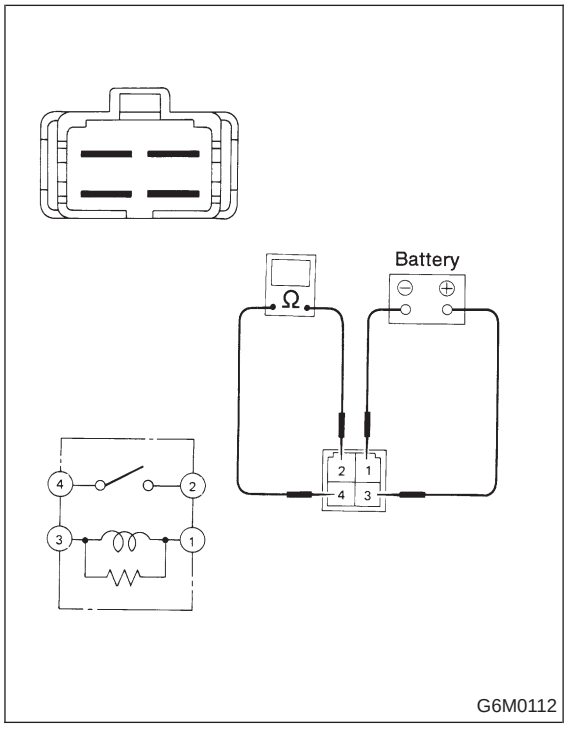
Move rear window defogger switch to each position and check continuity between terminals.



2. DEFOGGER RELAY

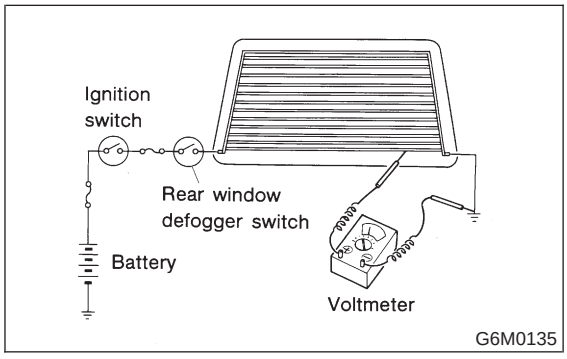
Check continuity between terminals as indicated in table below, when connecting the battery to terminal No. 1 and No. 3.

When current flows.	Between terminals No. 2 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 2 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 3	Continuity exists.

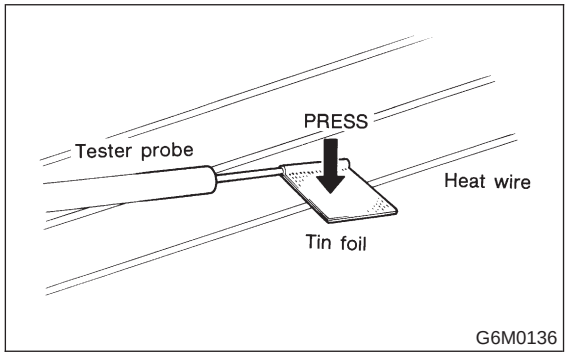


3. HEAT WIRES

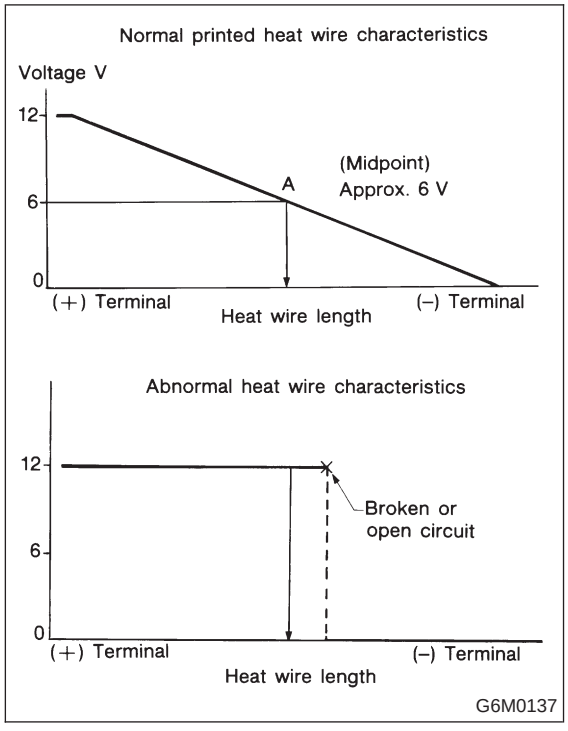
1) Start the engine so that battery is being charged.
2) Turn defogger switch to ON.
3) Check each heat wire at its center position for discontinuity by setting direct current voltmeter. Normal indication is about 6 volts.



NOTE:
When measuring voltage, wind a piece of tin foil around the tip of the tester probe and press the foil against the wire with your finger.

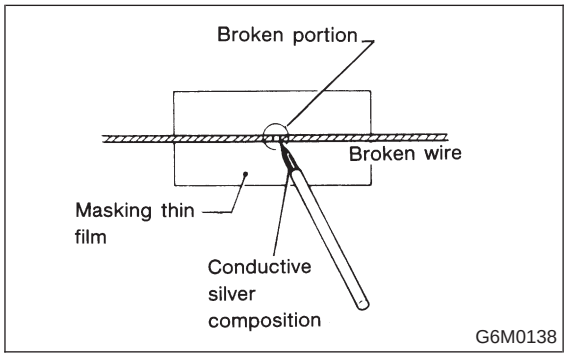


4) When tester indicates 12 volts when its probe reaches point “A”, a broken circuit occurs between point “A” and the negative terminal. Slowly move tester probe toward the negative terminal while contacting it on heat wire to locate point where tester indication changes abruptly (0 volts). This is the point where a broken circuit occurs.
When tester indicates 0 volts when its probe reaches point “A”, a broken circuit occurs between point “A” and the positive terminal. Locate a point where tester indication changes abruptly (12 volts) while slowly moving tester probe toward the positive terminal.



C: REPAIR

1) Clean broken wire and its surrounding area.
2) Cut off slit on (used) thin film by 0.5 mm (0.020 in) width and 10 mm (0.39 in) length.
3) Place the slit on glass along the broken wire, and deposit conductive silver composition (DUPONT No. 4817) on the broken portion.



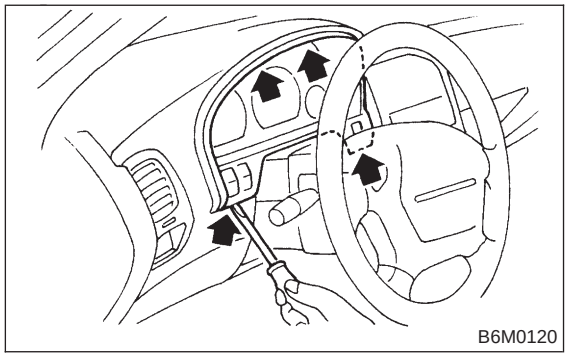
4) Dry out the deposited portion.
5) Inspect the repaired wire for continuity.

14. Combination Meter

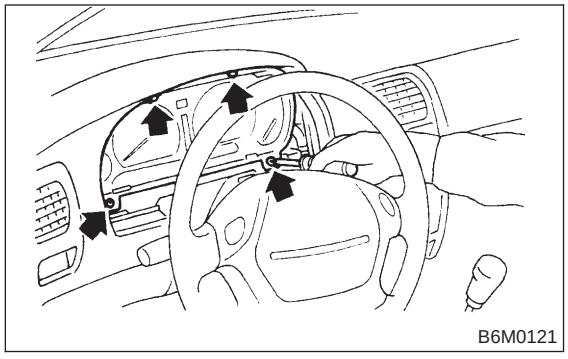
A: REMOVAL AND INSTALLATION

1. COMBINATION METER

1) Move steering wheel fully down.
2) Remove screws which secure meter visor.


B6M0120

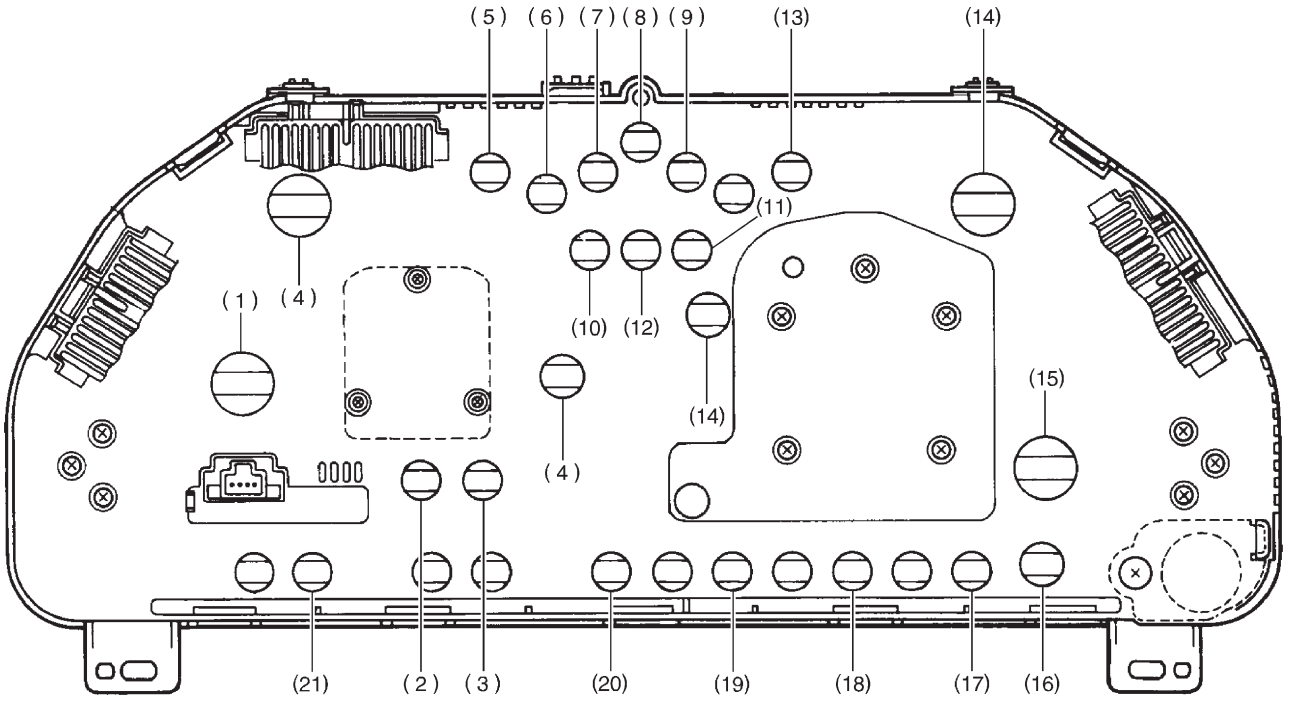
3) Remove visor from instrument panel.
4) Disconnect connectors from meter visor.
5) Remove screws which secure combination meter, and pull combination meter out.


B6M0121

6) Disconnect connectors from back of combination meter.
7) Installation is in the reverse order of removal.

CAUTION:
When installing combination meter, be sure to connect connectors to backside of combination meter.

B: BULB REPLACEMENT



B6M0761C

(1) Tachometer and temperature gauge illumination
(2) Oil pressure
(3) CHECK ENGINE (Malfunction Indicator Light)
(4) Tachometer illumination
(5) Turn signal (RH)
(6) Headlight beam
(7) Door open (Front-Right)
(8) Seat belt
(9) Door open (Front-Left)
(10) Door open (Rear-Right)
(11) Door open (Rear-Left)
(12) Rear gate open (Wagon)
(13) Turn signal (LH)
(14) Speedometer illumination
(15) Speedometer and fuel gauge illumination
(16) Low fuel
(17) Charge
(18) Brake fluid level/parking brake
(19) FWD
(20) AT oil temperature
(21) ABS

15. Vehicle Speed Sensor 2

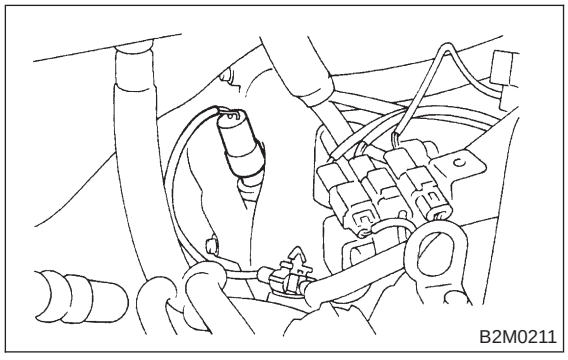
A: GENERAL PRECAUTIONS

(1) Be careful not to drop or bump sensor as this may break built-in magnet.
(2) Drive key is designed to separate from vehicle speed sensor 2. Be careful not to lose it or forget to install.
(3) Vehicle speed sensor 2 is installed in part (which contains bearings, etc., finished to a high degree of accuracy). Do not allow foreign matter (filings, sand, etc.) to get into it.
(4) When checking output of vehicle speed sensor 2 as a single unit, ensure test leads are connected to their correct terminals. Failure to do this may damage internal IC.
(5) Discard vehicle speed sensor 2 after removal; replace with new one.

B: REMOVAL

CAUTION:
● Be careful when removing vehicle speed sensor 2 immediately after driving vehicle for a while, as temperature around it is high.
● Before removing vehicle speed sensor 2, clean dirt, etc. from surrounding areas. Take care not to allow foreign matter to get into mounting hole.

1) Remove collector cover.
2) Disconnect vehicle speed sensor 2 connector.



3) Turn and remove vehicle speed sensor 2.
4) Remove key and packing.

C: INSTALLATION

CAUTION:
● Ensure sensor mounting hole is clean and free of foreign matter.
● Apply grease to tip end of key to prevent key from falling off sensor.
● Align tip end of key with key groove on end of speedometer shaft during installation.

1) Hand tighten vehicle speed sensor 2, then tighten it using suitable tool.

Tightening torque required for sensor to reach bottom of transmission is as follows:

Tightening torque:
0.39 — 0.88 N·m (4.0 — 9.0 kg-cm, 3.5 — 7.8 in-lb)

CAUTION:
● When torque must be applied that exceeds 0.88 N·m (9.0 kg-cm, 7.8 in-lb), the key and key groove on end of speedometer may not be aligned properly. Remove the key, align it correctly and reassemble.
● Sensor threads are secured by Locktite. The reassembly must be completed within 5 minutes before Locktite dries.

2) Tighten vehicle speed sensor 2 further to specified torque.

Tightening torque:
5.9±1.5 N·m (60±15 kg-cm, 52±13 in-lb)

16. Horn and Cigarette Lighter

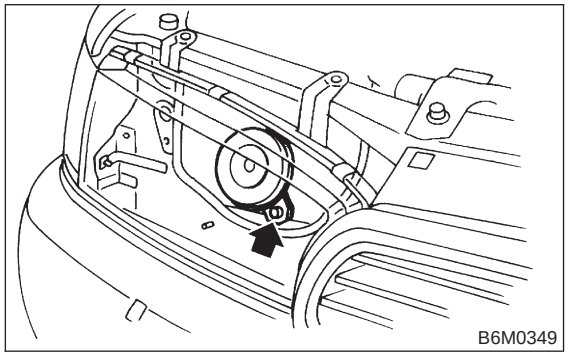
A: REMOVAL AND INSTALLATION

1. HORN

1) Open the engine hood.
2) Disconnect connector of horn.
3) Remove the horn.
4) Installation is in the reverse order of removal.

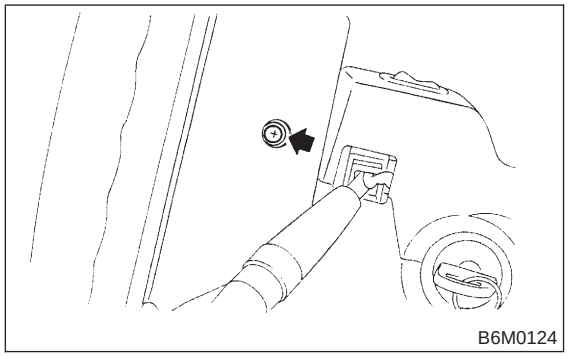
Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

CAUTION:
After installing horn, connect connector, fit firmly wiring harness to prevent from disconnecting due to vibration.



2. HORN SWITCH (HORN PAD)

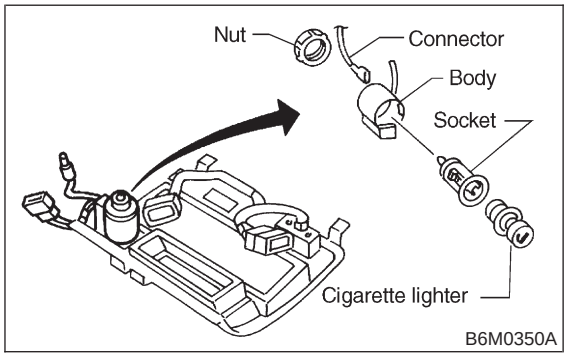
1) Remove screw which secures horn switch (steering pad) to the base of steering wheel.



2) Remove horn switch (steering pad) from steering wheel while disconnecting connector.
3) Installation is in the reverse order of removal.

3. CIGARETTE LIGHTER

1) Remove center panel from instrument panel. <Ref. to 5-4 [W1A0].>
2) Disconnect connector from cigarette lighter.
3) Turn illumination socket 45° counterclockwise and remove it.
4) Loosen nut, and then remove cigarette lighter body.



5) Installation is in the reverse order of removal.

CAUTION:
● Align socket with cutout portion of instrument panel during installation.
● In case of replacing cigarette lighter, use genuine part only and always replace both plug and socket combination.

B: INSPECTION

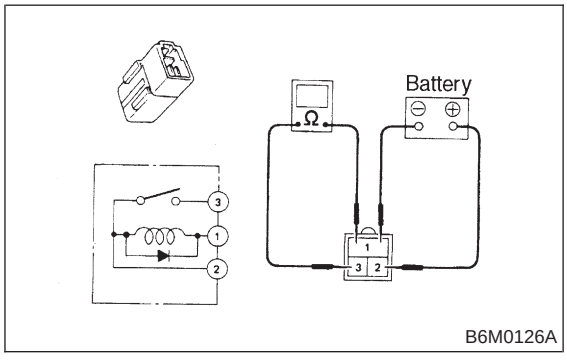
1. HORN SWITCH

Ensure that horn switch is free from the following defects:
(1) Burned or shorted contacts
(2) Broken or weak spring
(3) Damaged harness
(4) Worn or corroded mating surface of horn plate

2. HORN RELAY

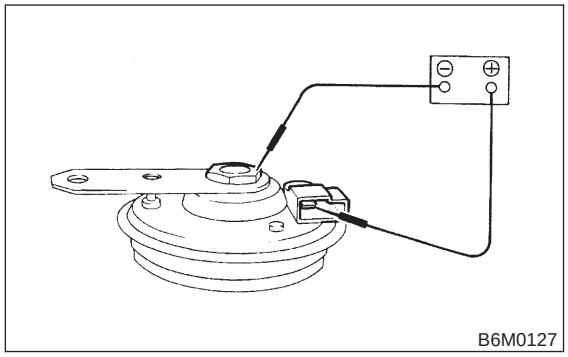
Check continuity between terminals as indicated in table, when connecting the battery to terminals No. 1 and No. 2.

When current flows.	Between terminals No. 2 and No. 3	Continuity exists.
When current does not flow.	Between terminals No. 2 and No. 3	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.



3. HORN

Make sure that horn sounds when battery voltage is applied between connector terminal and horn body.



4. CIGARETTE LIGHTER

1) Remove plug. Then, check element's contact for wear, and element for accumulation of ashes, foreign particles, etc.
2) Check element for discontinuity.
3) Remove socket and clean element. Then, check for wear or foreign particles on element's contact and mating surface.
4) Ensure that cigarette lighter returns within 20 seconds after it is turned to ON.

17. Power Window

A: REMOVAL AND INSTALLATION

1. MAIN SWITCH, SUB SWITCH AND POWER WINDOW MOTOR

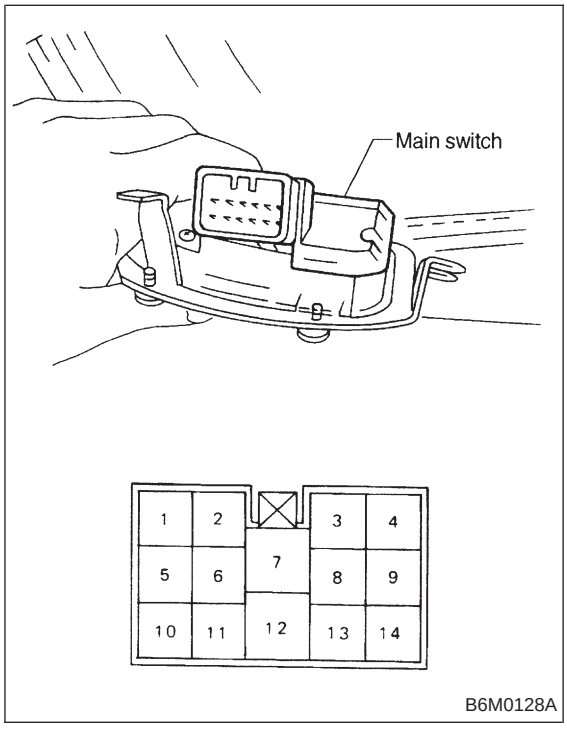
Remove and install power window main switch, sub switch and motor. <Ref. to 5-2 [W2A2].>

NOTE:
To remove the power window motor, it is necessary to disassemble the door component parts.

B: INSPECTION

1. MAIN SWITCH

Set power window main switch to each position and check continuity between terminals.



Window lock switch	Switch / Position	Front RH				Front LH				Rear RH				Rear LH			
		7	14	9	12	7	13	8	12	7	6	11	12	7	10	5	12
NORMAL	UP	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	OFF		○	○	○		○	○	○		○	○	○		○	○	○
	DOWN	○		○		○		○		○		○		○		○	
			○		○		○		○		○		○		○		○
LOCK	UP	○	○			○	○	○	○	○	○			○	○		
	OFF		○	○			○	○	○		○	○			○	○	
	DOWN	○		○		○		○		○		○		○		○	
							○		○								

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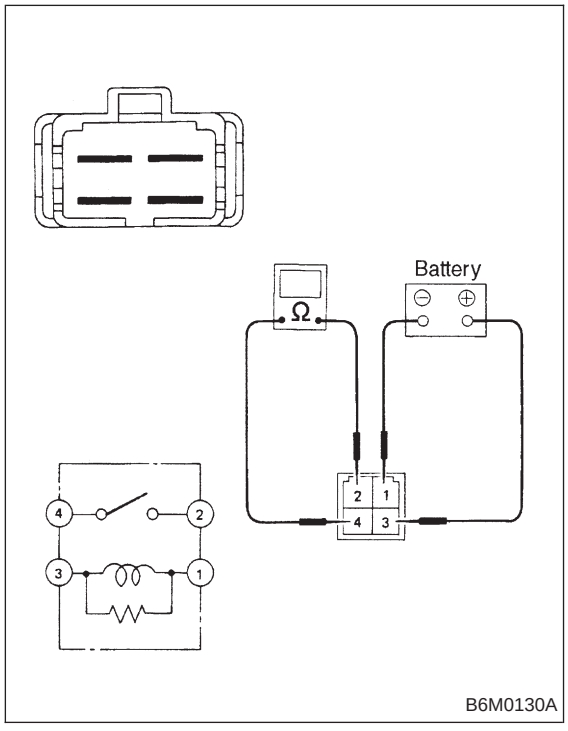
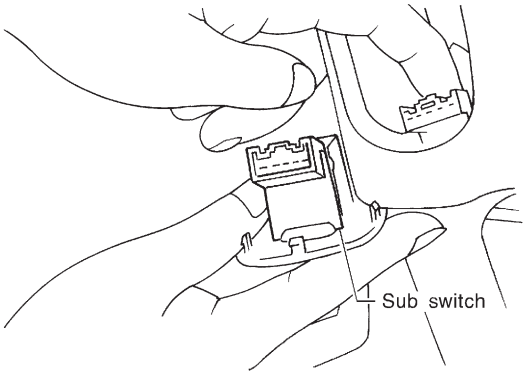
2. SUB SWITCH

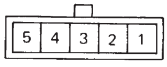
Set power window sub switch to each position and check continuity between terminals.



B6M0130A



Switch position \ Terminal	5	1	3	4	2
UP	○		○	○	○
↕					
OFF		○	○	○	○
↕					
DOWN	○	○		○	○



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3. POWER WINDOW MOTOR

1) Make sure that power window motor rotates properly when battery voltage is applied to terminals of motor connector.
2) Change polarity of battery connections to terminals to ensure that motor rotates in reverse direction.

4. POWER WINDOW RELAY

Check continuity between terminals as indicated in table, when connecting the battery to terminal No. 1 and No. 3.

When current flows.	Between terminals No. 2 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 2 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 3	Continuity exists.

18. Power Door Lock

A: REMOVAL AND INSTALLATION

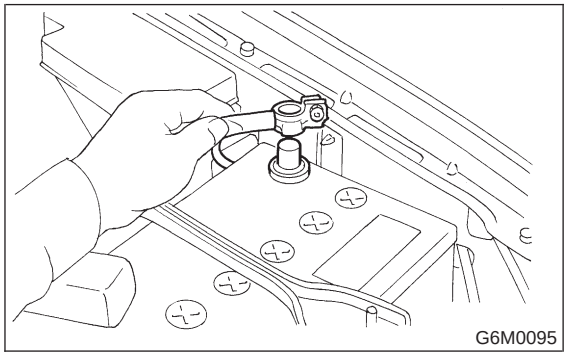
1. FRONT AND REAR DOOR, AND REAR GATE LOCK ACTUATOR

Remove and install front door lock actuator, rear door lock actuators, and rear gate lock actuator. <Ref. to 5-2 [W2A7].>

NOTE:
To remove and install the actuators, it is necessary to disassemble the door component parts.

2. DOOR LOCK TIMER

1) Disconnect battery ground cable.



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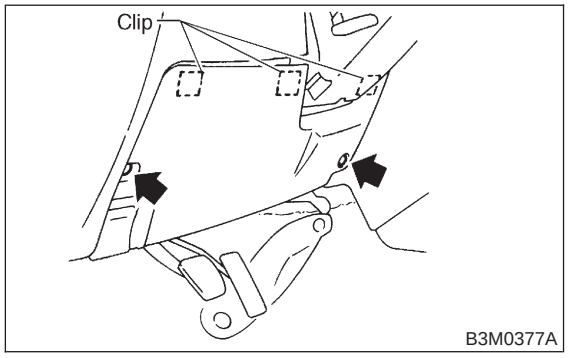
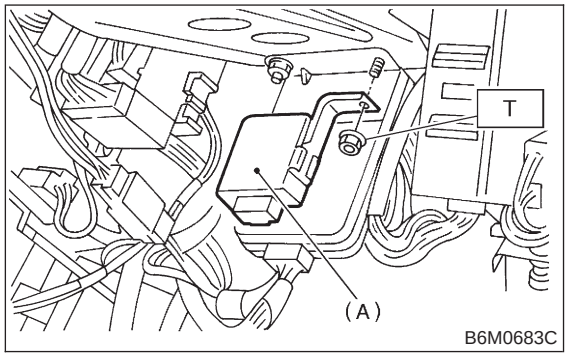
2) Remove lower cover and then disconnect connector.



3) Remove door lock timer (A) while disconnecting connector.



4) Installation is in the reverse order of removal.

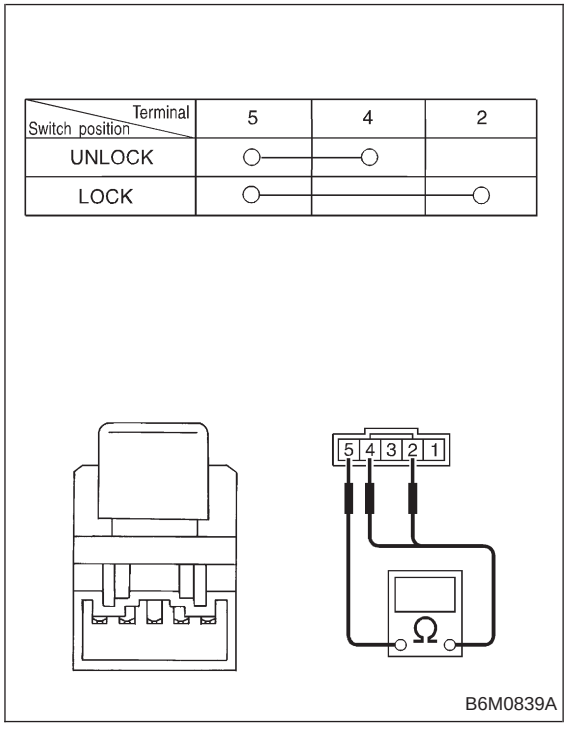
Tightening torque:
7.4±2.5 N·m (0.75±0.25 kg-m, 5.4±1.8 ft-lb)

B: INSPECTION

1. DOOR LOCK SWITCH (DRIVER'S AND FRONT PASSENGER'S DOOR)

1) Remove door trim panel. <Ref. to 5-2 [W2A2].>

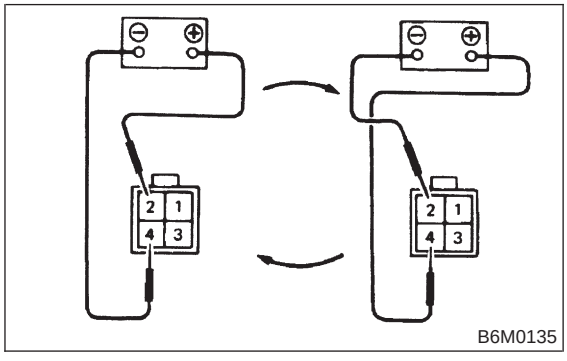
2) Set switch to each position and check continuity between terminals.



2. ACTUATOR

1) Remove door trim panel. <Ref. to 5-2 [W2A2].>
2) Disconnect connector of actuator.
3) Make sure that door link moves to LOCK or UNLOCK position when battery voltage is applied between terminals:

- Connect battery positive (+) terminal to terminal No. 2, and negative (−) terminal to terminal No. 4 at a moment.
- Connect battery positive (+) terminal to terminal No. 4, and negative terminal (−) to terminal No. 2 at a moment.



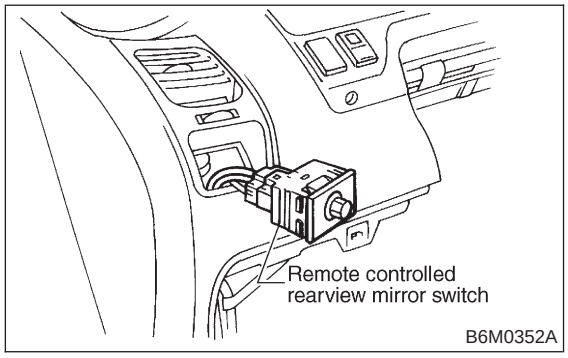
19. Remote Controlled Rearview Mirror

A: REMOVAL AND INSTALLATION

1. REMOTE CONTROLLED REARVIEW MIRROR SWITCH

1) Remove rearview mirror switch from instrument panel by using a small standard screwdriver.

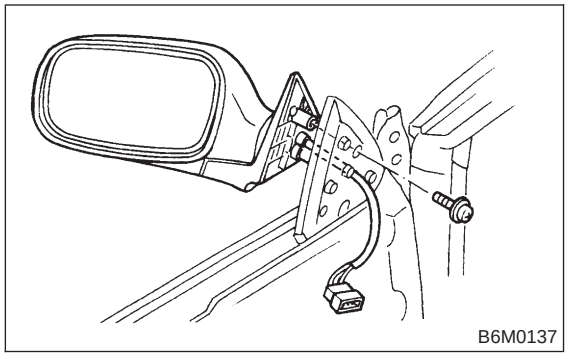
CAUTION:
Do not pry rearview mirror switch forcefully as this may scratch instrument panel.



2) Remove rearview mirror switch while disconnecting connector.
3) Installation is in the reverse order of removal.

2. REARVIEW MIRROR

1) Remove door trim panel. <Ref. to 5-2 [W2A2].>
2) Disconnect connector of rearview mirror.
3) Remove screws which secure rearview mirror, and then remove rearview mirror.

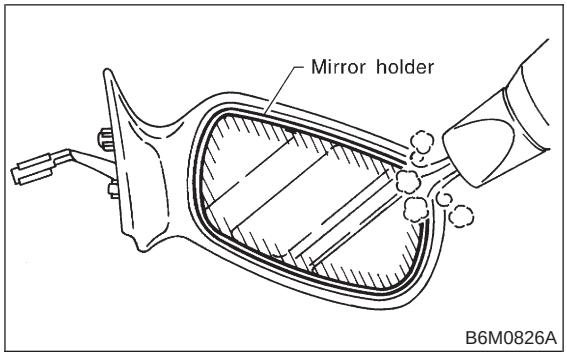


4) Installation is in the reverse order of removal.

3. MIRROR PLATE

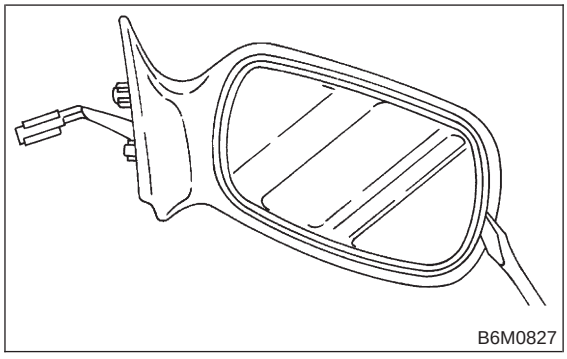
1) Remove rearview mirror. <Ref. to 6-2 [W19A2].>
2) Warm around the mirror holder by hair dryer.

CAUTION:
The mirror holder will become extremely hot. Avoid carelessly touching it.



3) Remove mirror plate while lifting the mirror holder using a flat bladed screwdriver.

NOTE:
When removing mirror plate in vehicles with mirror heater, disconnect mirror connector which is on the back side.

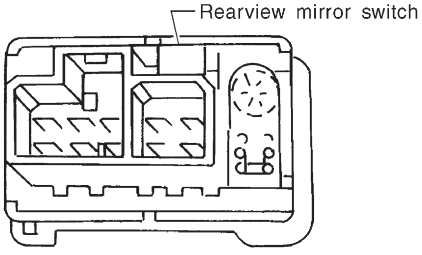


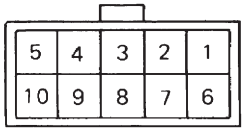
4) Installation is in the reverse order of removal.

B: INSPECTION

1. REARVIEW MIRROR SWITCH

Move rearview mirror switch to each position and check continuity between terminals.





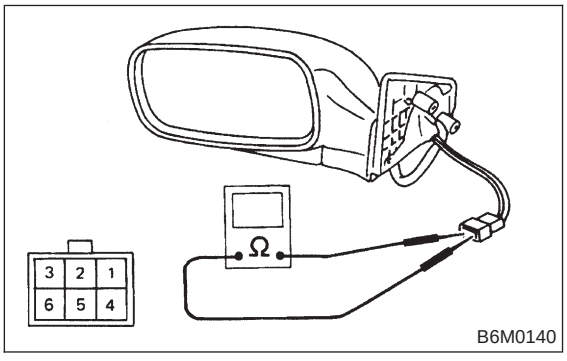
Switch position / Terminal	Mirror switch					Left/Right changing switch		
	OFF	Right	Left	Up	Down	Left	N	Right
7						○		
9							○	
6								○
8								○
2		○	○	○	○			
		○					○	○
1		○	○	○				
				○	○	○		○
4		○	○	○				
3								

B6M0714A

2. REARVIEW MIRROR

Check to ensure that rearview mirror moves properly when battery voltage is applied to terminals.

Operation	Terminal connection	
	(+)	(−)
UP	3	1
DOWN	1	3
RIGHT	1	2
LEFT	2	1



20. Sunroof

A: REMOVAL AND INSTALLATION

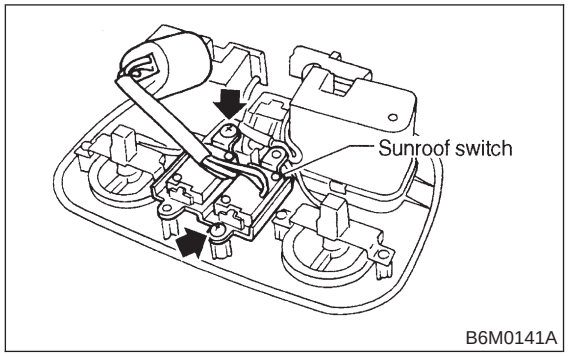
1. SUNROOF AND SUNROOF MOTOR

<Ref. to 5-1 [W16A0].> as for removal and installation of sunroof system.

2. SUNROOF SWITCH

NOTE:
The sunroof switch is installed in spot light body.

1) Pry spot light lens off using a screwdriver.
2) Remove screws which secure spot light body.
3) Remove spot light body while disconnecting connectors.
4) Remove screw which secures sunroof switch, and then remove sunroof switch.

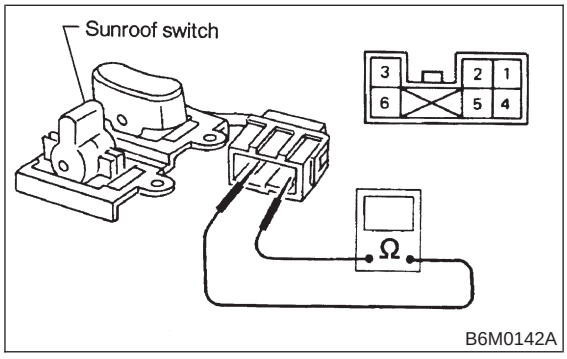


5) Installation is in the reverse order of removal.

B: INSPECTION

1. SUNROOF SWITCH

Set sunroof switch to each position and check continuity between terminals as indicated in table below:



Except OUTBACK					
Terminal / Switch position	4	3	6	5	2
Open	○	○			
Close	○		○		
Tilt up	○			○	
Tilt down	○				○

OUTBACK					
Terminal / Switch position	4	2	5	6	3
Open (Rear)	○	○			
Close (Rear)	○		○		
Tilt up (Front)	○			○	
Tilt down (Front)	○				○

B6M0861A

2. SUNROOF MOTOR

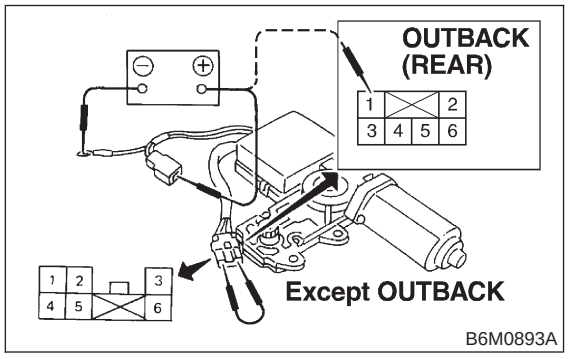
1) Apply battery voltage between 1-pin connector (Except OUTBACK) or terminal No. 1 (OUTBACK) and body ground wire.
2) Make sure that sunroof motor moves when connecting terminals as described below:

Except OUTBACK

- Connect between terminals No. 3 and 4 (OPEN)
- Connect between terminals No. 6 and 4 (CLOSE)
- Connect between terminals No. 5 and 4 (TILT UP)
- Connect between terminals No. 2 and 4 (TILT DOWN)

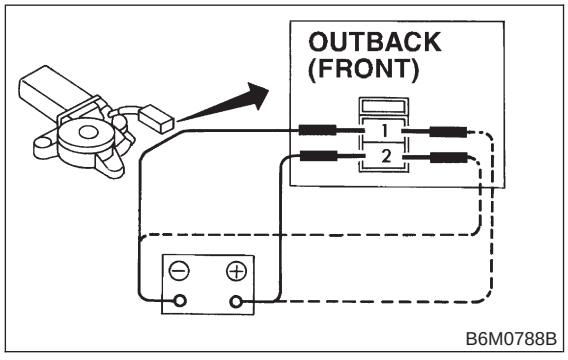
OUTBACK (Rear)

- Connect between terminals No. 2 and 3 (OPEN)
- Connect between terminals No. 6 and 3 (CLOSE)



OUTBACK (Front)

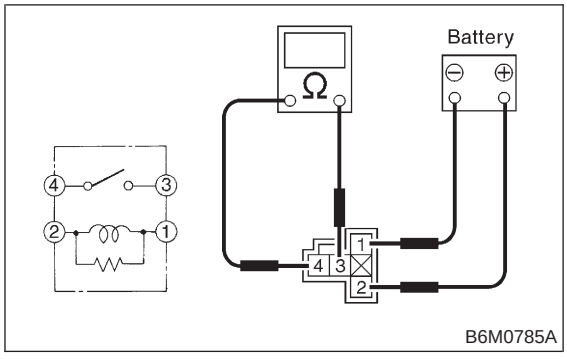
- Connect between terminals No. 1 and 2 (TILT UP)
- Connect between terminals No. 2 and 1 (TILT DOWN)



3. SUNROOF RELAY

Check continuity between terminals as indicated in table below, when battery voltage is applied between terminals No. 1 and No. 2.

When current flows.	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.

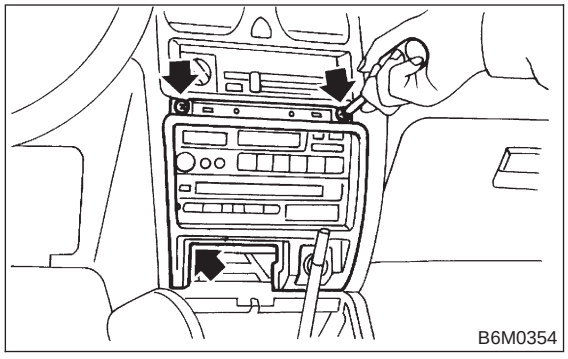


21. Radio, Speaker and Antenna

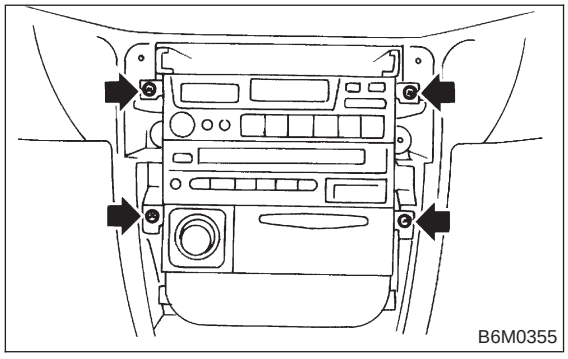
A: REMOVAL AND INSTALLATION

1. RADIO BODY

1) Remove hand brake cover.
2) Remove console cover.
3) Remove screws which secure center panel, and remove center panel.


B6M0354

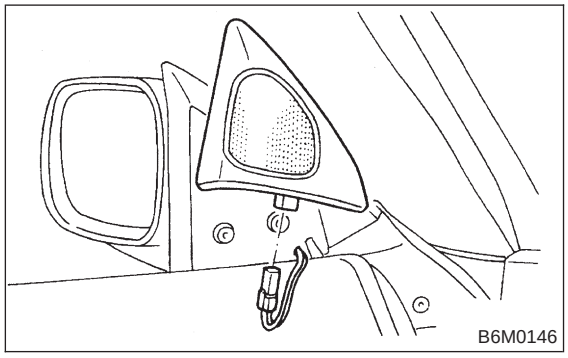
4) Remove fitting screws, and slightly pull radio out of instrument panel.


B6M0355

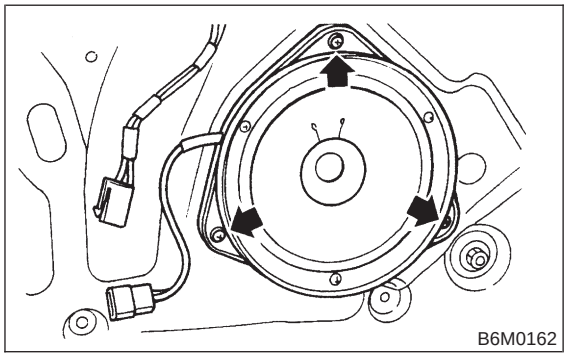
5) Disconnect connectors and antenna feeder cord.
6) Installation is in the reverse order of removal.

2. FRONT SPEAKER

1) Remove gusset speaker from behind the rear-view mirror while disconnecting connector.


B6M0146

2) Remove door trim panel. <Ref. to 5-2 [W2A2].>
3) Disconnect connector from speaker.
4) Remove screws which secure the speaker.
5) Remove door mount speaker.


B6M0162

6) Installation is in the reverse order of removal.

3. REAR SPEAKER (SEDAN)

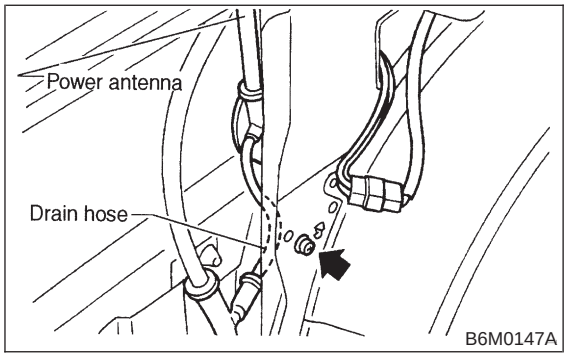
1) Remove rear seat cushion and rear backrest.
2) Remove left and right rear quarter trim panels.
3) Remove rear shelf trim panel.
4) Remove screws which secure speaker.
5) Remove speaker while disconnecting connector from speaker.
6) Installation is in the reverse order of removal.

4. REAR SPEAKER (WAGON)

1) Remove door trim panel. <Ref. to 5-2 [W2A2].>
2) Disconnect connector from speaker.
3) Remove screws which secure the speaker.
4) Remove speaker.
5) Installation is in the reverse order of removal.

5. POWER ANTENNA

1) Remove left side trunk trim (SEDAN), or left side rear lower quarter trim (WAGON).
2) Remove special nut (SEDAN).
3) Remove bolt which secures power antenna.
4) Remove power antenna while disconnecting connector and water drain hose.



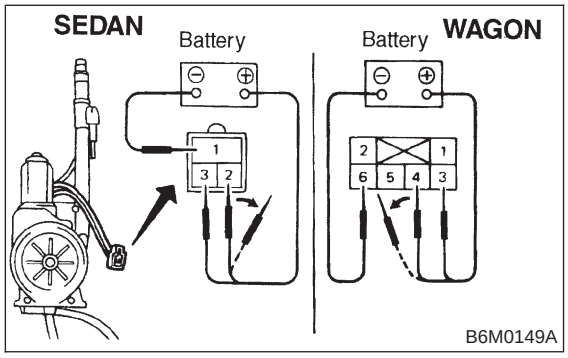
B6M0147A

5) Installation is in the reverse order of removal.

B: INSPECTION

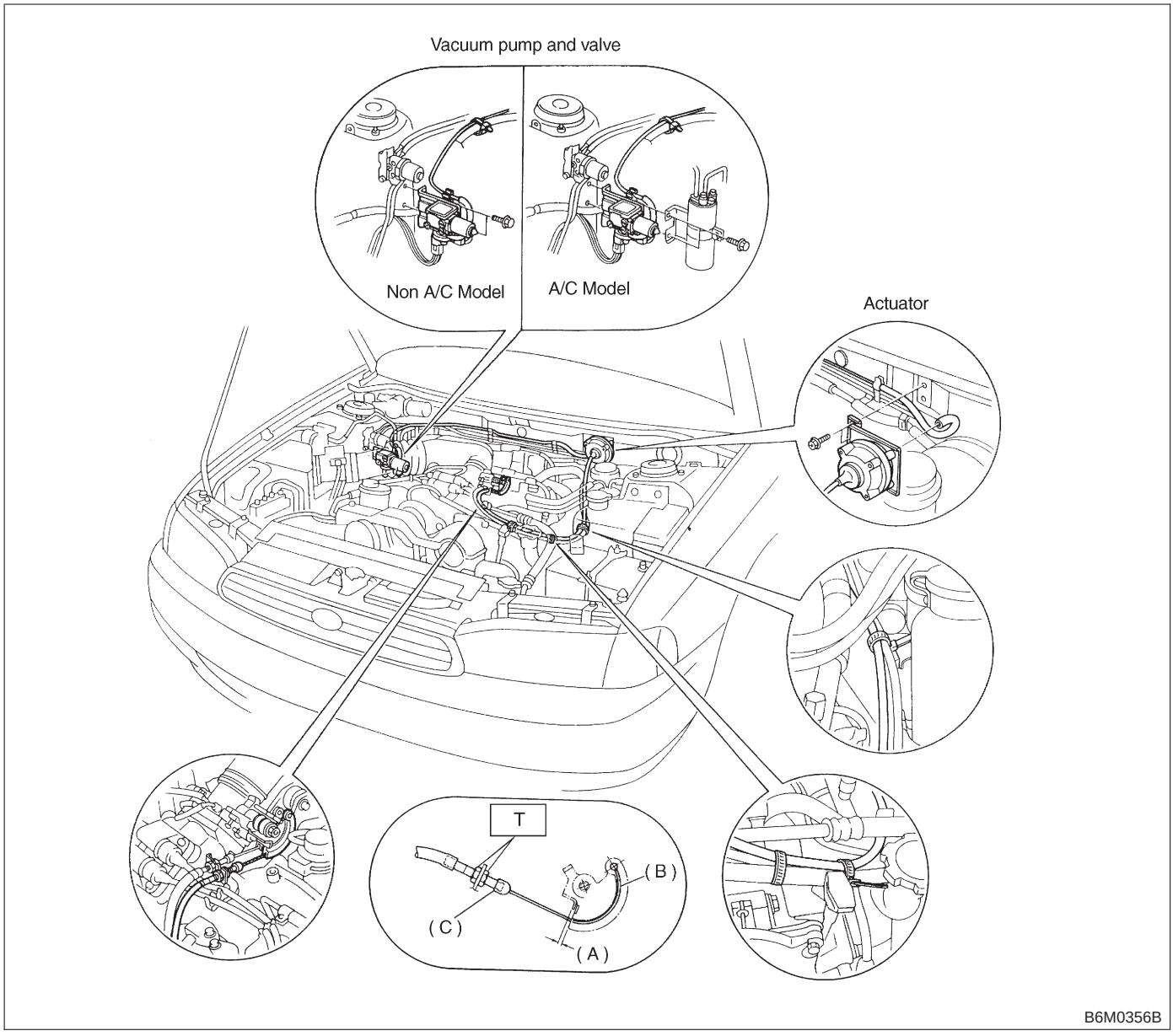
1. POWER ANTENNA

1) Connect battery positive (+) terminal to terminal No. 3 and connect terminal No. 1 (SEDAN) or No. 6 (WAGON) to ground. Ensure that antenna rod extends properly when battery positive (+) terminal is connected to terminal No. 2 (SEDAN) or No. 4 (WAGON).
2) Ensure that antenna rod retracts properly when battery positive (+) terminal is disconnected from terminal No. 2 (SEDAN) or No. 4 (WAGON).



22. Cruise Control

A: ADJUSTMENT



CAUTION:
(A): Must be adjusted when cable end outer is fixed in place, so that gap between throttle cam and lever is 1^{0}_{-1} mm ($0.04^{0}_{-0.04}$ in).
(Must be attached while throttle cam is being pulled by wire cable.)
(B): Must be coated evenly on cam end inner connection.
(C): Cover must be inserted securely, until tip of cable touches cover stopper.

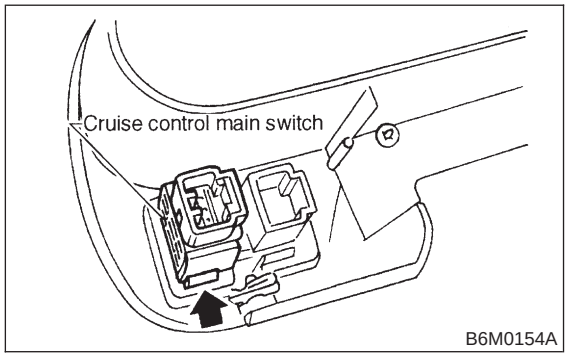
Tightening torque: N·m (kg-m, ft-lb)
T: 6.4 — 11.3 (0.65 — 1.15, 4.7 — 8.3)

B: REMOVAL AND INSTALLATION

1. CRUISE CONTROL MAIN SWITCH

1) Remove screws which secure meter visor.
2) Remove meter visor from instrument panel while disconnecting connectors.

3) Remove cruise control main switch from meter visor.

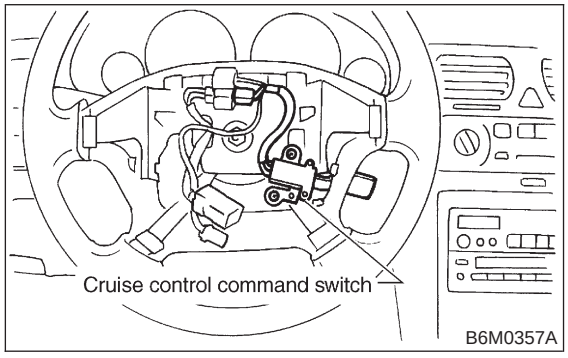


4) Installation is in the reverse order of removal.

2. CRUISE CONTROL COMMAND SWITCH

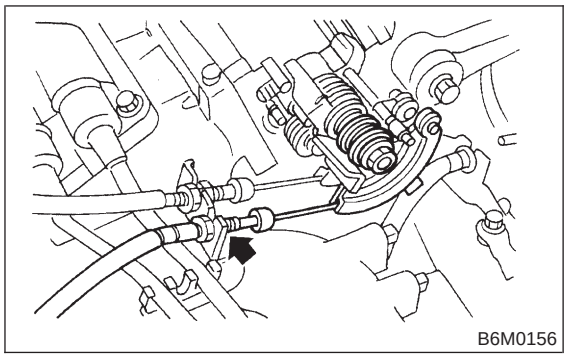
1) Remove screw which secures horn pad to the base of steering wheel.
2) Remove horn pad from steering wheel while disconnecting connector.
3) Disconnect connector of cruise control command switch.
4) Remove screws which secure cruise control command switch to steering wheel, and then remove command switch.
5) Installation is in the reverse order of removal.

WARNING:
When removing or installing the module from the airbag equipped model, refer to procedure for removal or installation of airbag module. <Ref. to 5-5 [W3A1].>

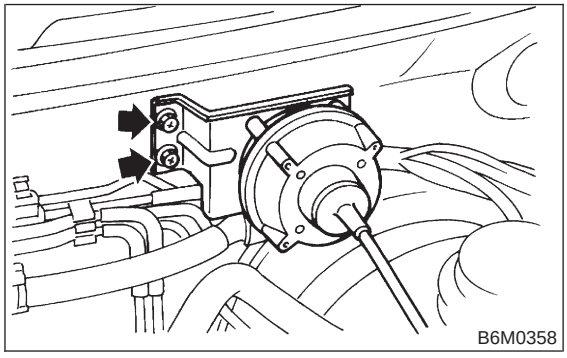


3. ACTUATOR

1) Loosen nut which secures cruise control cable end to throttle cam, and then remove cable from engine throttle cam.
2) Remove clip bands from cruise control cable.



3) Remove nuts which secure actuator.



4) Remove actuator while disconnecting vacuum hose.
5) Installation is in the reverse order of removal.

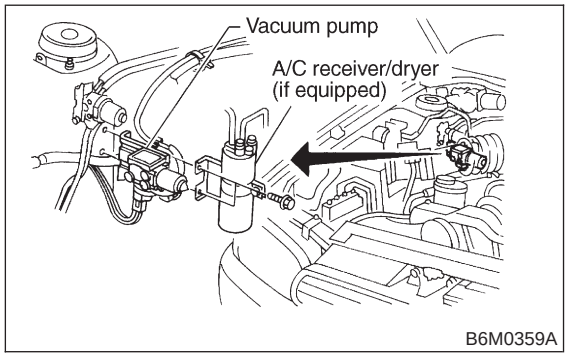
Tightening torque:
7.4±1.5 N·m (0.75±0.15 kg-m, 5.4±1.1 ft-lb)

CAUTION:
- **Be careful not to apply excessive load to the wire cable when adjusting and/or installing; otherwise, the actuator may be deformed or damaged.**
- **Do not bend cable sharply with a radius less than 100 mm (3.94 in); otherwise, cable may bend permanently, resulting in poor performance.**
- **When installing cable, be careful not to sharply bend or pinch the inner cable; otherwise, the cable may break.**

4. VACUUM PUMP AND VALVES

1) Disconnect connector from vacuum pump.

2) Remove bolts which secure vacuum pump.
3) Remove A/C receiver/drier bracket.



4) Remove vacuum pump while disconnecting vacuum hose.
5) Installation is in the reverse order of removal.

Tightening torque:
7.4±1.5 N·m (0.75±0.15 kg-m, 5.4±1.1 ft-lb)

5. STOP AND BRAKE SWITCH

Remove and install stop and brake switch.<Ref. to 4-5 [C1A0].> (MT), <Ref. to 4-5 [C1B0].> (AT)

6. CLUTCH SWITCH (MT)

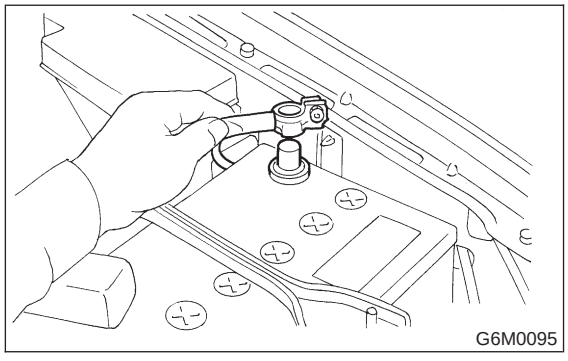
Remove and install clutch switch. <Ref. to 4-5 [C1A0].>

7. INHIBITOR SWITCH (AT)

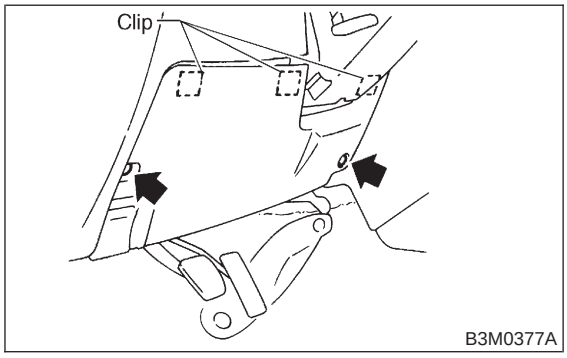
Remove and install inhibitor switch. <Ref. to 3-2 [W3B0].>

8. CRUISE CONTROL MODULE

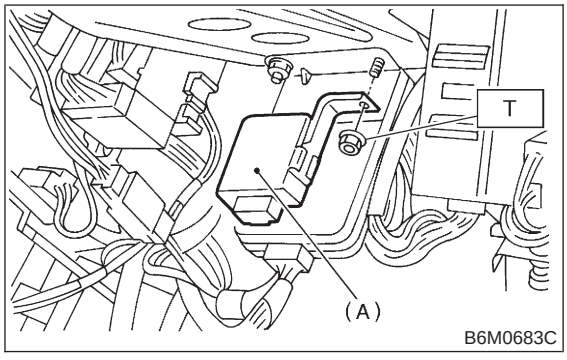
1) Disconnect battery ground cable.



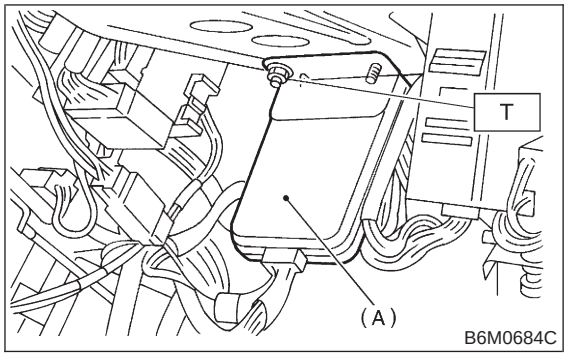
2) Remove lower cover and then disconnect connector.



3) Remove door lock timer (A) while disconnecting connector.



4) Remove cruise control module (A) while disconnecting connector.



5) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.5 N·m (0.75±0.25 kg-m, 5.4±1.8 ft-lb)

C: DRIVING TESTS

Conduct road tests by selecting a smooth, flat road or use free rollers as road test simulation.

1. MAIN SWITCH

1) Turn ignition switch ON.
2) Check that indicator light comes on when main switch is pressed (ON).
3) Check that indicator light goes out when main switch is pressed again (OFF).

4) Turn ignition switch OFF with main switch ON (which is indicated by illumination.).
5) Turn ignition switch ON again to ensure that indicator light remains OFF.

2. COMMAND SWITCH

1) Check that command switch is properly set in “SET/COAST”, “RESUME/ACCEL” or “CANCEL” mode.
2) Also check that command switch returns to the original position when released.

3. CONSTANT SPEED TEST

1) Turn main switch ON.
2) Drive vehicle at speed greater than 40 km/h (25 MPH).
3) Press command switch to set in “SET/COAST” mode.
4) Ensure that vehicle is maintained at the speed set when command switch was pressed.

4. ACCELERATION TEST

1) Set vehicle speed at speed greater than 40 km/h (25 MPH).
2) Ensure that vehicle continues to accelerate while holding command switch in RESUME/ ACCEL mode, and that vehicle maintains that optional speed when command switch is released.

5. DECELERATION TEST

1) Set vehicle speed at optional speed greater than 40 km/h (25 MPH).
2) Ensure that vehicle continues to decelerate while holding command switch in SET/COAST mode, and that it maintains that optional speed when command switch is released.

NOTE:
When vehicle speed reaches the lower speed limit of 30 km/h (19 MPH) during deceleration, cruise control will be released.

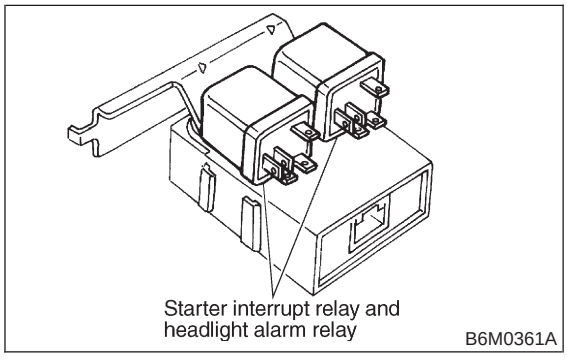
23. Security System

A: REMOVAL AND INSTALLATION

1. STARTER INTERRUPT RELAY

NOTE:
The starter interrupt relay and headlight alarm relay use the same parts and are mounted parallel to each other. Therefore, before removal and installation, identify the starter interrupt relay by the color of its wiring connection. <Ref. to 6-3 [D6AE0].>

1) Remove instrument panel lower cover.
2) Disconnect connector of starter interrupt relay.
3) Remove starter interrupt relay.

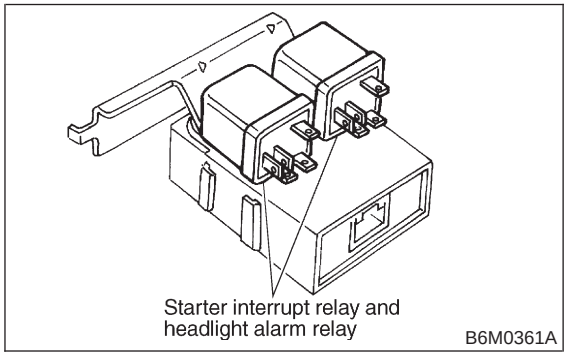


4) Installation is in the reverse order of removal.

2. HEADLIGHT ALARM RELAY

NOTE:
The headlight alarm relay and starter interrupt relay use the same parts and are mounted parallel to each other. Therefore, before removal and installation, identify the headlight alarm relay by the color of its wiring connection. <Ref. to 6-3 [D6AE0].>

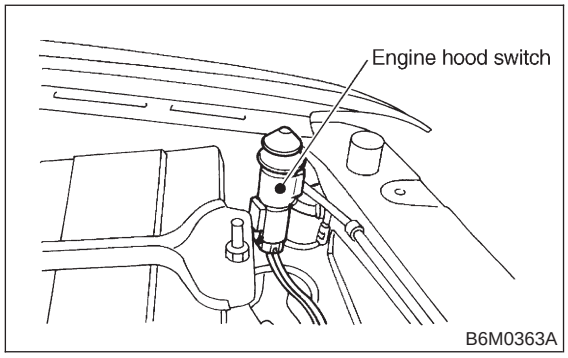
1) Remove instrument panel lower cover.
2) Disconnect connector of headlight alarm relay.
3) Remove headlight alarm relay.



4) Installation is in the reverse order of removal.

3. ENGINE HOOD SWITCH

1) Disconnect connector of engine hood switch from bottom side of switch body.
2) Remove headlight (LH).
3) Remove attaching bolt, and then remove engine hood switch.



4) Installation is in the reverse order of removal.

4. KEY CYLINDER LOCK/UNLOCK SWITCH AND TAMPER SWITCH

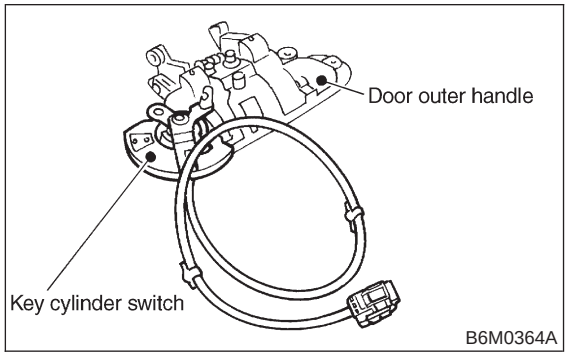
NOTE:
The key cylinder lock switch, unlock switch and tamper switch are united in the switch body.

● Door Switch:

1) Remove door trim panel and sealing cover. <Ref. to 5-2 [W2A3].>
2) Disconnect connector of door key cylinder switch from door cord.
3) Remove door outer handle. <Ref. to 5-2 [W2A8].>

CAUTION:
Be careful not to damage the door surface.

4) Remove clip, and then remove door key cylinder switch from door outer handle.



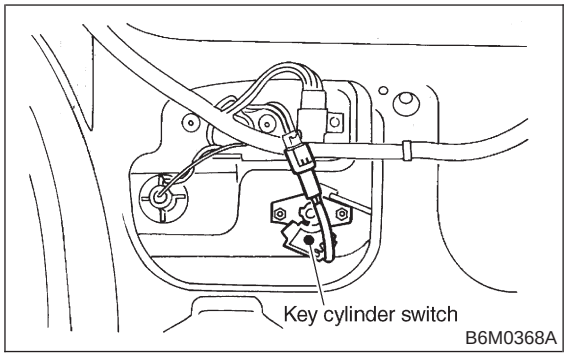
5) Installation is in the reverse order of removal.

● Trunk Lid Switch (SEDAN):

1) Disconnect connector of trunk lid key cylinder switch.
2) Disconnect rod from key cylinder.
3) Remove trunk lid key cylinder switch by pushing it.
4) Installation is in the reverse order of removal.

● Rear Gate Switch (WAGON):

1) Disconnect connector of rear gate key cylinder switch.
2) Disconnect rod from key cylinder.
3) Remove attaching bolts, and then remove rear gate key cylinder switch.



4) Installation is in the reverse order of removal.

5. DOOR LOCK/UNLOCK SWITCH

NOTE:
The door lock/unlock switch is united with the power door lock actuator.

● Driver and Passenger Door:

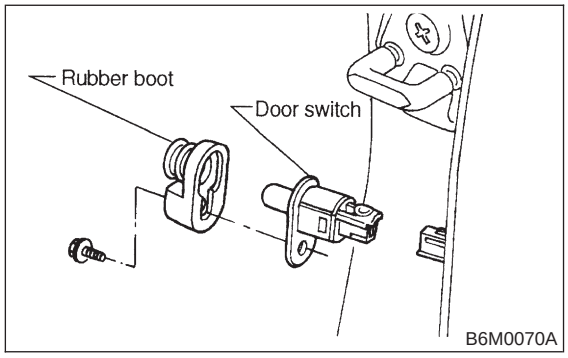
1) Remove door trim panel and sealing cover. <Ref. to 5-2 [W2A3].>
2) Disconnect connector of door lock actuator assembly from door code.
3) Remove door lock actuator assembly. <Ref. to 5-2 [W2A7].>
4) Installation is in the reverse order of removal.

● Rear Gate (WAGON):

1) Remove rear gate trim panel.
2) Disconnect rod from rear gate latch assembly.
3) Disconnect rear gate switch connector and power door lock actuator connector.
4) Remove bolts which secure power door lock actuator.
5) Remove bolts which secure latch.
6) Remove latch and actuator assembly.
7) Installation is in the reverse order of removal.

6. DOOR SWITCH

1) Remove rubber boot of door switch.
2) Remove screw which secures door switch to body.
3) Remove door switch while disconnecting connector.

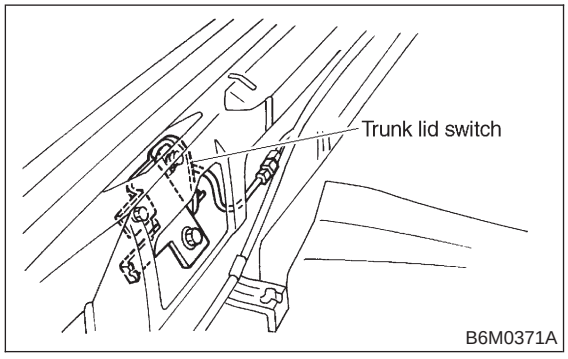


4) Installation is in the reverse order of removal.

7. TRUNK LID SWITCH (SEDAN)

NOTE:
The trunk lid switch is united with the trunk lid lock.

1) Remove trunk rear trim.
2) Disconnect connector of trunk switch (combined with trunk room light switch).
3) Put matching mark on the trunk lid lock and vehicle body before removal.
4) Remove bolts, then remove trunk lid lock from vehicle body.



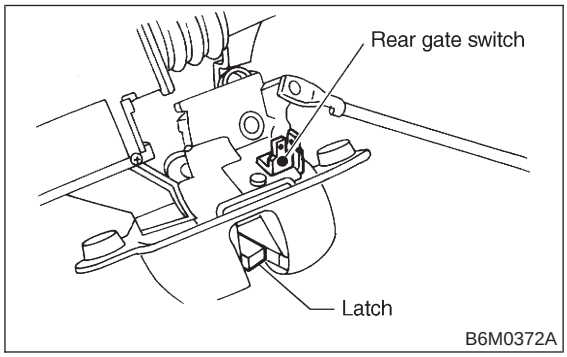
5) Installation is in the reverse order of removal.

NOTE:
Ensure that matching mark is aligned between trunk lid lock and vehicle body.

8. REAR GATE SWITCH (WAGON)

NOTE:
The rear gate switch is united with the rear gate latch assembly.

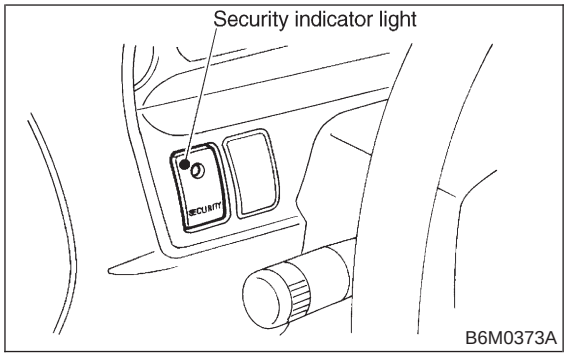
1) Remove rear gate trim panel.
2) Disconnect rod from rear gate latch assembly.
3) Disconnect rear gate switch (combined with luggage room light switch) connector and power door lock actuator connector.



4) Remove bolts which secure power door lock actuator.
5) Remove bolts which secure latch.
6) Remove latch and actuator assembly.
7) Installation is in the reverse order of removal.

9. SECURITY INDICATOR LIGHT

1) Remove screws which secure meter visor.
2) Remove meter visor from instrument panel while disconnecting connectors.
3) Remove security indicator light from meter visor.

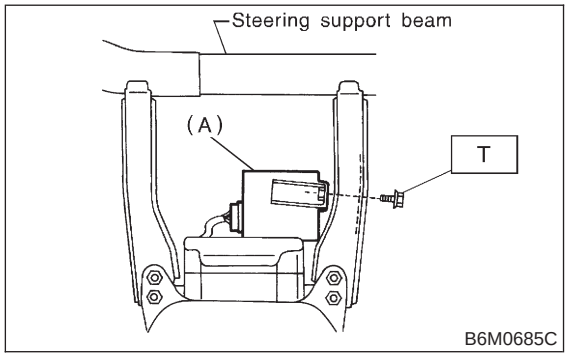


4) Installation is in the reverse order of removal.

10. SECURITY CONTROL MODULE

1) Remove instrument panel. <Ref. to 5-4 [W1A0].>

2) Remove bolt which secures security control module (A).



3) Remove security control module while disconnecting connector.
4) Installation is in the reverse order of removal.

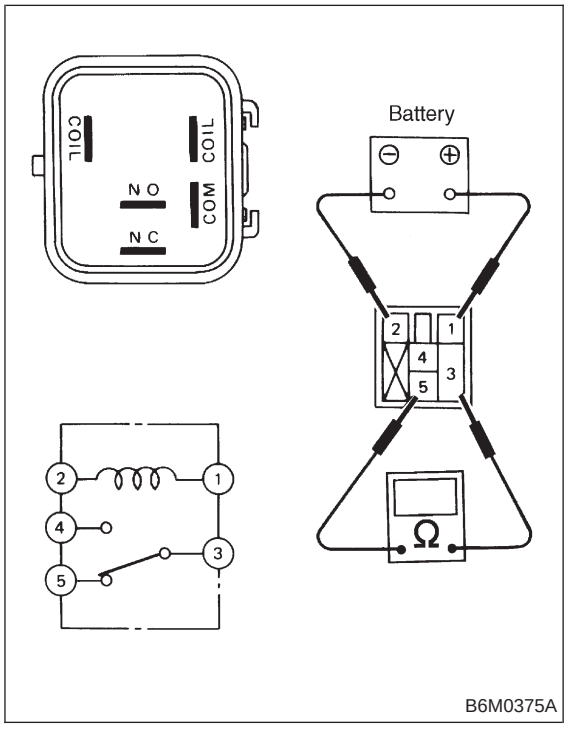
Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

B: INSPECTION

1. STARTER INTERRUPT RELAY

1) Disconnect connector of starter interrupt relay.
2) Connect battery to terminal No.1 and ground terminal No. 2.
3) Check continuity between terminals.

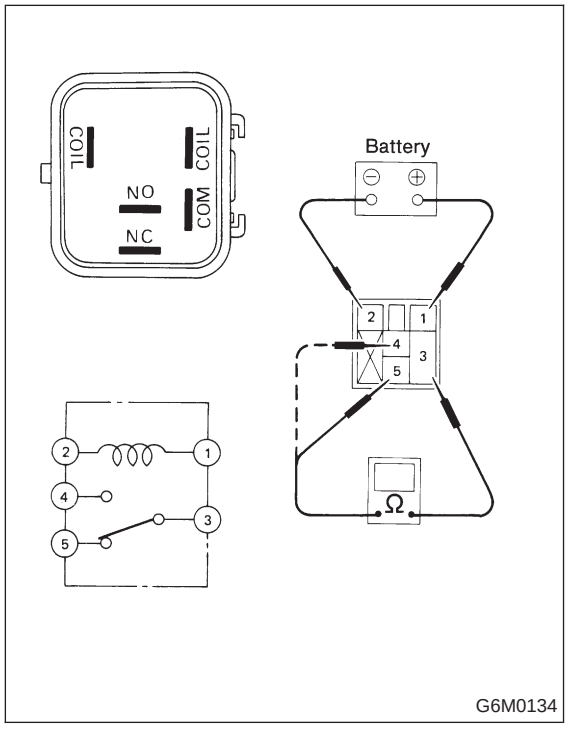
When current flows.	Between terminals No. 3 and No. 5	Continuity does not exist.
When current does not flow.	Between terminals No. 3 and No. 5	Continuity exists.
	Between terminals No. 1 and No. 2	Continuity exists.



2. HEADLIGHT ALARM RELAY

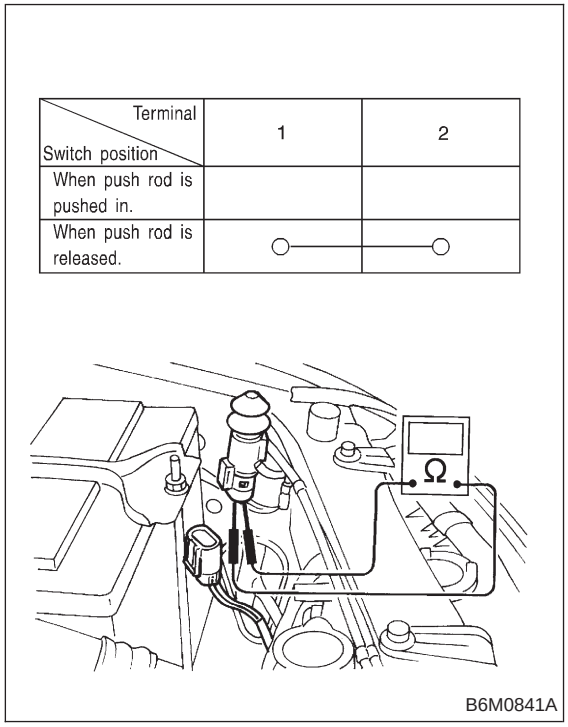
1) Disconnect connector of headlight alarm relay.
2) Connect battery to terminal No. 1 and ground terminal No. 2.
3) Check continuity between terminals.

When current flows.	Between terminals No. 3 and No. 5	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 5	Continuity exists.
	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.



3. ENGINE HOOD SWITCH

1) Disconnect connector of engine hood switch.
2) Check continuity between terminals when push rod is pushed in 1.5 mm (0.059 in) of its stroke.

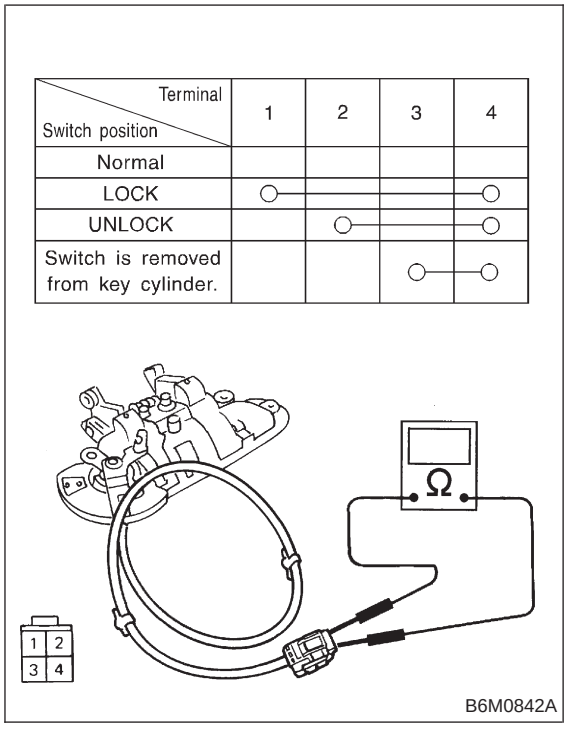


Terminal / Switch position	1	2
When push rod is pushed in.		
When push rod is released.	○	○

4. KEY CYLINDER LOCK/UNLOCK SWITCH AND TAMPER SWITCH

● Door Switch:

1) Disconnect connector of door key cylinder switch.
2) Move switch by turning the key cylinder with ignition key and/or remove switch from key cylinder to check continuity between terminals.



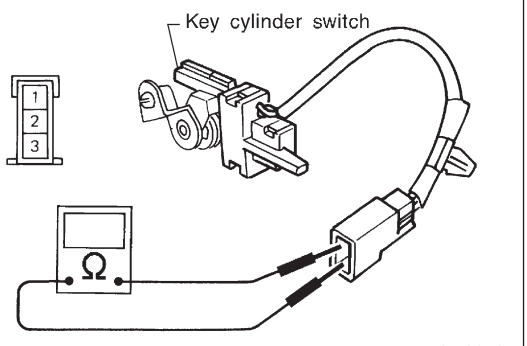
Terminal / Switch position	1	2	3	4
Normal				
LOCK	○			○
UNLOCK		○		○
Switch is removed from key cylinder.			○	○

● Trunk Lid Switch (SEDAN):

1) Disconnect connector of trunk lid key cylinder switch.

2) Move switch by turning the key cylinder with ignition key and/or remove switch from key cylinder to check continuity between terminals.

Switch position \ Terminal	1	2	3
Normal			
UNLOCK	○		○
Switch is removed from key cylinder.		○	○

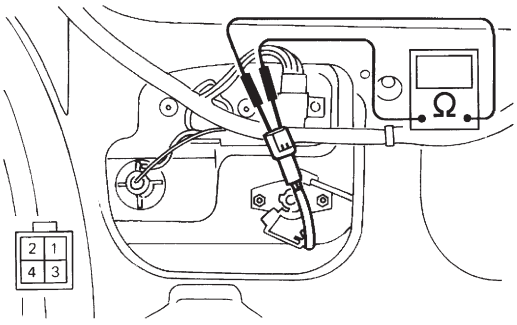


B6M0843A

- **Rear Gate Switch (WAGON):**

1) Disconnect connector of rear gate key cylinder switch.
2) Move switch by turning the key cylinder with ignition key and check continuity between terminals.

Switch position \ Terminal	1	2	4
Normal			
LOCK	○		○
UNLOCK		○	○



B6M0844A

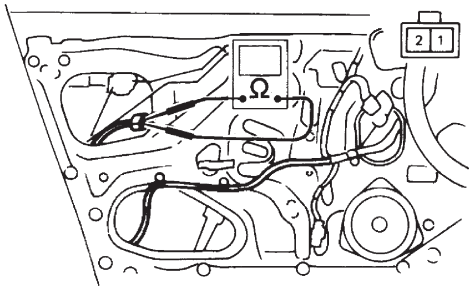
5. DOOR LOCK/UNLOCK SWITCH

NOTE:
The door lock/unlock switch is united with the power door lock actuator.

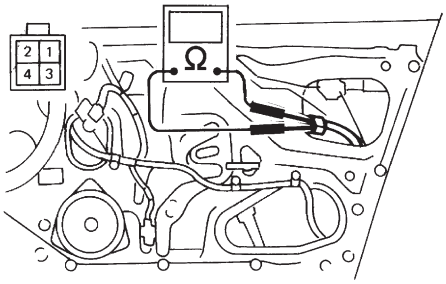
1) Disconnect connector of door lock/unlock switch.

2) Set switch to each position and check continuity between terminals.

Driver's door



Passenger's door and rear gate



Driver's door

Terminal / Switch position	1	2
UNLOCK	○	○
LOCK		

Passenger's Door

Terminal / Switch position	1	2	3	4
UNLOCK	○		○	
LOCK				

Rear Gate (WAGON)

Terminal / Switch position	1	2	3	4
UNLOCK	○		○	
LOCK				

B6M0720A

6. DOOR SWITCH

Inspect door switch. <Ref. to 6-2 [W9B1].>

NOTE:
The door switch is combined with the door switch for room light.

7. TRUNK LID SWITCH (SEDAN)

Inspect trunk lid switch. <Ref. to 6-2 [W9B2].>

NOTE:
The trunk lid switch is combined with the trunk room light switch.

8. REAR GATE SWITCH (WAGON)

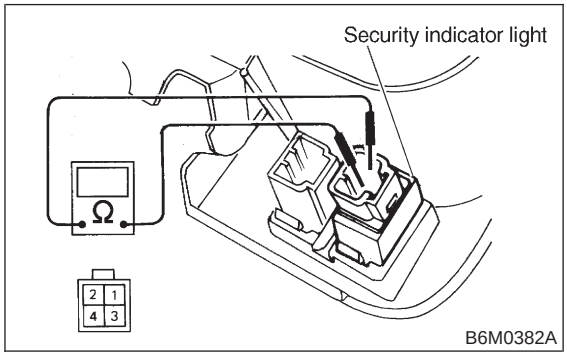
Inspect rear gate switch. <Ref. to 6-2 [W9B3].>

NOTE:
The rear gate switch is combined with the luggage room light switch.

9. SECURITY INDICATOR LIGHT

1) Remove security indicator light.
2) Check continuity between terminals of security indicator light.
3) If there is no continuity, the indicator light will be failured.

Terminals: No. 2 — No. 4



10. SECURITY CONTROL MODULE

Inspect security control module. <Ref. to 6-2b [T600].>

C: FUNCTION TEST

1. SECURITY SYSTEM OPERATION

1) Fully open all the door windows.
2) Turn the ignition switch to OFF and remove ignition key from ignition switch.
3) Get out of the vehicle and lock the driver's door using a ignition key.

4) Check that the security indicator light illuminates.
5) When the security indicator light illuminates, wait for 30 seconds.
After 30 seconds, check that the light starts repeating 0.2 sec. ON and 2.4 sec. OFF sequence.
6) Unlock the driver's door using the inside lock knob and open the door.
Ensure that:
(1) the horn sounds and headlights flash intermittently at 0.2 sec. ON and 0.6 sec. OFF. intervals, and
(2) the engine will not start even if the ignition switch is turned to START.
7) Unlock the driver's door one time using the ignition key.
Ensure the horn and headlights turn off.
8) Close and lock the driver's door without using a ignition key. (Set the inside lock knob to LOCK and then close the door while lifting the outer handle).
Check that the security indicator light illuminates continuously.
9) Within 30 seconds after the already mentioned step 8), unlock the rear LH door using the inside lock knob and open the door.
Check that the security indicator light flashes at 0.5 sec. intervals.
10) Close the rear LH door and lock the door using the inside lock knob.
Check that the security indicator light illuminates continuously.
11) Perform the already mentioned steps 9) and 10) on the rear RH door and front RH door.
12) Within 30 seconds after already mentioned step 11) has been finished, pull the engine hood opener lever and open the engine hood.
Check that the security indicator light flashes at 0.5 sec. intervals.
13) Close the engine hood completely.
Check that the security indicator light illuminates continuously.
14) Within 30 seconds after the already mentioned step 13), pull the trunk lid opener lever and open the trunk lid (SEDAN); or unlock the rear gate by operating the driver's door inside lock knob and open the rear gate (WAGON).
Check that the security indicator light flashes at 0.5 sec. intervals.
15) Close the trunk lid completely (SEDAN); or close the rear gate and lock by locking the driver's door using a ignition key (WAGON).
Check that the security indicator light illuminates continuously.
16) When the security indicator light illuminates continuously, wait for 30 seconds.
After 30 seconds, check that the light starts repeating 0.2 sec. ON and 2.4 sec. OFF sequence.
17) Unlock the trunk lid (SEDAN) or rear gate (WAGON) using a ignition key and open.
Check that the horn and headlights do not operate.
18) Close the trunk lid (SEDAN) or rear gate (WAGON).
19) Unlock and then lock the driver's door using a ignition key and wait for 30 seconds.
After 30 seconds, check that the light starts repeating 0.2 sec. ON and 2.4 sec. OFF sequence.
20) Only WAGON model; unlock and then lock the rear gate using a ignition key and wait for 30 seconds.
After 30 seconds, check that the light starts repeating 0.2 sec. ON and 2.4 sec. OFF sequence.
21) Unlock the front RH door using a ignition key and open the door.
Check that the horn and headlights do not operate.
After finishing these checks, ensure that security system's function is correct.

24. Seat Heater

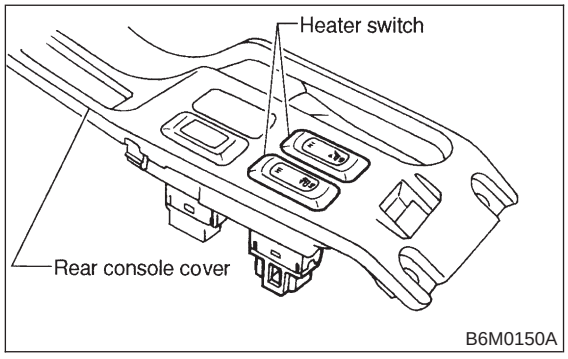
A: REMOVAL AND INSTALLATION

1. SEAT HEATER

Remove and install front seat (including heater system). <Ref. to 5-3 [W1A0].>

2. SEAT HEATER SWITCH

1) Remove screws which secure rear console cover, and then remove rear console cover.
2) Remove seat heater switch from console cover.

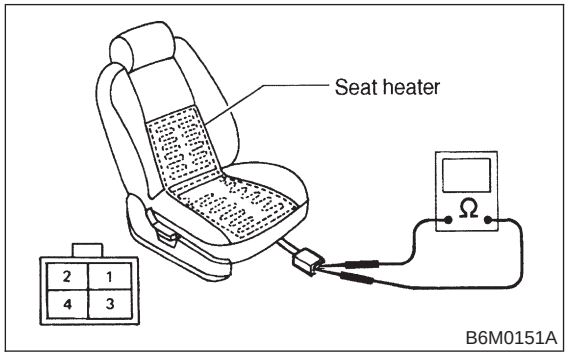


3) Installation is in the reverse order of removal.

B: INSPECTION

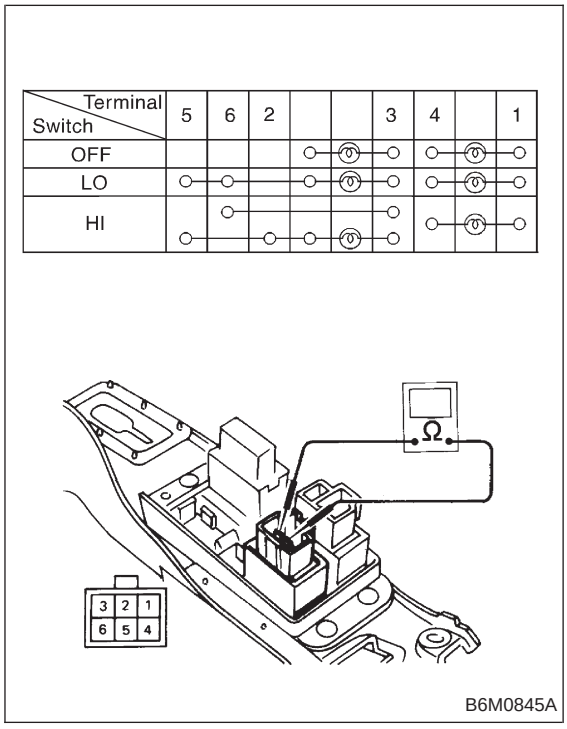
1. SEAT HEATER

Check continuity between terminals of seat heater connector:
- Between terminals No. 1 and No. 3
- Between terminals No. 1 and No. 4
- Between terminals No. 3 and No. 4



2. SEAT HEATER SWITCH

Set switch to each position and check continuity between terminals.

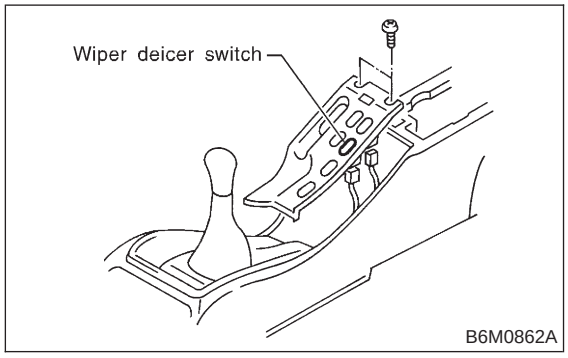


25. Wiper Deicer

A: REMOVAL AND INSTALLATION

1. WIPER DEICER SWITCH

1) Detach console cover while disconnecting connector.
2) Remove wiper deicer switch from console cover.

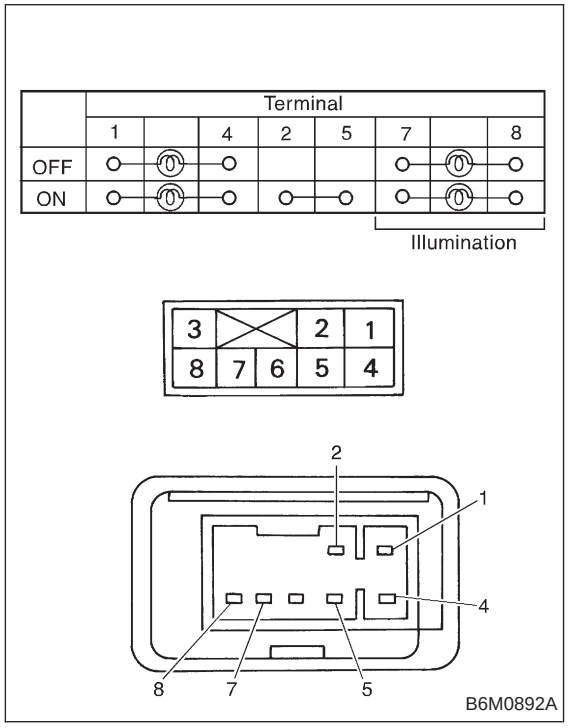


3) Installation is in the rverse order of removal.

B: INSPECTION

1. WIPER DEICER SWITCH

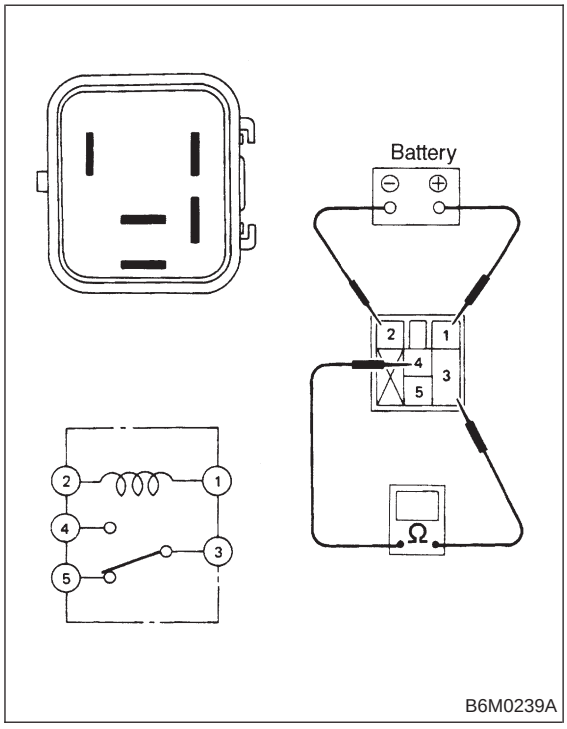
Set switch to each position and check continuity between terminals.



2. WIPER DEICER RELAY

Check continuity between terminals as indicated in table below, when connecting the battery to terminal No. 1 and No. 2.

When current flows.	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.



MEMO:

DIAGNOSTICS SECTION

FOREWORD

This portion of the service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
The diagnostics relating to the Electronic Control System which is made up of various electronic components (ECM's etc.) are explained in this manual.
For the repair or exchange of defective parts, please refer to the SERVICE MANUAL (Repair Section).
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

1. Important Safety Notice

● Providing appropriate service and repair is a matter of great importance in the serviceman's safety maintenance and safe operation, function and performance which the SUBARU vehicle possesses.

● In case the replacement of parts or replenishment of consumables is required, genuine SUBARU parts whose parts numbers are designated or their equivalents must be utilized.

● It must be made well known that the safety of the serviceman and the safe operation of the vehicle would be jeopardized if he used any service parts, consumables, special tools and work procedure manuals which are not approved or designated by SUBARU.

2. How to Use This Manual

● This Service Manual is divided into four volumes by section so that it can be used with ease at work. Refer to the Table of Contents, select and use the necessary section.

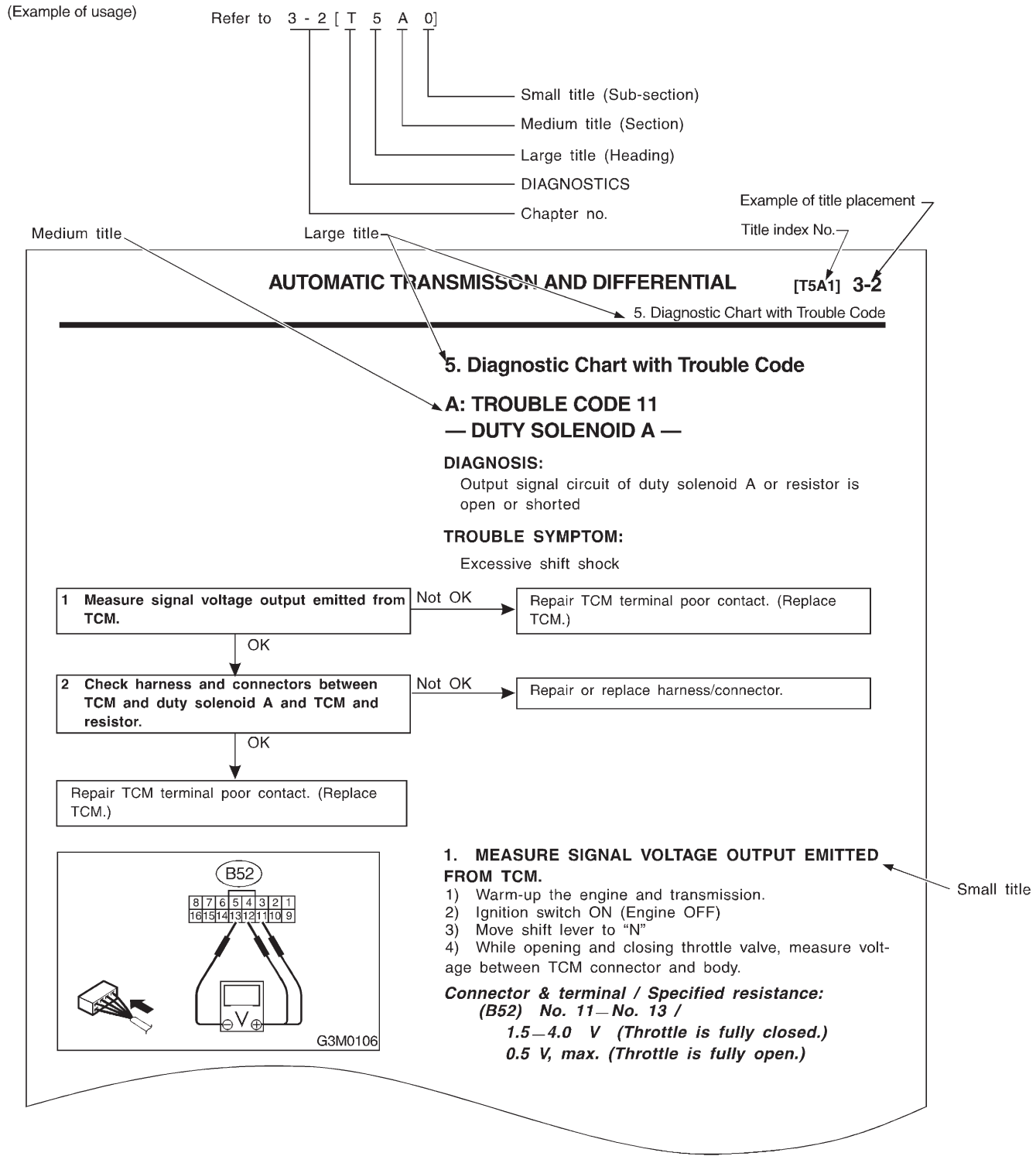
- GENERAL INFORMATION SECTION
- REPAIR SECTION
- DIAGNOSTICS SECTION
- WIRING DIAGRAM SECTION

● The description of each area is provided with four types of titles different in size as shown below. The Title No. or Symbol prefixes each title in order that the construction of the article and the flow of explanation can be easily understood.

[Example of each title]

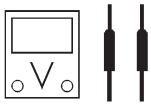
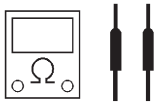
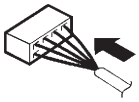
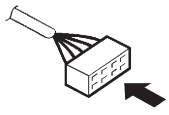
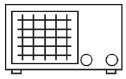
● Area title:	T. DIAGNOSTICS
● Large title (Heading):	1. Diagnostics Chart with Select Monitor (to denote the main item of explanation.)
● Medium title (Section):	A: BASIC DIAGNOSTICS CHART (to denote the type of work in principle.)
● Small title (Sub-section):	1. CHECK INPUT SIGNAL FOR ECM (to denote a derivative item of explanation.)

● The Title Index No. is indicated on the top left (or right) side of the page as the book is opened. This is useful for retrieving the necessary portion.



B0M0001

- In this manual, the following symbols are used.

Character	Description
 B0M0002	Circuit tester ● Voltage measurement
 B0M0003	Circuit tester ● Resistance measurement
 B0M0004	The arrow indicates that insertion of the probe or numbering of the connector pins is made from the side.
 B0M0005	The arrow indicates that insertion of the probe or numbering of the connector pins is made from the side.
 B0M0006	Oscilloscope
B0M0007	Oscilloscope positive probe
B0M0008	Oscilloscope earth head

- **WARNING**, **CAUTION**, NOTE

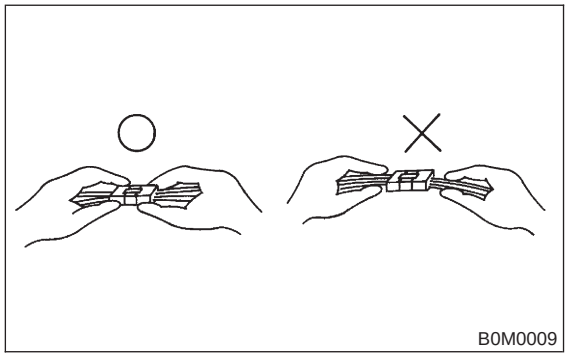
WARNING:	Indicates the item which must be observed precisely during performance of maintenance services in order to avoid injury to the mechanics and other persons.
CAUTION:	Indicates that item which must be followed precisely during performance of maintenance services so as to avoid damage and breakage to the vehicle and its parts and components.
NOTE:	Indicates the hints, knacks, etc. which make the maintenance job easier.

3. Basic Checks

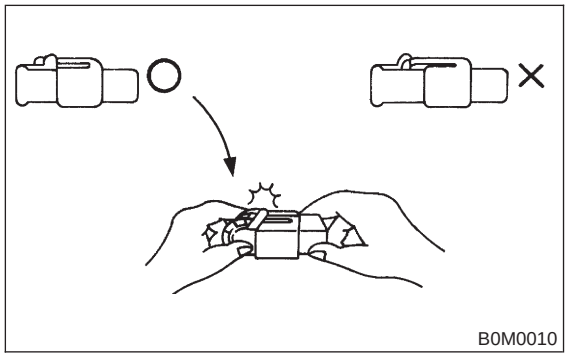
A: DISCONNECTING CONNECTORS

● Always hold the connector itself.

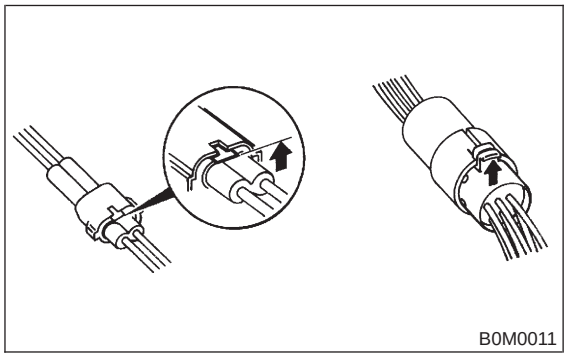
CAUTION:
Don't pull the harness.



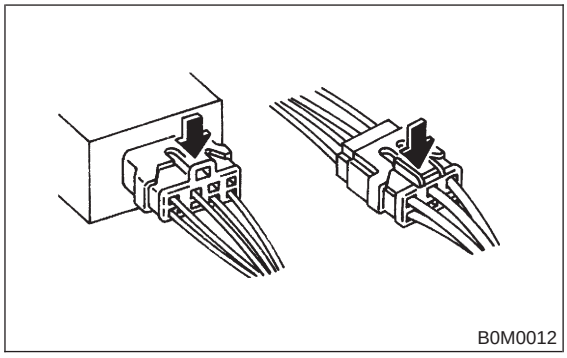
● Inspect a connector by pushing it all the way in. If the connector is equipped with a locking device, push it in until a clicking sound is heard.



● To disconnect a locking connector, first release the lock, then pull the connector off.
<Unlock by pulling the locking tab.>

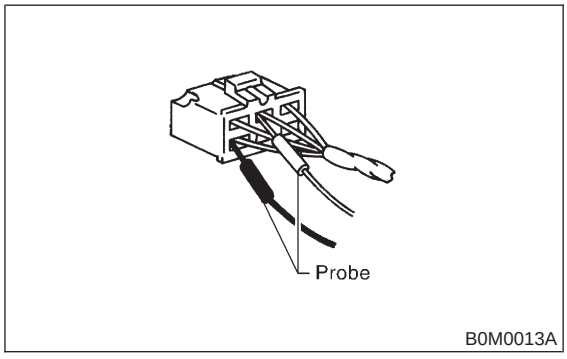


<Unlock by pushing the locking tab.>

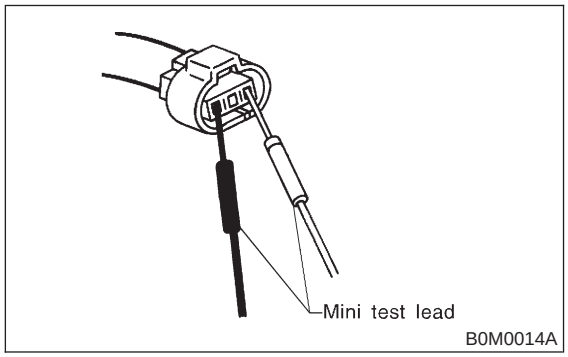


B: INSERTING A PROBE

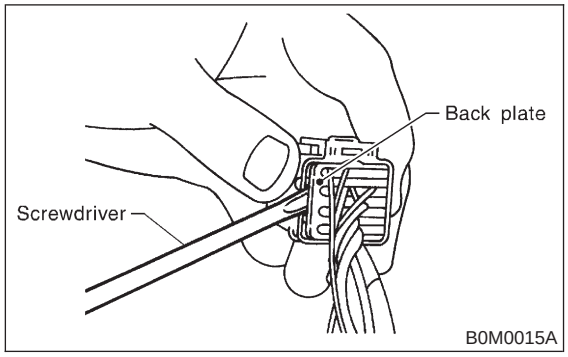
● Generally, probes are inserted into connectors from the rear side (wire side).
● When removing the shock protector take care not to deform it; this also applies to waterproof connectors, which cannot be tested from the wire side.



● Connectors equipped with shock protectors must be checked with a mini probe (thin), or it will be necessary to remove the shock protector.



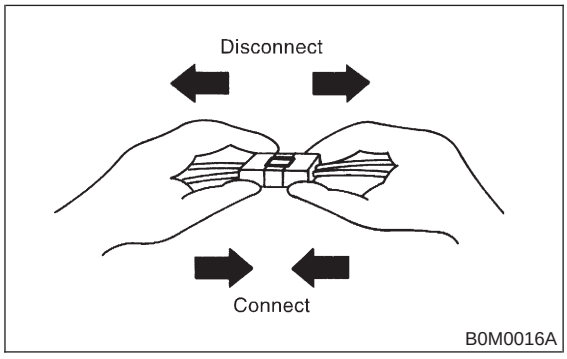
● When the connector has a back plate, remove the plate after removing the projection of the plate first. (Be careful not to use excessive force, since the terminals might brake off.)



C: CHECKING FOR POOR CONTACT ON PLUG-IN CONNECTORS

1. POOR CONTACT

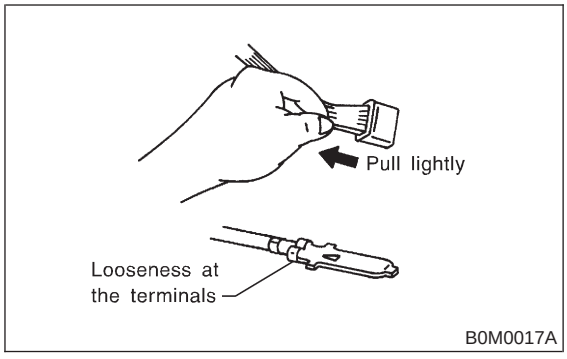
Poor contact is frequently caused by corroded terminals, dirt, foreign substances, weak contact points between male and female connectors, etc. Quite often a plug with poor contact will work perfectly again after it has been pulled off and reconnected. If harness and connector checks do not reveal any defect, it can be assumed that an intermittent contact in a connector is the source of trouble.



2. VISUAL INSPECTION

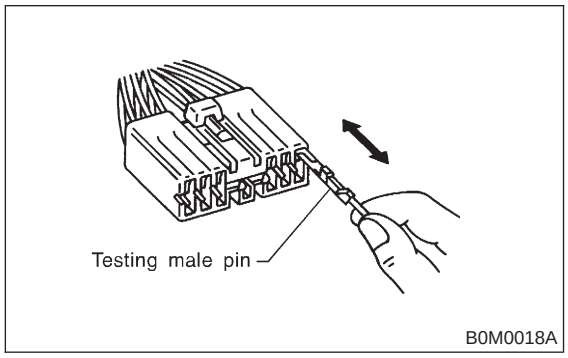
1) Disconnect the two connector halves.
2) Check the connector pins for signs of corrosion or foreign material.
3) Check the connector for loose and damaged terminals, and make sure they are set correctly in the connector.

NOTE:
When the harness is pulled lightly, the terminals should not come out.

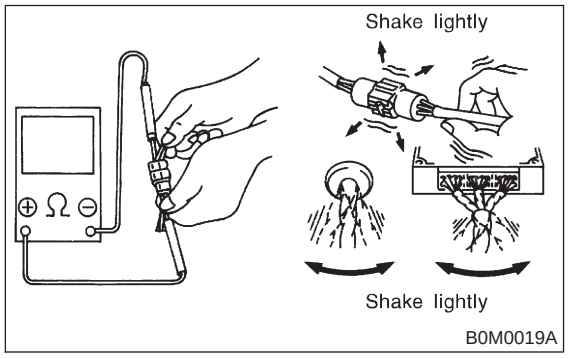


4) Insert the male pin of the connector into the female pin, then pull it out.

NOTE:
If one of the pins allows to pull out easily, it is a likely source of a malfunction.



5) Shake lightly the connector and the harness, and check for sudden changes in voltage or resistance.

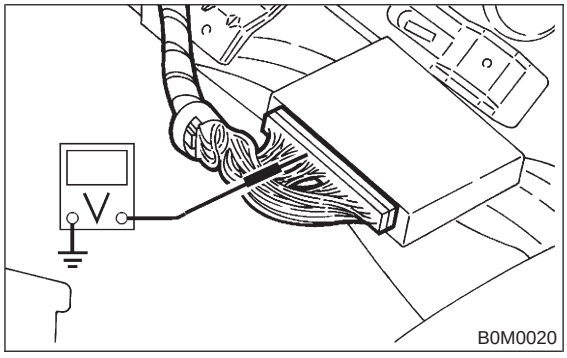


4. Diagnosis and Checking Procedure Using Instruments

A: USING A CIRCUIT TESTER

1. VOLTAGE CHECK (range set to DC V)

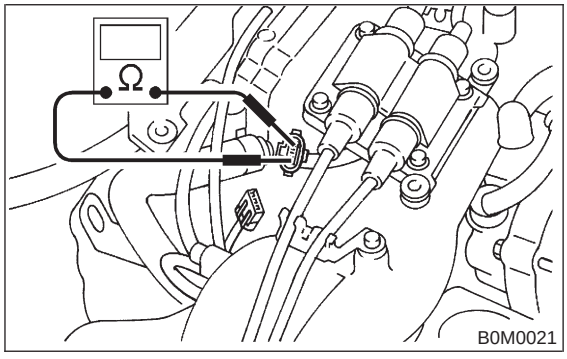
Connect the positive probe to the terminal to be tested, and the negative probe to body ground. (or the ground terminal of the ECM)



2. CHECKING THE CONNECTION (range set to Ω)

Measure the resistance and check for open or shorted wire in the harness or the connector.

NOTE:
This check must be carried out with both connectors disconnected.
(This avoids by-passing the connection through other circuits.)



1) Check for open circuit. (range: Ω × 1K)
Measure the resistance between the respective pins in both connectors.

Specified resistance:
More than 1 MΩ (No continuity) Open circuit
Less than 10 Ω (Continuity) O.K.

2) Check for correct insulation value. (range: Ω × 1K)
Measure the resistance between the pins in both connectors, as well as between the suspected pin and the body. (body short)

Specified resistance:
More than 1 MΩ (No continuity) O.K.
Less than 10 Ω (Continuity) Short circuit

3) Resistance measurement (range set to Ω)
Measuring the internal resistance of sensors, solenoid valves etc. to check the operating condition of components.

NOTE:
● Select the appropriate range for measuring the internal resistance, or the measurement will result in an incorrect reading.
● Before changing the measurement range the gauge must be reset to zero.

B: USING A SUBARU SELECT MONITOR

With this testing procedure the defective component can be determined by directly monitoring input/output signals of the ECM or the trouble codes.

1. FEATURES

● A variety of data can be checked without movements from the drivers seat, passenger's seat or from outside the vehicle.
● This unit allows the identification of the type of malfunction, for example whether the cause is an open or shorted wire in the input/output signal line, or whether the breakdown of a component is caused by a lack of maintenance.

2. DIAGNOSIS

● Refer to the reference values for input/output and control data to determine whether the malfunction is caused by a worn out component, an open wire, a short etc.
● Perform the diagnostics procedure as described in chapter "Check based on trouble codes" by monitoring the trouble codes.

NOTE:
It will be easier to determine a malfunction if the vehicle data for normal conditions are available for comparison.

C: USING AN OSCILLOSCOPE

A malfunction can be determined by displaying the waveforms of input/output signals on the oscilloscope.

1. DIAGNOSIS

A simple comparison of the waveforms may lead to an incorrect diagnosis. To exactly determine the sources of the malfunction it will be necessary to determine them under consideration about information other than waveforms.

2. APPLYING INPUT/OUTPUT SIGNALS

Connect the probe directly with the terminal of the signal.

5. Table of Contents

ENGINE COOLING SYSTEM 2-5

1. Radiator Main Fan

A: OPERATION (WITHOUT A/C MODEL)

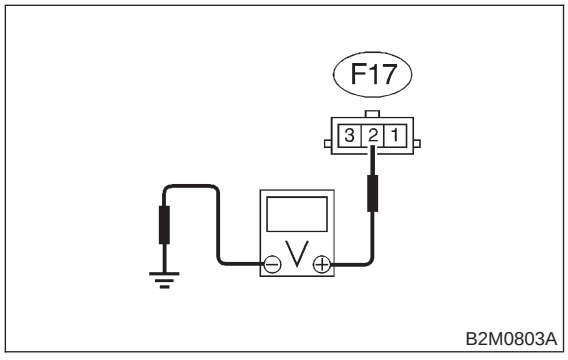
DETECTING CONDITION:
● Engine coolant temperature is above 95°C (203°F).
TROUBLE SYMPTOM:
● Radiator main fan does not operate under the above condition.

1A1 : CHECK POWER SUPPLY TO MAIN FAN MOTOR.

CAUTION:
Be careful not to overheat engine during repair.

1) Turn ignition switch to OFF.
2) Disconnect connector from main fan motor.
3) Start the engine, and warm-up it until engine coolant temperature increases over 95°C (203°F).
4) Stop the engine and turn ignition switch to ON.
5) Measure voltage between main fan motor connector and chassis ground.

Connector & terminal
(F17) No. 2 (+) — Chassis ground (−):

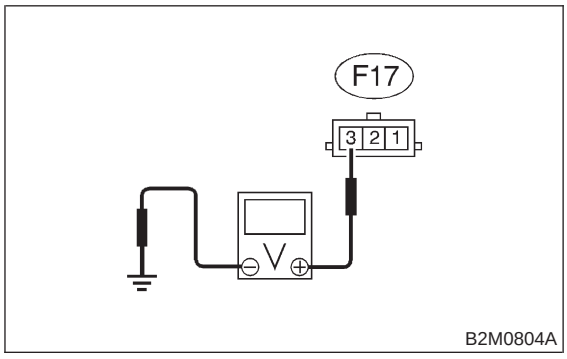


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **1A2**.
NO : Go to step **1A6**.

1A2 : CHECK POWER SUPPLY TO MAIN FAN MOTOR.

Measure voltage between main fan motor connector and chassis ground.

Connector & terminal
(F17) No. 3 (+) — Chassis ground (−):

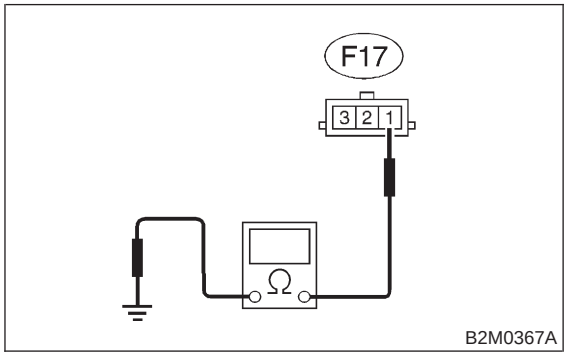


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **1A3**.
NO : Go to step **1A6**.

1A3 : CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.

1) Turn ignition switch to OFF.
2) Measure resistance between main fan motor connector and chassis ground.

Connector & terminal
(F17) No. 1 — Chassis ground:



CHECK : ***Is resistance less than 5 Ω?***
YES : Go to step **1A4**.
NO : Repair open circuit in harness between main fan motor connector and chassis ground.

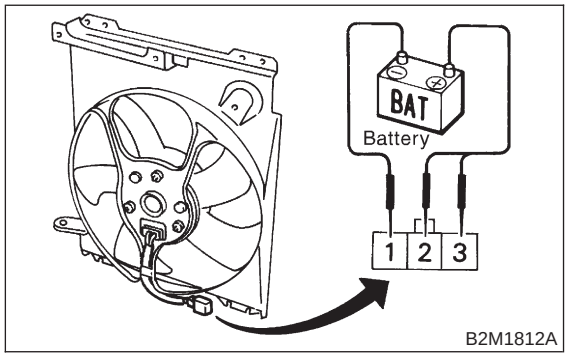
1A4 : CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in main fan motor connector?***
YES : Repair poor contact in main fan motor connector.
NO : Go to step **1A5**.

1A5 : CHECK MAIN FAN MOTOR.

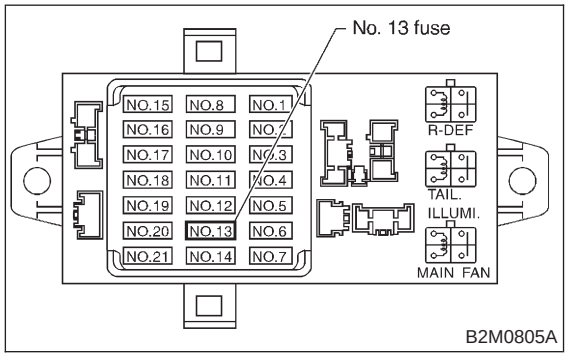
Connect battery positive (+) terminal to terminals No. 2 and No. 3, and negative (−) terminal to terminal No. 1 of main fan motor connector.



CHECK : ***Does the main fan rotate?***
YES : Repair poor contact in main fan motor connector.
NO : Replace main fan motor with a new one.

1A6 : CHECK FUSE.

1) Turn ignition switch to OFF.
2) Remove fuse No. 13 from fuse and relay box.
3) Check condition of fuse.

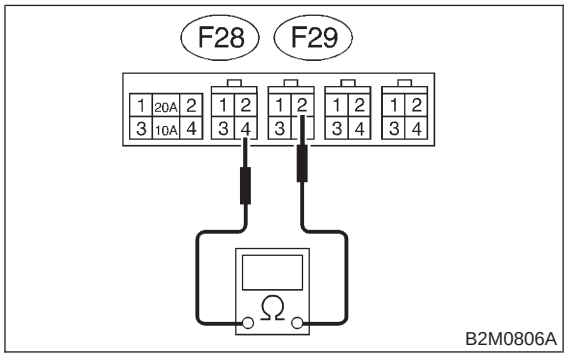


CHECK : ***Is the fuse blown-out?***
YES : Replace fuse.
NO : Go to step **1A7**.

1A7 : CHECK A/C RELAY HOLDER.

1) Turn ignition switch to OFF.
2) Disconnect connectors from A/C relay holder.
3) Measure resistance between A/C relay holder connectors.

Connector & terminal
(F28) No. 4 — (F29) No. 2:

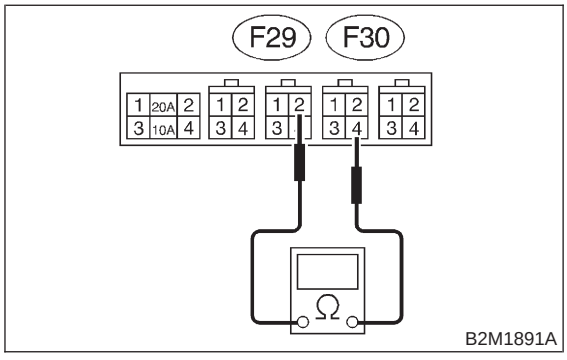


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **1A8**.
NO : Repair open circuit in A/C relay holder short harness.

1A8 : CHECK A/C RELAY HOLDER.

Measure resistance between A/C relay holder connectors.

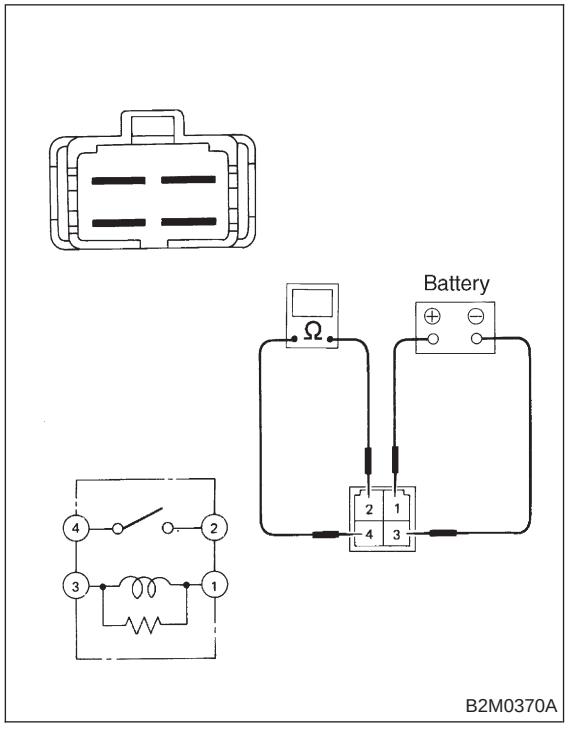
Connector & terminal
(F30) No. 4 — (F29) No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **1A9**.
NO : Repair open circuit in A/C relay holder short harness.

1A9 : CHECK MAIN FAN RELAY.

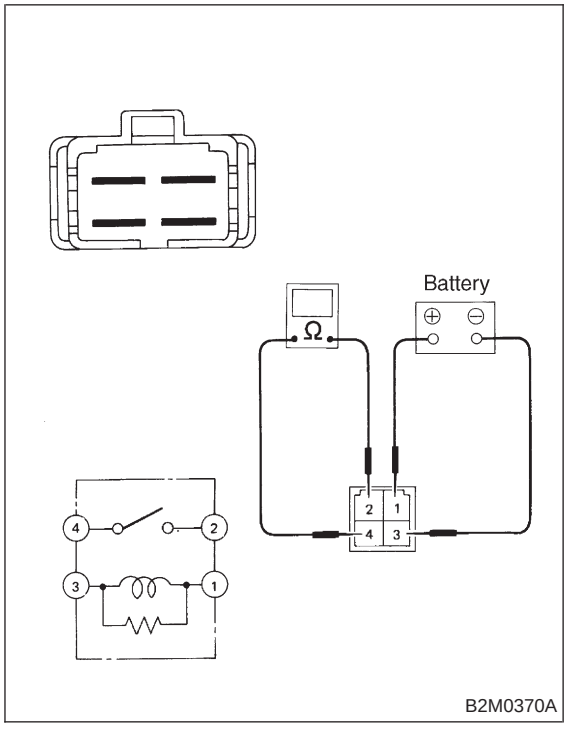
1) Turn ignition switch to OFF.
2) Remove main fan relay from fuse and relay box.
3) Check continuity between main fan relay terminals.



CHECK : ***Does no continuity exist between terminals No. 2 and No. 4?***
YES : Go to step **1A10**.
NO : Replace main fan relay.

1A10 : CHECK MAIN FAN RELAY.

1) Connect battery positive (+) terminal to terminal No. 1 of main fan relay, and negative (−) terminal to terminal No. 3.
2) Check continuity between main fan relay terminals.

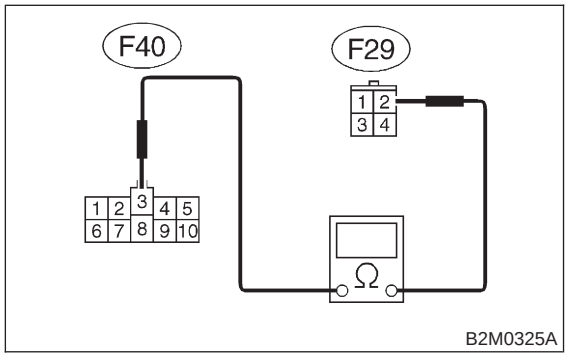


CHECK : ***Does continuity exist between terminals No. 2 and No. 4?***
YES : Go to step **1A11**.
NO : Replace main fan relay.

1A11 : CHECK HARNESS CONNECTOR BETWEEN FUSE AND RELAY BOX AND A/C RELAY HOLDER.

1) Turn ignition switch to OFF.
2) Disconnect connector from fuse and relay box.
3) Measure resistance of harness connector between fuse and relay box and A/C relay holder.

Connector & terminal
(F40) No. 3 — (F29) No. 2:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **1A12**.
NO : Repair open circuit in harness between fuse and relay box and A/C relay holder connector.

1A12 : CHECK POOR CONTACT.

Check poor contact in fuse and relay box connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in fuse and relay box connector?***
YES : Repair poor contact in fuse and relay box connector.
NO : Go to step **1A13**.

1A13 : CHECK POOR CONTACT.

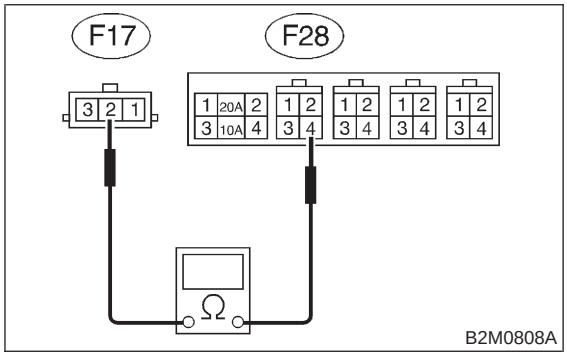
Check poor contact in A/C relay holder connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in A/C relay holder connector?***
YES : Repair poor contact in A/C relay holder connector.
NO : Go to step **1A14**.

1A14 : CHECK HARNESS CONNECTOR BETWEEN A/C RELAY HOLDER AND MAIN FAN MOTOR.

Measure resistance of harness connector between A/C relay holder and main fan motor.

Connector & terminal
(F28) No. 4 — (F17) No. 2:

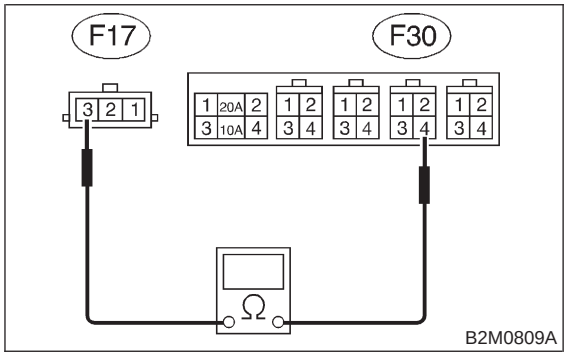


CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **1A15**.
NO : Repair open circuit in harness between A/C relay holder and main fan motor connector.

1A15 : CHECK HARNESS CONNECTOR BETWEEN A/C RELAY HOLDER AND MAIN FAN MOTOR.

Measure resistance of harness connector between A/C relay holder and main fan motor.

Connector & terminal
(F30) No. 4 — (F17) No. 3:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **1A16**.
NO : Repair open circuit in harness between A/C relay holder and main fan motor connector.

1A16 : CHECK POOR CONTACT.

Check poor contact in A/C relay holder connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in A/C relay holder connector?***

YES : Repair poor contact in A/C relay holder connector.

NO : Go to step **1A17**.

1A17 : CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in main fan motor connector?***

YES : Repair poor contact in main fan motor connector.

NO : Refer to 2-7 “On-Board Diagnostics II System” diagnostics procedure.

B: LO MODE OPERATION (WITH A/C MODEL)

DETECTING CONDITION:

Condition (1):
- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is below 10 km/h (6 MPH).

Condition (2):
- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned OFF.
- Vehicle speed is below 10 km/h (6 MPH).

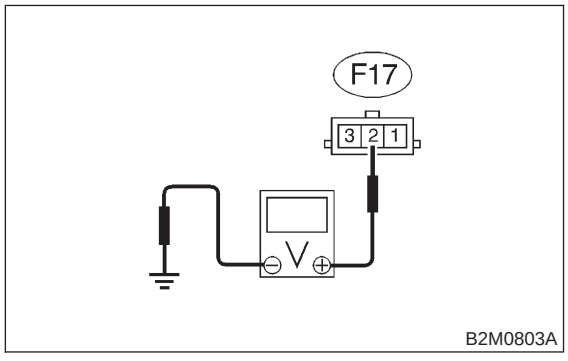
TROUBLE SYMPTOM:
- Radiator main fan does not rotate at LO speed under conditions (1) and (2) above.

1B1 : CHECK POWER SUPPLY TO MAIN FAN MOTOR.

CAUTION:
Be careful not to overheat engine during repair.

1) Turn ignition switch to OFF.
2) Disconnect connector from main fan motor.
3) Start the engine, and warm-up it until engine coolant temperature increases over 95°C (203°F).
4) Stop the engine and turn ignition switch to ON.
5) Turn A/C switch to OFF.
6) Measure voltage between main fan motor connector and chassis ground.

Connector & terminal
(F17) No. 2 (+) — Chassis ground (−):

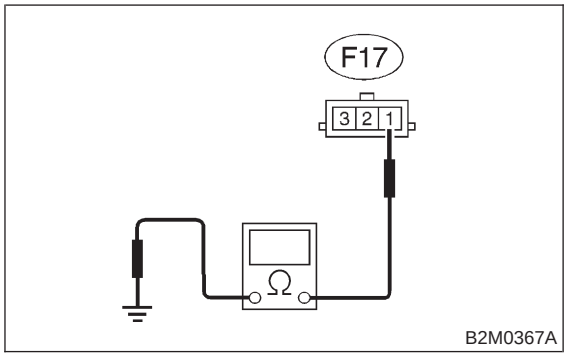


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **1B2**.
NO : Go to step **1B5**.

1B2 : CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.

1) Turn ignition switch to OFF.
2) Measure resistance between main fan motor connector and chassis ground.

Connector & terminal
(F17) No. 1 — Chassis ground:



CHECK : ***Is resistance less than 5 Ω?***
YES : Go to step **1B3**.
NO : Repair open circuit in harness between main fan motor connector and chassis ground.

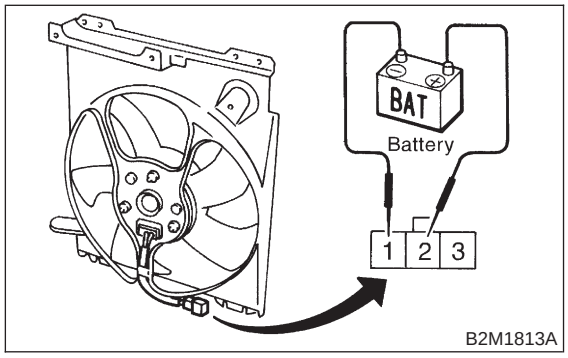
1B3 : CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in main fan motor connector?***
YES : Repair poor contact in main fan motor connector.
NO : Go to step **1B4**.

1B4 : CHECK MAIN FAN MOTOR.

Connect battery positive (+) terminal to terminals No. 2 of main fan motor connector, and negative (−) terminal to terminal No. 1.

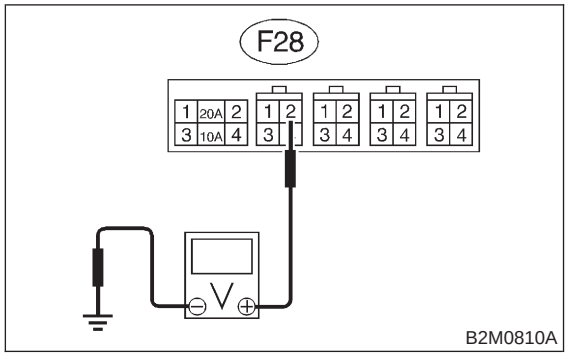


CHECK : ***Does the main fan rotate at LO speed?***
YES : Repair poor contact in main fan motor connector.
NO : Replace main fan motor with a new one.

1B5 : CHECK POWER SUPPLY TO MAIN FAN RELAY-1.

1) Turn ignition switch to OFF.
2) Remove main fan relay-1 from A/C relay holder.
3) Measure voltage between main fan relay-1 terminal and chassis ground.

Connector & terminal
(F28) No. 2 (+) — Chassis ground (−):

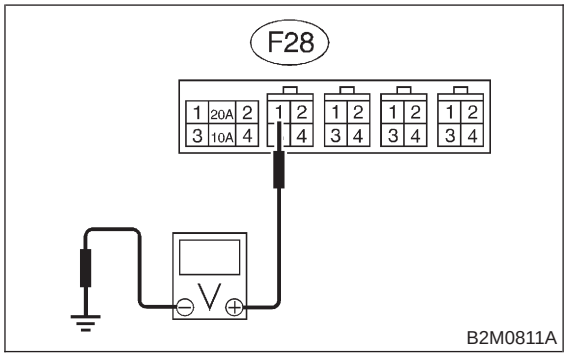


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **1B6**.
NO : Go to step **1B7**.

1B6 : CHECK POWER SUPPLY TO MAIN FAN RELAY-1.

1) Turn ignition switch to ON.
2) Measure voltage between main fan relay-1 terminal and chassis ground.

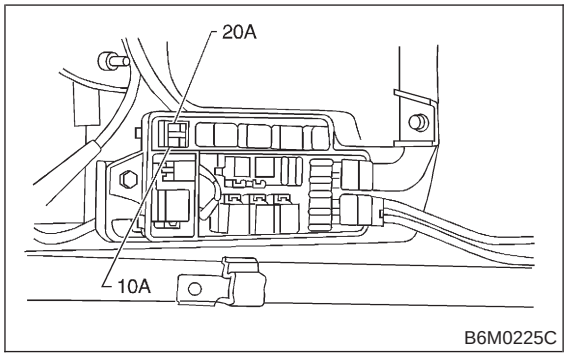
Connector & terminal
(F28) No. 1 (+) — Chassis ground (−):



CHECK : ***Is voltage more than 10 V?***
YES : Go to step **1B17**.
NO : Go to step **1B12**.

1B7 : CHECK 20 A FUSE.

1) Turn ignition switch to OFF.
2) Remove 20 A fuse from A/C relay holder.
3) Check condition of fuse.

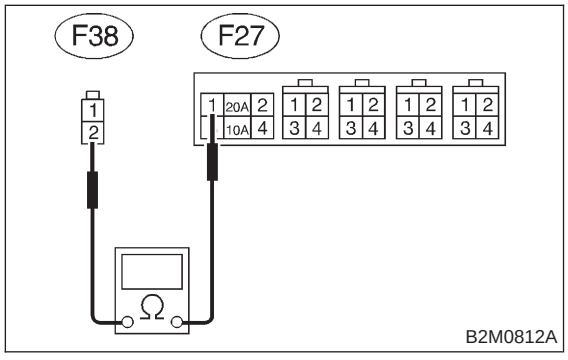


CHECK : ***Is the fuse blown-out?***
YES : Replace fuse.
NO : Go to step **1B8**.

1B8 : CHECK HARNESS CONNECTOR BETWEEN MAIN FUSE BOX AND A/C RELAY HOLDER 20 A FUSE.

1) Turn ignition switch to OFF.
2) Disconnect connector from main fuse box.
3) Disconnect connectors (F25) and (F26) from generator.
4) On LHD model, disconnect connector (F34) from SBF holder.
5) Measure resistance of harness between main fuse box connector and A/C relay holder 20 A fuse terminal.

Connector & terminal
(F38) No. 2 — (F27) No. 1:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **1B9**.
NO : Repair open circuit in harness between main fuse box connector and 20 A fuse terminal.

1B9 : CHECK POOR CONTACT.

Check poor contact in main fuse box connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in main fuse box connector?***
YES : Repair poor contact in main fuse box connector.
NO : Go to step **1B10**.

1B10 : CHECK POOR CONTACT.

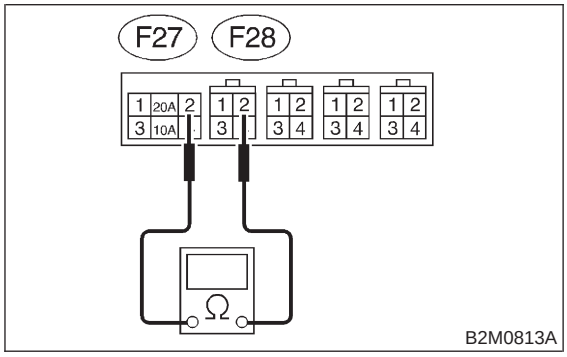
Check poor contact in A/C relay holder 20A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in A/C relay holder 20 A fuse connector?***
YES : Repair poor contact in 20 A fuse connector.
NO : Go to step **1B11**.

1B11 : CHECK HARNESS CONNECTOR BETWEEN 20 A FUSE AND MAIN FAN RELAY-1 IN A/C RELAY HOLDER.

Measure resistance of harness between 20 A fuse and main fan relay-1 terminal.

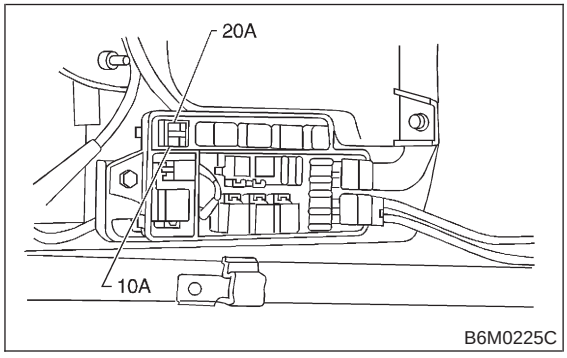
Connector & terminal
(F27) No. 2 — (F28) No. 2:



CHECK : ***Is resistance less than 1 Ω?***
YES : Repair poor contact in main fan relay-1 connector.
NO : Repair open circuit in harness between 20 A fuse and main fan relay-1 connector.

1B12 : CHECK 10 A FUSE.

1) Turn ignition switch to OFF.
2) Remove 10 A fuse from A/C relay holder.
3) Check condition of fuse.

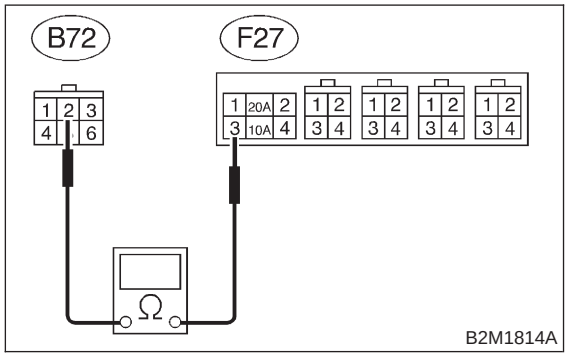


CHECK : ***Is the fuse blown-out?***
YES : Replace fuse.
NO : Go to step **1B13**.

1B13 : CHECK HARNESS CONNECTOR BETWEEN IGNITION SWITCH AND A/C RELAY HOLDER 10 A FUSE.

1) Turn ignition switch to OFF.
2) Disconnect connector from ignition switch.
3) Disconnect connector (i5) from fuse and relay box.
4) Measure resistance of harness between ignition switch connector and A/C relay holder 10 A fuse terminal.

Connector & terminal
(B72) No. 2 — (F27) No. 3:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **1B14**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ignition switch connector and 10 A fuse terminal.
- Poor contact in coupling connector (B61).

1B14 : CHECK POOR CONTACT.

Check poor contact in ignition switch connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ignition switch connector?***
YES : Repair poor contact in ignition switch connector.
NO : Go to step **1B15**.

1B15 : CHECK POOR CONTACT.

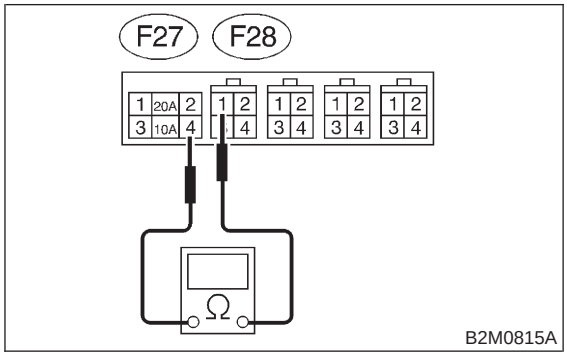
Check poor contact in A/C relay holder 10A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in A/C relay holder 10 A fuse connector?***
YES : Repair poor contact in 10 A fuse connector.
NO : Go to step **1B16**.

1B16 : CHECK HARNESS CONNECTOR BETWEEN 10 A FUSE AND MAIN FAN RELAY-1 IN A/C RELAY HOLDER.

Measure resistance of harness between 10 A fuse and main fan relay-1 terminal.

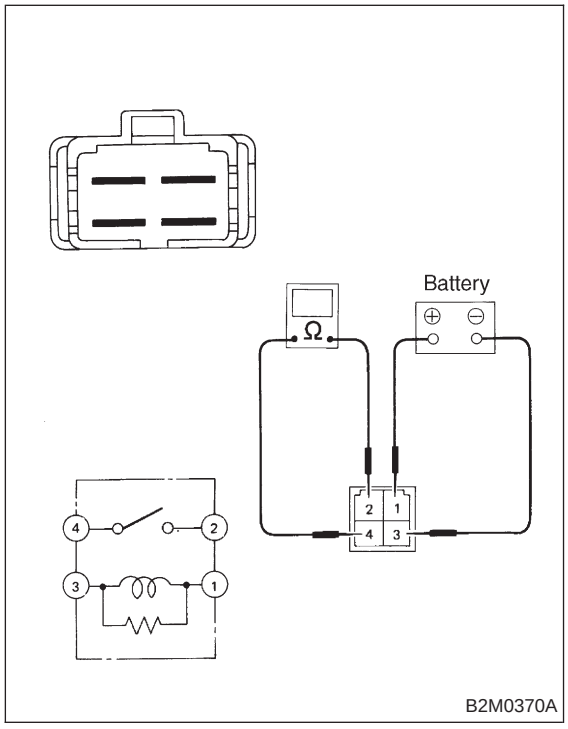
Connector & terminal
(F27) No. 4 — (F28) No. 1:



CHECK : ***Is resistance less than 1 Ω?***
YES : Repair poor contact in main fan relay-1 connector.
NO : Repair open circuit in harness between 10 A fuse and main fan relay-1 connector.

1B17 : CHECK MAIN FAN RELAY-1.

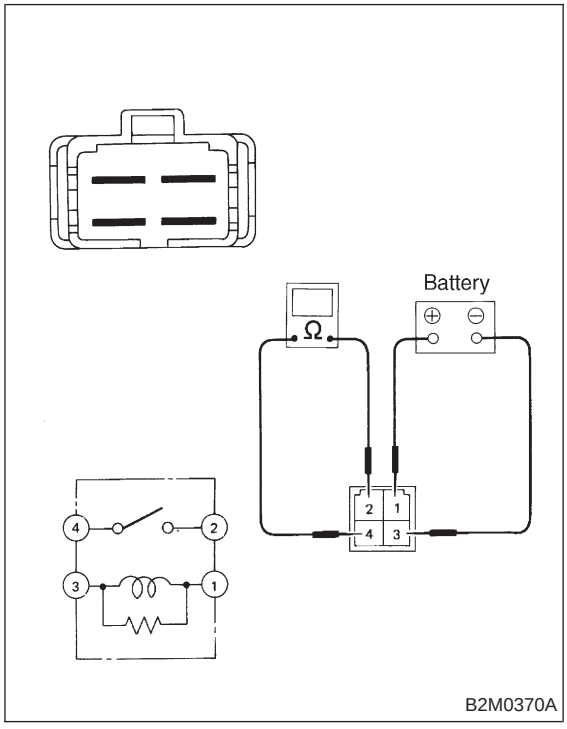
1) Turn ignition switch to OFF.
2) Check continuity between main fan relay-1 terminals.



CHECK : ***Does continuity exist between terminals No. 2 and No. 4?***
YES : Replace main fan relay-1.
NO : Go to step **1B18**.

1B18 : CHECK MAIN FAN RELAY-1.

1) Connect battery to terminals No. 1 and No. 3 of main fan relay-1.
2) Check continuity between main fan relay-1 terminals.

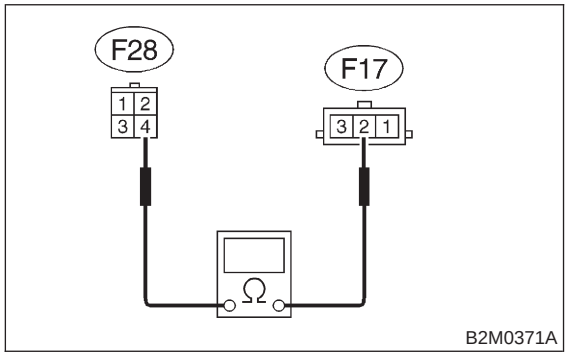


CHECK : ***Does continuity exist between terminals No. 2 and No. 4?***
YES : Go to step **1B19**.
NO : Replace main fan relay-1.

1B19 : CHECK HARNESS CONNECTOR BETWEEN MAIN FAN RELAY-1 AND MAIN FAN MOTOR.

Measure resistance of harness between main fan motor connector and main fan relay-1 terminal.

Connector & terminal
(F17) No. 2 — (F28) No. 4:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **1B20**.
NO : Repair open circuit in harness between main fan motor and main fan relay-1 connector.

1B20 : CHECK POOR CONTACT.

Check poor contact in main fan relay-1 connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in main fan relay-1 connector?***
YES : Repair poor contact in main fan relay-1 connector.
NO : Go to step **1B21**.

1B21 : CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in main fan motor connector?***
YES : Repair poor contact in main fan motor connector.
NO : Refer to 2-7 “On-Board Diagnostics II System” diagnostics procedure.

C: HI MODE OPERATION (WITH A/C MODEL)

DETECTING CONDITION:

Condition (1):
- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is over 20 km/h (12 MPH).

Condition (2):
- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned OFF.
- Vehicle speed is over 20 km/h (12 MPH).

Condition (3):
- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned ON.

TROUBLE SYMPTOM:
- Radiator main fan does not rotate at HI speed under conditions (1), (2) and (3) above.

1C1 : CHECK OPERATION OF MAIN FAN MOTOR LO MODE.

CAUTION:
Be careful not to overheat engine during repair.

1) Start the engine, and warm-up it until engine coolant temperature increases over 95°C (203°F).
2) Stop the engine and turn ignition switch to ON.
3) Turn A/C switch to OFF.

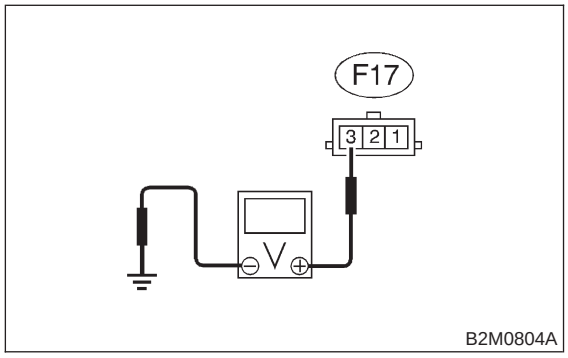
CHECK : ***Does the main fan operate at LO MODE?***
YES : Go to step **1C2**.
NO : Go to LO MODE OPERATION diagnostics chart. <Ref. to 2-5 [T1B0].>

1C2 : CHECK POWER SUPPLY TO MAIN FAN MOTOR.

CAUTION:
Be careful not to overheat engine during repair.

1) Turn ignition switch to OFF.
2) Disconnect connector from main fan motor.
3) Warm-up the engine until engine coolant temperature increases over 95°C (203°F).
4) Stop the engine and turn ignition switch to ON.
5) Turn A/C switch to ON.
6) Measure voltage between main fan motor connector and chassis ground.

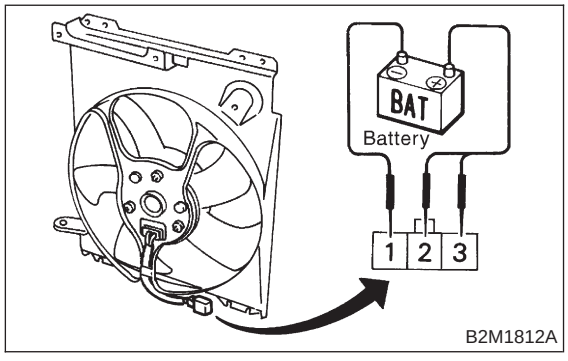
Connector & terminal
(F17) No. 3 (+) — Chassis ground (−):



CHECK : ***Is voltage more than 10 V?***
YES : Go to step **1C3**.
NO : Go to step **1C4**.

1C3 : CHECK MAIN FAN MOTOR.

1) Turn ignition switch and A/C switch to OFF.
2) Connect battery positive (+) terminal to terminals No. 2 and No. 3 of main fan motor connector, and negative (−) terminal to terminal No. 1.

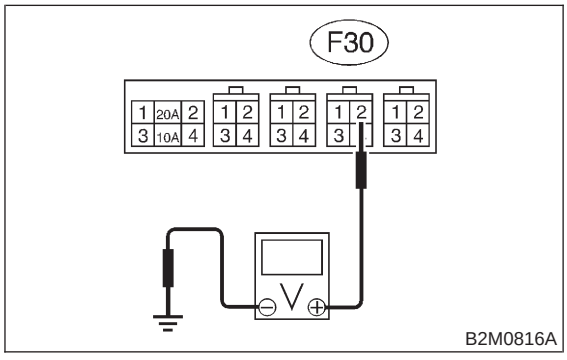


CHECK : ***Does the main fan rotate at HI speed?***
YES : Repair poor contact in main fan motor connector.
NO : Replace main fan motor with a new one.

1C4 : CHECK POWER SUPPLY TO MAIN FAN RELAY-2.

1) Turn ignition switch and A/C switch to OFF.
2) Remove main fan relay-2 from A/C relay holder.
3) Measure voltage between main fan relay-2 terminal and chassis ground.

Connector & terminal
(F30) No. 2 (+) — Chassis ground (−):

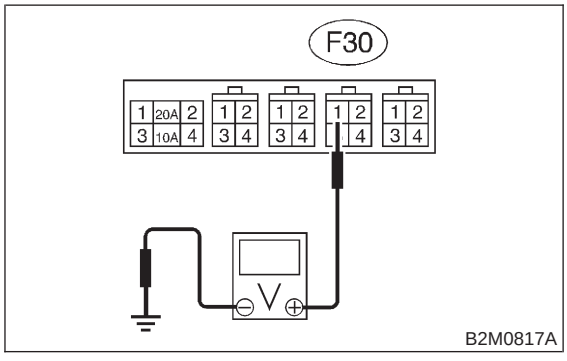


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **1C5**.
NO : Go to step **1C6**.

1C5 : CHECK POWER SUPPLY TO MAIN FAN RELAY-2.

1) Turn ignition switch to ON.
2) Measure voltage between main fan relay-2 terminal and chassis ground.

Connector & terminal
(F30) No. 1 (+) — Chassis ground (−):

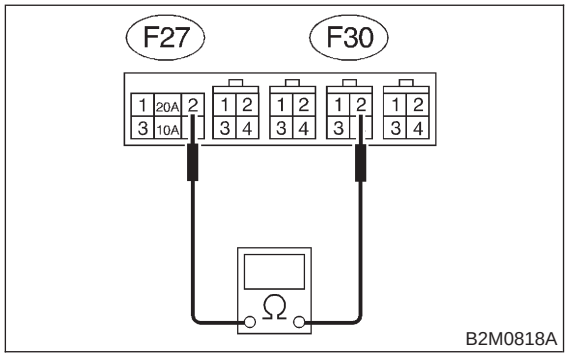


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **1C8**.
NO : Go to step **1C7**.

1C6 : CHECK HARNESS CONNECTOR BETWEEN 20 A FUSE AND MAIN FAN RELAY-2 IN A/C RELAY HOLDER.

1) Turn ignition switch to OFF.
2) Remove 20 A fuse from A/C relay holder.
3) Measure resistance of harness between 20 A fuse and main fan relay-2 terminal.

Connector & terminal
(F27) No. 2 — (F30) No. 2:

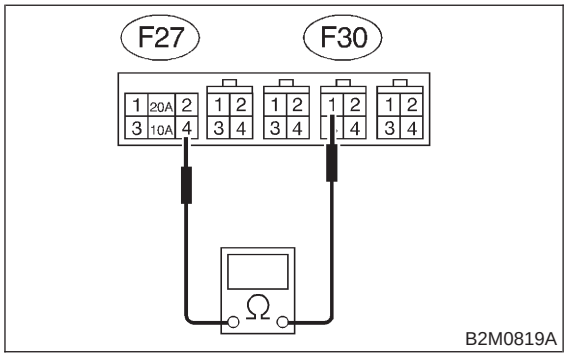


CHECK : ***Is resistance less than 1 Ω?***
YES : Repair poor contact in main fan relay-2 connector.
NO : Repair open circuit in harness between 20 A fuse and main fan relay-2 connector.

1C7 : CHECK HARNESS CONNECTOR BETWEEN 10 A FUSE AND MAIN FAN RELAY-2 IN A/C RELAY HOLDER.

1) Turn ignition switch to OFF.
2) Remove 10 A fuse from A/C relay holder.
3) Measure resistance of harness between 10 A fuse and main fan relay-2 terminal.

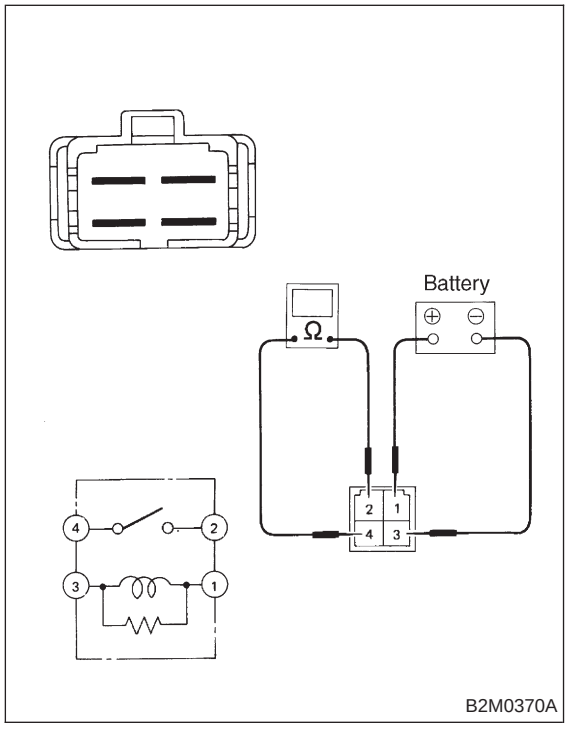
Connector & terminal
(F27) No. 4 — (F30) No. 1:



CHECK : ***Is resistance less than 1 Ω?***
YES : Repair poor contact in main fan relay-2 connector.
NO : Repair open circuit in harness between 10 A fuse and main fan relay-2 connector.

1C8 : CHECK MAIN FAN RELAY-2.

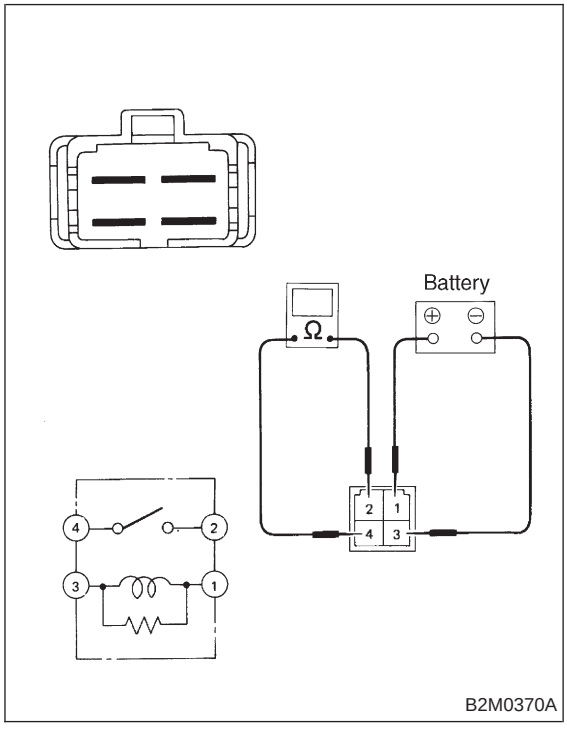
1) Turn ignition switch to OFF.
2) Check continuity between main fan relay-2 terminals.



CHECK : ***Does continuity exist between terminals No. 2 and No. 4?***
YES : Replace main fan relay-2.
NO : Go to step **1C9**.

1C9 : CHECK MAIN FAN RELAY-2.

1) Connect battery to terminals No. 1 and No. 3 of main fan relay-2.
2) Check continuity between main fan relay-2 terminals.

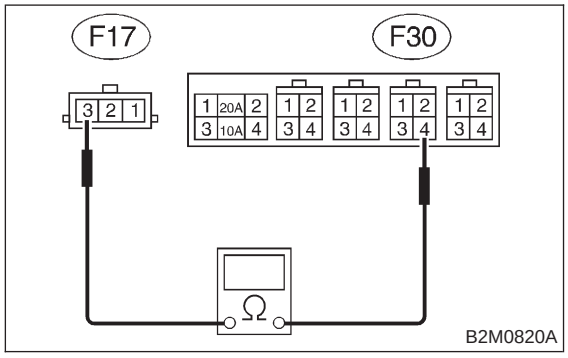


CHECK : ***Does continuity exist between terminals No. 2 and No. 4?***
YES : Go to step **1C10**.
NO : Replace main fan relay-2.

1C10 : CHECK HARNESS CONNECTOR BETWEEN MAIN FAN RELAY-2 AND MAIN FAN MOTOR.

Measure resistance of harness between main fan motor connector and main fan relay-2 terminal.

Connector & terminal
(F17) No. 3 — (F30) No. 4:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **1C11**.
NO : Repair open circuit in harness between main fan motor and main fan relay-2 connector.

1C11 : CHECK POOR CONTACT.

Check poor contact in main fan relay-2 connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in main fan relay-2 connector?***
YES : Repair poor contact in main fan relay-2 connector.
NO : Go to step **1C12**.

1C12 : CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in main fan motor connector?***
YES : Repair poor contact in main fan motor connector.
NO : Refer to 2-7 “On-Board Diagnostics II System” diagnostics procedure.

2. Radiator Sub Fan (With A/C model only)

A: LO MODE OPERATION

DETECTING CONDITION:

Condition (1):
- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is below 10 km/h (6 MPH).

Condition (2):
- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned OFF.
- Vehicle speed is below 10 km/h (6 MPH).

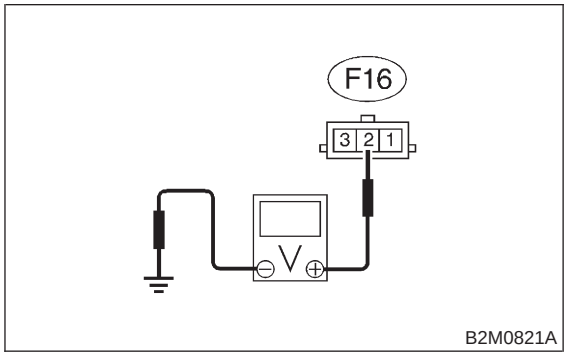
TROUBLE SYMPTOM:
- Radiator sub fan does not rotate at LO speed under conditions (1) and (2) above.

2A1 : CHECK POWER SUPPLY TO SUB FAN MOTOR.

CAUTION:
Be careful not to overheat engine during repair.

1) Turn ignition switch to OFF.
2) Disconnect connector from sub fan motor.
3) Start the engine, and warm-up it until engine coolant temperature increases over 95°C (203°F).
4) Stop the engine and turn ignition switch to ON.
5) Turn A/C switch to OFF.
6) Measure voltage between sub fan motor connector and chassis ground.

Connector & terminal
(F16) No. 2 (+) — Chassis ground (−):

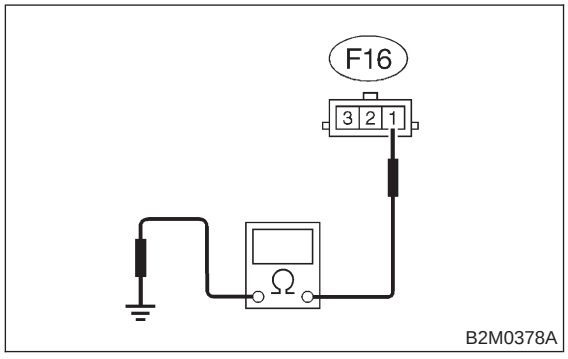


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **2A2**.
NO : Go to step **2A5**.

2A2 : CHECK GROUND CIRCUIT OF SUB FAN MOTOR.

1) Turn ignition switch to OFF.
2) Measure resistance between sub fan motor connector and chassis ground.

Connector & terminal
(F16) No. 1 — Chassis ground:



CHECK : ***Is resistance less than 5 Ω?***
YES : Go to step **2A3**.
NO : Repair open circuit in harness between sub fan motor connector and chassis ground.

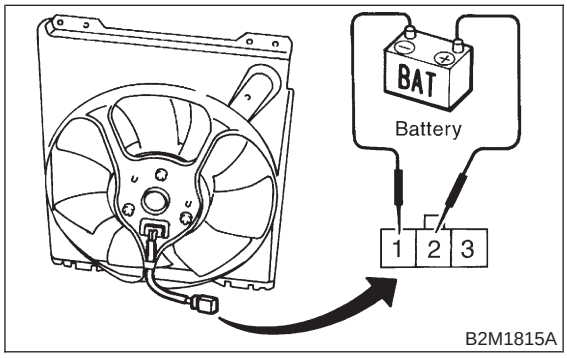
2A3 : CHECK POOR CONTACT.

Check poor contact in sub fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in sub fan motor connector?***
YES : Repair poor contact in sub fan motor connector.
NO : Go to step **2A4**.

2A4 : CHECK SUB FAN MOTOR.

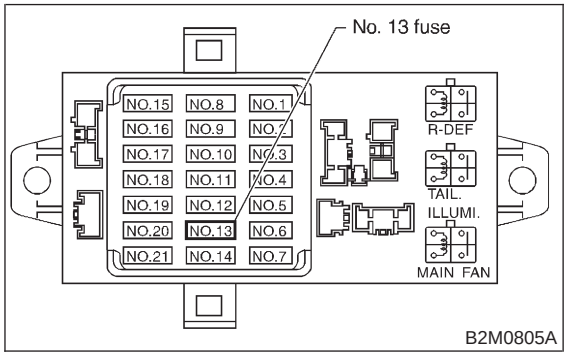
Connect battery positive (+) terminal to terminal No. 2 of sub fan motor, and negative (−) terminal to terminal No. 1.



CHECK : ***Does the sub fan rotate at LO speed?***
YES : Repair poor contact in sub fan motor connector.
NO : Replace sub fan motor with a new one.

2A5 : CHECK FUSE.

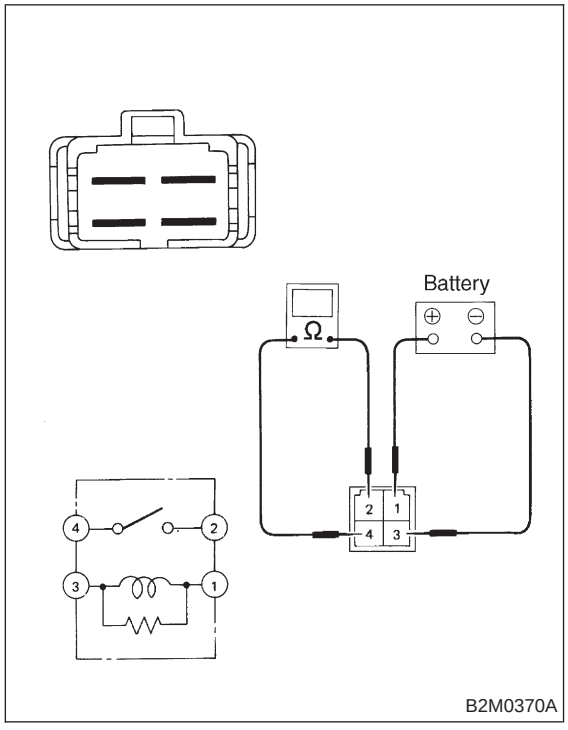
1) Turn ignition switch to OFF.
2) Remove fuse No. 13 from fuse and relay box.
3) Check condition of fuse.



CHECK : ***Is the fuse blown-out?***
YES : Replace fuse.
NO : Go to step **2A6**.

2A6 : CHECK SUB FAN RELAY-1.

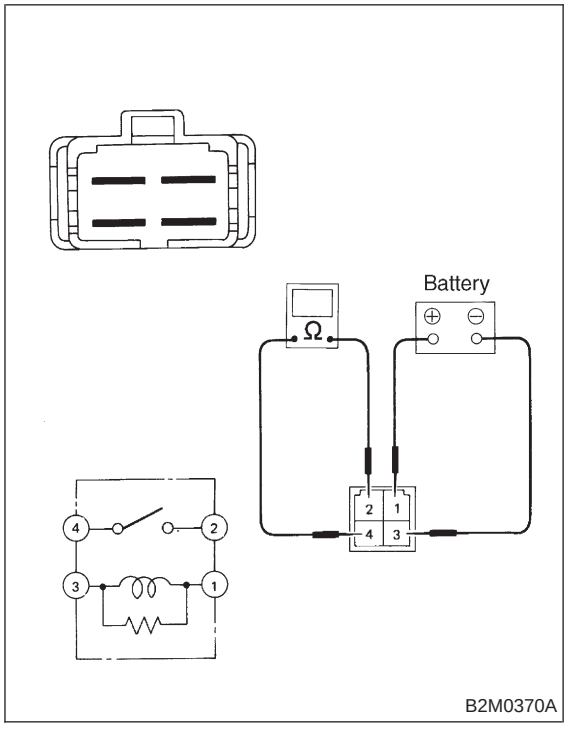
1) Turn ignition switch to OFF.
2) Remove sub fan relay-1 from fuse and relay box.
3) Check continuity between sub fan relay-1 terminals.



CHECK : ***Does continuity exist between terminals No. 2 and No. 4?***
YES : Replace sub fan relay-1.
NO : Go to step **2A7**.

2A7 : CHECK SUB FAN RELAY-1.

1) Connect battery positive (+) terminal to terminal No. 1 of sub fan relay-1 and negative (−) terminal to terminal No. 3 .
2) Check continuity between sub fan relay-1 terminals.

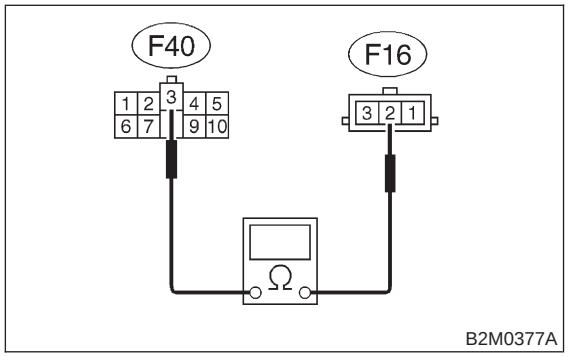


CHECK : ***Does continuity exist between terminals No. 2 and No. 4?***
YES : Go to step **2A8**.
NO : Replace sub fan relay-1.

2A8 : CHECK HARNESS CONNECTOR BETWEEN FUSE AND RELAY BOX AND SUB FAN MOTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from fuse and relay box.
3) Measure resistance of harness connector between fuse and relay box and sub fan motor.

Connector & terminal
(F40) No. 3 — (F16) No. 2:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **2A9**.
NO : Repair open circuit in harness between fuse and relay box and sub fan motor connector.

2A9 : CHECK POOR CONTACT.

Check poor contact in fuse and relay box connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in fuse and relay box connector?***
YES : Repair poor contact in fuse and relay box connector.
NO : Go to step **2A10**.

2A10 : CHECK POOR CONTACT.

Check poor contact in sub fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in sub fan motor connector?***
YES : Repair poor contact in sub fan motor connector.
NO : Refer to 2-7 “On-Board Diagnostics II System” diagnostics procedure.

B: HI MODE OPERATION

DETECTING CONDITION:

Condition (1):
- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is over 20 km/h (12 MPH).

Condition (2):
- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned OFF.
- Vehicle speed is over 20 km/h (12 MPH).

Condition (3):
- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned ON.

TROUBLE SYMPTOM:
- Radiator sub fan does not rotate at HI speed under conditions (1), (2) and (3) above.

2B1 : CHECK OPERATION OF SUB FAN MOTOR LO MODE.

CAUTION:
Be careful not to overheat engine during repair.

1) Start the engine, and warm-up it until engine coolant temperature increases over 95°C (203°F).
2) Stop the engine and turn ignition switch to ON.
3) Turn A/C switch to OFF.

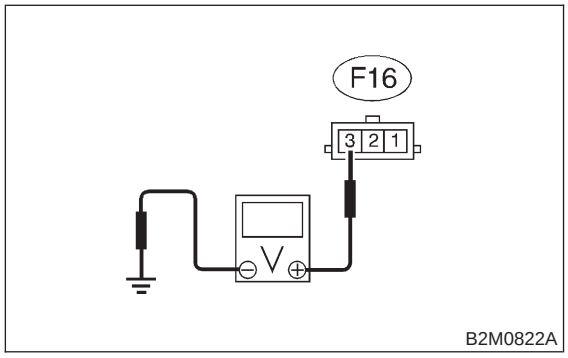
CHECK : ***Does the sub fan operate at LO MODE?***
YES : Go to step **2B2**.
NO : Go to LO MODE OPERATION diagnostics chart. <Ref. to 2-5 [T2A0].>

2B2 : CHECK POWER SUPPLY TO SUB FAN MOTOR.

CAUTION:
Be careful not to overheat engine during repair.

1) Turn ignition switch to OFF.
2) Disconnect connector from sub fan motor.
3) Start the engine, and warm-up it until engine coolant temperature increases over 95°C (203°F).
4) Stop the engine and turn ignition switch to ON.
5) Turn A/C switch to ON.
6) Measure voltage between sub fan motor connector and chassis ground.

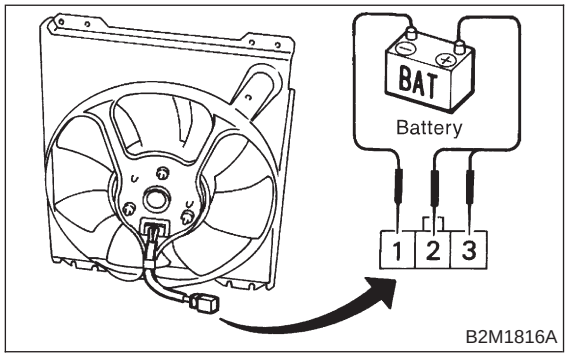
Connector & terminal
(F16) No. 3 (+) — Chassis ground (−):



CHECK : ***Is voltage more than 10 V?***
YES : Go to step **2B3**.
NO : Go to step **2B4**.

2B3 : CHECK SUB FAN MOTOR.

1) Turn ignition switch and A/C switch to OFF.
2) Connect battery positive (+) terminal to terminals No. 2 and No. 3 of sub fan motor connector, and negative (−) terminal to terminal No. 1.

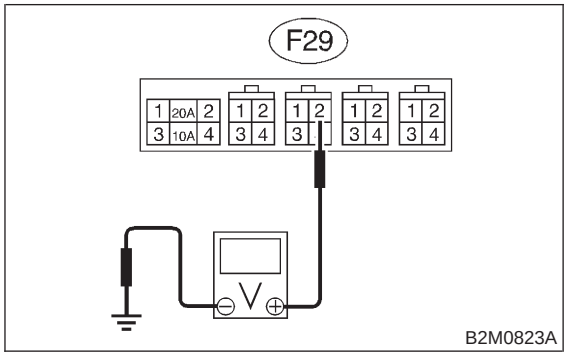


CHECK : ***Does the sub fan rotate at HI speed?***
YES : Repair poor contact in sub fan motor connector.
NO : Replace sub fan motor with a new one.

2B4 : CHECK POWER SUPPLY TO SUB FAN RELAY-2.

1) Turn ignition switch and A/C switch to OFF.
2) Remove sub fan relay-2 from A/C relay holder.
3) Turn ignition switch to ON.
4) Measure voltage between sub fan relay-2 terminal and chassis ground.

Connector & terminal
(F29) No. 2 (+) — Chassis ground (−):

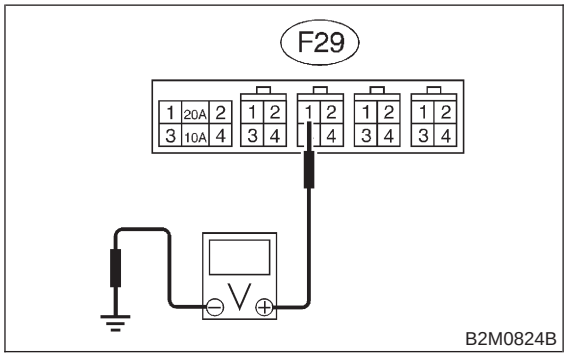


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **2B5**.
NO : Go to step **2B6**.

2B5 : CHECK POWER SUPPLY TO SUB FAN RELAY-2.

Measure voltage between sub fan relay-2 connector and chassis ground.

Connector & terminal
(F29) No. 1 (+) — Chassis ground (−):

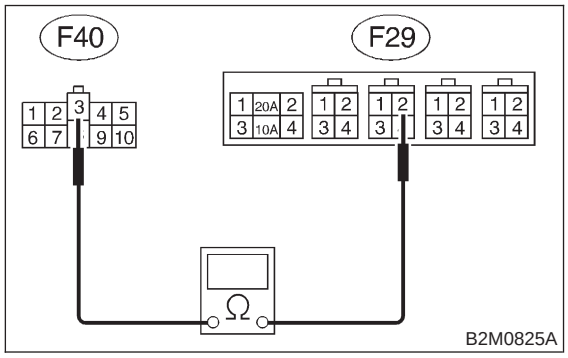


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **2B9**.
NO : Go to step **2B7**.

2B6 : CHECK HARNESS CONNECTOR BETWEEN FUSE AND RELAY BOX AND A/C RELAY HOLDER SUB FAN RELAY-2.

1) Turn ignition switch to OFF.
2) Disconnect connector from fuse and relay box.
3) Measure resistance of harness between fuse and relay box connector and A/C relay holder sub fan relay-2 terminal.

Connector & terminal
(F40) No. 3 — (F29) No. 2:



CHECK : ***Is resistance less than 1 Ω?***
YES : Repair poor contact in sub fan relay-2 connector.
NO : Repair open circuit in harness between fuse and relay box connector and sub fan relay-2 terminal.

2B7 : CHECK OPERATION OF MAIN FAN MOTOR LO MODE.

1) Turn ignition switch to OFF.
2) Install sub fan relay-2 on A/C relay holder, and connect sub fan motor connector.

CAUTION:
Be careful not to overheat engine during repair.

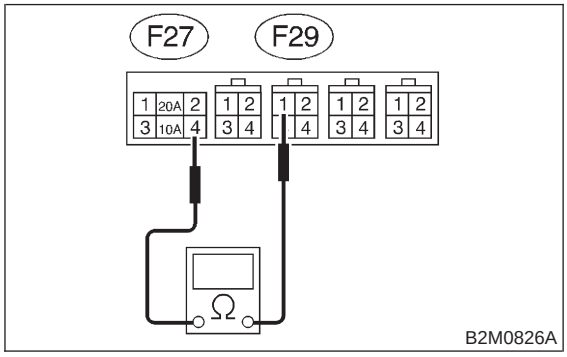
3) Start the engine, and warm-up it until engine coolant temperature increases over 95°C (203°F).
4) Stop the engine and turn ignition switch to ON.
5) Turn A/C switch to OFF.

CHECK : ***Does the main fan operate at LO MODE?***
YES : Go to step **2B8**.
NO : Go to LO MODE OPERATION diagnostics chart. <Ref. to 2-5 [T1B0].>

2B8 : CHECK HARNESS CONNECTOR BETWEEN 10 A FUSE AND SUB FAN RELAY-2 IN A/C RELAY HOLDER.

1) Turn ignition switch to ON.
2) Remove 10 A fuse from A/C relay holder.
3) Remove sub fan relay-2 from A/C relay holder.
4) Measure resistance of harness between 10 A fuse and sub fan relay-2 terminal.

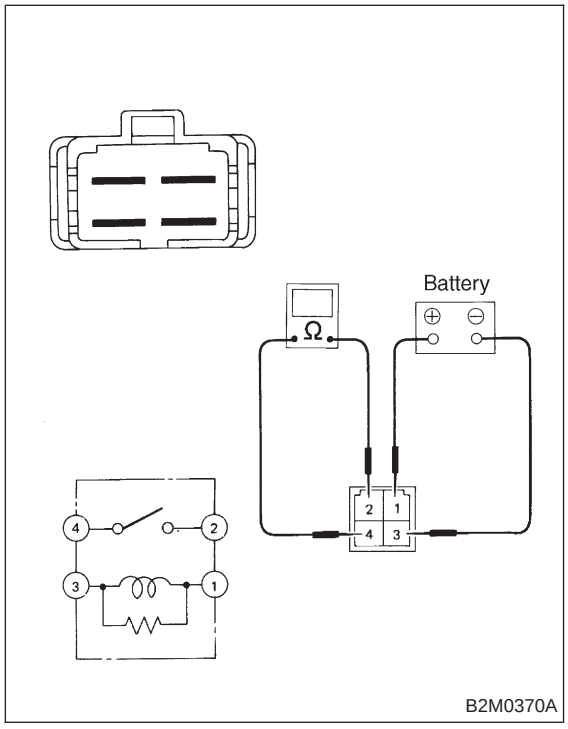
Connector & terminal
(F27) No. 4 — (F29) No. 1:



CHECK : ***Is resistance less than 1 Ω?***
YES : Repair poor contact in sub fan relay-2 connector.
NO : Repair open circuit in harness between 10 A fuse and sub fan relay-2 connector.

2B9 : CHECK SUB FAN RELAY-2.

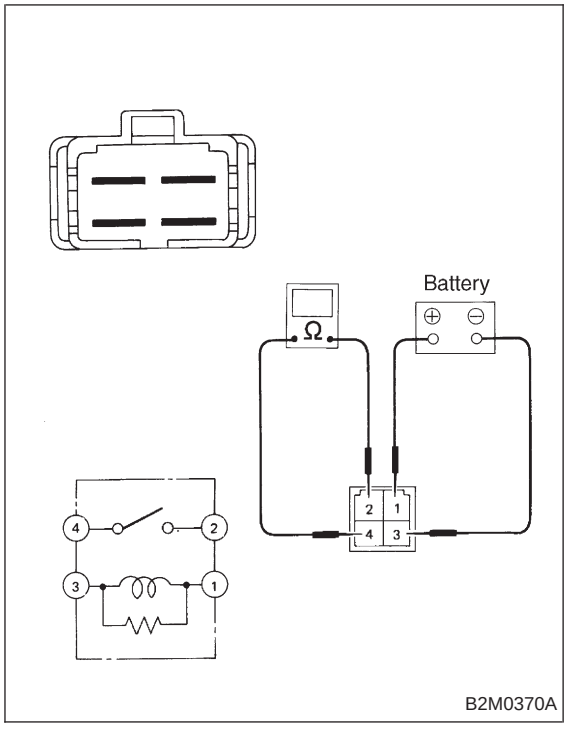
1) Turn ignition switch to OFF.
2) Check continuity between sub fan relay-2 terminals.



CHECK : ***Does continuity exist between terminals No. 2 and No. 4?***
YES : Replace sub fan relay-2.
NO : Go to step **2B10**.

2B10 : CHECK SUB FAN RELAY-2.

1) Connect battery to terminals No. 1 and No. 3 of sub fan relay-2.
2) Check continuity between sub fan relay-2 terminals.

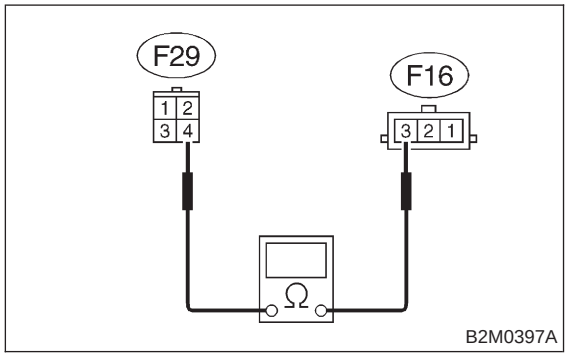


CHECK : ***Does continuity exist between terminals No. 2 and No. 4?***
YES : Go to step **2B11**.
NO : Replace sub fan relay-2.

2B11 : CHECK HARNESS CONNECTOR BETWEEN SUB FAN RELAY-2 AND SUB FAN MOTOR.

Measure resistance of harness between sub fan motor connector and sub fan relay-2 terminal.

Connector & terminal
(F16) No. 3 — (F29) No. 4:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **2B12**.
NO : Repair open circuit in harness between sub fan motor and sub fan relay-2 connector.

2B12 : CHECK POOR CONTACT.

Check poor contact in sub fan relay-2 connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in sub fan relay-2 connector?***
YES : Repair poor contact in sub fan relay-2 connector.
NO : Go to step **2B13**.

2B13 : CHECK POOR CONTACT.

Check poor contact in sub fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in sub fan motor connector?***
YES : Repair poor contact in sub fan motor connector.
NO : Refer to 2-7 “On-Board Diagnostics II System” diagnostics procedure.

MEMO:

ON-BORAD DIAGNOSTICS II SYSTEM 2-7

1. General

A: GENERAL DESCRIPTION

● The on-board diagnostics (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter indicates occurrence of a fault or trouble.
● Further, against such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
● The OBD system incorporated with the vehicles within this engine family complies with Section 1968.1, California Code of Regulations (OBD-II regulation). The OBD system monitors the components and the system malfunction listed in Engine Section which affects on emissions.
● When the system decides that a malfunction occurs, MIL illuminates. At the same time of the MIL illumination or blinking, a diagnostic trouble code (DTC) and a freeze frame engine conditions are stored into on-board computer.
● The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer when it detects a malfunction first.
● If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or misfire.
● When the malfunction does not occur again for three consecutive driving cycles, MIL is turned off, but DTC remains at on-board computer.
● The OBD-II system is capable of communication with a general scan tool (OBD-II general scan tool) formed by ISO 9141 CARB.
● The OBD-II diagnostics procedure is different from the usual diagnostics procedure. When troubleshooting OBD-II vehicles, connect Subaru select monitor or the OBD-II general scan tool to the vehicle.

B: ENGINE

1. ENGINE AND EMISSION CONTROL SYSTEM

● The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.
● Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc.
The MFI system also has the following features:
- Reduced emission of harmful exhaust gases.
- Reduced in fuel consumption.
- Increased engine output.
- Superior acceleration and deceleration.
- Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

C: AUTOMATIC TRANSMISSION

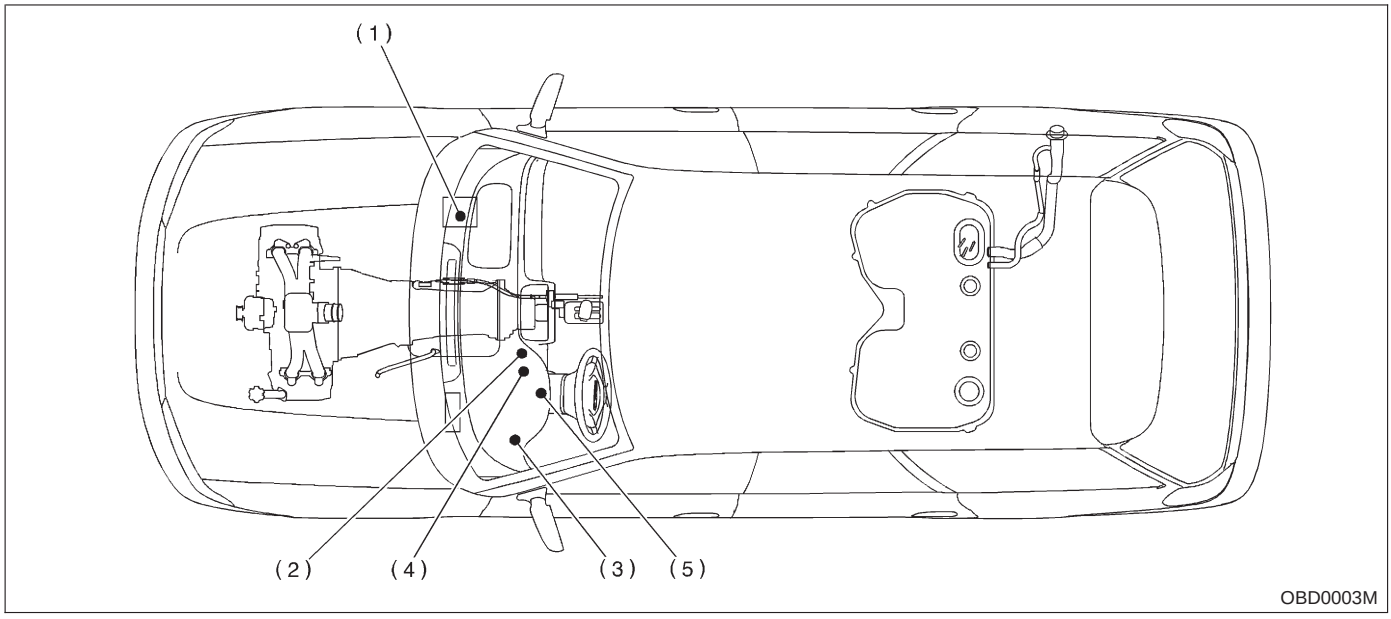
1. ELECTRONIC-HYDRAULIC CONTROL SYSTEM

The electronic-hydraulic control system consists of various sensors and switches, a transmission control module (TCM) and the hydraulic controller including solenoid valves. The system controls the transmission proper including shift control, lock-up control, overrunning clutch control, line pressure control and shift timing control. It also controls the AWD transfer clutch. In other words, the system detects various operating conditions from various input signals and sends output signals to shift solenoids 1, 2 and 3 and duty solenoids A, B and C (a total of six solenoids).

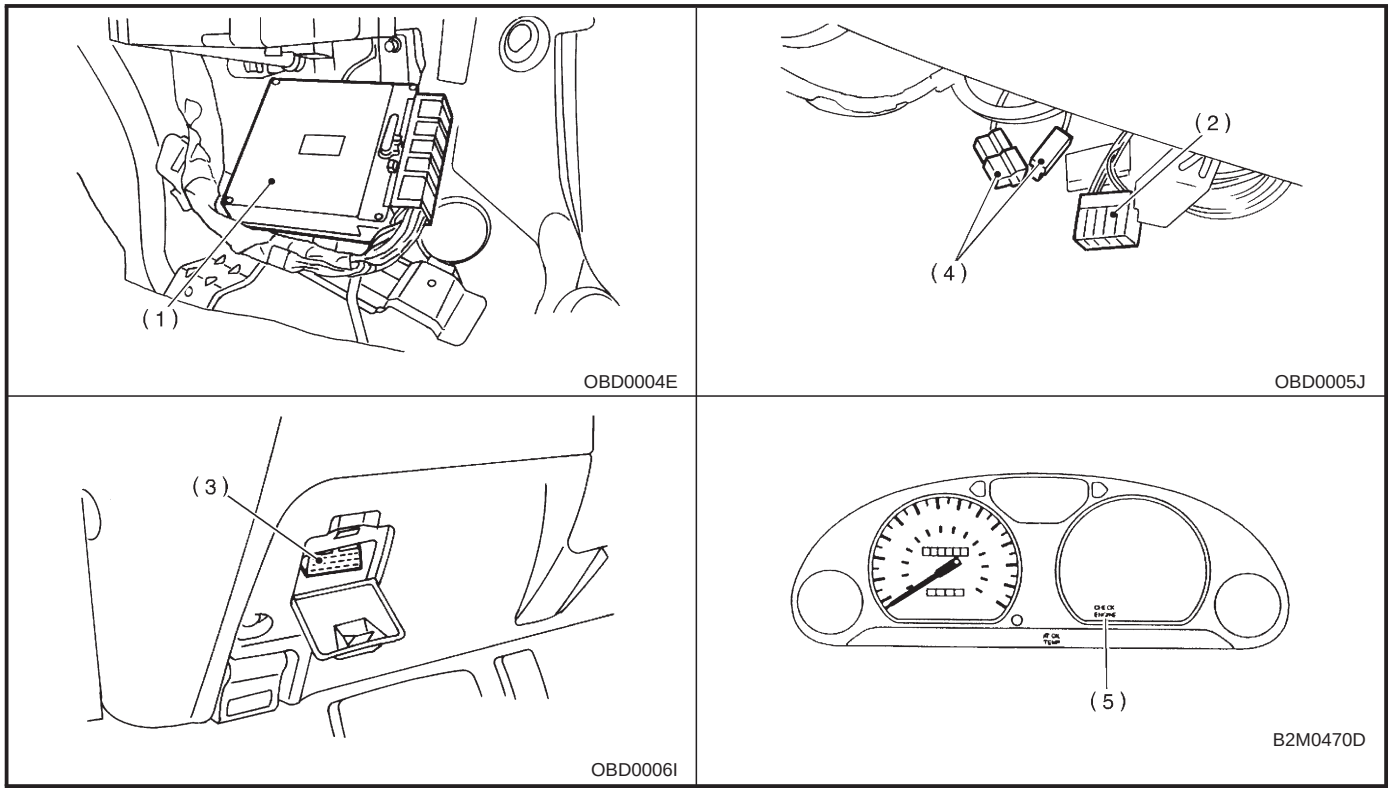
2. Electrical Components Location

A: ENGINE (2200 cc FWD MODEL AND TAIWAN SPEC. VEHICLES)

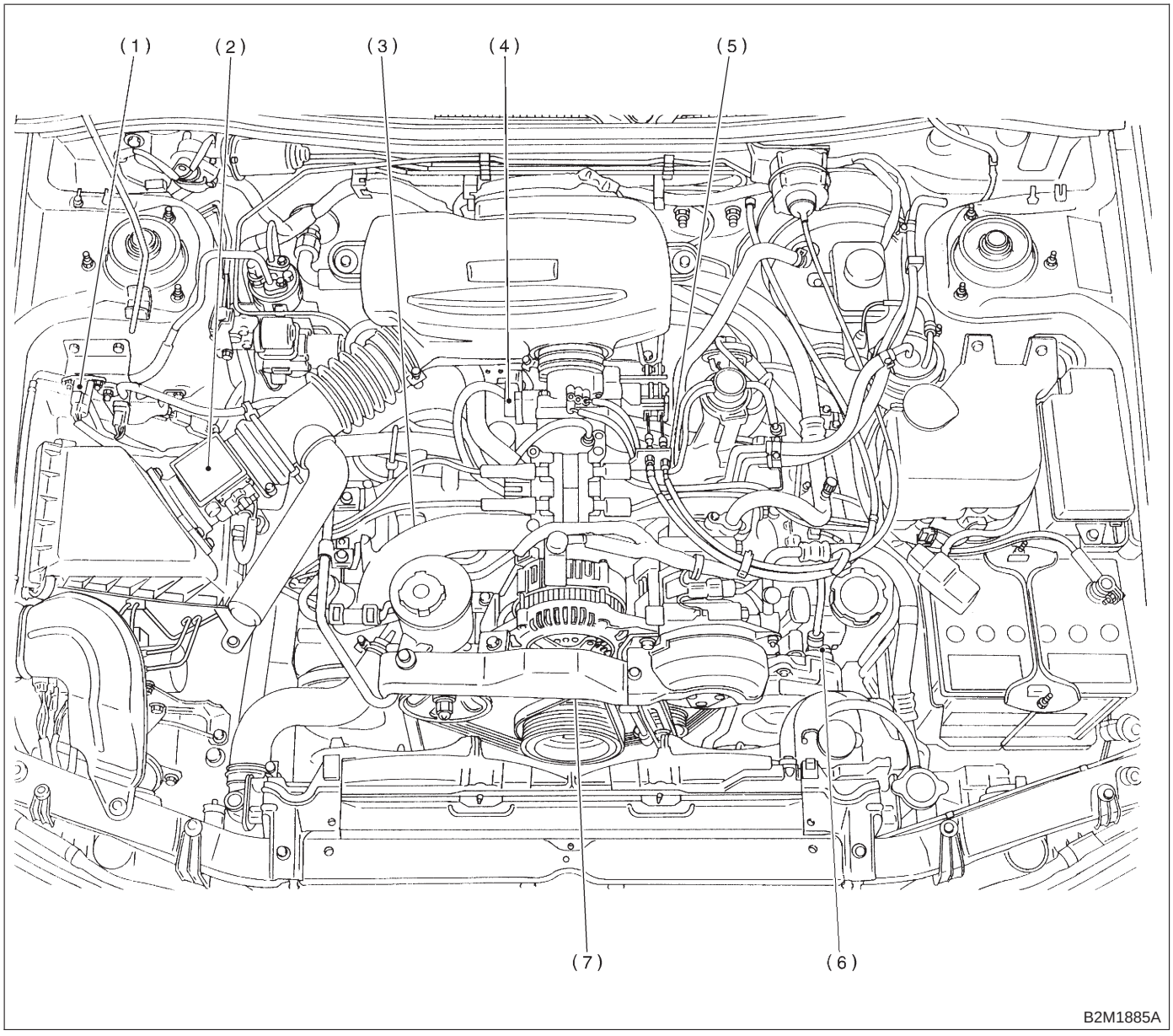
1. MODULE



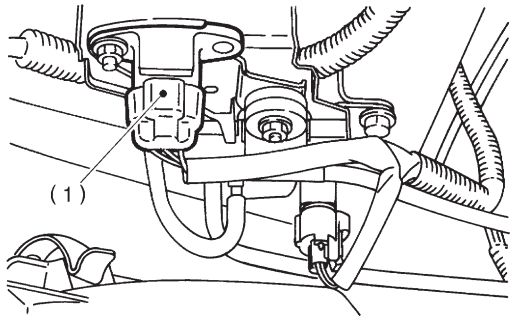
(1) Engine control module (ECM)
(2) Data link connector (for Subaru select monitor only)
(3) Data link connector (for Subaru select monitor and OBD-II general scan tool)
(4) Test mode connector
(5) CHECK ENGINE malfunction indicator lamp (MIL)



2. SENSOR



(1) Pressure sensor
(2) Mass air flow sensor
(3) Engine coolant temperature sensor
(4) Throttle position sensor
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor



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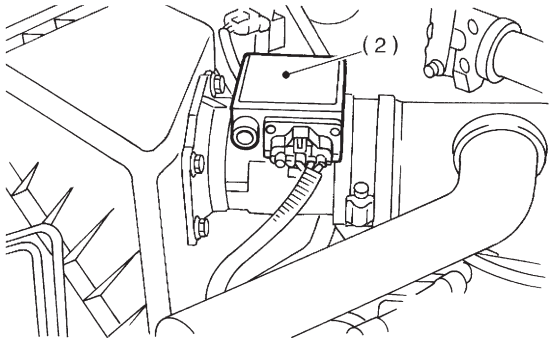
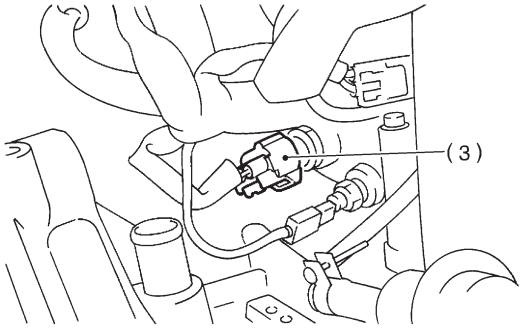


B2M1034C



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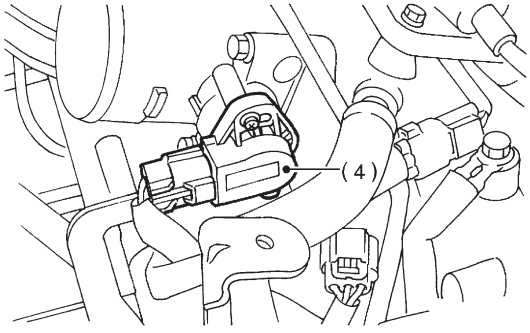

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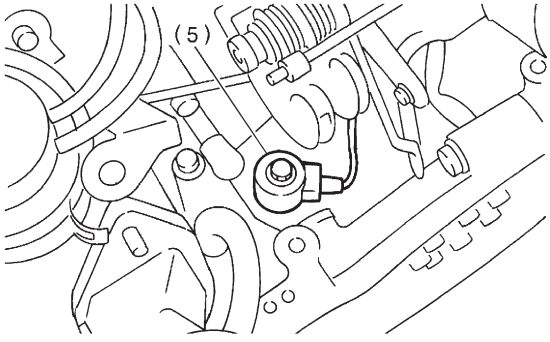
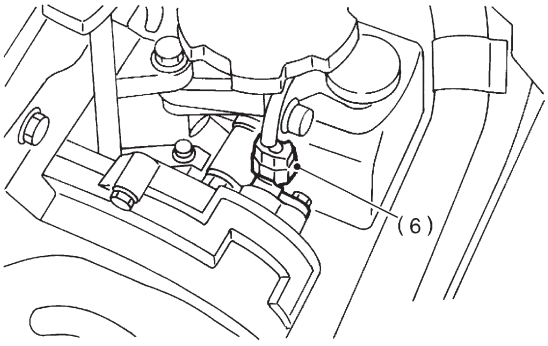
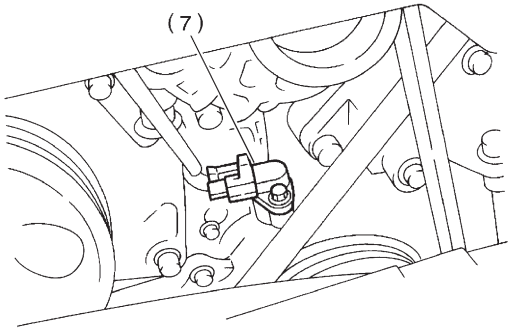


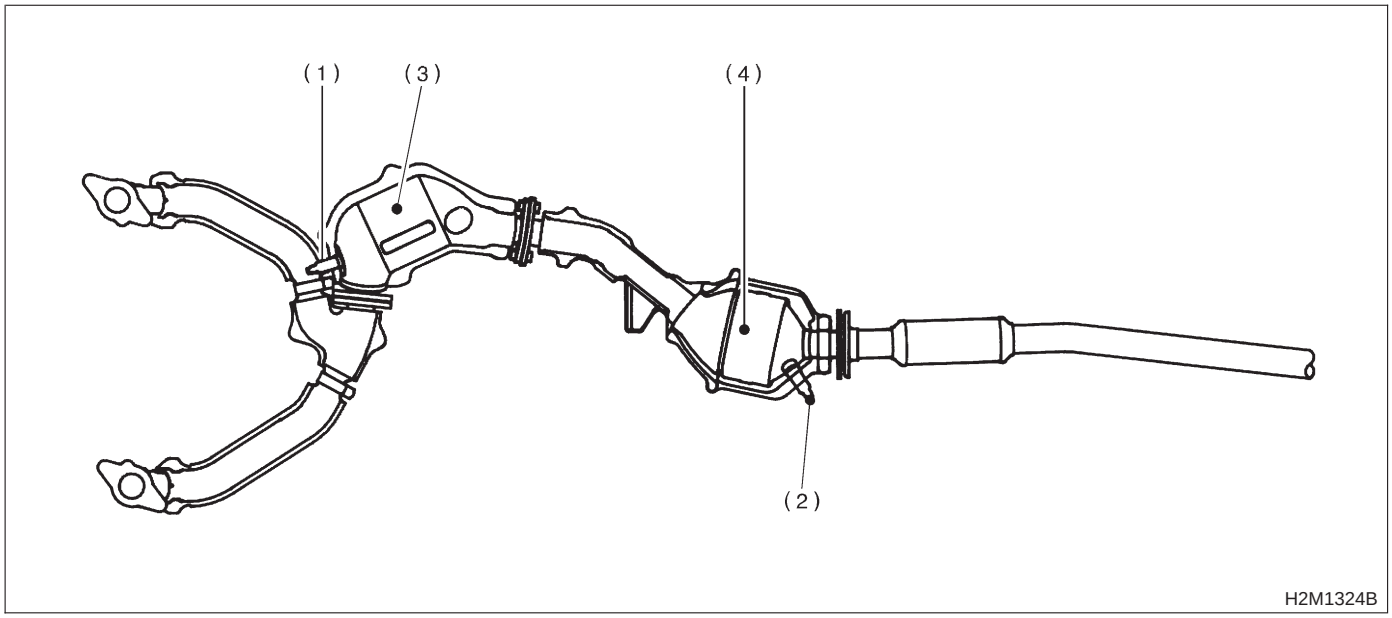
B2M1691B



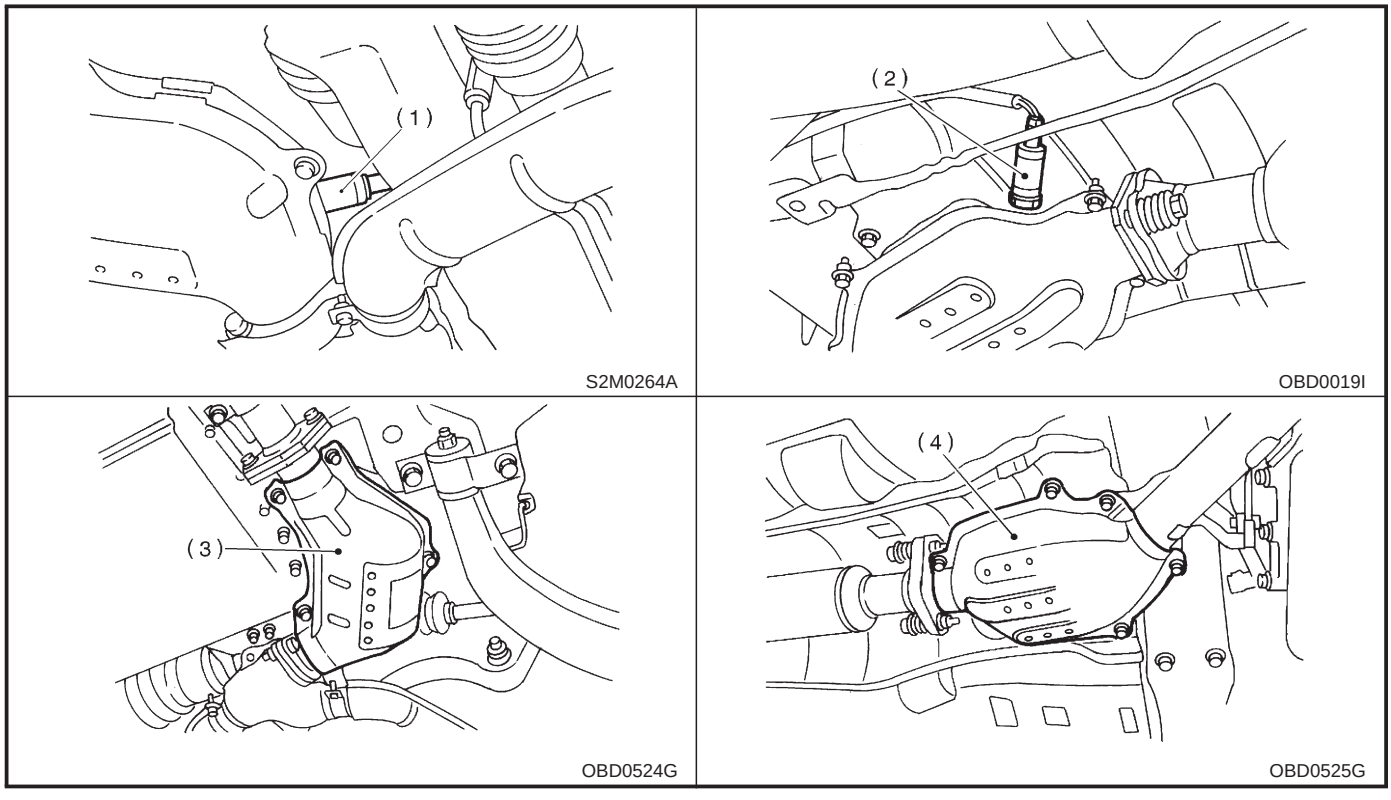
OBD0015D



B2M0213J

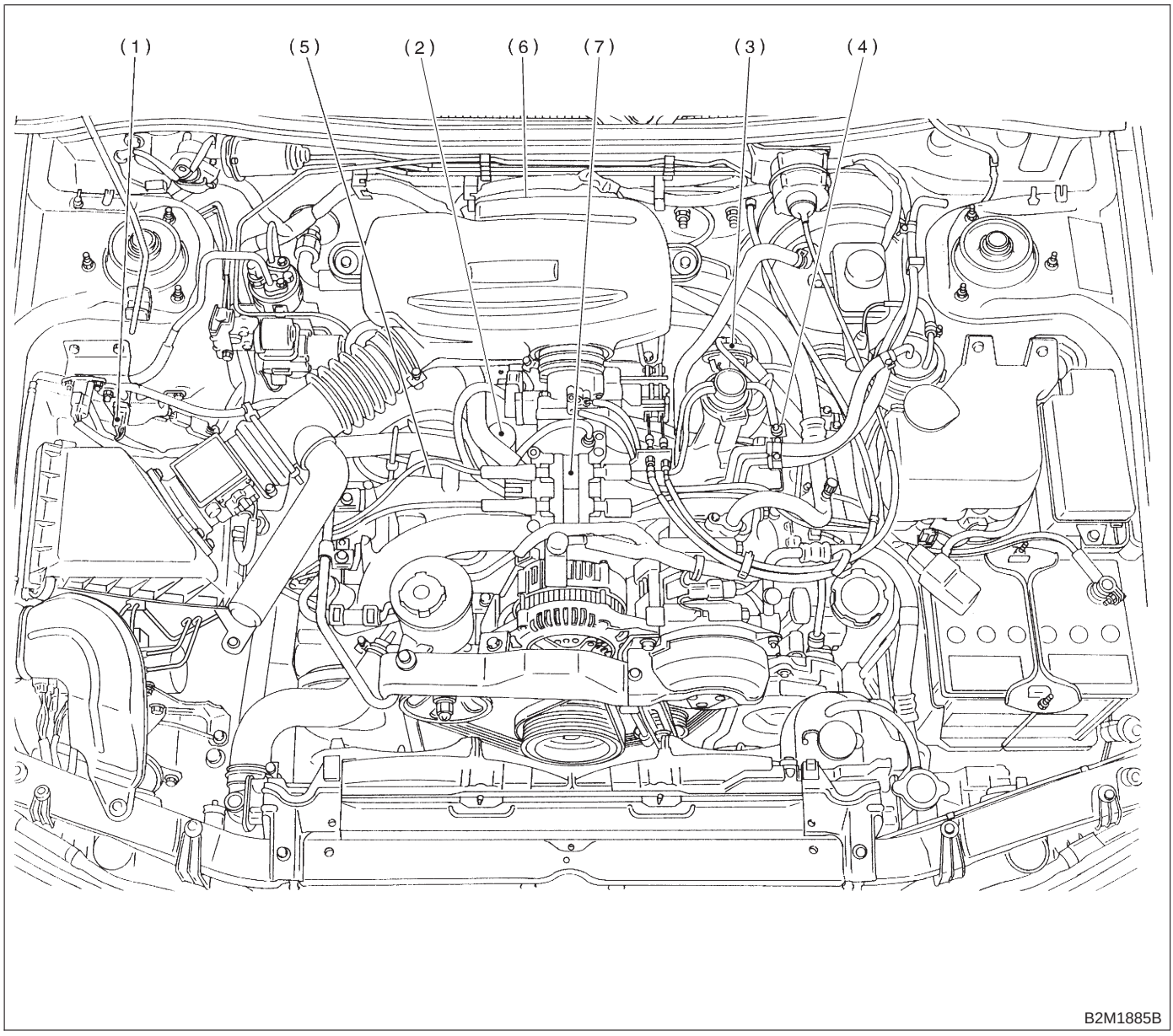


(1) Front oxygen sensor
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Rear catalytic converter

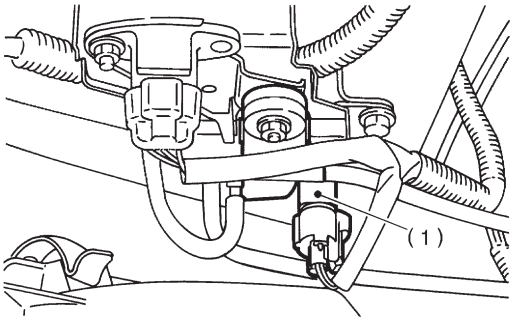


MEMO:

3. SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



(1) Pressure sources switching solenoid valve
(2) Idle air control solenoid valve
(3) EGR valve (Except 2200 cc MT vehicles)
(4) EGR control solenoid valve (Except 2200 cc MT vehicles)
(5) Purge control solenoid valve
(6) Ignitor
(7) Ignition coil



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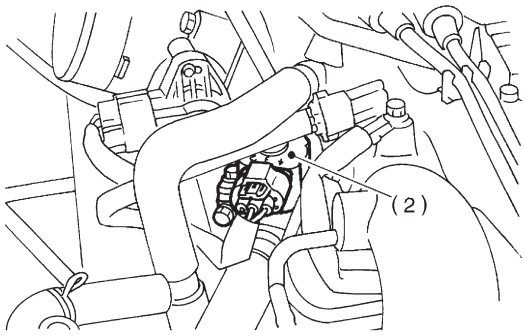
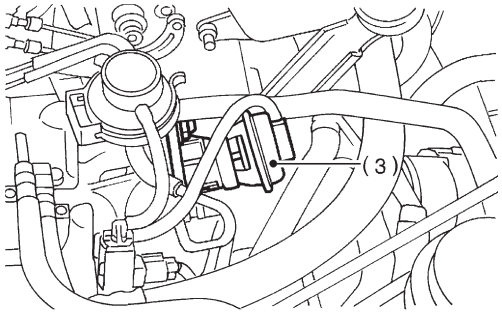
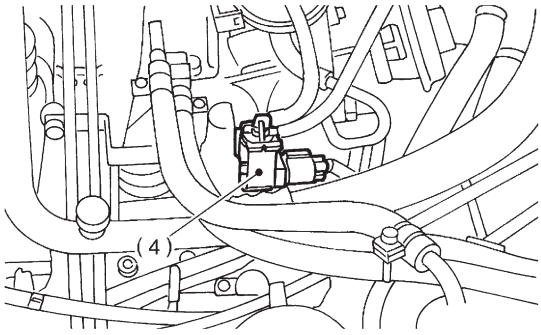


B2M1036C



B2M1037E



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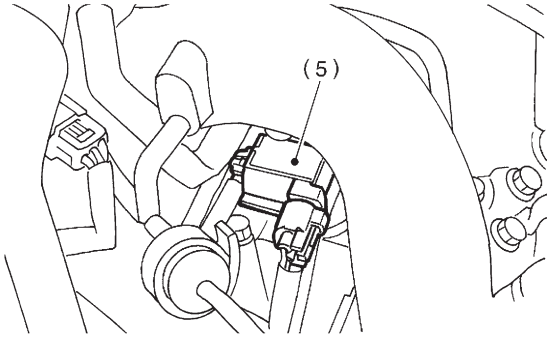
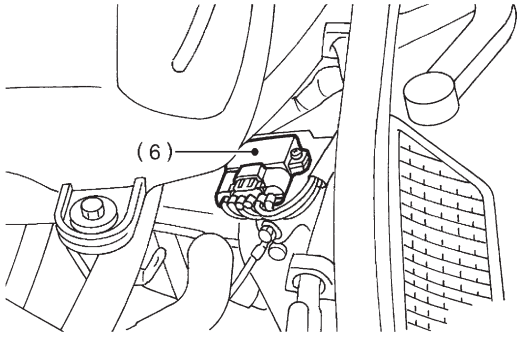
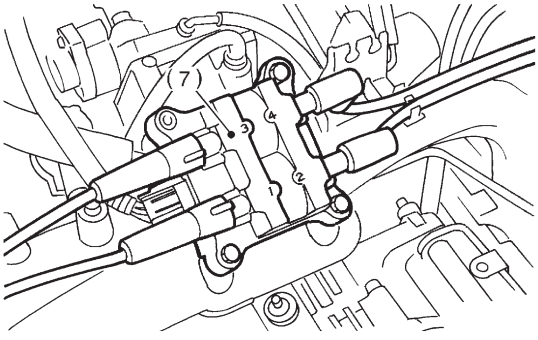


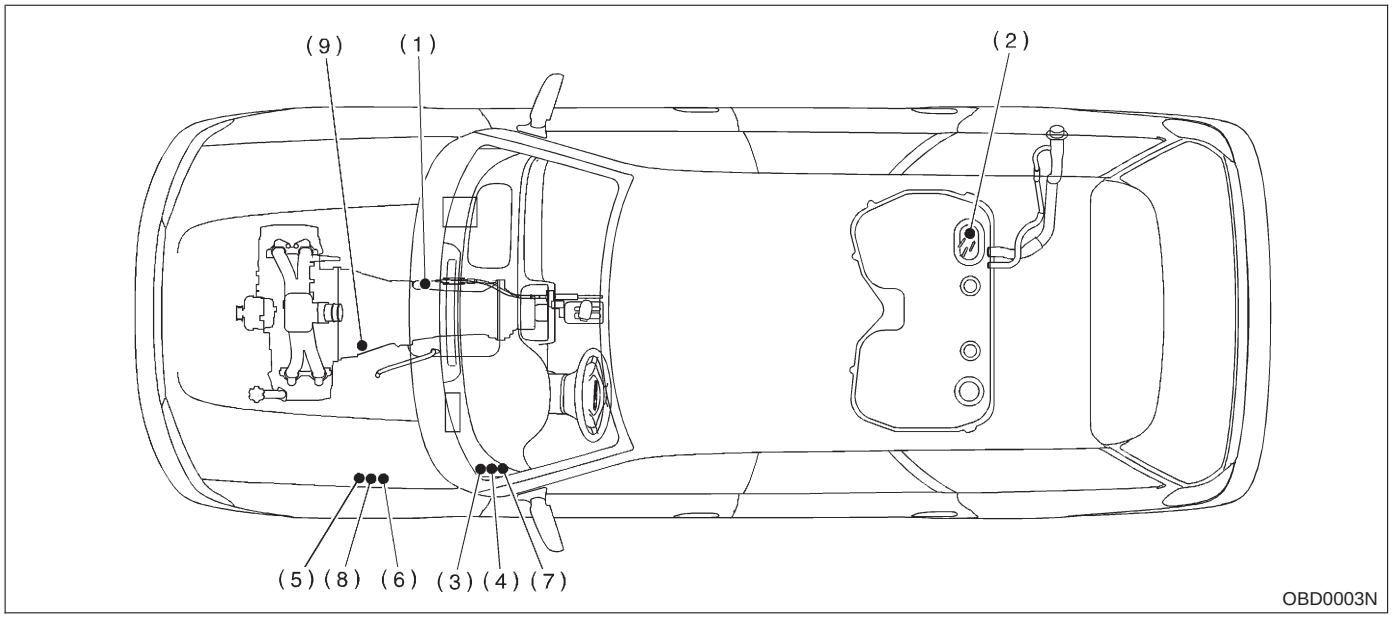
B2M1039I



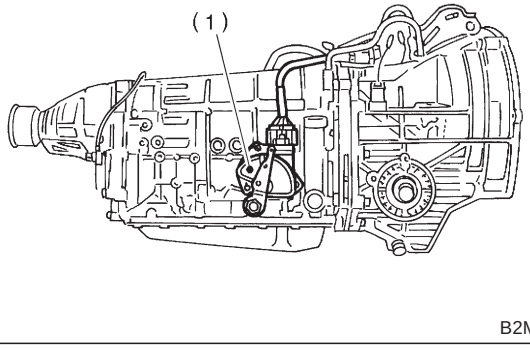
B2M1040E

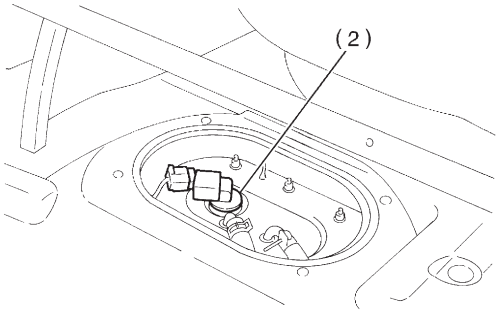


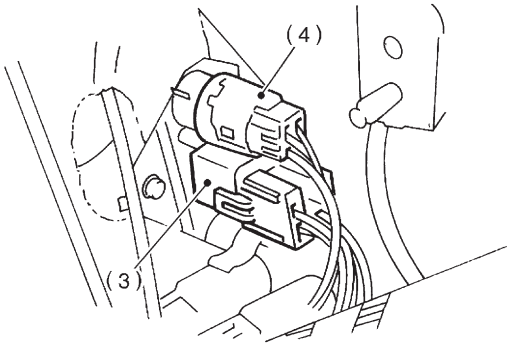
B2M1041E

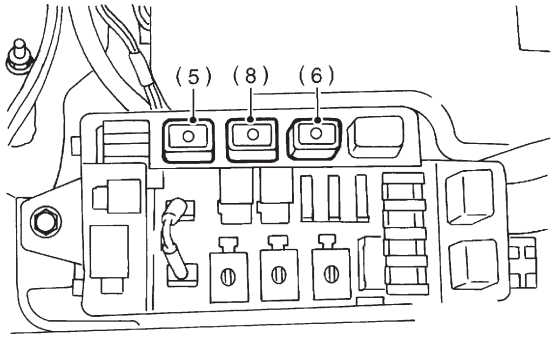


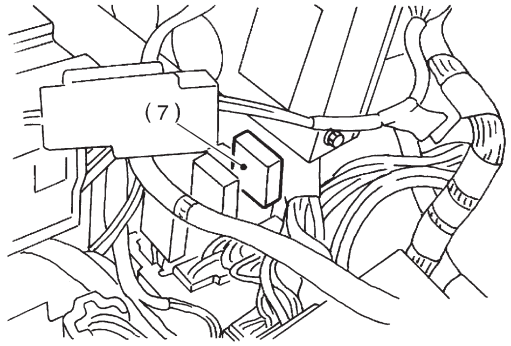
(1) Inhibitor switch (AT vehicles only)
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Radiator main fan relay 1 (With A/C models only)
(6) Radiator main fan relay 2 (With A/C models only)
(7) Radiator sub fan relay 1 (With A/C models)
Main fan relay (Without A/C models)
(8) Radiator sub fan relay 2 (With A/C models only)
(9) Starter



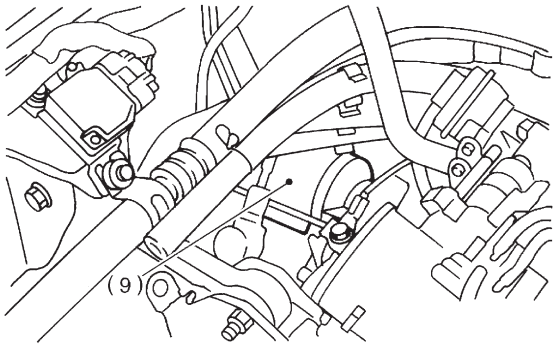








OBD0036B

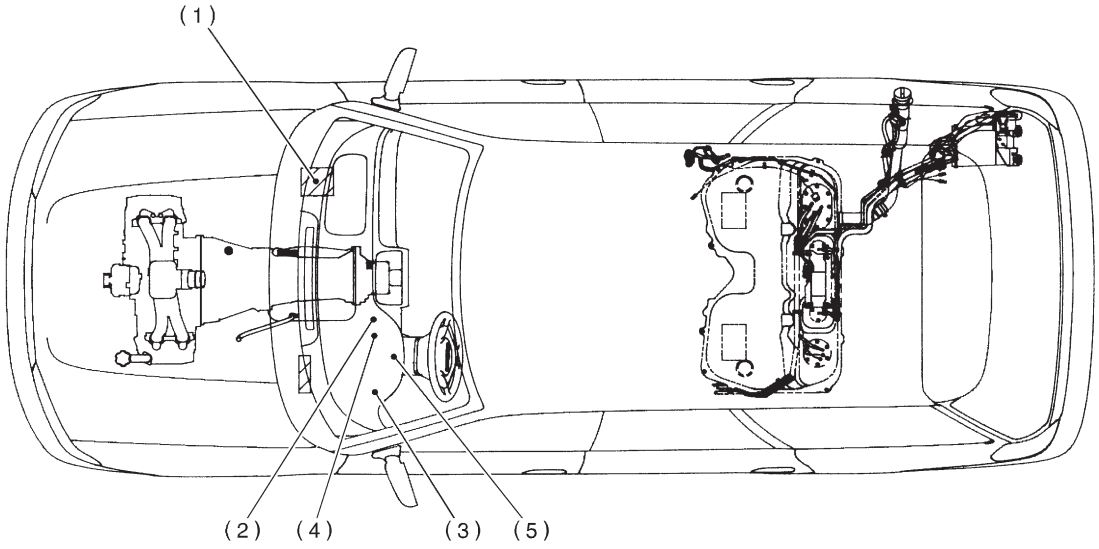


OBD0038D

B: ENGINE (2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES)

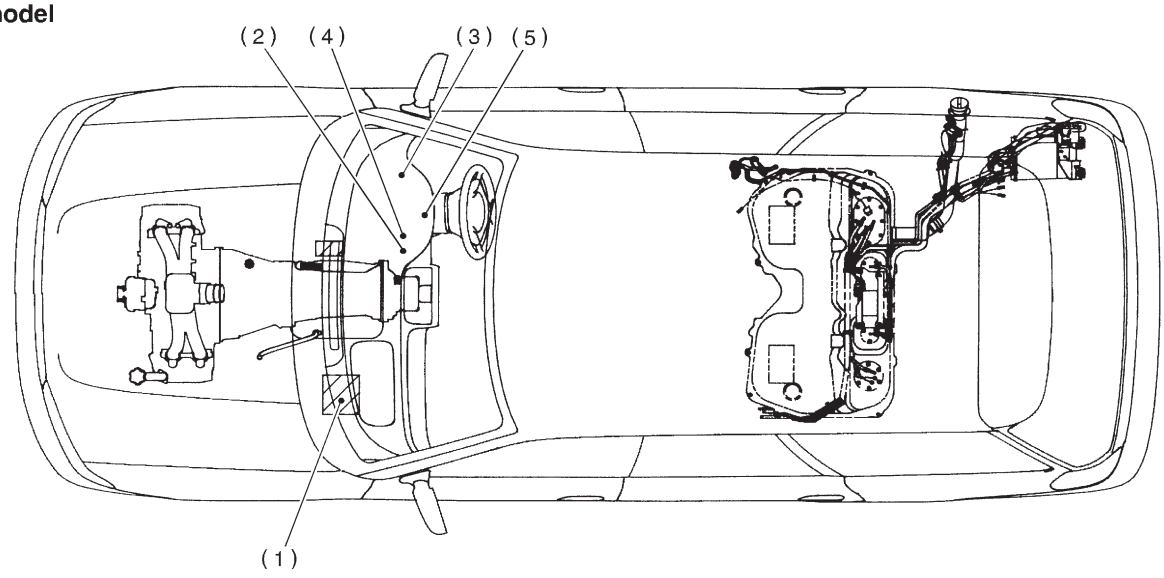
1. MODULE

LHD model



B2M1730A

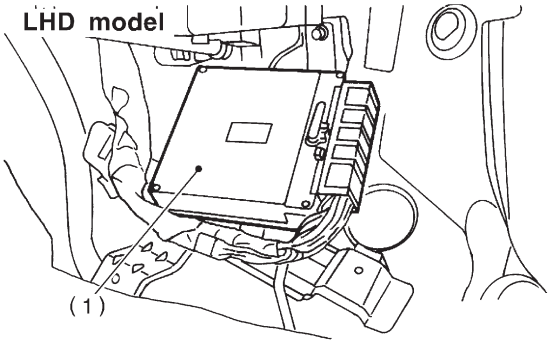
RHD model



B2M1733A

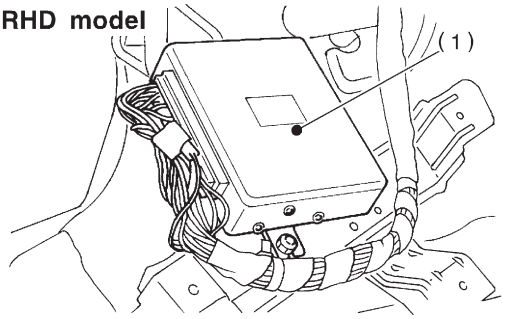
(1) Engine control module (ECM)
(2) Data link connector (for Subaru select monitor only)
(3) Data link connector (for Subaru select monitor and OBD-II general scan tool)
(4) Test mode connector
(5) CHECK ENGINE malfunction indicator lamp (MIL)

LHD model



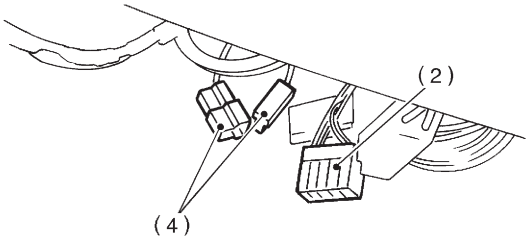
OBD0004D

RHD model



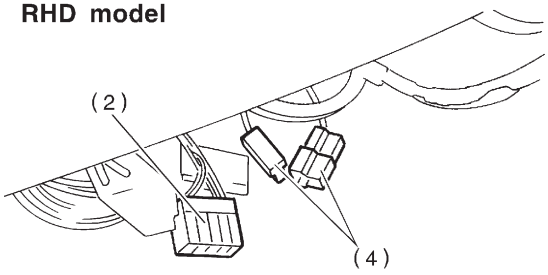
B2M0431C

LHD model



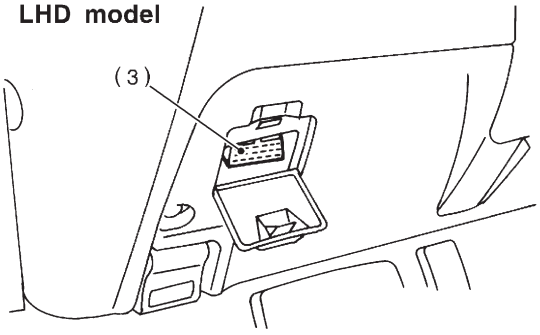
OBD0005I

RHD model



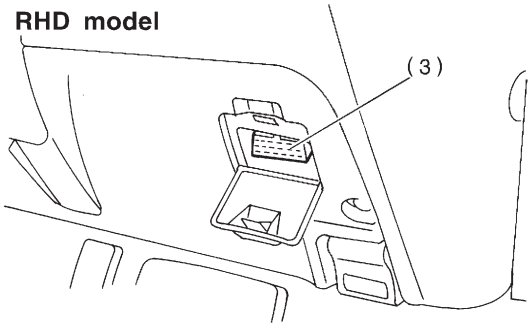
B2M0432E

LHD model

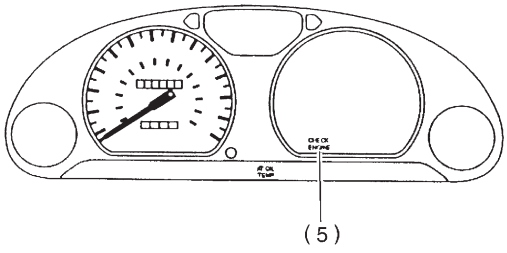


OBD0006G

RHD model

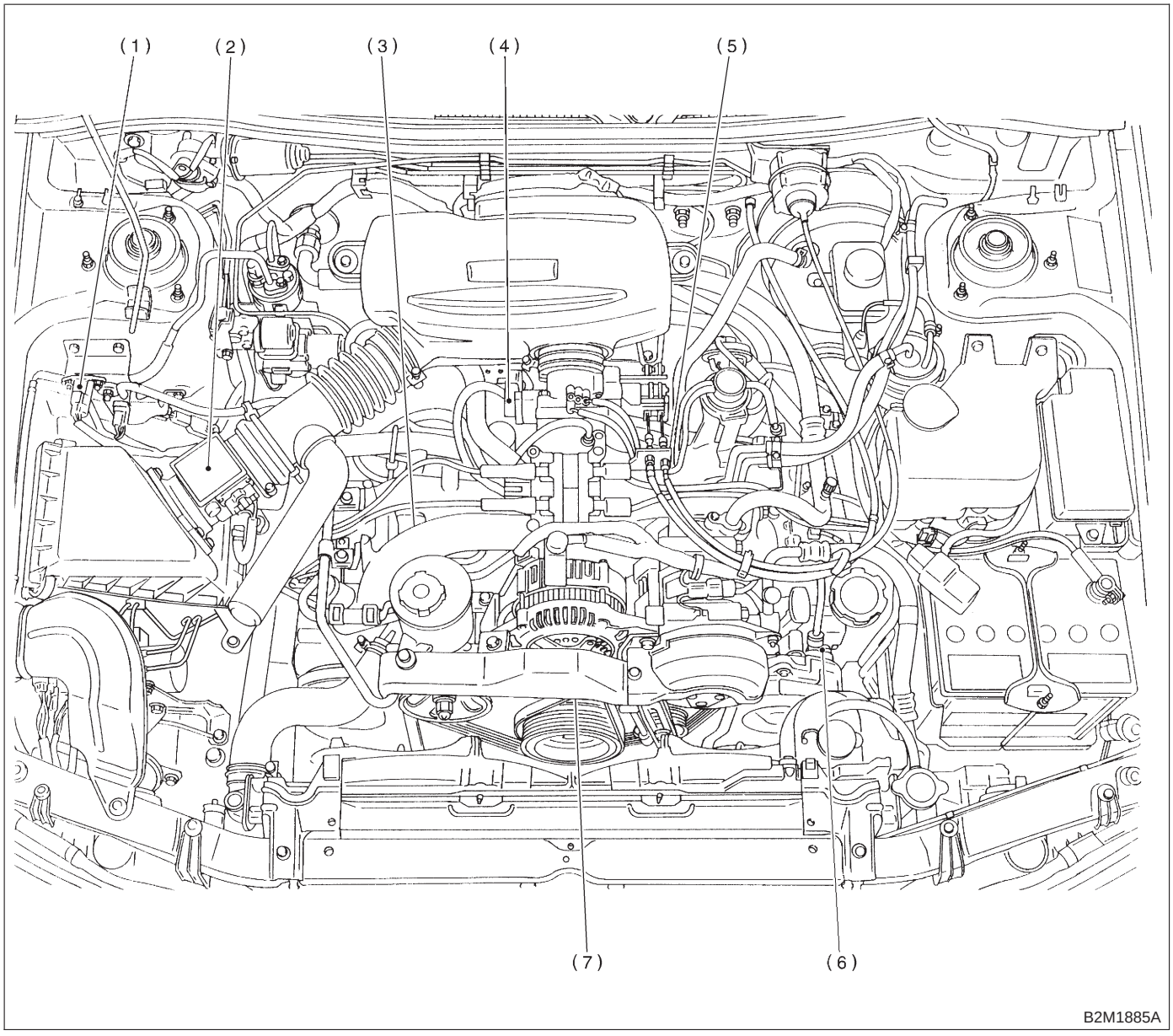


B2M0433E

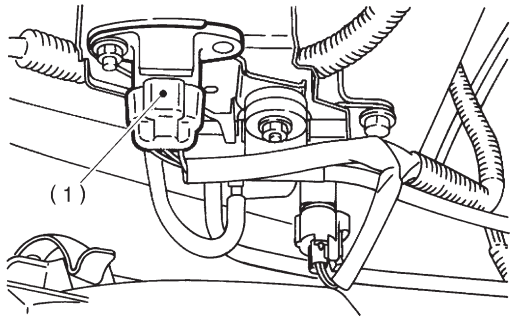


B2M0470D

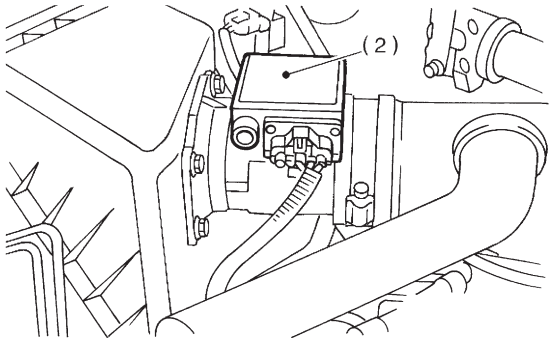
2. SENSOR



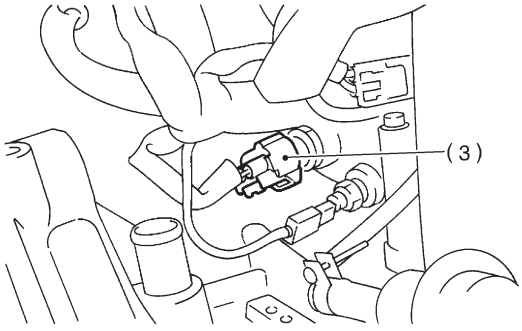
(1) Pressure sensor
(2) Mass air flow sensor
(3) Engine coolant temperature sensor
(4) Throttle position sensor
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor



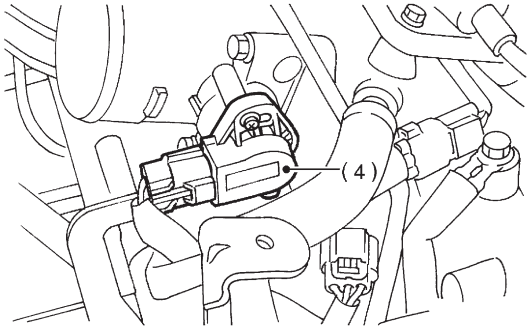
B2M0776B



B2M1034C



B2M1690B



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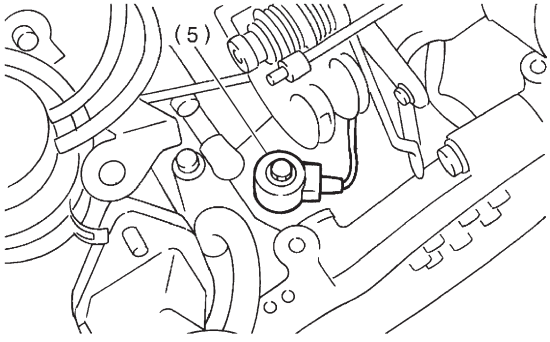

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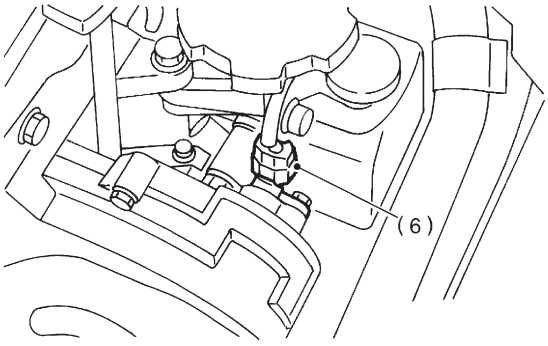
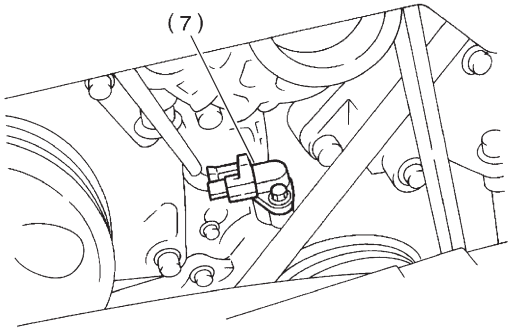
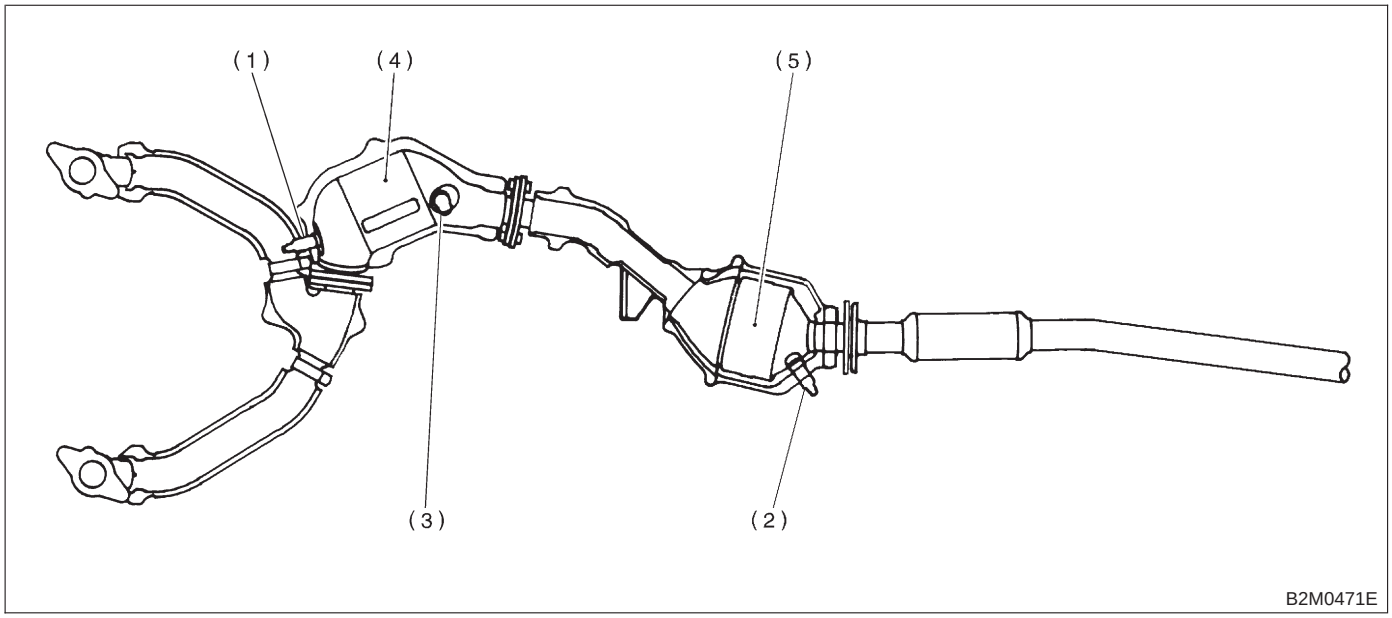


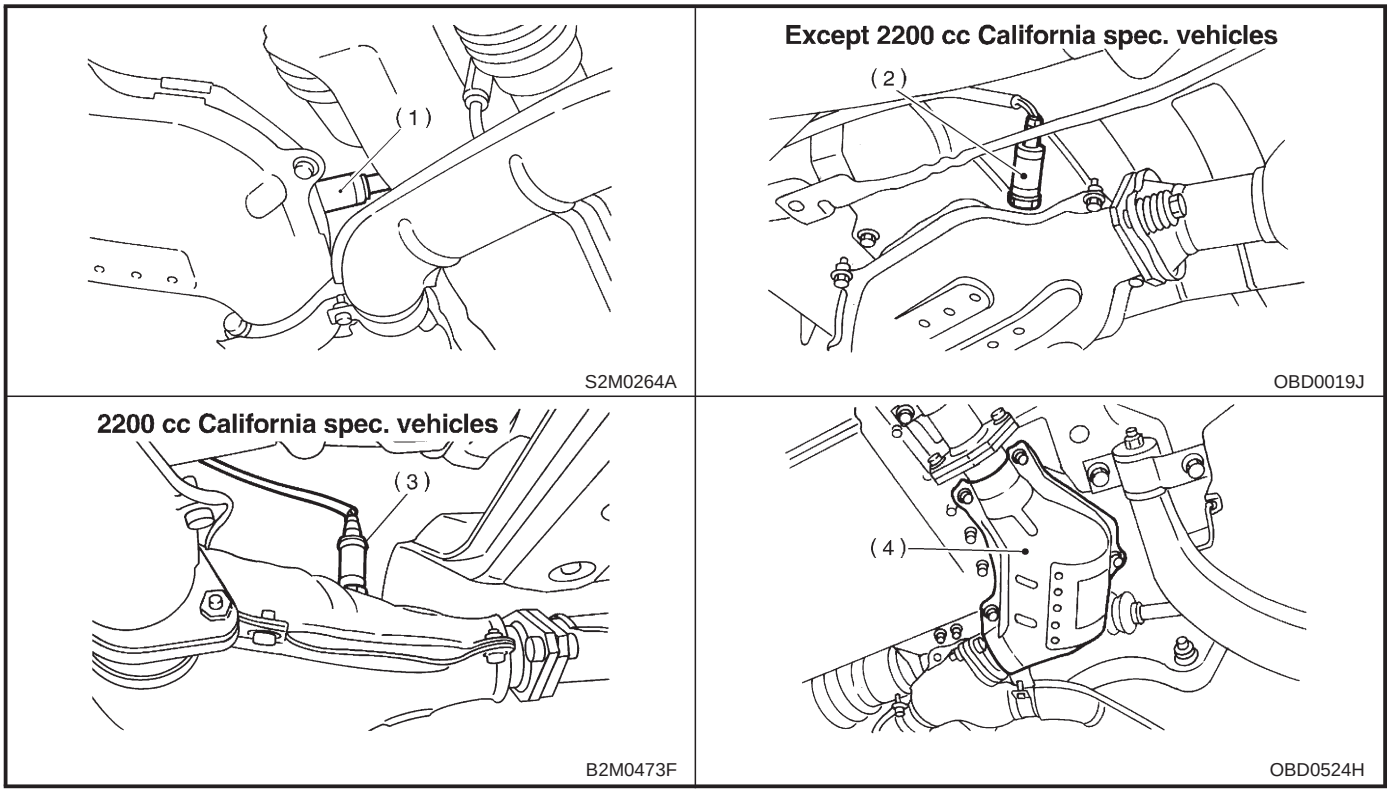
OBD0015D

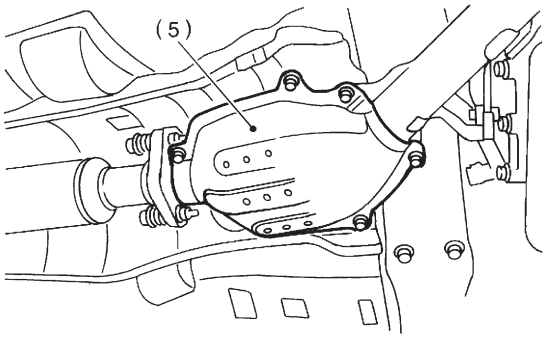


B2M0213J



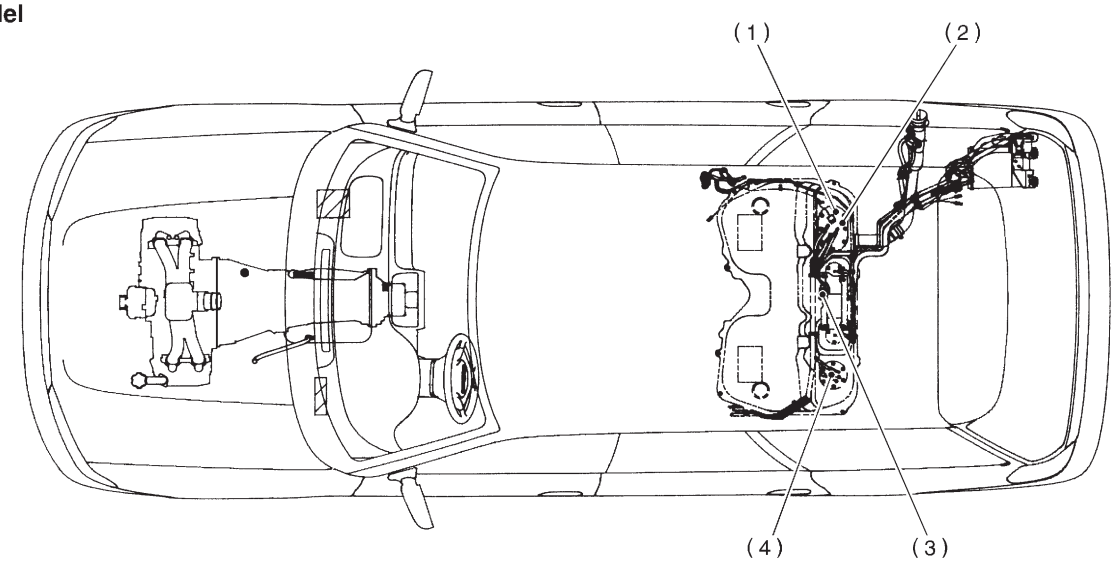
(1) Front oxygen sensor
(2) Rear oxygen sensor (Except 2200 cc California spec. vehicles)
(3) Rear oxygen sensor (2200 cc California spec. vehicles)
(4) Front catalytic converter
(5) Rear catalytic converter





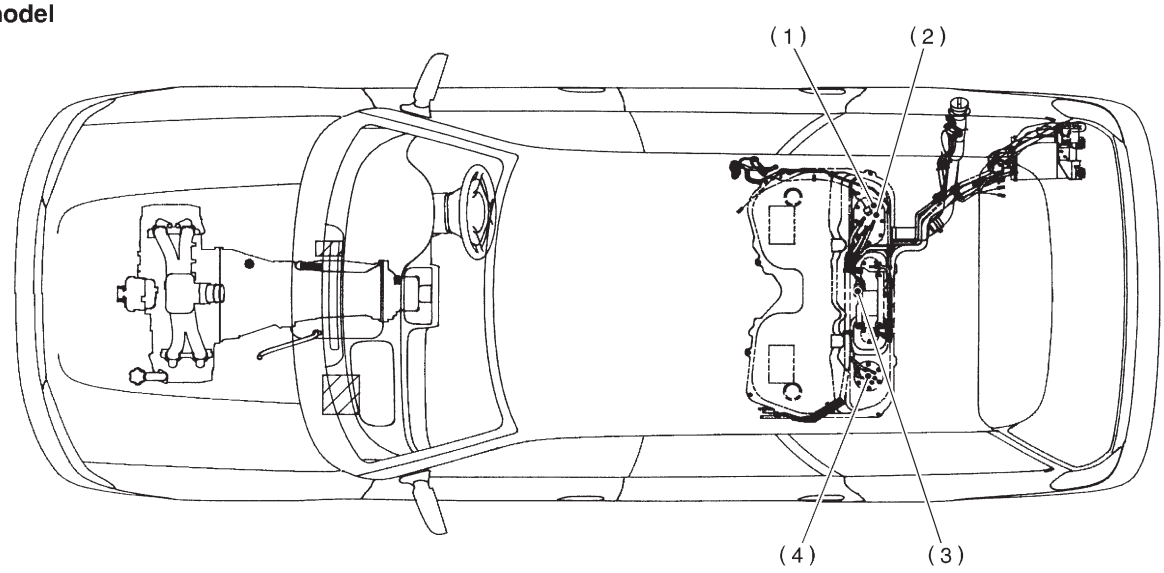
OBD0525H

LHD model



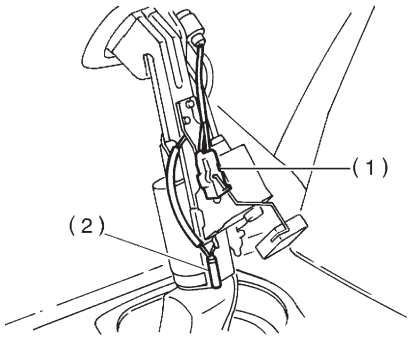
B2M1730B

RHD model

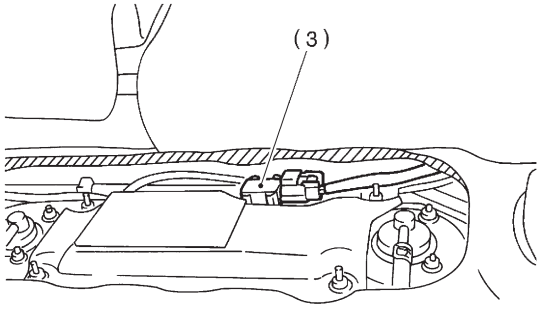


B2M1733B

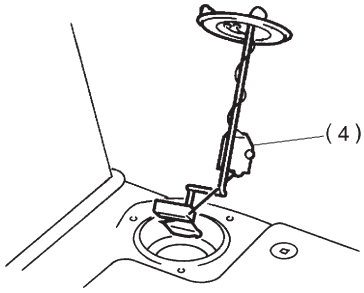
(1) Fuel level sensor
(2) Fuel temperature sensor
(3) Fuel tank pressure sensor
(4) Fuel sub level sensor



B2M0921B

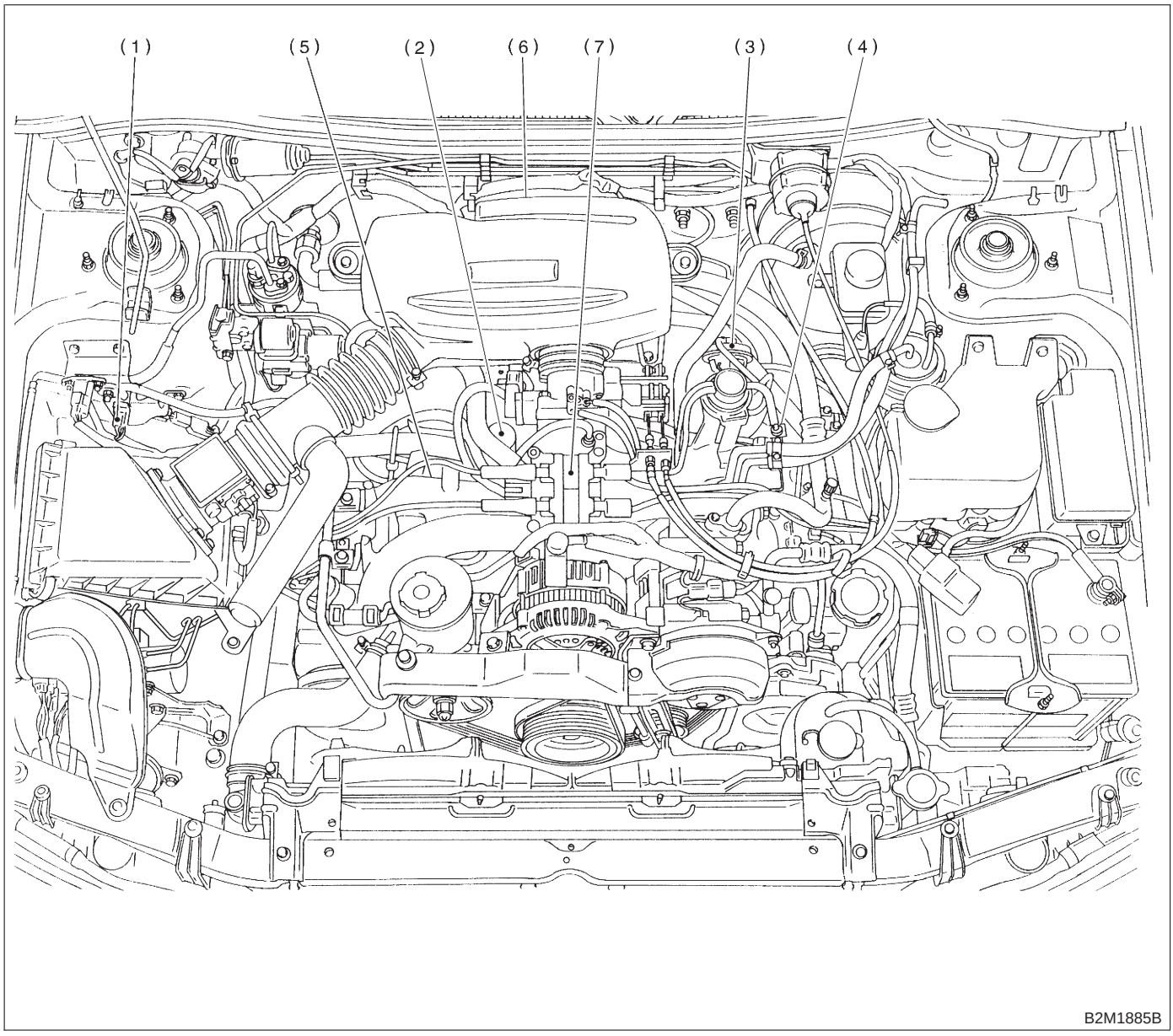


B2M1807A

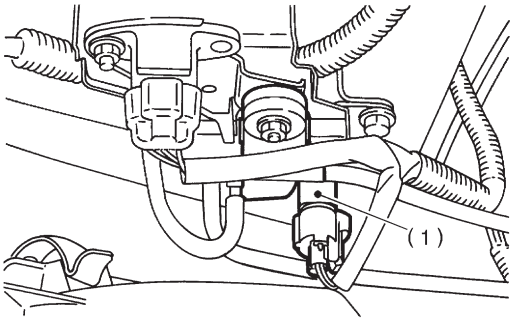


B2M0946B

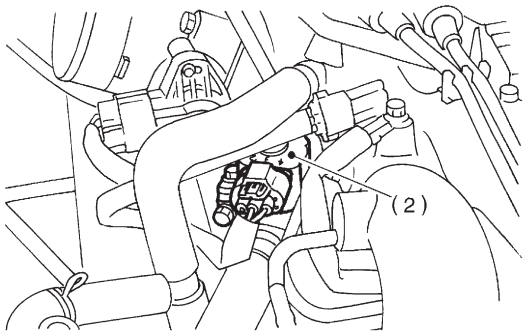
3. SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



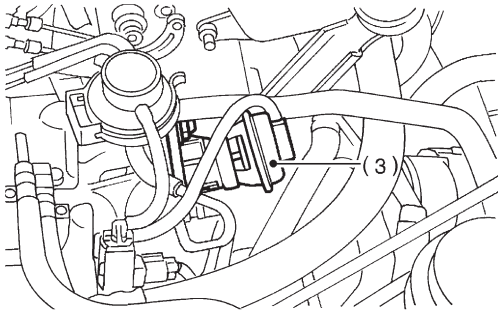
(1) Pressure sources switching solenoid valve
(2) Idle air control solenoid valve
(3) EGR valve (Except 2200 cc MT vehicles)
(4) EGR control solenoid valve (Except 2200 cc MT vehicles)
(5) Purge control solenoid valve
(6) Ignitor
(7) Ignition coil



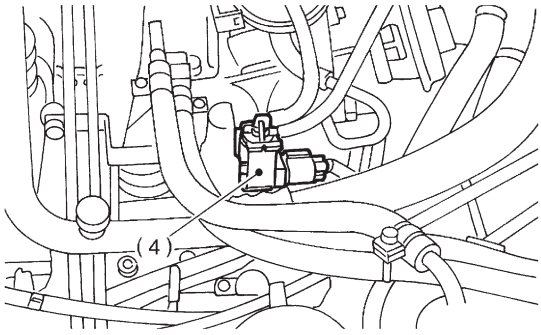
B2M0777B



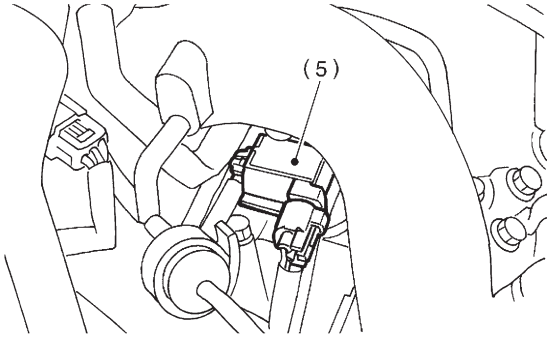
B2M1036C



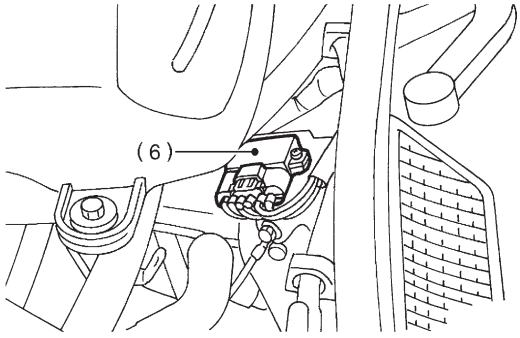
B2M1037E



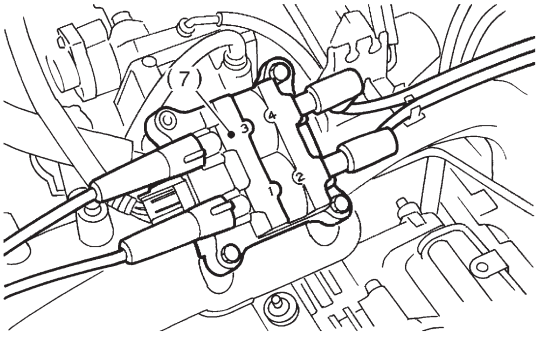
B2M1038E



B2M1039I

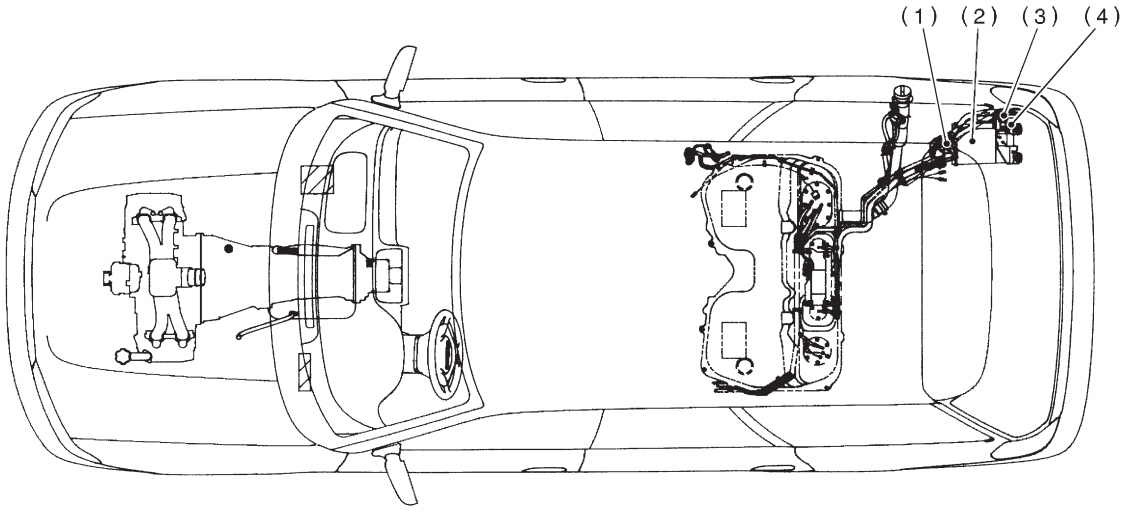


B2M1040E



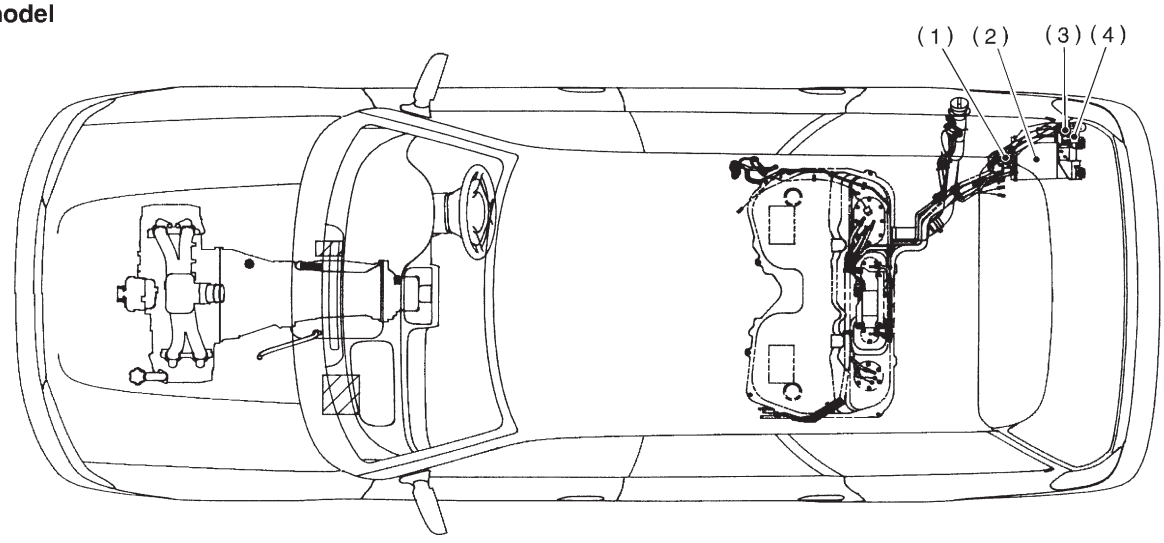
B2M1041E

LHD model



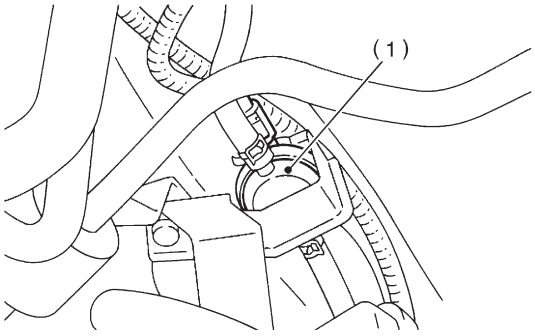
B2M1730C

RHD model



B2M1733C

(1) Pressure control solenoid valve
(2) Canister
(3) Drain valve
(4) Air filter



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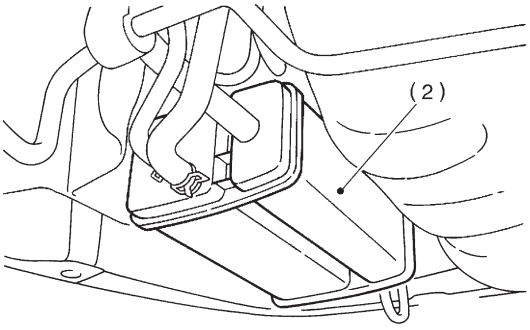

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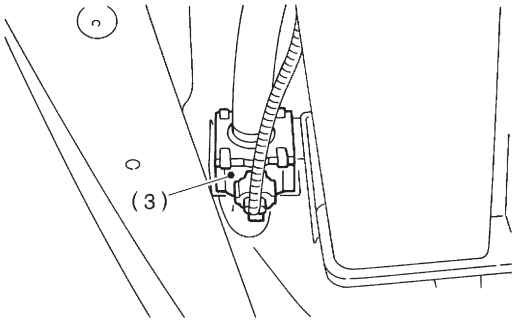

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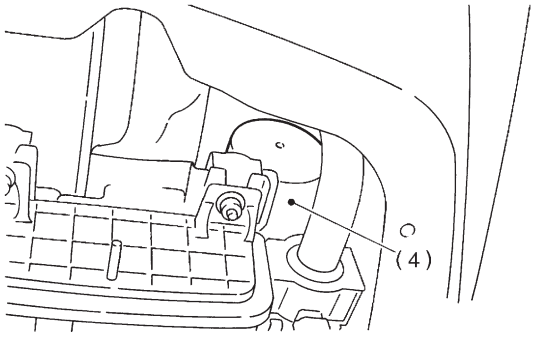

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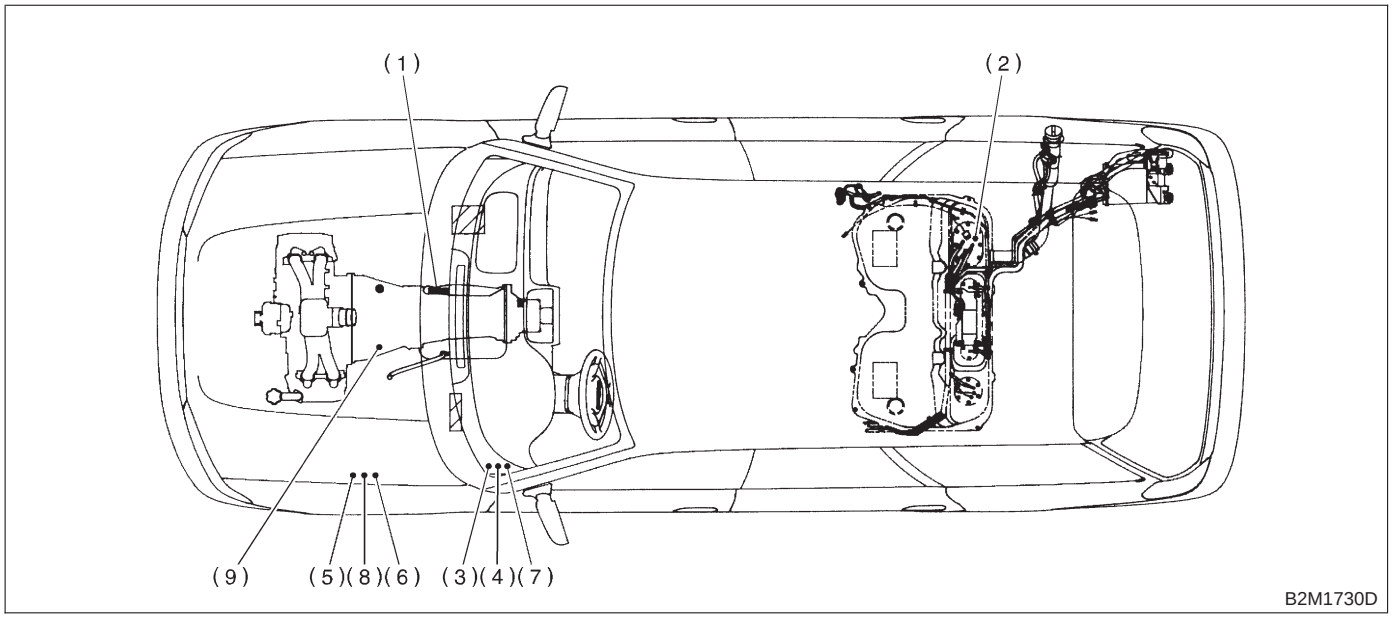
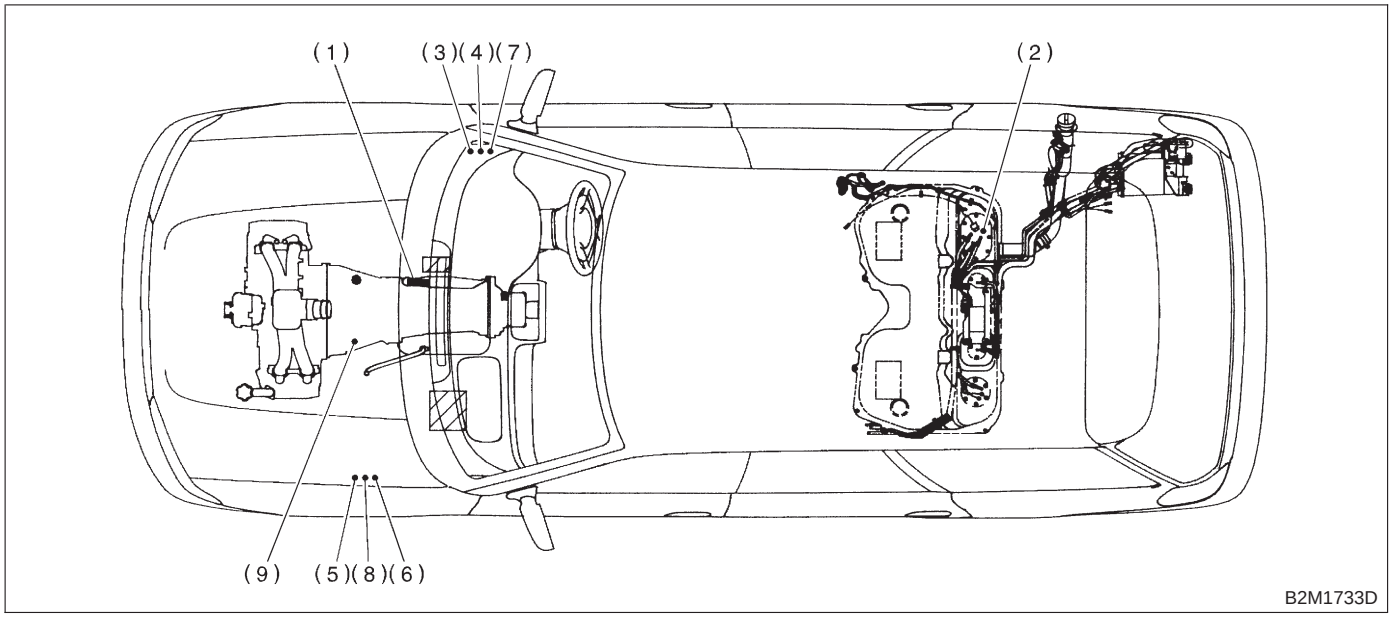
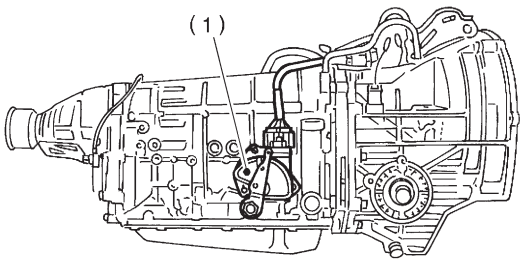
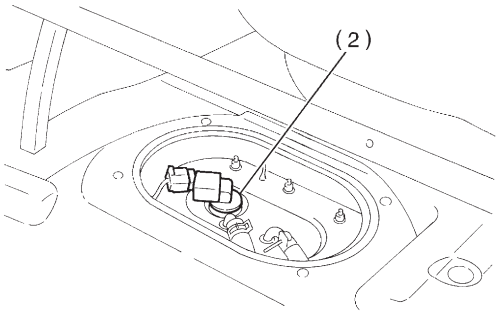




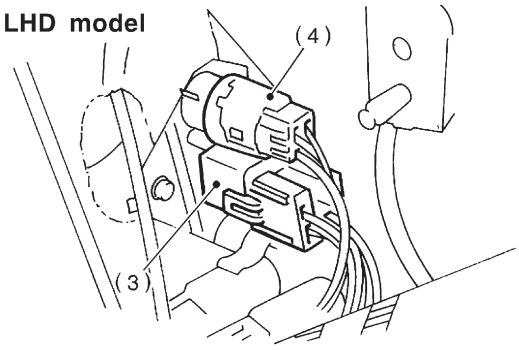
(1) Inhibitor switch (AT vehicles only)
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Radiator main fan relay 1 (With A/C models only)
(6) Radiator main fan relay 2 (With A/C models only)
(7) Radiator sub fan relay 1 (With A/C models)
Main fan relay (Without A/C models)
(8) Radiator sub fan relay 2 (With A/C models only)
(9) Starter



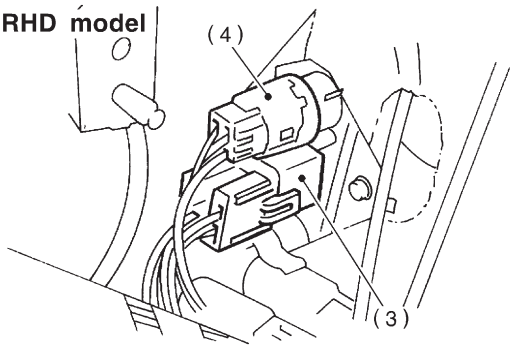
B2M1043K



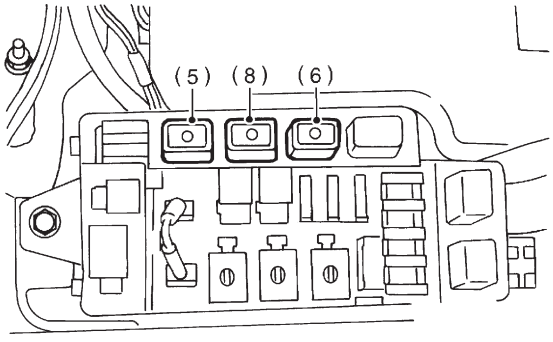
B2M0216B



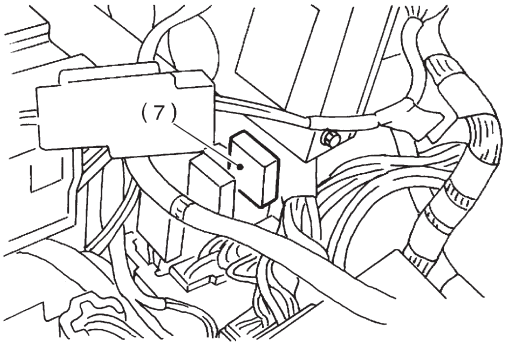
B2M0218F



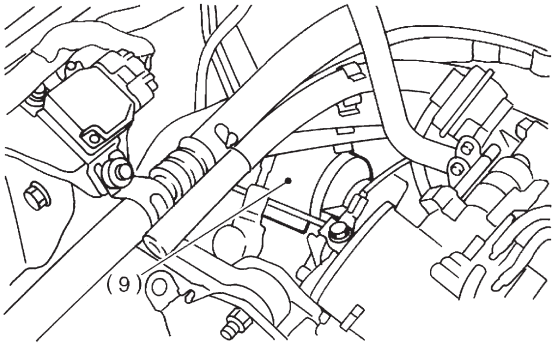
B2M0434D



OBD0034D



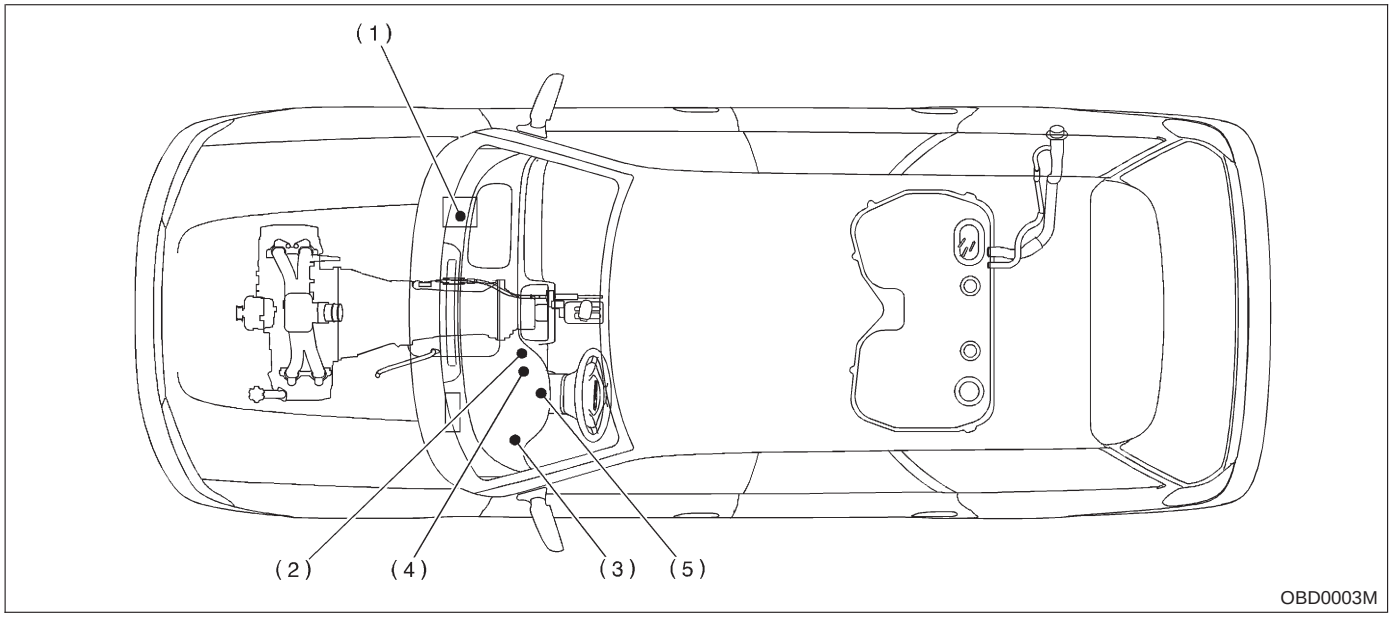
OBD0036B



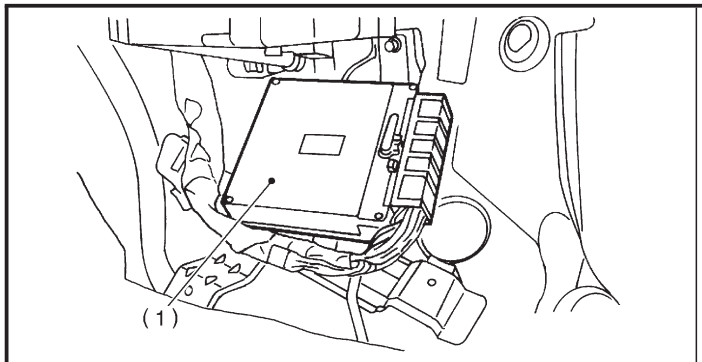
OBD0038D

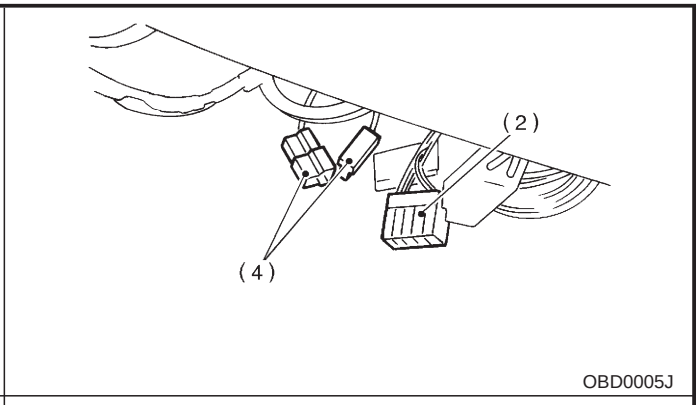
C: ENGINE (2500 cc MODEL)

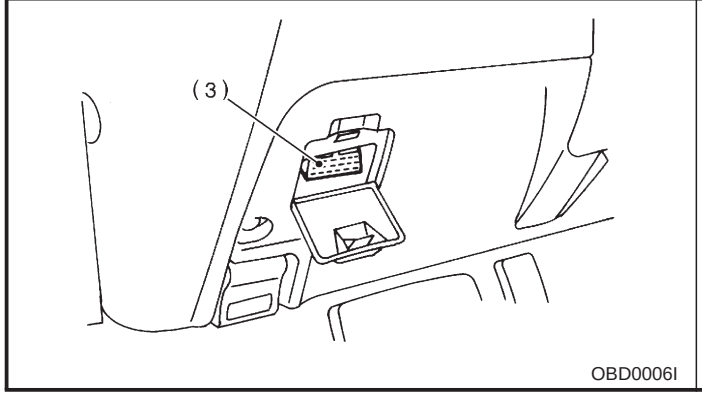
1. MODULE

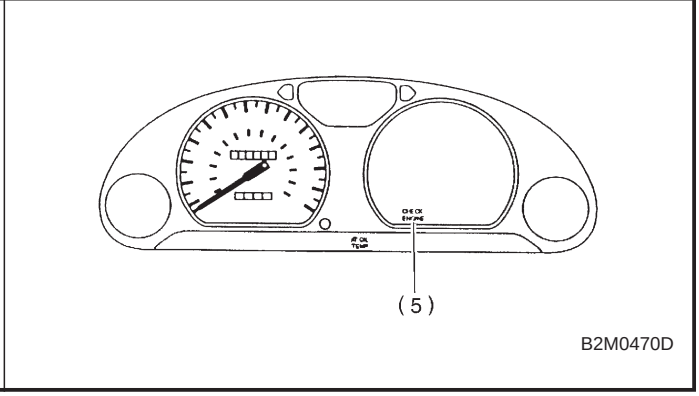


(1) Engine control module (ECM)
(2) Data link connector (for Subaru select monitor only)
(3) Data link connector (for Subaru select monitor and OBD-II general scan tool)
(4) Test mode connector
(5) CHECK ENGINE malfunction indicator lamp (MIL)



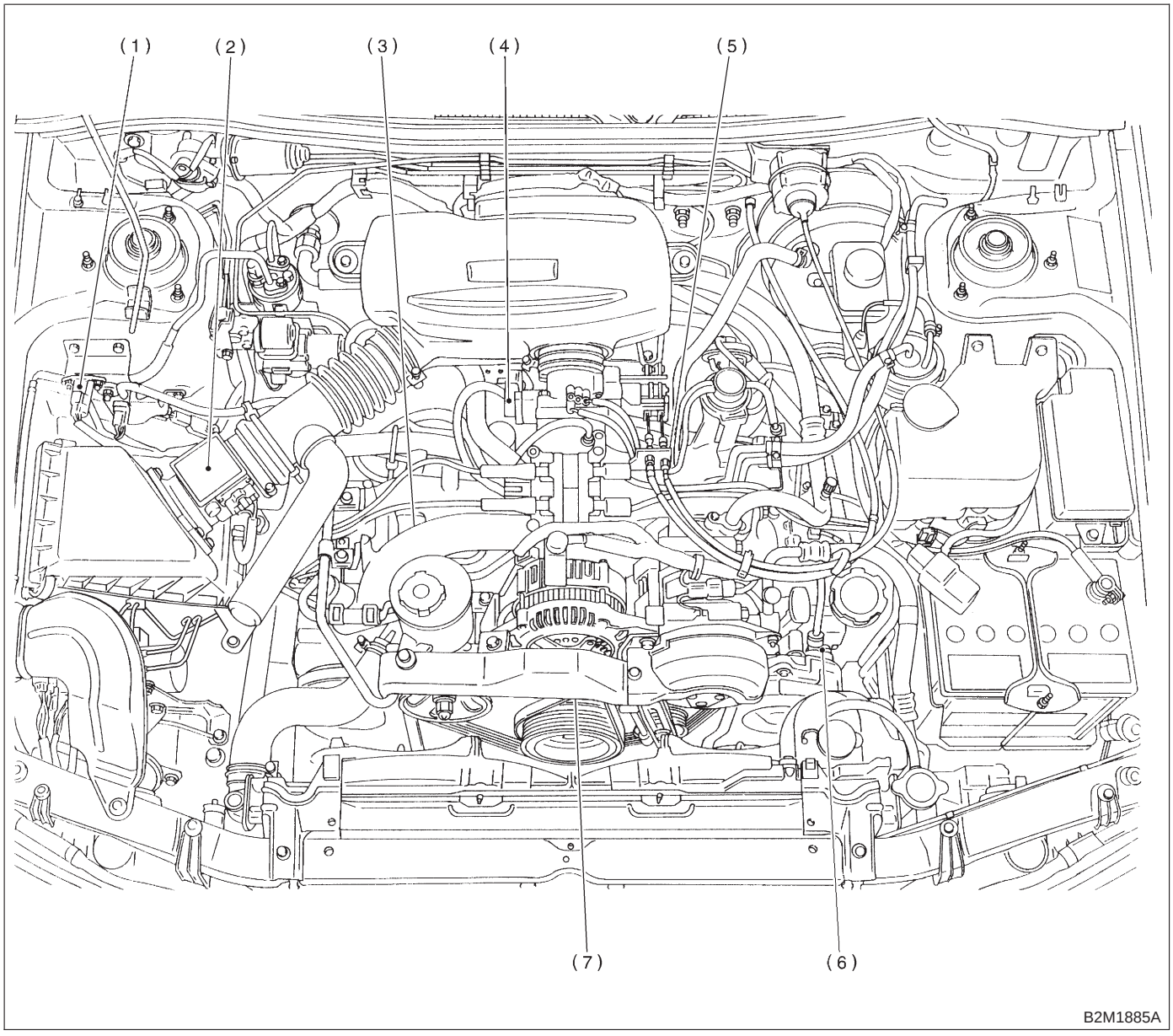




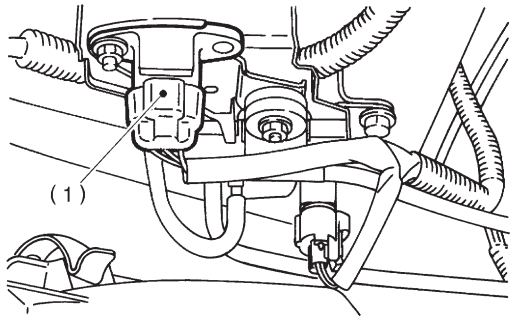


MEMO:

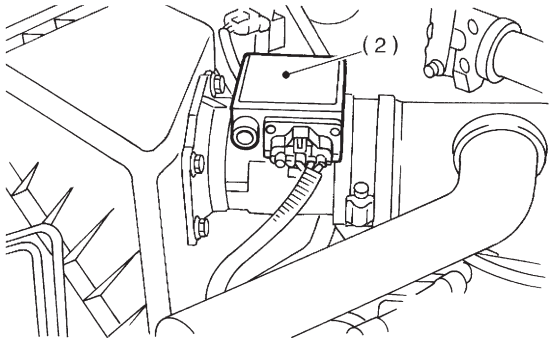
2. SENSOR



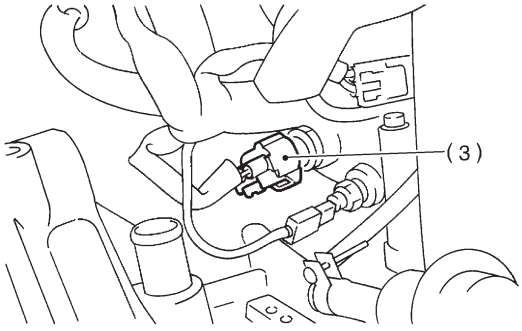
(1) Pressure sensor
(2) Mass air flow sensor
(3) Engine coolant temperature sensor
(4) Throttle position sensor
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor



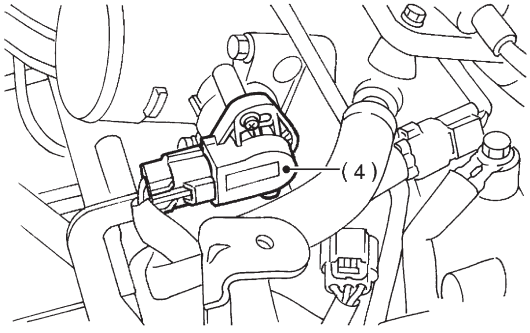
B2M0776B



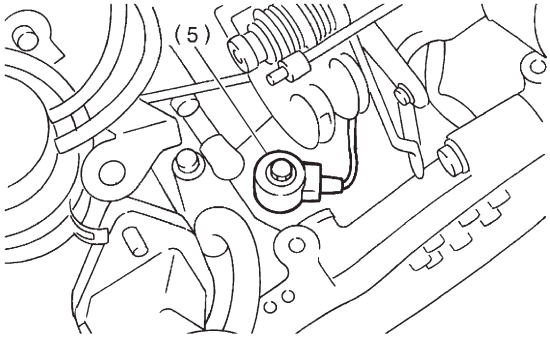
B2M1034C



B2M1690B



B2M1035C



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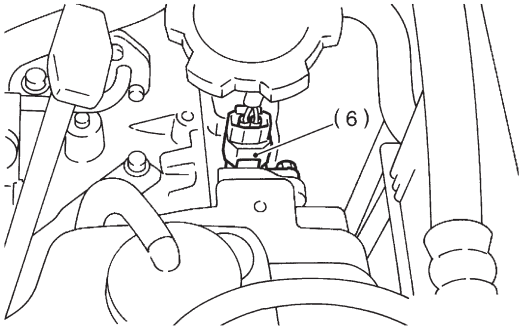
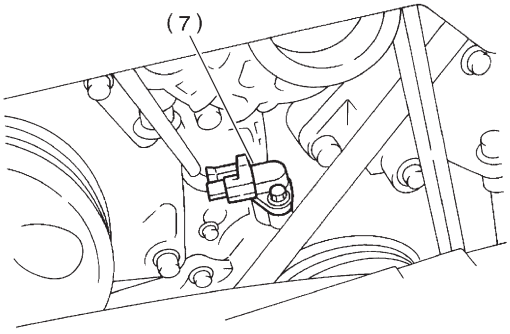
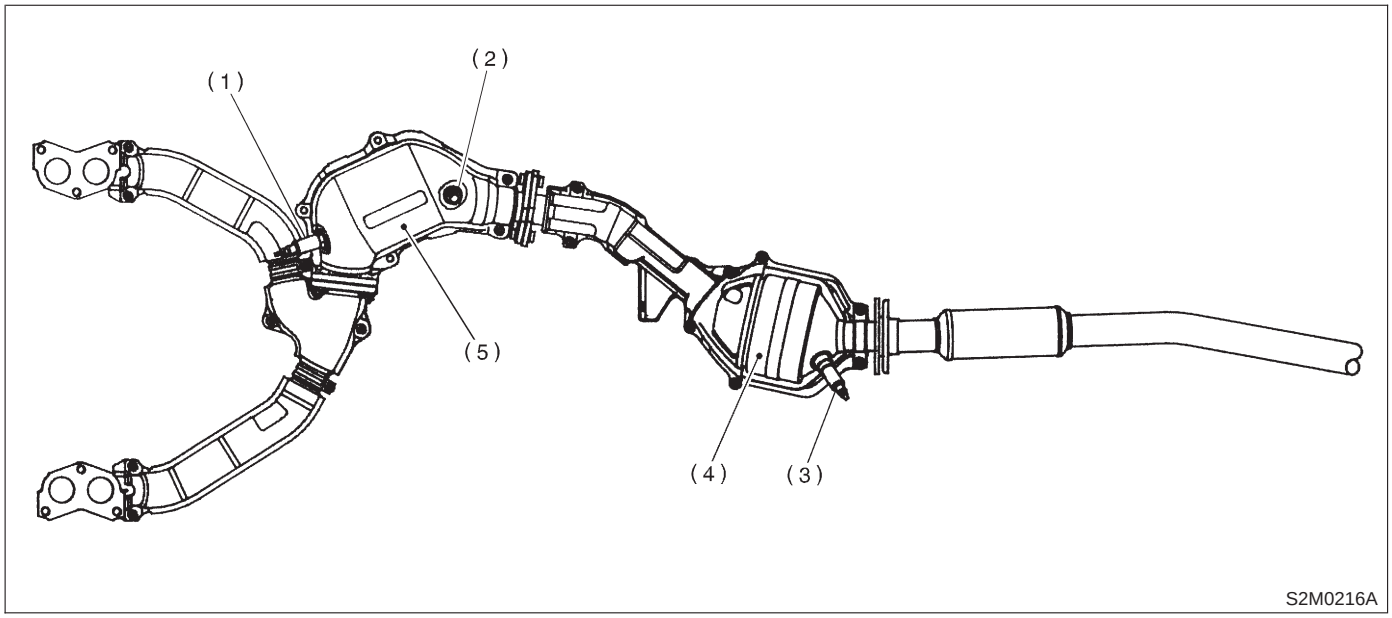


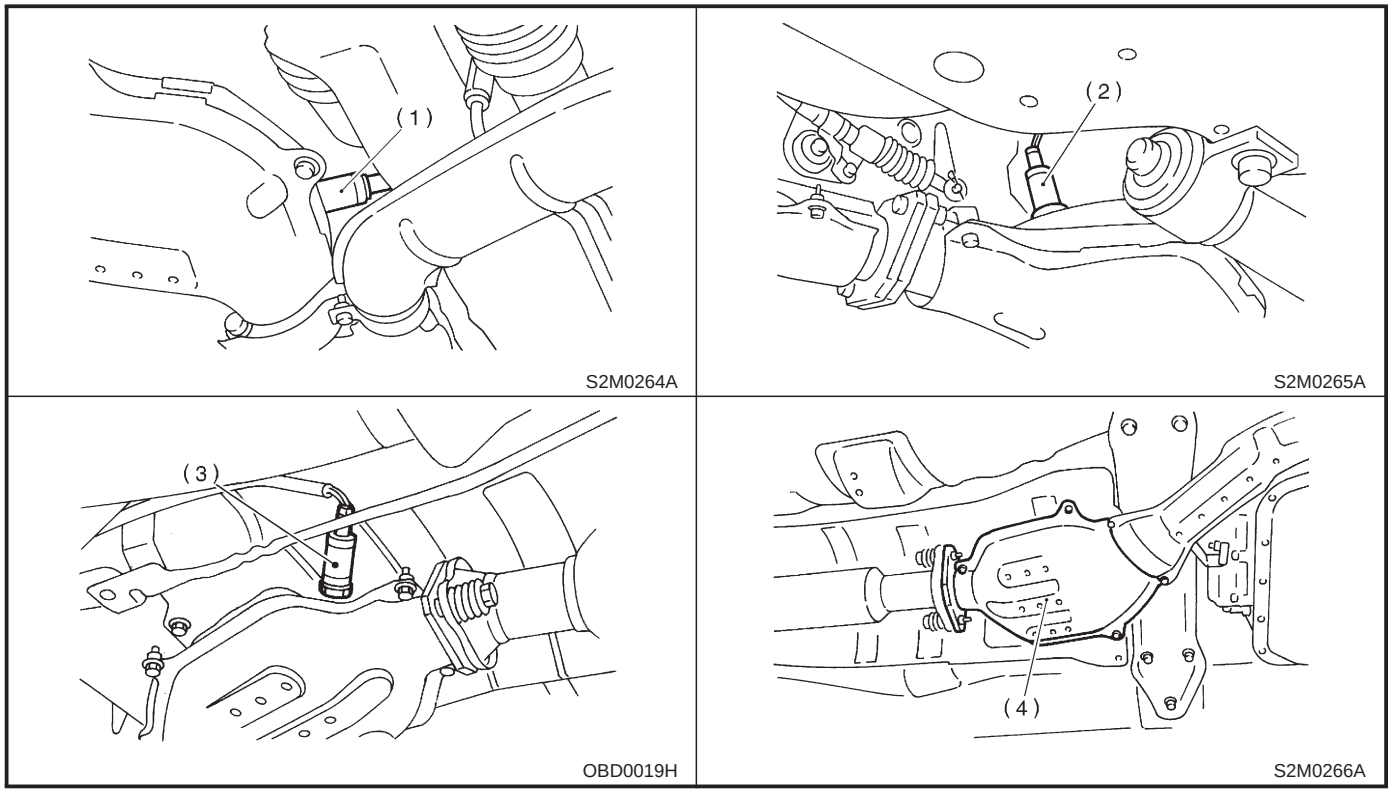
S2M0263A

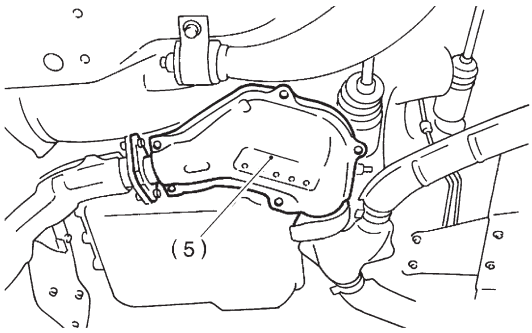


B2M0213J

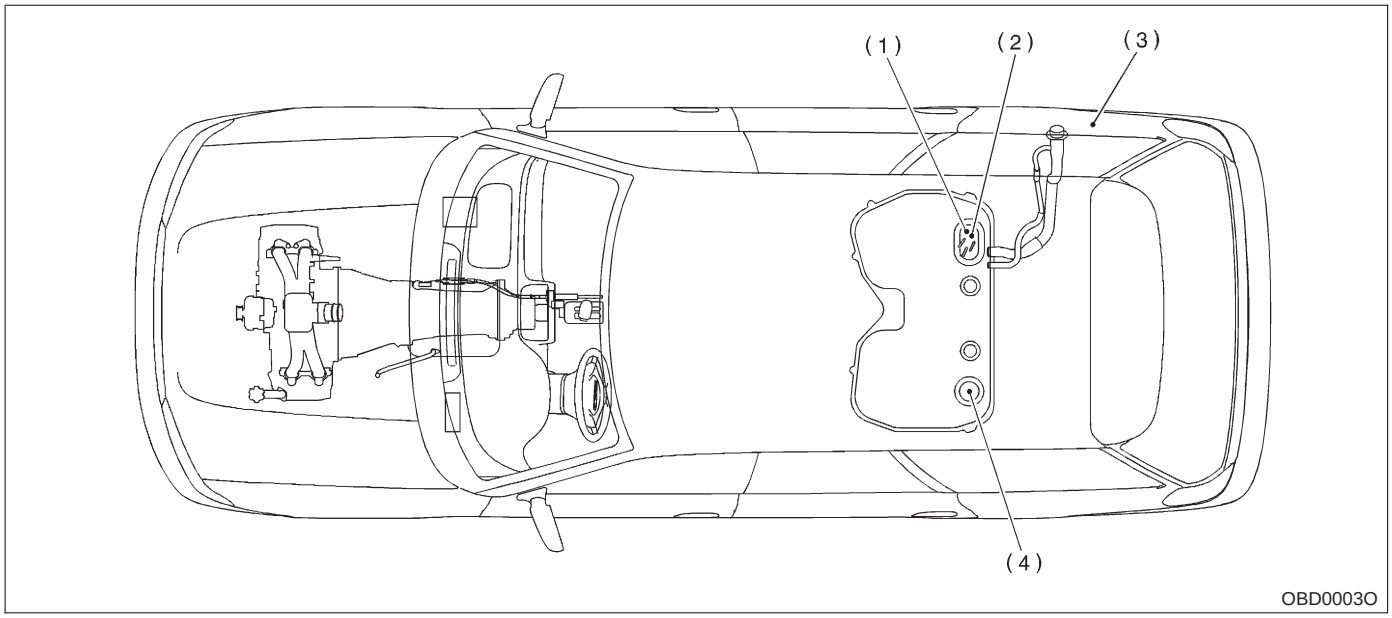


(1) Front oxygen sensor
(2) Rear oxygen sensor (California spec. vehicles)
(3) Rear oxygen sensor (California spec. vehicles only)
(4) Rear catalytic converter
(5) Front catalytic converter

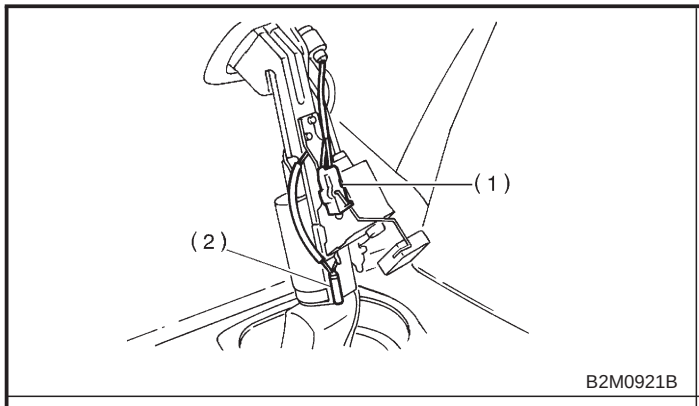


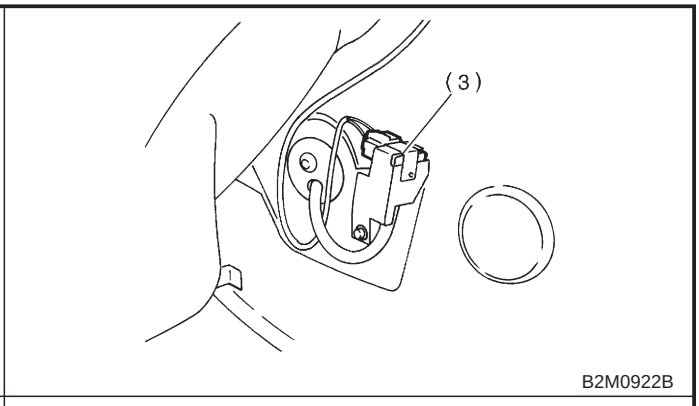


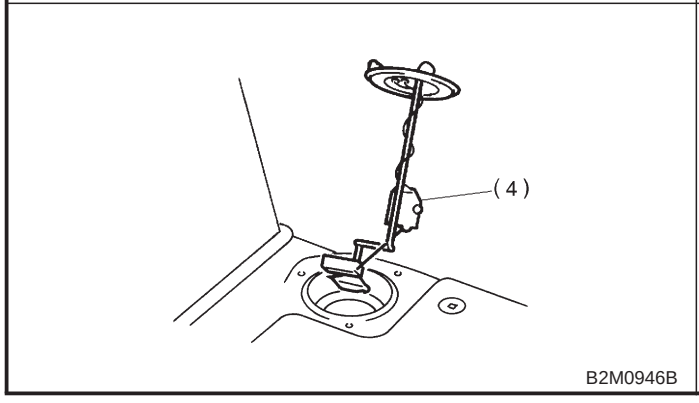
S2M0267A



(1) Fuel level sensor
(2) Fuel temperature sensor (2200 cc AWD models only)
(3) Fuel tank pressure sensor (2200 cc AWD models only)
(4) Fuel sub level sensor

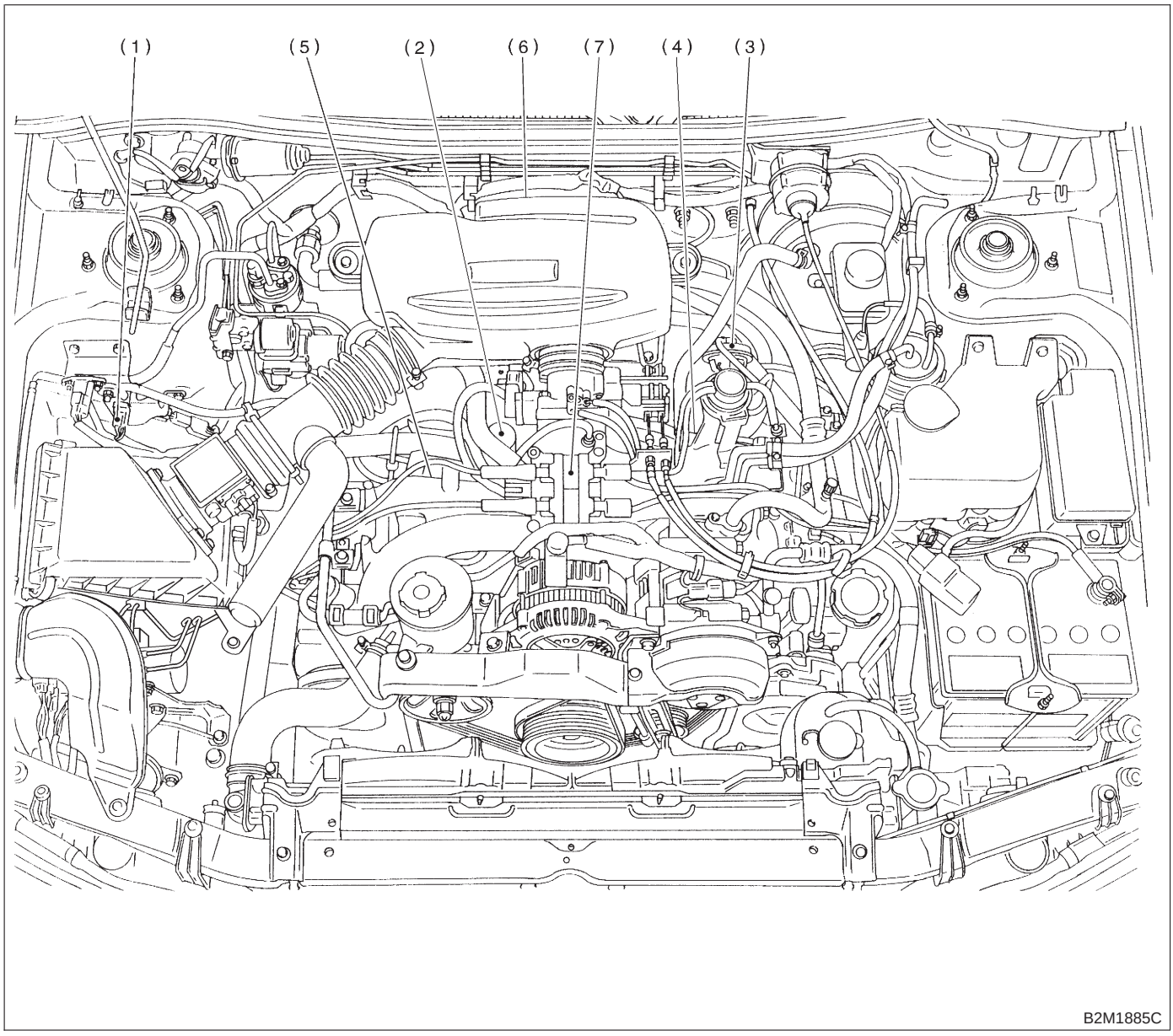




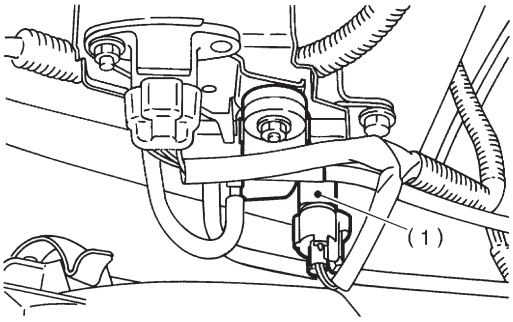


MEMO:

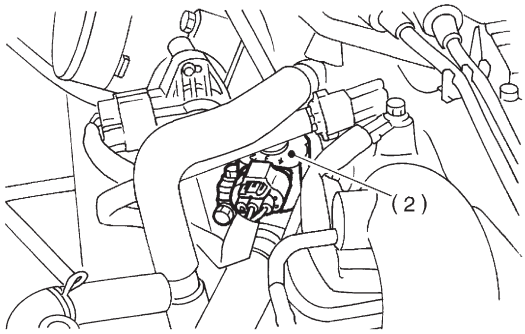
3. SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



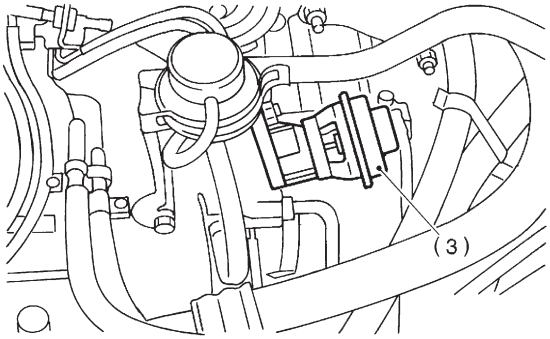
(1) Pressure sources switching solenoid valve
(2) Idle air control solenoid valve
(3) EGR valve
(4) EGR control solenoid valve
(5) Purge control solenoid valve
(6) Ignitor
(7) Ignition coil



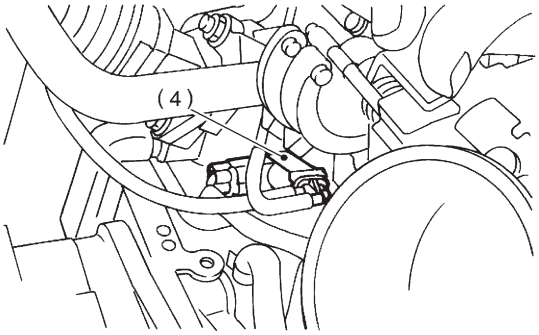
B2M0777B



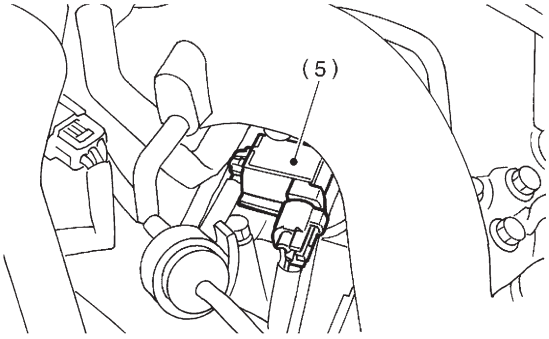
B2M1036C



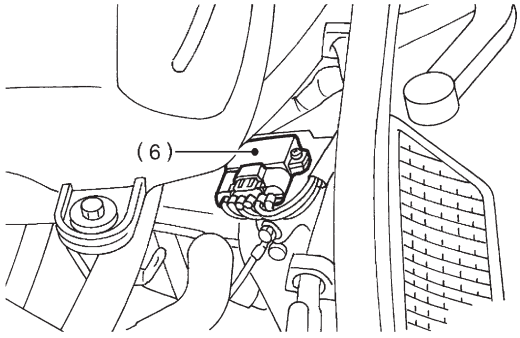
B2M0670E



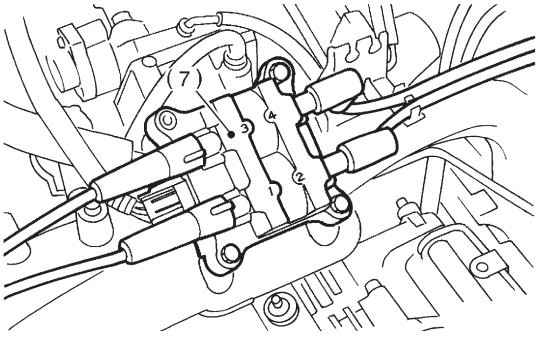
OBD0024F



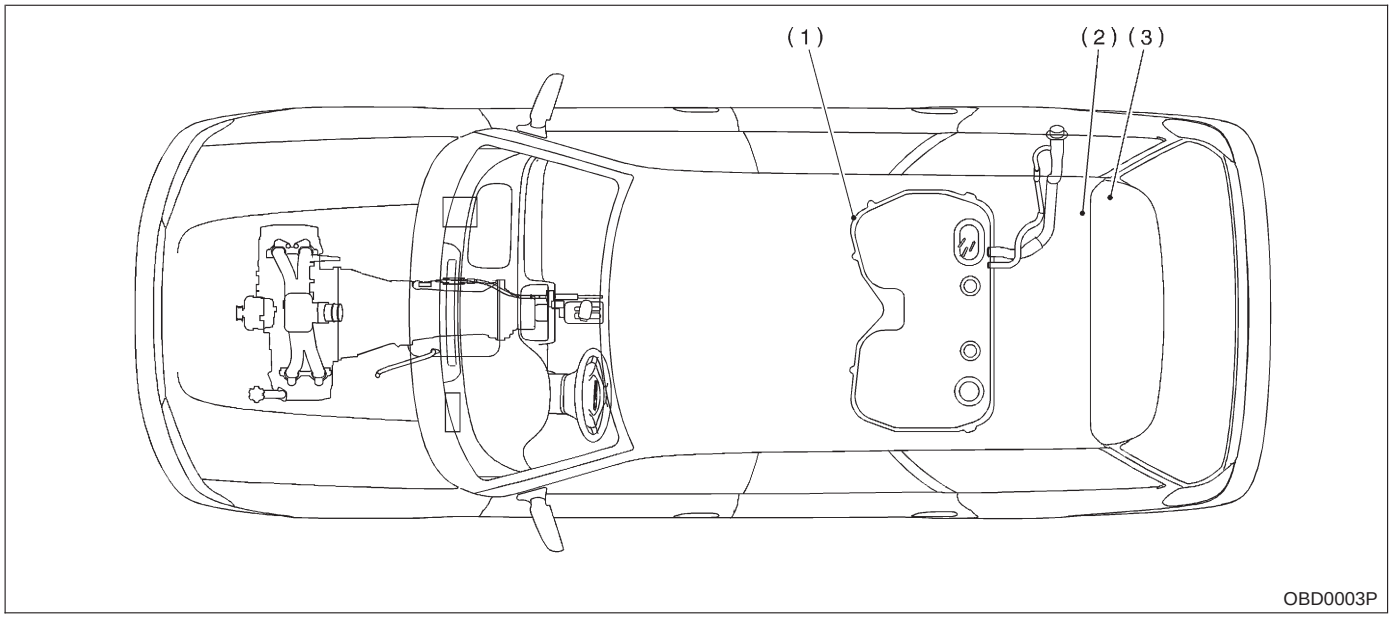
B2M1039I



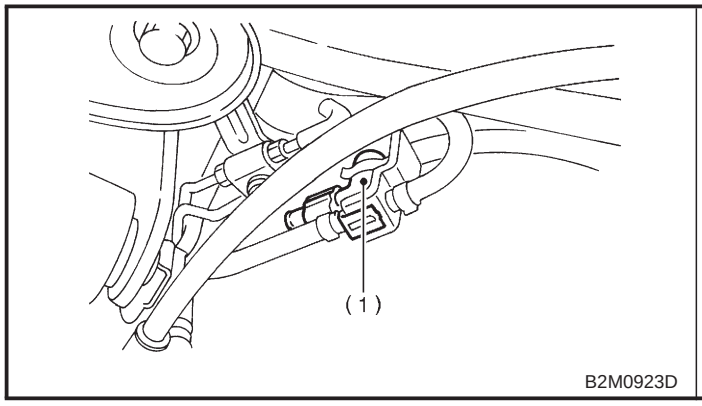
B2M1040E

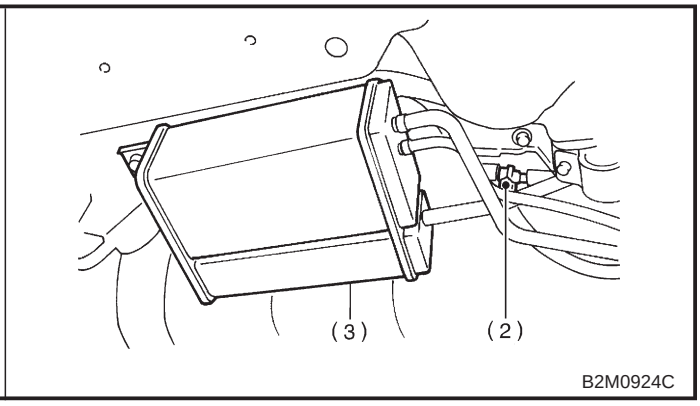


B2M1041E

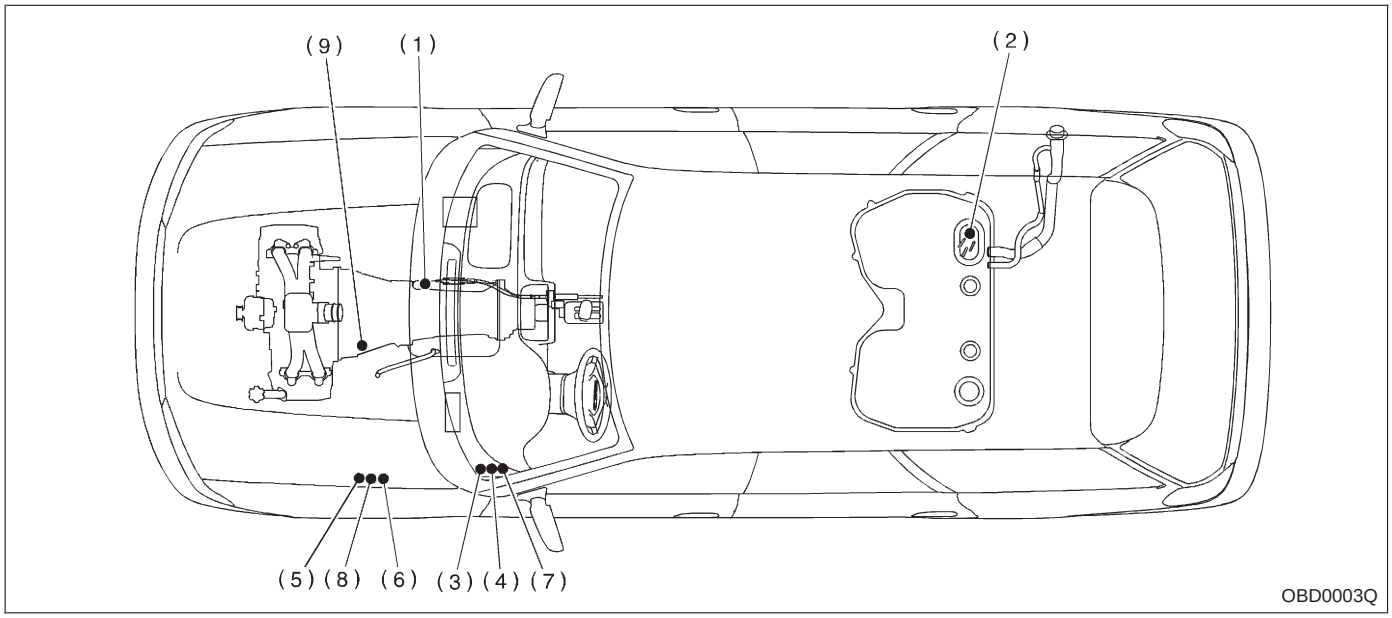


(1) Pressure control solenoid valve (2) Vent control solenoid valve (3) Canister

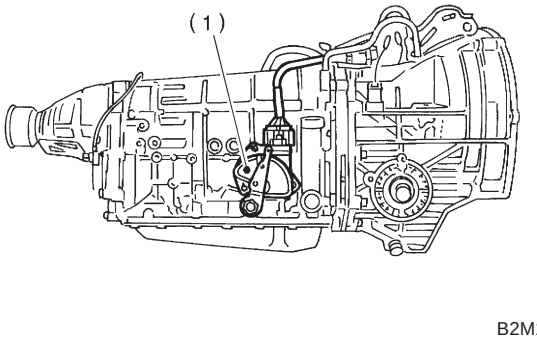


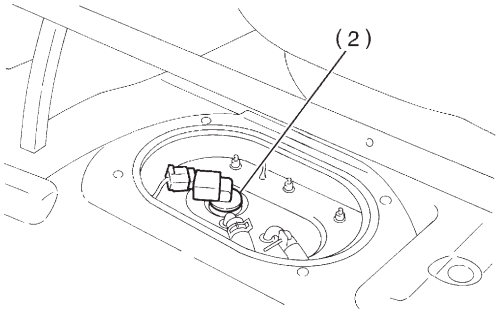


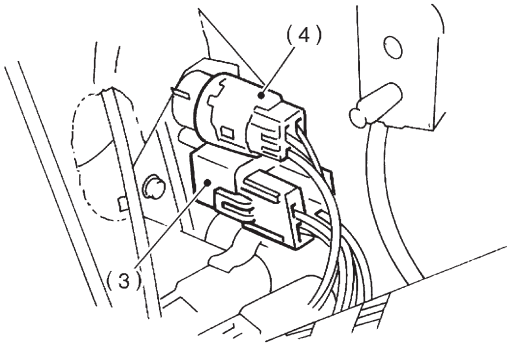
MEMO:

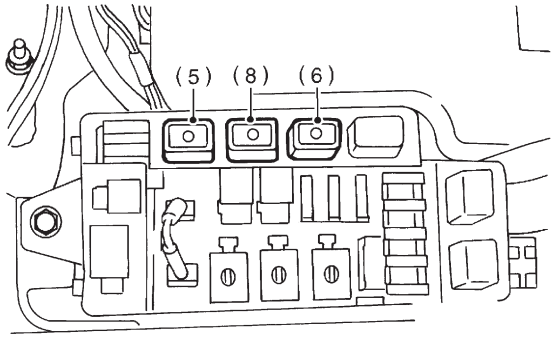


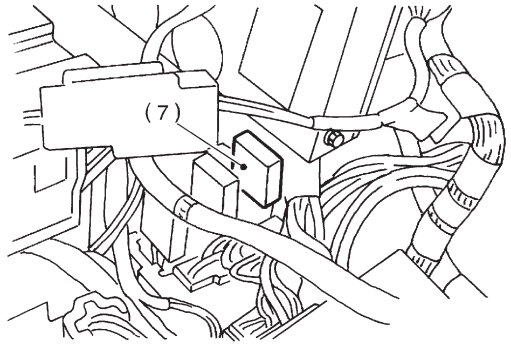
(1) Inhibitor switch (AT vehicles only)
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Radiator main fan relay 1 (With A/C models only)
(6) Radiator main fan relay 2 (With A/C models only)
(7) Radiator sub fan relay 1 (With A/C models)
Main fan relay (Without A/C models)
(8) Radiator sub fan relay 2 (With A/C models only)
(9) Starter



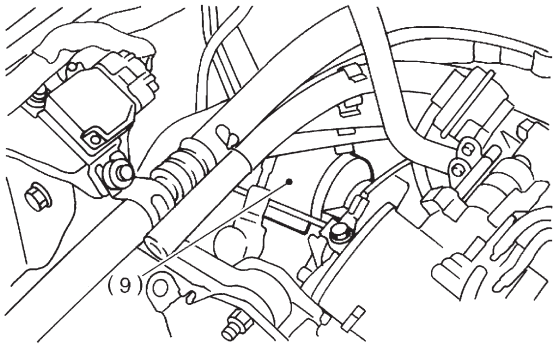








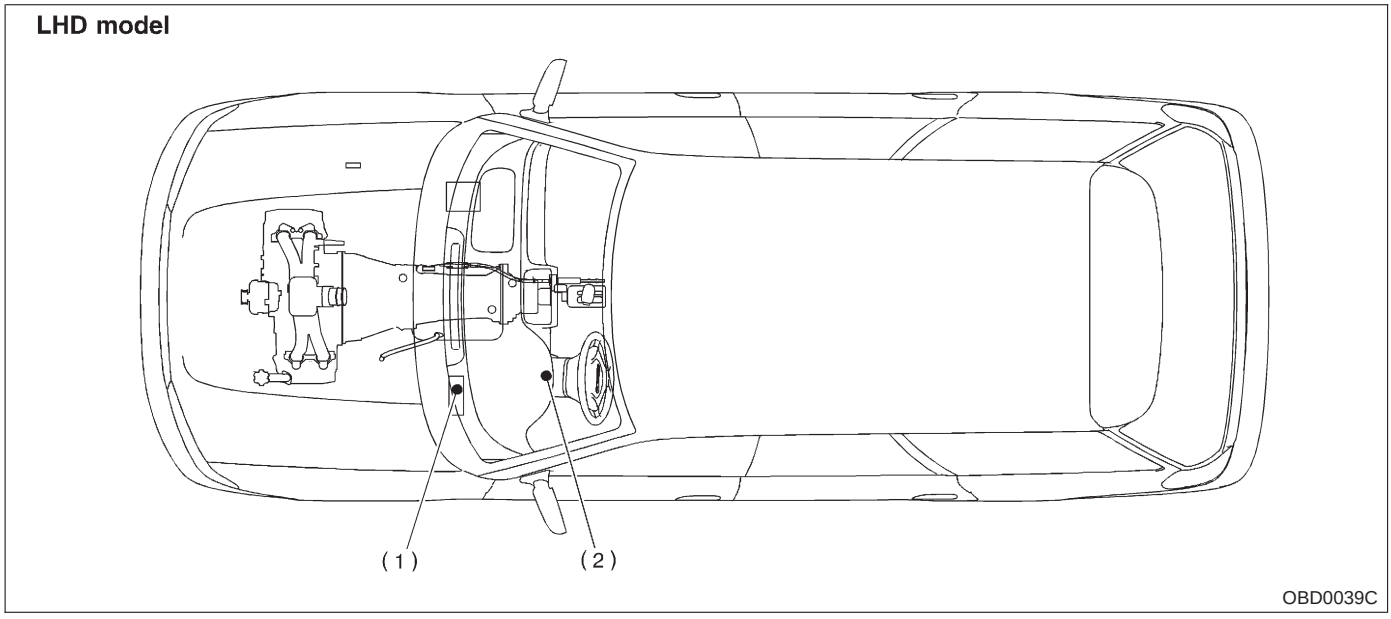
OBD0036B

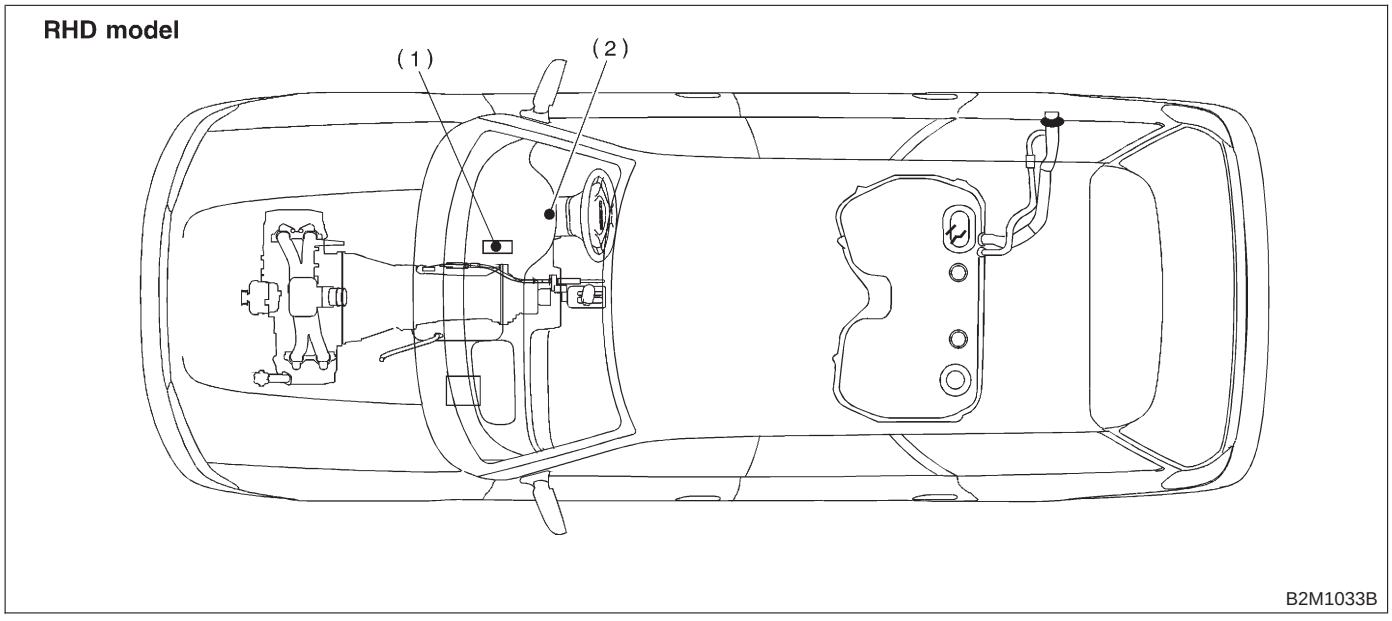


OBD0038D

D: TRANSMISSION

1. MODULE

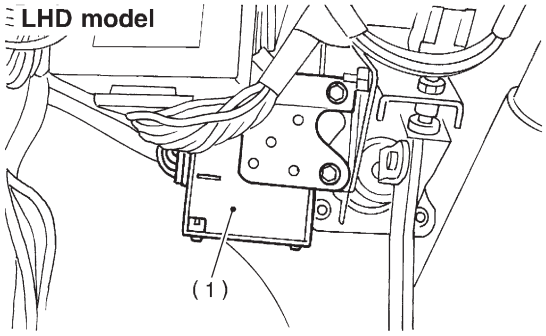




(1) Transmission Control Module (TCM) (for AT vehicles)

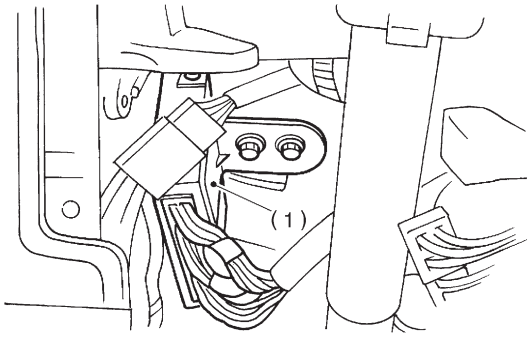
(2) AT diagnostic indicator light (for AT vehicles)

LHD model

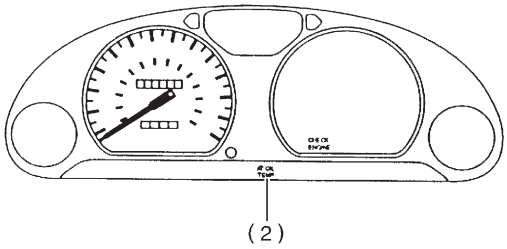


B3M0443M

RHD model

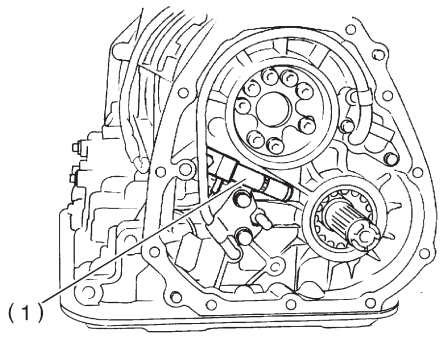


B3M0445G

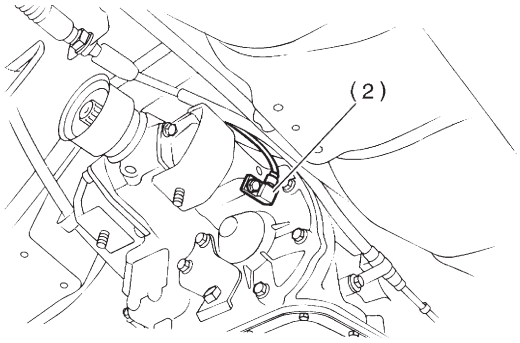


B2M0470E

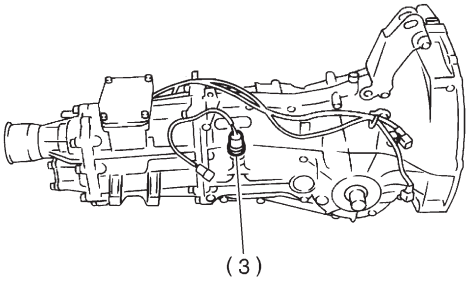
2. SENSOR



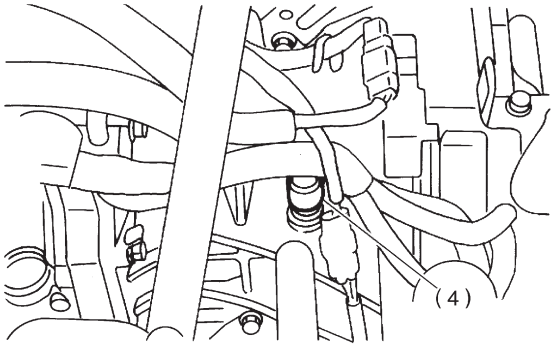
OBD0041B



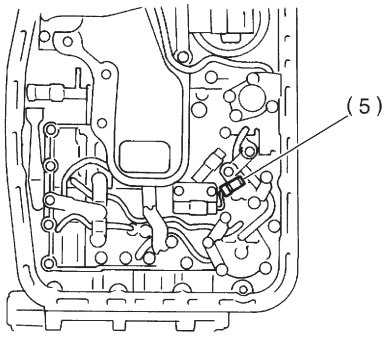
OBD0042D



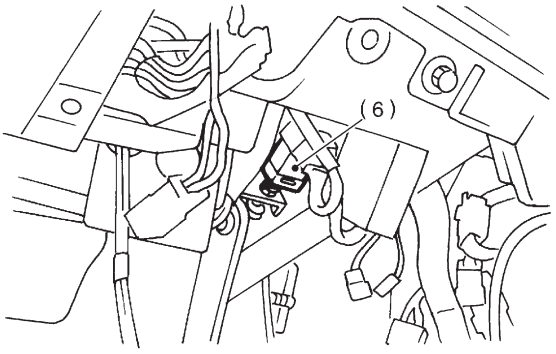
OBD0043B



OBD0044D



H2M1145H

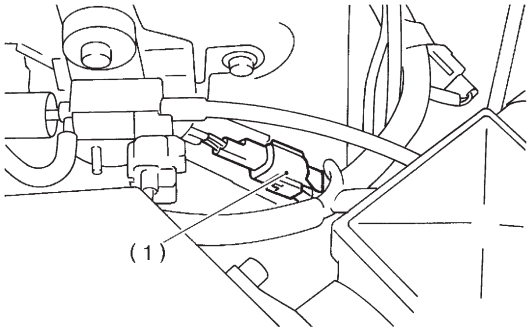


OBD0653B

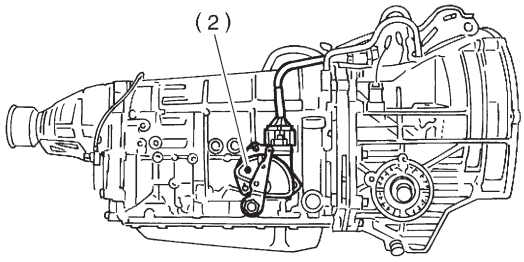
(1) Vehicle speed sensor 1 (for AT FWD vehicles only)
(2) Vehicle speed sensor 1 (for AT AWD vehicles only)
(3) Vehicle speed sensor 2 (for MT vehicles only)
(4) Vehicle speed sensor 2 (for AT vehicles only)
(5) ATF temperature sensor (for AT vehicles only)
(6) Brake light switch

3. SOLENOID VALVE AND RELAY

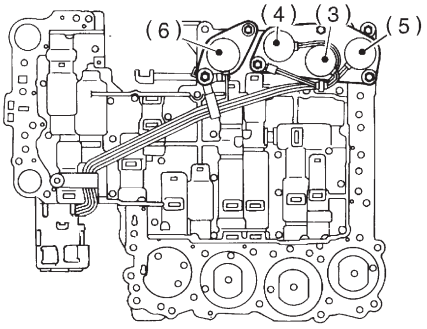
- **For AT vehicles**



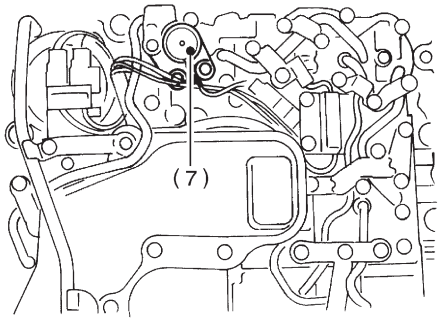
S2M0284A



B2M1043L



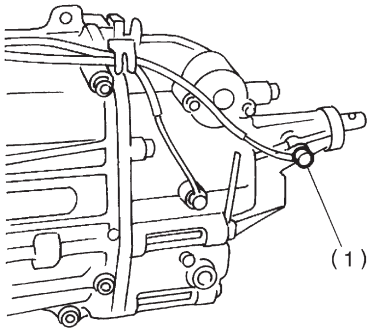
OBD0048G



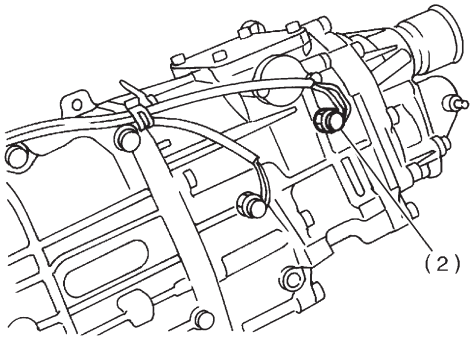
H2M1147C

(1) Dropping resistor
(2) Inhibitor switch
(3) Shift solenoid valve 1
(4) Shift solenoid valve 2
(5) Shift solenoid valve 3
(6) Duty solenoid valve A
(7) Duty solenoid valve B

- **For MT vehicles**



OBD0051B



OBD0526E

(1) Neutral position switch (FWD models only)
(2) Neutral position switch (AWD models only)

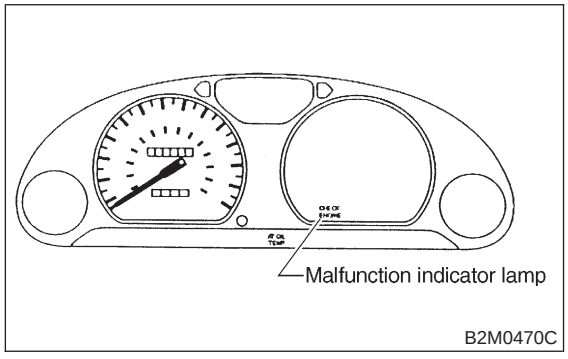
3. Diagnosis System

A: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL)

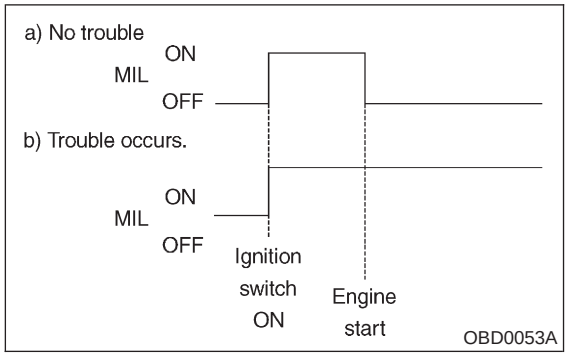
1. ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL)

1) When ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter illuminates.

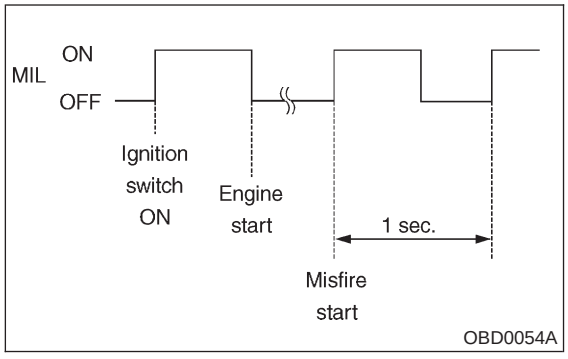
NOTE:
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to 2-7 [T700].>



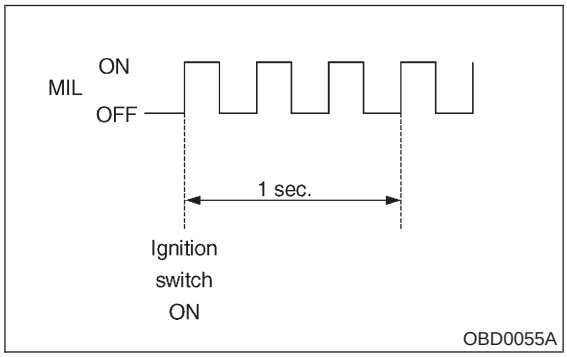
2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning.



3) If the diagnosis system senses a misfire which could damage the catalyzer, the MIL will blink at a cycle of 1 Hz.



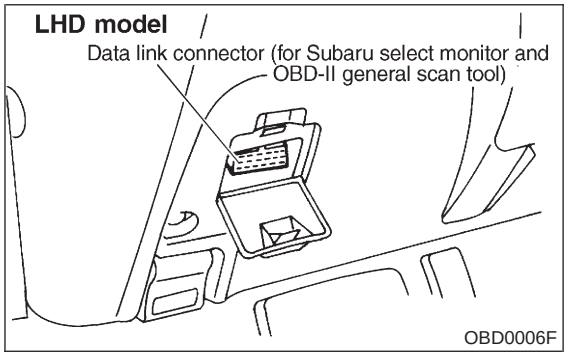
4) When ignition switch is turned to ON (engine off) or to "START" with the test mode connector connected, the MIL blinks at a cycle of 3 Hz.

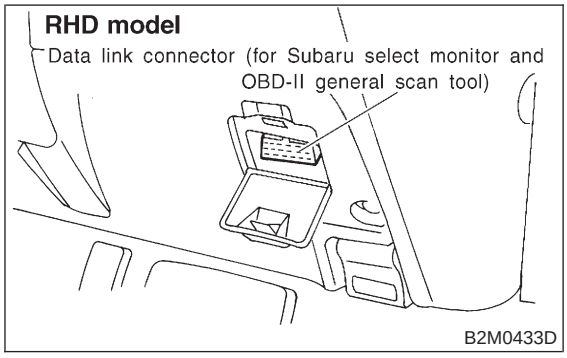


B: OBD-II GENERAL SCAN TOOL

1. HOW TO USE OBD-II GENERAL SCAN TOOL

1) Prepare a general scan tool (OBD-II general scan tool) required by SAE J1978.
2) Open the cover and connect the OBD-II general scan tool to the data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.





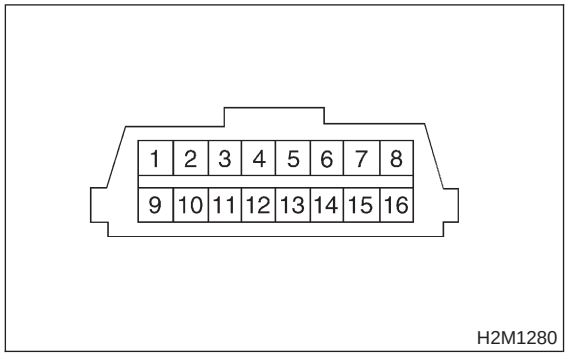
3) Using the OBD-II general scan tool, call up diagnostic trouble code(s) and freeze frame data.
OBD-II general scan tool functions consist of:
(1) MODE $01: Current powertrain diagnostic data
(2) MODE $02: Powertrain freeze frame data
(3) MODE $03: Emission-related powertrain diagnostic trouble codes
(4) MODE $04: Clear/Reset emission-related diagnostic information
(5) MODE $05: Oxygen sensor monitoring test results
Read out data according to repair procedures. (For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.)

NOTE:
For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].> (LHD), <Ref. to 2-7 [T11A0].> (RHD)

2. DATA LINK CONNECTOR (FOR OBD-II GENERAL SCAN TOOL AND SUBARU SELECT MONITOR)

1) This connector is used both for OBD-II general scan tools and the Subaru Select Monitor.
2) Terminal No. 4 to No. 6 of the data link connector is used for the Subaru Select Monitor signal.

CAUTION:
Do not connect any scan tools other than the OBD-II general scan tools and the Subaru Select Monitor, because the circuit for the Subaru Select Monitor may be damaged.



Terminal No.	Contents	Terminal No.	Contents
1	Power supply	9	Blank
2	Blank	10	K line of ISO 9141 CARB
3	Blank	11	Blank
4	Subaru Select Monitor signal (ECM to Subaru Select Monitor)*	12	Ground
5	Subaru Select Monitor signal (Subaru Select Monitor to ECM)*	13	Ground
6	Subaru Select Monitor clock*	14	Blank
7	Blank	15	Blank
8	Blank	16	Blank

*: Circuit only for Subaru Select Monitor

3. CURRENT POWERTRAIN DIAGNOSTIC DATA (MODE $01)

Refers to data denoting the current operating condition of analog input/output, digital input/output and/or the powertrain system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related powertrain trouble codes and MIL status	ON/OFF
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
10	Air flow rate from mass air flow sensor	g/sec
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
14	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 1	V and %
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 2	V and %
1C	On-board diagnosis system	—

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access generic OBD-II PIDs (MODE $01).

4. POWERTRAIN FREEZE FRAME DATA (MODE $02)

Refers to data denoting the operating condition when trouble is sensed by the on-board diagnosis system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	Trouble code that caused CARB required freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access freeze frame data (MODE $02).

5. EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE (MODE $03)

Refers to data denoting emission-related powertrain diagnostic trouble codes.
For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].> (LHD), <Ref. to 2-7 [T11A0].> (RHD)

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access emission-related powertrain diagnostic trouble codes (MODE $03).

6. CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION (MODE $04)

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE $04).

7. OXYGEN SENSOR MONITORING TEST RESULTS (MODE $05)

Refers to the mode using oxygen sensor output data while the on-board diagnosis system is performing diagnosis on the oxygen sensor.
A list of the support oxygen sensor output data and test ID (identification) are shown in the following table.

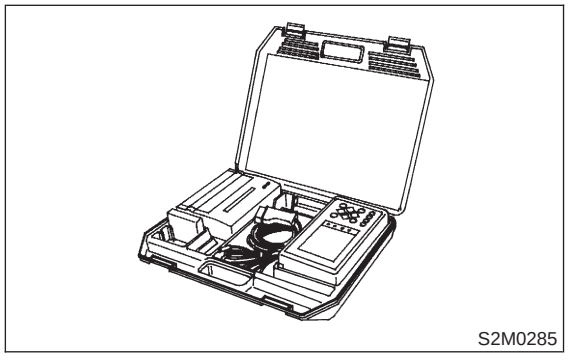
Test ID	Data	Unit of measure
01	Rich to lean sensor threshold voltage (constant)	V
02	Lean to rich sensor threshold voltage (constant)	V
03	Low sensor voltage for switch time calculation (constant)	V
04	High sensor voltage for switch time calculation (constant)	V
05	Rich to lean sensor switch time (calculated)	sec.
06	Lean to rich sensor switch time (calculated)	sec.
07	Minimum sensor voltage for test cycle (calculated)	V
08	Maximum sensor voltage for test cycle (calculated)	V

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access oxygen sensor monitoring test results (MODE $05).

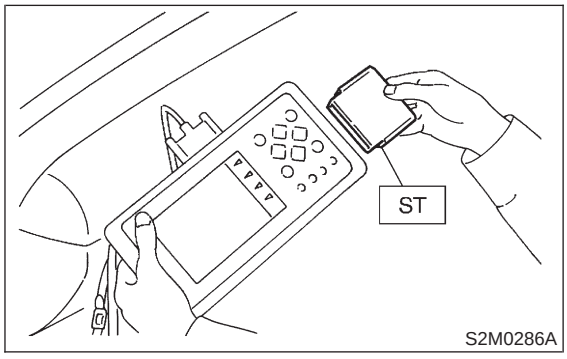
C: SUBARU SELECT MONITOR

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare Subaru select monitor kit.


S2M0285

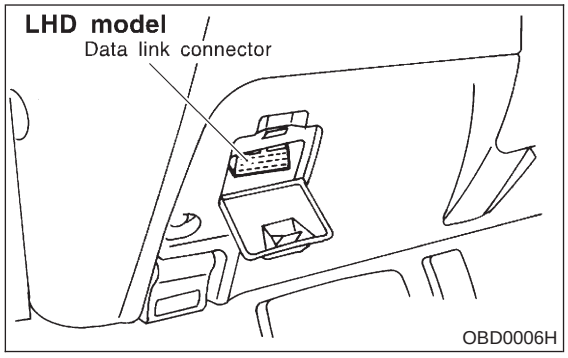
2) Connect diagnosis cable to Subaru select monitor.
3) Insert cartridge into Subaru select monitor.
ST 24082AA010 CARTRIDGE

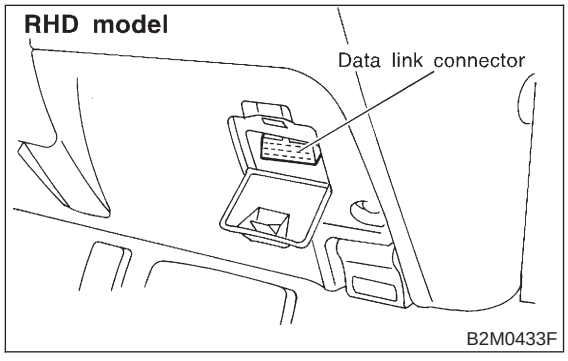


S2M0286A

4) Connect Subaru select monitor to data link connector.

(1) Open the cover data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.

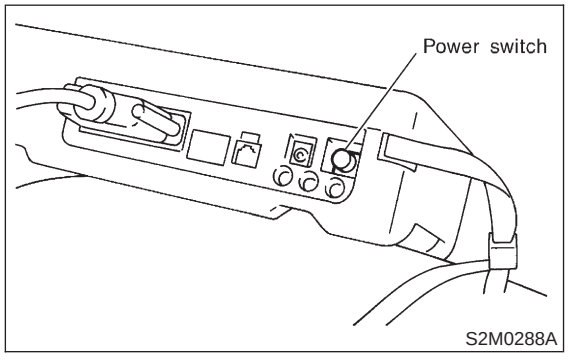




(2) Connect diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for Subaru select monitor and OBD-II general scan tool.

5) Turn ignition switch to ON (engine OFF) and Subaru select monitor switch to ON.



6) Using Subaru select monitor, call up diagnostic trouble code(s) and various data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) SHOWN ON DISPLAY FOR ENGINE. (NORMAL MODE)

1) On the ┌Main Menu┘ display screen, select the {1. All System Diagnosis} and press the [YES] key.
2) Make sure that a diagnostic trouble code (DTC) is shown on the {EGI/EMPi} display screen.

NOTE:
● For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
● For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].> (LHD), <Ref. to 2-7 [T11A0].> (RHD)

3. READ DIAGNOSTIC TROUBLE CODE (DTC) SHOWN ON DISPLAY FOR ENGINE. (OBD MODE)

1) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {7. OBD System} and press the [YES] key.
5) On the ┌OBD Menu┘ display screen, select the {3. Diagnosis Code(s) Display} and press the [YES] key.
6) Make sure that a diagnostic trouble code (DTC) is shown on the display screen.

NOTE:
● For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
● For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].> (LHD), <Ref. to 2-7 [T11A0].> (RHD)

MEMO:

4. READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE. (NORMAL MODE)

1) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
2) On the 「System Selection Menu」 display screen, select the {EGI/EMPi} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the 「EGI/EMPI Diagnosis」 display screen, select the {1. Current Data Display & Save} and press the [YES] key.
5) On the 「Data Display Menu」 display screen, select the {1. 12 Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

● A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Vehicle speed signal	Vehicle Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
Engine coolant temperature signal	Coolant Temp.	°C or °F
Ignition timing signal	Ignition Timing	deg
Mass air flow signal	Mass Air Flow	g/s or lb/m
Mass air flow signal	Air Flow Sensor Voltage	V
Throttle position signal	Throttle Opening Angle	%
Throttle position signal	Throttle Sensor Voltage	V
Injection pulse width	Fuel Injection #1 Pulse	ms
Idle air control signal	ISC Valve Duty Ratio	%
Engine load data	Engine Load	%
Front oxygen sensor output signal	Front O2 Sensor	V
Rear oxygen sensor output signal	Rear O2 Sensor	V
Short term fuel trim	A/F Correction #1	%
Knock sensor signal	Knocking Correction	deg
Atmospheric absolute pressure signal	Atmosphere Pressure	mmHg or kPa or inHg
Intake manifold absolute pressure signal	Mani. Relative Pressure	mmHg or kPa or inHg
A/F correction (short term fuel trim) by rear oxygen sensor	Rear O2 A/F Learning	%
Long term fuel trim	Whole A/F Learning	%
Long term whole fuel trim	Front O2 A/F Learning	%
Front oxygen sensor heater current	Front O2 Heater	A
Rear oxygen sensor heater current	Rear O2 Heater	A
Canister purge control solenoid valve duty ratio	CPC Valve Duty Ratio	%
Fuel tank pressure signal	Fuel Tank Pressure	mmHg or kPa or inHg
Fuel temperature signal	Fuel Temp.	°C or °F
Fuel level signal	Fuel Level	V
Ignition switch signal	Ignition Switch	ON or OFF
Automatic transmission vehicle identification signal	AT Vehicle ID Signal	ON or OFF
Test mode connector signal	Test Mode Signal	ON or OFF
Neutral position switch signal	Neutral Position Switch	ON or OFF
Air conditioning switch signal	A/C Switch	ON or OFF
Air conditioning relay signal	A/C Relay	ON or OFF
Radiator main fan relay signal	Radiator Fan Relay #1	ON or OFF
Fuel pump relay signal	Fuel Pump Relay	ON or OFF
Knocking signal	Knocking Signal	ON or OFF
Radiator sub fan relay signal	Radiator Fan Relay #2	ON or OFF
Engine torque control signal	Torque Control Signal	ON or OFF
Pressure sources switching solenoid valve	Pressure Sources Change	ON or OFF
Front oxygen sensor rich signal	Front O2 Rich Signal	ON or OFF
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF
Federal specification vehicle identification signal	FED Spec. Vehicle Signal	ON or OFF

Contents	Display	Unit of measure
Exhaust gas recirculation system diagnosis signal	EGR System Diagnosis	ON or OFF
Catalyst diagnosis signal	Catalyst Diagnosis	ON or OFF
Pressure control solenoid valve	PCV Solenoid Valve	ON or OFF
Exhaust gas recirculation solenoid valve	EGR Solenoid Valve	ON or OFF
Vent control solenoid valve or drain valve	Vent. Solenoid Valve	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

5. READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE. (OBD MODE)

1) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {7. OBD System} and press the [YES] key.
5) On the ┌OBD Menu┘ display screen, select the {1. Current Data Display & Save} and press the [YES] key.
6) On the ┌Data Display Menu┘ display screen, select the {1. 12 Data Display} and press the [YES] key.
7) Using the scroll key, move the display screen up or down until the desired data is shown.

● A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Number of diagnosis code	Number of Diagnosis Code	—
Malfunction indicator lamp status	MIL Status	ON or OFF
Monitoring test of misfire	Misfire monitoring	ON or OFF
Monitoring test of fuel system	Fuel system monitoring	ON or OFF
Monitoring test of comprehensive component	Component monitoring	ON or OFF
Test of catalyst	Catalyst Diagnosis	ON or OFF
Test of heated catalyst	Heated catalyst	ON or OFF
Test of evaporative emission purge control system	Evaporative purge system	ON or OFF
Test of secondary air system	Secondary air system	ON or OFF
Test of air conditioning system refrigerant	A/C system refrigerant	ON or OFF
Test of oxygen sensor	Oxygen sensor	ON or OFF
Test of oxygen sensor heater	Oxygen sensor heater	ON or OFF
Test of Exhaust gas recirculation system	EGR System Diagnosis	ON or OFF
Air fuel ratio control system for bank 1	Fuel system for Bank 1	ON or OFF
Engine load data	Engine load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Ignition timing advance for #1 cylinder	Ignition timing adv. #1	°
Mass air flow signal	Mass Air Flow	g/s or lb/m
Throttle position signal	Throttle Opening Angle	%
Front oxygen sensor output signal	Oxygen sensor #11	V
Air fuel ratio correction by front oxygen sensor	Short term fuel trim #11	%
Rear oxygen sensor output signal	Oxygen sensor #12	V
Air fuel ratio correction by rear oxygen sensor	Short term fuel trim #12	%
On-board diagnostic system	OBD System	—

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

6. READ FREEZE FRAME DATA SHOWN ON DISPLAY FOR ENGINE. (OBD MODE)

1) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {7. OBD System} and press the [YES] key.
5) On the ┌OBD Menu┘ display screen, select the {2. Freeze Frame Data} and press the [YES] key.

● A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Diagnostic trouble code (DTC) for freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	ON or OFF
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. READ OXYGEN SENSOR MONITORING TEST RESULTS DATA SHOWN ON DISPLAY FOR ENGINE. (OBD MODE)

1) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {7. OBD System} and press the [YES] key.
5) On the ┌OBD Menu┘ display screen, select the {5. O2 Sensor Monitor} and press the [YES] key.
6) On the ┌O2 Sensor Select┘ display screen, select the {Bank 1-Sensor1} or {Bank 1-Sensor2} and press the [YES] key.

● Bank 1-Sensor1 indicates the front oxygen sensor, and Bank 1-Sensor2 indicates the rear oxygen sensor.
● A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Oxygen sensor for monitoring test	<O2 Sensor Monitor (-------)>	—
Rich to lean oxygen sensor threshold voltage	Rich to lean sensor volt	V
Lean to rich oxygen sensor threshold voltage	Lean to rich sensor volt	V
Low oxygen sensor voltage for switch time calculation	Low sensor voltage	V
High oxygen sensor voltage for switch time calculation	High sensor voltage	V
Rich to lean oxygen sensor switch time	Rich to lean switch time	sec
Lean to rich oxygen sensor switch time	Lean to rich switch time	sec
Maximum oxygen sensor voltage for test cycle	Maximum sensor Voltage	V
Minimum oxygen sensor voltage for test cycle	Minimum sensor Voltage	V

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

8. LED OPERATION MODE FOR ENGINE

1) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {1. Current Data Display & Save} and press the [YES] key.
5) On the ┌Data Display Menu┘ display screen, select the {2. 6 Data & LED Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

● A list of the support data is shown in the following table.

Contents	Display	Message	LED "ON" requirements
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned ON.
Automatic transmission vehicle identification signal	AT Vehicle ID Signal	ON or OFF	When AT identification signal is entered.
Test mode connector signal	Test Mode Signal	ON or OFF	When test mode connector is connected.
Neutral position switch signal	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is turned ON.
Air conditioning relay signal	A/C Relay	ON or OFF	When air conditioning relay is in function.
Radiator main fan relay signal	Radiator Fan Relay #1	ON or OFF	When radiator main fan relay is in function.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	When fuel pump relay is in function.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is entered.
Radiator sub fan relay signal	Radiator Fan Relay #2	ON or OFF	When radiator sub fan relay is in function.
Engine torque control signal	Torque Control Signal #1	ON or OFF	When engine torque control signal is entered.
Pressure sources switching solenoid valve	Pressure Sources Change	ON or OFF	When pressure sources switching solenoid valve is in function.
Front oxygen sensor rich signal	Front O2 Rich Signal	ON or OFF	When front oxygen sensor mixture ratio is rich.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Federal specification vehicle identification signal	FED Spec. Vehicle Signal	ON or OFF	Federal specification vehicle identification signal is entered.
Exhaust gas recirculation system diagnosis signal	EGR System Diagnosis	ON or OFF	When diagnosis of EGR system is finished.
Catalyst diagnosis signal	Catalyst Diagnosis	ON or OFF	When diagnosis of catalyzer is finished.
Pressure control solenoid valve	PCV Solenoid Valve	ON or OFF	When pressure control solenoid valve is in function.
Exhaust gas recirculation solenoid valve	EGR Solenoid Valve	ON or OFF	When EGR Solenoid Valve is in function.
Vent control solenoid valve or drain valve	Vent. Solenoid Valve	ON or OFF	When vent control solenoid valve is in function.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

9. READ CURRENT DATA SHOWN ON DISPLAY FOR AT.

1) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ┌System Selection Menu┘ display screen, select the {AT/ECVT} and press the [YES] key.
3) Press the [YES] key after displayed the information of transmission type.
4) On the ┌E-4AT/ECVT Diagnosis┘ display screen, select the {1. Current Data Display & Save} and press the [YES] key.
5) On the ┌Data Display Menu┘ display screen, select the {1. 12 Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

● A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Vehicle speed sensor 1 signal	Vehicle Speed #1	km/h or MPH
Vehicle speed sensor 2 signal	Vehicle Speed #2	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature	ATF Temp.	°C or °F
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Mass air sensor signal	Mass Air Flow Sensor	V
2 wheel drive switch signal	2WD Switch	ON or OFF
Kick down switch signal	Kick Down Switch	ON or OFF
Stop lamp switch signal	Stop Lamp Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Power mode switch signal	Power Mode Switch	ON or OFF
Neutral/Parking range signal	N/P Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Hold mode switch signal	Hold Mode Switch	ON or OFF
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Over running clutch control solenoid valve	Over Running Solenoid	ON or OFF
Automatic transmission fluid temperature warning lamp	ATF Temp. Warning Lamp	ON or OFF
Hold mode indicator lamp	Hold Lamp	ON or OFF
2 wheel drive mode indicator lamp	2WD Mode Lamp	ON or OFF
Torque control output signal	Torque Control Signal	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

D: CLEAR MEMORY MODE

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the ⌜Main Menu⌟ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ⌜System Selection Menu⌟ display screen, select the {EGI/EMPi} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the ⌜EGI/EMPI Diagnosis⌟ display screen, select the {3. Clear Memory} and press the [YES] key.
5) When the 'Done' and 'Turn Ignition Switch OFF' are shown on the display screen, turn the Subaru select monitor and ignition switch to OFF.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the ⌜Main Menu⌟ display screen, select the {2. Each System Check} and press the [YES] key.
2) On the ⌜System Selection Menu⌟ display screen, select the {EGI/EMPi} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the ⌜EGI/EMPI Diagnosis⌟ display screen, select the {7. OBD System} and press the [YES] key.
5) On the ⌜OBD Menu⌟ display screen, select the {4. Diagnosis Code(s) Cleared} and press the [YES] key.
6) When the 'Clear Diagnostic Code?' is shown on the display screen, press the [YES] key.
7) Turn Subaru select monitor and ignition switch to OFF.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

3. OBD-II GENERAL SCAN TOOL

For clear memory procedures using the OBD-II general scan tool, refer to the OBD-II General Scan Tool Instruction Manual.

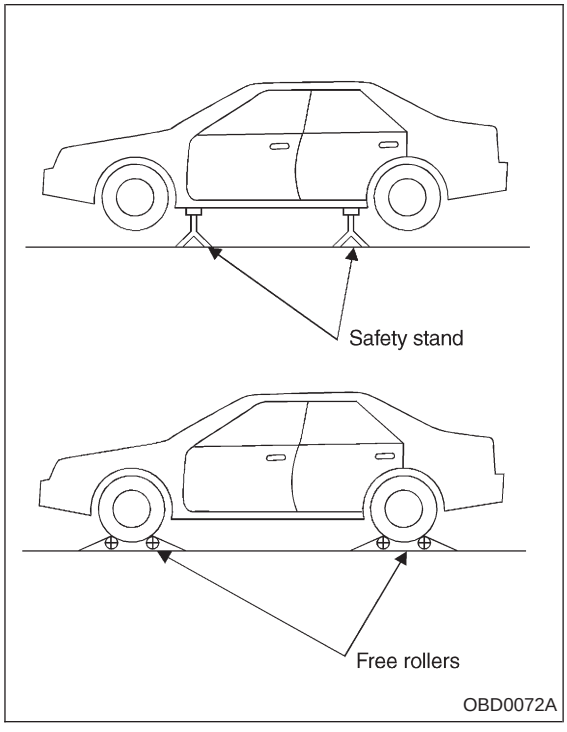
E: INSPECTION MODE

1. PREPARATIONS FOR THE INSPECTION MODE

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

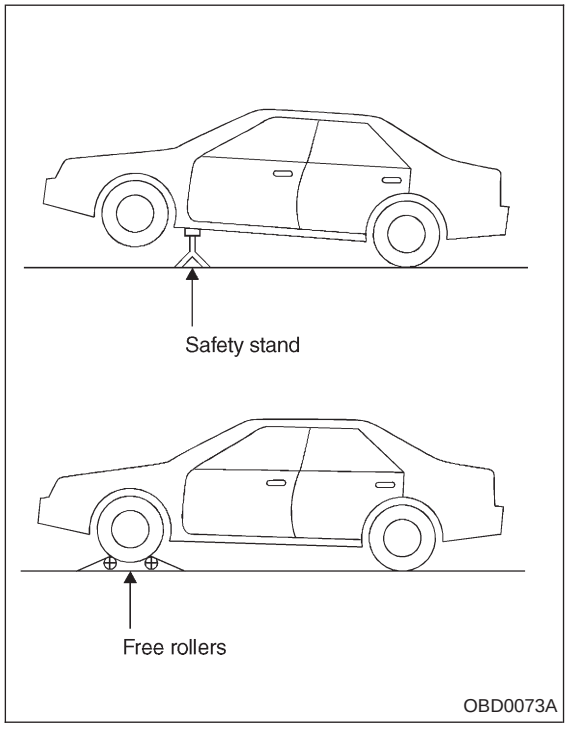
- **FULL-TIME AWD MODELS**

WARNING:
- **Before raising the vehicle, ensure parking brakes are applied.**
- **Do not use a pantograph jack in place of a safety stand.**
- **Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.**
- **Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.**
- **In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.**
- **Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.**



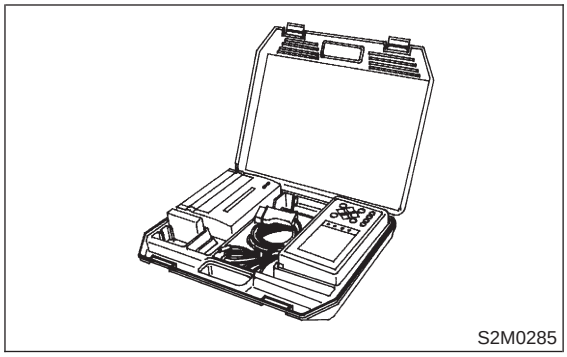
● **FWD MODELS**

WARNING:
● Before raising the vehicle, ensure parking brakes are applied.
● Do not use a pantograph jack in place of a safety stand.
● If only the front wheels are raised or placed on a free roller, apply parking brakes and lock the rear wheels.
● Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
● Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
● In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
● Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.

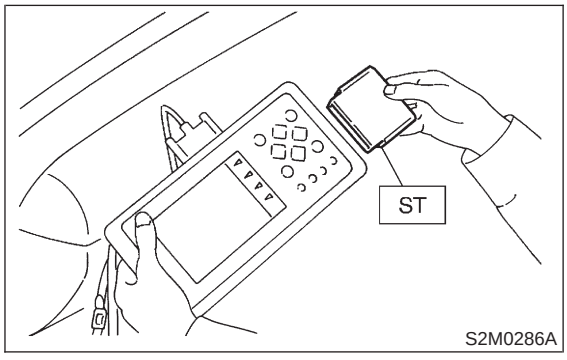


2. SUBARU SELECT MONITOR

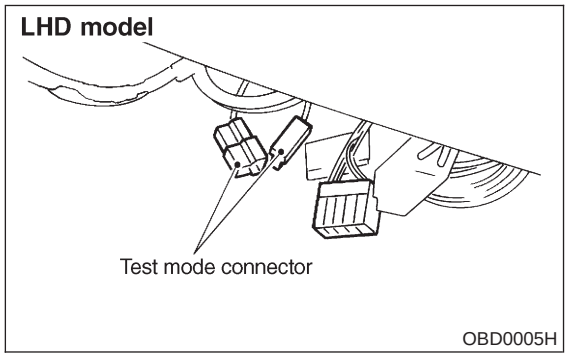
After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data.
1) Prepare Subaru select monitor kit.

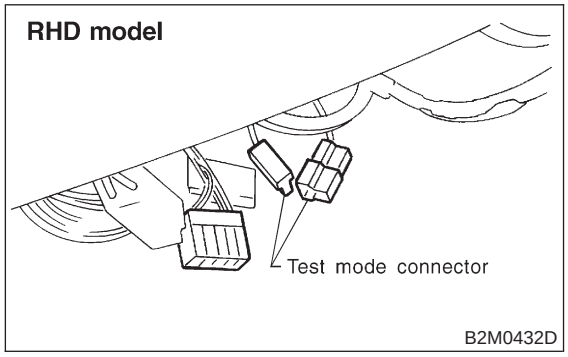


2) Connect diagnosis cable to Subaru select monitor.
3) Insert cartridge into Subaru select monitor.
ST 24082AA010 CARTRIDGE



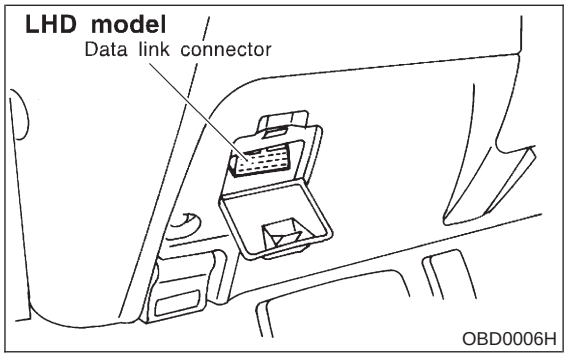
4) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.

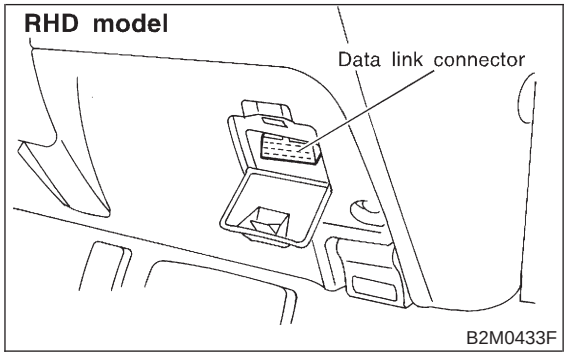




5) Connect Subaru select monitor to data link connector.

(1) Open the cover and connect Subaru select monitor to data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.

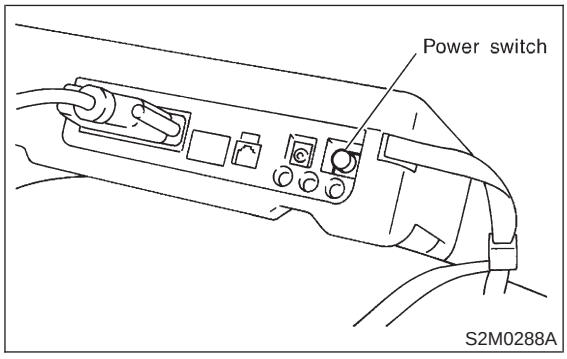




(2) Connect diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for Subaru select monitor and OBD-II general scan tool.

6) Turn ignition switch to ON (engine OFF) and Subaru select monitor switch to ON.



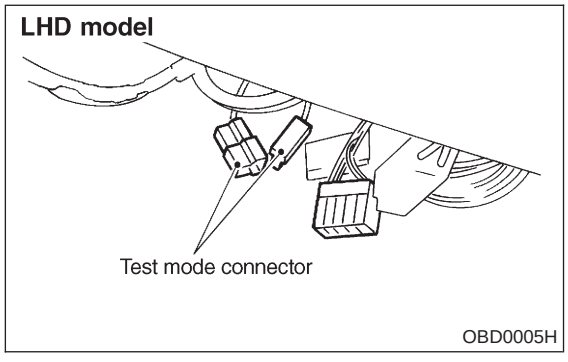
7) On the 「Main Menu」 display screen, select the {2. Each System Check} and press the [YES] key.
8) On the 「System Selection Menu」 display screen, select the {EGI/EMPi} and press the [YES] key.
9) Press the [YES] key after displayed the information of engine type.

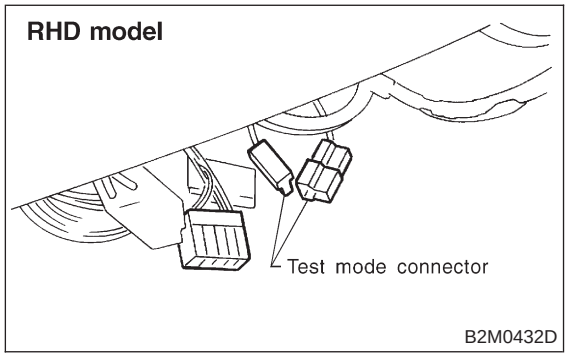
10) On the 「EGI/EMPI Diagnosis」 display screen, select the {6. Dealer Check Mode Procedure} and press the [YES] key.
11) When the “Perform Inspection (Dealer Check) Mode?” is shown on the display screen, press the [YES] key.
12) Perform subsequent procedures as instructed on the display screen.
● If trouble still remains in the memory, the corresponding diagnostic trouble code (DTC) appears on the display screen.

NOTE:
● For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
● For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].> (LHD), <Ref. to 2-7 [T11A0].> (RHD)
● On AWD vehicles, release the parking brake.
● The speed difference between front and rear wheels may light either the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

3. OBD-II GENERAL SCAN TOOL

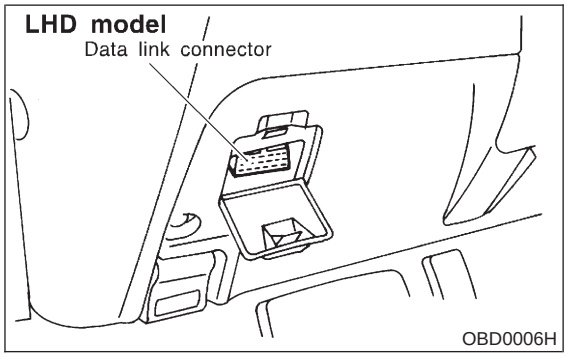
After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data:
1) Connect test mode connector at the lower side of the instrument panel (on the driver’s side), to the side of the center console box.

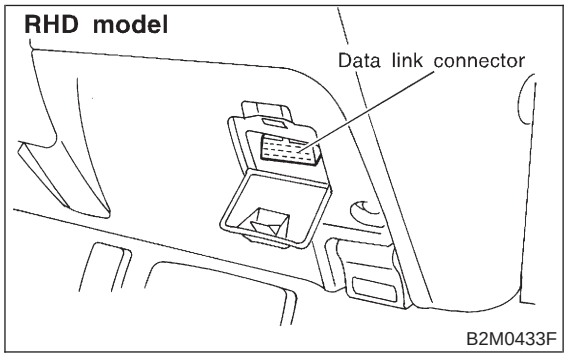




2) Open the cover and connect the OBD-II general scan tool to its data link connector in the lower portion of the instrument panel (on the driver’s side), to the lower cover.

CAUTION:
Do not connect the scan tools except for Subaru select monitor and OBD-II general scan tool.





3) Start the engine.

NOTE:
● Ensure the selector lever is placed in the “P” position before starting. (AT vehicles)
● Depress clutch pedal when starting the engine. (MT vehicles)

4) Using the selector lever or shift lever, turn the “P” position switch and the “N” position switch to ON.
5) Depress the brake pedal to turn the brake switch ON. (AT vehicles)
6) Keep engine speed in the 2,500 — 3,000 rpm range for 40 seconds.

NOTE:
On models without tachometer, use the tachometer (Secondary pickup type).

7) Place the selector lever or shift lever in the “D” position (AT vehicles) or “1st” gear (MT vehicles) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
● On AWD vehicles, release the parking brake.
● The speed difference between front and rear wheels may light the ABS warning light, but this

indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

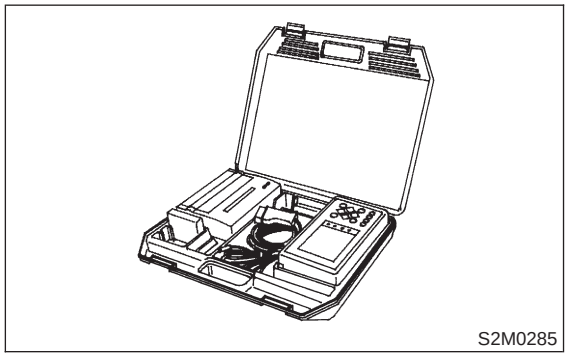
8) Using the OBD-II general scan tool, check for diagnostic trouble code(s) and record the result(s).

NOTE:
● For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.
● For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].> (LHD), <Ref. to 2-7 [T11A0].> (RHD)

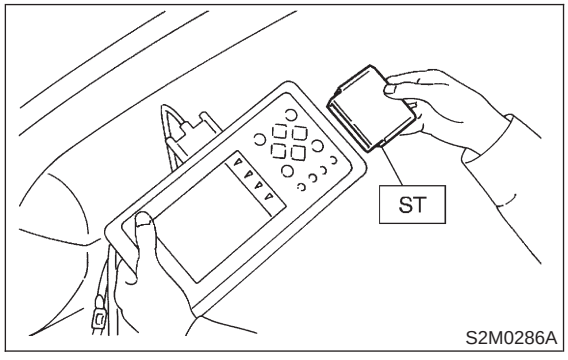
F: COMPULSORY VALVE OPERATION CHECK MODE

1. SUBARU SELECT MONITOR

1) Prepare Subaru select monitor kit.

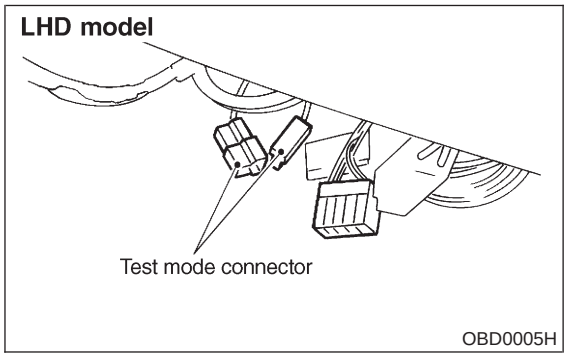

S2M0285

2) Connect diagnosis cable to Subaru select monitor.
3) Insert cartridge into Subaru select monitor.
ST 24082AA010 CARTRIDGE

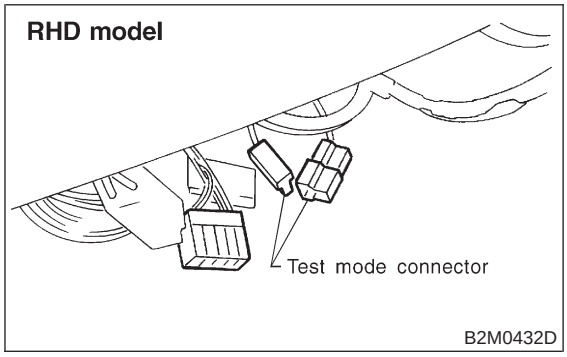


S2M0286A

4) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



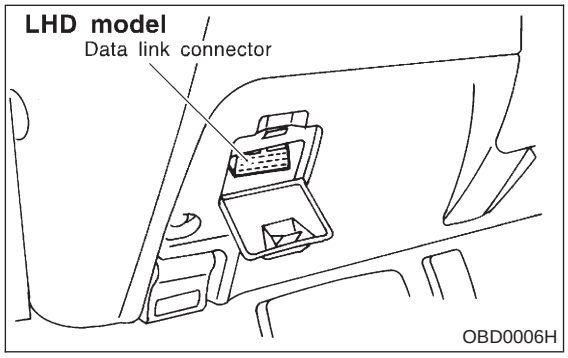
OBD0005H

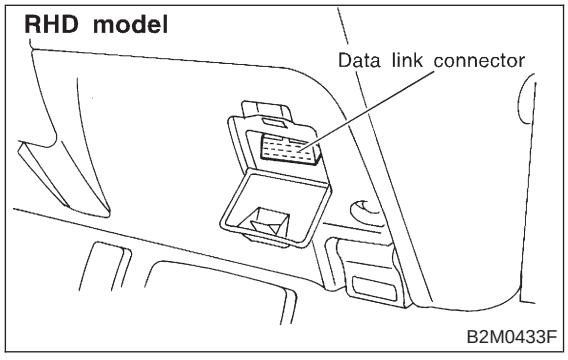


B2M0432D

5) Connect Subaru select monitor to data link connector.

(1) Open the cover and connect Subaru select monitor to data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.

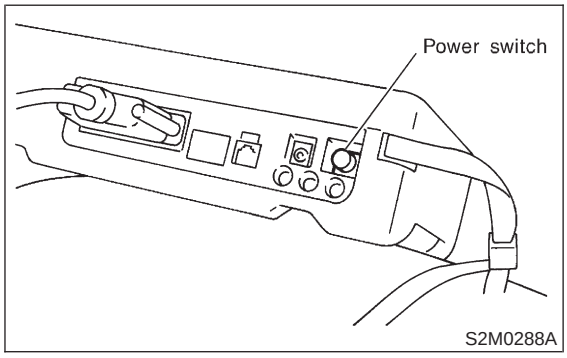




(2) Connect diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for Subaru select monitor and OBD-II general scan tool.

6) Turn ignition switch to ON (engine OFF) and Subaru select monitor switch to ON.



7) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
8) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
9) Press the [YES] key after displayed the information of engine type.
10) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {4. System Operation Check Mode} and press the [YES] key.
11) On the ┌System Operation Check Mode ┘ display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired compulsory actuator on the ┌Actuator ON/OFF Operation┘ display screen and press the [YES] key.
13) Pressing the [NO] key completes the compulsory operation check mode. The display will then return to the ┌Actuator ON/OFF Operation ┘ screen.

● A list of the support data is shown in the following table.

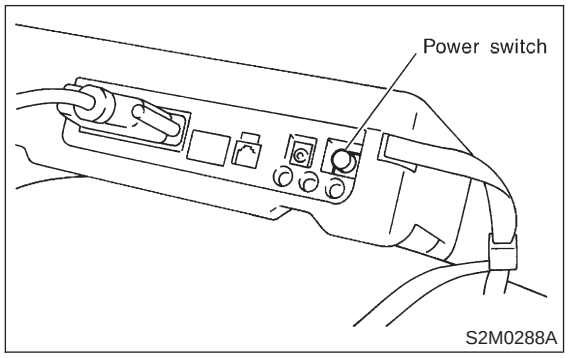
Contents	Display
Compulsory fuel pump relay operation check	Fuel Pump Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid Valve
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Relay
Compulsory exhaust gas recirculation control solenoid valve operation check	EGR Solenoid Valve
Compulsory pressure control solenoid valve operation check	PCV Solenoid Valve
Compulsory vent control solenoid valve (drain valve) operation check	Vent Control Solenoid Valve
Compulsory pressure sources switching solenoid valve operation check	Pressure Switching Sol.1

NOTE:
● Because ASV solenoid valve, FICD solenoid valve and air injection system diagnosis solenoid valve are not installed, ASV Solenoid Valve, FICD Solenoid Valve and Pressure Switching Sol.2 will be displayed but non-functional.
● For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

G: FINISHING DIAGNOSIS OPERATION

1. SUBARU SELECT MONITOR

1) Turn ignition switch to OFF.
2) Turn Subaru select monitor switch to OFF.



3) Disconnect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.
4) Disconnect Subaru select monitor from its data link connector.

4. Cautions

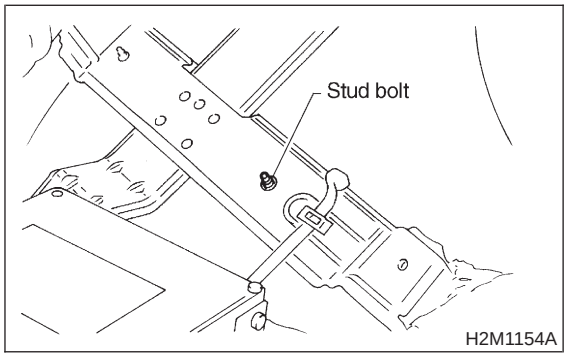
A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the engine control module (ECM), main relay and fuel pump relay.

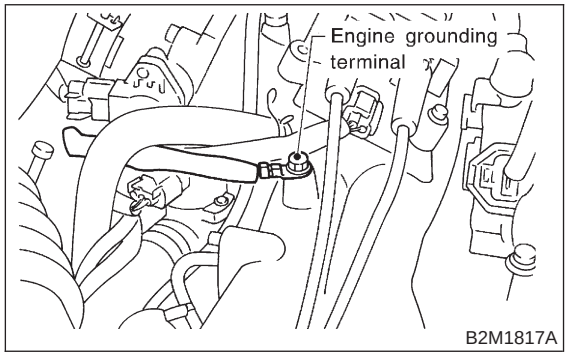
CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
● Be careful not to damage Airbag system wiring harness when servicing the engine control module (ECM), transmission control module (TCM), main relay and fuel pump relay.

B: PRECAUTIONS

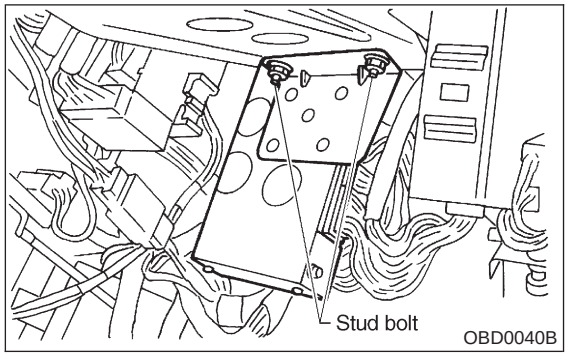
1) Never connect the battery in reverse polarity.
● The ECM will be destroyed instantly.
● The fuel injector and other part will be damaged in just a few minutes more.
2) Do not disconnect the battery terminals while the engine is running.
● A large counter electromotive force will be generated in the alternator, and this voltage may damage electronic parts such as ECM, etc.
3) Before disconnecting the connectors of each sensor and the ECM, be sure to turn OFF the ignition switch.
4) Before removing ECM from the located position, disconnect two cables on battery.
● Otherwise, the ECM may be damaged.
5) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.
6) Use ECM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.



7) Use engine grounding terminal or engine proper as the grounding point to the body when measuring voltage and resistance in the engine compartment.



8) Use TCM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.



9) Every MFI-related part is a precision part. Do not drop them.
10) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:
● The antenna must be kept as far apart as possible from the control unit.
(The ECM is located under the steering column, inside of the instrument panel lower trim panel.)
● The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
● Carefully adjust the antenna for correct matching.
● When mounting a large power type radio, pay special attention to the three items above mentioned.
● Incorrect installation of the radio may affect the operation of the ECM.

11) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.

12) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes must be distinguished clearly when performing diagnostics.
13) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.
14) In AT vehicles, do not continue the stall for more than five seconds at a time (from closed throttle, fully open throttle to stall engine speed).
15) On ABS vehicle, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis system.

C: PRE-INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

1. POWER SUPPLY

1) Measure battery voltage and specific gravity of electrolyte.

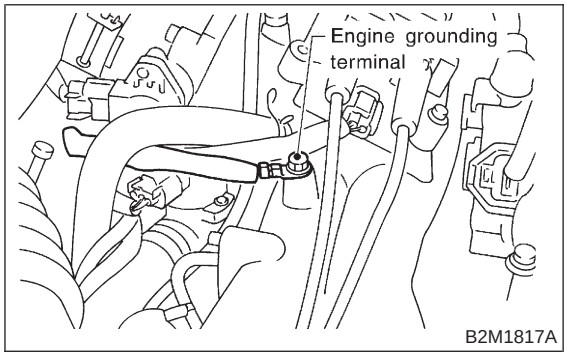
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

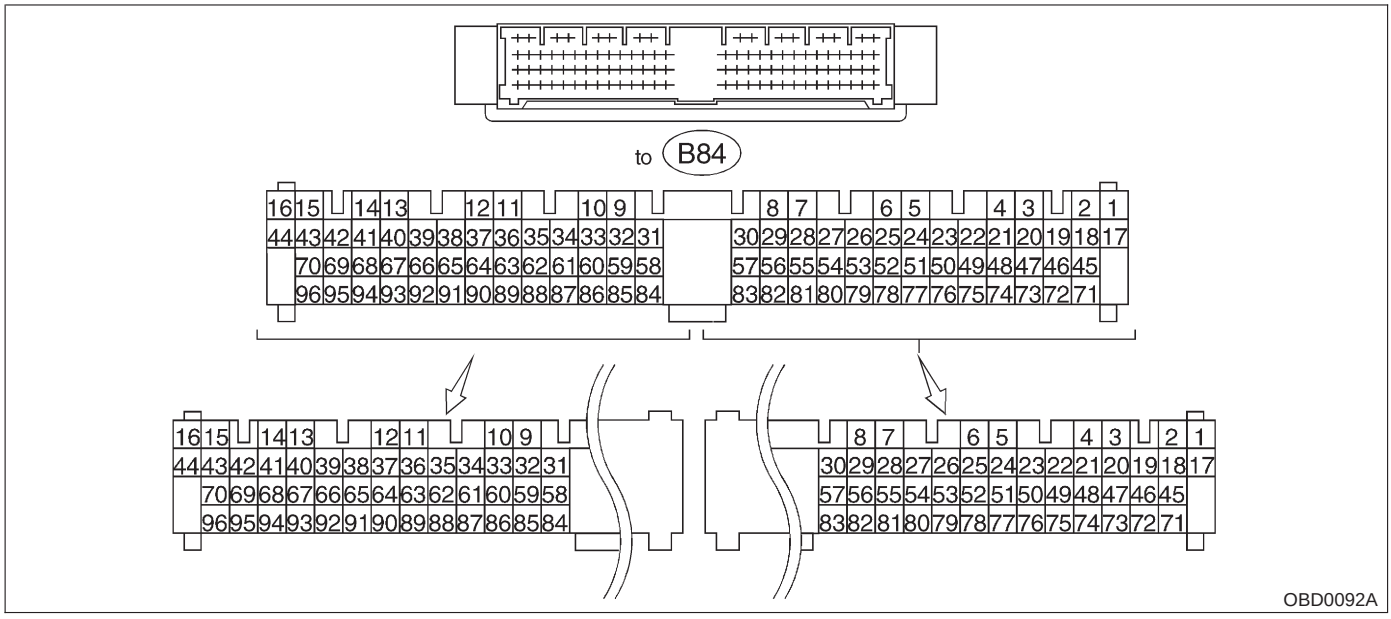
2. ENGINE GROUNDING

Make sure the engine grounding terminal is properly connected to the engine.



5. Specified Data

A: ENGINE CONTROL MODULE (ECM) I/O SIGNAL



Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	B84	8	0	−7 — +7	Sensor output waveform
	Signal (−)	B84	29	0	0	—
	Shield	B84	54	0	0	—
Camshaft position sensor	Signal (+)	B84	7	0	−7 — +7	Sensor output waveform
	Signal (−)	B84	28	0	0	—
	Shield	B84	54	0	0	—
Mass air flow sensor	Signal	B84	5	0 — 0.3	0.8 — 1.2	—
	Shield	B84	57	0	0	—
	GND	B84	53	0	0	—
Throttle position sensor	Signal	B84	6	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B84	21	5	5	—
	GND	B84	20	0	0	—
Front oxygen sensor	Signal	B84	23	0	0 — 0.9	—
	Shield	B84	56	0	0	—
Rear oxygen sensor	Signal	B84	24	0	0 — 0.9	—
	Shield	B84	56	0	0	—
Engine coolant temperature sensor		B84	22	1.0 — 1.4	1.0 — 1.4	After warm-up
Vehicle speed sensor 2		B84	83	0 or 5	0 or 5	“5” and “0” are repeatedly displayed when vehicle is driven.
Starter switch		B84	86	0	0	Cranking: 8 to 14
A/C switch		B84	60	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B84	85	10 — 13	13 — 14	—

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Neutral position switch (MT)		B84	82	ON: 5.0±0.5 OFF: 0		● On MT vehicle; switch is ON when gear is in neutral position.
Neutral position switch (AT)				ON: 0 OFF: 5.0±0.5		● On AT vehicle; switch is ON when shift is in “N” or “P” position.
Test mode connector		B84	84	5	5	When connected: 0
Knock sensor	Signal	B84	3	2.8	2.8	—
	Shield	B84	56	0	0	—
AT/MT identification		B84	81	(AT) 5 (MT) 0	(AT) 5 (MT) 0	When measuring voltage between ECM and chassis ground.
Back-up power supply		B84	39	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control unit power supply		B84	1 2	10 — 13	13 — 14	—
Ignition control	# 1, # 2	B84	41	0	1 — 3.4	—
	# 3, # 4	B84	40	0	1 — 3.4	—
Fuel injector	# 1	B84	96	10 — 13	1 — 14	Waveform
	# 2	B84	70	10 — 13	1 — 14	Waveform
	# 3	B84	44	10 — 13	1 — 14	Waveform
	# 4	B84	16	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	OPEN end	B84	14	—	1 — 13	Waveform
	CLOSE end	B84	13	—	13 — 1	Waveform
Fuel pump relay control		B84	32	ON: 0.5, or less OFF: 10 — 13	0.5, or less	—
A/C relay control		B84	31	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 1 control		B84	74	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 2 control		B84	73	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	With A/C vehicles only
Self-shutoff control		B84	63	10 — 13	13 — 14	—
Malfunction indicator lamp		B84	58	—	—	Light “ON”: 1, or less Light “OFF”: 10 — 14
Engine speed output		B84	64	—	0 — 13, or more	Waveform
Torque control signal		B84	79	5	5	—
Mass air flow signal for AT		B84	47	0 — 0.3	0.8 — 1.2	—
Purge control solenoid valve		B84	72	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Atmospheric pressure sensor		B84	26	3.9 — 4.1	2.0 — 2.3	—
Pressure sources switching solenoid valve		B84	15	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
EGR solenoid valve		B84	71	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Front oxygen sensor heater signal		B84	38	0 — 1.0	0 — 1.0	—
Rear oxygen sensor heater signal		B84	37	0 — 1.0	0 — 1.0	—

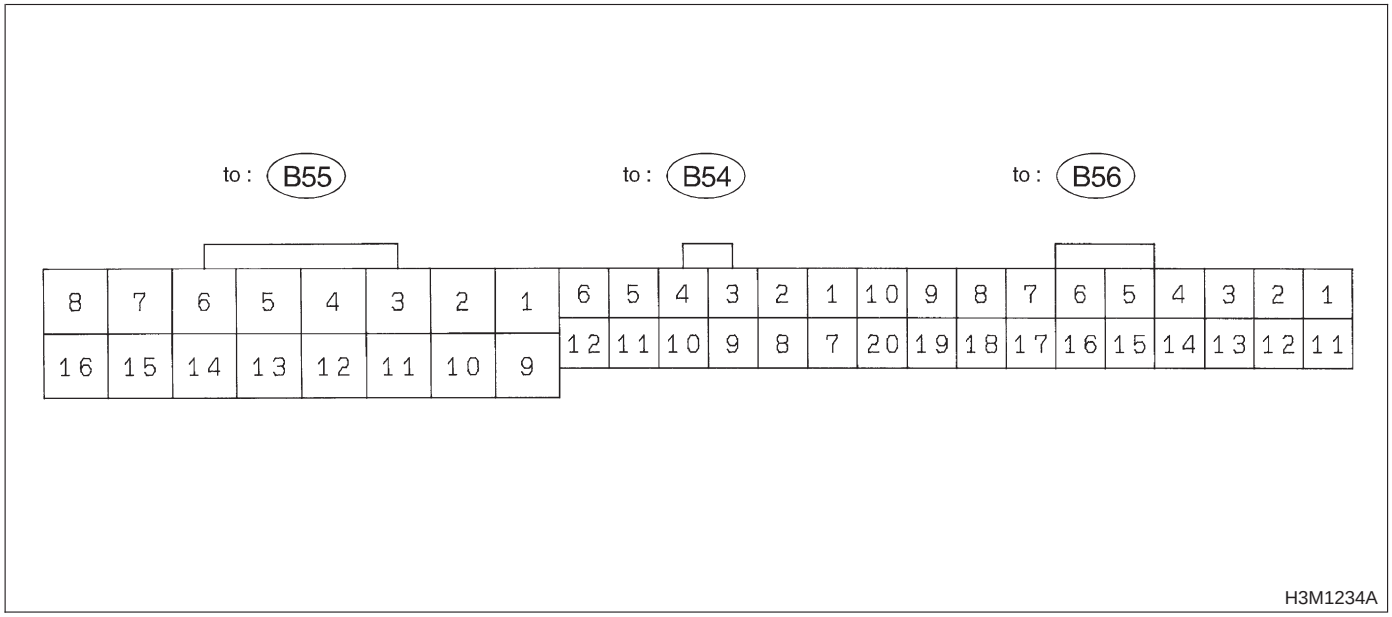
Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Fuel temperature sensor		B84	25	2.5 — 3.8	2.5 — 3.8	● Except 2200 cc FWD and Taiwan spec. vehicles ● Ambient temperature: 25°C (77°F)
Fuel level sensor		B84	27	0.12 — 4.75	0.12 — 4.75	Except 2200 cc FWD and Taiwan spec. vehicles
Fuel tank pressure sensor	Signal	B84	4	2.3 — 2.7	2.3 — 2.7	● Except 2200 cc FWD and Taiwan spec. vehicles ● The value obtained after the fuel filler cap was removed once and recapped.
	Power supply	B84	21	5	5	—
	GND	B84	20	0	0	—
Fuel tank pressure control solenoid valve		B84	10	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	Except 2200 cc FWD and Taiwan spec. vehicles
Vent control solenoid valve		B84	35	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	2500 cc models
Drain valve		B84	35	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	2200 cc AWD except Taiwan spec. vehicles
TCS signal		B84	61	0 — 7	0 — 7	Waveform
AT diagnosis input signal		B84	80	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	Waveform
GND (sensors)		B84	20	0	0	—
GND (injectors)		B84	69	0	0	—
			95			
GND (ignition system)		B84	94	0	0	—
GND (power supply)		B84	19	0	0	—
			46			
GND (control systems)		B84	17	0	0	—
			18			
GND (oxygen sensor heater)		B84	42	0	0	—

B: ENGINE CONDITION DATA

Content	Model	Specified data
Mass air flow	2200 cc	1.7 — 3.3 (g/sec): Idling
		7.1 — 14.2 (g/sec): 2,500 rpm racing
	2500 cc	2.2 — 4.2 (g/sec): Idling
		8.6 — 14.5 (g/sec): 2,500 rpm racing
Engine load	2200 cc	1.6 — 2.9 (%): Idling
		6.4 — 12.8 (%): 2,500 rpm racing
	2500 cc	1.9 — 3.5 (%): Idling
		7.2 — 12.1 (%): 2,500 rpm racing

Measuring condition:
- After warm-up the engine.
- Gear position is in “N” or “P” position.
- A/C is turned OFF.
- All accessory switches are turned OFF.

C: TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL



NOTE:
Check with ignition switch ON.

Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)
Back-up power supply		B56	14	Ignition switch OFF	10 — 16
Ignition power supply		B54	6	Ignition switch ON (with engine OFF)	10 — 16
		B55	1		
Inhibitor switch	"P" range switch	B56	9	Selector lever in "P" range	Less than 1
				Selector lever in any other than "P" range	More than 8
	"N" range switch	B56	8	Selector lever in "N" range	Less than 1
				Selector lever in any other than "N" range	More than 8
	"R" range switch	B56	10	Selector lever in "R" range	Less than 1
				Selector lever in any other than "R" range	More than 6
	"D" range switch	B54	1	Selector lever in "D" range	Less than 1
				Selector lever in any other than "D" range	More than 6
	"3" range switch	B54	2	Selector lever in "3" range	Less than 1
				Selector lever in any other than "3" range	More than 6
	"2" range switch	B54	3	Selector lever in "2" range	Less than 1
				Selector lever in any other than "2" range	More than 6
	"1" range switch	B54	4	Selector lever in "1" range	Less than 1
				Selector lever in any other than "1" range	More than 6
Brake switch		B56	7	Brake pedal depressed	More than 10.5
				Brake pedal released	Less than 1
ABS signal		B56	5	ABS switch ON	Less than 1
				ABS switch OFF	More than 6.5
AT diagnostics signal		B55	12	Ignition switch ON (with engine OFF)	Less than 1
				Ignition switch ON (with engine ON)	More than 10
Diagnosis switch		B56	6	Diagnosis connector connected.	Less than 1
				Diagnosis connector disconnected.	More than 6

Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Throttle position sensor	B54	8	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.3 — 4.9	
Throttle position sensor power supply	B56	19	Ignition switch ON (with engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B54	10	ATF temperature 20°C (68°F)	2.9 — 4.0	2.1 k — 2.9 k
			ATF temperature 80°C (176°F)	1.0 — 1.4	275 — 375
Vehicle speed sensor 1	B54	12	Vehicle stopped.	0	450 — 720
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed sensor 2	B56	11	When vehicle is slowly moved at least 2 meters (7ft).	Less than 1←→More than 9	—
Engine speed signal	B54	5	Ignition switch ON (with engine OFF).	More than 10.5	—
			Ignition switch ON (with engine ON).	8 — 11	
Cruise set signal	B56	3	When cruise control is set (SET lamp ON).	Less than 1	—
			When cruise control is not set (SET lamp OFF).	More than 6.5	
Torque control signal	B55	16	Ignition switch ON	4 — 6	—
Mass air flow signal	B54	9	Engine idling after warm-up	0.5 — 1.2	—
Shift solenoid 1	B55	14	1st or 4th gear	More than 9	20 — 32
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B55	13	1st or 2nd gear	More than 9	20 — 32
			3rd or 4th gear	Less than 1	
Shift solenoid 3	B55	15	Selector lever in “N” range (with throttle fully closed).	Less than 1	20 — 32
			Selector lever in “D” range (with throttle fully closed).	More than 9	
Duty solenoid A	B55	8	Throttle fully closed (with engine OFF) after warm-up.	2.0 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	
Dropping resistor	B55	7	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	12 — 18
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	
Duty solenoid B	B55	5	When lock up occurs.	More than 8.5	9 — 17
			When lock up is released.	Less than 0.5	
Duty solenoid C (AWD models only)	B55	3	Fuse on FWD switch	More than 8.5	9 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
Sensor ground line 1	B54	7	—	0	Less than 1
Sensor ground line 2	B56	20	—	0	Less than 1
System ground line	B56	1	—	0	Less than 1

Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Power system ground line	B55	10	—	0	Less than 1
FWD switch (AWD models only)	B56	2	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	
Data link signal (Subaru select monitor)	B56	12	—	—	—
		13	—	—	
AT diagnosis signal	B56	11	Ignition switch ON	Less than 1 ←→ More than 4	—

6. Basic Diagnostic Procedure

A: BASIC DIAGNOSTIC PROCEDURE FOR ENGINE

6A1 : CHECK ENGINE START FAILURE.

1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to 2-7 [T6C0].>
2) Start the engine.

CHECK : ***Does the engine start?***
YES : Go to step **6A2**.
NO : Inspection using “8. Diagnostics for Engine Start Failure”. <Ref. to 2-7 [T800].>

6A2 : CHECK ILLUMINATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).

CHECK : ***Does CHECK ENGINE malfunction indicator lamp illuminate?***
YES : Go to step **6A3**.
NO : Inspection using “9. General Diagnostics Table”. <Ref. to 2-7 [T900].>

6A3 : CHECK INDICATION OF DTC ON DISPLAY.

1) Turn ignition switch to OFF.
2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.
3) Turn ignition switch to ON and the Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Read DTC on the Subaru Select Monitor or OBD-II general scan tool.

CHECK : ***Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC?***
YES : Go to step **6A4**.
NO : Repair the related parts.

NOTE:
If DTC is not shown on display although the MIL illuminates, perform diagnostics of MIL (CHECK ENGINE malfunction indicator lamp) circuit or combination meter. <Ref. to 2-7 [T700].>

6A4 : PERFORM THE DIAGNOSIS.

1) Inspect using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].> “11. Diagnostics Chart with Trouble Code for RHD Vehicles”. <Ref. to 2-7 [T1100].>

NOTE:
Carry out the basic check, only when DTC about automatic transmission is shown on display. <Ref. to 2-7 [T6B0].>

2) Repair the trouble cause.
3) Perform the clear memory mode. <Ref. to 2-7 [T3D0].>
4) Perform the inspection mode. <Ref. to 2-7 [T3E0].>

CHECK : ***Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC?***
YES : Inspect using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>, “11. Diagnostics Chart with Trouble Code for RHD Vehicles ”. <Ref. to 2-7 [T1100].>
NO : Complete the diagnosis.

B: BASIC CHECK ITEMS FOR AT

When trouble code about automatic transmission is shown on display, carry out the following basic check. After that, carry out the replacement or repair work.
1) ATF level check <Ref. to 3-2 [W1B1].>
2) Differential gear oil level check <Ref. to 3-2 [W1B2].>
3) ATF leak check <Ref. to 3-2 [W1B3].>
4) Differential gear oil leak check <Ref. to 3-2 [W1B3].>
5) Brake band adjustment <Ref. to 3-2 [W2B0].>
6) Stall test <Ref. to 3-2 [W8A0].>
7) Line pressure test <Ref. to 3-2 [W10A0].>
8) Transfer clutch pressure test <Ref. to 3-2 [W11A0].>
9) Time lag test <Ref. to 3-2 [W9A0].>
10) Road test <Ref. to 3-2 [W7A0].>
11) Shift characteristics <Ref. to 3-2 [W7A0].>

MEMO:

C: CHECK LIST FOR INTERVIEW

1. CHECK LIST NO. 1

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine no.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
Vin no.			miles
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others:		
Outdoor temperature	°F (°C)		
	☐ Hot ☐ Warm ☐ Cool ☐ Cold		
Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Others:		
Engine temperature	☐ Cold ☐ Warming-up ☐ After warming-up ☐ Any temperature ☐ Others:		
Engine speed	rpm		
Vehicle speed	MPH		
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH)		
Headlight	☐ ON/☐ OFF	Rear defogger	☐ ON/☐ OFF
Blower	☐ ON/☐ OFF	Radio	☐ ON/☐ OFF
A/C compressor	☐ ON/☐ OFF	CD/Cassette	☐ ON/☐ OFF
Cooling fan	☐ ON/☐ OFF	Car phone	☐ ON/☐ OFF
Front wiper	☐ ON/☐ OFF	CB	☐ ON/☐ OFF
Rear wiper	☐ ON/☐ OFF		

2. CHECK LIST NO. 2

Check the following items about the vehicle's state when MIL turns on.

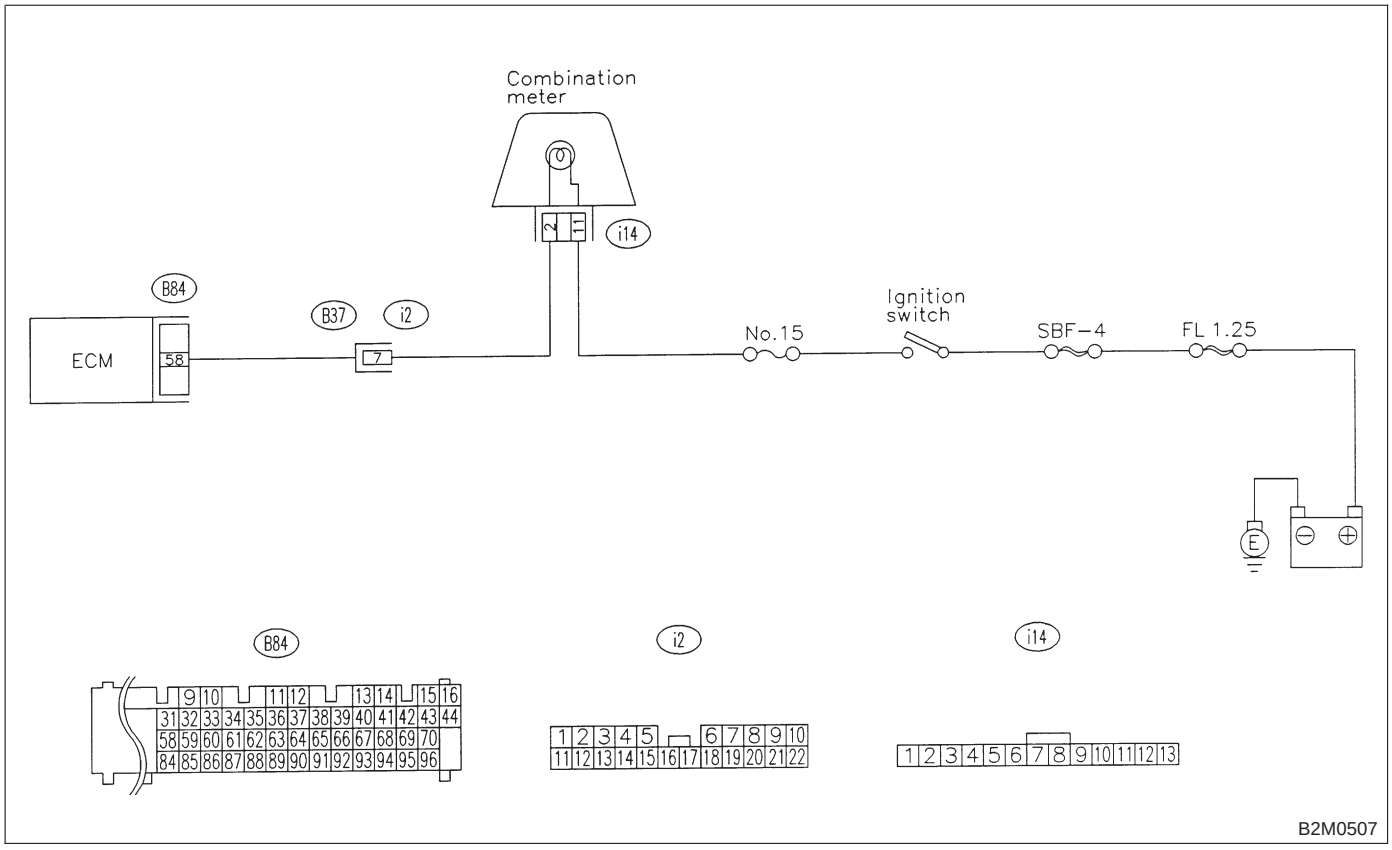
NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ☐ Yes/☐ No
☐ Low fuel warning light ☐ Charge indicator light ☐ AT diagnostics indicator light ☐ ABS warning light ☐ TCS warning light ☐ Engine oil pressure warning light
b) Fuel level
• Lack of gasoline: ☐ Yes/☐ No • Indicator position of fuel gauge:
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ☐ Yes/☐ No
• What:
d) Intentional connecting or disconnecting of hoses: ☐ Yes/☐ No
• What:
e) Installing of parts other than genuine parts: ☐ Yes/☐ No
• What: • Where:
f) Occurrence of noise: ☐ Yes/☐ No
• From where: • What kind:
g) Occurrence of smell: ☐ Yes/☐ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ☐ Yes/☐ No
i) Troubles occurred
☐ Engine does not start. ☐ Engine stalls during idling. ☐ Engine stalls while driving. ☐ Engine speed decreases. ☐ Engine speed does not decrease. ☐ Rough idling ☐ Poor acceleration ☐ Back fire ☐ After fire ☐ No shift ☐ Excessive shift shock

7. Diagnostics for CHECK ENGINE Malfunction Indicator Lamp (MIL)

A: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON.

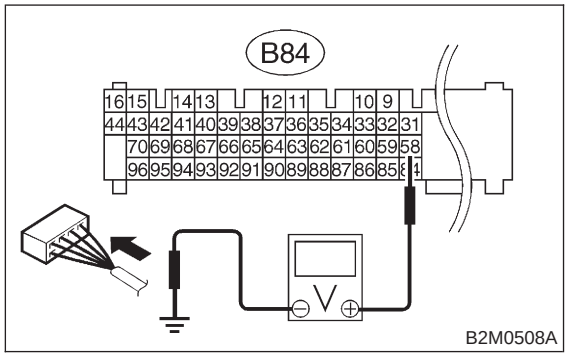
- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
- **TROUBLE SYMPTOM:**
  - When ignition switch is turned ON (engine OFF), MIL does not come on.
- **WIRING DIAGRAM:**



7A1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 58 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **7A2**.
NO : Go to step **7A4**.

7A2 : CHECK POOR CONTACT.

CHECK : ***Does the MIL come on when shaking or pulling ECM connector and harness?***
YES : Repair poor contact in ECM connector.
NO : Go to step **7A3**.

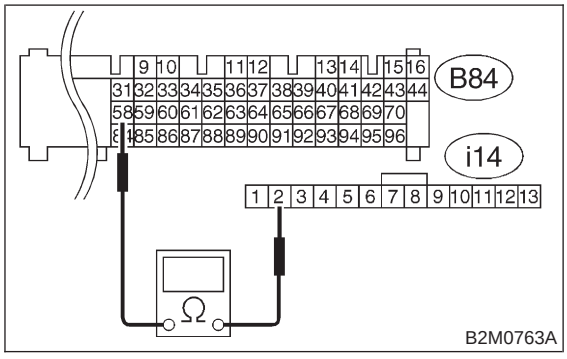
7A3 : CHECK ECM CONNECTOR.

CHECK : ***Is ECM connector correctly connected?***
YES : Replace ECM.
NO : Repair connection of ECM connector.

7A4 : CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove combination meter. <Ref. to 6-2 [W14A1].>
3) Disconnect connector from ECM and combination meter.
4) Measure resistance of harness between ECM and combination meter connector.

Connector & terminal
(B84) No. 58 — (i14) No. 2:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **7A5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and combination meter connector
- Poor contact in coupling connector (B37)

7A5 : CHECK POOR CONTACT.

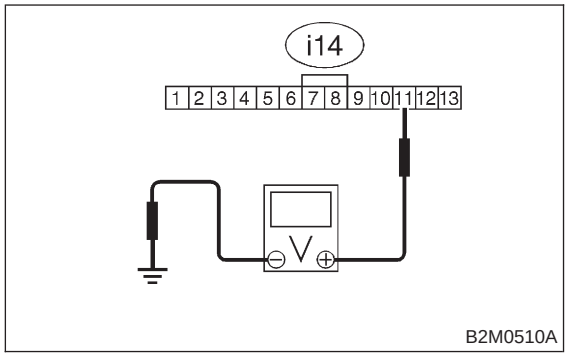
Check poor contact in combination meter connector.
<Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in combination meter connector?***
YES : Repair poor contact in combination meter connector.
NO : Go to step **7A6**.

7A6 : CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.

1) Turn ignition switch to ON.
2) Measure voltage between combination meter connector and chassis ground.

Connector & terminal
(i14) No. 11 (+) — Chassis ground (−):



CHECK : ***Is voltage more than 10 V?***
YES : Go to step **7A7**.
NO : Check the following and repair if necessary.

NOTE:
- Blown out fuse (No. 15).
- If replaced fuse (No. 15) is blown easily, check the harness for short circuit of harness between fuse (No. 15) and combination meter connector.
  - Open or short circuit in harness between fuse (No. 15) and combination meter connector
  - Open or short circuit in harness between fuse (No. 15) and ignition switch connector
  - Poor contact in ignition switch connector

7A7 : CHECK POOR CONTACT.

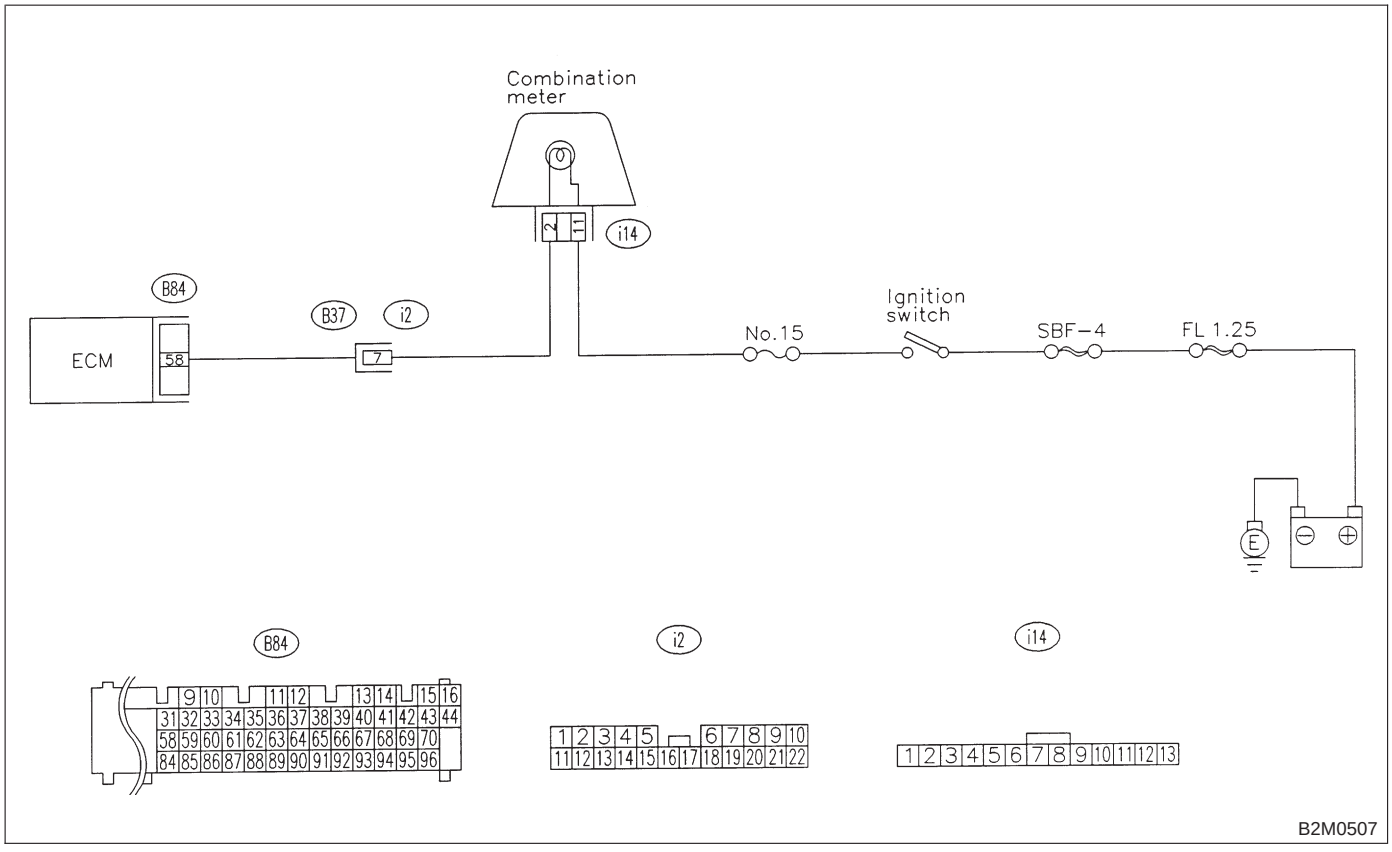
Check poor contact in combination meter connector.
<Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in combination meter connector?***
YES : Repair poor contact in combination meter connector.
NO : Replace bulb or combination meter.

MEMO:

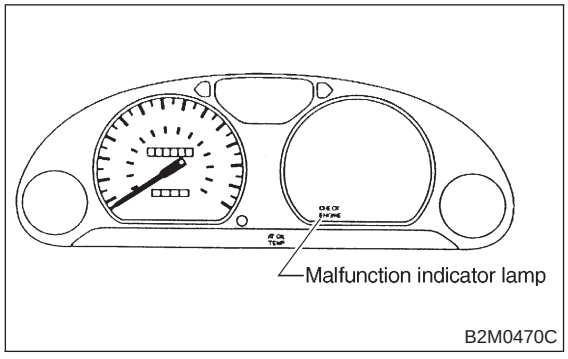
B: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT GO OFF.

- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is shorted.
- **TROUBLE SYMPTOM:**
  - Although MIL comes on when engine runs, trouble code is not shown on Subaru select monitor or OBD-II general scan tool display.
- **WIRING DIAGRAM:**



7B1 : CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Turn ignition switch to ON.



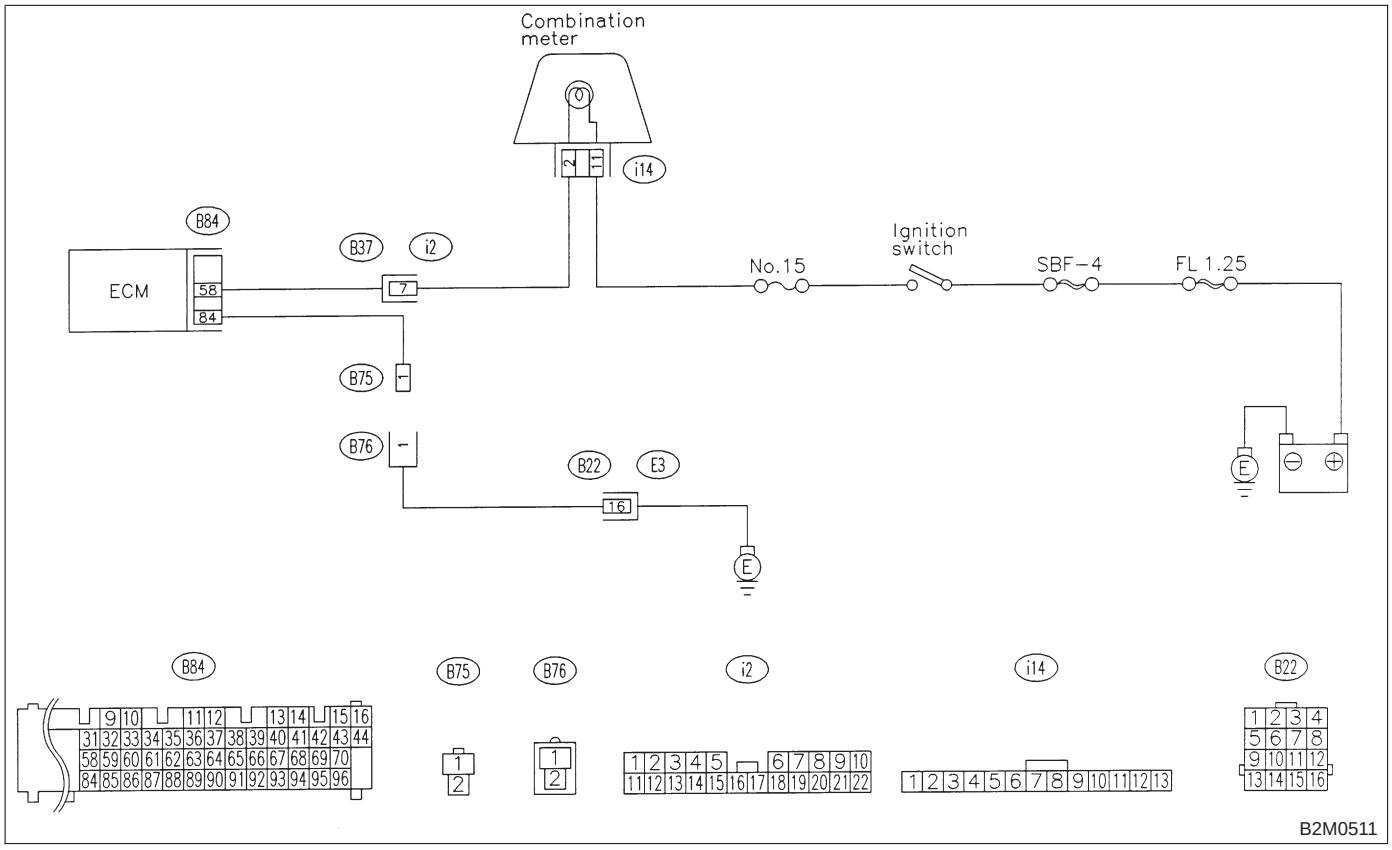
CHECK : ***Does the MIL come on?***

YES : Repair ground short circuit in harness between combination meter and ECM connector.

NO : Replace ECM.

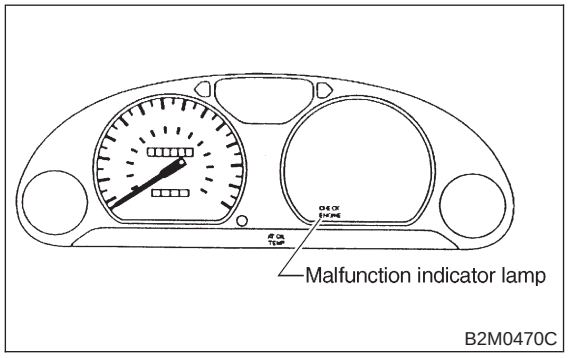
C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 Hz.

- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
  - Test mode connector circuit is in open.
- **TROUBLE SYMPTOM:**
  - When inspection mode, MIL does not blink at a cycle of 3 Hz.
- **WIRING DIAGRAM:**



7C1 : CHECK OPERATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).

1) Turn ignition switch to OFF.
2) Disconnect test mode connector.
3) Turn ignition switch to ON.

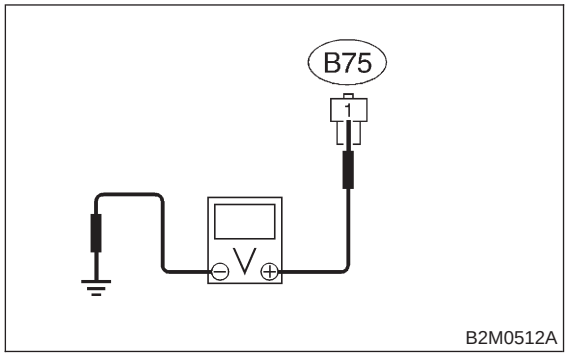


CHECK : ***Does the MIL come on?***
YES : Go to step **7C2**.
NO : Repair the MIL circuit. <Ref. to 2-7 [T7A0].>

7C2 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between test mode connector and chassis ground.

Connector & terminal
(B75) No.1 (+) — Chassis ground (−):

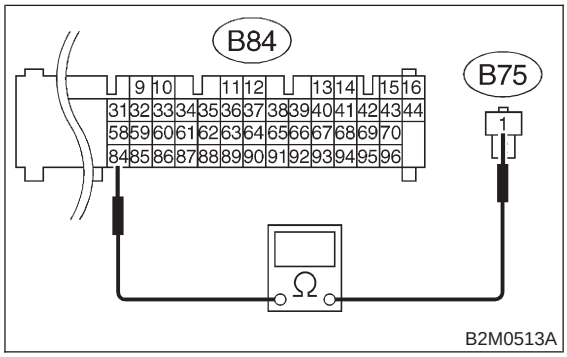


CHECK : ***Is voltage less than 1 V?***
YES : Go to step **7C3**.
NO : Go to step **7C5**.

7C3 : CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and test mode connector.

Connector & terminal
(B84) No.84 — (B75) No.1:



CHECK : ***Is resistance less than 1 Ω?***
YES : Go to step **7C4**.
NO : Repair open circuit in harness between ECM and test mode connector.

7C4 : CHECK POOR CONTACT.

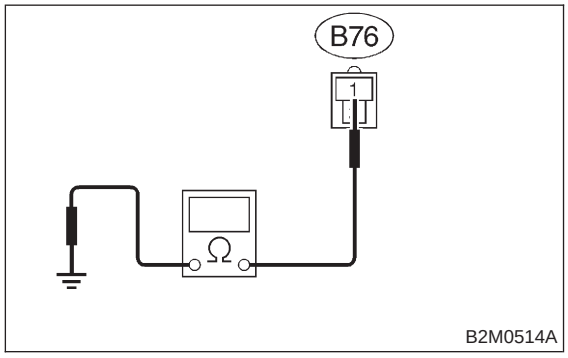
Check poor contact in ECM connector.
<Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

7C5 : CHECK GROUND CIRCUIT.

1) Turn ignition switch to OFF.
2) Measure resistance of harness between test mode connector and chassis ground.

Connector & terminal
(B76) No.1 — Chassis ground:



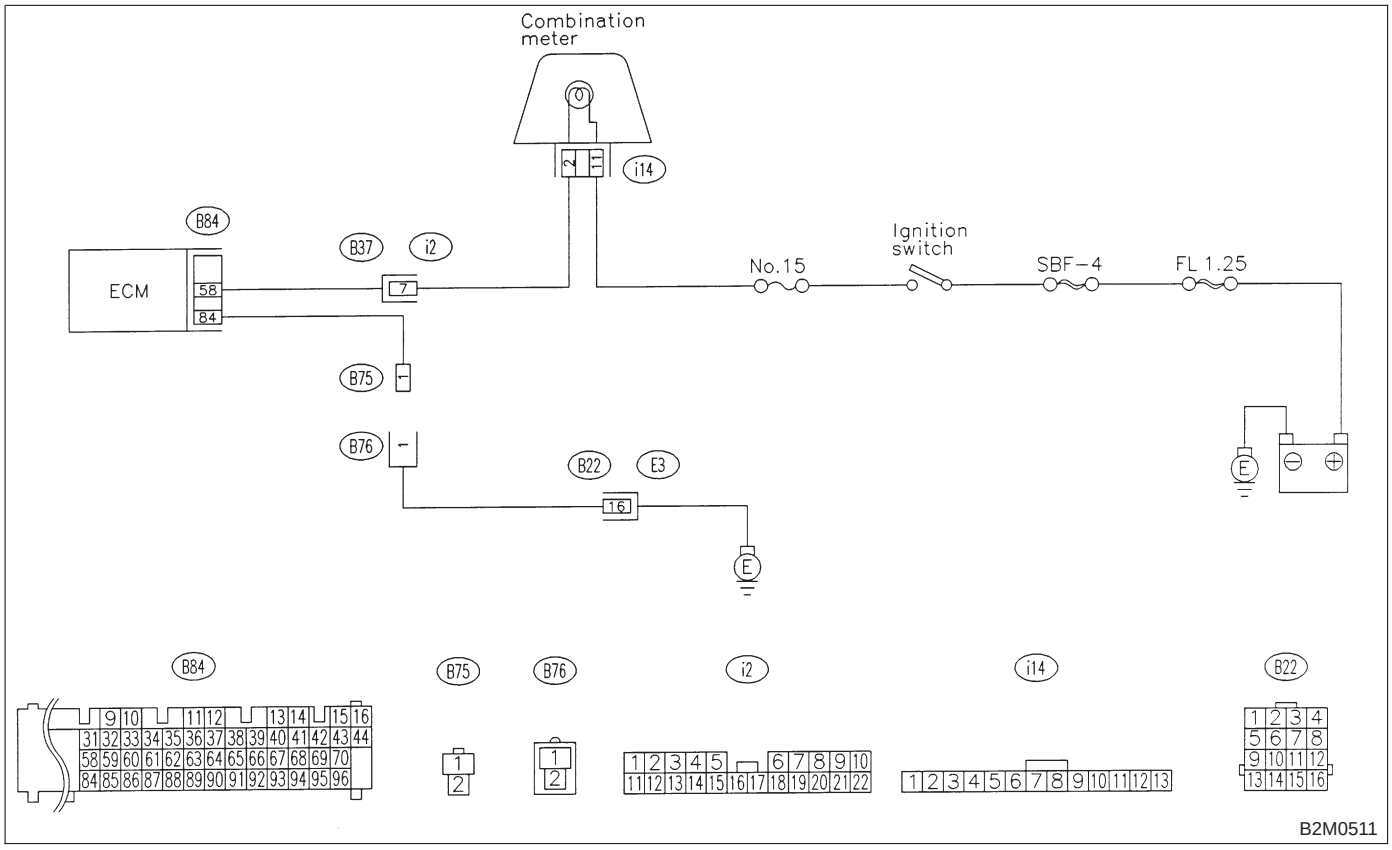
CHECK : ***Is resistance less than 5 Ω?***
YES : Repair poor contact in test mode connector.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between test mode and coupling connector (B22)
- Open circuit in harness between coupling connector (B22) and engine grounding terminal
- Poor contact in coupling connector (B22)

MEMO:

D: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 Hz.

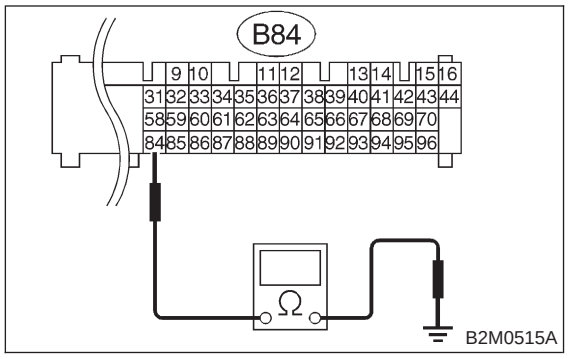
- **DIAGNOSIS:**
  - Test mode connector circuit is shorted.
- **TROUBLE SYMPTOM:**
  - Even though test mode connector is disconnected, MIL blinks at a cycle of 3 Hz when ignition switch is turned to ON.
- **WIRING DIAGRAM:**



7D1 : CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B84) No. 84 — Chassis ground:



CHECK : ***Is resistance less than 5 Ω?***
YES : Repair short circuit in harness between ECM and test mode connector.
NO : Replace ECM.

MEMO:

8. Diagnostics for Engine Starting Failure

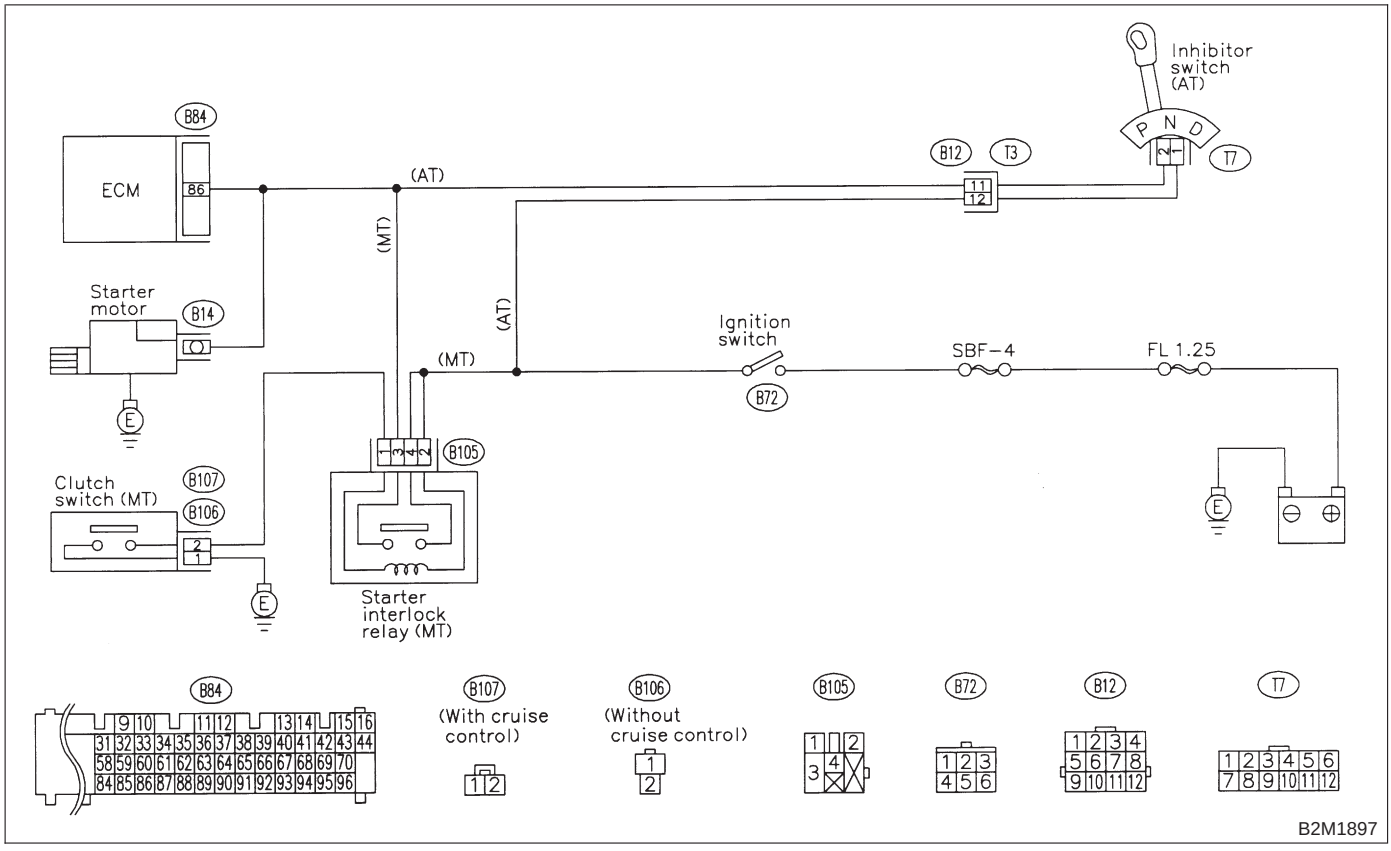
A: BASIC DIAGNOSTICS CHART

1. Inspection of starter motor circuit. <Ref. to 2-7 [T8B0].>
↓
2. Inspection of ECM power supply and ground line. <Ref. to 2-7 [T8C0].>
↓
3. Inspection of ignition control system. <Ref. to 2-7 [T8D0].>
↓
4. Inspection of fuel pump circuit. <Ref. to 2-7 [T8E0].> <Ref. to 2-7 [T8F0].>
↓
5. Inspection of fuel injector circuit. <Ref. to 2-7 [T8G0].>
↓
6. Inspection of crankshaft position sensor circuit. <Ref. to 2-7 [T8H0].>
↓
7. Inspection of camshaft position sensor circuit. <Ref. to 2-7 [T8I0].>
↓
8. Inspection using Subaru select monitor or OBD-II general scan tool <Ref. to 2-7 [T1000].> and <Ref. to 2-7 [T1100].> or inspection using “9. General Diagnostics Table”. <Ref. to 2-7 [T900].>

B: STARTER MOTOR CIRCUIT

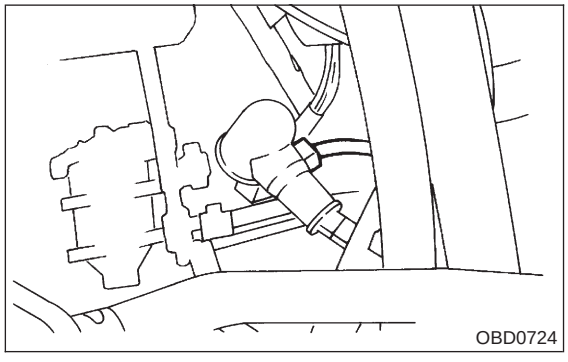
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



8B1 : CHECK INPUT SIGNAL FOR STARTER MOTOR.

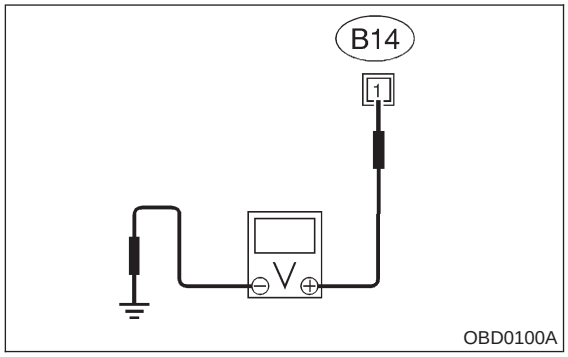
1) Turn ignition switch to OFF.
2) Disconnect connector from starter motor.



3) Turn ignition switch to ST.

4) Measure power supply voltage between starter motor connector terminal and engine ground.

Connector & terminal
(B14) No. 1 (+) — Engine ground (−):



NOTE:
● On AT vehicles, place the selector lever in the "P" or "N" position.
● On MT vehicles, depress the clutch pedal.

CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **8B2**.
NO : Go to step **8B3**.

8B2 : CHECK GROUND CIRCUIT OF STARTER MOTOR.

1) Turn ignition switch to OFF.
2) Disconnect terminal from starter motor.

3) Measure resistance of ground cable between ground cable terminal and engine ground.

CHECK : ***Is resistance less than 5 Ω?***
YES : Check starter motor. <Ref. to 6-1 [K100].>
NO : Repair open circuit of ground cable.

8B3 : CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.

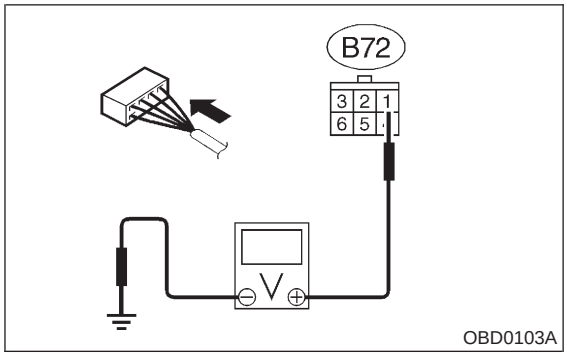
1) Turn ignition switch to OFF.
2) Remove SBF No. 4 from main fuse box.
3) Measure resistance of fuse.

CHECK : ***Is resistance less than 1 Ω?***
YES : Replace SBF No. 4.
NO : Go to step **8B4**.

8B4 : CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.

1) Install SBF No. 4 to main fuse box.
2) Turn ignition switch to ON.
3) Measure power supply voltage between ignition switch connector and chassis ground.

Connector & terminal
(B72) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **8B5**.
NO : Repair open circuit in harness between ignition switch and SBF No. 4 connector.

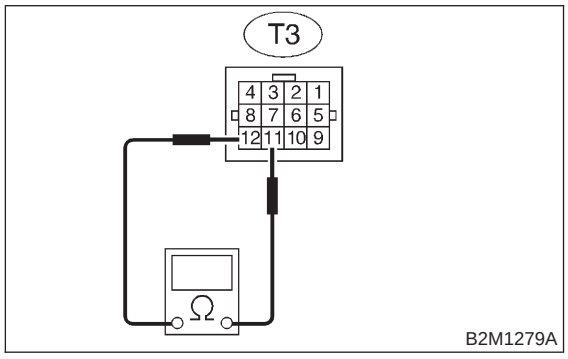
8B5 : CHECK TRANSMISSION TYPE.

CHECK : ***Is transmission type AT?***
YES : Go to step **8B6**.
NO : Go to step **8B9**.

8B6 : CHECK INHIBITOR SWITCH CIRCUIT.

1) Turn ignition switch to OFF.
2) Place the selector lever in the “P” or “N” position.
3) Measure resistance between transmission harness connector receptacle’s terminals.

Connector & terminal
(T3) No. 11 — No. 12:

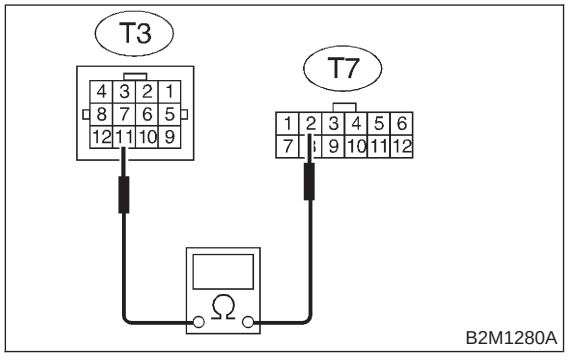


CHECK : ***Is the resistance less than 1 Ω?***
YES : Repair open circuit in harness between starter motor and ignition switch connector.
NO : Go to step **8B7**.

8B7 : CHECK TRANSMISSION HARNESS.

1) Disconnect connector from inhibitor switch.
2) Measure resistance of harness between transmission harness and inhibitor switch connector.

Connector & terminal
(T3) No. 11 — (T7) No. 2:

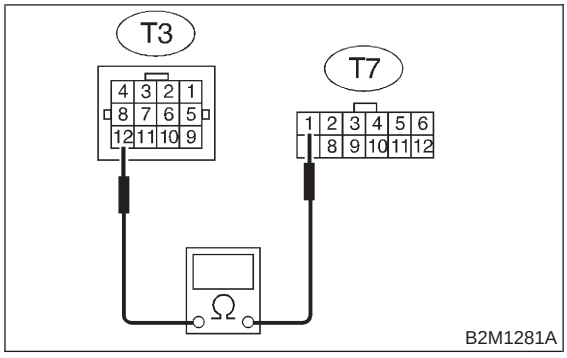


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8B8**.
NO : Repair open circuit in harness between transmission harness and inhibitor switch connector.

8B8 : CHECK TRANSMISSION HARNESS.

Measure resistance of harness between transmission harness and inhibitor switch connector.

Connector & terminal
(T3) No. 12 — (T7) No. 1:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8B9**.
NO : Repair open circuit in harness between transmission harness and inhibitor switch connector.

8B9 : CHECK POOR CONTACT.

Check poor contact in inhibitor switch connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in inhibitor switch connector?***
YES : Repair poor contact in inhibitor switch connector.
NO : Replace inhibitor switch.

8B10 : CHECK STARTER INTERLOCK CIRCUIT.

1) Turn ignition switch to “ST”.
2) Measure voltage between clutch switch connector and chassis ground.

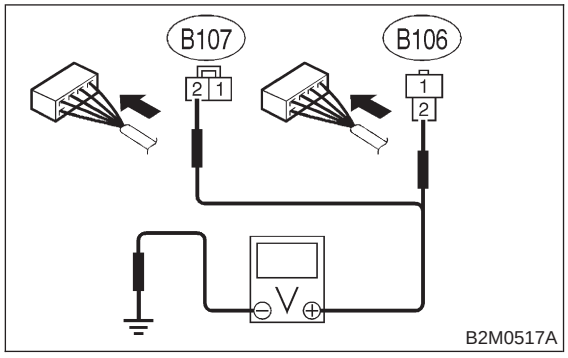
Connector & terminal

- ***With cruise control***

(B107) No. 2 (+) — Chassis ground (−):

- ***Without cruise control***

(B106) No. 2 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Replace starter interlock relay.
NO : Go to step **8B11**.

8B11 : CHECK STARTER INTERLOCK CIRCUIT.

1) Turn ignition switch to OFF.
2) Measure resistance between clutch switch connector terminals while depressing the clutch pedal.

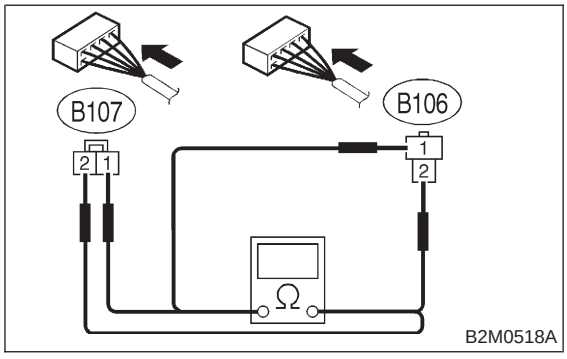
Connector & terminal

- ***With cruise control***

(B107) No. 1 — No. 2:

- ***Without cruise control***

(B106) No. 1 — No. 2:

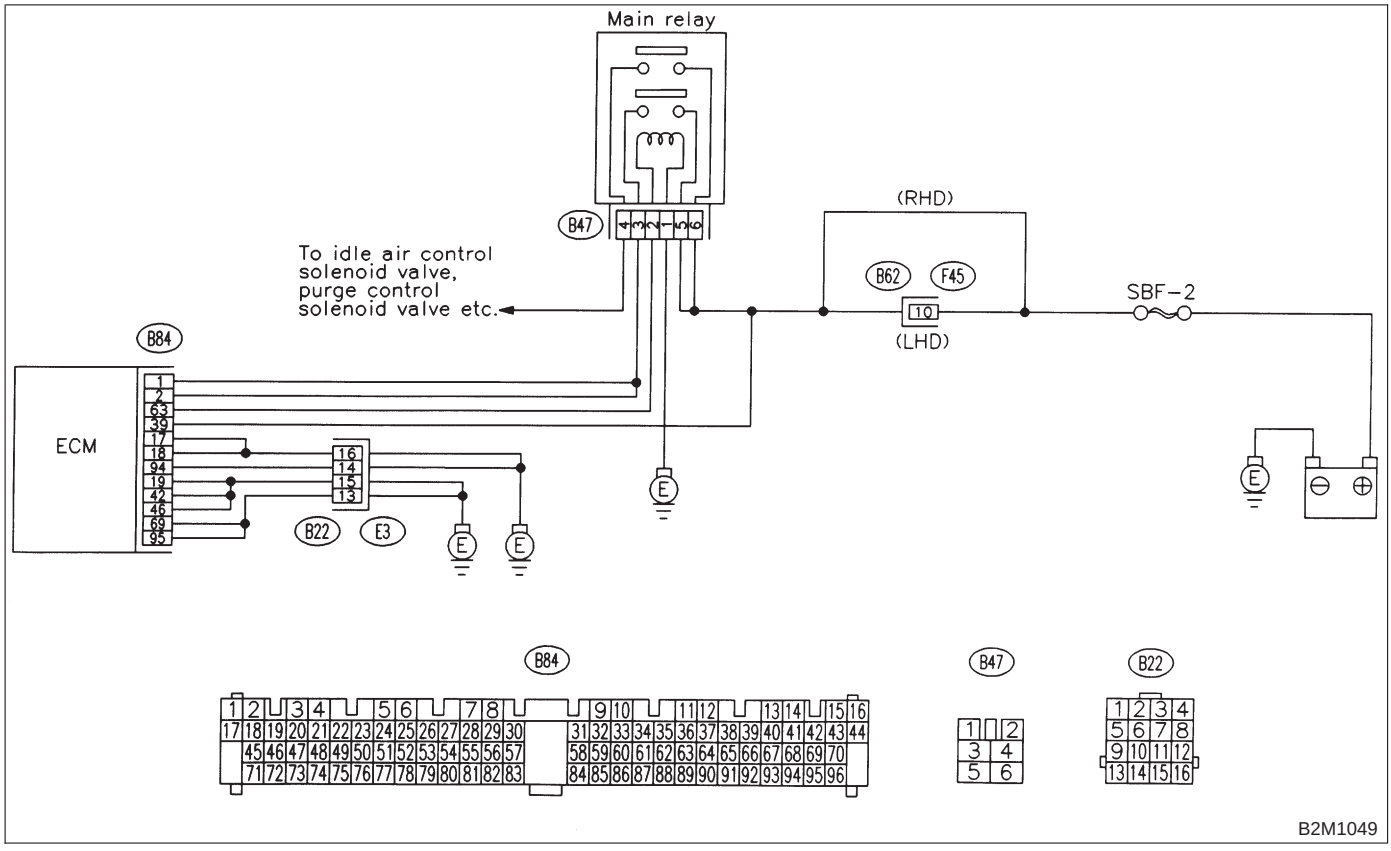


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair open circuit in harness between starter motor and ignition switch connector.
NO : Replace clutch switch.

C: CONTROL MODULE POWER SUPPLY AND GROUND LINE

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

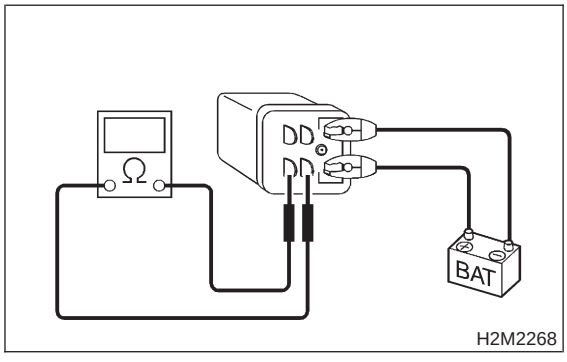
- **WIRING DIAGRAM:**



8C1 : CHECK MAIN RELAY.

1) Turn the ignition switch to OFF.
2) Remove main relay.
3) Connect battery to main relay terminals No. 1 and No. 2.
4) Measure resistance between main relay terminals.

Terminals
No. 3 — No. 5:

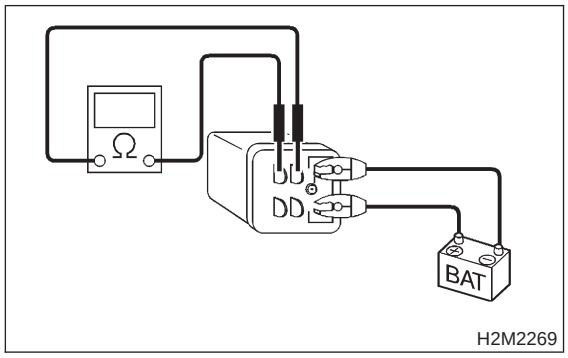


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **8C2**.
NO : Replace main relay.

8C2 : CHECK MAIN RELAY.

Measure resistance between main relay terminals.

Terminals
No. 4 — No. 6:

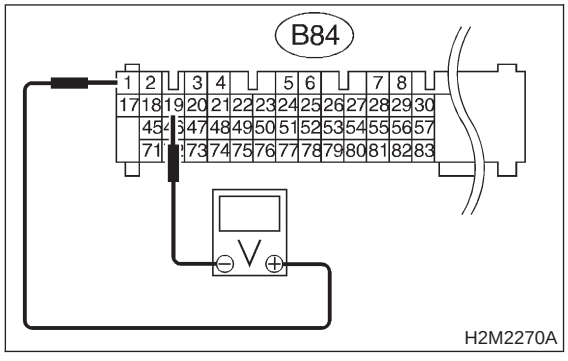


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **8C3**.
NO : Replace main relay.

8C3 : CHECK POWER SUPPLY CIRCUIT OF ECM.

1) Install main relay.
2) Disconnect connectors from ECM.
3) Turn ignition switch to ON.
4) Measure power supply voltage between ECM connector terminals.

Connector & terminal
(B84) No. 1 (+) — No. 19 (−):

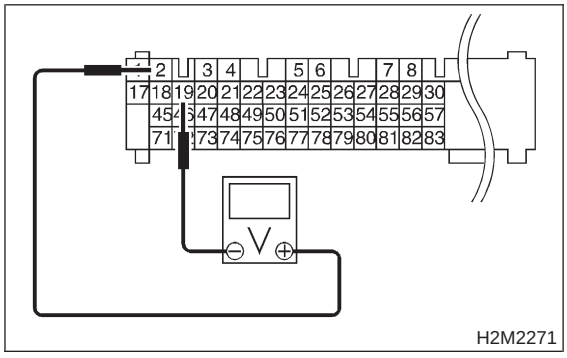


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **8C4**.
NO : Repair open or ground short circuit in harness of power supply circuit.

8C4 : CHECK POWER SUPPLY CIRCUIT OF ECM.

Measure power supply voltage between ECM connector terminals.

Connector & terminal
(B84) No. 2 (+) — No. 19 (−):

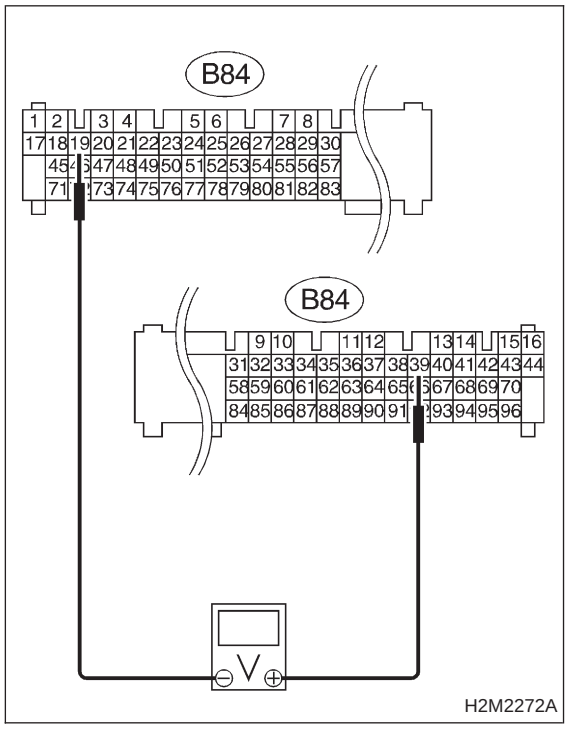


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **8C5**.
NO : Repair open or ground short circuit in harness of power supply circuit.

8C5 : CHECK POWER SUPPLY CIRCUIT OF ECM.

Measure power supply voltage between ECM connector terminals.

Connector & terminal
(B84) No. 39 (+) — No. 19 (−):

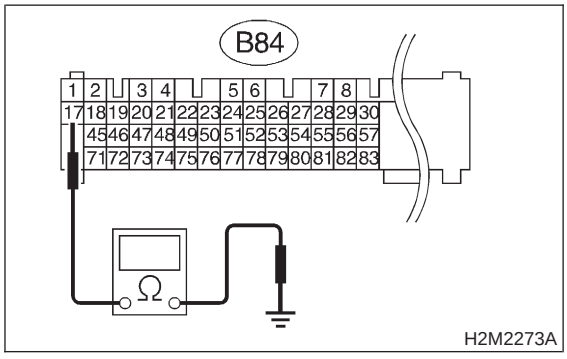


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **8C6**.
NO : Repair open or ground short circuit in harness of power supply circuit.

8C6 : CHECK GROUND CIRCUIT OF ECM.

1) Turn ignition switch to OFF.
2) Measure resistance of harness connector between ECM and chassis ground.

Connector & terminal
(B84) No. 17 — Chassis ground:

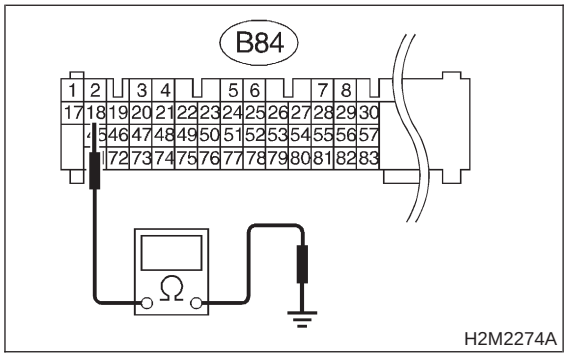


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8C7**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C7 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 18 — Chassis ground:

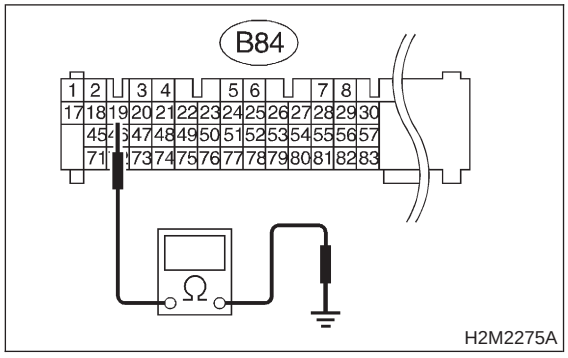


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8C8**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C8 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 19 — Chassis ground:

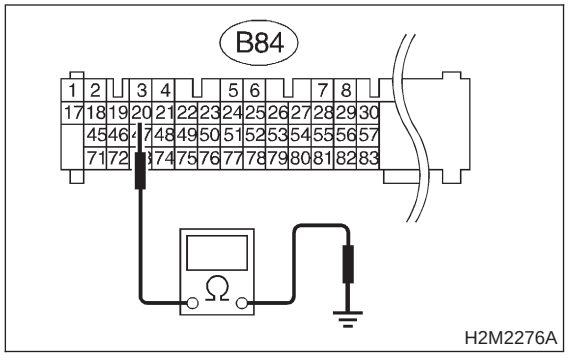


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8C9**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C9 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 20 — Chassis ground:

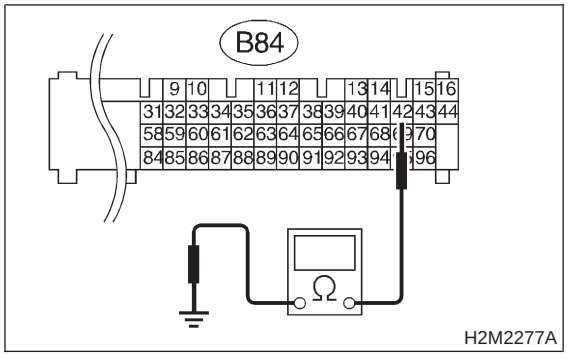


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8C10**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C10 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 42 — Chassis ground:

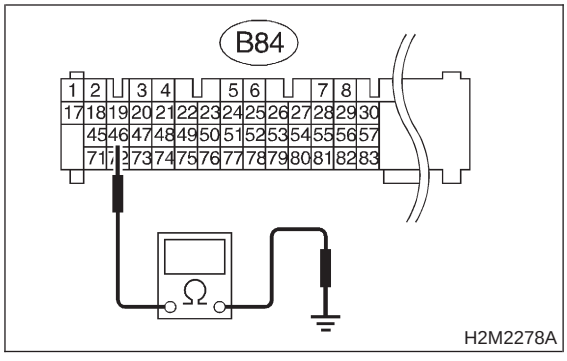


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8C11**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C11 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 46 — Chassis ground:

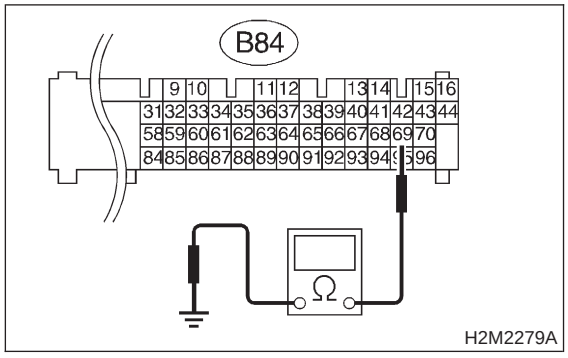


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8C12**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C12 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 69 — Chassis ground:

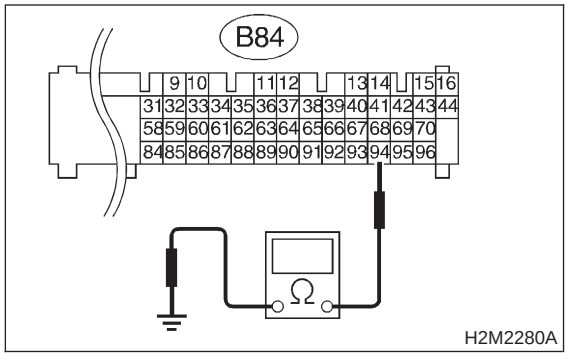


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8C13**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C13 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 94 — Chassis ground:

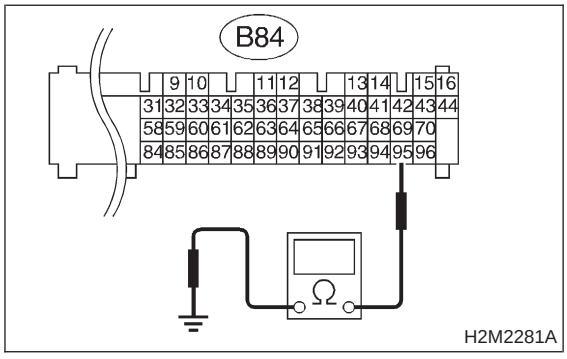


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8C14**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8C14 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 95 — Chassis ground:



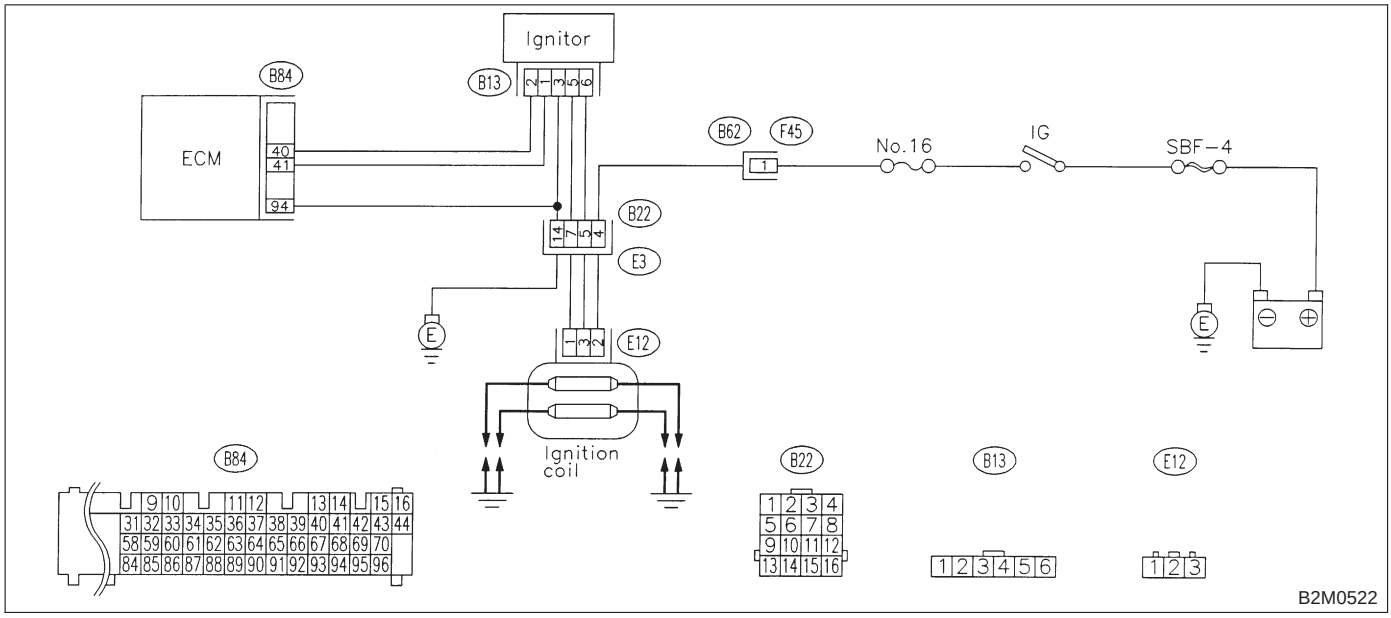
CHECK : ***Is the resistance less than 5 Ω?***
YES : Check ignition control system. <Ref. to 2-7 [T8D0].>
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

MEMO:

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



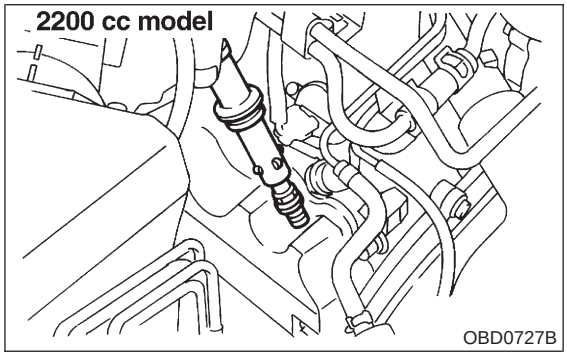
8D1 : CHECK IGNITION SYSTEM FOR SPARKS.

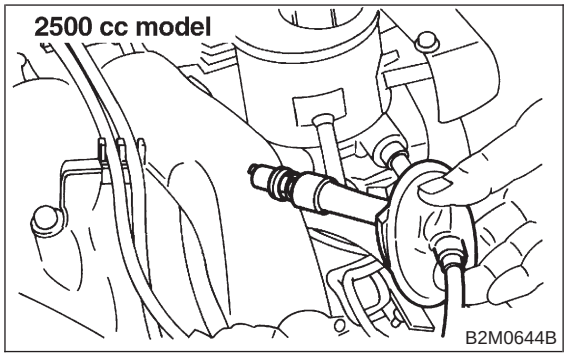
1) Remove plug cord cap from each spark plug.
2) Install new spark plug on plug cord cap.

CAUTION:
Do not remove spark plug from engine.

3) Contact spark plug's thread portion on engine.

4) While opening throttle valve fully, crank engine to check that spark occurs at each cylinder.



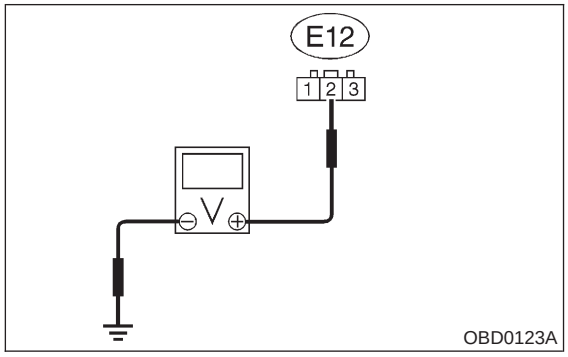


CHECK : ***Does spark occur at each cylinder?***
YES : Check fuel pump system. <Ref. to 2-7 [T8E0].> or <Ref. to 2-7 [T8F0].>
NO : Go to step **8D2**.

8D2 : CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL.

1) Turn ignition switch to OFF.
2) Disconnect connector from ignition coil.
3) Turn ignition switch to ON.
4) Measure power supply voltage between ignition coil connector and engine ground.

Connector & terminal
(E12) No. 2 (+) — Engine ground (−):

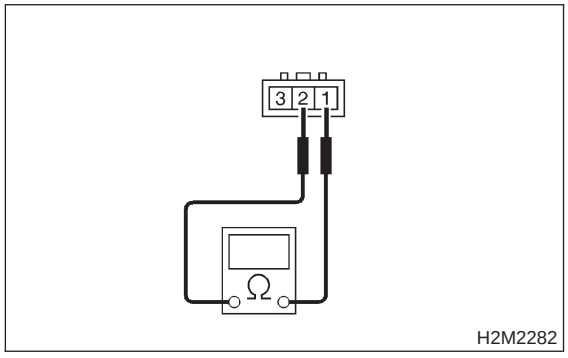


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **8D3**.
NO : Repair open or ground short circuit in harness between ignition coil and ignition switch connector.

8D3 : CHECK IGNITION COIL.

Measure resistance between ignition coil terminals to check primary coil.

Terminals
No. 2 — No. 1:

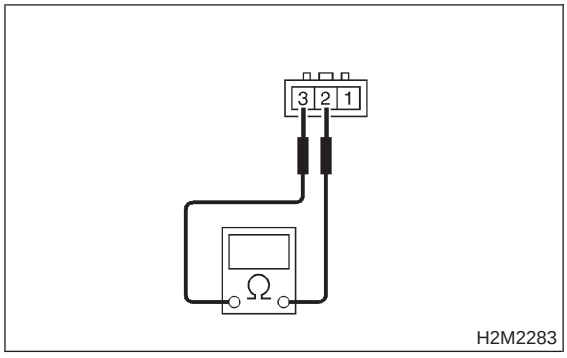


CHECK : ***Is the resistance between 0.4 and 1.0 Ω?***
YES : Go to step **8D4**.
NO : Replace ignition coil.

8D4 : CHECK IGNITION COIL.

Measure resistance between ignition coil terminals to check primary coil.

Terminals
No. 2 — No. 3:

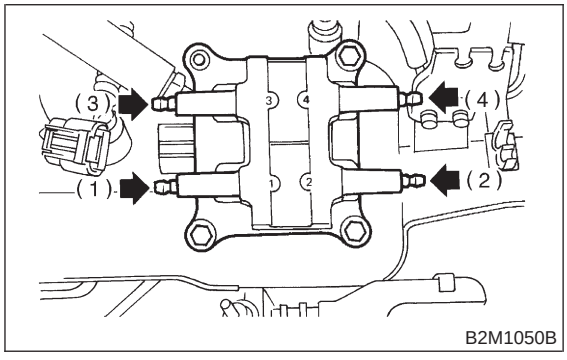


CHECK : ***Is the resistance between 0.4 and 1.0 Ω?***
YES : Go to step **8D5**.
NO : Replace ignition coil.

8D5 : CHECK IGNITION COIL.

Measure resistance between spark plug cord contact portions to check secondary coil.

Terminals
#1 — #2:

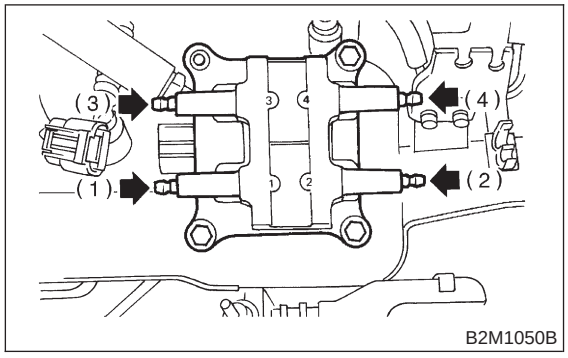


CHECK : ***Is the resistance between 10 and 15 kΩ?***
YES : Go to step **8D6**.
NO : Replace ignition coil.

8D6 : CHECK IGNITION COIL.

Measure resistance between spark plug cord contact portions to check secondary coil.

Terminals
#3 — #4:

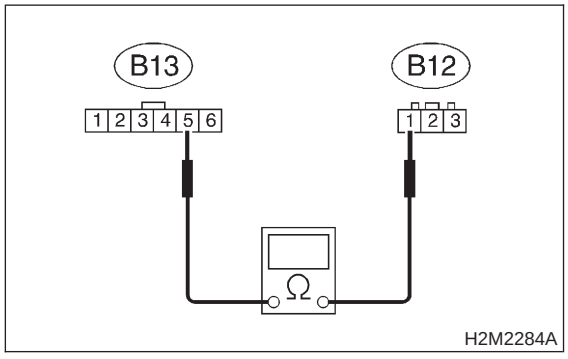


CHECK : ***Is the resistance between 10 and 15 kΩ?***
YES : Go to step **8D7**.
NO : Replace ignition coil.

8D7 : CHECK HARNESS BETWEEN IGNITOR AND IGNITION COIL CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ignitor.
3) Measure resistance of harness connector between ignition coil and ignitor.

Connector & terminal
(B13) No. 5 — (E12) No. 1:

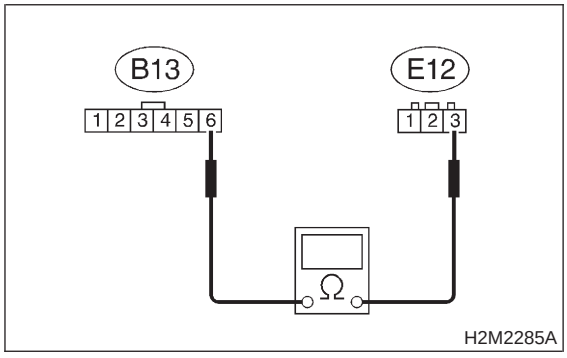


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D8**.
NO : Go to step **8D9**.

8D8 : CHECK HARNESS BETWEEN IGNITOR AND IGNITION COIL CONNECTOR.

Measure resistance of harness between ignition coil and ignitor connector.

Connector & terminal
(B13) No. 6 — (E12) No. 3:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D10**.
NO : Go to step **8D9**.

8D9 : CHECK POOR CONTACT.

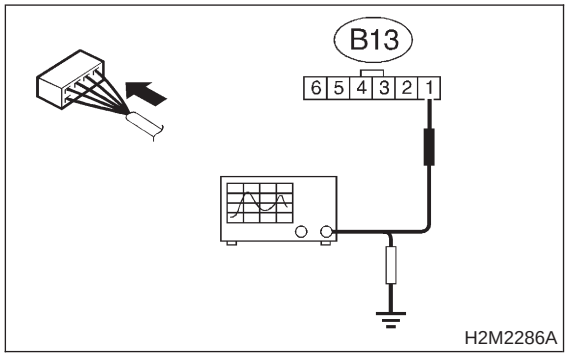
Check poor contact in coupling connector (B22). <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in coupling connector (B22)?***
YES : Repair poor contact in coupling connector (B22).
NO : Repair open circuit in harness between ignition coil and ignitor connector.

8D10 : CHECK INPUT SIGNAL FOR IGNITOR.

Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignitor connector and engine ground.

Connector & terminal:
(B13) No. 1 (+) — Engine ground (−):

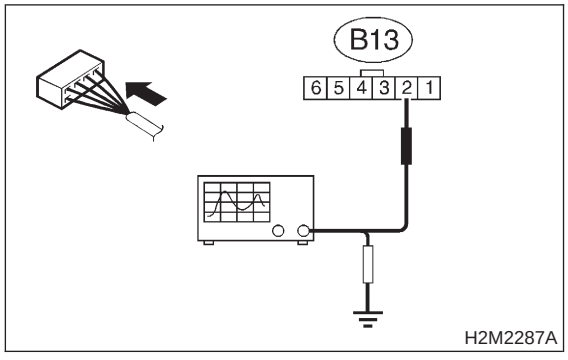


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **8D11**.
NO : Replace ignitor.

8D11 : CHECK INPUT SIGNAL FOR IGNITOR.

Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignitor connector and engine ground.

Connector & terminal:
(B13) No. 2 (+) — Engine ground (−):

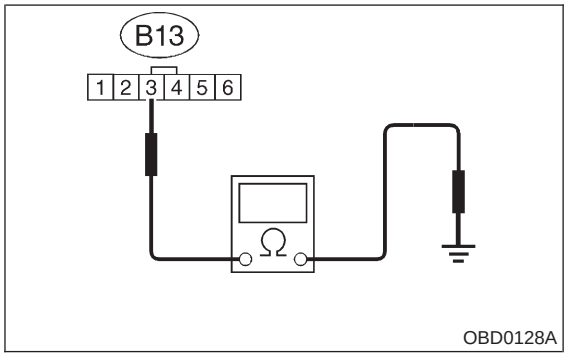


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **8D12**.
NO : Replace ignitor.

8D12 : CHECK HARNESS OF IGNITOR GROUND CIRCUIT.

1) Turn ignition switch to OFF.
2) Measure resistance between ignitor and engine ground.

Connector & terminal
(B13) No. 3 — Engine ground:



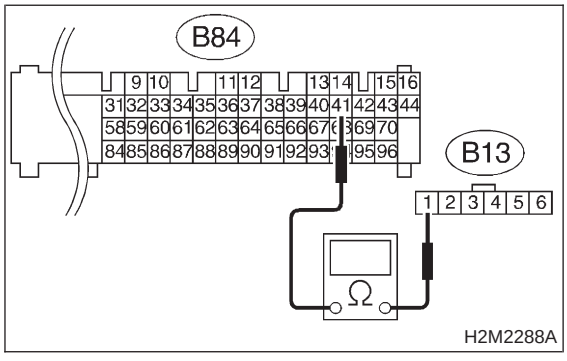
CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8D13**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ignitor connector and engine grounding terminal
- Poor contact in coupling connector (B22)

8D13 : CHECK HARNESS BETWEEN ECM AND IGNITOR CONNECTOR.

1) Disconnect connector from ECM.
2) Measure resistance of harness connector between ECM and ignitor.

Connector & terminal
(B84) No. 41 — (B13) No. 1:

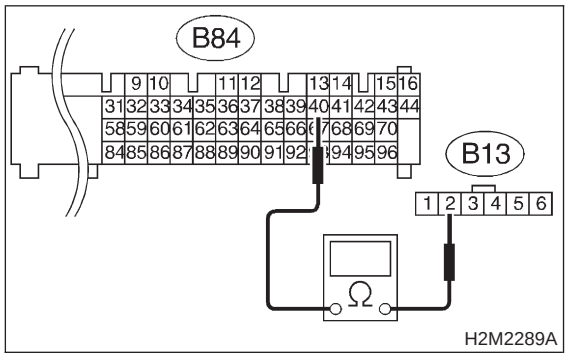


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D14**.
NO : Repair open circuit in harness between ECM and ignitor connector.

8D14 : CHECK HARNESS BETWEEN ECM AND IGNITOR CONNECTOR.

Measure resistance of harness between ECM and ignitor connector.

Connector & terminal
(B84) No. 40 — (B13) No. 2:

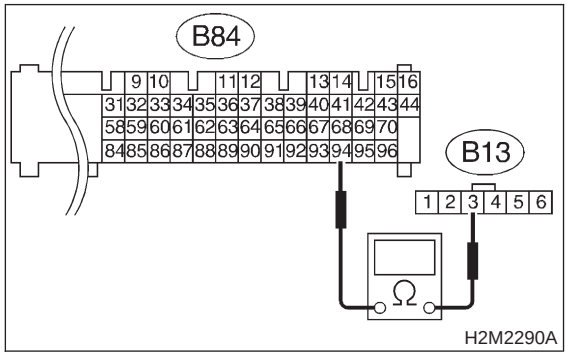


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D15**.
NO : Repair open circuit in harness between ECM and ignitor connector.

8D15 : CHECK HARNESS BETWEEN ECM AND IGNITOR CONNECTOR.

Measure resistance of harness between ECM and ignitor connector.

Connector & terminal
(B84) No. 94 — (B13) No. 3:

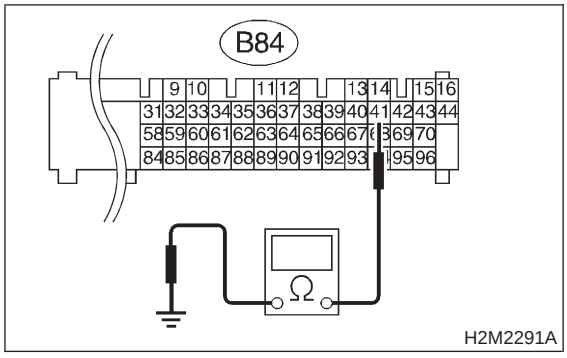


CHECK : ***Is the resistance less than 1 Ω?***
YES : Repair open circuit in harness between ECM and ignitor connector.
NO : Go to step **8D16**.

8D16 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness connector between ECM and chassis ground.

Connector & terminal
(B84) No. 41 — Chassis ground:

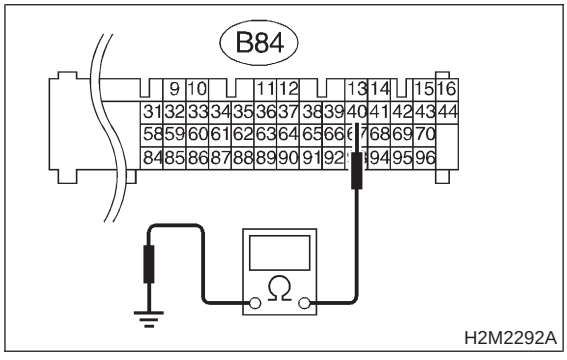


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8D17**.
NO : Repair ground short circuit in harness between ECM and ignitor connector.

8D17 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 40 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8D18**.
NO : Repair ground short circuit in harness between ECM and ignitor connector.

8D18 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***

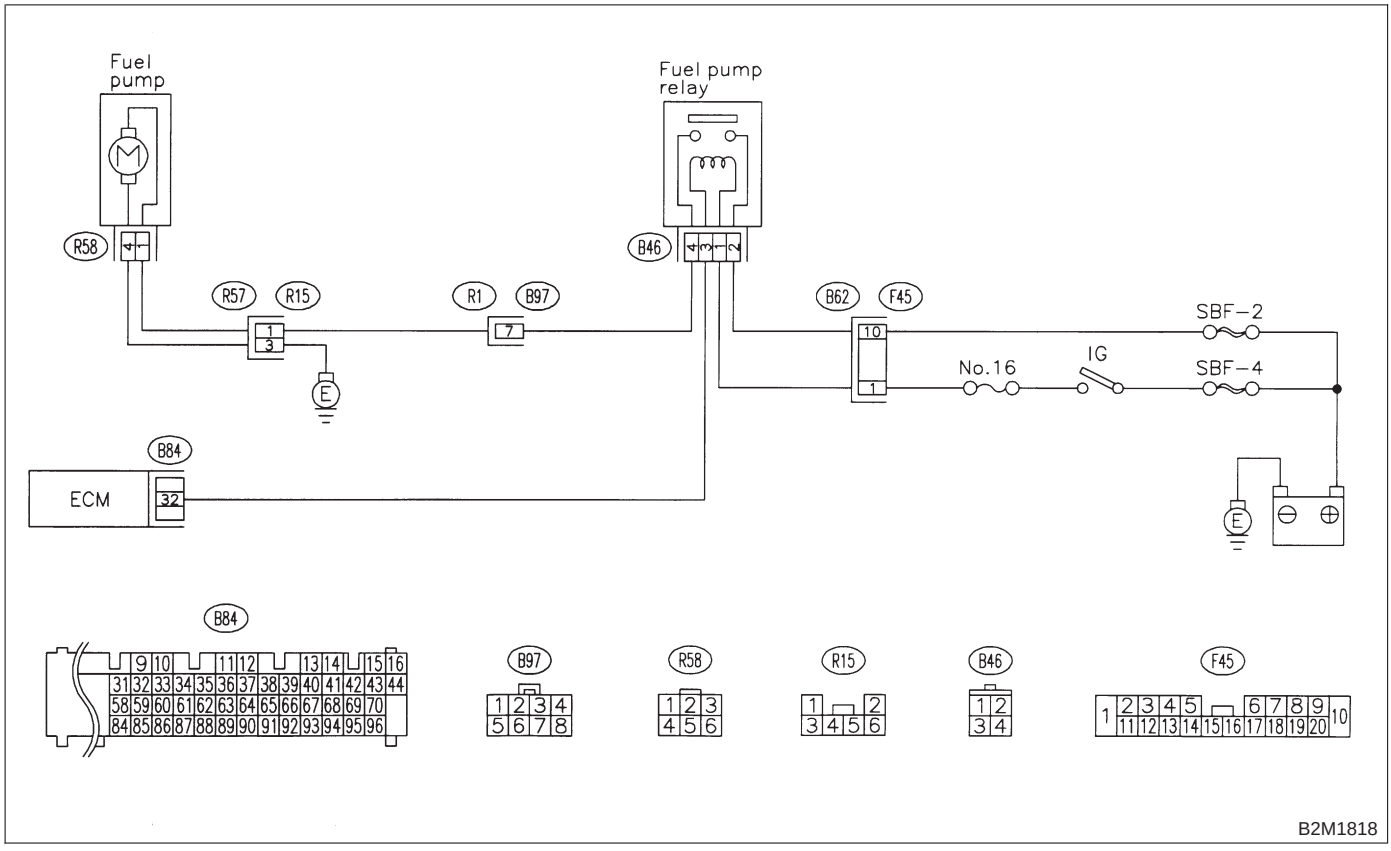
YES : Repair poor contact in ECM connector.

NO : Check fuel pump circuit. <Ref. to 2-7 [T8E0].> <Ref. to 2-7 [T8F0].>

E: FUEL PUMP CIRCUIT (2200 cc FWD AND TAIWAN SPEC. VEHICLES)

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



8E1 : CHECK OPERATING SOUND OF FUEL PUMP.

Make sure that fuel pump is in operation for two seconds when turning ignition switch to ON.

NOTE:
Fuel pump operation check can also be executed using Subaru Select Monitor (Function mode: FD01).
For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>

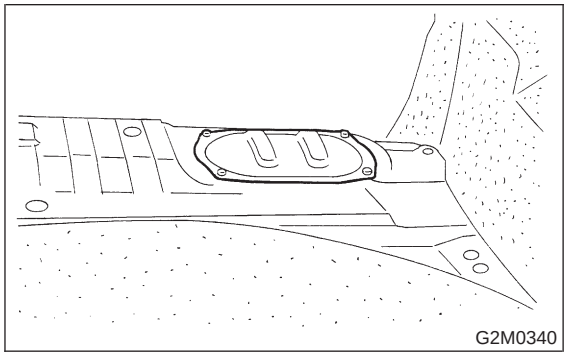
CHECK : ***Does fuel pump produce operating sound?***

YES : Check fuel injector circuit. <Ref. to 2-7 [T8G0].>

NO : Go to step **8E2**.

8E2 : CHECK GROUND CIRCUIT OF FUEL PUMP.

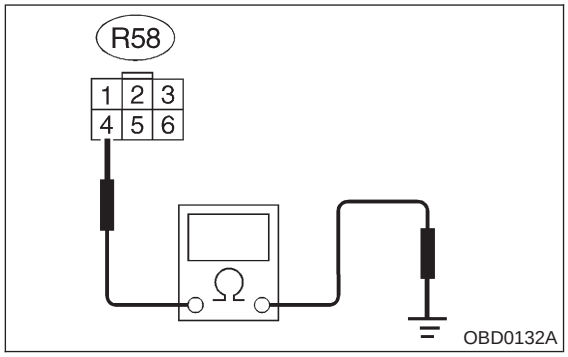
1) Turn ignition switch to OFF.
2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



3) Disconnect connector from fuel pump.

4) Measure resistance of harness connector between fuel pump and chassis ground.

Connector & terminal
(R58) No. 4 — Chassis ground:



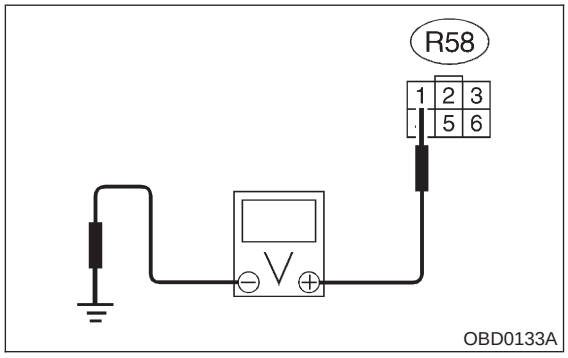
CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8E3**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in coupling connector (R15)

8E3 : CHECK POWER SUPPLY TO FUEL PUMP.

1) Turn ignition switch to ON.
2) Measure voltage of power supply circuit between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 1 (+) — Chassis ground (−):

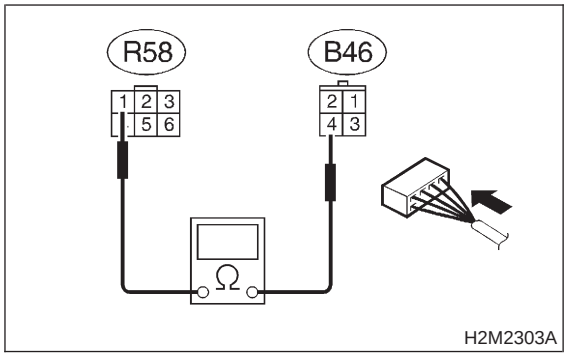


CHECK : ***Is the voltage more than 10 V?***
YES : Replace fuel pump.
NO : Go to step **8E4**.

8E4 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.

1) Turn ignition switch to OFF.
2) Measure resistance of harness connector between fuel pump and fuel pump relay.

Connector & terminal
(R58) No. 1 — (B46) No. 4:



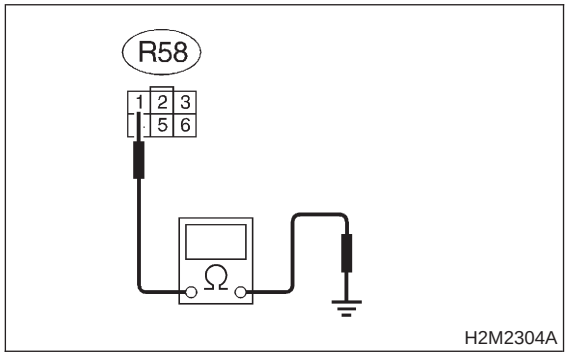
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in coupling connectors (R15 and B97)

8E5 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.

Measure resistance of harness between fuel pump and fuel pump relay connector.

Connector & terminal
(R58) No. 1 — Chassis ground:

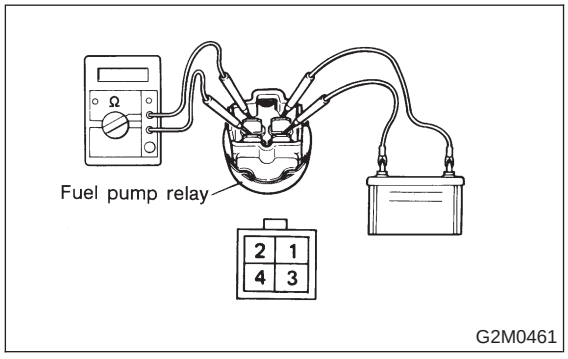


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8E6**.
NO : Repair short circuit in harness between fuel pump and fuel pump relay connector.

8E6 : CHECK FUEL PUMP RELAY.

1) Disconnect connectors from fuel pump relay and main relay.
2) Remove fuel pump relay and main relay with bracket.
3) Connect battery to fuel pump relay connector terminals No. 1 and No. 3.
4) Measure resistance between connector terminals of fuel pump relay.

Terminals
No. 2 — No. 4:

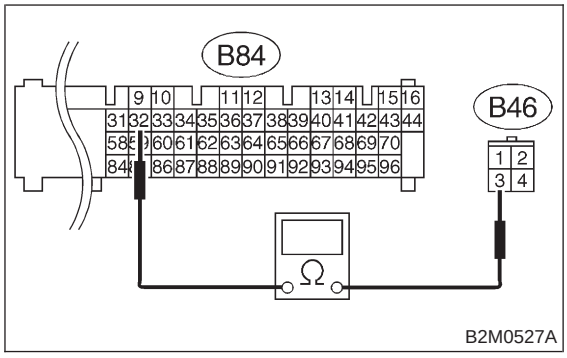


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **8E7**.
NO : Replace fuel pump relay.

8E7 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.

1) Disconnect connectors from ECM.
2) Measure resistance of harness between ECM and fuel pump relay connector.

Connector & terminal
(B84) No. 32 — (B46) No. 3:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E8**.
NO : Repair open circuit in harness between ECM and fuel pump relay connector.

8E8 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

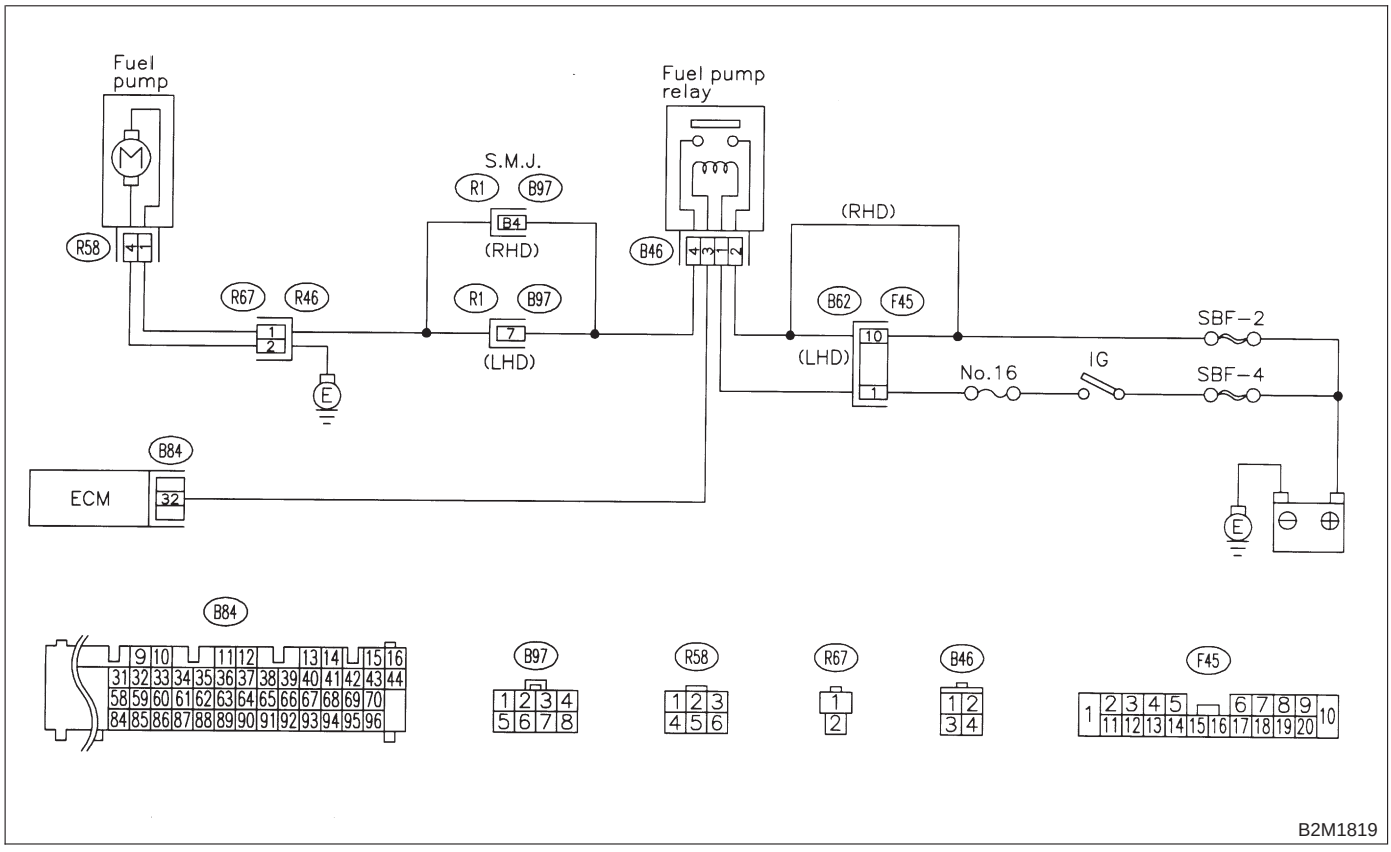
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Check fuel injector circuit. <Ref. to 2-7 [T8G0].>

MEMO:

F: FUEL PUMP CIRCUIT (EXCEPT 2200 cc FWD AND TAIWAN SPEC. VEHICLES)

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



8F1 : CHECK OPERATING SOUND OF FUEL PUMP.

Make sure that fuel pump is in operation for two seconds when turning ignition switch to ON.

NOTE:
Fuel pump operation check can also be executed using Subaru Select Monitor (Function mode: FD01).
For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

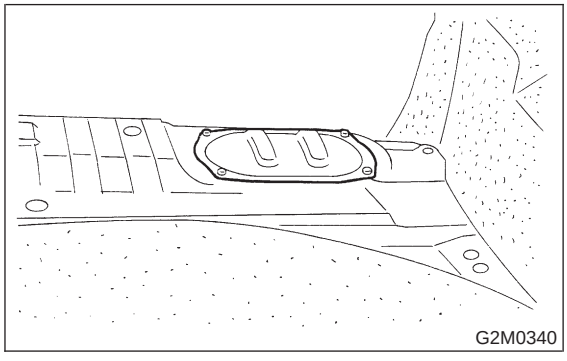
CHECK : ***Does fuel pump produce operating sound?***

YES : Check fuel injector circuit. <Ref. to 2-7 [T8G0].>

NO : Go to step **8F2**.

8F2 : CHECK GROUND CIRCUIT OF FUEL PUMP.

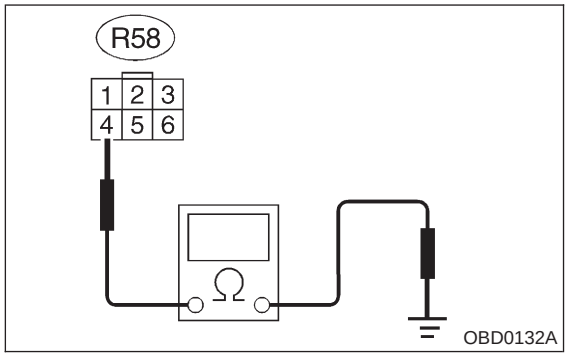
1) Turn ignition switch to OFF.
2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



3) Disconnect connector from fuel pump.

4) Measure resistance of harness connector between fuel pump and chassis ground.

Connector & terminal
(R58) No. 4 — Chassis ground:



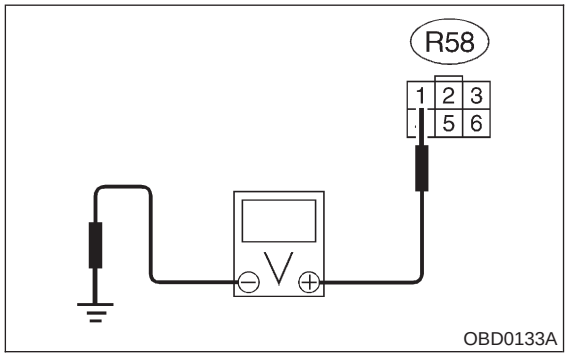
CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8F3**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in coupling connector (R67)

8F3 : CHECK POWER SUPPLY TO FUEL PUMP.

1) Turn ignition switch to ON.
2) Measure voltage of power supply circuit between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 1 (+) — Chassis ground (−):

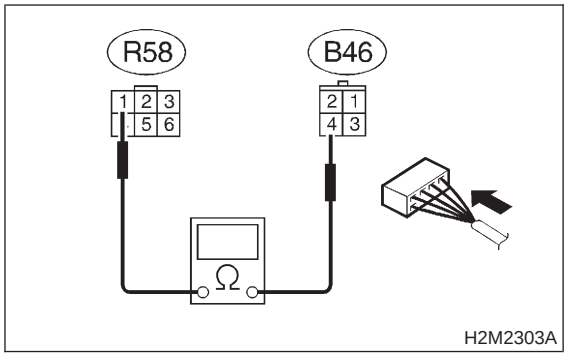


CHECK : ***Is the voltage more than 10 V?***
YES : Replace fuel pump.
NO : Go to step **8F4**.

8F4 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.

1) Turn ignition switch to OFF.
2) Measure resistance of harness connector between fuel pump and fuel pump relay.

Connector & terminal
(R58) No. 1 — (B46) No. 4:



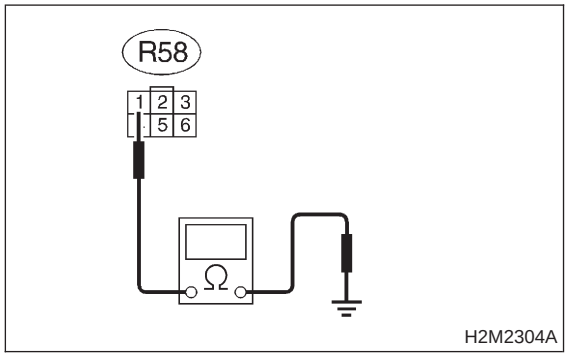
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8F5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in coupling connectors (R67 and B97)

8F5 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.

Measure resistance of harness between fuel pump and fuel pump relay connector.

Connector & terminal
(R58) No. 1 — Chassis ground:

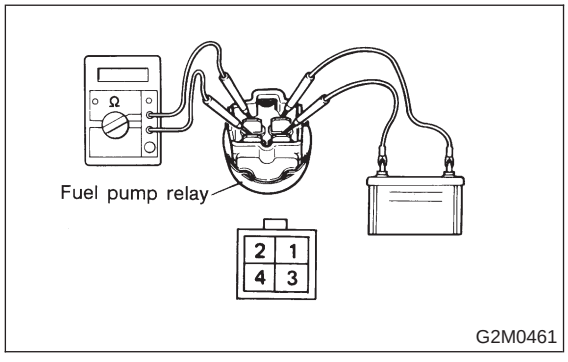


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8F6**.
NO : Repair short circuit in harness between fuel pump and fuel pump relay connector.

8F6 : CHECK FUEL PUMP RELAY.

1) Disconnect connectors from fuel pump relay and main relay.
2) Remove fuel pump relay and main relay with bracket.
3) Connect battery to fuel pump relay connector terminals No. 1 and No. 3.
4) Measure resistance between connector terminals of fuel pump relay.

Terminals
No. 2 — No. 4:

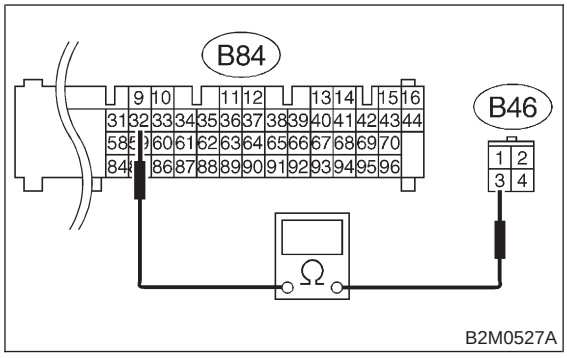


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **8F7**.
NO : Replace fuel pump relay.

8F7 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.

1) Disconnect connectors from ECM.
2) Measure resistance of harness between ECM and fuel pump relay connector.

Connector & terminal
(B84) No. 32 — (B46) No. 3:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8F8**.
NO : Repair open circuit in harness between ECM and fuel pump relay connector.

8F8 : CHECK POOR CONTACT.

Check poor contact in ECM connector.
<Ref. to FOREWORD [T3C1].>

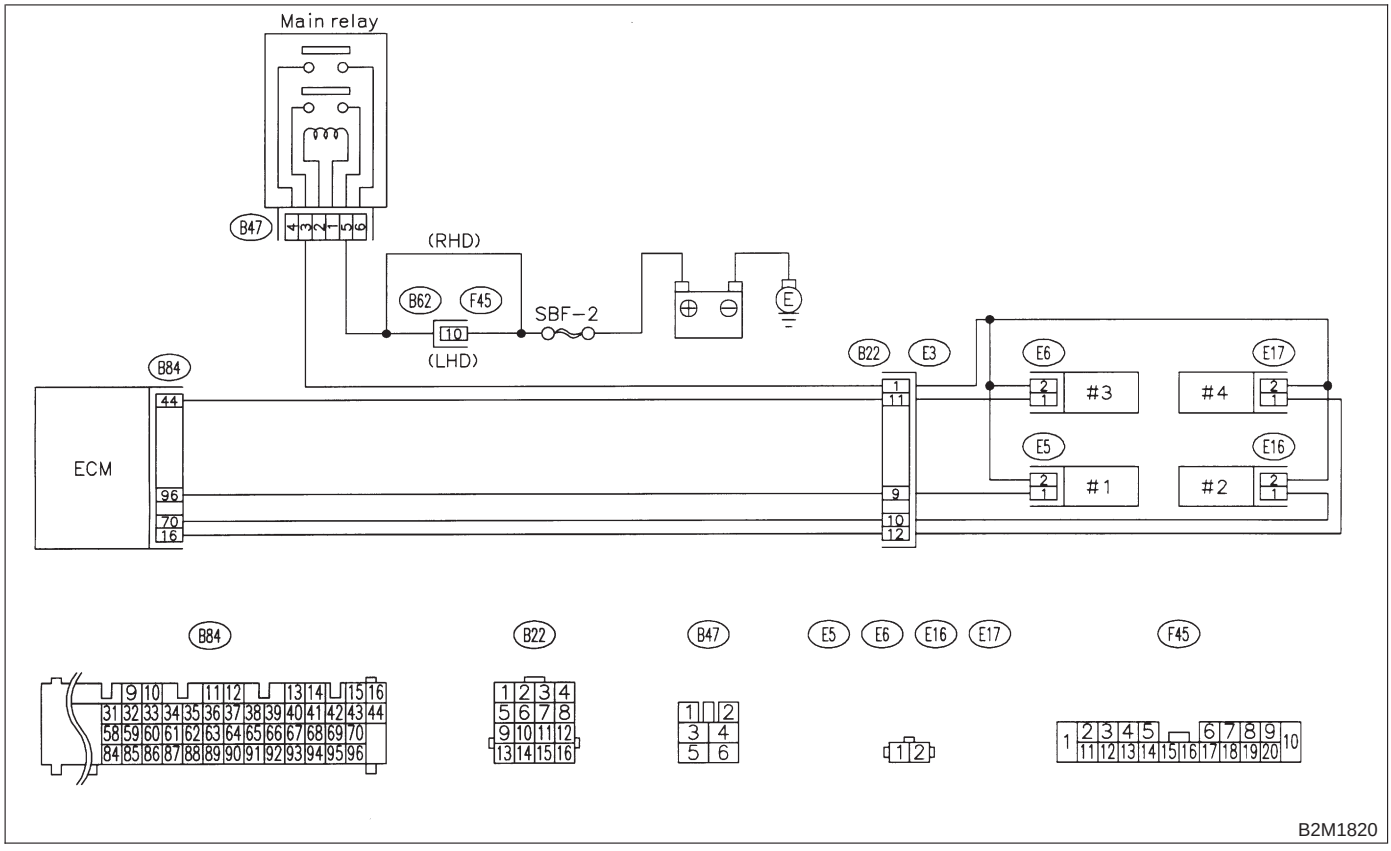
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Check fuel injector circuit. <Ref. to 2-7 [T8G0].>

G: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>**

NOTE:
Check fuel injector circuit. <Ref. to 2-7 [T10AA0].> or <Ref. to 2-7 [T10AE0].> (LHD), <Ref. to 2-7 [T11AA0].> or <Ref. to 2-7 [T11AE0].> (RHD)

- **WIRING DIAGRAM:**

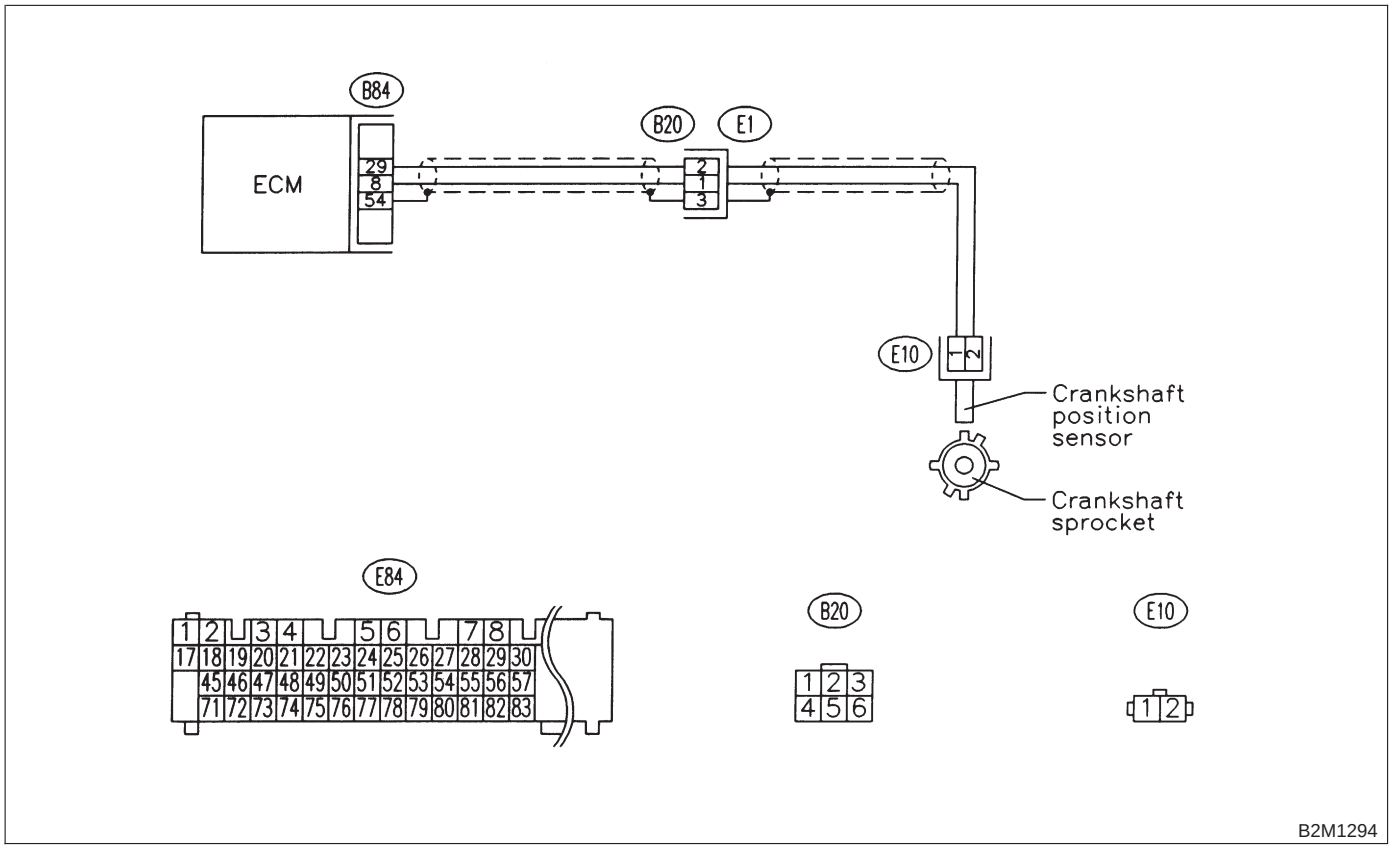


H: CRANKSHAFT POSITION SENSOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

NOTE:
Check crankshaft position sensor circuit. <Ref. to 2-7 [T10AK0].> (LHD), <Ref. to 2-7 [T11AK0].> (RHD)

- **WIRING DIAGRAM:**

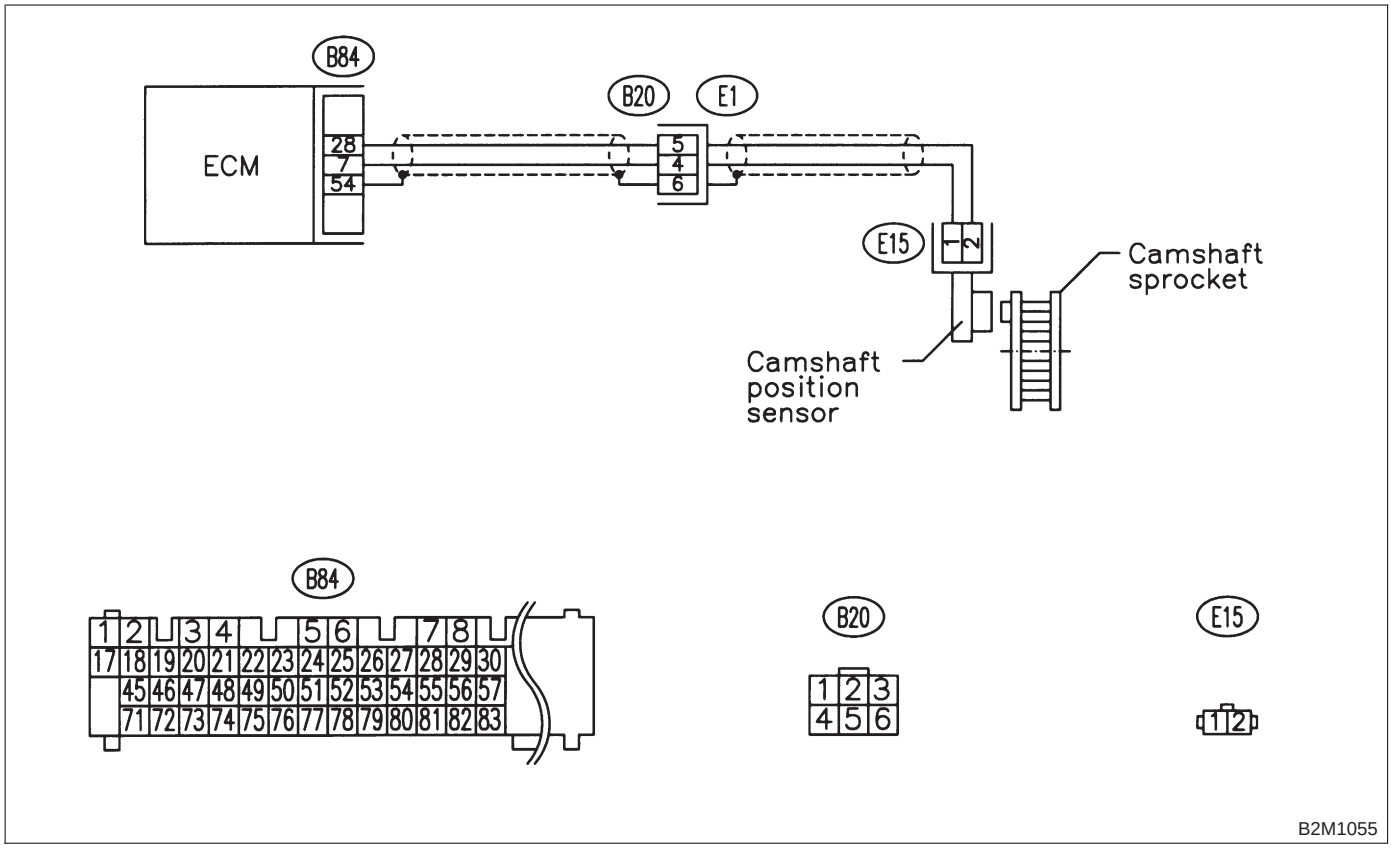


I: CAMSHAFT POSITION SENSOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

NOTE:
Check camshaft position sensor circuit. <Ref. to 2-7 [T10AM0].> (LHD), <Ref. to 2-7 [T11AM0].> (RHD)

- **WIRING DIAGRAM:**



9. General Diagnostic Table

A: GENERAL DIAGNOSTICS TABLE WITH NON-CONFORMITY SYMPTOM FOR ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to 2-3a [K100].> or <Ref. to 2-3b [K100].>

Symptom	Problem parts
1. Engine stalls during idling.	1) Idle air control solenoid valve 2) Mass air flow sensor 3) Ignition parts (*1) 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) EGR valve 8) Fuel injection parts (*4)
2. Rough idling	1) Idle air control solenoid valve 2) Mass air flow sensor 3) Engine coolant temperature sensor (*2) 4) Ignition parts (*1) 5) Air intake system (*5) 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) EGR valve 11) Oxygen sensor 12) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Idle air control solenoid valve 2) Engine coolant temperature sensor 3) Accelerator cable (*6) 4) Throttle position sensor 5) Mass air flow sensor
4. Poor acceleration	1) Mass air flow sensor 2) Throttle position sensor 3) Fuel injection parts (*4) 4) Fuel pump and fuel pump relay 5) Engine coolant temperature sensor (*2) 6) Crankshaft position sensor (*3) 7) Camshaft position sensor (*3) 8) A/C switch and A/C cut relay 9) Engine torque control signal circuit 10) Ignition parts (*1)
5. Engine stalls or engine sags or hesitates at acceleration.	1) Mass air flow sensor 2) Engine coolant temperature sensor (*2) 3) Crankshaft position sensor (*3) 4) Camshaft position sensor (*3) 5) Purge control solenoid valve 6) EGR valve 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Fuel pump and fuel pump relay
6. Surge	1) Mass air flow sensor 2) Engine coolant temperature sensor (*2) 3) Crankshaft position sensor (*3) 4) Camshaft position sensor (*3) 5) EGR valve 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Fuel pump and fuel pump relay

Symptom	Problem parts
7. Spark knock	1) Mass air flow sensor 2) Engine coolant temperature sensor 3) Knock sensor 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Mass air flow sensor 2) Engine coolant temperature sensor (*2) 3) Fuel injection parts (*4) 4) Fuel pump and fuel pump relay

*1: Check ignitor, ignition coil and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check fuel injector, fuel pressure regulator and fuel filter.
*5: Inspect air leak in air intake system.
*6: Adjust accelerator cable.

B: GENERAL DIAGNOSTICS TABLE WITH NON-CONFORMITY SYMPTOM FOR AUTOMATIC TRANSMISSION

NOTE:
Check general diagnostics table with non-conformity symptom for automatic transmission. <Ref. to 3-2 [T1000].>

10. Diagnostic Chart with Trouble Code for LHD Vehicles

A: DIAGNOSTIC TROUBLE CODE (DTC) LIST

DTC No.	Item	Index
P0101	Mass air flow sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T10B0].>
P0102	Mass air flow sensor circuit low input	<Ref. to 2-7 [T10C0].>
P0103	Mass air flow sensor circuit high input	<Ref. to 2-7 [T10D0].>
P0106	Pressure sensor circuit range/performance problem	<Ref. to 2-7 [T10E0].>
P0107	Pressure sensor circuit low input	<Ref. to 2-7 [T10F0].>
P0108	Pressure sensor circuit high input	<Ref. to 2-7 [T10G0].>
P0117	Engine coolant temperature sensor circuit low input	<Ref. to 2-7 [T10H0].>
P0118	Engine coolant temperature sensor circuit high input	<Ref. to 2-7 [T10I0].>
P0121	Throttle position sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T10J0].>
P0122	Throttle position sensor circuit low input	<Ref. to 2-7 [T10K0].>
P0123	Throttle position sensor circuit high input	<Ref. to 2-7 [T10L0].>
P0125	Insufficient coolant temperature for closed loop fuel control	<Ref. to 2-7 [T10M0].>
P0130	Front oxygen sensor circuit malfunction	<Ref. to 2-7 [T10N0].>
P0133	Front oxygen sensor circuit slow response	<Ref. to 2-7 [T10O0].>
P0135	Front oxygen sensor heater circuit malfunction	<Ref. to 2-7 [T10P0].>
P0136	Rear oxygen sensor circuit malfunction	<Ref. to 2-7 [T10Q0].>
P0139	Rear oxygen sensor circuit slow response	<Ref. to 2-7 [T10R0].>
P0141	Rear oxygen sensor heater circuit malfunction	<Ref. to 2-7 [T10S0].>
P0170	Fuel trim malfunction	<Ref. to 2-7 [T10T0].>
P0181	Fuel temperature sensor A circuit range/performance problem	<Ref. to 2-7 [T10U0].>
P0182	Fuel temperature sensor A circuit low input	<Ref. to 2-7 [T10V0].>
P0183	Fuel temperature sensor A circuit high input	<Ref. to 2-7 [T10W0].>
P0261	Fuel injector circuit low input - #1	<Ref. to 2-7 [T10X0].>
P0262	Fuel injector circuit high input - #1	<Ref. to 2-7 [T10AB0].>
P0264	Fuel injector circuit low input - #2	<Ref. to 2-7 [T10Y0].>

DTC No.	Item	Index
P0265	Fuel injector circuit high input - #2	<Ref. to 2-7 [T10AC0].>
P0267	Fuel injector circuit low input - #3	<Ref. to 2-7 [T10Z0].>
P0268	Fuel injector circuit high input - #3	<Ref. to 2-7 [T10AD0].>
P0270	Fuel injector circuit low input - #4	<Ref. to 2-7 [T10AA0].>
P0271	Fuel injector circuit high input - #4	<Ref. to 2-7 [T10AE0].>
P0301	Cylinder 1 misfire detected	<Ref. to 2-7 [T10AF0].>
P0302	Cylinder 2 misfire detected	<Ref. to 2-7 [T10AG0].>
P0303	Cylinder 3 misfire detected	<Ref. to 2-7 [T10AH0].>
P0304	Cylinder 4 misfire detected	<Ref. to 2-7 [T10AI0].>
P0325	Knock sensor circuit malfunction	<Ref. to 2-7 [T10AJ0].>
P0335	Crankshaft position sensor circuit malfunction	<Ref. to 2-7 [T10AK0].>
P0336	Crankshaft position sensor circuit range/performance problem	<Ref. to 2-7 [T10AL0].>
P0340	Camshaft position sensor circuit malfunction	<Ref. to 2-7 [T10AM0].>
P0341	Camshaft position sensor circuit range/performance problem	<Ref. to 2-7 [T10AN0].>
P0400	Exhaust gas recirculation flow malfunction	<Ref. to 2-7 [T10AO0].>
P0403	Exhaust gas recirculation circuit low input	<Ref. to 2-7 [T10AP0].>
P0420	Catalyst system efficiency below threshold	<Ref. to 2-7 [T10AQ0].>
P0440	Evaporative emission control system malfunction	<Ref. to 2-7 [T10AR0].>
P0441	Evaporative emission control system incorrect purge flow	<Ref. to 2-7 [T10AS0].>
P0443	Evaporative emission control system purge control valve circuit low input	<Ref. to 2-7 [T10AT0].>
P0446	Evaporative emission control system vent control low input [2200 cc AWD except Taiwan spec. vehicles]	<Ref. to 2-7 [T10AU0].>
P0446	Evaporative emission control system vent control low input [2500 cc models]	<Ref. to 2-7 [T10AV0].>
P0451	Evaporative emission control system pressure sensor range/performance problem	<Ref. to 2-7 [T10AW0].>
P0452	Evaporative emission control system pressure sensor low input	<Ref. to 2-7 [T10AX0].>
P0453	Evaporative emission control system pressure sensor high input	<Ref. to 2-7 [T10AY0].>
P0461	Fuel level sensor circuit range/performance problem	<Ref. to 2-7 [T10AZ0].>
P0462	Fuel level sensor circuit low input	<Ref. to 2-7 [T10BA0].>

DTC No.	Item	Index
P0463	Fuel level sensor circuit high input	<Ref. to 2-7 [T10BB0].>
P0480	Cooling fan relay 1 circuit low input	<Ref. to 2-7 [T10BC0].>
P0483	Cooling fan function problem	<Ref. to 2-7 [T10BD0].>
P0500	Vehicle speed sensor malfunction	<Ref. to 2-7 [T10BE0].>
P0505	Idle control system malfunction	<Ref. to 2-7 [T10BF0].>
P0506	Idle control system RPM lower than expected	<Ref. to 2-7 [T10BG0].>
P0507	Idle control system RPM higher than expected	<Ref. to 2-7 [T10BH0].>
P0600	Serial communication link malfunction	<Ref. to 2-7 [T10BI0].>
P0601	Internal control module memory check sum error	<Ref. to 2-7 [T10BJ0].>
P0703	Brake switch input malfunction	<Ref. to 2-7 [T10BK0].>
P0705	Transmission range sensor circuit malfunction	<Ref. to 2-7 [T10BL0].>
P0710	Transmission fluid temperature sensor circuit malfunction	<Ref. to 2-7 [T10BM0].>
P0720	Output speed sensor (vehicle speed sensor 1) circuit malfunction	<Ref. to 2-7 [T10BN0].>
P0725	Engine speed input circuit malfunction	<Ref. to 2-7 [T10BO0].>
P0731	Gear 1 incorrect ratio	<Ref. to 2-7 [T10BP0].>
P0732	Gear 2 incorrect ratio	<Ref. to 2-7 [T10BQ0].>
P0733	Gear 3 incorrect ratio	<Ref. to 2-7 [T10BR0].>
P0734	Gear 4 incorrect ratio	<Ref. to 2-7 [T10BS0].>
P0740	Torque converter clutch system malfunction	<Ref. to 2-7 [T10BT0].>
P0743	Torque converter clutch system electrical	<Ref. to 2-7 [T10BU0].>
P0748	Pressure control solenoid electrical	<Ref. to 2-7 [T10BV0].>
P0753	Shift solenoid A electrical	<Ref. to 2-7 [T10BW0].>
P0758	Shift solenoid B electrical	<Ref. to 2-7 [T10BX0].>
P0760	Shift solenoid C malfunction	<Ref. to 2-7 [T10BY0].>
P0763	Shift solenoid C electrical	<Ref. to 2-7 [T10BZ0].>
P1100	Starter switch circuit low input	<Ref. to 2-7 [T10CA0].>
P1101	Neutral position switch circuit malfunction [MT vehicles]	<Ref. to 2-7 [T10CB0].>

DTC No.	Item	Index
P1101	Neutral position switch circuit high input [AT vehicles]	<Ref. to 2-7 [T10CC0].>
P1102	Pressure sources switching solenoid valve circuit low input	<Ref. to 2-7 [T10CD0].>
P1103	Engine torque control signal circuit malfunction	<Ref. to 2-7 [T10CE0].>
P1104	TCS signal circuit low input	<Ref. to 2-7 [T10CF0].>
P1120	Starter switch circuit high input	<Ref. to 2-7 [T10CG0].>
P1121	Neutral position switch circuit low input [AT vehicles]	<Ref. to 2-7 [T10CH0].>
P1122	Pressure sources switching solenoid valve circuit high input	<Ref. to 2-7 [T10CI0].>
P1124	TCS signal circuit high input	<Ref. to 2-7 [T10CJ0].>
P1141	Mass air flow sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T10CK0].>
P1142	Throttle position sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T10CL0].>
P1143	Pressure sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T10CM0].>
P1144	Pressure sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T10CN0].>
P1400	Fuel tank pressure control solenoid valve circuit low input	<Ref. to 2-7 [T10CO0].>
P1420	Fuel tank pressure control solenoid valve circuit high input	<Ref. to 2-7 [T10CP0].>
P1421	Exhaust gas recirculation circuit high input	<Ref. to 2-7 [T10CQ0].>
P1422	Evaporative emission control system purge control valve circuit high input	<Ref. to 2-7 [T10CR0].>
P1423	Evaporative emission control system vent control high input [2200 cc AWD except Taiwan spec. vehicles]	<Ref. to 2-7 [T10CS0].>
P1423	Evaporative emission control system vent control high input [2500 cc models]	<Ref. to 2-7 [T10CT0].>
P1440	Fuel tank pressure control system function problem (low input)	<Ref. to 2-7 [T10CU0].>
P1441	Fuel tank pressure control system function problem (high input)	<Ref. to 2-7 [T10CV0].>
P1442	Fuel level sensor circuit range/performance problem 2	<Ref. to 2-7 [T10CW0].>
P1443	Evaporative emission control system vent control function problem	<Ref. to 2-7 [T10CX0].>
P1507	Idle control system malfunction (fail-safe)	<Ref. to 2-7 [T10CY0].>
P1520	Cooling fan relay 1 circuit high input	<Ref. to 2-7 [T10CZ0].>
P1540	Vehicle speed sensor malfunction 2	<Ref. to 2-7 [T10DA0].>
P1700	Throttle position sensor circuit malfunction for automatic transmission	<Ref. to 2-7 [T10DB0].>
P1701	Cruise control set signal circuit malfunction for automatic transmission	<Ref. to 2-7 [T10DC0].>

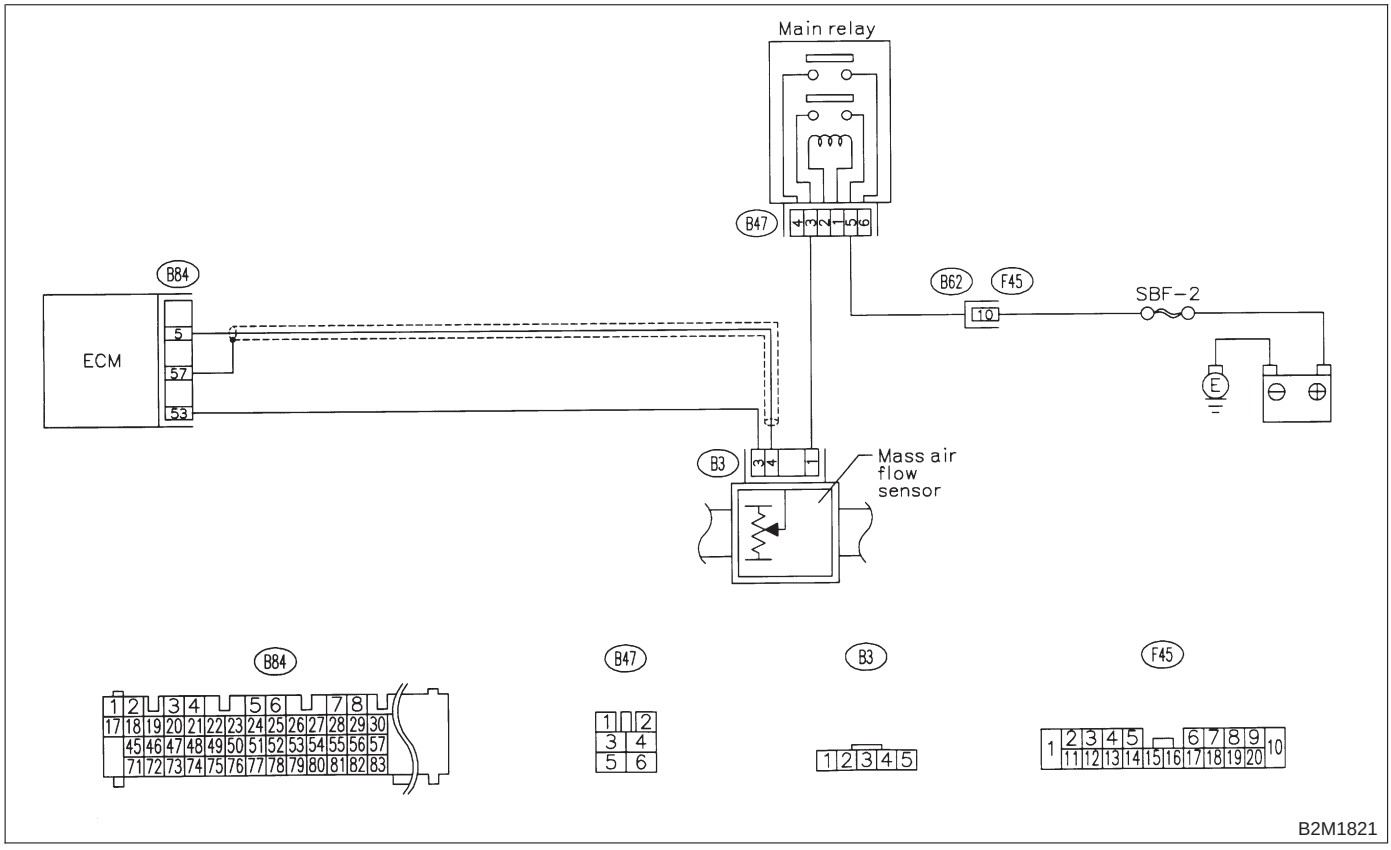
DTC No.	Item	Index
P1702	Automatic transmission diagnosis input signal circuit low input	<Ref. to 2-7 [T10DD0].>
P1722	Automatic transmission diagnosis input signal circuit high input	<Ref. to 2-7 [T10DE0].>
P1742	Automatic transmission diagnosis input signal circuit malfunction	<Ref. to 2-7 [T10DF0].>

B: DTC P0101 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10B1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0102 or P0103?***

YES : Inspect DTC P0102 or P0103 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0101.

NO : Replace mass air flow sensor.

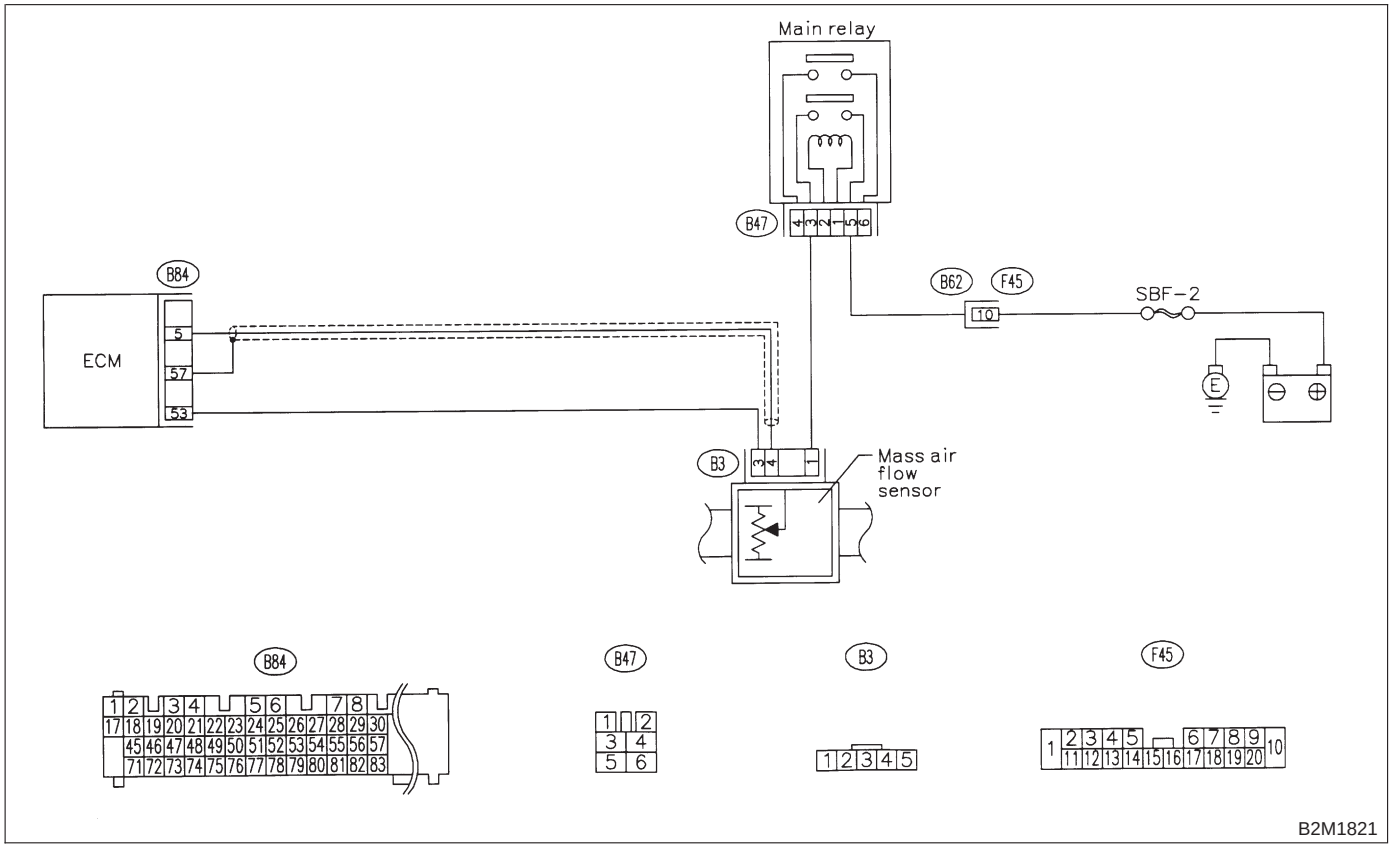
C: DTC P0102 — MASS AIR FLOW SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

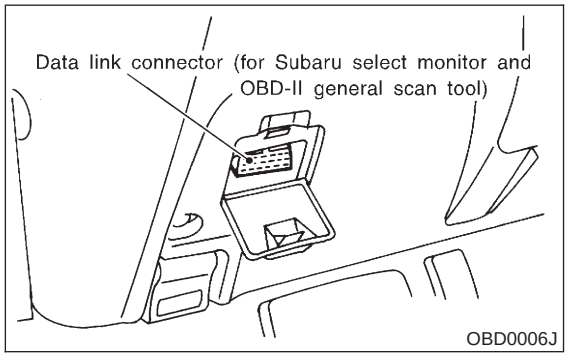
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10C1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of mass air flow sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value equal to or more than 1.3 g/sec (0.172 lb/min) or 0.3 V and equal to or less than 250 g/sec (33 lb/min) or 5.0 V?***

YES : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the mass air flow sensor.

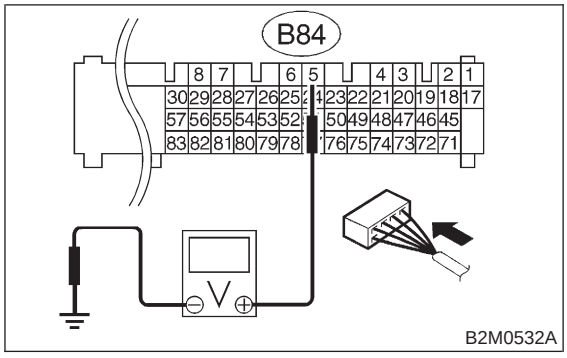
NOTE:
In this case, repair the following:
● Open or ground short circuit in harness between mass air flow sensor and ECM connector
● Poor contact in mass air flow sensor or ECM connector

NO : Go to step **10C2**.

10C2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground while engine is idling.

Connector & terminal
(B84) No. 5 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.3 V?***
YES : Go to step **10C4**.
NO : Go to step **10C3**.

10C3 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Measure voltage between ECM connector and chassis ground while engine is idling.

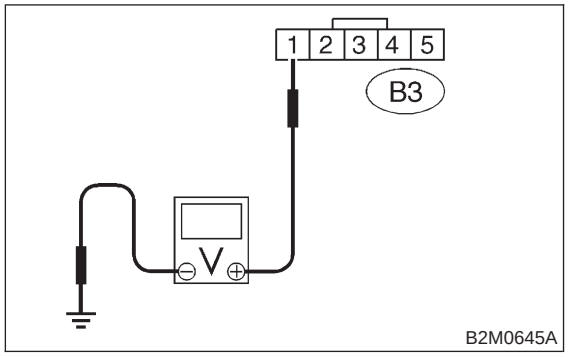
CHECK : ***Does the voltage change more than 0.3 V by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10C4 : CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from mass air flow sensor.
3) Turn ignition switch to ON.
4) Measure voltage between mass air flow sensor connector and engine ground.

Connector & terminal
(B3) No. 1 (+) — Engine ground (−):

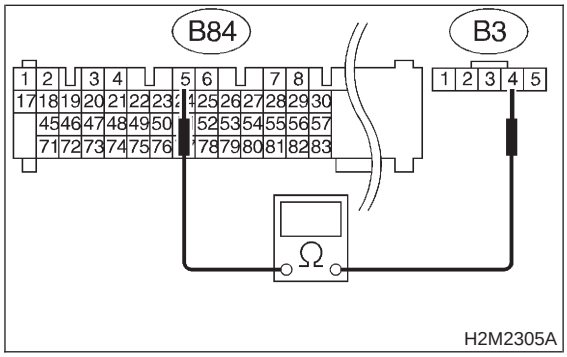


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10C5**.
NO : Repair open circuit in harness between main relay and mass air flow sensor connector.

10C5 : CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and mass air flow sensor connector.

Connector & terminal
(B84) No. 5 — (B3) No. 4:



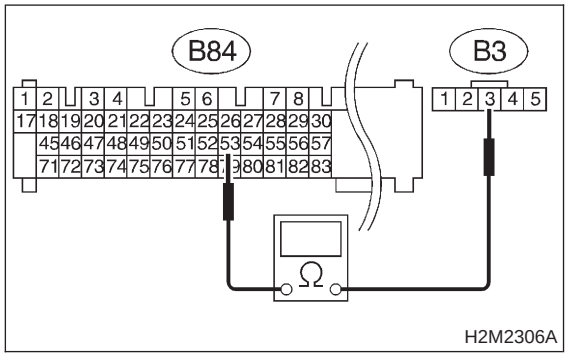
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10C6**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and mass air flow sensor connector
- Poor contact in mass air flow sensor connector
- Poor contact in ECM connector

10C6 : CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.

Measure resistance of harness between ECM and mass air flow sensor connector.

Connector & terminal
(B84) No. 53 — (B3) No. 3:



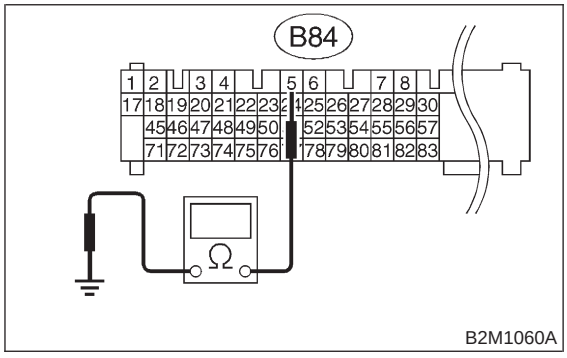
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10C7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and mass air flow sensor connector
- Poor contact in mass air flow sensor connector
- Poor contact in ECM connector

10C7 : CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.

Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B84) No. 5 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Replace mass air flow sensor.
NO : Repair ground short circuit in harness between ECM and mass air flow sensor connector.

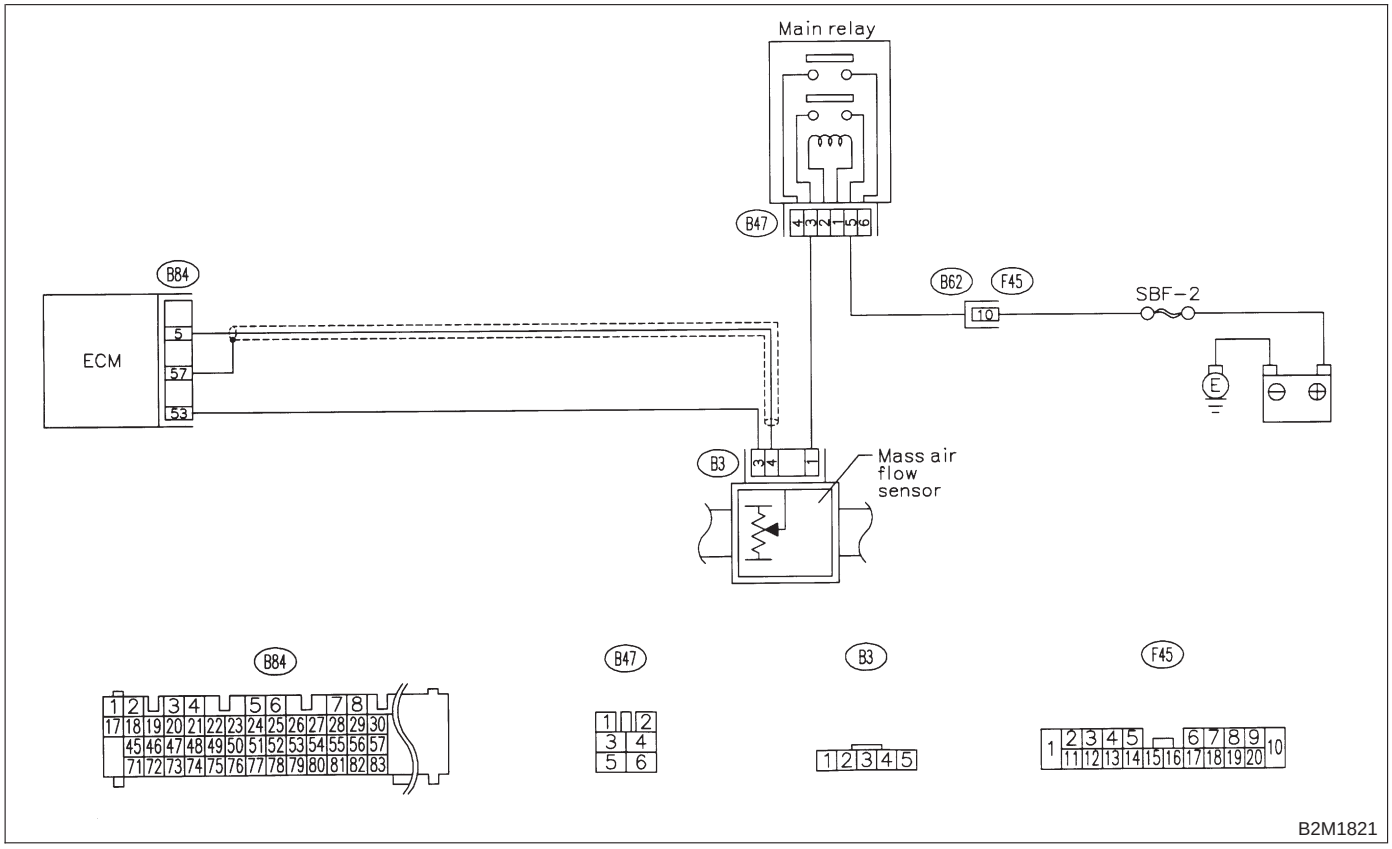
D: DTC P0103 — MASS AIR FLOW SENSOR CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

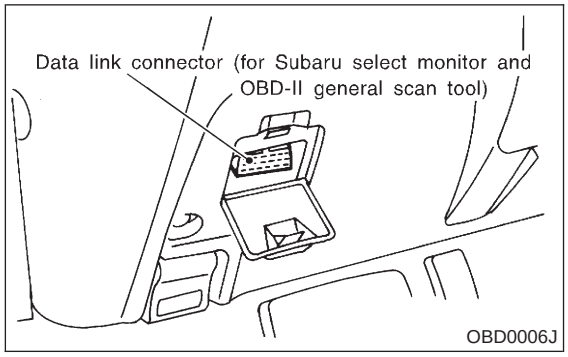
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10D1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of mass air flow sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value equal to or more than 1.3 g/sec (0.172 lb/min) or 0.3 V and equal to or less than 250 g/sec (33 lb/min) or 5.0 V?***

YES : Even if MIL lights up, the circuit has returned to a normal condition at this time.

NO : Go to step **10D2**.

10D2 : CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.

1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
2) Disconnect connector from mass air flow sensor.
3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
4) Read data of mass air flow sensor signal using Subaru select monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 250 g/sec (33 lb/min) or 5 V in function mode F06?***

YES : Repair battery short circuit in harness between mass air flow sensor and ECM connector. After repair, replace ECM.

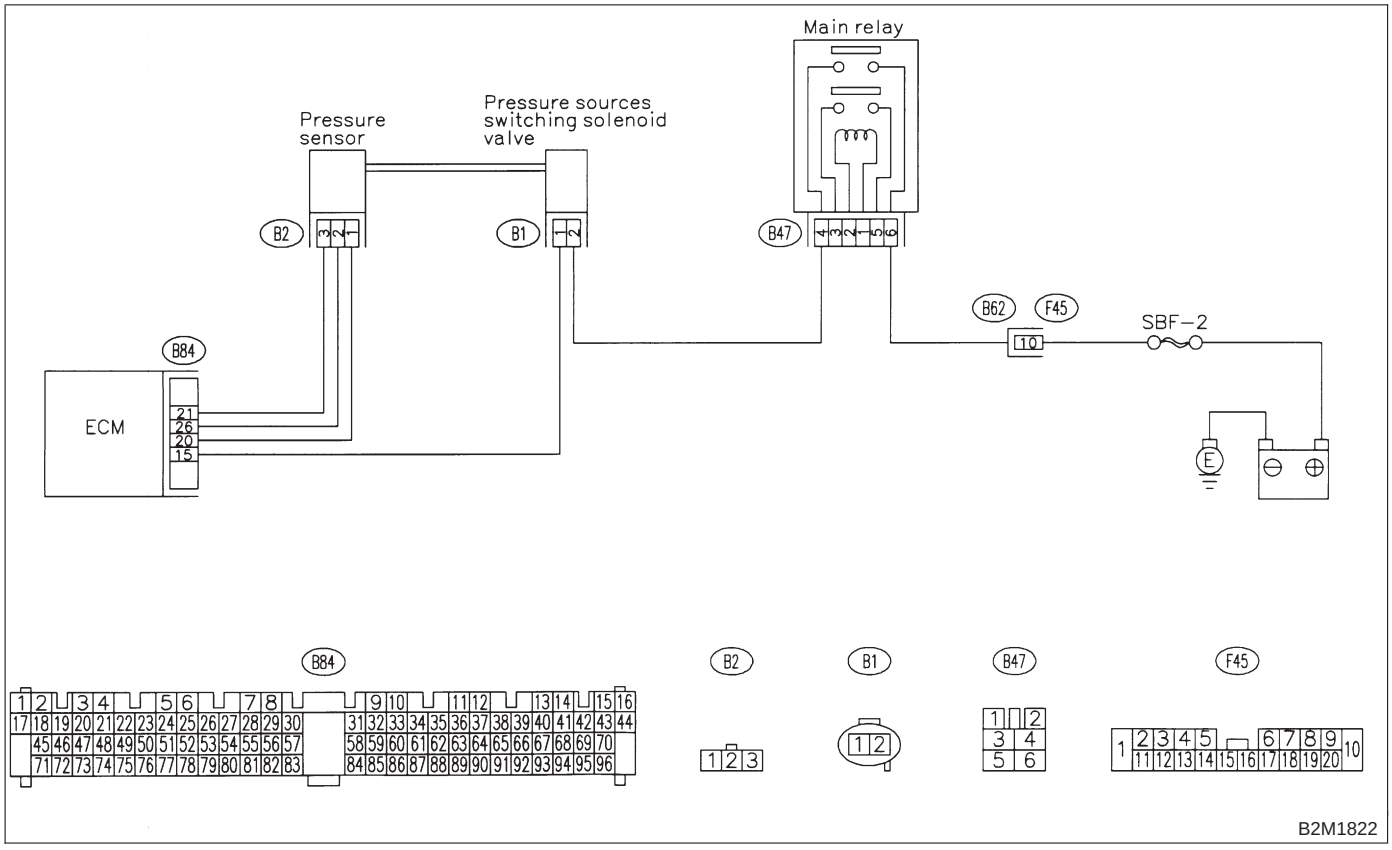
NO : Replace mass air flow sensor.

E: DTC P0106 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10E1 :	CHECK ANY OTHER DTC ON DISPLAY.

NOTE:
In this case, it is not necessary to inspect DTC P0106.

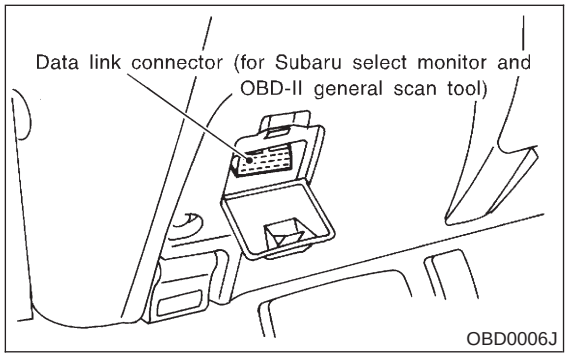
CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0107, P0108, P1102 OR P1122?***

YES : Inspect DTC P0107, P0108, P1102 OR P1122 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NO : Go to step **10E2**.

10E2 : CHECK DATA FOR CONTROL.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch ON and Subaru Select Monitor or the OBD-II general scan tool switch ON.
4) Start engine.
5) Read data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 85 kPa (638 mmHg, 25.12 inHg)?***
YES : Go to step **10E5**.
NO : Go to step **10E3**.

10E3 : CHECK DATA FOR CONTROL.

Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

CHECK : ***Is the value less than 32 kPa (240 mmHg, 9.45 inHg)?***
YES : Go to step **10E6**.
NO : Go to step **10E4**.

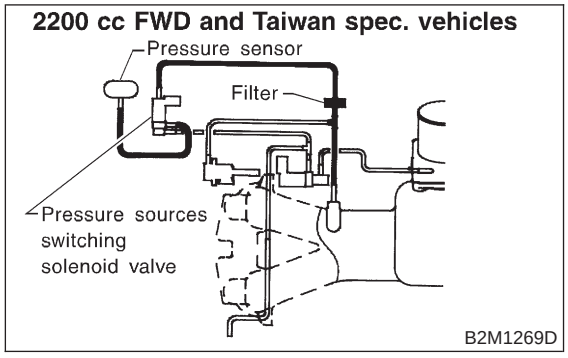
10E4 : CHECK DATA FOR CONTROL.

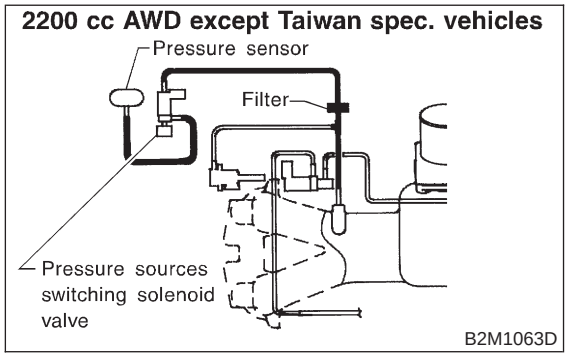
Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

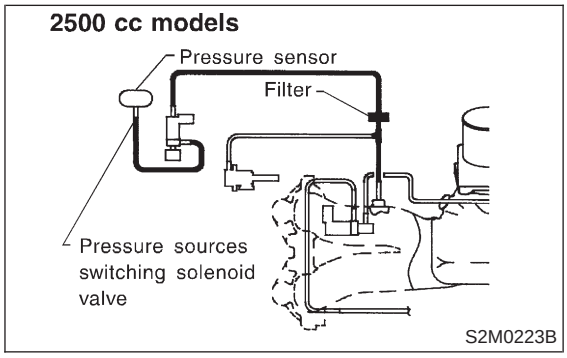
CHECK : ***Is the value more than 133 kPa (998 mmHg, 39.29 inHg)?***
YES : Replace pressure sensor.
NO : Repair poor contact in pressure sensor connector, pressure sources switching solenoid valve connector, and ECM connector.

10E5 : CHECK VACUUM HOSES.

Check the following items.
- Disconnection of the vacuum hose from pressure sources switching solenoid valve to intake manifold
- Holes in the vacuum hose between pressure sources switching solenoid valve to intake manifold
- Clogging of the vacuum hose between pressure sources switching solenoid valve to intake manifold
- Disconnection of the vacuum hose from pressure sensor to pressure sources switching solenoid valve
- Holes in the vacuum hose between pressure sensor and pressure sources switching solenoid valve
- Clogging of the vacuum hose between pressure sensor and pressure sources switching solenoid valve
- Clogging of the filter



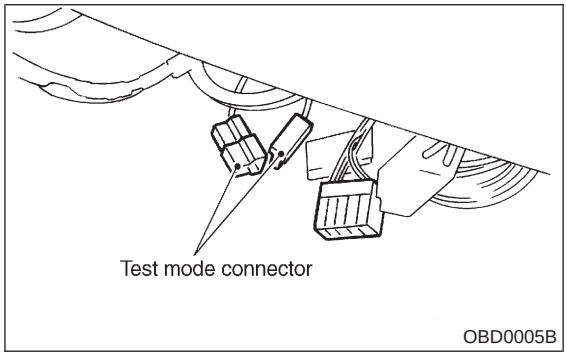




CHECK : ***Is there a fault in vacuum hose?***
YES : Repair or replace hoses or filter.
NO : Go to step **10E6**.

10E6 : CHECK PRESSURE SOURCES SWITCHING SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Connect test mode connector.



3) Turn ignition switch to ON.

NOTE:
Pressure sources switching solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to the “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>

CHECK : ***Does pressure sources switching solenoid valve produce operating sound? (ON ⇔ OFF each 1.5 sec.)***
YES : Replace pressure sensor.
NO : Replace pressure sources switching solenoid valve.

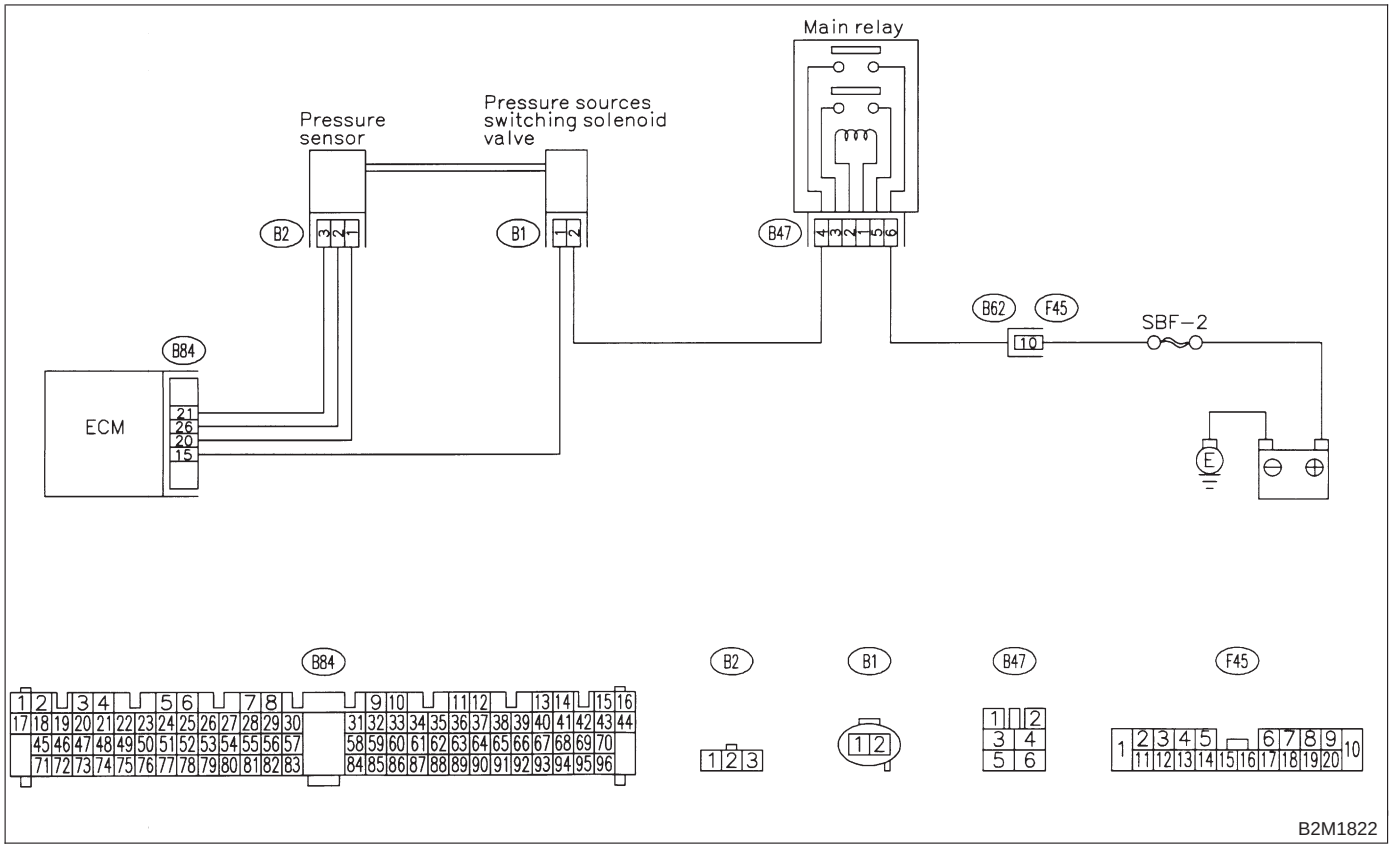
MEMO:

F: DTC P0107 — PRESSURE SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

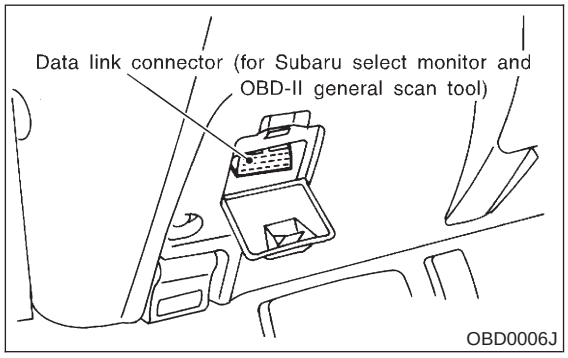
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10F1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
4) Start engine.
5) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

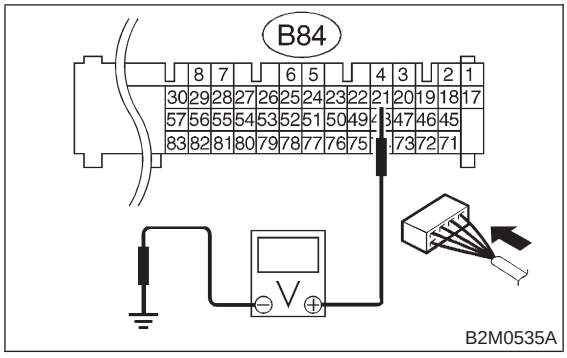
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value less than 0 kPa (0 mmHg, 0 inHg)?***
YES : Go to step **10F2**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time

10F2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):

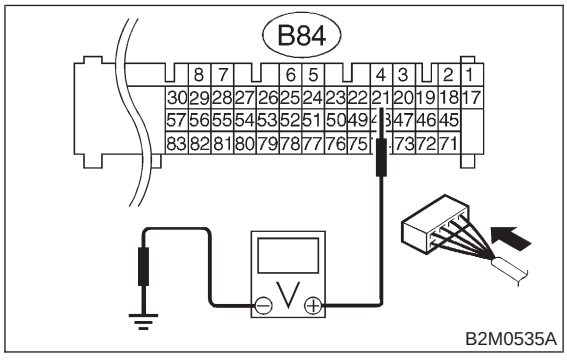


CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10F4**.
NO : Go to step **10F3**.

10F3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):



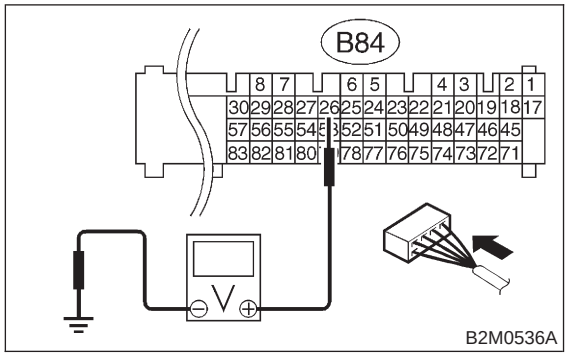
CHECK : ***Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10F4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 26 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.2 V?***
YES : Go to step **10F6**.
NO : Go to step **10F5**.

10F5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of atmospheric absolute pressure signal using Subaru Select Monitor.

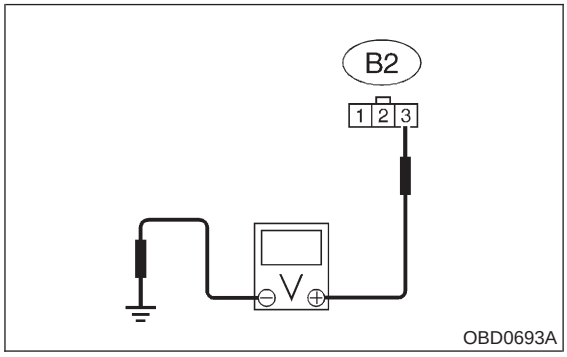
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

CHECK : ***Does the value change more than 0 kPa (0 mmHg, 0 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10F6**.

10F6 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from pressure sensor.
3) Turn ignition switch to ON.
4) Measure voltage between pressure sensor connector and engine ground.

Connector & terminal
(B2) No. 3 (+) — Engine ground (−):

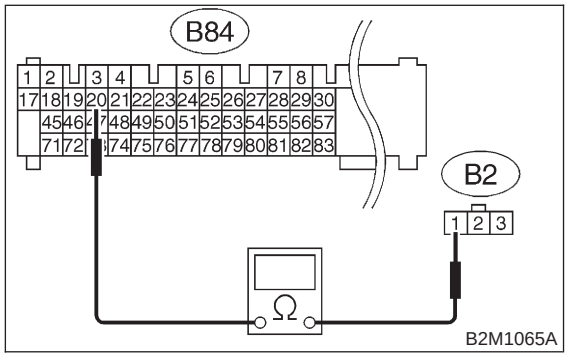


CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10F7**.
NO : Repair open circuit in harness between ECM and pressure sensor connector.

10F7 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and pressure sensor connector.

Connector & terminal
(B84) No. 20 — (B2) No. 1:

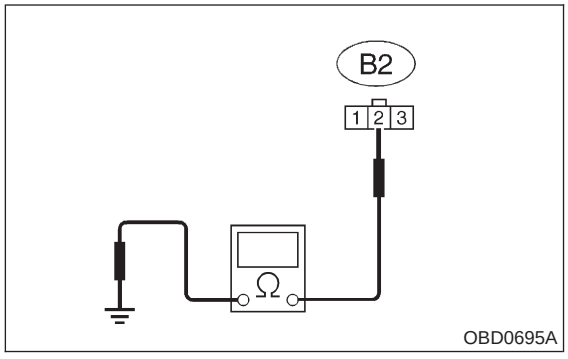


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10F8**.
NO : Repair open circuit in harness between ECM and pressure sensor connector.

10F8 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

Measure resistance of harness between pressure sensor connector and engine ground.

Connector & terminal
(B2) No. 2 — Engine ground:



CHECK : ***Is the resistance more than 500 kΩ?***
YES : Go to step **10F9**.
NO : Repair ground short circuit in harness between ECM and pressure sensor connector.

10F9 : CHECK POOR CONTACT.

Check poor contact in pressure sensor connector. <Ref. to FOREWORD [T3C1].>

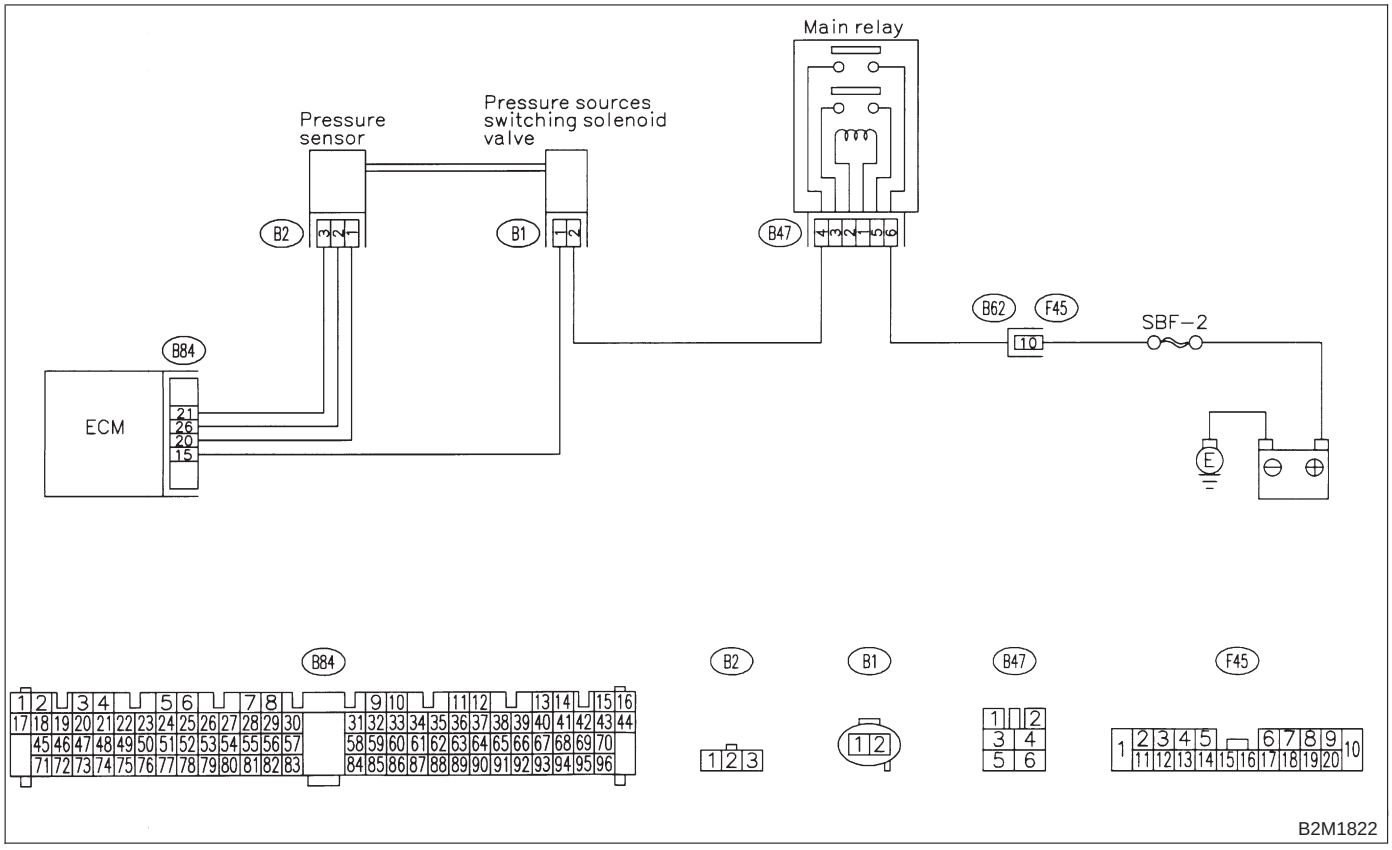
CHECK : ***Is there poor contact in pressure sensor connector?***
YES : Repair poor contact in pressure sensor connector.
NO : Replace pressure sensor.

G: DTC P0108 — PRESSURE SENSOR CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

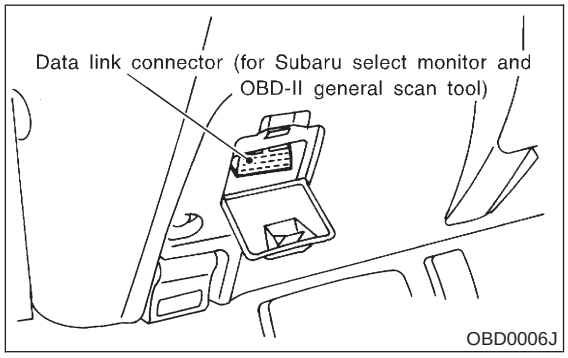
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10G1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
4) Start engine.
5) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

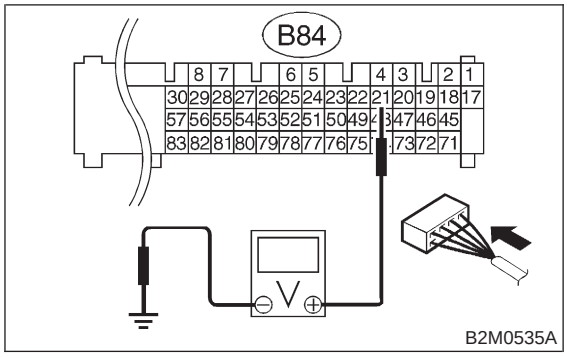
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 140 kPa (1,050 mmHg, 41.34 inHg)?***
YES : Go to step **10G10**.
NO : Go to step **10G2**.

10G2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):

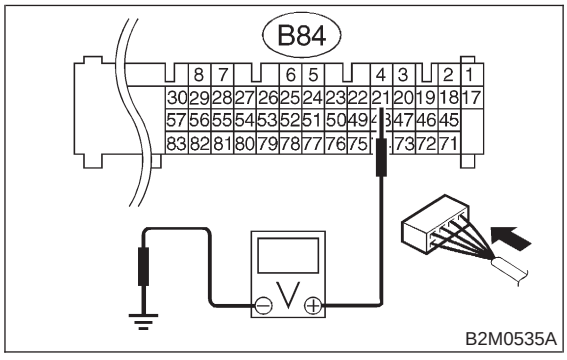


CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10G4**.
NO : Go to step **10G3**.

10G3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):



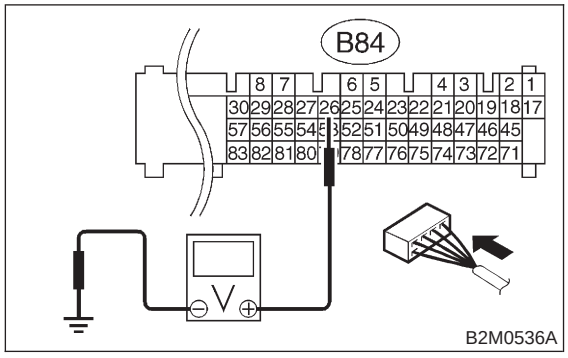
CHECK : ***Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10G4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 26 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.2 V?***
YES : Go to step **10G6**.
NO : Go to step **10G5**.

10G5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of atmospheric absolute pressure signal using Subaru Select Monitor.

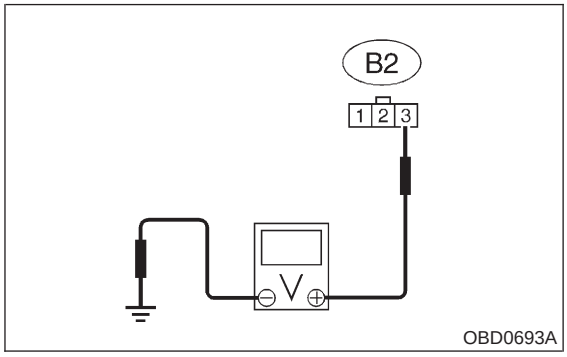
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

CHECK : ***Does the value change more than 0 kPa (0 mmHg, 0 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10G6**.

10G6 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from pressure sensor.
3) Turn ignition switch to ON.
4) Measure voltage between pressure sensor connector and engine ground.

Connector & terminal
(B2) No. 3 (+) — Engine ground (−):

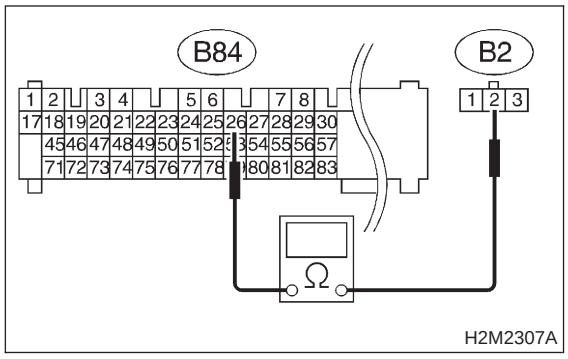


CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10G7**.
NO : Repair open circuit in harness between ECM and pressure sensor connector.

10G7 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and pressure sensor connector.

Connector & terminal
(B84) No. 26 — (B2) No. 2:

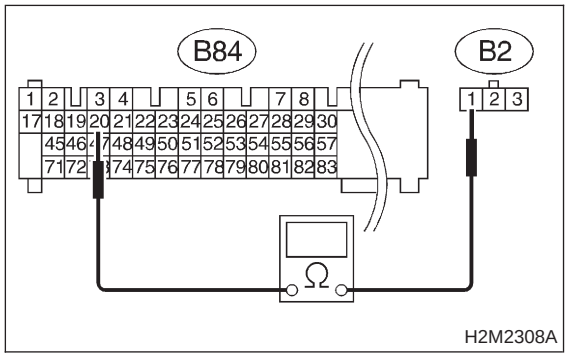


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10G8**.
NO : Repair open circuit in harness between ECM and pressure sensor connector.

10G8 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

Measure resistance of harness between ECM and pressure sensor connector.

Connector & terminal
(B84) No. 20 — (B2) No. 1:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10G9**.
NO : Repair open circuit in harness between ECM and pressure sensor connector.

10G9 : CHECK POOR CONTACT.

Check poor contact in pressure sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in pressure sensor connector?***
YES : Repair poor contact in pressure sensor connector.
NO : Replace pressure sensor.

10G10 : CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
2) Disconnect connector from pressure sensor.
3) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
4) Read data of intake manifold absolute pressure signal using Subaru select monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 140 kPa (1,050 mmHg, 41.34 inHg)?***
YES : Repair battery short circuit in harness between ECM and pressure sensor connector.
NO : Replace pressure sensor.

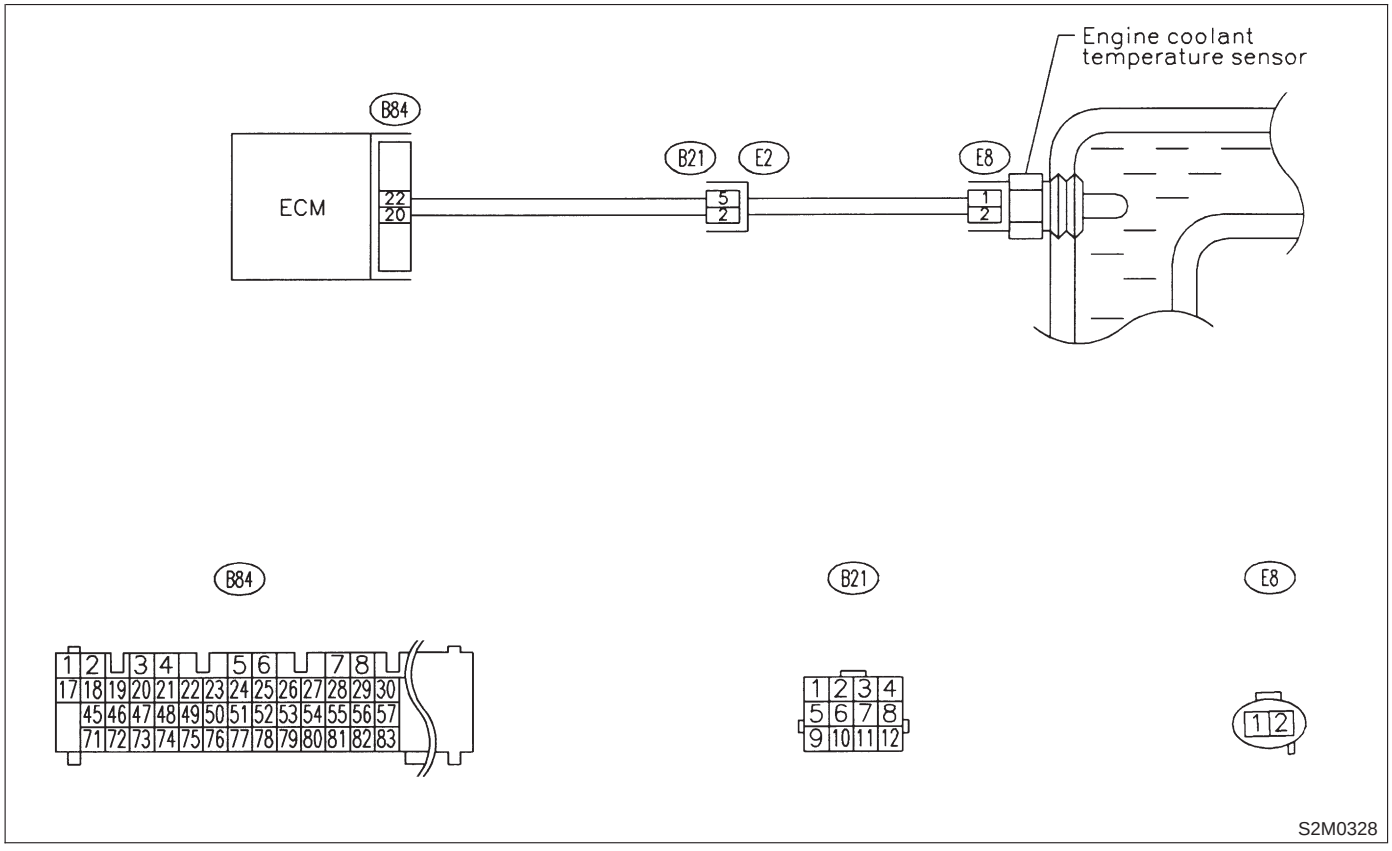
H: DTC P0117 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

- **TROUBLE SYMPTOM:**
  - Hard to start
  - Erroneous idling
  - Poor driving performance

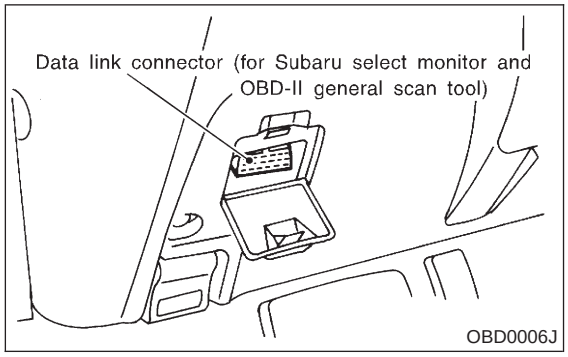
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10H1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

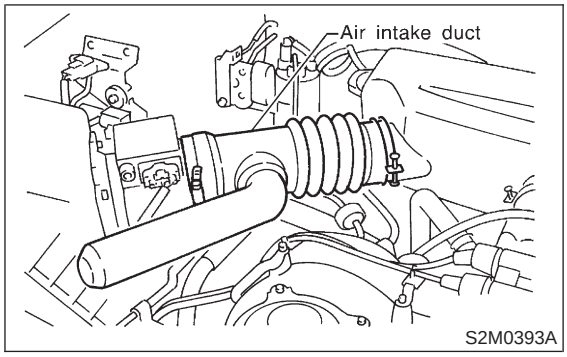
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value greater than 150°C (300°F)?***
YES : Go to step **10H2**.
NO : Repair poor contact.

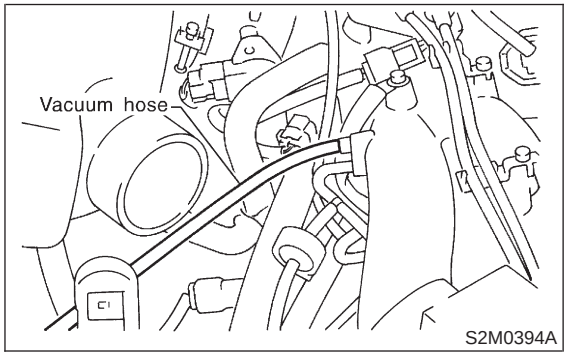
NOTE:
In this case, repair the following:
● Poor contact in engine coolant temperature sensor
● Poor contact in ECM
● Poor contact in coupling connector (B21)

10H2 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

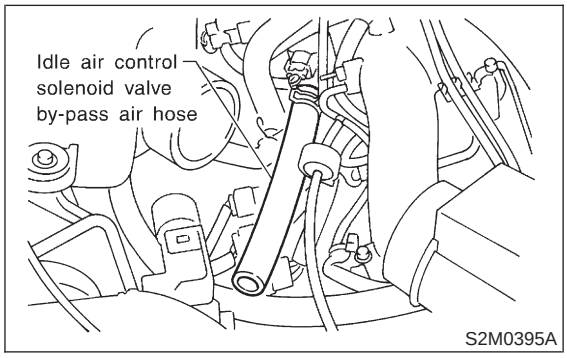
1) Turn ignition switch to OFF.
2) Remove air intake duct.



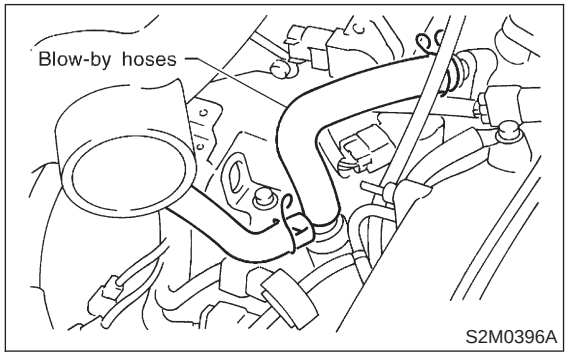
3) Remove vacuum hose from intake manifold.



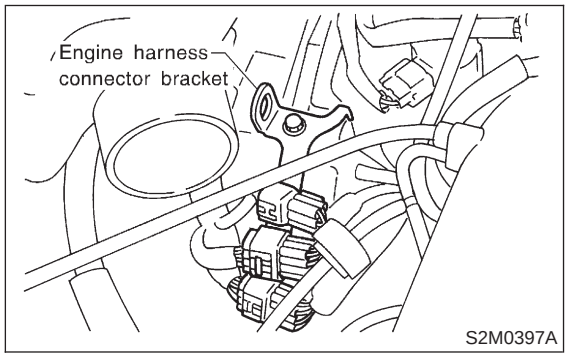
4) Remove idle air control solenoid valve by-pass air hose.



5) Remove blow-by hoses.



6) Remove engine harness connector bracket from cylinder block.



7) Disconnect connector from engine coolant temperature sensor.
8) Turn ignition switch and Subaru Select Monitor or OBD-II general scan tool switch to ON.
9) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value less than −40°C (−40°F)?***
YES : Replace engine coolant temperature sensor.
NO : Repair ground short circuit in harness between engine coolant temperature sensor and ECM connector.

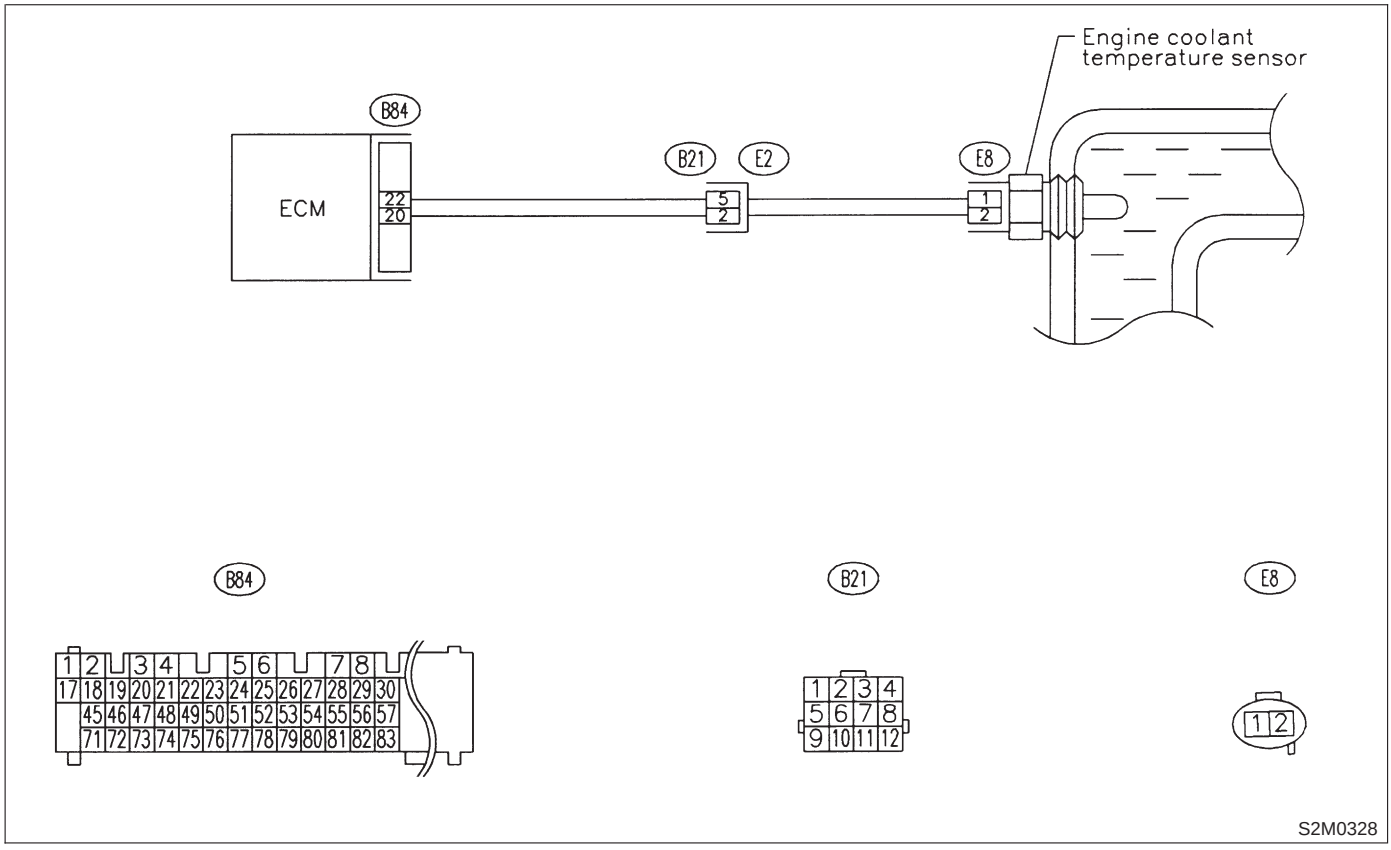
MEMO:

I: DTC P0118 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Hard to start
  - Erroneous idling
  - Poor driving performance

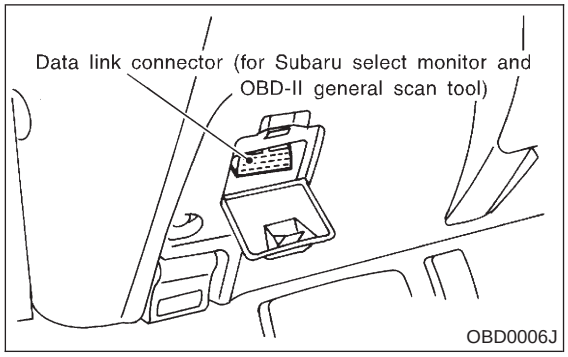
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10I1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

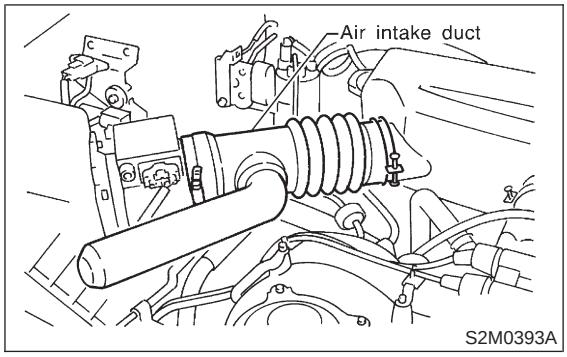
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value less than −40°C (−40°F)?***
YES : Go to step **10I2**.
NO : Repair poor contact.

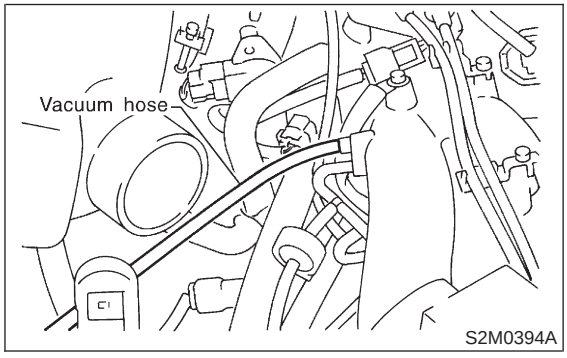
NOTE:
In this case, repair the following:
● Poor contact in engine coolant temperature sensor
● Poor contact in ECM
● Poor contact in coupling connector (B21)

10I2 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

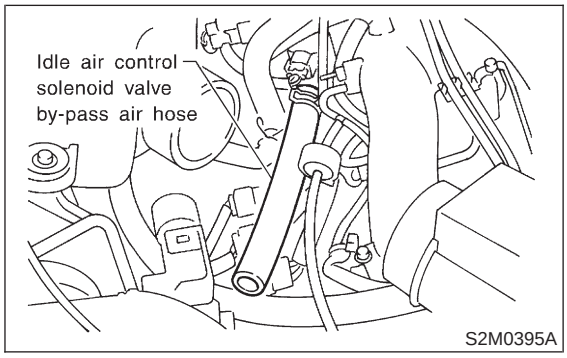
1) Turn ignition switch to OFF.
2) Remove air intake duct.



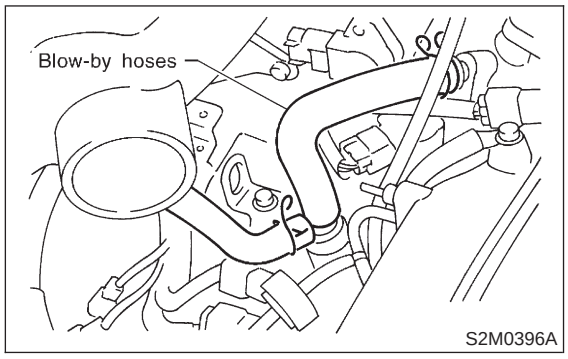
3) Remove vacuum hose from intake manifold.



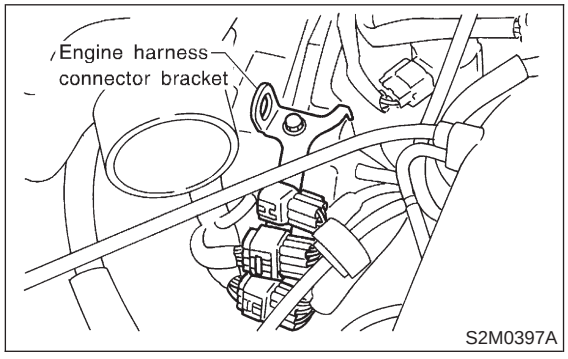
4) Remove idle air control solenoid valve by-pass air hose.



5) Remove blow-by hoses.

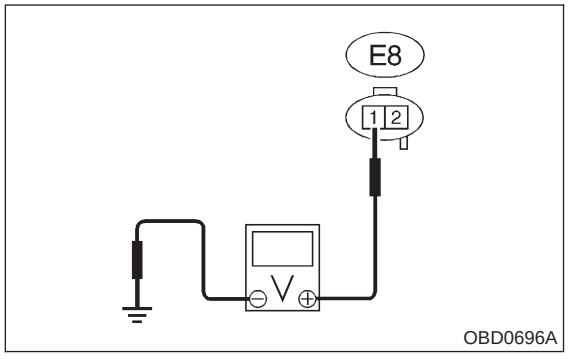


6) Remove engine harness connector bracket from cylinder block.



7) Disconnect connector from engine coolant temperature sensor.
8) Measure voltage between engine coolant temperature sensor connector and engine ground.

Connector & terminal
(E8) No. 1 (+) — Engine ground (−):

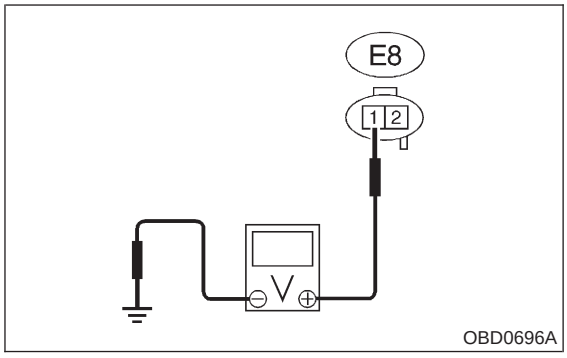


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.
NO : Go to step **10I3**.

10I3 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to ON.
2) Measure voltage between engine coolant temperature sensor connector and engine ground.

Connector & terminal
(E8) No. 1 (+) — Engine ground (−):

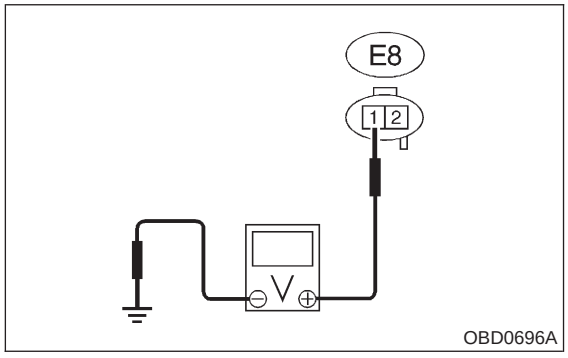


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.
NO : Go to step **10I4**.

10I4 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

Measure voltage between engine coolant temperature sensor connector and engine ground.

Connector & terminal
(E8) No. 1 (+) — Engine ground (−):



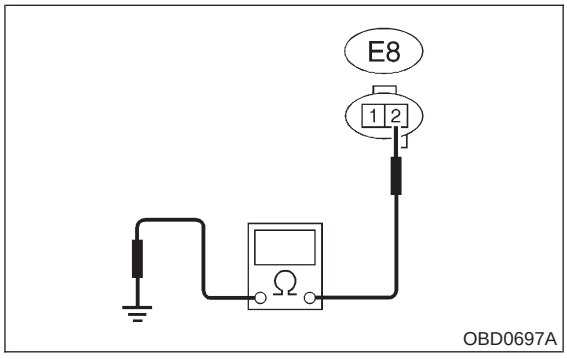
CHECK : ***Is the voltage more than 4 V?***
YES : Go to step **10I5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and engine coolant temperature sensor connector
- Poor contact in engine coolant temperature sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

10I5 : CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Measure resistance of harness between engine coolant temperature sensor connector and engine ground.

Connector & terminal
(E8) No. 2 — Engine ground:



CHECK : ***Is the resistance less than 5 Ω?***
YES : Replace engine coolant temperature sensor.
NO : Repair harness and connector.

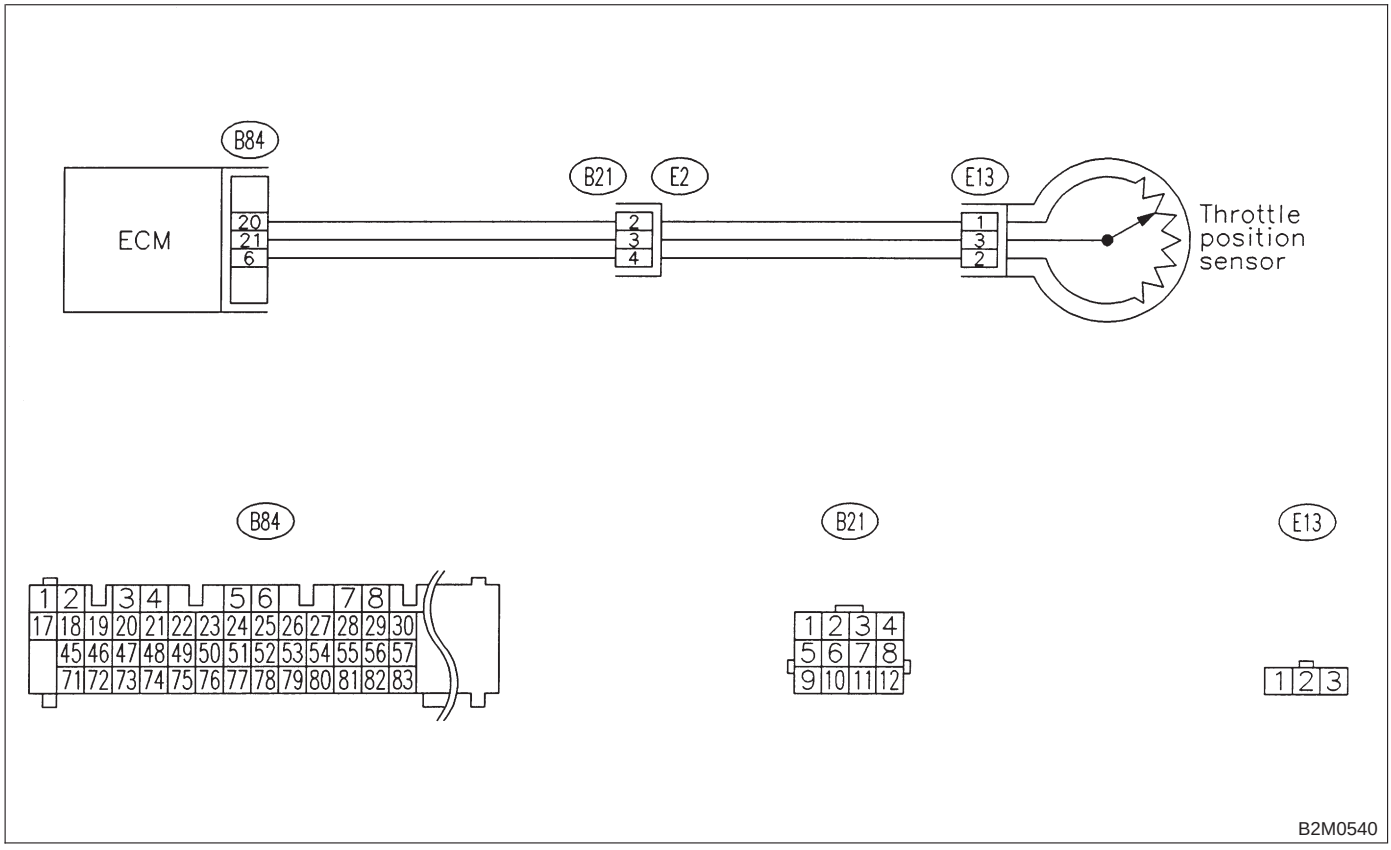
NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and engine coolant temperature sensor connector
- Poor contact in engine coolant temperature sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

J: DTC P0121 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10J1 :	CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0122 or P0123?***

YES : Inspect DTC P0122 or P0123 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0121.

NO : Replace throttle position sensor.

MEMO:

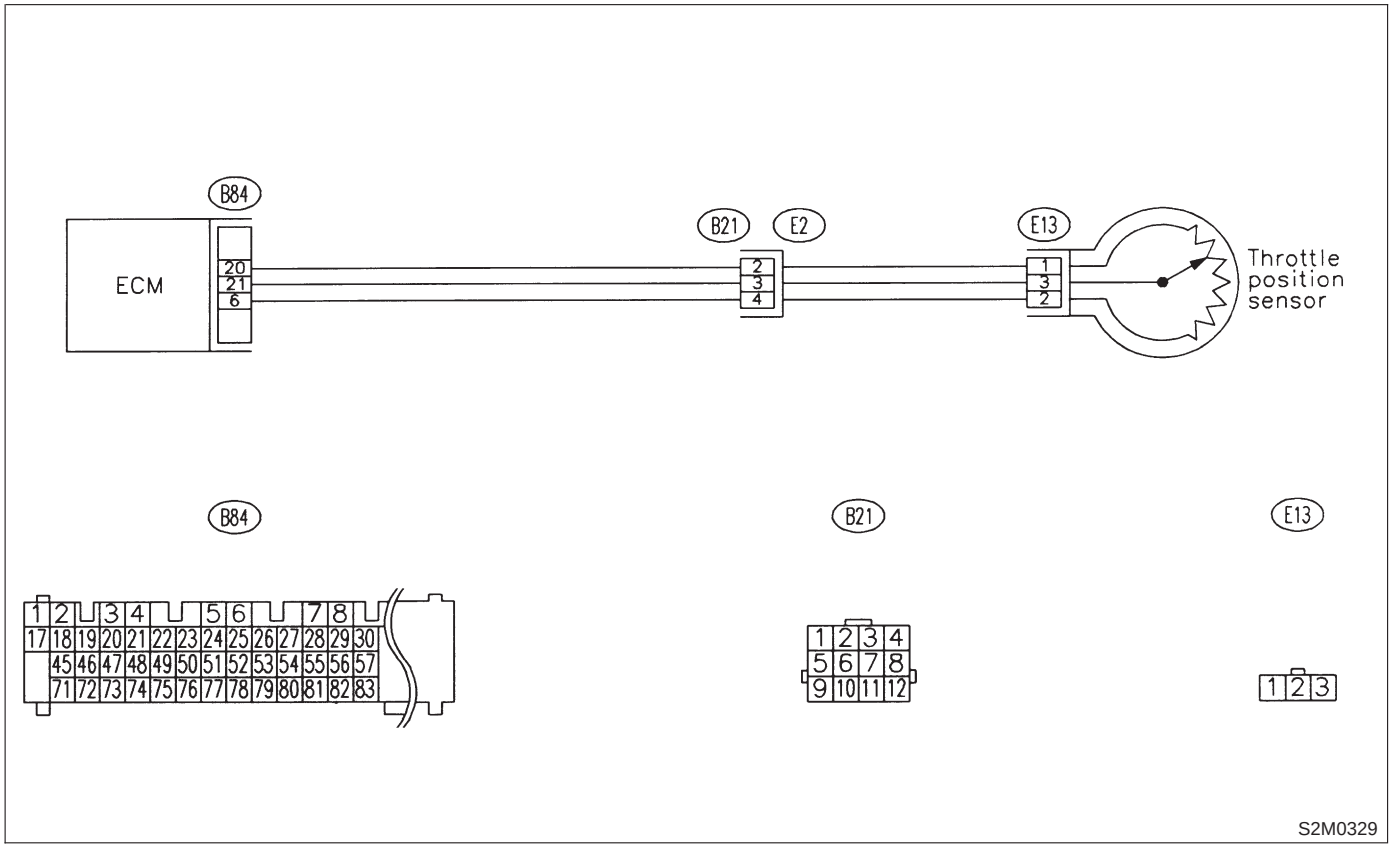
K: DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

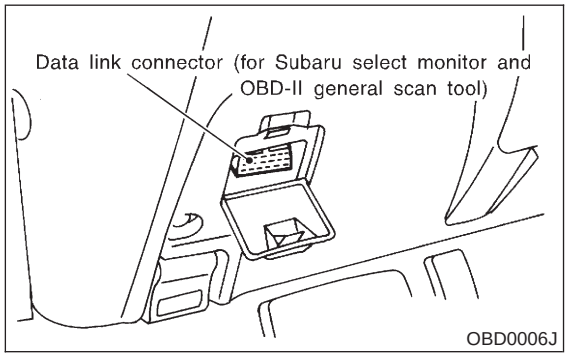
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10K1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

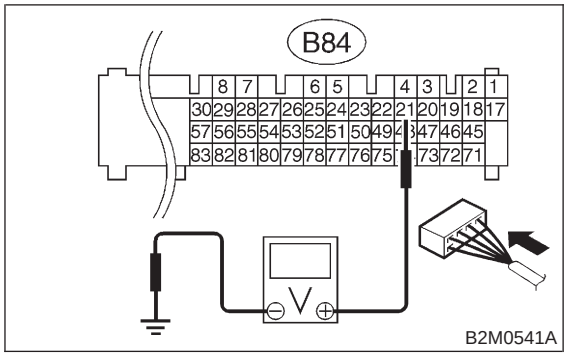
CHECK : ***Is the value less than 0.1 V?***
YES : Go to step **10K2**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:
In this case, repair the following:
● Poor contact in throttle position sensor connector
● Poor contact in ECM connector
● Poor contact in coupling connector (B21)

10K2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground while throttle valve is fully closed.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):

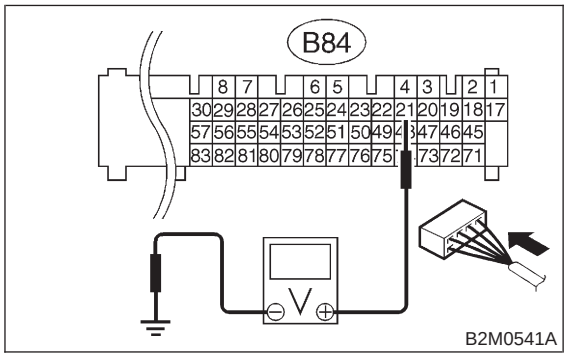


CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10K4**.
NO : Go to step **10K3**.

10K3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):



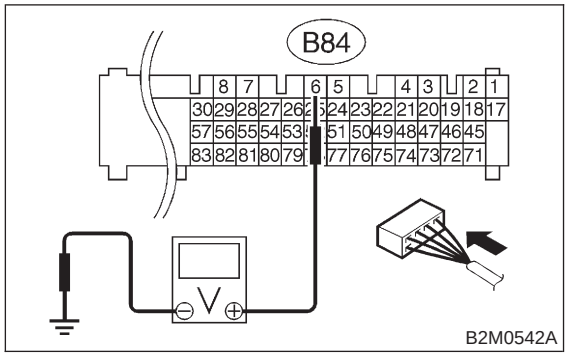
CHECK : ***Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10K4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 6 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.1 V?***
YES : Go to step **10K6**.
NO : Go to step **10K5**.

10K5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

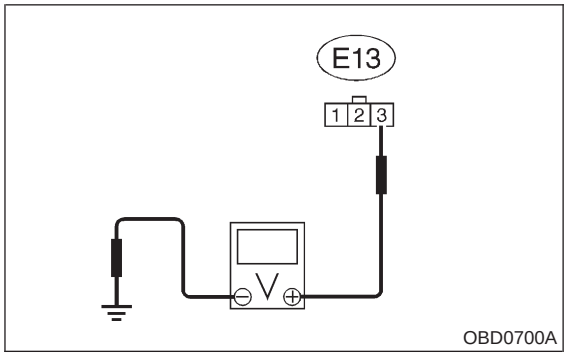
Measure voltage between ECM connector and chassis ground.

CHECK : ***Does the voltage change more than 0.1 V by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10K6**.

10K6 : CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from throttle position sensor.
3) Turn ignition switch to ON.
4) Measure voltage between throttle position sensor connector and engine ground.

Connector & terminal
(E13) No. 3 (+) — Engine ground (−):



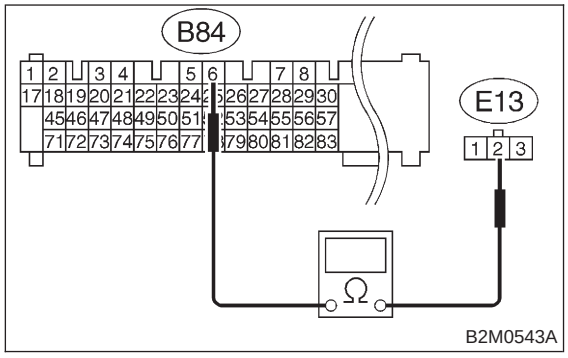
CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10K7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between throttle position sensor and ECM connector
- Poor contact in throttle position sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

10K7 : CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Measure resistance of harness between ECM connector and throttle position sensor connector.

Connector & terminal
(B84) No. 6 — (E13) No. 2:



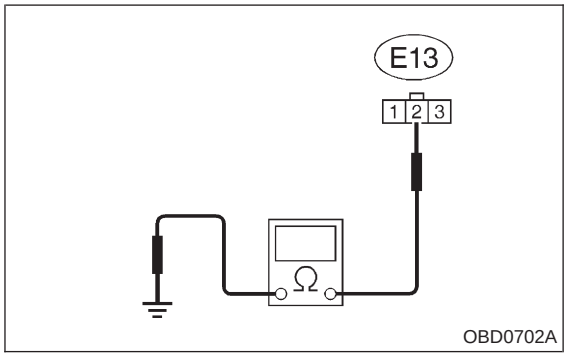
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10K8**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between throttle position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in throttle position sensor connector
- Poor contact in coupling connector (B21)

10K8 : CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.

Measure resistance of harness between throttle position sensor connector and engine ground.

Connector & terminal
(E13) No. 2 — Engine ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between throttle position sensor and ECM connector.
NO : Go to step **10K9**.

10K9 : CHECK POOR CONTACT.

Check poor contact in throttle position sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in throttle position sensor connector?***
YES : Repair poor contact in throttle position sensor connector.
NO : Replace throttle position sensor.

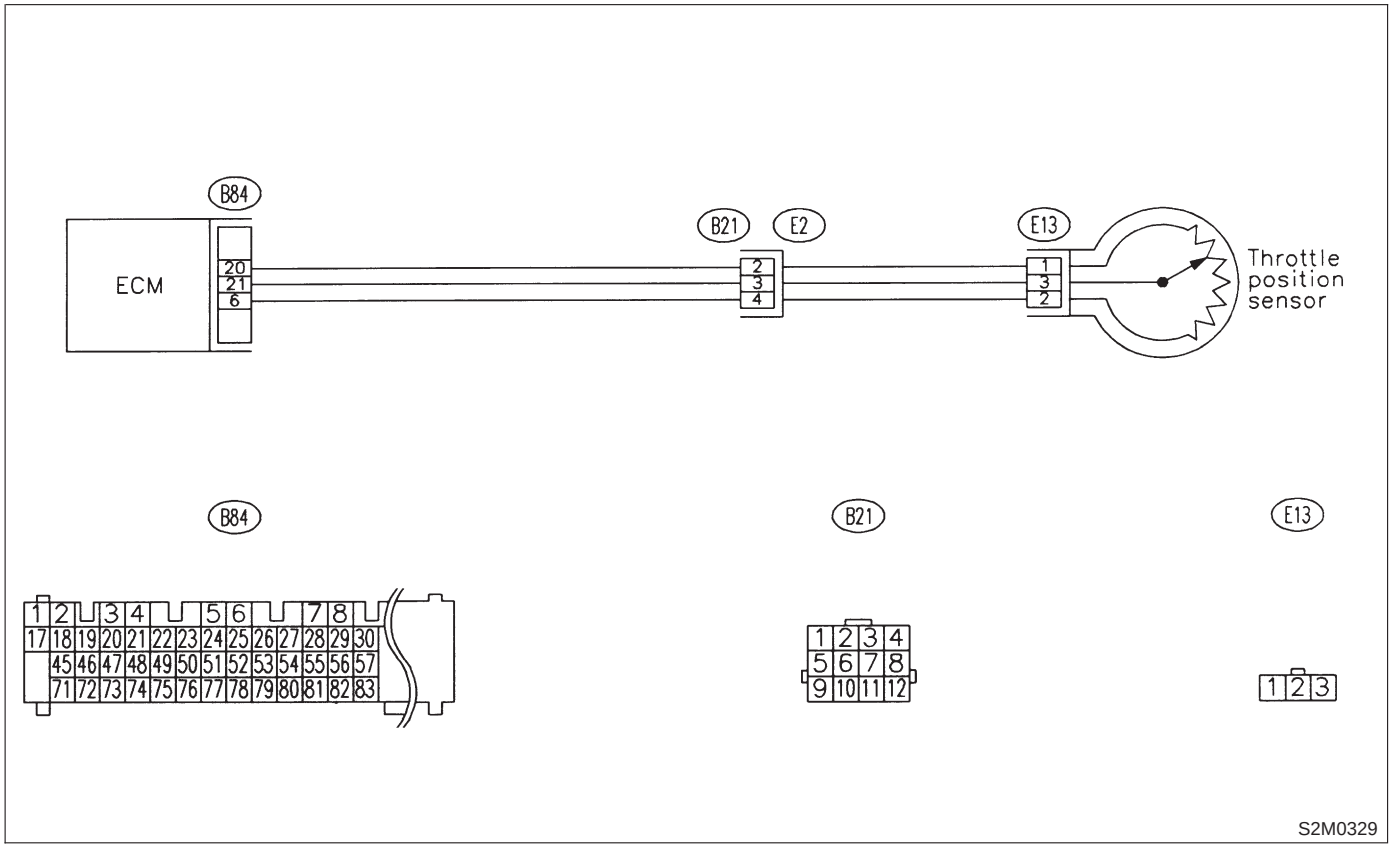
L: DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

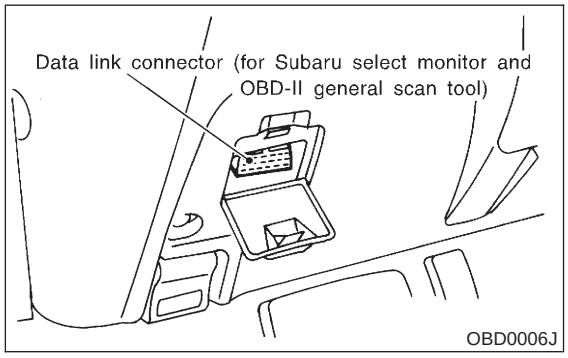
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10L1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

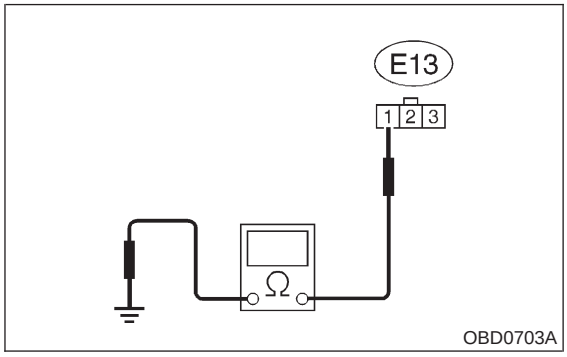
CHECK : ***Is the value more than 4.9 V?***
YES : Go to step **10L2**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:
In this case, repair the following:
● Poor contact in throttle position sensor connector
● Poor contact in ECM connector
● Poor contact in coupling connector (B21)

10L2 : CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from throttle position sensor.
3) Measure resistance of harness between throttle position sensor connector and engine ground.

Connector & terminal
(E13) No. 1 — Engine ground:



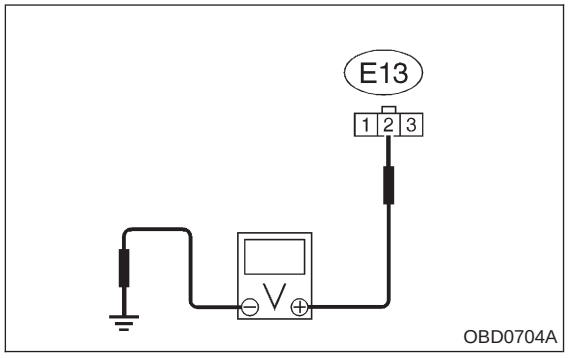
CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **10L3**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between throttle position sensor and ECM connector
● Poor contact in coupling connector (B21)

10L3 : CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to ON.
2) Measure voltage between throttle position sensor connector and engine ground.

Connector & terminal
(E13) No. 2 (+) — Engine ground (−):



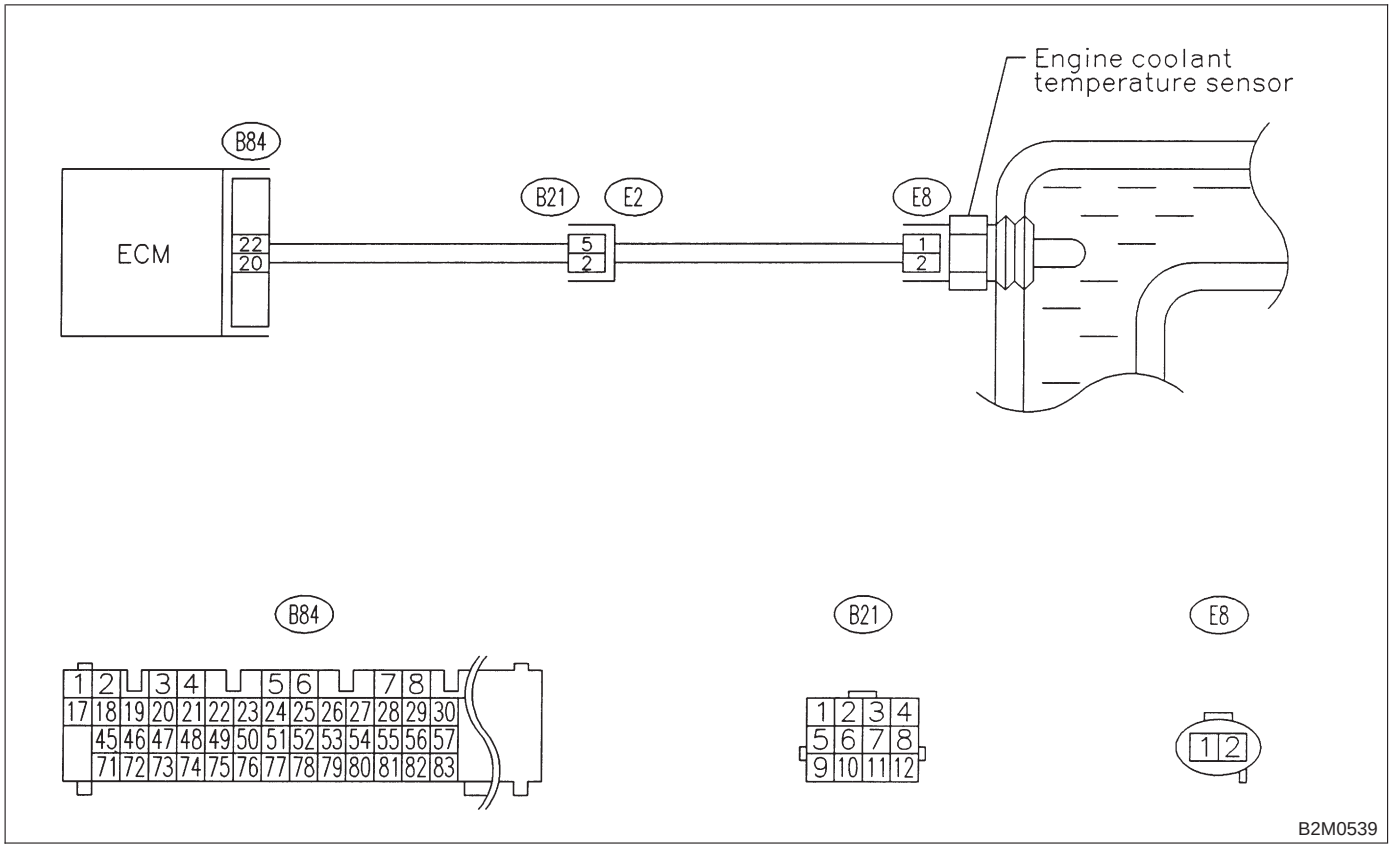
CHECK : ***Is the voltage more than 4.9 V?***
YES : Repair battery short circuit in harness between throttle position sensor and ECM connector. After repair, replace ECM.
NO : Replace throttle position sensor.

M: DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Engine would not return to idling.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10M1 :	CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0116 or P0117?***

YES : Inspect DTC P0116 or P0117 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0125.

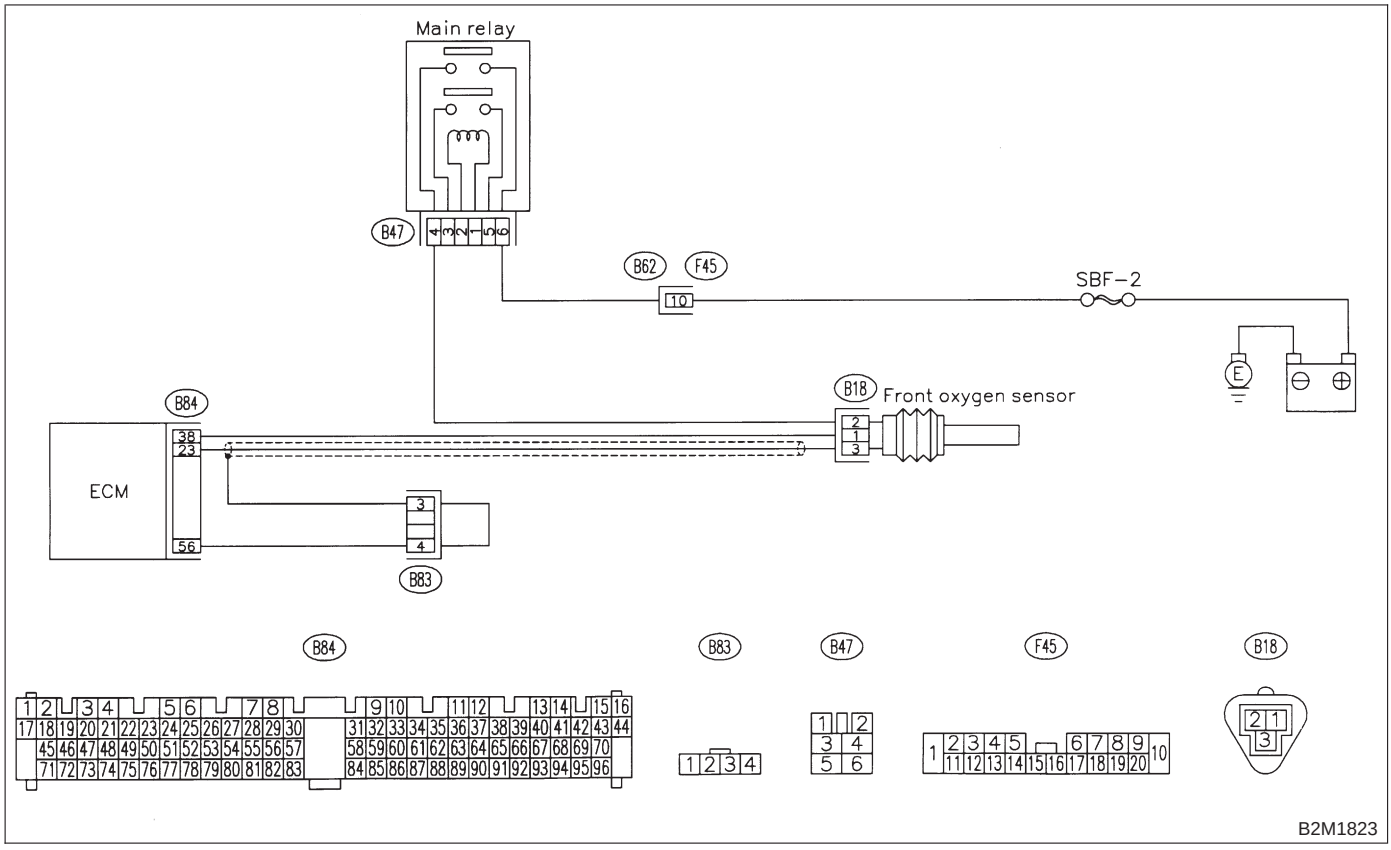
NO : Replace engine coolant temperature sensor.

N: DTC P0130 — FRONT OXYGEN SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



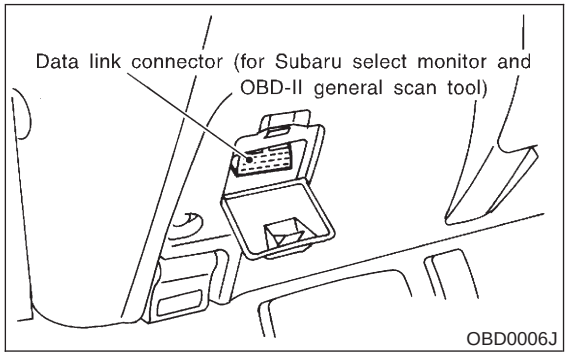
10N1 : CHECK FOR OTHER CAUSES AFFECTING EXHAUST GAS.

NOTE:
- Check for use of improper fuel.
- Check if engine oil or coolant level is extremely low.

CHECK : ***Is CO % more than 2 % after engine warm-up?***
YES : Check fuel system.
NO : Go to step **10N2**.

10N2 : CHECK FRONT OXYGEN SENSOR DATA.

1) Turn ignition switch to OFF.
2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Start engine and Turn the Subaru Select Monitor and the OBD-II general scan tool switch to ON.
4) Warm-up the engine until coolant temperature is above 70°C (160°F) and keep the engine speed at 2,000 rpm to 3,000 rpm for one minute.
5) Read data of front oxygen sensor signal using Subaru Select Monitor or OBD-II general scan tool.

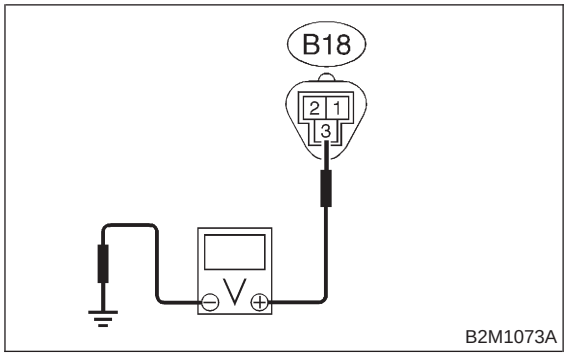
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the difference of voltage less than 0.1 V between the value of max. output and min. output with function mode F12?***
YES : Go to step **10N3**.
NO : Replace front oxygen sensor.

10N3 : CHECK HARNESS BETWEEN FRONT OXYGEN SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from front oxygen sensor.
3) Turn ignition switch to ON.
4) Measure voltage between front oxygen sensor harness connector and engine ground.

Connector & terminal
(B18) No. 3 (+) — Engine ground (−):



CHECK : ***Is the voltage more than 0.2 V?***
YES : Go to step **10N4**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between ECM and front oxygen sensor connector
● Poor contact in the ECM connector

10N4 : CHECK POOR CONTACT.

Check poor contact in front oxygen sensor connector. <Ref. to FOREWORD [T3C1].>

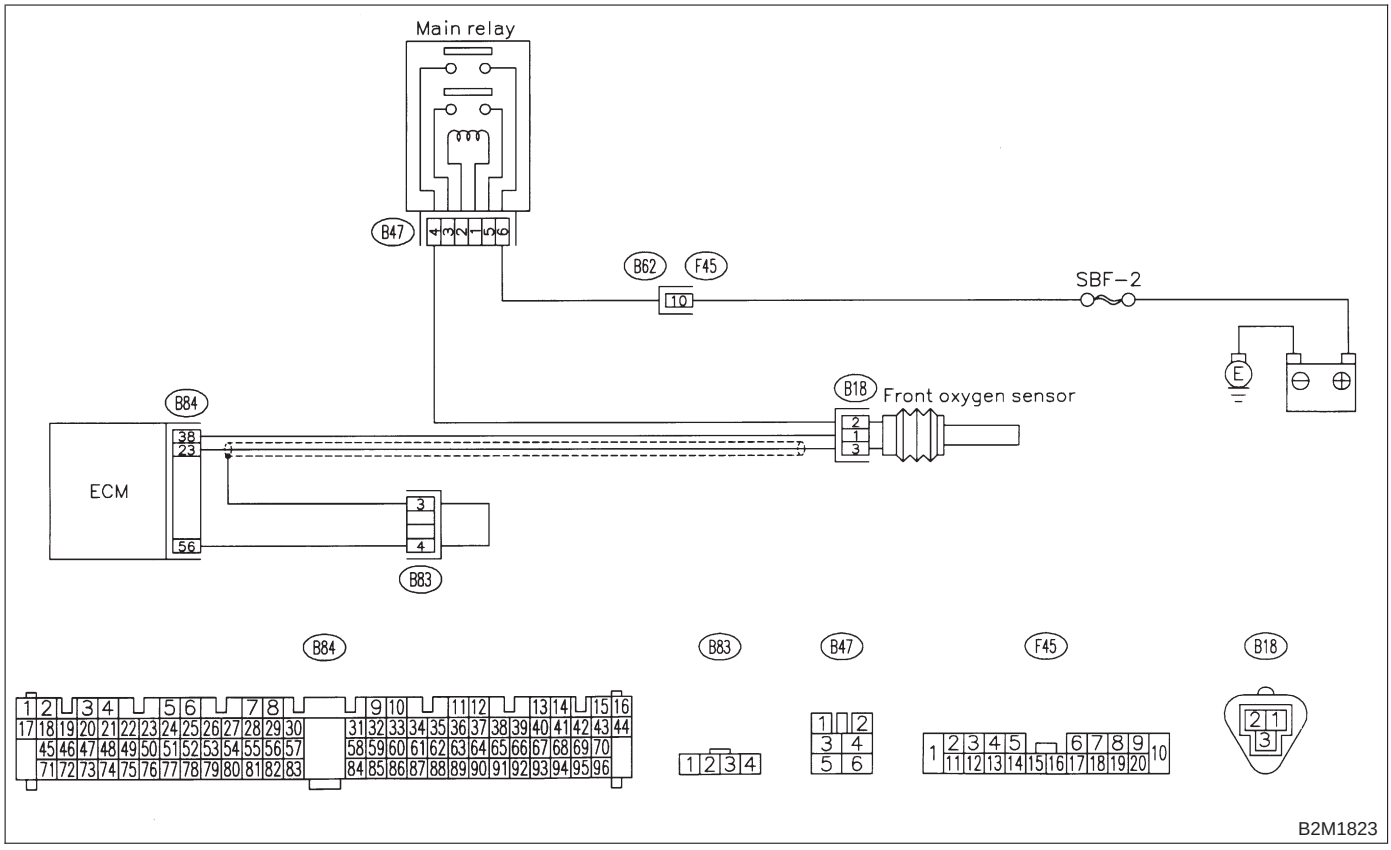
CHECK : ***Is there poor contact in front oxygen sensor connector?***
YES : Repair poor contact in front oxygen sensor connector.
NO : Replace front oxygen sensor.

O: DTC P0133 — FRONT OXYGEN SENSOR CIRCUIT SLOW RESPONSE —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10O1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0130?***

YES : Inspect DTC P0130 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0133.

NO : Go to step **10O2**.

10O2 : CHECK EXHAUST SYSTEM.

NOTE:
Check the following items.
- Loose installation of front portion of exhaust pipe onto cylinder heads
- Loose connection between front exhaust pipe and front catalytic converter
- Damage of exhaust pipe resulting in a hole

CHECK : ***Is there a fault in exhaust system?***

YES : Repair exhaust system.

NO : Replace front oxygen sensor.

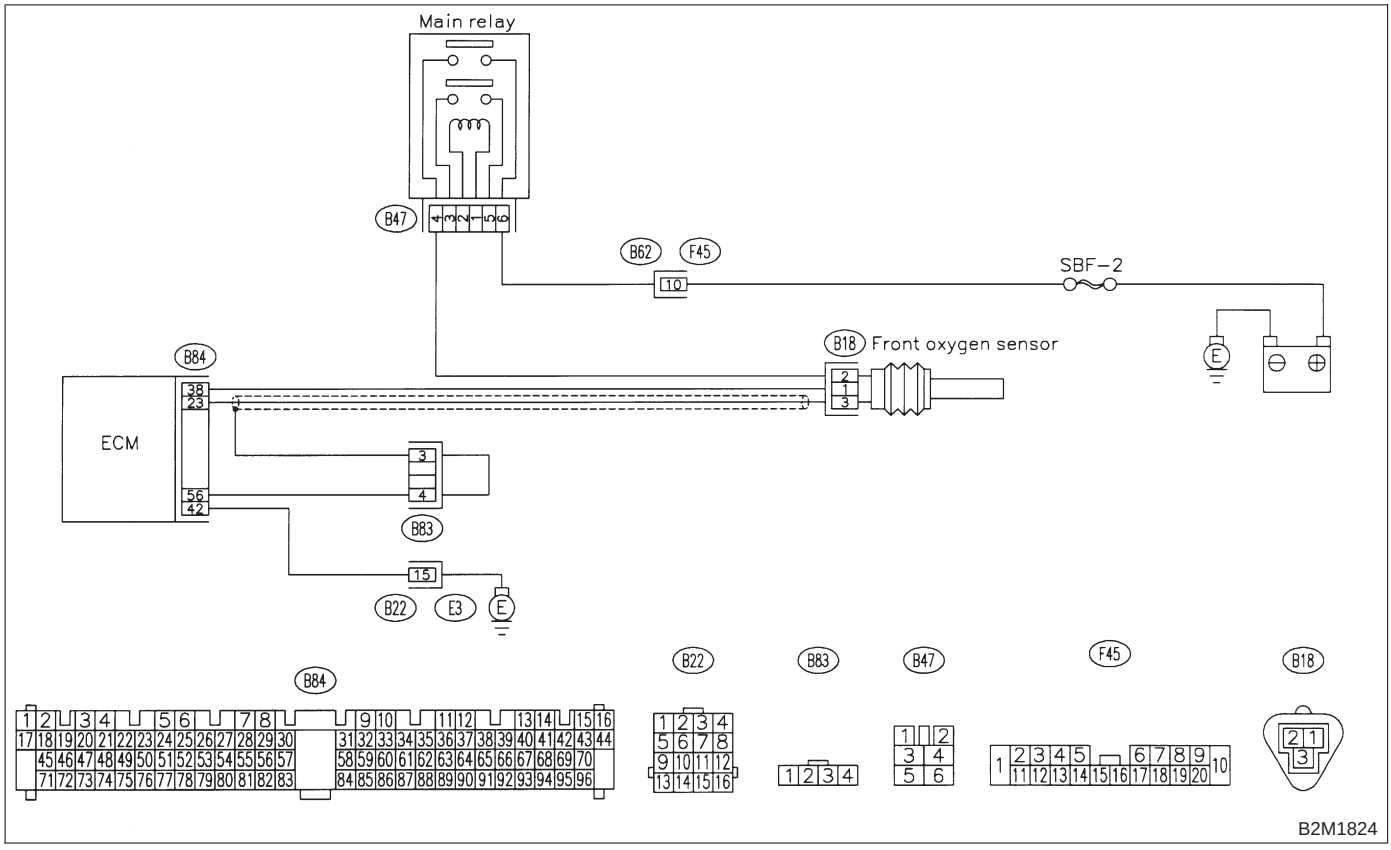
MEMO:

P: DTC P0135 — FRONT OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10P1 :	CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0135 and P0141 at the same time?***

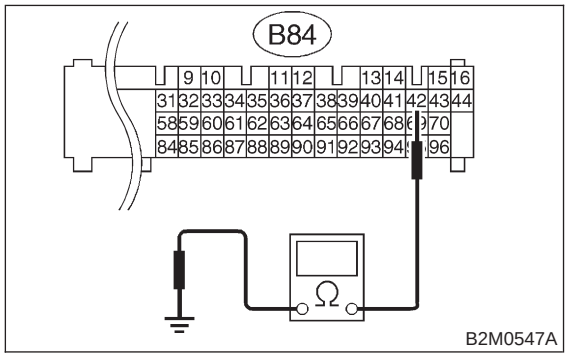
YES : Go to step **10P2**.

NO : Go to step **10P3**.

10P2 : CHECK GROUND CIRCUIT OF ECM.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B84) No. 42 — Chassis ground:

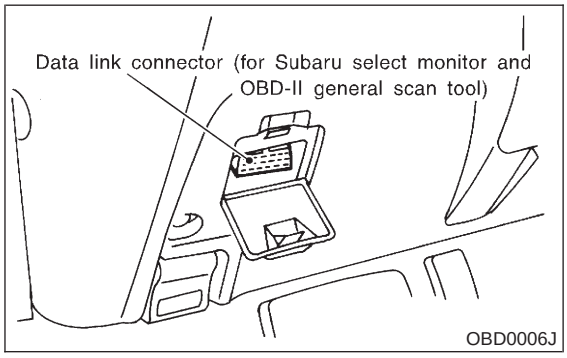


CHECK : ***Is the resistance less than 5 Ω?***
YES : Repair poor contact in ECM connector.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and coupling connector (B22)
- Open circuit in harness between coupling connector (B22) and engine grounding terminal
- Poor contact in front oxygen sensor connector
- Poor contact in coupling connector (B22)

10P3 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine
5) Read data of front oxygen sensor heater current using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
- Subaru Select Monitor

For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
- OBD-II scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 0.2 A?***
YES : Repair connector.

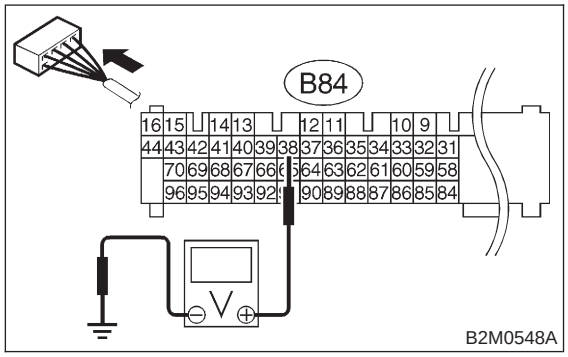
NOTE:
In this case, repair the following:
- Poor contact in front oxygen sensor connector
- Poor contact in ECM connector

NO : Go to step **10P4**.

10P4 : CHECK OUTPUT SIGNAL FROM ECM.

1) Start and idle the engine.
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 38 (+) — Chassis ground (−):

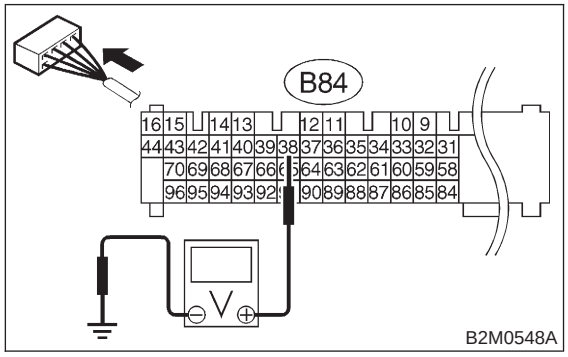


CHECK : ***Is the voltage less than 1.0 V?***
YES : Go to step **10P7**.
NO : Go to step **10P5**.

10P5 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 38 (+) — Chassis ground (−):

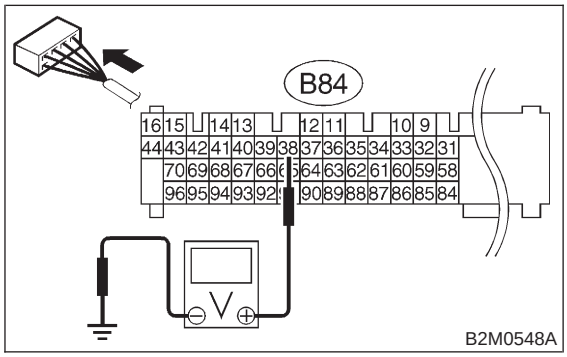


CHECK : ***Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10P6**.

10P6 : CHECK OUTPUT SIGNAL FROM ECM.

1) Disconnect connector from front oxygen sensor.
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 38 (+) — Chassis ground (−):

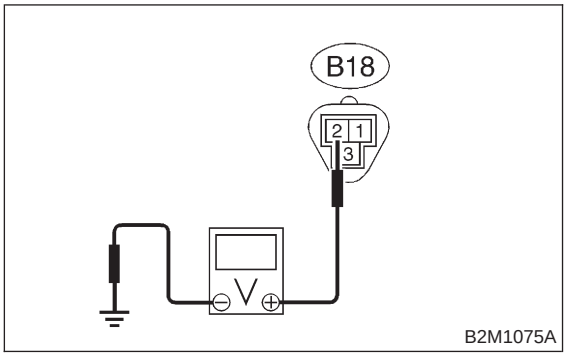


CHECK : ***Is the voltage less than 1.0 V?***
YES : Replace ECM.
NO : Repair battery short circuit in harness between ECM and front oxygen sensor connector. After repair, replace ECM.

10P7 : CHECK POWER SUPPLY TO FRONT OXYGEN SENSOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from front oxygen sensor.
3) Turn ignition switch to ON.
4) Measure voltage between front oxygen sensor connector and engine ground.

Connector & terminal
(B18) No. 2 (+) — Engine ground (−):



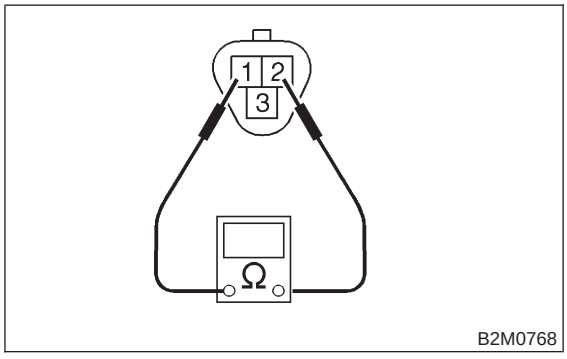
CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10P8**.
NO : Repair power supply line.

NOTE:
In this case, repair the following:
- Open circuit in harness between main relay and front oxygen sensor connector
- Poor contact in front oxygen sensor connector
- Poor contact in main relay connector

10P8 : CHECK FRONT OXYGEN SENSOR.

1) Turn ignition switch to OFF.
2) Measure resistance between front oxygen sensor connector terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 30 Ω?***
YES : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between front oxygen sensor and ECM connector
- Poor contact in front oxygen sensor connector
- Poor contact in ECM connector

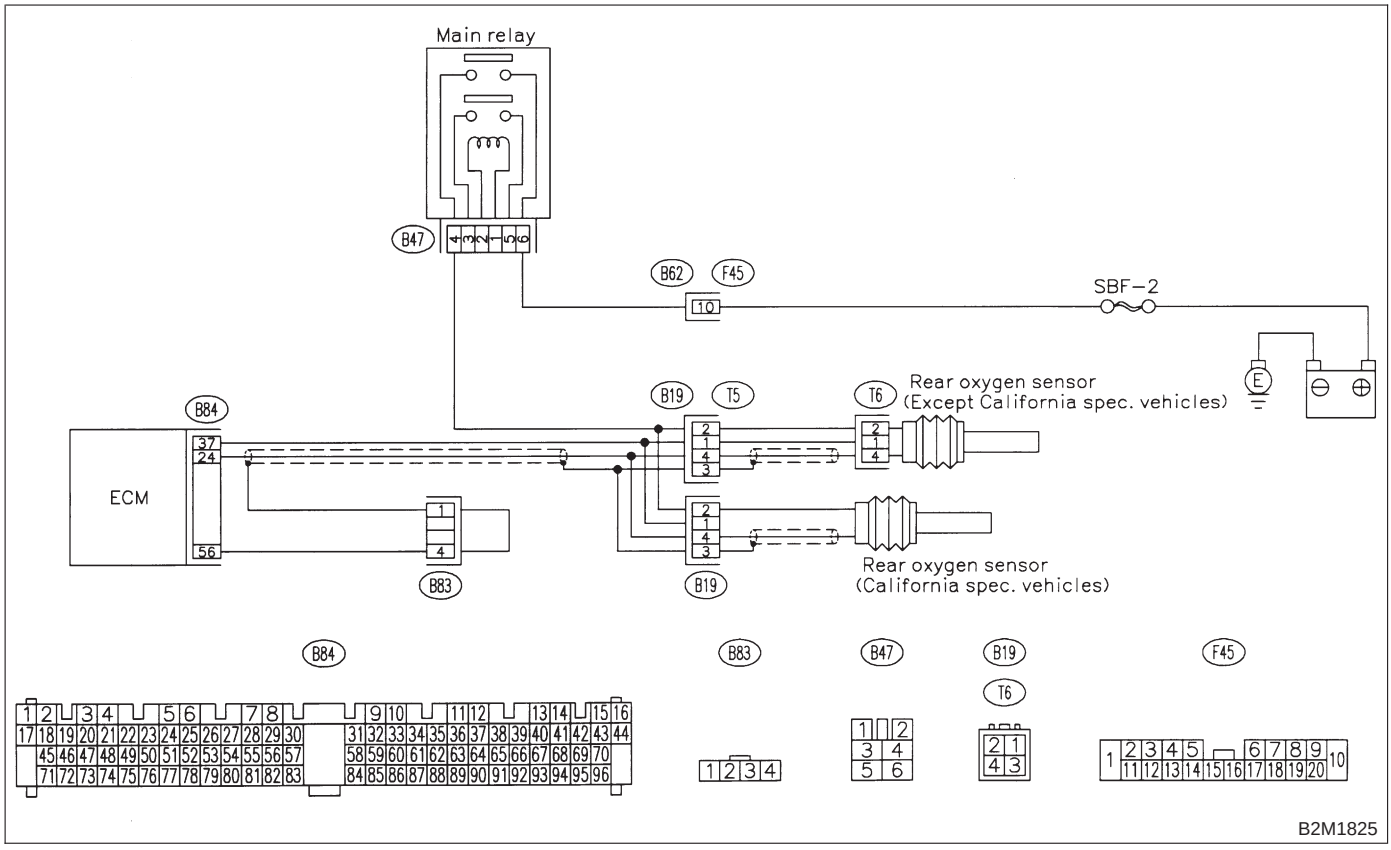
NO : Replace front oxygen sensor.

Q: DTC P0136 — REAR OXYGEN SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10Q1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0130?***

YES : Go to step **10Q2**.

NO : Go to step **10Q3**.

10Q2 : CHECK FAILURE CAUSE OF P0130.

Perform the step **10N1** of DTC P0130 <Ref. to 2-7 [T10N1].>.

CHECK : ***Is the failure cause of P0130 in the fuel system?***

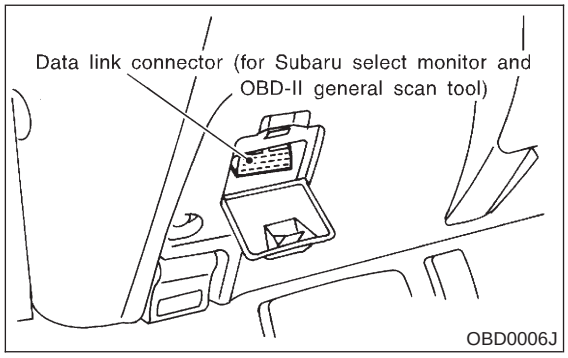
YES : Check fuel system.

NOTE:
In this case, it is not necessary to inspect DTC P0136.

NO : Go to step **10Q3**.

10Q3 : CHECK REAR OXYGEN SENSOR DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or OBD-II general scan tool to data link connector.



3) Start the engine, and turn Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Warm-up the engine until engine coolant temperature is above 70°C (160°F), and keep the engine speed at 2,000 rpm to 3,000 rpm for two minutes.
5) Read data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Does the value fluctuate?***
YES : Go to step **10Q8**.
NO : Go to step **10Q4**.

10Q4 : CHECK REAR OXYGEN SENSOR DATA.

Read data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II General Scan Tool.

CHECK : ***Is the value fixed between 0.2 and 0.4 V?***
YES : Go to step **10Q5**.
NO : Replace rear oxygen sensor.

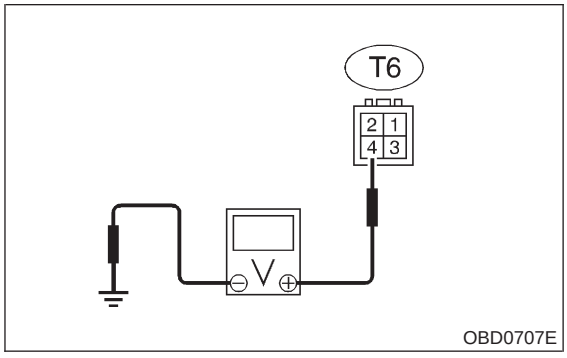
10Q5 : CHECK VEHICLE SPECIFICATION.

CHECK : ***Is the vehicle California specification?***
YES : Go to step **10Q6**.
NO : Go to step **10Q7**.

10Q6 : CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from rear oxygen sensor.
3) Turn ignition switch to ON.
4) Measure voltage between rear oxygen sensor harness connector and engine ground or chassis ground.

Connector & terminal
(B19) No. 4 (+) — Engine ground (−):



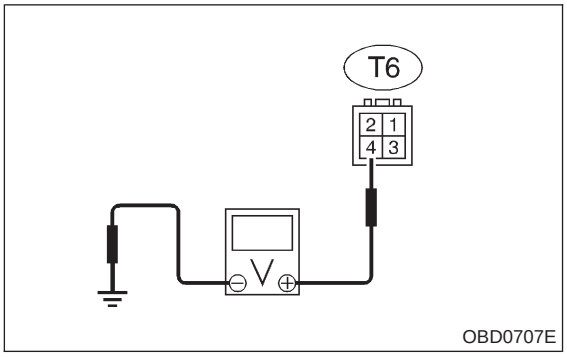
CHECK : ***Is the voltage more than 0.2 V?***
YES : Replace rear oxygen sensor.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between rear oxygen sensor and ECM connector
● Poor contact in rear oxygen sensor connector
● Poor contact in ECM connector

10Q7 : CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from rear oxygen sensor.
3) Turn ignition switch to ON.
4) Measure voltage between rear oxygen sensor harness connector and engine ground or chassis ground.

Connector & terminal
(T6) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 0.2 V?***
YES : Replace rear oxygen sensor.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between rear oxygen sensor and ECM connector
- Poor contact in rear oxygen sensor connector
- Poor contact in ECM connector
- Poor contact in rear oxygen sensor connecting harness connector

10Q8 : CHECK EXHAUST SYSTEM.

Check exhaust system parts.

NOTE:
Check the following items.
- Loose installation of portions
- Damage (crack, hole etc.) of parts
- Looseness and ill fitting of parts between front oxygen sensor and rear oxygen sensor

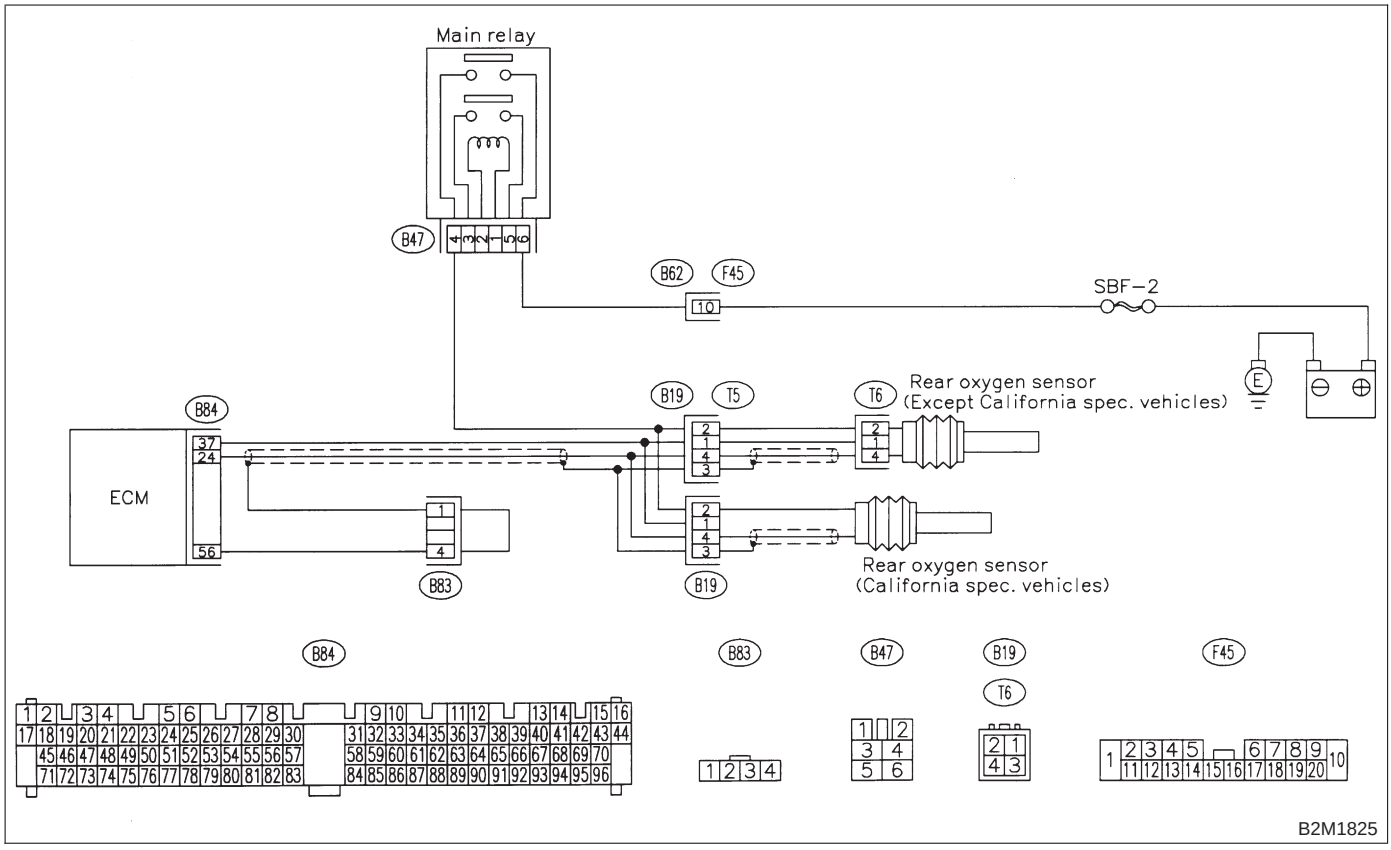
CHECK : ***Is there a fault in exhaust system?***
YES : Repair or replace faulty parts.
NO : Replace rear oxygen sensor.

R: DTC P0139 — REAR OXYGEN SENSOR CIRCUIT SLOW RESPONSE —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10R1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0136?***

YES : Inspect DTC P0136 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0139.

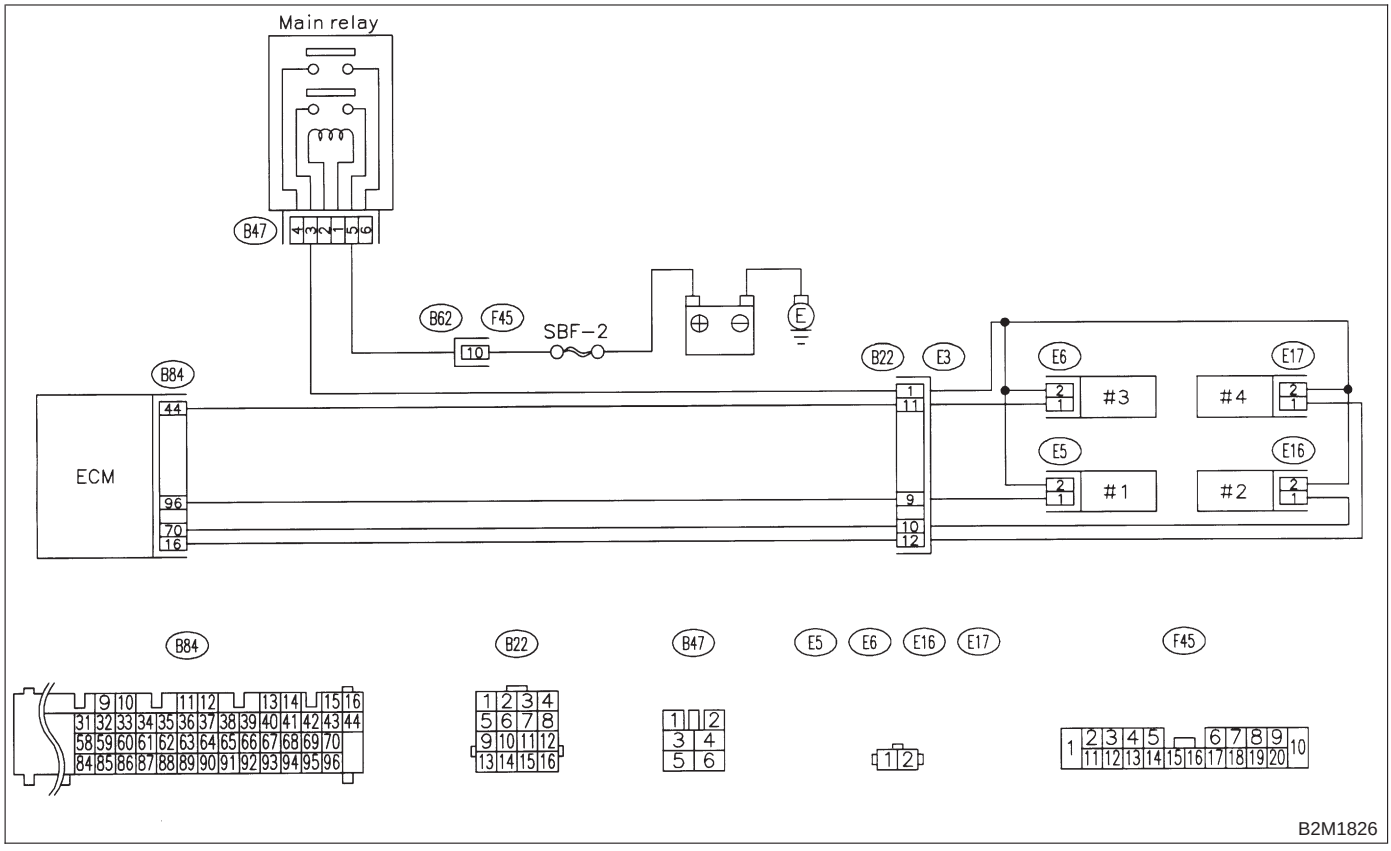
NO : Replace rear oxygen sensor.

S: DTC P0141 — REAR OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10S1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0141 and P0135 at the same time?***

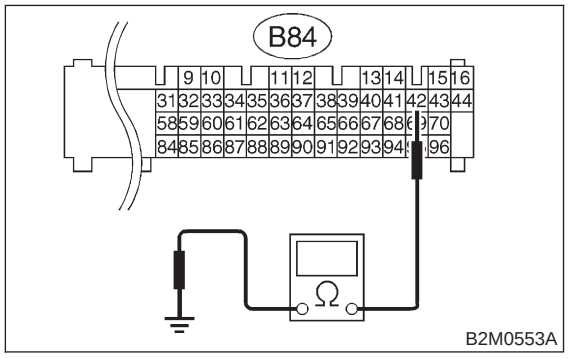
YES : Go to step **10S2**.

NO : Go to step **10S3**.

10S2 : CHECK GROUND CIRCUIT OF ECM.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B84) No. 42 — Chassis ground:

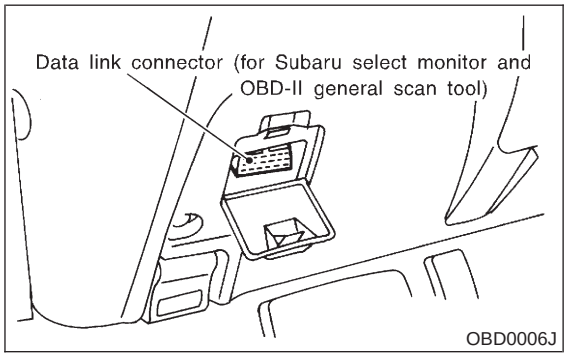


CHECK : ***Is the resistance less than 5 Ω?***
YES : Repair poor contact in ECM connector.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and coupling connector (B22)
- Open circuit in harness between coupling connector (B22) and engine grounding terminal
- Poor contact in rear oxygen sensor connector
- Poor contact in rear oxygen sensor connecting harness connector (B19)
- Poor contact in coupling connector (B22)

10S3 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of rear oxygen sensor heater current using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
- Subaru Select Monitor

For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>
- OBD-II scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 0.2 A?***
YES : Repair connector.

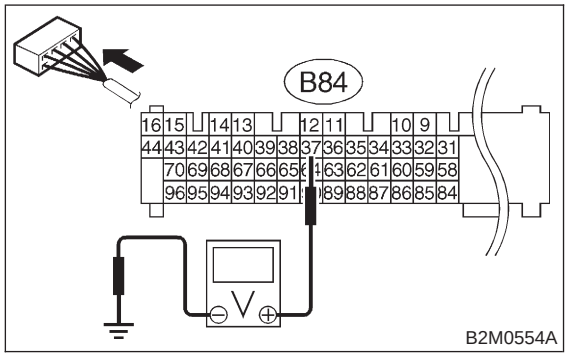
NOTE:
In this case, repair the following:
- Poor contact in rear oxygen sensor connector
- Poor contact in rear oxygen sensor connecting harness connector
- Poor contact in ECM connector

NO : Go to step **10S4**.

10S4 : CHECK OUTPUT SIGNAL FROM ECM.

1) Start and idle the engine.
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 37 (+) — Chassis ground (−):

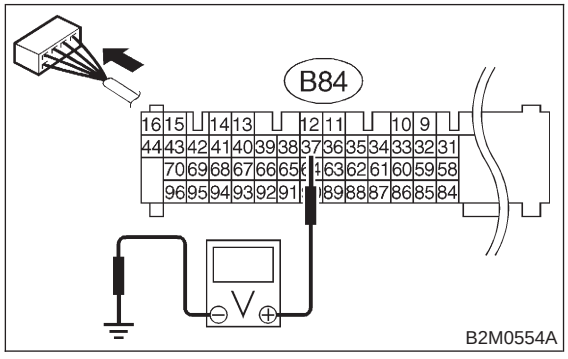


CHECK : ***Is the voltage less than 1.0 V?***
YES : Go to step **10S7**.
NO : Go to step **10S5**.

10S5 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 37 (+) — Chassis ground (−):

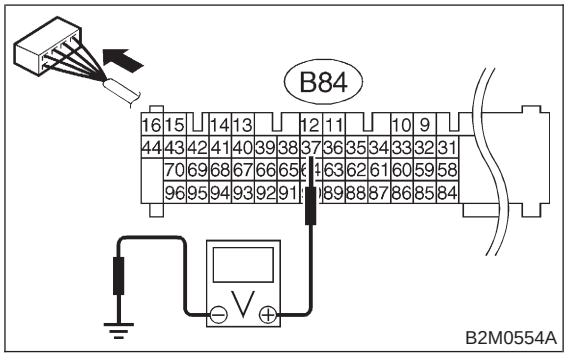


CHECK : ***Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10S6**.

10S6 : CHECK OUTPUT SIGNAL FROM ECM.

1) Disconnect connector from rear oxygen sensor.
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 37 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1.0 V?***
YES : Replace ECM.
NO : Repair battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace ECM.

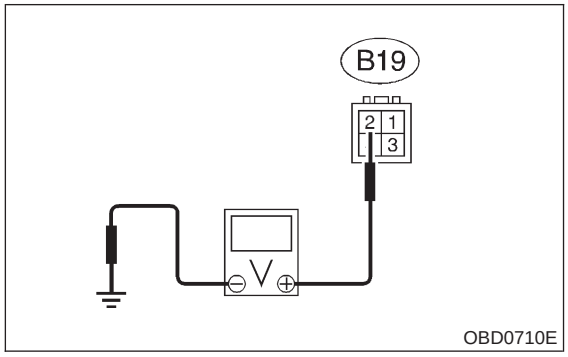
10S7 : CHECK VEHICLE SPECIFICATION.

CHECK : ***Is the vehicle California specification?***
YES : Go to step **10S8**.
NO : Go to step **10S9**.

10S8 : CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from rear oxygen sensor.
3) Turn ignition switch to ON.
4) Measure voltage between rear oxygen sensor connector and engine ground or chassis ground.

Connector & terminal
(B19) No. 2 (+) — Engine ground (−):



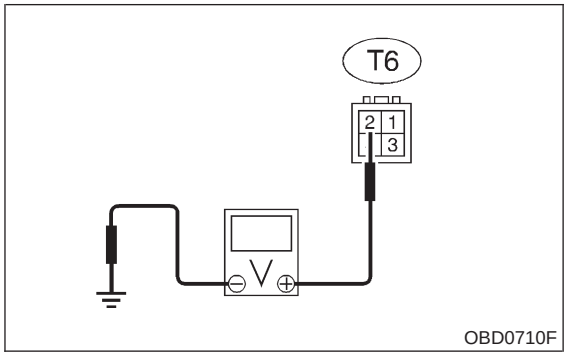
CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10S10**.
NO : Repair power supply line.

NOTE:
In this case, repair the following:
- Open circuit in harness between main relay and rear oxygen sensor connector
- Poor contact in rear oxygen sensor connector

10S9 : CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from rear oxygen sensor.
3) Turn ignition switch to ON.
4) Measure voltage between rear oxygen sensor connector and engine ground or chassis ground.

Connector & terminal
(T6) No. 2 (+) — Chassis ground (−):



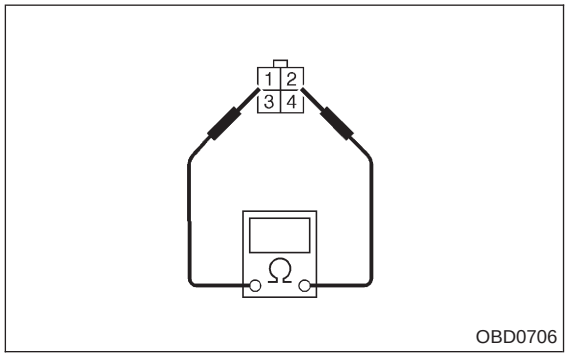
CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10S10**.
NO : Repair power supply line.

NOTE:
In this case, repair the following:
- Open circuit in harness between main relay and rear oxygen sensor connector
- Poor contact in rear oxygen sensor connector
- Poor contact in rear oxygen sensor connecting harness connector

10S10 : CHECK REAR OXYGEN SENSOR.

1) Turn ignition switch to OFF.
2) Measure resistance between rear oxygen sensor connector terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 30 Ω?***
YES : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between rear oxygen sensor and ECM connector
- Poor contact in rear oxygen sensor connector
- Poor contact in ECM connector
- Poor contact in rear oxygen sensor connecting harness connector

NO : Replace rear oxygen sensor.

MEMO:

T: DTC P0170 — FUEL TRIM MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

10T1 : CHECK EXHAUST SYSTEM.

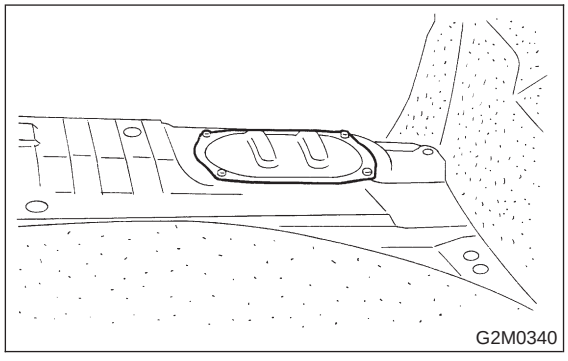
CHECK : ***Are there holes or loose bolts on exhaust system?***
YES : Repair exhaust system.
NO : Go to step **10T2**.

10T2 : CHECK AIR INTAKE SYSTEM.

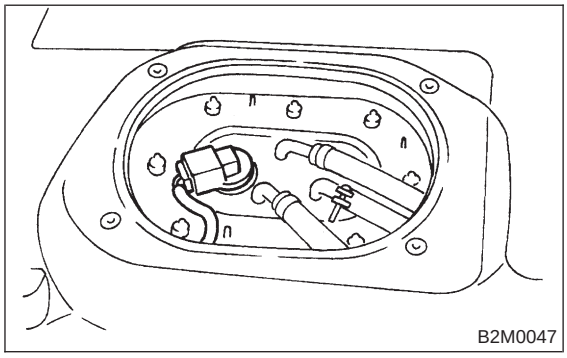
CHECK : ***Are there holes, loose bolts or disconnection of hose on air intake system?***
YES : Repair air intake system.
NO : Go to step **10T3**.

10T3 : CHECK FUEL PRESSURE.

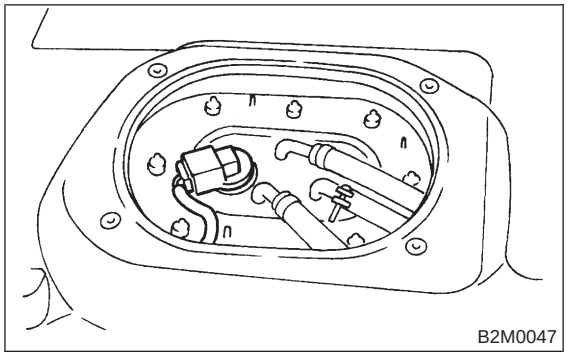
1) Release fuel pressure.
(1) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).


G2M0340

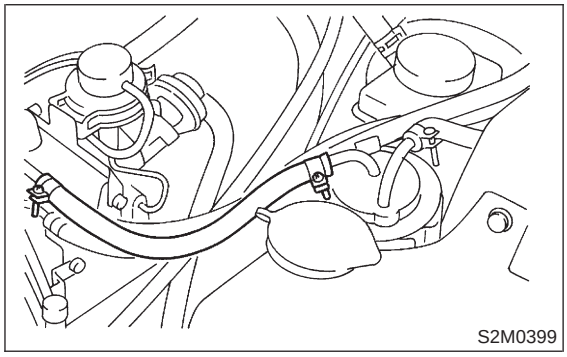
(2) Disconnect connector from fuel tank.


B2M0047

(3) Start the engine, and run it until it stalls.
(4) After stopping the engine, crank the engine for 5 to 7 seconds to reduce fuel pressure.
(5) Turn ignition switch to OFF.
(6) Remove fuel filler cap.
2) Connect connector to fuel tank.


B2M0047

3) Disconnect fuel delivery hose from fuel filter, and connect fuel pressure gauge.

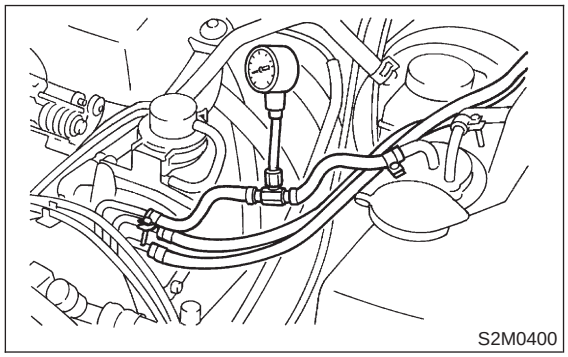

S2M0399

4) Install fuel filler cap.

5) Start the engine and idle while gear position is neutral.
6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

WARNING:
Before removing fuel pressure gauge, release fuel pressure.

NOTE:
If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.



CHECK : ***Is fuel pressure between 226 and 275 kPa (2.3 — 2.8 kg/cm^2, 33 — 40 psi)?***
YES : Go to step **10T4**.
NO : Repair the following items.

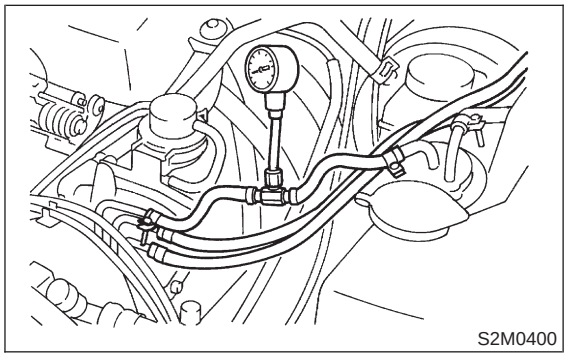
Fuel pressure too high	● Clogged fuel return line or bent hose
Fuel pressure too low	● Improper fuel pump discharge ● Clogged fuel supply line

10T4 : CHECK FUEL PRESSURE.

After connecting pressure regulator vacuum hose, measure fuel pressure.

WARNING:
Before removing fuel pressure gauge, release fuel pressure.

NOTE:
● If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.
● If out of specification as measured at this step, check or replace pressure regulator and pressure regulator vacuum hose.

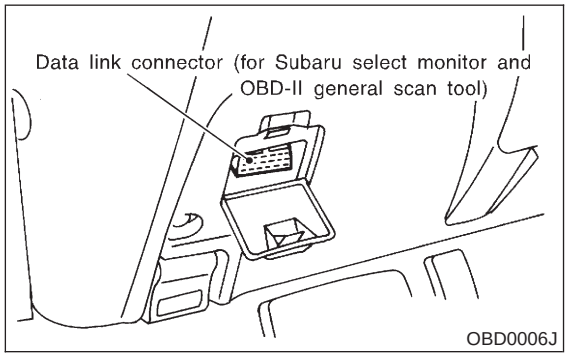


CHECK : ***Is fuel pressure between 157 and 206 kPa (1.6 — 2.1 kg/cm^2, 23 — 30 psi)?***
YES : Go to step **10T5**.
NO : Repair the following items.

Fuel pressure too high	● Faulty pressure regulator ● Clogged fuel return line or bent hose
Fuel pressure too low	● Faulty pressure regulator ● Improper fuel pump discharge ● Clogged fuel supply line

10T5 : CHECK ENGINE COOLANT TEMPERATURE SENSOR. < REF. TO 2-7 [T10H0].> OR <REF. TO 2-7 [T10I0].>

1) Turn ignition switch to OFF.
2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Start the engine and warm-up completely.
4) Read data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is temperature greater than 60°C (140°F)?***
YES : Go to step **10T6**.
NO : Replace engine coolant temperature sensor.

10T6 : CHECK MASS AIR FLOW SENSOR.

1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F).
2) Place the selector lever in "N" or "P" position.
3) Turn A/C switch to OFF.
4) Turn all accessory switches to OFF.
5) Read data of mass flow sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

Specification:

Engine speed	Specified value
Idling	2.2 — 4.2 (g/sec)
2,500 rpm	8.6 — 14.5 (g/sec)

CHECK : ***Is the voltage within the specifications?***
YES : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

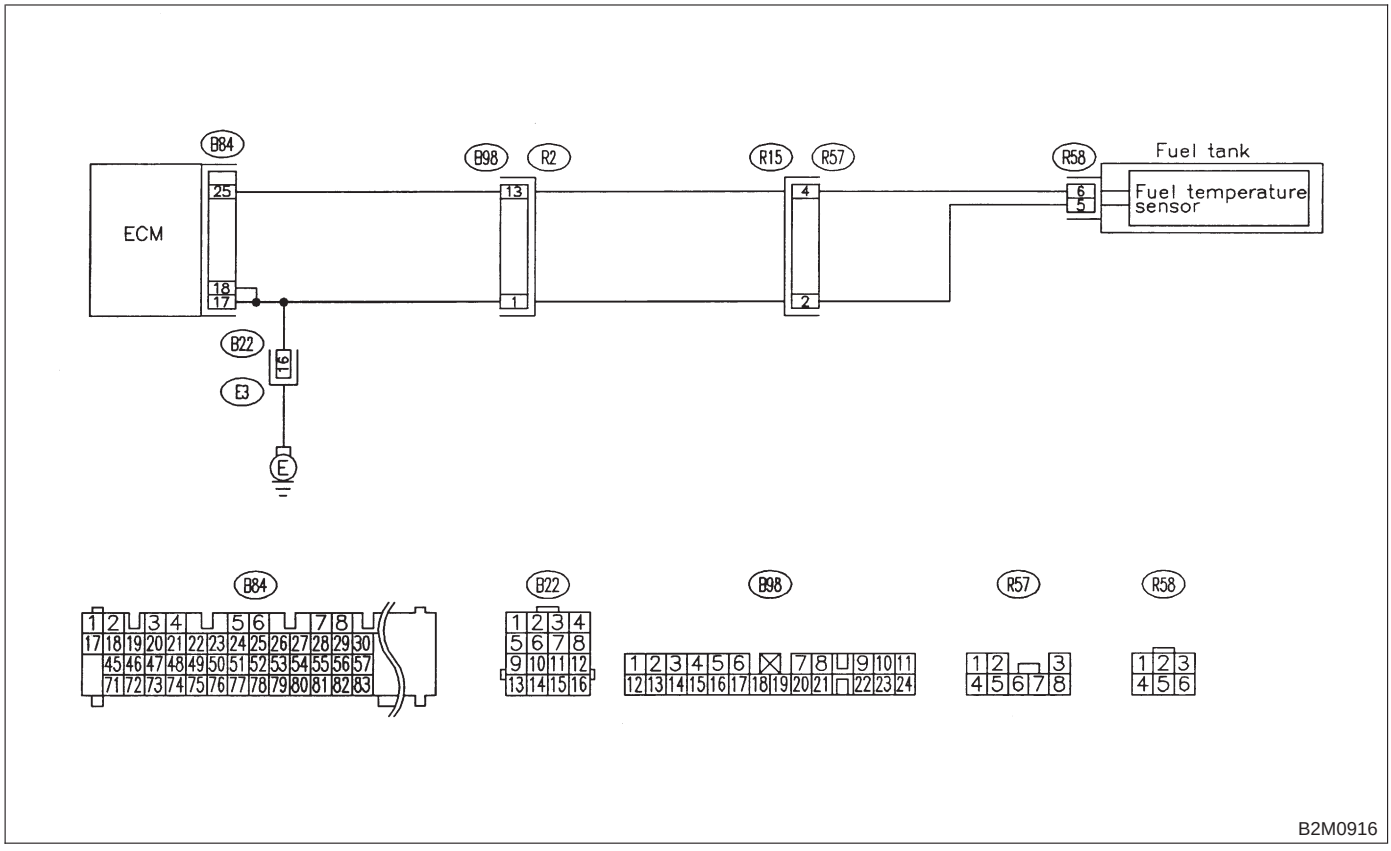
NO : Replace mass air flow sensor.

U: DTC P0181 — FUEL TEMPERATURE SENSOR A CIRCUIT RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10U1 :	**CHECK ANY OTHER DTC ON DISPLAY.**

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0182 or P0183?***

YES : Inspect DTC P0182 or P0183 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0181.

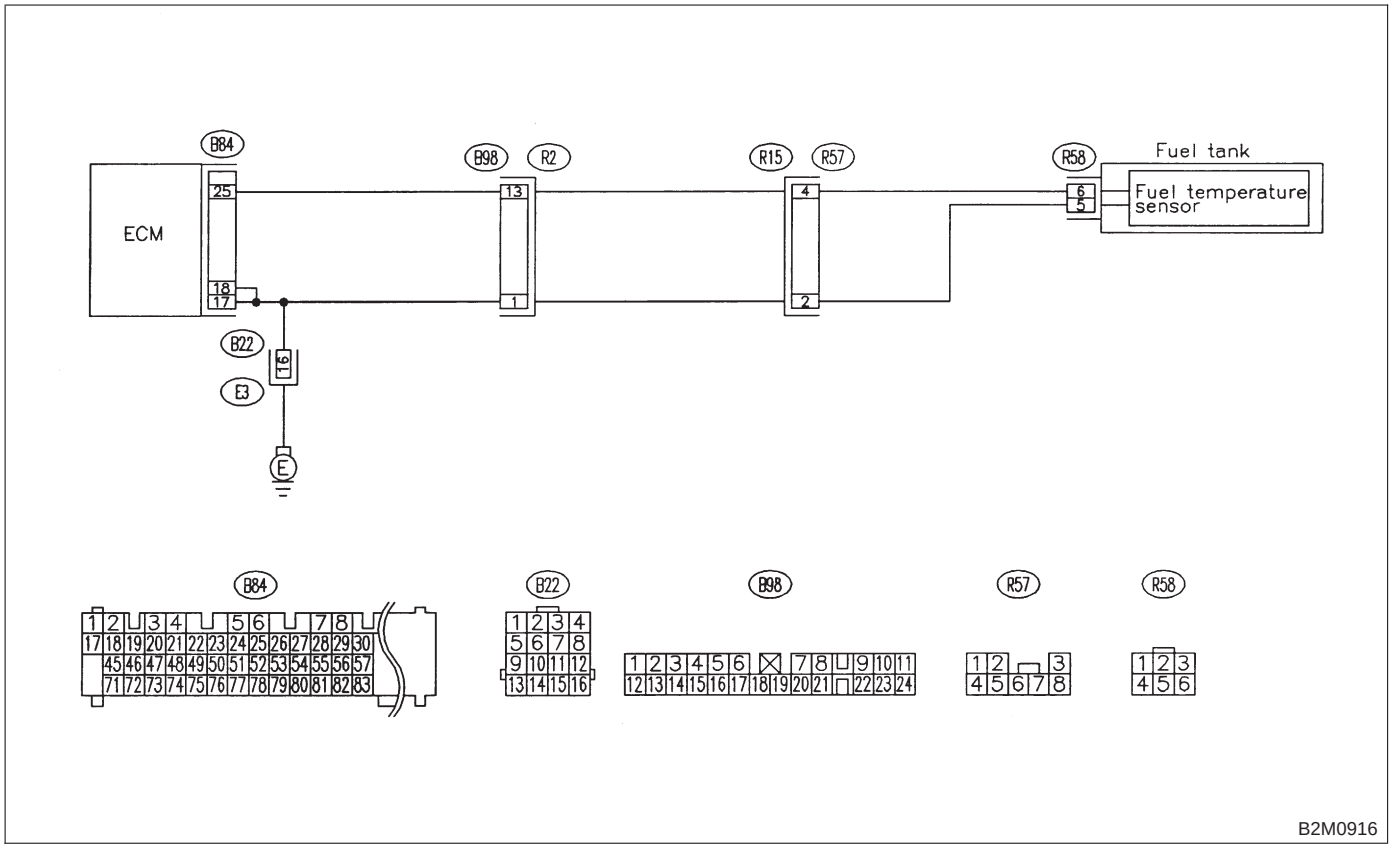
NO : Replace fuel temperature sensor.

V: DTC P0182 — FUEL TEMPERATURE SENSOR A CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

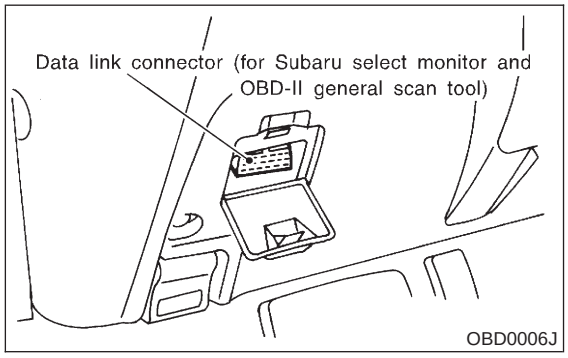
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10V1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



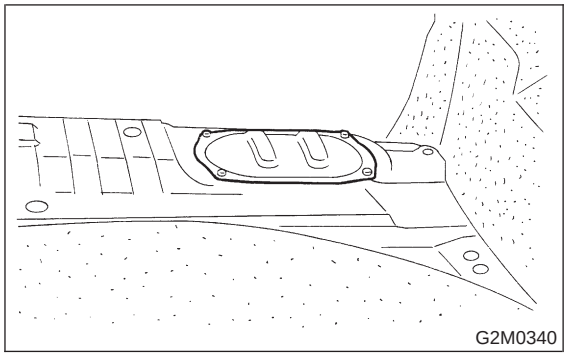
3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

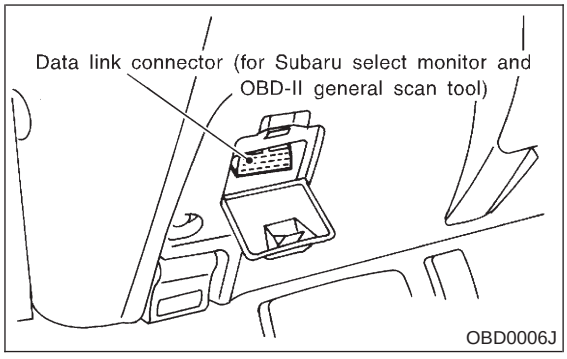
CHECK : ***Is the value greater than 150°C (300°F)?***
YES : Go to step **10V2**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

10V2 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove access hole lid.



3) Disconnect connector from fuel pump.
4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



5) Turn ignition switch and Subaru Select Monitor or OBD-II general scan tool switch to ON.
6) Read data of fuel temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

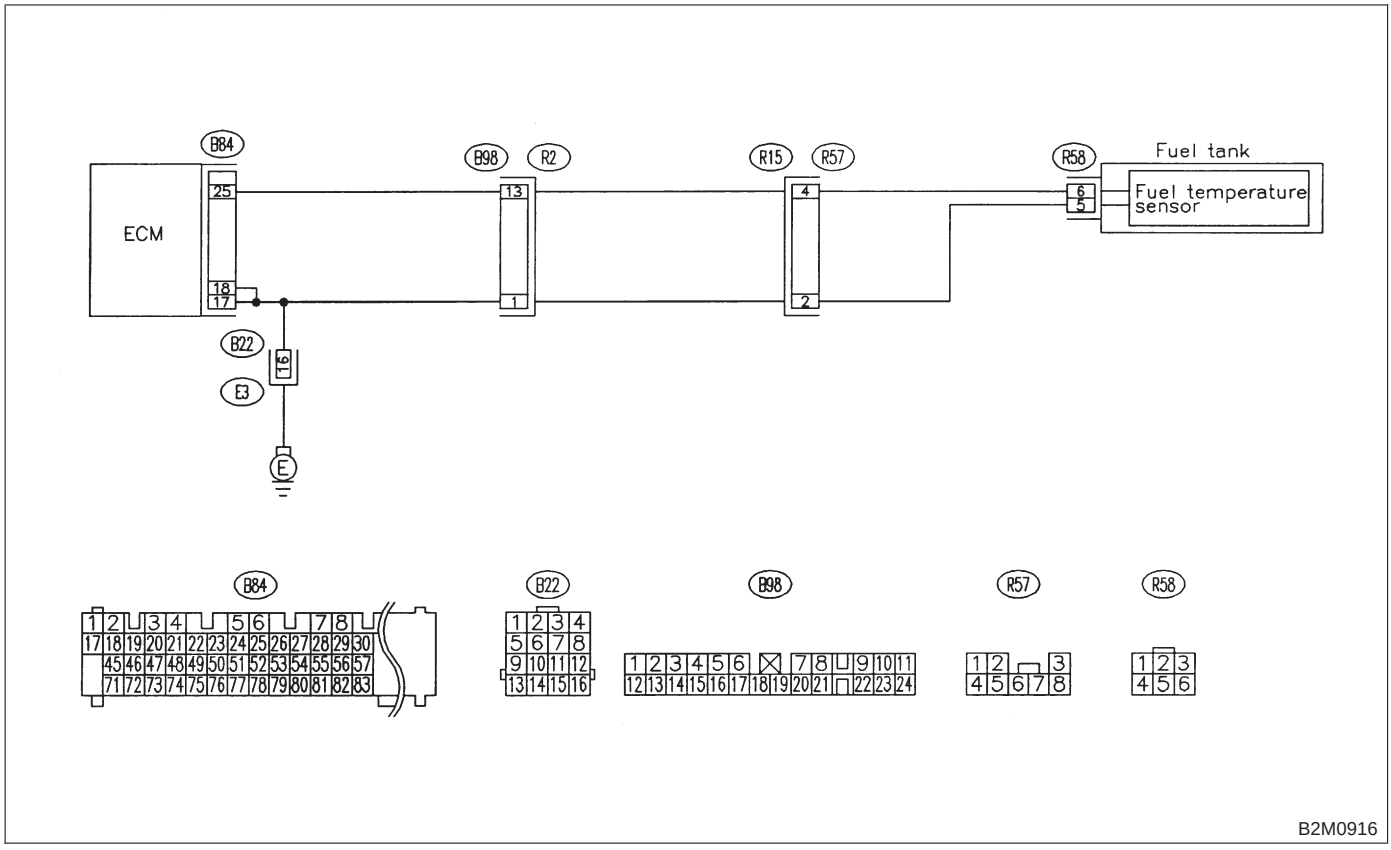
CHECK : ***Is the value less than −40°C (−40°F)?***
YES : Replace fuel temperature sensor.
NO : Repair ground short circuit in harness between fuel pump and ECM connector.

W: DTC P0183 — FUEL TEMPERATURE SENSOR A CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

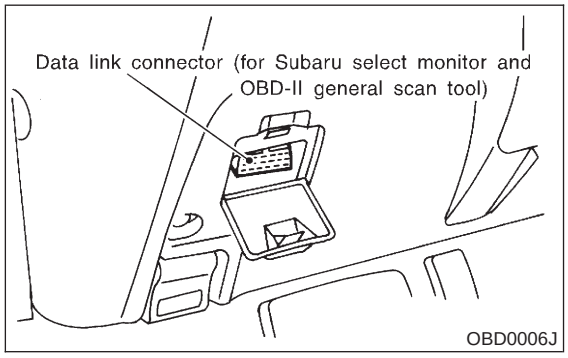
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10W1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

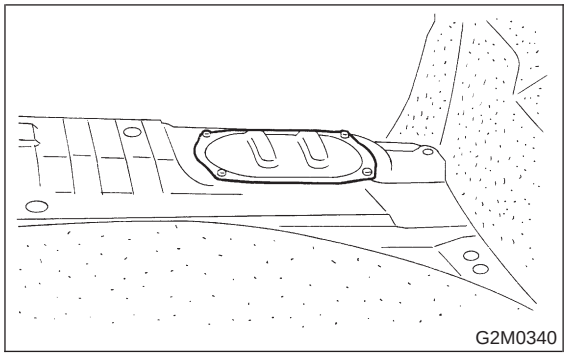
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value less than −40°C (−40°F)?***
YES : Go to step **10W2**.
NO : Repair poor contact.

NOTE:
In this case, repair the following:
● Poor contact in fuel pump connector
● Poor contact in ECM connector
● Poor contact in coupling connectors (B22, B98 and R57)

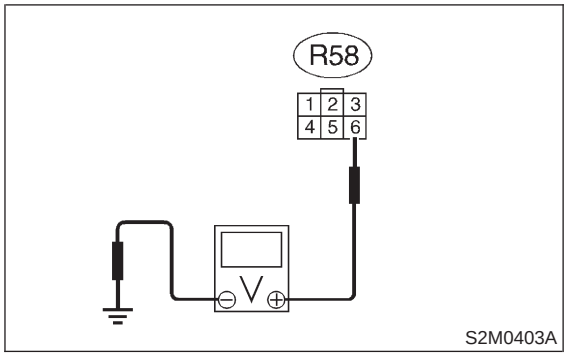
10W2 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove access hole lid.



3) Disconnect connector from fuel pump.
4) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (−):

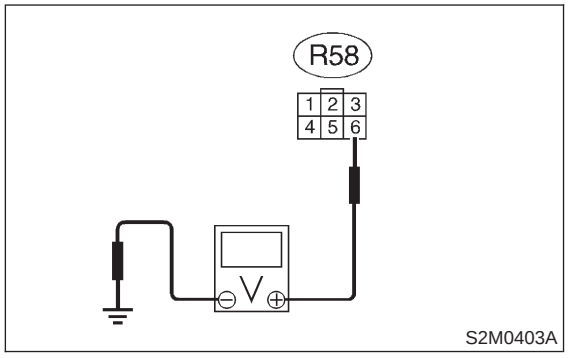


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and fuel pump connector.
NO : Go to step **10W3**.

10W3 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to ON.
2) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (−):

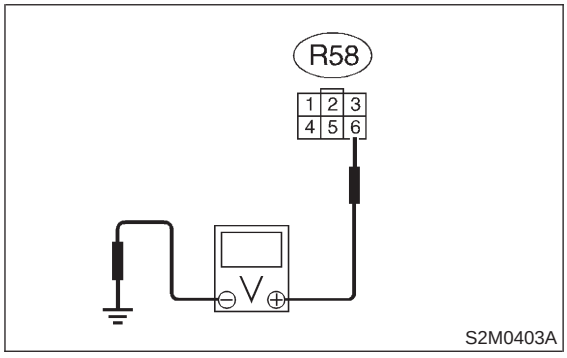


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and fuel pump connector.
NO : Go to step **10W4**.

10W4 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (−):



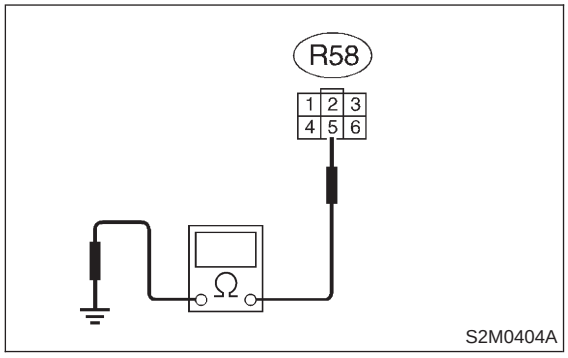
CHECK : ***Is the voltage more than 4 V?***
YES : Go to step **10W5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel pump connector
- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B98 and R57)

10W5 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 5 — Chassis ground:



CHECK : ***Is the resistance less than 5 Ω?***
YES : Replace fuel temperature sensor.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel pump connector
- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B22, B98 and R57)

X: DTC P0261 — FUEL INJECTOR CIRCUIT LOW INPUT - #1 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T10AA0]. <Ref. to 2-7 [T10AA0].>

Y: DTC P0264 — FUEL INJECTOR CIRCUIT LOW INPUT - #2 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T10AA0]. <Ref. to 2-7 [T10AA0].>

Z: DTC P0267 — FUEL INJECTOR CIRCUIT LOW INPUT - #3 —

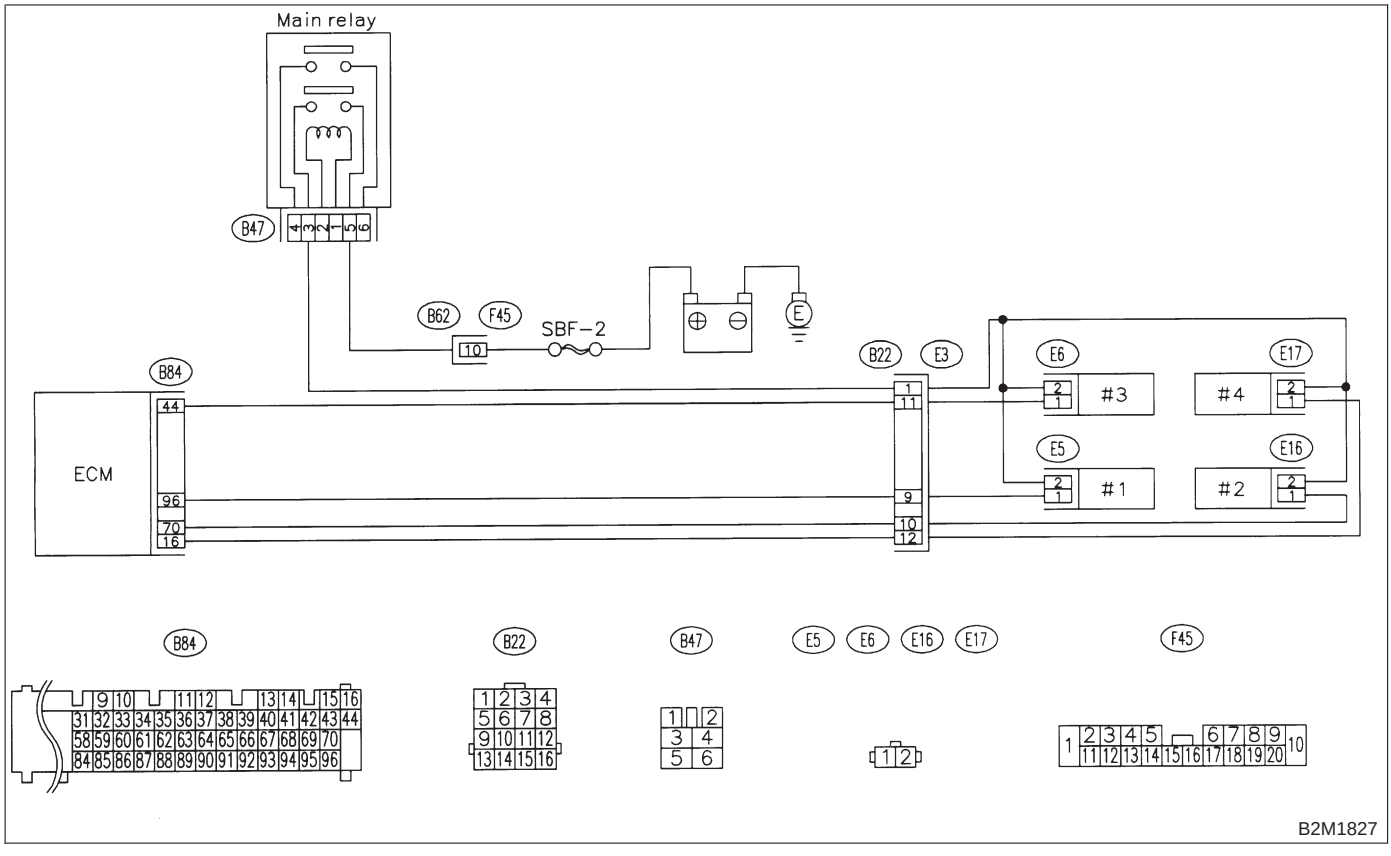
NOTE:
For the diagnostic procedure, refer to 2-7 [T10AA0]. <Ref. to 2-7 [T10AA0].>

AA: DTC P0270 — FUEL INJECTOR CIRCUIT LOW INPUT - #4 —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Failure of engine to start
  - Engine stalls.
  - Erroneous idling
  - Rough driving

CAUTION:
- **Check or repair only faulty cylinders.**
- **After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>**

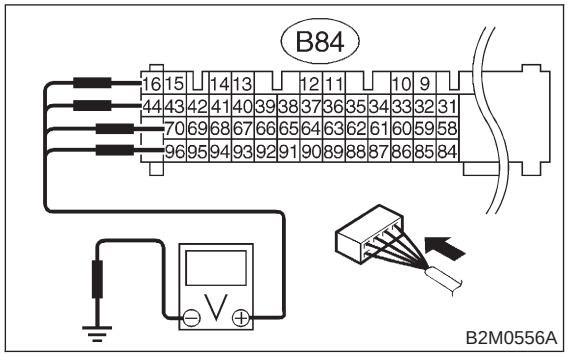
- **WIRING DIAGRAM:**



10AA1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM connector and chassis ground on faulty cylinders.

Connector & terminal
#1 (B84) No. 96 (+) — Chassis ground (−):
#2 (B84) No. 70 (+) — Chassis ground (−):
#3 (B84) No. 44 (+) — Chassis ground (−):
#4 (B84) No. 16 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10AA2**.
NO : Go to step **10AA3**.

10AA2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

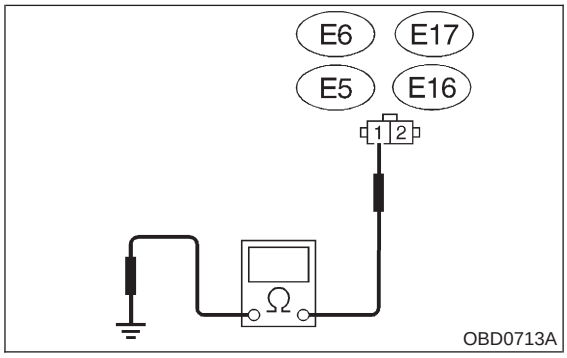
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10AA3 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from fuel injector on faulty cylinders.
3) Measure voltage between ECM connector and engine ground on faulty cylinders.

Connector & terminal
#1 (E5) No. 1 — Engine ground:
#2 (E16) No. 1 — Engine ground:
#3 (E6) No. 1 — Engine ground:
#4 (E17) No. 1 — Engine ground:



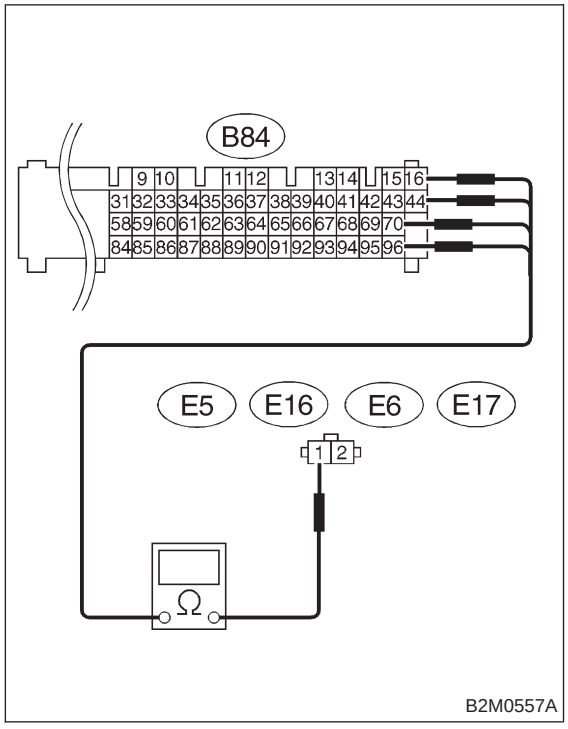
CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between fuel injector and ECM connector.
NO : Go to step **10AA4**.

10AA4 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

Measure resistance of harness connector between ECM connector and fuel injector on faulty cylinders.

Connector & terminal

#1 (B84) No. 96 — (E5) No. 1:
#2 (B84) No. 70 — (E16) No. 1:
#3 (B84) No. 44 — (E6) No. 1:
#4 (B84) No. 16 — (E17) No. 1:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AA5**.
NO : Repair harness and connector.

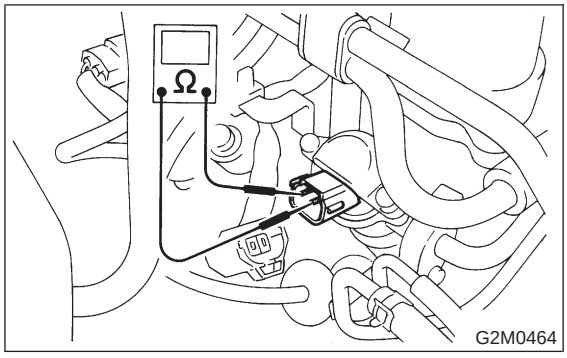
NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel injector connector
- Poor contact in coupling connector (B22)

10AA5 : CHECK FUEL INJECTOR.

Measure resistance between fuel injector terminals on faulty cylinder.

Terminals

No. 1 — No. 2:

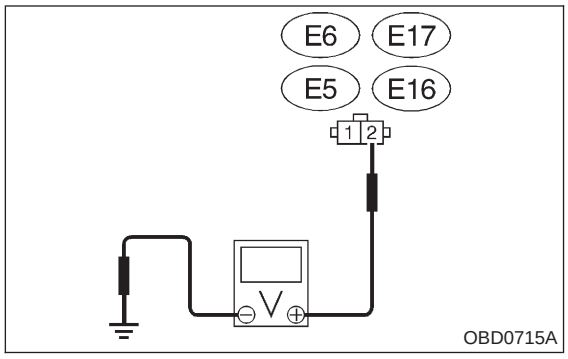


CHECK : ***Is the resistance between 5 and 20 Ω?***
YES : Go to step **10AA6**.
NO : Replace faulty fuel injector.

10AA6 : CHECK POWER SUPPLY LINE.

1) Turn ignition switch to ON.
2) Measure voltage between fuel injector and engine ground on faulty cylinders.

Connector & terminal
#1 (E5) No. 2 (+) — Engine ground (−):
#2 (E16) No. 2 (+) — Engine ground (−):
#3 (E6) No. 2 (+) — Engine ground (−):
#4 (E17) No. 2 (+) — Engine ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Repair poor contact in all connectors in fuel injector circuit.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between main relay and fuel injector connector on faulty cylinders
● Poor contact in coupling connector (B22)
● Poor contact in main relay connector
● Poor contact in fuel injector connector on faulty cylinders

AB: DTC P0262 — FUEL INJECTOR CIRCUIT HIGH INPUT - #1 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T10AE0]. <Ref. to 2-7 [T10AE0].>

AC: DTC P0265 — FUEL INJECTOR CIRCUIT HIGH INPUT - #2 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T10AE0]. <Ref. to 2-7 [T10AE0].>

AD: DTC P0268 — FUEL INJECTOR CIRCUIT HIGH INPUT - #3 —

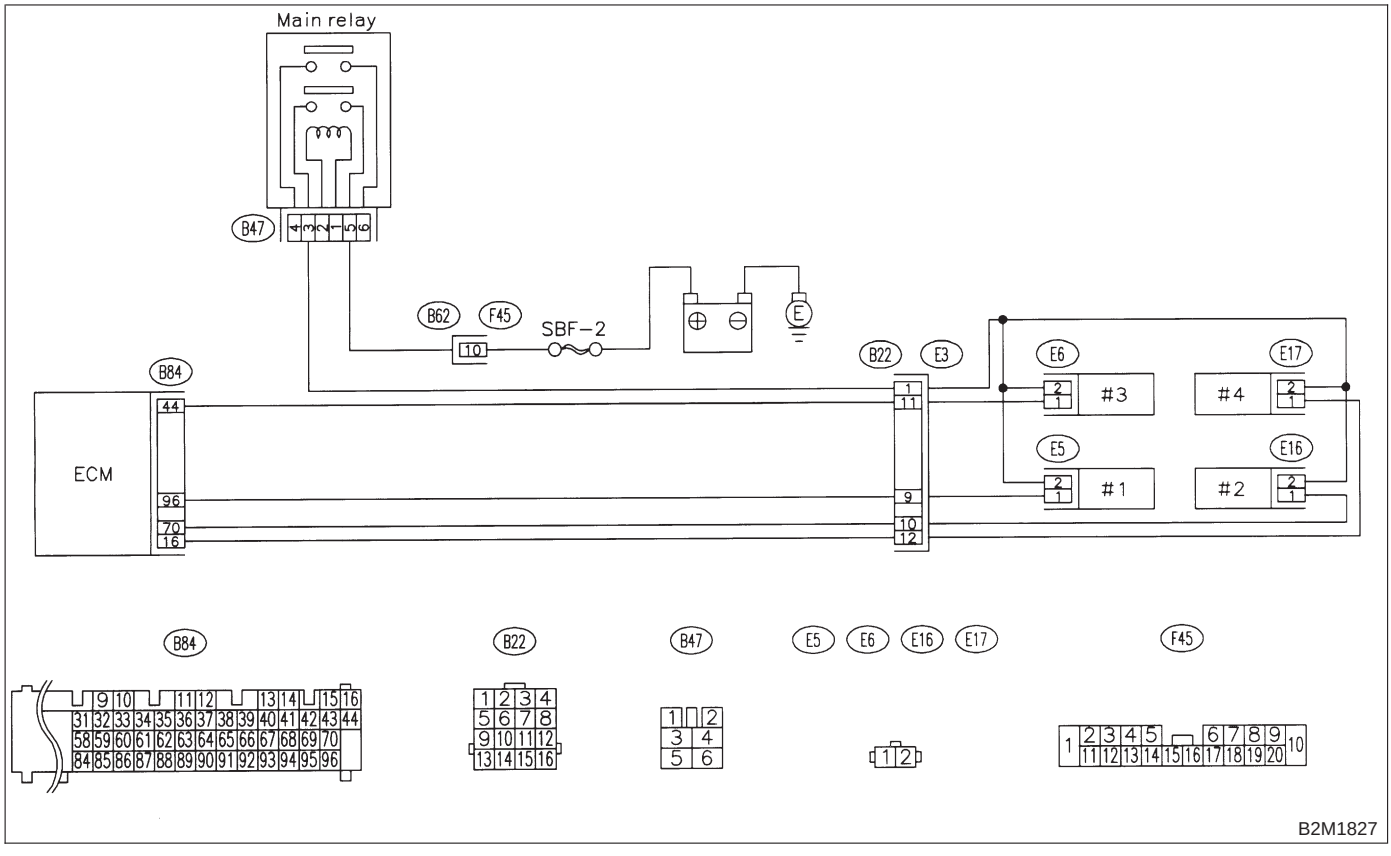
NOTE:
For the diagnostic procedure, refer to 2-7 [T10AE0]. <Ref. to 2-7 [T10AE0].>

AE: DTC P0271 — FUEL INJECTOR CIRCUIT HIGH INPUT - #4 —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Failure of engine to start
  - Engine stalls.
  - Erroneous idling
  - Rough driving

CAUTION:
- **Check or repair only faulty cylinders.**
- **After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>**

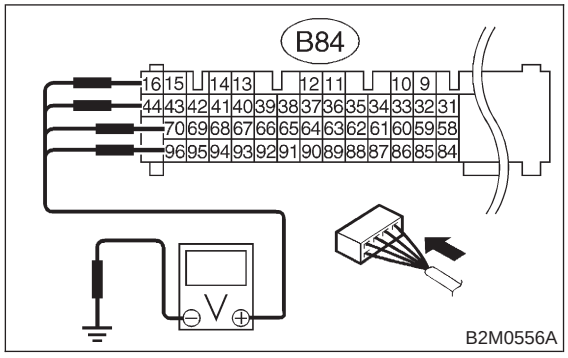
- **WIRING DIAGRAM:**



10AE1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM connector and chassis ground on faulty cylinders.

Connector & terminal
#1 (B84) No. 96 (+) — Chassis ground (−):
#2 (B84) No. 70 (+) — Chassis ground (−):
#3 (B84) No. 44 (+) — Chassis ground (−):
#4 (B84) No. 16 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10AE3**.
NO : Go to step **10AE2**.

10AE2 : CHECK POOR CONTACT.

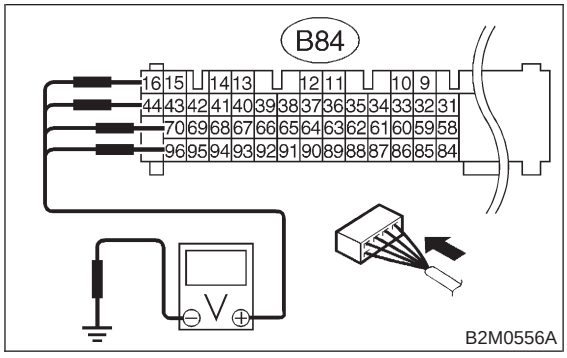
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10AE3 : CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from fuel injector on faulty cylinder.
3) Turn ignition switch to ON.
4) Measure voltage between ECM connector and chassis ground on faulty cylinders.

Connector & terminal
#1 (B84) No. 96 (+) — Chassis ground (−):
#2 (B84) No. 70 (+) — Chassis ground (−):
#3 (B84) No. 44 (+) — Chassis ground (−):
#4 (B84) No. 16 (+) — Chassis ground (−):

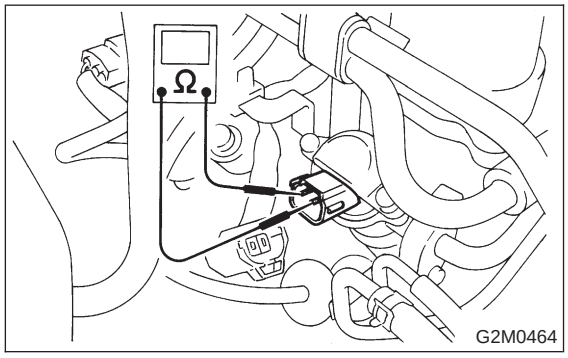


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and fuel injector. After repair, replace ECM.
NO : Go to step **10AE4**.

10AE4 : CHECK FUEL INJECTOR.

1) Turn ignition switch to OFF.
2) Measure resistance between fuel injector terminals on faulty cylinder.

Terminals
No. 1 — No. 2 :



CHECK : ***Is the resistance less than 1 Ω?***
YES : Replace faulty fuel injector and ECM.
NO : Go to step **10AE5**.

10AE5 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

MEMO:

AF: DTC P0301 — CYLINDER 1 MISFIRE DETECTED —

NOTE:
For the diagnostic procedure, refer to 2-7 [T10AI0]. <Ref. to 2-7 [T10AI0].>

AG: DTC P0302 — CYLINDER 2 MISFIRE DETECTED —

NOTE:
For the diagnostic procedure, refer to 2-7 [T10AI0]. <Ref. to 2-7 [T10AI0].>

AH: DTC P0303 — CYLINDER 3 MISFIRE DETECTED —

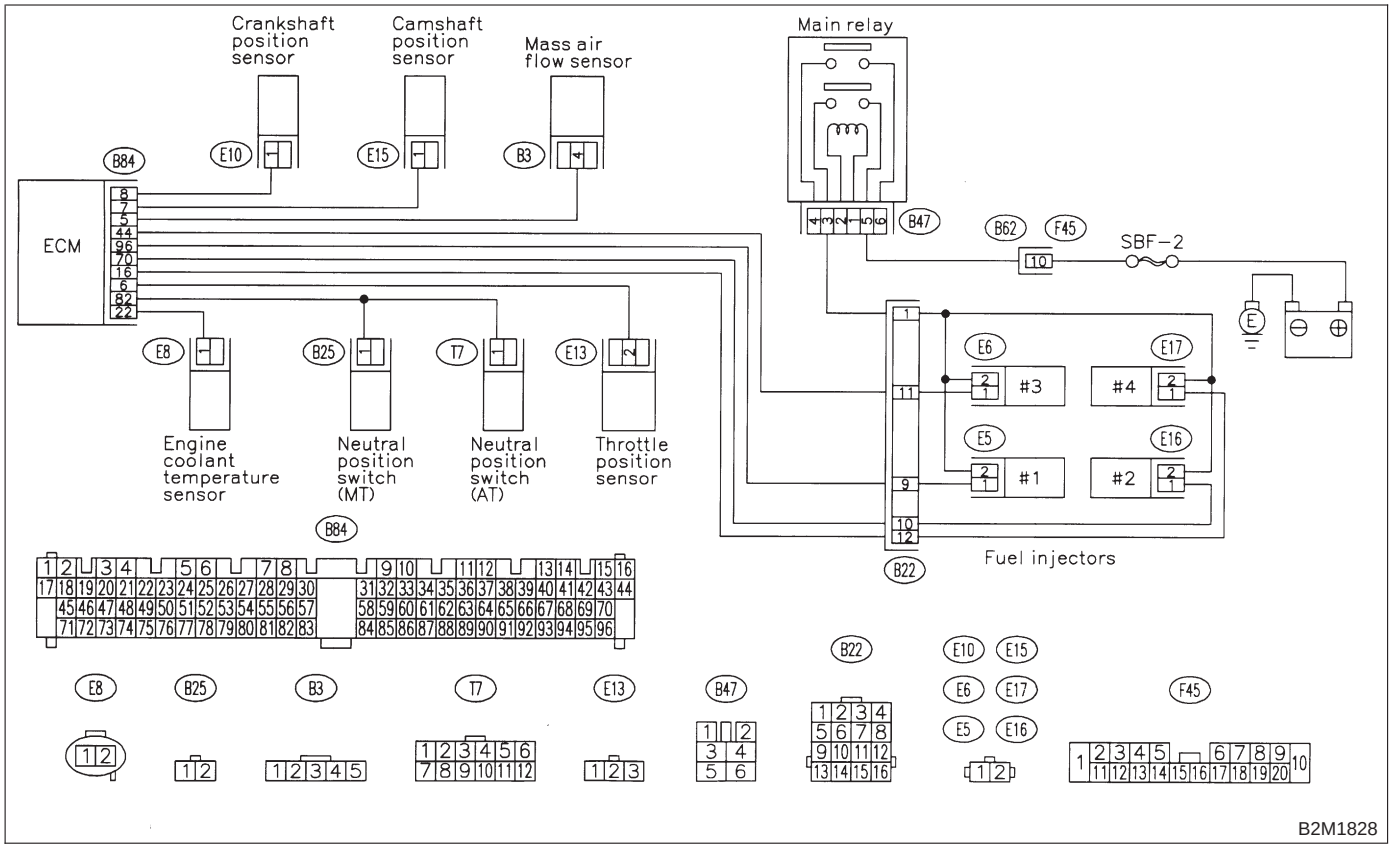
NOTE:
For the diagnostic procedure, refer to 2-7 [T10AI0]. <Ref. to 2-7 [T10AI0].>

AI: DTC P0304 — CYLINDER 4 MISFIRE DETECTED —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
  - Immediately at fault recognition (A misfire which could damage catalyst occurs.)
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Erroneous idling
  - Rough driving

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AI1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0101, P0102, P0103, P0116, P0117, P0125, P0261, P0262, P0264, P0265, P0267, P0268, P0270 or P0271?***

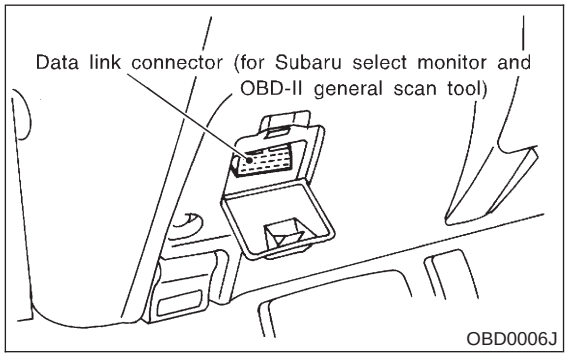
YES : Inspect DTC P0101, P0102, P0103, P0116, P0117, P0125, P0261, P0262, P0264, P0265, P0267, P0268, P0270 or P0271 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0301, P0302, P0303 and P0304.

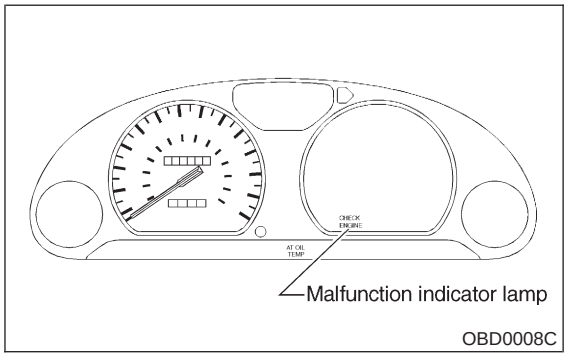
NO : Go to step **10AI2**.

10AI2 : CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor to the data link connector.



3) Clear memory using Subaru Select Monitor. <Ref. to 2-7 [T3D0].>
4) Start engine, and drive the vehicle more than 10 minutes.



CHECK : ***Is the MIL coming on or blinking?***

YES : Go to step **10AI5**.

NO : Go to step **10AI3**.

10AI3 : CHECK AMOUNT OF FUEL.

CHECK : ***Has the vehicle been run empty of fuel?***

YES : Finish diagnostics operation, if the engine has no abnormality.

NO : Go to step **10AI4**.

10AI4 : CHECK CAUSE OF MISFIRE DIAGNOSED.

CHECK : ***Was the cause of misfire diagnosed when the engine is running?***

YES : Finish diagnostics operation, if the engine has no abnormality.

NOTE:
Ex. Remove spark plug cord, etc.

NO : Repair poor contact.

NOTE:
In this case, repair the following:
- Poor contact in ignitor connector
- Poor contact in ignition coil connector
- Poor contact in fuel injector connector on faulty cylinders
- Poor contact in ECM connector
- Poor contact in coupling connector (B22)

10AI5 : CHECK AIR INTAKE SYSTEM.

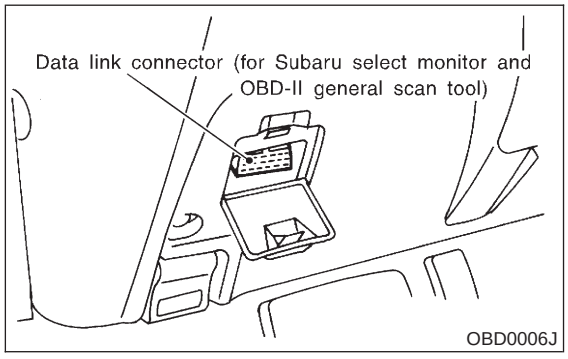
CHECK : ***Is there a fault in air intake system?***
YES : Repair air intake system.

NOTE:
Check the following items:
- Are there air leaks or air suction caused by loose or dislocated nuts and bolts?
- Are there cracks or any disconnection of hoses?

NO : Go to step **10AI6**.

10AI6 : CHECK MISFIRE SYMPTOM.

1) Turn ignition switch to OFF.
2) Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON, and turn Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Read diagnostic trouble code (DTC).
- Subaru Select Monitor

<Ref. to 2-7 [T3C2].>
- OBD-II general scan tool

For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.

NOTE:
Perform diagnosis according to the items listed below.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate only one DTC?***
YES : Go to step **10AI11**.
NO : Go to step **10AI7**.

10AI7 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0301 and P0302?***
YES : Go to step **10AI12**.
NO : Go to step **10AI8**.

10AI8 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0303 and P0304?***
YES : Go to step **10AI13**.
NO : Go to step **10AI9**.

10AI9 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0301 and P0303?***
YES : Go to step **10AI14**.
NO : Go to step **10AI10**.

10AI10 : CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0302 and P0304?***
YES : Go to step **10AI15**.
NO : Go to step **10AI16**.

10AI11 : ONLY ONE CYLINDER

CHECK : ***Is there a fault in that cylinder?***
YES : Repair or replace faulty parts.

NOTE:
Check the following items.
- Spark plug
- Spark plug cord
- Fuel injector
- Compression ratio

NO : Go to step **10AI17**.

10AI12 : GROUP OF #1 AND #2 CYLINDERS

CHECK : ***Are there faults in #1 and #2 cylinders?***

YES : Repair or replace faulty parts.

NOTE:
- Check the following items.
  - Spark plugs
  - Fuel injectors
  - Ignition coil
- If no abnormal is discovered, check for "D: IGNITION CONTROL SYSTEM" of #1 and #2 cylinders side. <Ref. to 2-7 [T8D0].>

NO : Go to step **10AI17**.

10AI13 : GROUP OF #3 AND #4 CYLINDERS

CHECK : ***Are there faults in #3 and #4 cylinders?***

YES : Repair or replace faulty parts.

NOTE:
- Check the following items.
  - Spark plugs
  - Fuel injectors
  - Ignition coil
- If no abnormal is discovered, check for "D: IGNITION CONTROL SYSTEM" of #3 and #4 cylinders side. <Ref. to 2-7 [T8D0].>

NO : Go to step **10AI17**.

10AI14 : GROUP OF #1 AND #3 CYLINDERS

CHECK : ***Are there faults in #1 and #3 cylinders?***

YES : Repair or replace faulty parts.

NOTE:
Check the following items.
- Spark plugs
- Fuel injectors
- Skipping timing belt teeth

NO : Go to step **10AI17**.

10AI15 : GROUP OF #2 AND #4 CYLINDERS

CHECK : ***Are there faults in #2 and #4 cylinders?***

YES : Repair or replace faulty parts.

NOTE:
Check the following items.
- Spark plugs
- Fuel injectors
- Skipping timing belt teeth

NO : Go to step **10AI17**.

10AI16 : CYLINDER AT RANDOM

CHECK : ***Is the engine idle rough?***

YES : Go to step **10AI17**.

NO : Go to DTC P0170. <Ref. to 2-7 [T10T3].>, <Ref. to 2-7 [T10T4].> and <Ref. to 2-7 [T10T5].>

10AI17 : PERFORM CONFIRMATION OF ACTUAL DRIVING PATTERN.

1) Conduct CLEAR MEMORY and INSPECTION MODE. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>
2) Start and warm-up the engine until the radiator fan makes one complete rotation. (All accessory switches are OFF.)
3) Turn Subaru select monitor switch to ON.
4) Operate the LED operation mode for engine.
   (1) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
   (2) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
   (3) Press the [YES] key after displayed the information of engine type.
   (4) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {1. Current Data Display & Save} and press the [YES] key.
   (5) On the ┌Data Display Menu┘ display screen, select the {2. 6 Data & LED Display} and press the [YES] key.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

5) Run at the speed of 88±5 km/h (55±3 MPH) until the LED of {EGR System Diagnosis} comes on.

NOTE:
● Keep the throttle valve opening at the same degree, since diagnosis will be interrupted when the opening varies. Diagnosis starts in 190 seconds after starting engine and takes 4 seconds.
● Put the gear to “5th” gear position (MT) or “D” range (AT) for the diagnosis.

CHECK : ***Has the LED come on?***
YES : Go to step **10AI18**.
NO : Go to step **10AI17**.

10AI18 : CHECK EGR SYSTEM.

1) Put up the vehicle.
2) Read data of maximum and minimum EGR system pressure using Subaru Select Monitor.
   (1) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
   (2) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
   (3) On the [YES] key after displayed the information of engine type.
   (4) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {5. Display of Diagnosis} and press the [YES] key.
   (5) On the ┌Display of Diagnosis┘ display screen, select the {EGR System Diagnosis} and press the [YES] key.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

CHECK : ***Is the minimum EGR system pressure value less than 1 kPa?***
YES : Clean EGR valve.

CAUTION:
Do not use solvent when cleaning EGR valve assembly, as it can damage diaphragm.

NOTE:
● Remove and blow away the exhaust deposits. Make sure the valve operates smoothly and the valve seat area is completely cleaned.
● Replace EGR valve as required.

NO : Go to DTC P0170. <Ref. to 2-7 [T10T3].>, <Ref. to 2-7 [T10T4].> and <Ref. to 2-7 [T10T5].>

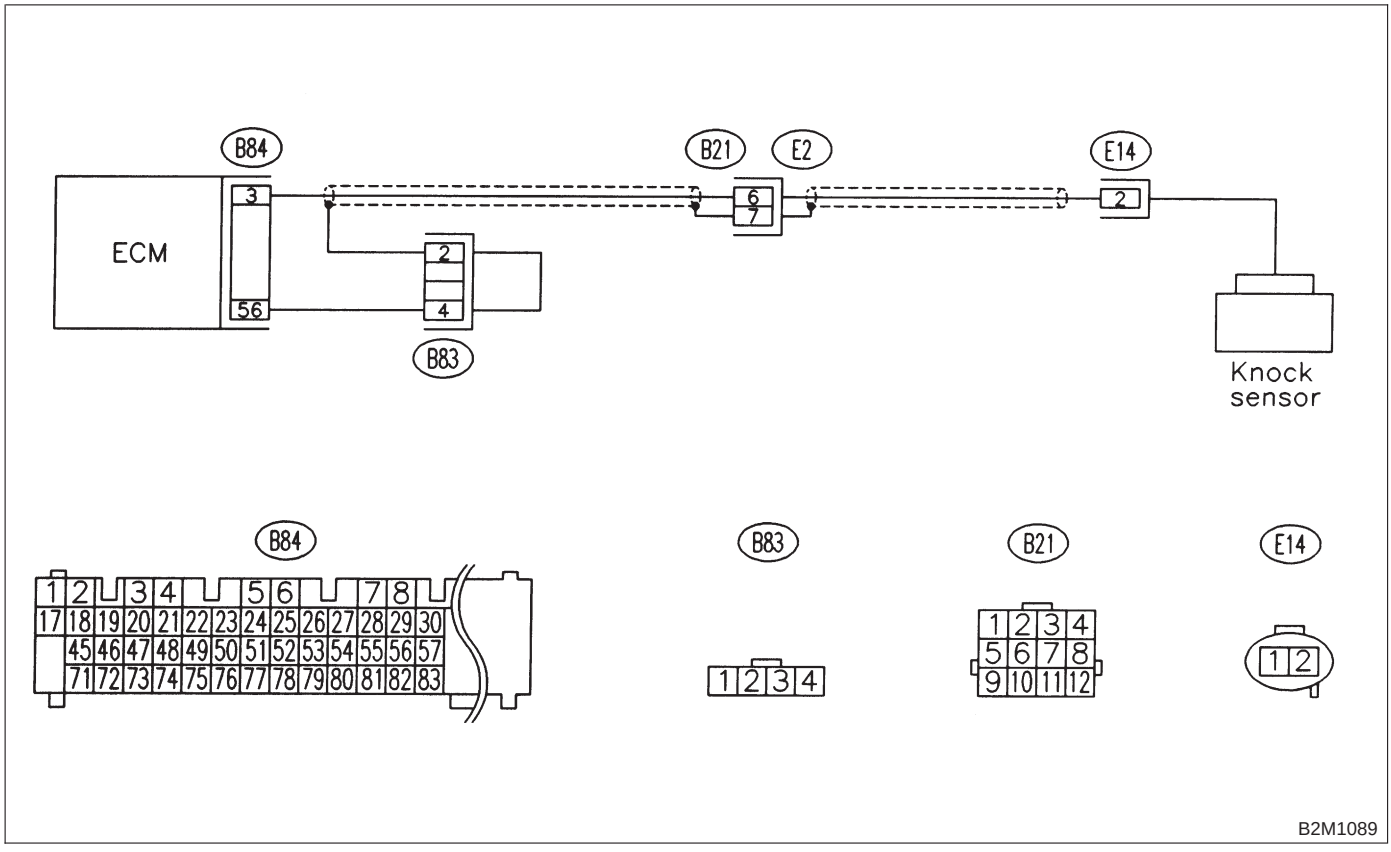
MEMO:

AJ: DTC P0325 — KNOCK SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Poor driving performance
  - Knocking occurs.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

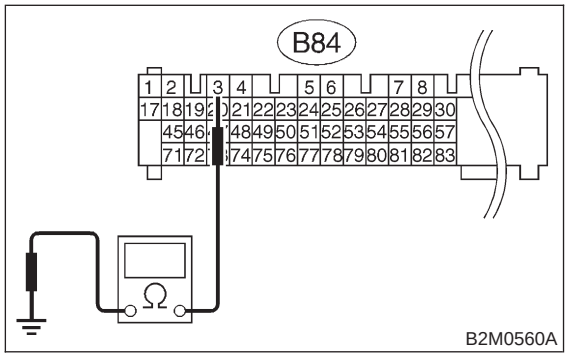
- **WIRING DIAGRAM:**



10AJ1 : CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance between ECM harness connector and chassis ground.

Connector & terminal
(B84) No. 3 — Chassis ground:

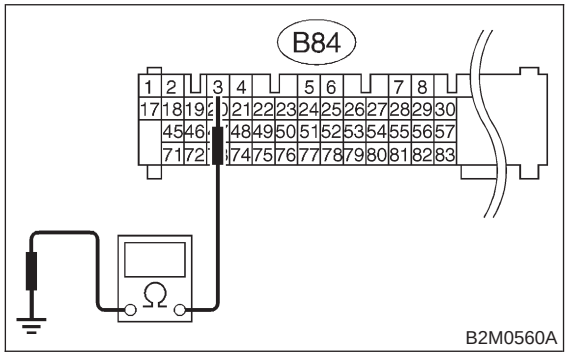


CHECK : ***Is the resistance more than 700 kΩ?***
YES : Go to step **10AJ3**.
NO : Go to step **10AJ2**.

10AJ2 : CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.

Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B84) No. 3 — Chassis ground:

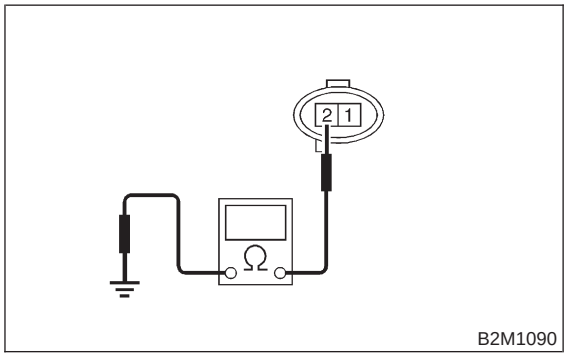


CHECK : ***Is the resistance less than 400 kΩ?***
YES : Go to step **10AJ5**.
NO : Go to step **10AJ6**.

10AJ3 : CHECK KNOCK SENSOR.

1) Disconnect connector from knock sensor.
2) Measure resistance between knock sensor connector terminal and engine ground.

Terminal
No. 2 — Engine ground:



CHECK : ***Is the resistance more than 700 kΩ?***
YES : Go to step **10AJ4**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between knock sensor and ECM connector
- Poor contact in knock sensor connector
- Poor contact in coupling connector (B21)

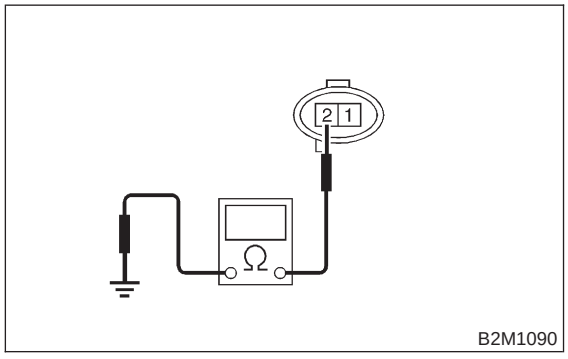
10AJ4 : CHECK CONDITION OF KNOCK SENSOR INSTALLATION.

CHECK : ***Is the knock sensor installation bolt tightened securely?***
YES : Replace knock sensor.
NO : Tighten knock sensor installation bolt securely.

10AJ5 : CHECK KNOCK SENSOR.

1) Disconnect connector from knock sensor.
2) Measure resistance between knock sensor connector terminal and engine ground.

Terminal
No. 2 — Engine ground:



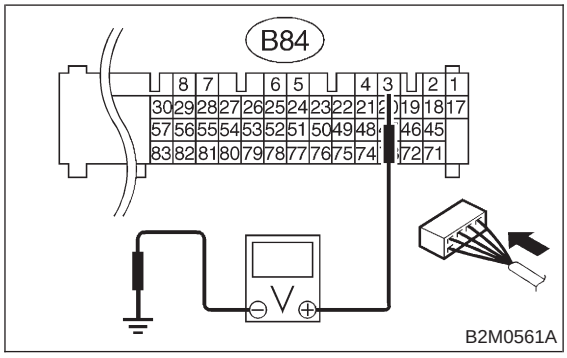
CHECK : ***Is the resistance less than 400 kΩ?***
YES : Replace knock sensor.
NO : Repair ground short circuit in harness between knock sensor connector and ECM connector.

NOTE:
The harness between both connectors is shielded. Repair short circuit of harness together with shield.

10AJ6 : CHECK INPUT SIGNAL FOR ECM.

1) Connect connectors to ECM and knock sensor.
2) Turn ignition switch to ON.
3) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 3 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 2 V?***
YES : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

NOTE:
In this case, repair the following:
- Poor contact in knock sensor connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

NO : Repair poor contact in ECM connector.

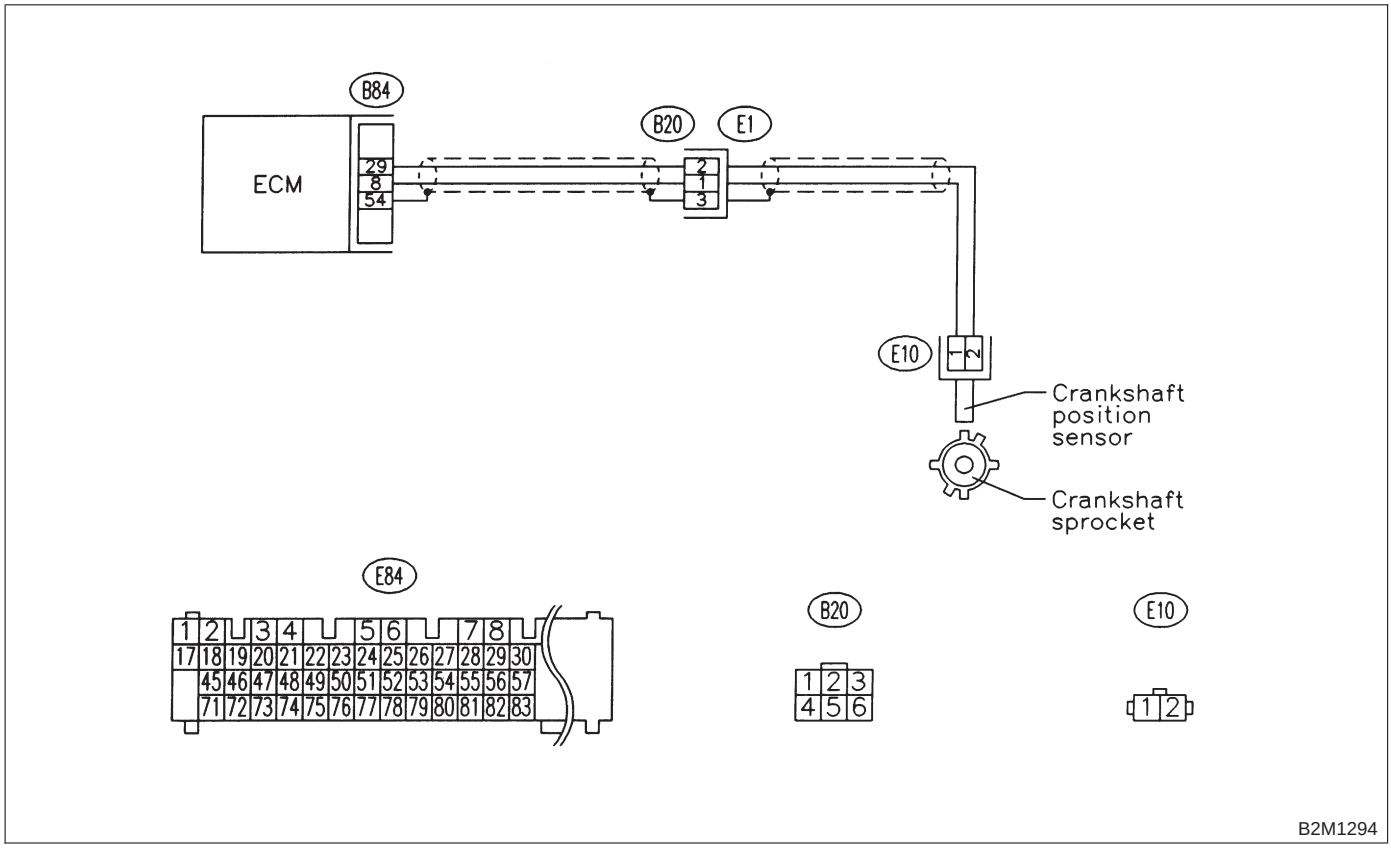
MEMO:

AK: DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

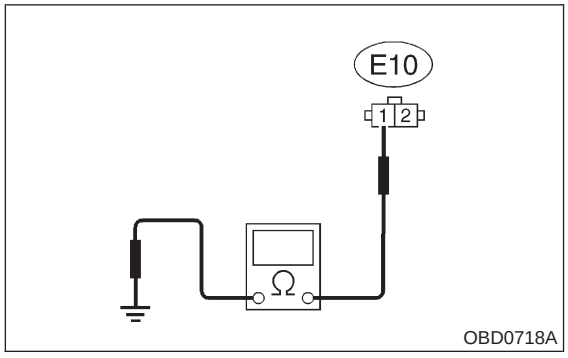
- **WIRING DIAGRAM:**



10AK1 : CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from crankshaft position sensor.
3) Measure resistance of harness between crankshaft position sensor connector and engine ground.

Connector & terminal
(E10) No. 1 — Engine ground:



CHECK : ***Is the resistance more than 100 kΩ?***
YES : Repair harness and connector.

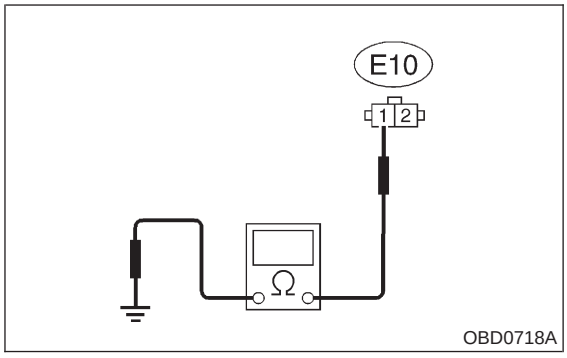
NOTE:
In this case, repair the following:
- Open circuit in harness between crankshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B20)

NO : Go to step **10AK2**.

10AK2 : CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between crankshaft position sensor connector and engine ground.

Connector & terminal
(E10) No. 1 — Engine ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between crankshaft position sensor and ECM connector.

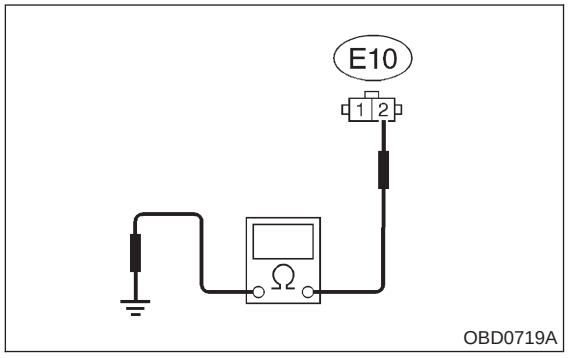
NOTE:
The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.

NO : Go to step **10AK3**.

10AK3 : CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between crankshaft position sensor connector and engine ground.

Connector & terminal
(E10) No. 2 — Engine ground:



CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **10AK4**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between crankshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B20)

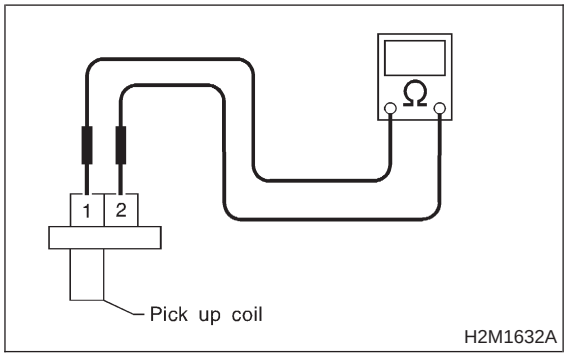
10AK4 : CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.

CHECK : ***Is the crankshaft position sensor installation bolt tightened securely?***
YES : Go to step **10AK5**.
NO : Tighten crankshaft position sensor installation bolt securely.

10AK5 : CHECK CRANKSHAFT POSITION SENSOR.

1) Remove crankshaft position sensor.
2) Measure resistance between connector terminals of crankshaft position sensor.

Terminals
No. 1 — No. 2:



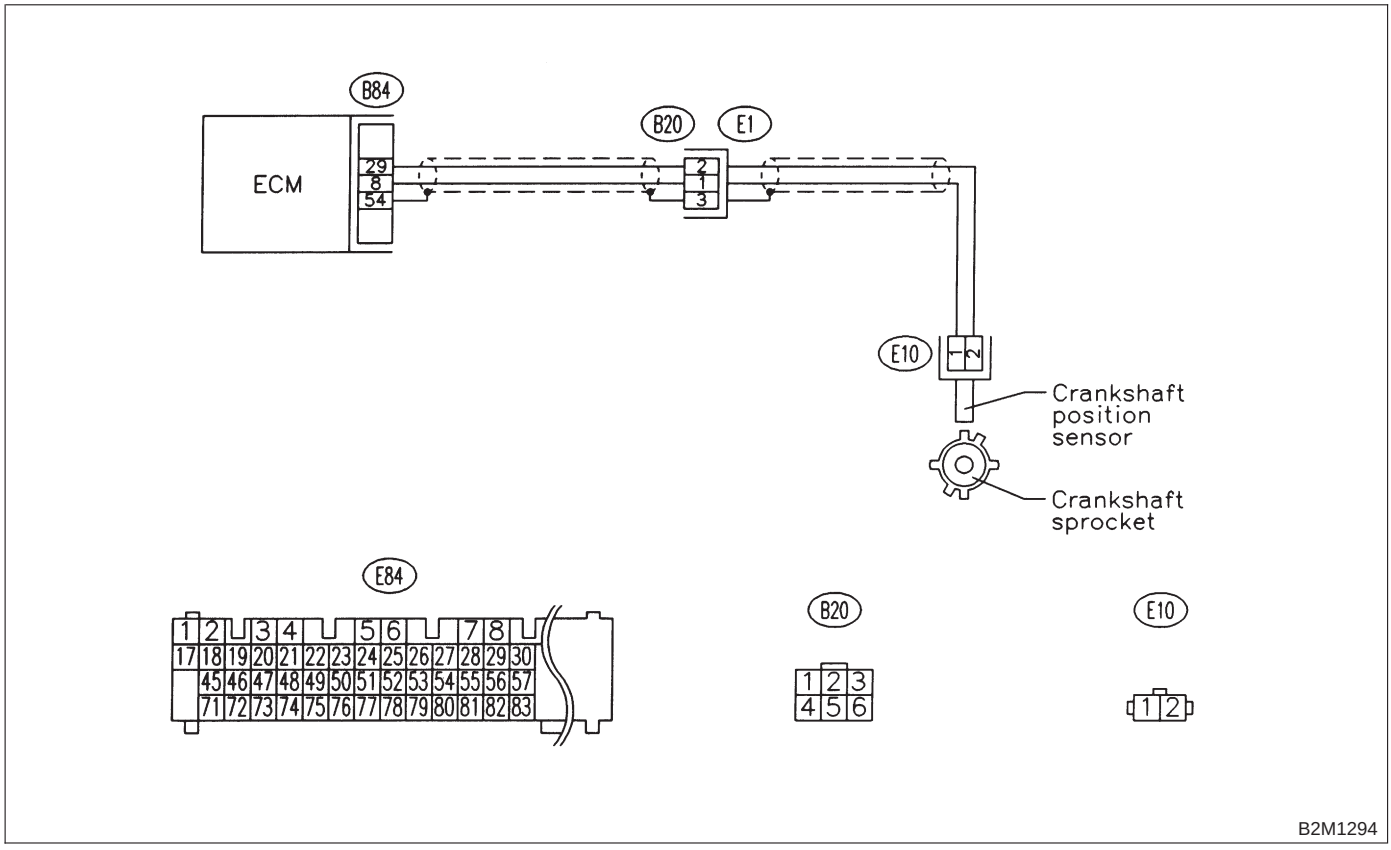
CHECK : ***Is the resistance between 1 and 4 kΩ?***
YES : Repair poor contact in crankshaft position sensor connector.
NO : Replace crankshaft position sensor.

AL: DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AL1 :	**CHECK ANY OTHER DTC ON DISPLAY.**

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0335?***

YES : Inspect DTC P0335 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

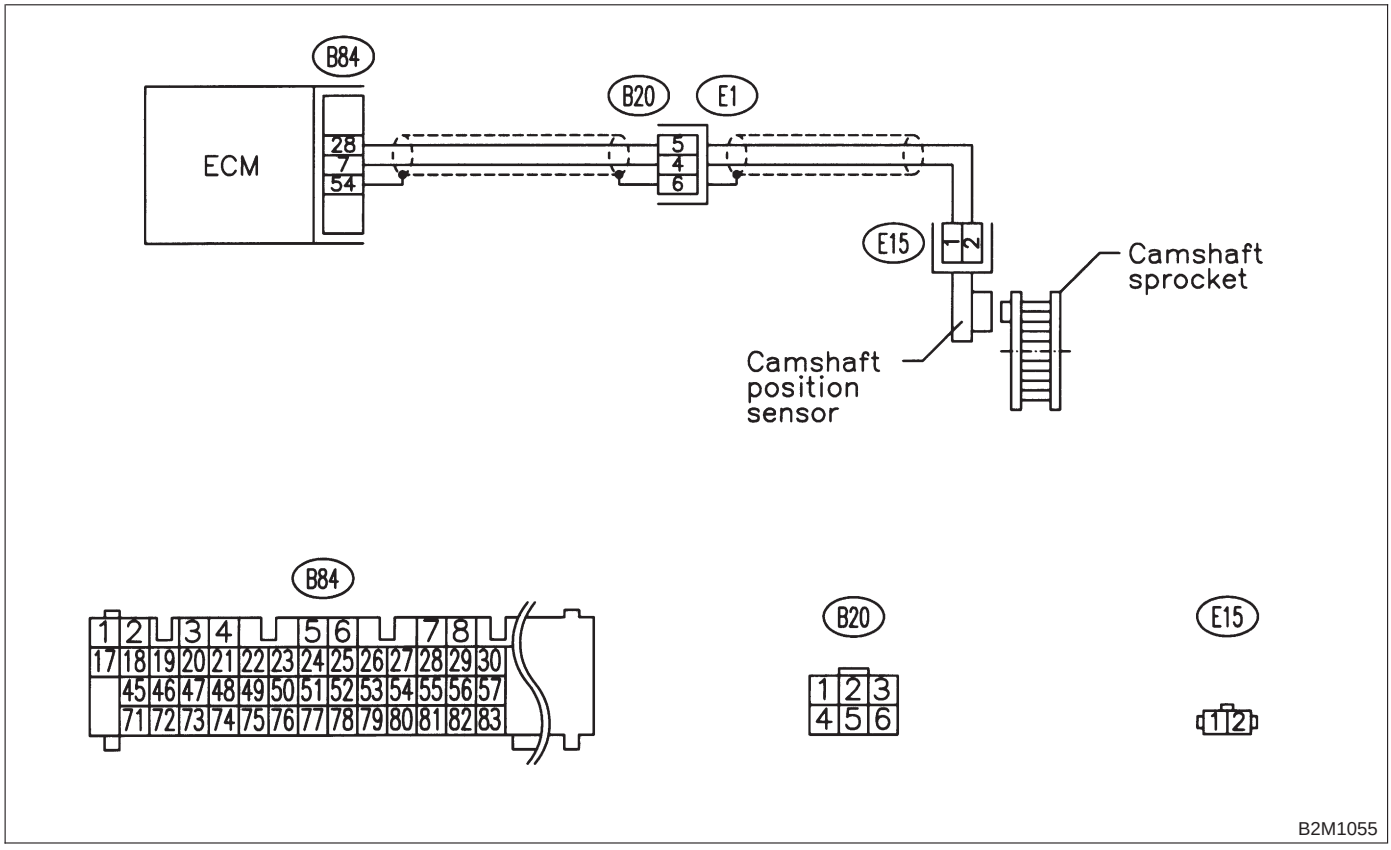
NO : Replace crankshaft position sensor.

AM: DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

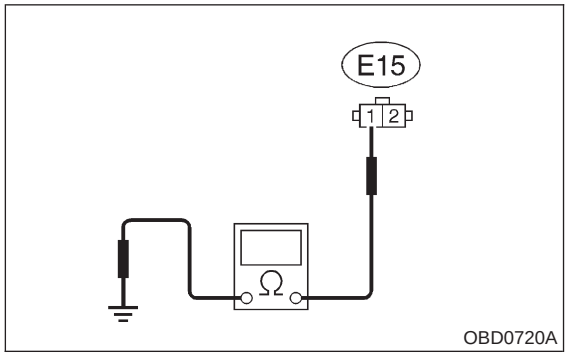
- **WIRING DIAGRAM:**



10AM1 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from camshaft position sensor.
3) Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal
(E15) No. 1 — Engine ground:



CHECK : ***Is the resistance more than 100 kΩ?***
YES : Repair harness and connector.

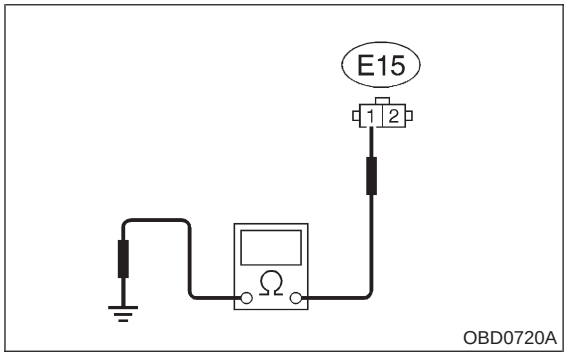
NOTE:
In this case, repair the following:
- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B20)

NO : Go to step **10AM2**.

10AM2 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal
(E15) No. 1 — Engine ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between camshaft position sensor and ECM connector.

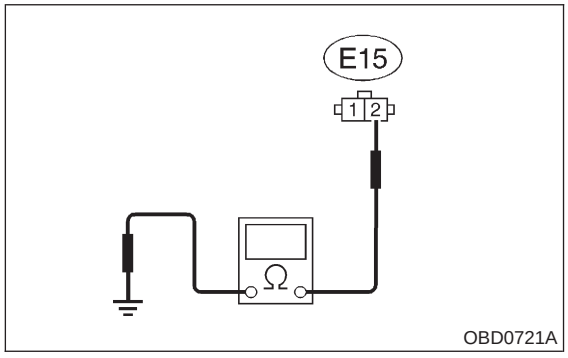
NOTE:
The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.

NO : Go to step **10AM3**.

10AM3 : CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.

Measure resistance of harness between camshaft position sensor connector and engine ground.

Connector & terminal
(E15) No. 2 — Engine ground:



CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **10AM4**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between camshaft position sensor and ECM connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B20)

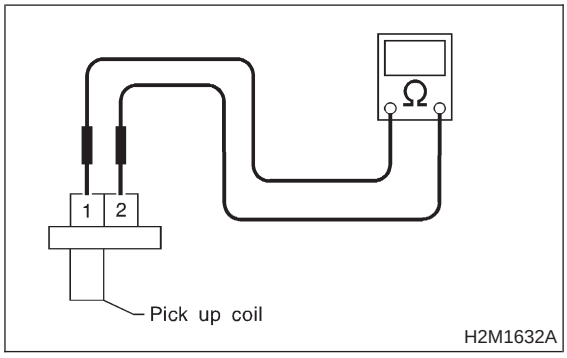
10AM4 : CHECK CONDITION OF CAMSHAFT POSITION SENSOR.

CHECK : ***Is the camshaft position sensor installation bolt tightened securely?***
YES : Go to step **10AM5**.
NO : Tighten camshaft position sensor installation bolt securely.

10AM5 : CHECK CAMSHAFT POSITION SENSOR.

1) Remove camshaft position sensor.
2) Measure resistance between connector terminals of camshaft position sensor.

Terminals
No. 1 — No. 2:



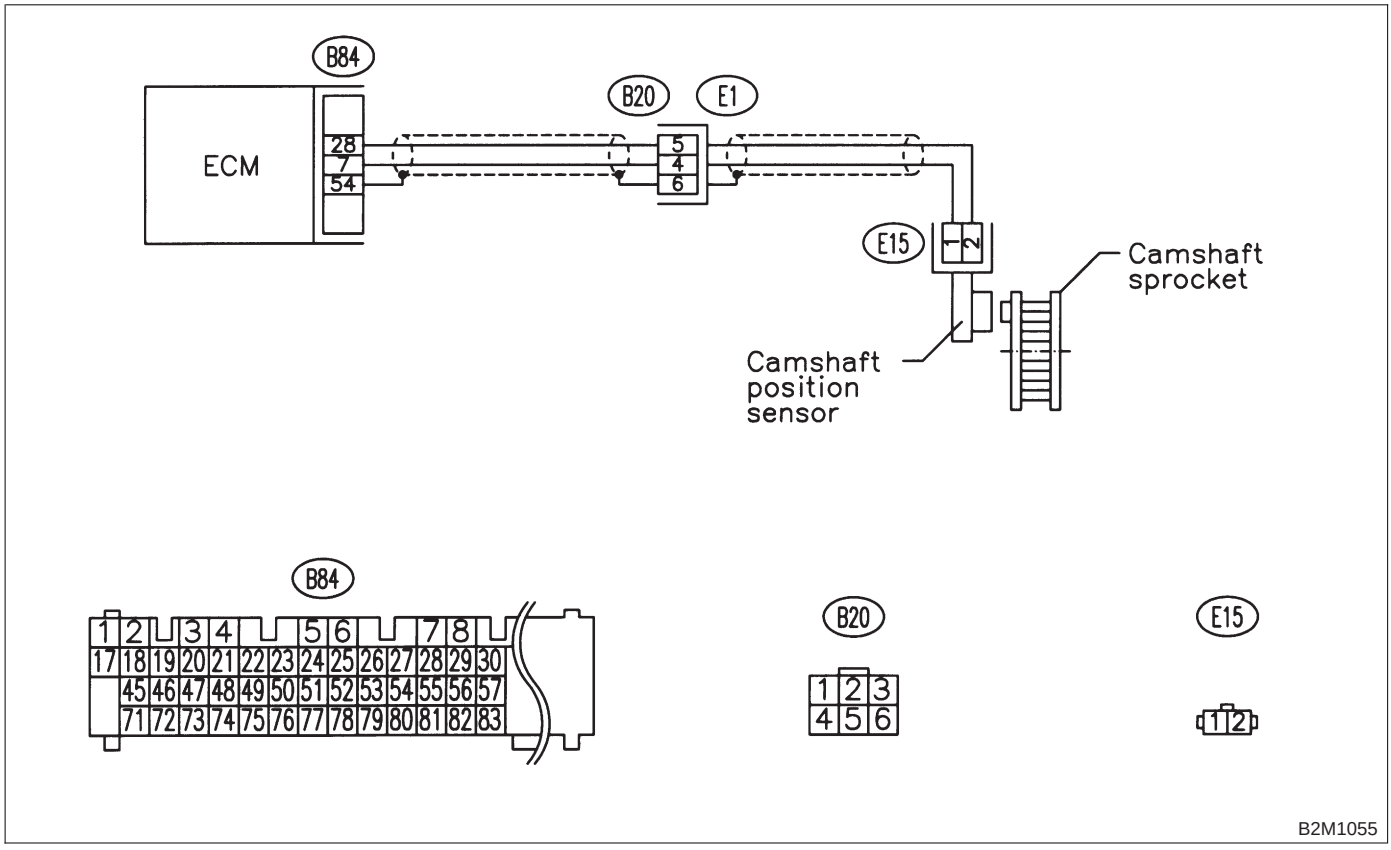
CHECK : ***Is the resistance between 1 and 4 kΩ?***
YES : Repair poor contact in camshaft position sensor connector.
NO : Replace camshaft position sensor.

AN: DTC P0341 — CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AN1 :	**CHECK ANY OTHER DTC ON DISPLAY.**

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0340?***

YES : Inspect DTC P0340 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

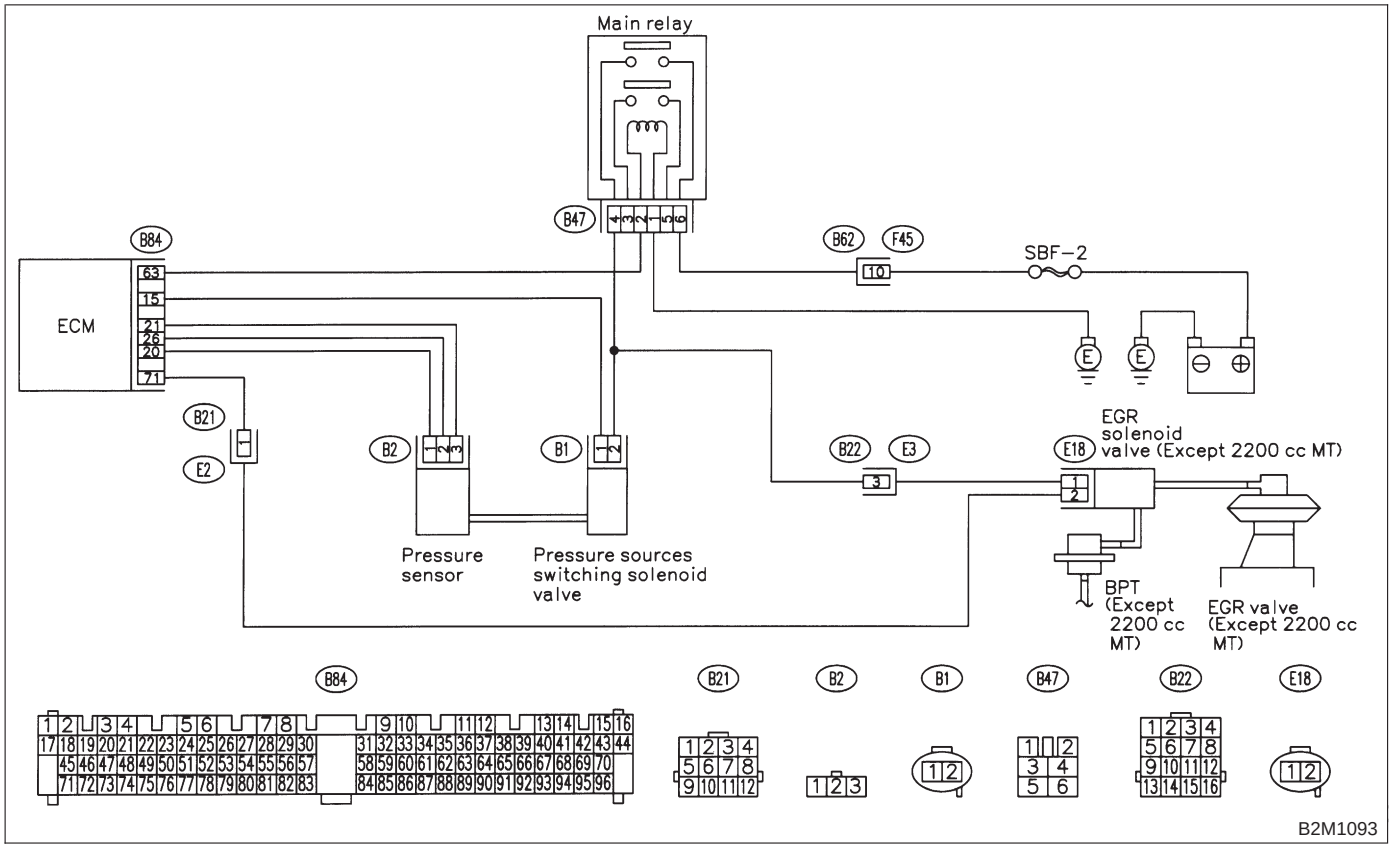
NO : Replace camshaft position sensor.

AO: DTC P0400 — EXHAUST GAS RECIRCULATION FLOW MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Poor driving performance on low engine speed

CAUTION:
Before confirmation of actual driving pattern, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AO1 : CHECK ENGINE/TRANSMISSION TYPE.

CHECK : ***Is engine/transmission type 2200 cc/MT?***

YES : Check AT/MT identification circuit. <Ref. to 2-7 [T10DG0].>

NO : Go to step **10AO2**.

10AO2 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P0403, P1102, P1122 or P1421?***

YES : Inspect DTC P0106, P0107, P0108, P0403, P1102, P1122 or P1421 using "10. Diagnostics Chart with Trouble Code for LHD Vehicles". <Ref. to 2-7 [T1000].>

NOTE:
Manually check that EGR valve diaphragm is not stuck.

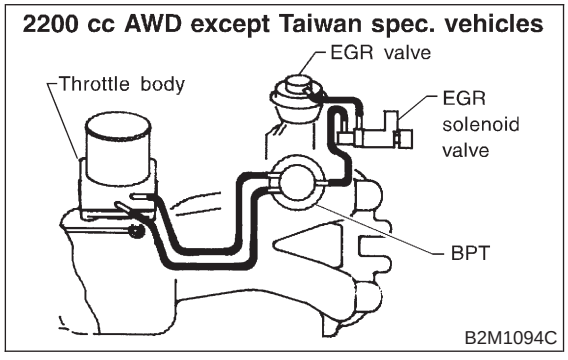
WARNING:
Be careful when checking EGR valve, since it may be extremely hot.

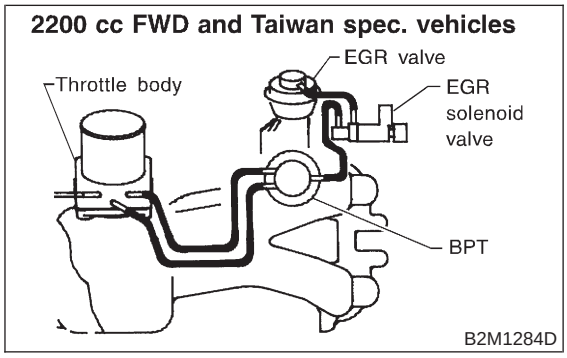
NOTE:
In this case, it is not necessary to inspect DTC P0400. After checking the above item, go to **CONFIRMATION OF ACTUAL DRIVING PATTERN**. <Ref. to 2-7 [T10AO7].>

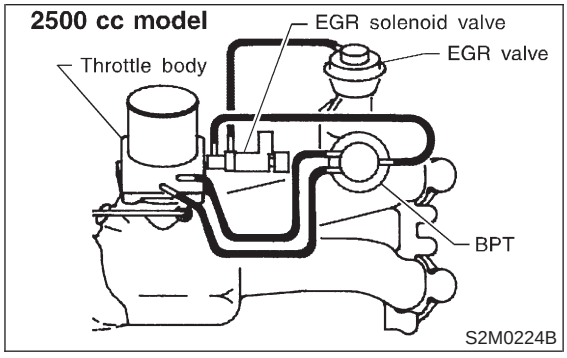
NO : Go to step **10AO3**.

10AO3 : CHECK VACUUM LINE.

Check the following items.
- Disconnection, leakage and clogging of the two vacuum hoses and pipes between throttle body and BPT
- Disconnection, leakage and clogging of the vacuum hose and pipe between EGR solenoid valve and BPT
- Disconnection, leakage and clogging of the vacuum hose between EGR solenoid valve and EGR valve
- Disconnection, leakage and clogging of BPT pressure transmitting hose







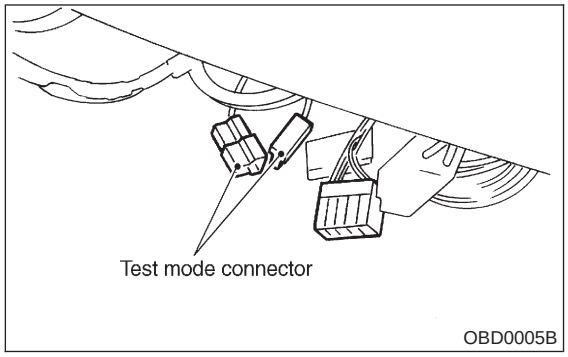
CHECK : ***Is there a fault in vacuum line?***

YES : Repair or replace hoses and pipes. And after the checking and repairing, go to **CONFIRMATION OF ACTUAL DRIVING PATTERN**. <Ref. to 2-7 [T10AO7].>

NO : Go to step **10AO4**.

10AO4 : CHECK OPERATION OF EGR SYSTEM.

1) Turn ignition switch to OFF.
2) Connect the test mode connector.



3) Turn ignition switch to ON.

NOTE:
EGR control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

CHECK : ***Does EGR solenoid valve produce operating sound?***

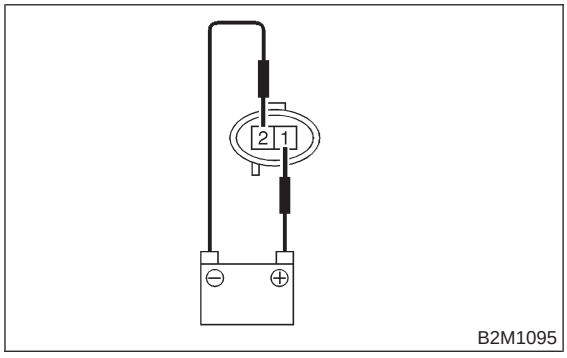
YES : Go to step **10AO5**.

NO : Replace EGR solenoid valve.

10AO5 : CHECK EGR VALVE.

1) Turn ignition switch to OFF.
2) Disconnect connector from EGR solenoid valve.
3) Connect 12 V battery's ground (−) terminal to one terminal of the EGR solenoid valve. Then connect 12 V battery's (+) terminal to the other terminal of it.

CAUTION:
Do not use the 12 V battery installed in the vehicle, because the electrical system may be damaged.



4) Start the engine.

CHECK : ***Does EGR valve operate at a throttle valve opening of 5 to 10 degrees with visually check?***

YES : Possibly EGR valve malfunction may be due to freezing or clogging by foreign matter. At this point in time do not replace EGR valve, since it is not faulty. And after the checking, go to **CONFIRMATION OF ACTUAL DRIVING PATTERN**. <Ref. to 2-7 [T10AO7].>

NOTE:
If malfunction is detected again in the confirmation of actual driving pattern, EGR valve is faulty. Go to step **10AO6**.

NO : Go to step **10AO6**.

10AO6 : CHECK MECHANICAL TROUBLE.

Turn ignition switch to OFF.

CHECK : ***Is there clogging in the gas outlets of intake manifold or cylinder head, checking by breathing into the outlets?***

YES : Repair or replace intake manifold or cylinder head. And go to **CONFIRMATION OF ACTUAL DRIVING PATTERN**. <Ref. to 2-7 [T10AO7].>

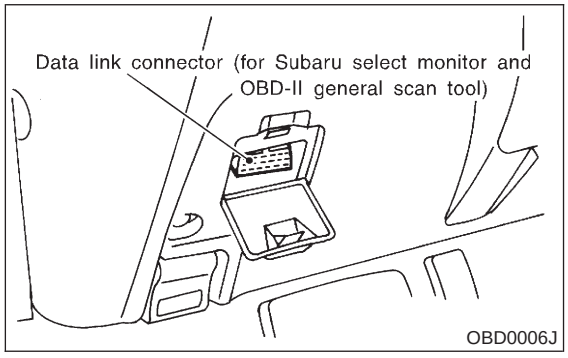
NO : Clean EGR valve. And go to **CONFIRMATION OF ACTUAL DRIVING PATTERN**. <Ref. to 2-7 [T10AO7].>

CAUTION:
Do not use solvent when cleaning EGR valve assembly, as it can damage diaphragm.

NOTE:
● Remove and blow away the exhaust deposits. Make sure the valve operates smoothly and the valve seat area is completely cleaned.
● Replace EGR valve as required.

10AO7 : CONFIRMATION OF ACTUAL DRIVING PATTERN.

1) Connect Subaru select monitor to its data link connector.



2) Conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>
3) Start and warm-up the engine until the radiator fan makes one complete rotation. (All accessory switches are OFF.)
4) Turn Subaru select monitor switch to ON.
5) Operate the LED operation mode for engine.
(1) On the ┌Main Menu┘ display screen, select the {2. Each System Check} and press the [YES] key.
(2) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
(3) Press the [YES] key after displayed the information of engine type.
(4) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {1. Current Data Display & Save} and press the [YES] key.
(5) On the ┌Data Display Menu┘ display screen, select the {2. 6 Data & LED Display} and press the [YES] key.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

6) Run at the speed of 88±5 km/h (55±3 MPH) until the LED of {EGR System Diagnosis} comes on.

NOTE:
● Keep the throttle valve opening at the same degree, since diagnosis will be interrupted when the opening varies. Diagnosis starts in 190 seconds after starting engine and takes 4 seconds.
● Put the gear to “5th” gear position (MT) or “D” range (AT) for the diagnosis.

7) Read DTC using Subaru select monitor.
(1) On the ┌Main Menu┘ display screen, select the {2. Check of Each System} and press the [YES] key.
(2) On the ┌System Selection Menu┘ display screen, select the {EGI/EMPi} and press the [YES] key.
(3) Press the [YES] key after displayed the information of engine type.
(4) On the ┌EGI/EMPI Diagnosis┘ display screen, select the {7. OBD System} and press the [YES] key.
(5) On the ┌OBD Menu┘ display screen, select the {6. Temporary code inspect} and press the [YES] key.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

8) Confirm the “No Temporary Diagnostic Code” indication on Subaru select monitor.

CHECK : ***Does the Subaru select monitor indicate any other DTC on display?***

YES : Inspect the relevant DTC using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

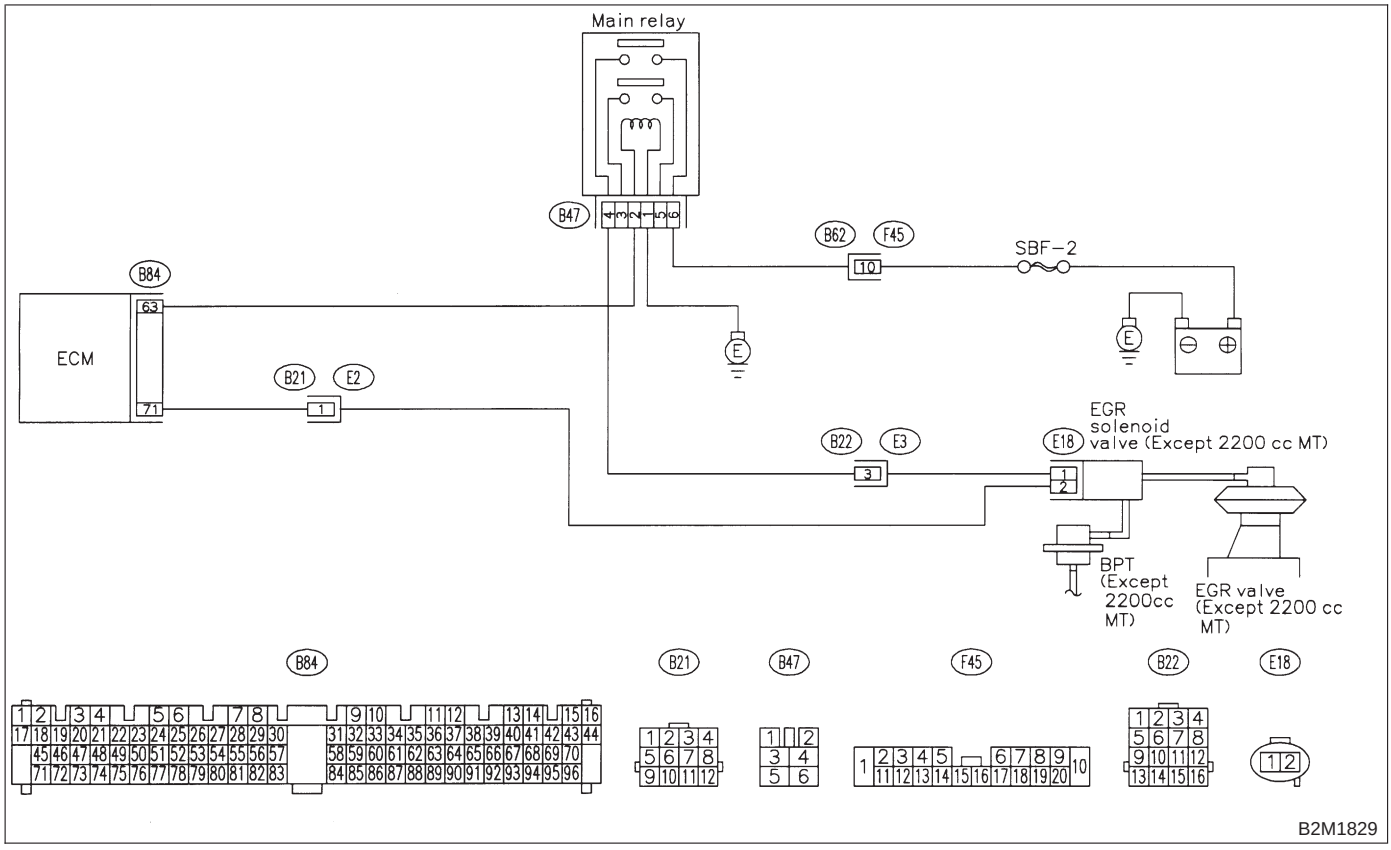
NO : End of diagnosis.

AP: DTC P0403 — EXHAUST GAS RECIRCULATION CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Poor driving performance on low engine speed

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AP1 : CHECK ENGINE/TRANSMISSION TYPE.

CHECK : ***Is engine/transmission type 2200 cc/MT?***

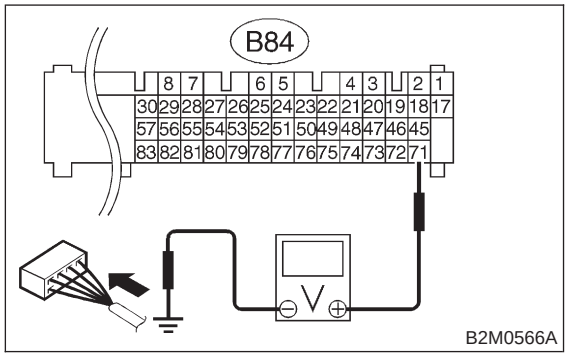
YES : Check AT/MT identification circuit. <Ref. to 2-7 [T10DG0].>

NO : Go to step **10AP2**.

10AP2 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 71 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10AP3**.
NO : Go to step **10AP4**.

10AP3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

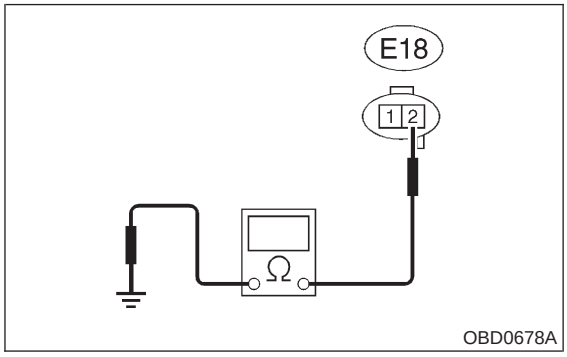
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

NOTE:
In this case, repair the following:
- Poor contact in EGR solenoid valve connector
- Poor contact in ECM connector
- Poor contact in coupling connector (B21)

10AP4 : CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from EGR solenoid valve and ECM.
3) Measure resistance of harness between EGR solenoid valve connector and engine ground.

Connector & terminal
(E18) No. 2 — Engine ground:

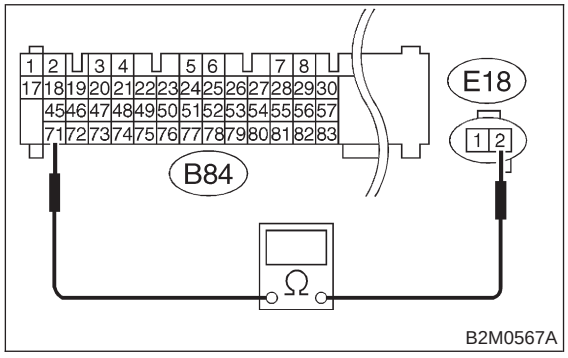


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and EGR solenoid valve connector.
NO : Go to step **10AP5**.

10AP5 : CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and EGR solenoid valve connector.

Connector & terminal
(B84) No. 71 — (E18) No. 2:



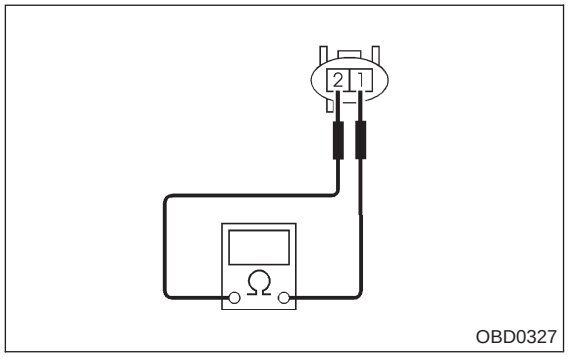
CHECK : ***Is the voltage less than 1 Ω?***
YES : Go to step **10AP6**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between EGR solenoid valve and ECM connector
- Poor contact in coupling connector (B21)
- Poor contact in EGR solenoid valve connector
- Poor contact in ECM connector

10AP6 : CHECK EGR SOLENOID VALVE.

Measure resistance between EGR solenoid valve terminals.

Terminals
No. 1 — No. 2:

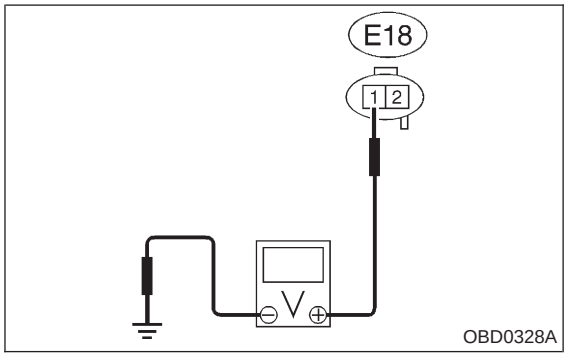


CHECK : ***Is the resistance between 10 and 100 Ω?***
YES : Go to step **10AP7**.
NO : Replace EGR solenoid valve.

10AP7 : CHECK POWER SUPPLY TO EGR SOLENOID VALVE.

1) Turn ignition switch to ON.
2) Measure voltage between EGR solenoid valve and engine ground.

Connector & terminal
(E18) No. 1 (+) — Engine ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10AP8**.
NO : Repair open circuit in harness between main relay and EGR solenoid valve connector.

10AP8 : CHECK POOR CONTACT.

Check poor contact in EGR solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in EGR solenoid valve connector?***
YES : Repair poor contact in EGR solenoid valve connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

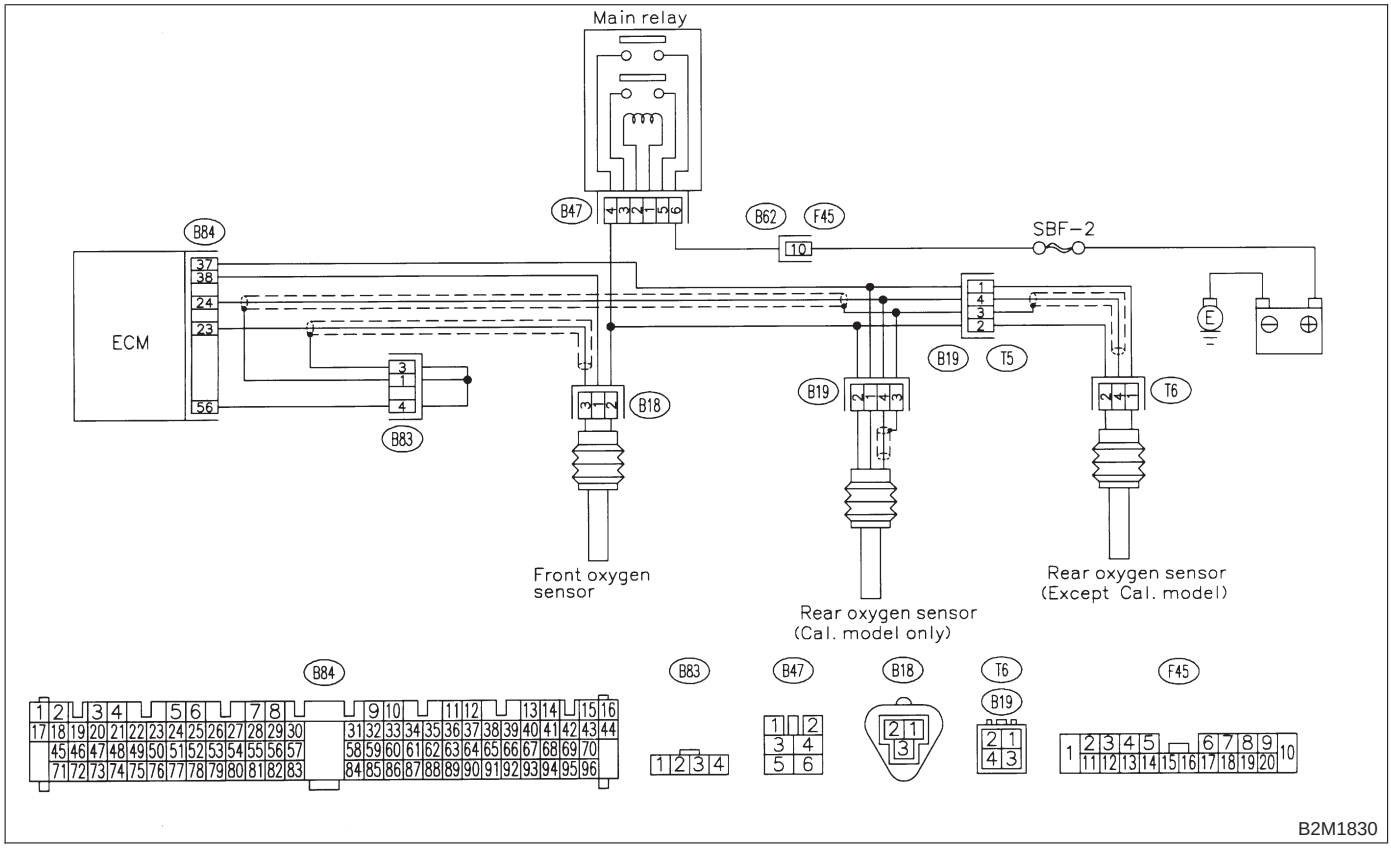
MEMO:

AQ: DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition (2200 cc Federal spec. vehicles only)
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Engine stalls.
  - Idle mixture is out of specifications.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AQ1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0130, P0133, P0135, P0136, P0139 and P0141?***

YES : Inspect the relevant DTC using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0420.

NO : Go to step **10AQ2**.

10AQ2 : CHECK EXHAUST SYSTEM.

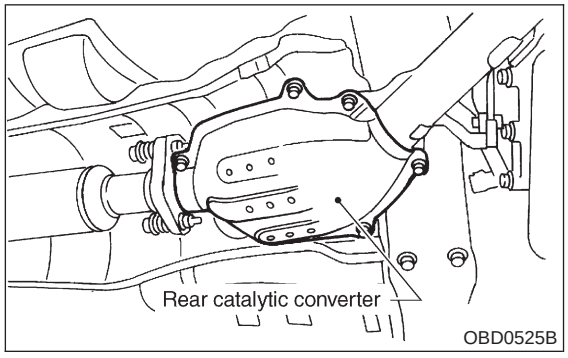
Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes.

NOTE:
Check the following positions.
- Between cylinder head and front exhaust pipe
- Between front exhaust pipe and front catalytic converter
- Between front catalytic converter and rear catalytic converter

CHECK : ***Is there a fault in exhaust system?***
YES : Repair or replace exhaust system.
NO : Go to step **10AQ3**.

10AQ3 : CHECK REAR CATALYTIC CONVERTER.

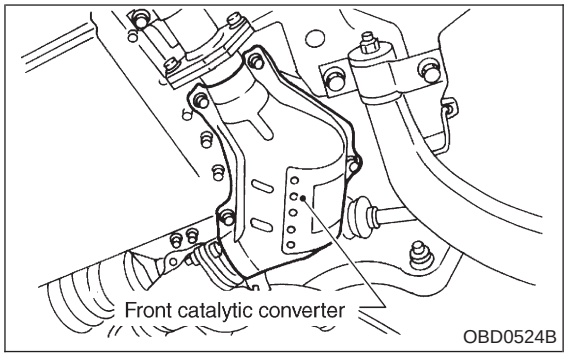
Separate rear catalytic converter from rear exhaust pipe.



CHECK : ***Is there damage at rear face of rear catalyst?***
YES : Replace front and rear catalytic converters.
NO : Go to step **10AQ4**.

10AQ4 : CHECK FRONT CATALYTIC CONVERTER.

Remove front catalytic converter.



CHECK : ***Is there damage at rear face or front face of front catalyst?***
YES : Replace front catalytic converter.
NO : Contact with SOA service.

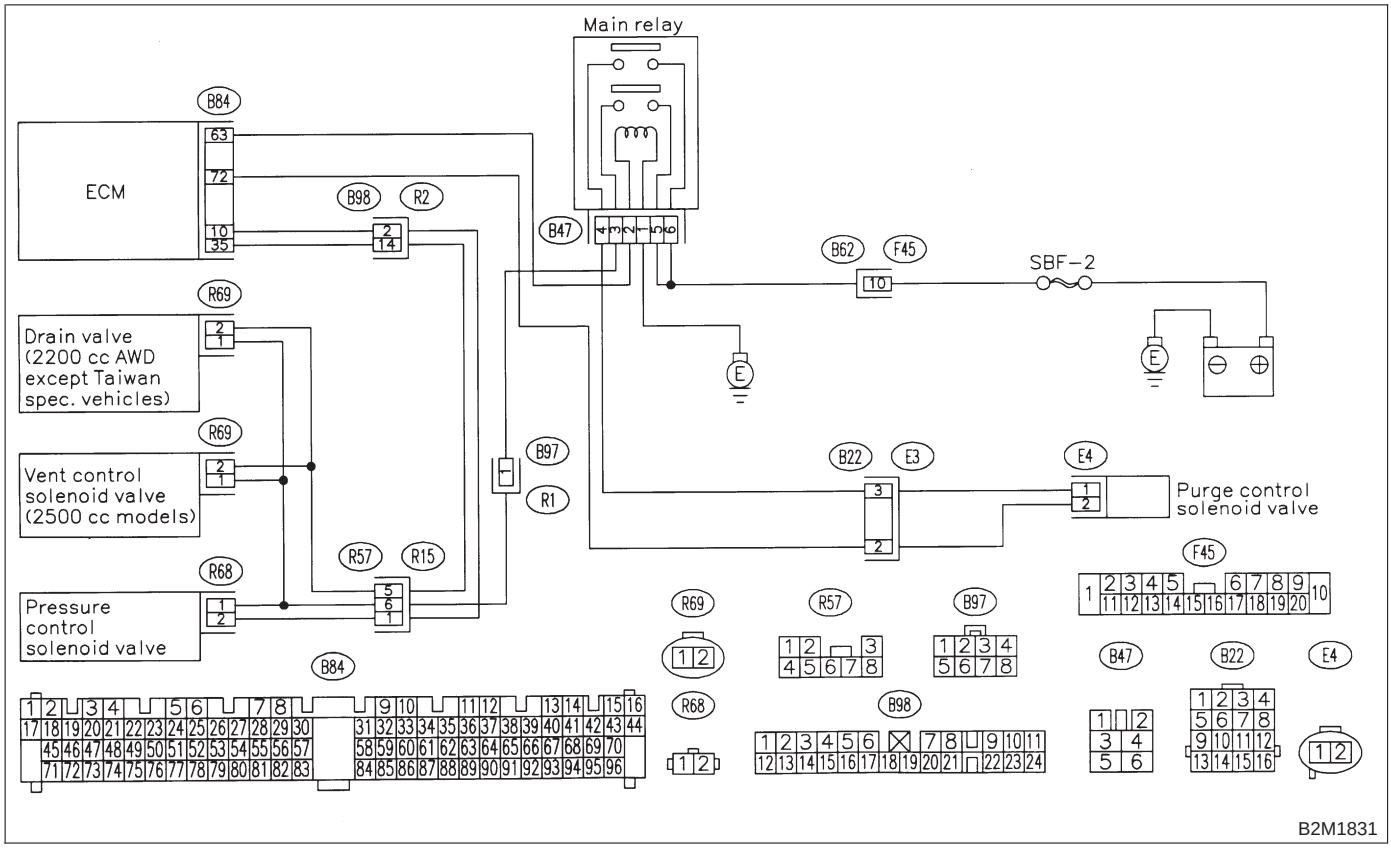
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AR: DTC P0440 — EVAPORATIVE EMISSION CONTROL SYSTEM MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Gasoline smell

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AR1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Is there any other DTC on display?***
YES : Inspect the relevant DTC using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>
NO : Go to step **10AR2**.

10AR2 : CHECK FUEL FILLER CAP.

1) Turn ignition switch to OFF.
2) Open the fuel flap.

CHECK : ***Is the fuel filler cap tightened securely?***
YES : Tighten fuel filler cap securely.
NO : Go to step **10AR3**.

10AR3 : CHECK FUEL FILLER PIPE PACKING.

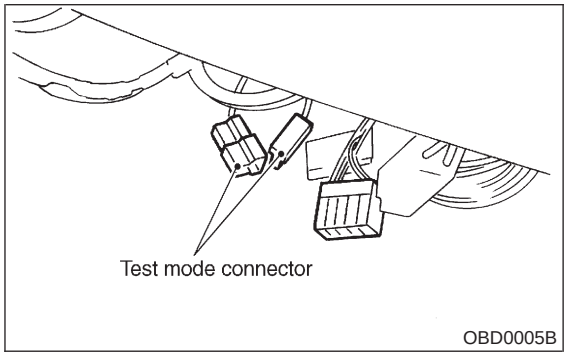
CHECK : ***Is there any damage to the seal between fuel filler cap and fuel filler pipe?***

YES : Repair or replace fuel filler cap and fuel filler pipe.

NO : Go to step **10AR4**.

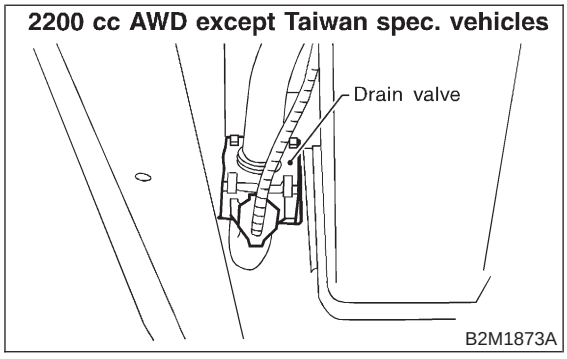
10AR4 : CHECK DRAIN VALVE OR VENT CONTROL SOLENOID VALVE.

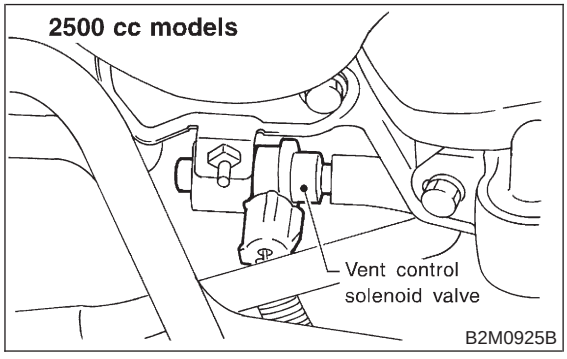
1) Connect test mode connector.



2) Turn ignition switch to ON.

NOTE:
Drain valve or vent control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>





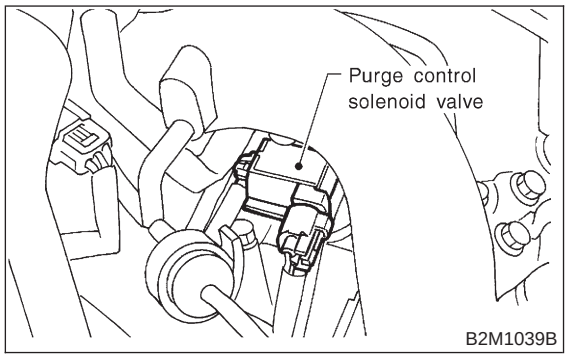
CHECK : ***Does drain valve or vent control solenoid valve produce operating sound?***

YES : Go to step **10AR5**.

NO : Replace drain valve or vent control solenoid valve.

10AR5 : CHECK PURGE CONTROL SOLENOID VALVE.

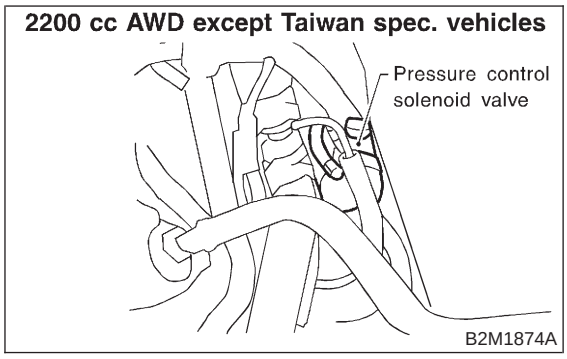
NOTE:
Purge control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>

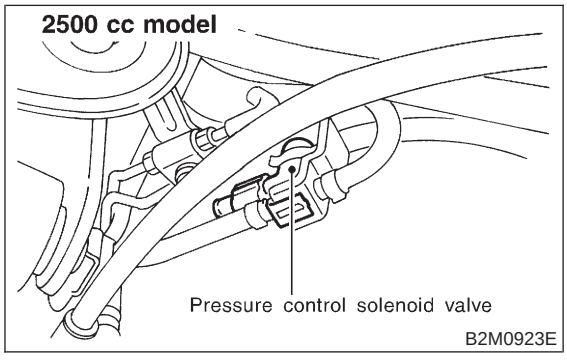


CHECK : ***Does purge control solenoid valve produce operating sound?***
YES : Go to step **10AR6**.
NO : Replace purge control solenoid valve.

10AR6 : CHECK PRESSURE CONTROL SOLENOID VALVE.

NOTE:
Pressure control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>





CHECK : ***Does pressure control solenoid valve produce operating sound?***
YES : Go to step **10AR7**.
NO : Replace pressure control solenoid valve.

10AR7 : CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

Turn ignition switch to OFF.

CHECK : ***Does fuel leak in fuel line?***
YES : Repair or replace fuel line.
NO : Go to step **10AR8**.

10AR8 : CHECK CANISTER.

CHECK : ***Is there any damage at canister?***
YES : Repair or replace canister.
NO : Go to step **10AR9**.

10AR9 : CHECK FUEL TANK.

CHECK : ***Is there any damage at fuel tank?***
YES : Repair or replace fuel tank.
NO : Go to step **10AR10**.

10AR10 : CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.

CHECK : ***Are there holes, cracks, clogging or disconnections of hoses or pipes in evaporative emission control system?***
YES : Repair or replace hoses or pipes.
NO : Contact with SOA service.

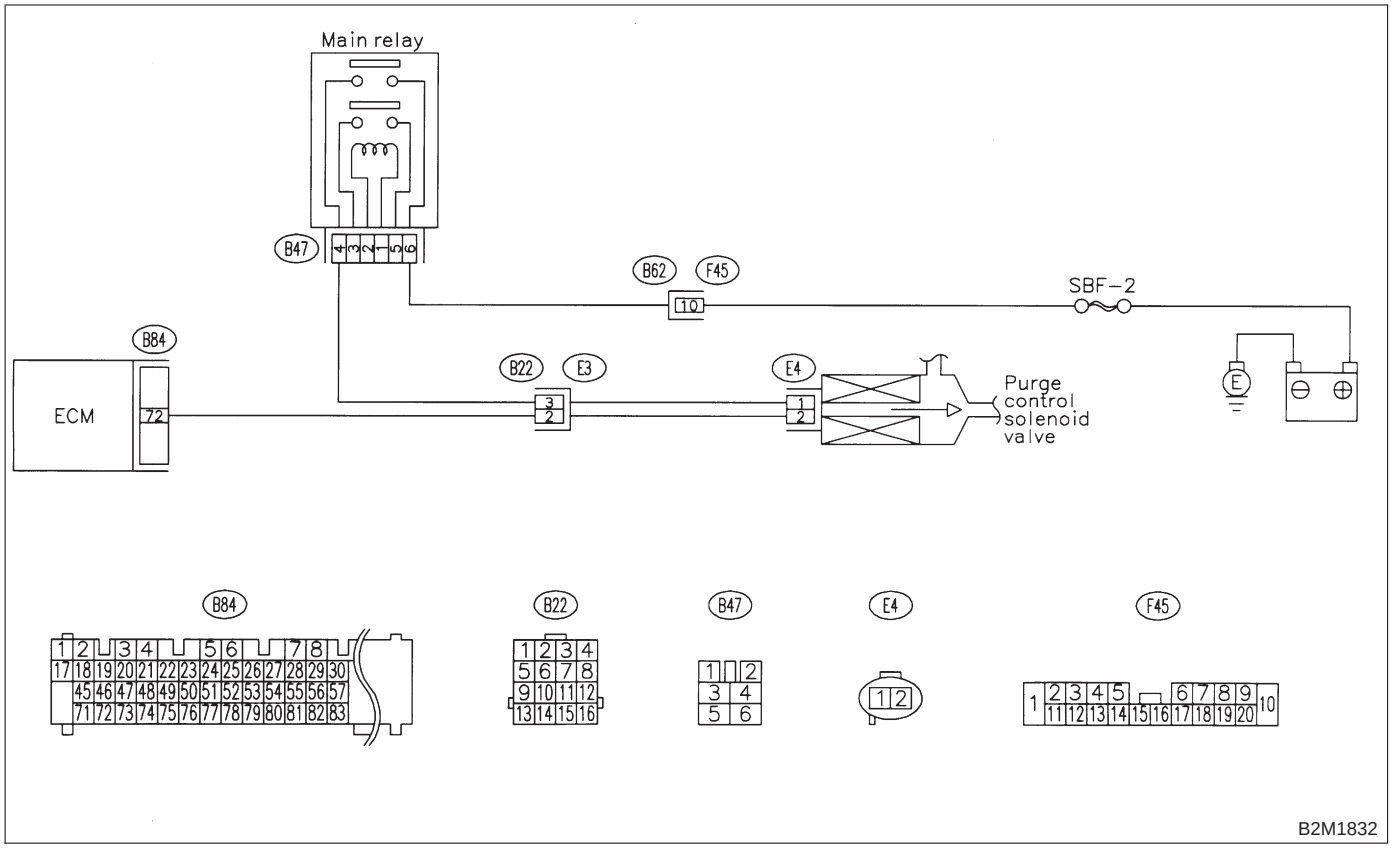
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AS: DTC P0441 — EVAPORATIVE EMISSION CONTROL SYSTEM INCORRECT PURGE FLOW —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AS1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P0443, P1102, P1122 or P1422?***

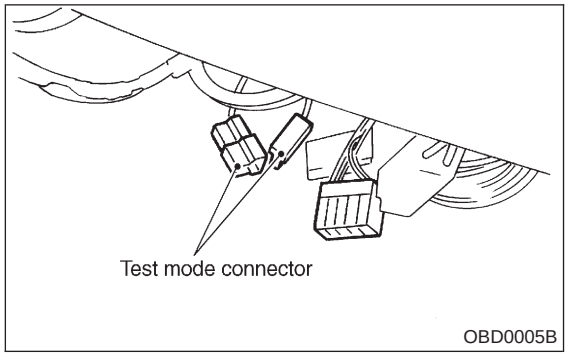
YES : Inspect the relevant DTC P0106, P0107, P0108, P0443, P1102, P1122 or P1422 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0441.

NO : Go to step **10AS2**.

10AS2 : CHECK PURGE CONTROL SOLENOID VALVE OPERATION.

1) Turn ignition switch to OFF.
2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



3) Turn ignition switch to ON.

NOTE:
Purge control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

CHECK : ***Does purge control solenoid valve produce operating sound at about 0.3 Hz?***

YES : Go to step **10AS3**.

NO : Replace purge control solenoid valve.

10AS3 : CHECK PURGE CONTROL SOLENOID VALVE.

Disconnect canister purge hose from canister.

CHECK : ***Does pulsation occur by blowing through the canister purge hose?***

YES : Repair or replace evaporation line.

NOTE:
In this case, repair the following:
- Loose connections in evaporation line
- Cracks in evaporation line
- Clogging in evaporation line

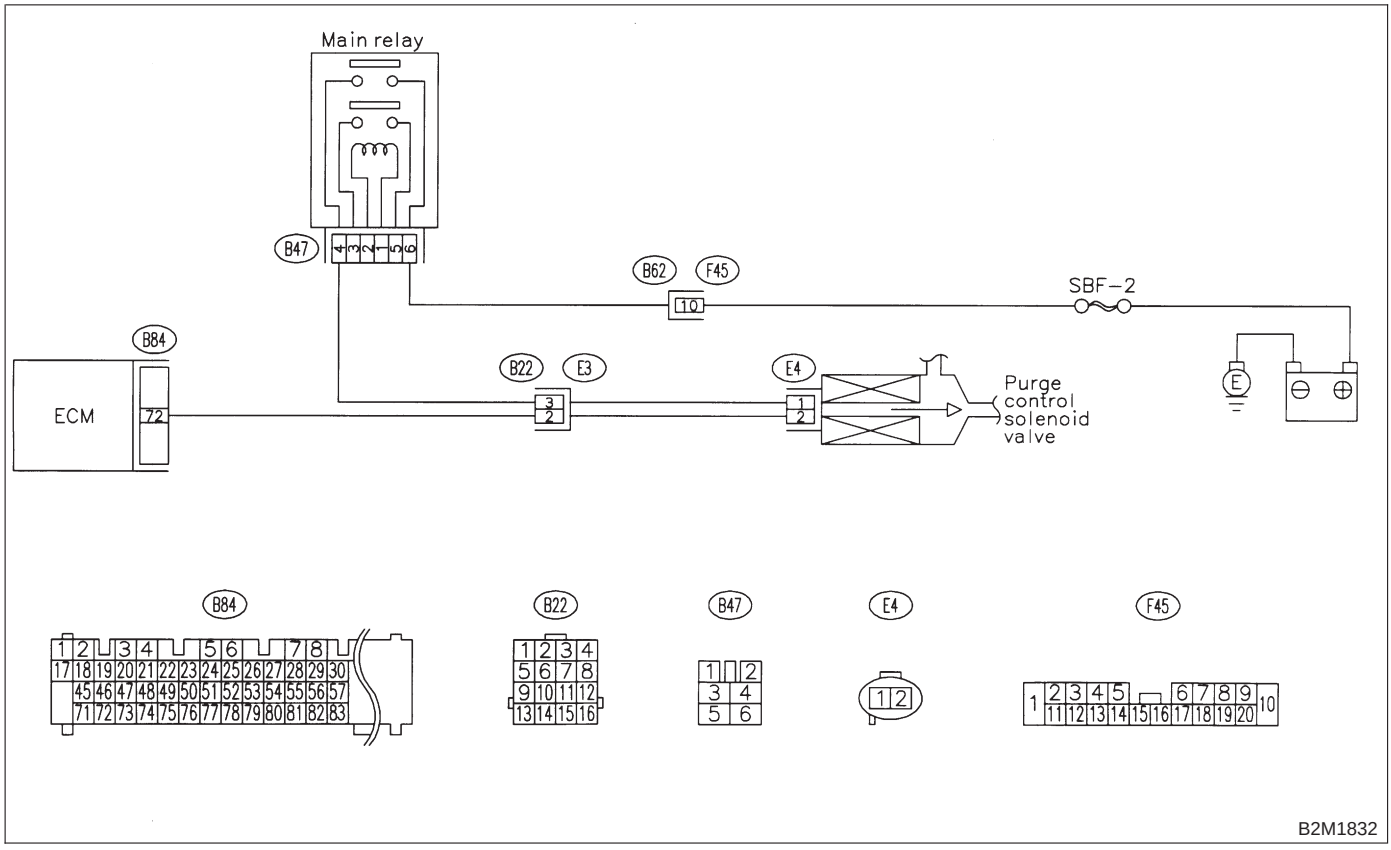
NO : Replace purge control solenoid valve.

AT: DTC P0443 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

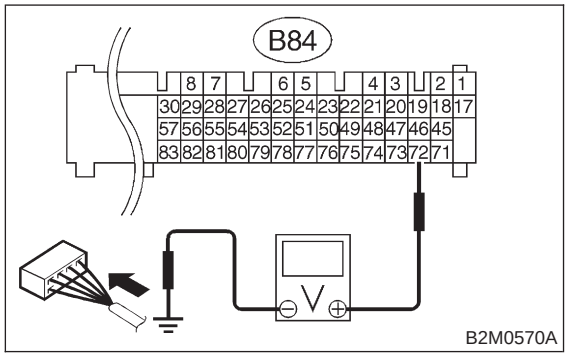
- **WIRING DIAGRAM:**



10AT1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 72 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact with SOA service.

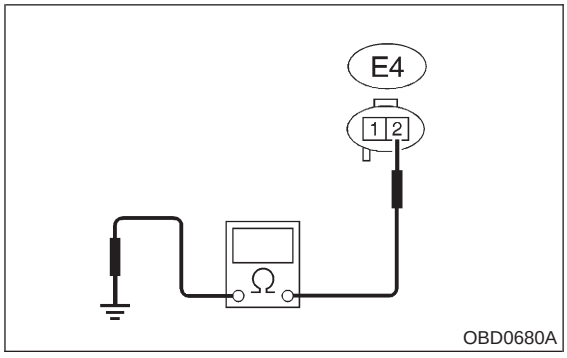
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

NO : Go to step **10AT2**.

10AT2 : CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from purge control solenoid valve and ECM.
3) Measure resistance of harness between purge control solenoid valve connector and engine ground.

Connector & terminal
(E4) No. 2 — Engine ground:



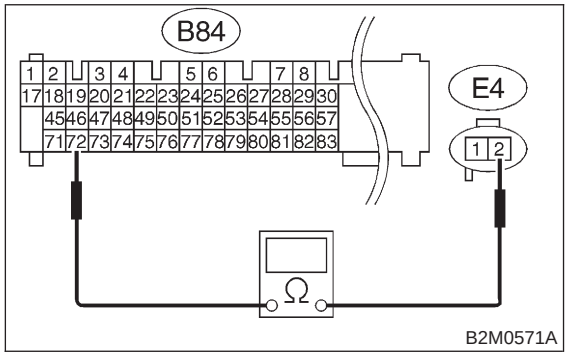
CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and purge control solenoid valve connector.

NO : Go to step **10AT3**.

10AT3 : CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and purge control solenoid valve of harness connector.

Connector & terminal
(B84) No. 72 — (E4) No. 2:



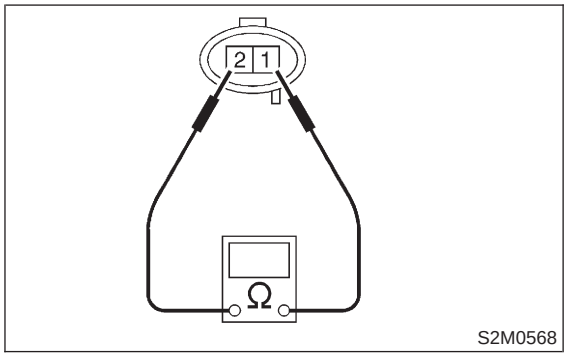
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AT4**.
NO : Repair open circuit in harness between ECM and purge control solenoid valve connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and purge control solenoid valve connector
- Poor contact in coupling connector (B22)

10AT4 : CHECK PURGE CONTROL SOLENOID VALVE.

1) Remove purge control solenoid valve.
2) Measure resistance between purge control solenoid valve terminals.

Terminals
No. 1 — No. 2:

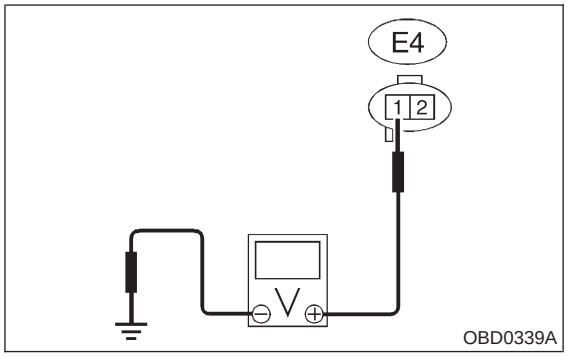


CHECK : ***Is the resistance between 10 and 100 Ω?***
YES : Go to step **10AT5**.
NO : Replace purge control solenoid valve.

10AT5 : CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.

1) Turn ignition switch to ON.
2) Measure voltage between purge control solenoid valve and engine ground.

Connector & terminal
(E4) No. 1 (+) — Engine ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10AT6**.
NO : Repair open circuit in harness between main relay and purge control solenoid valve connector.

10AT6 : CHECK POOR CONTACT.

Check poor contact in purge control solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in purge control solenoid valve connector?***

YES : Repair poor contact in purge control solenoid valve connector.

NO : Contact with SOA service.

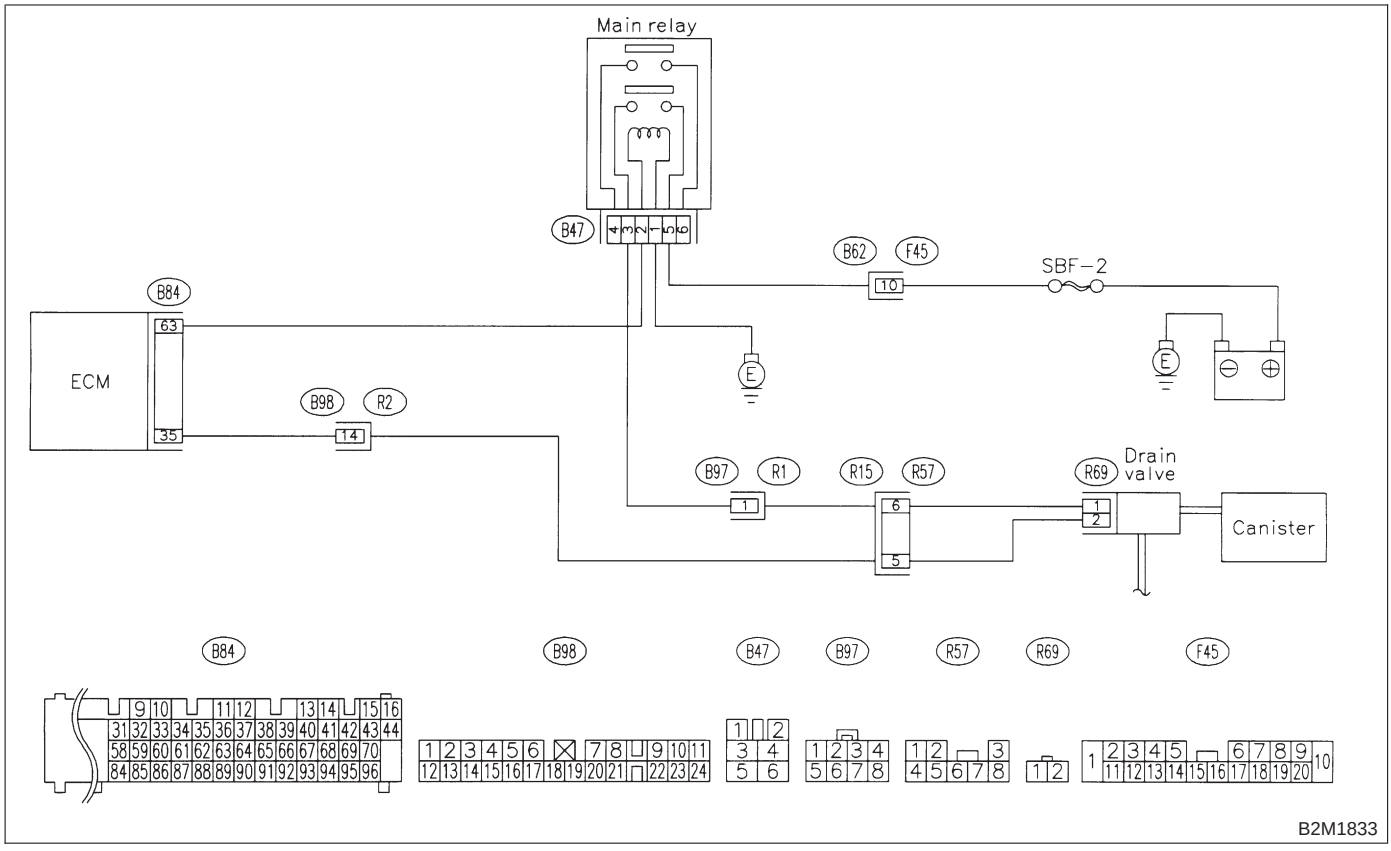
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AU: DTC P0446 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL LOW INPUT [2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES] —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

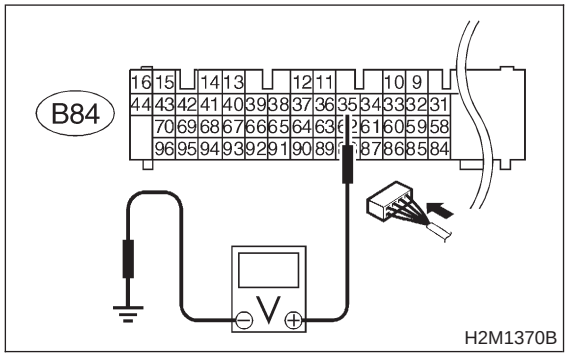
- **WIRING DIAGRAM:**



10AU1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 35 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10AU2**.
NO : Go to step **10AU3**.

10AU2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

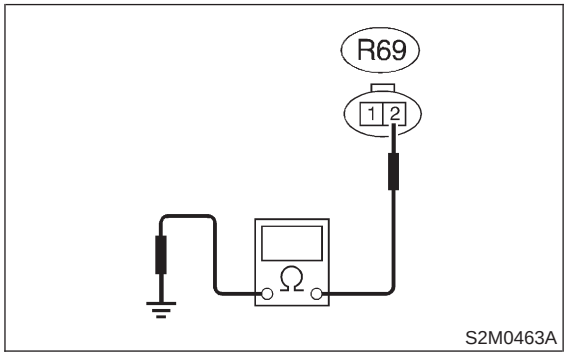
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

NOTE:
In this case, repair the following:
- Poor contact in drain valve connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B97, B98 and R57)

10AU3 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from drain valve and ECM.
3) Measure resistance of harness between drain valve connector and chassis ground.

Connector & terminal
(R69) No. 2 — Chassis ground:

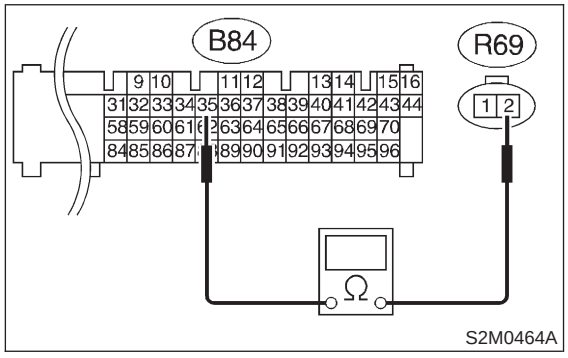


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and drain valve connector.
NO : Go to step **10AU4**.

10AU4 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and drain valve connector.

Connector & terminal
(B84) No. 35 — (R69) No. 2:



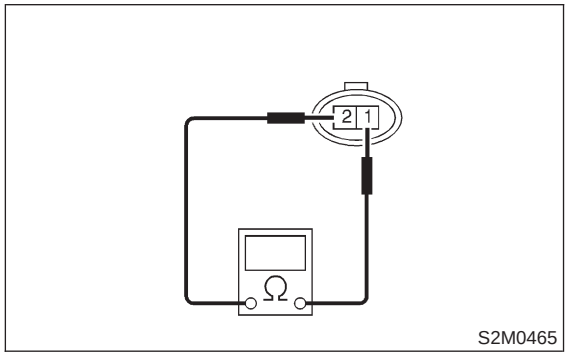
CHECK : ***Is the voltage less than 1 Ω?***
YES : Go to step **10AU5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between ECM and drain valve connector
● Poor contact in coupling connectors (B98 and R57)

10AU5 : CHECK DRAIN VALVE.

Measure resistance between drain valve terminals.

Terminals
No. 1 — No. 2:

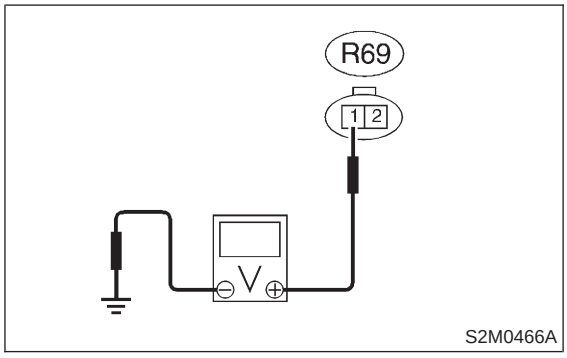


CHECK : ***Is the resistance between 10 and 100 Ω?***
YES : Go to step **10AU6**.
NO : Replace drain valve.

10AU6 : CHECK POWER SUPPLY TO DRAIN VALVE.

1) Turn ignition switch to ON.
2) Measure voltage between drain valve and chassis ground.

Connector & terminal
(R69) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10AU7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between main relay and drain valve
● Poor contact in coupling connectors (B97 and R57)
● Poor contact in main relay connector

10AU7 : CHECK POOR CONTACT.

Check poor contact in drain valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in drain valve connector?***
YES : Repair poor contact in drain valve connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

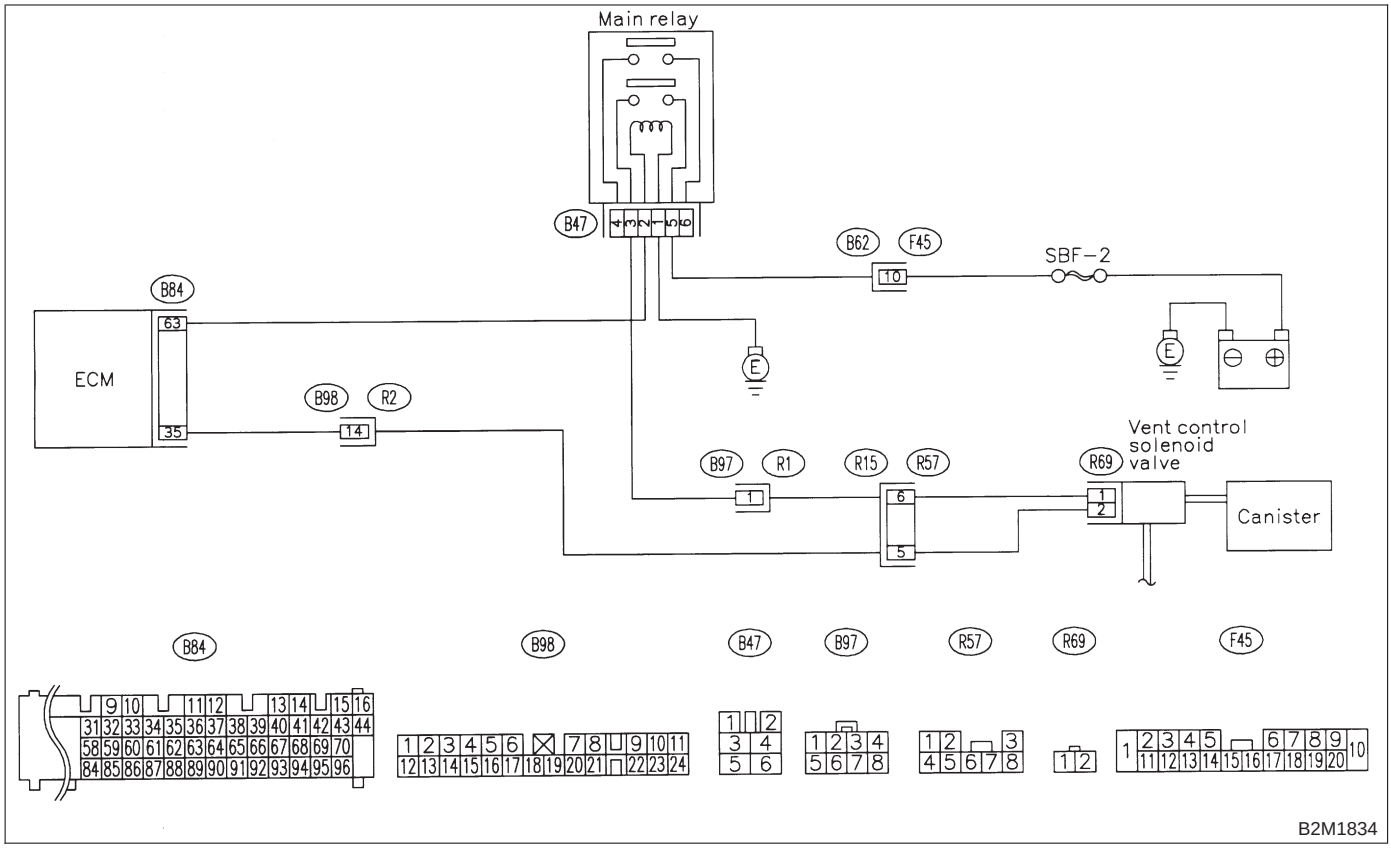
MEMO:

AV: DTC P0446 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL LOW INPUT [2500 cc MODELS] —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

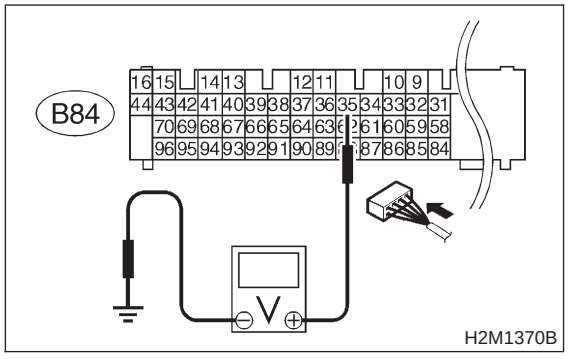
- **WIRING DIAGRAM:**



10AV1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 35 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10AV2**.
NO : Go to step **10AV3**.

10AV2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

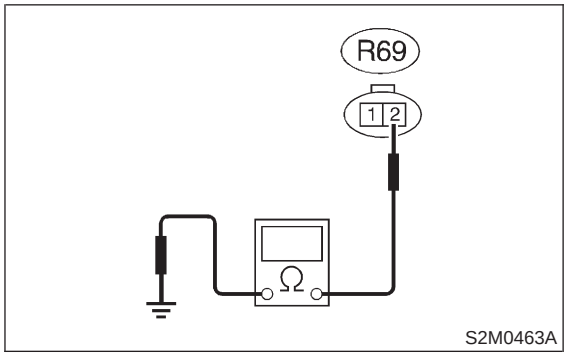
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

NOTE:
In this case, repair the following:
- Poor contact in vent control solenoid valve connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B97, B98 and R57)

10AV3 : CHECK HARNESS BETWEEN VENT CONTROL SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from vent control solenoid valve and ECM.
3) Measure resistance of harness between vent control solenoid valve connector and chassis ground.

Connector & terminal
(R69) No. 2 — Chassis ground:

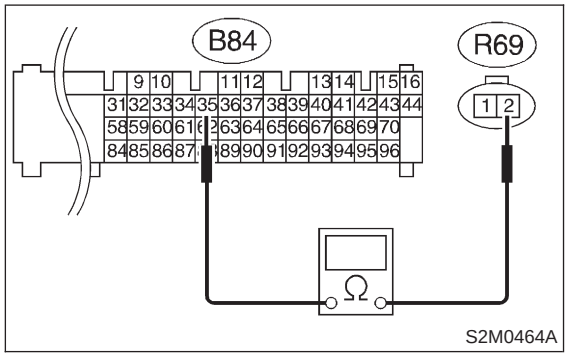


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and vent control solenoid valve connector.
NO : Go to step **10AV4**.

10AV4 : CHECK HARNESS BETWEEN VENT CONTROL SOLENOID VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and vent control solenoid valve connector.

Connector & terminal
(B84) No. 35 — (R69) No. 2:



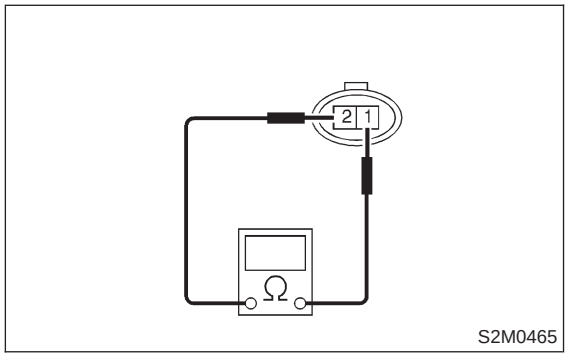
CHECK : ***Is the voltage less than 1 Ω?***
YES : Go to step **10AV5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and vent control solenoid valve connector
- Poor contact in coupling connectors (B98 and R57)

10AV5 : CHECK VENT CONTROL SOLENOID VALVE.

Measure resistance between vent control solenoid valve terminals.

Terminals
No. 1 — No. 2:

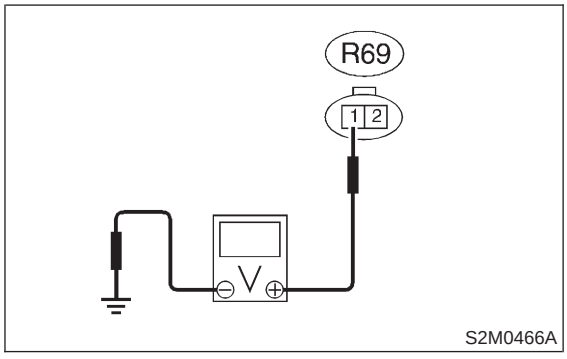


CHECK : ***Is the resistance between 10 and 100 Ω?***
YES : Go to step **10AV6**.
NO : Replace vent control solenoid valve.

10AV6 : CHECK POWER SUPPLY TO VENT CONTROL SOLENOID VALVE.

1) Turn ignition switch to ON.
2) Measure voltage between vent control solenoid valve and chassis ground.

Connector & terminal
(R69) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10AV7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between main relay and vent control solenoid valve
- Poor contact in coupling connectors (B97 and R57)
- Poor contact in main relay connector

10AV7 : CHECK POOR CONTACT.

Check poor contact in vent control solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in vent control solenoid valve connector?***
YES : Repair poor contact in vent control solenoid valve connector.
NO : Contact with SOA service.

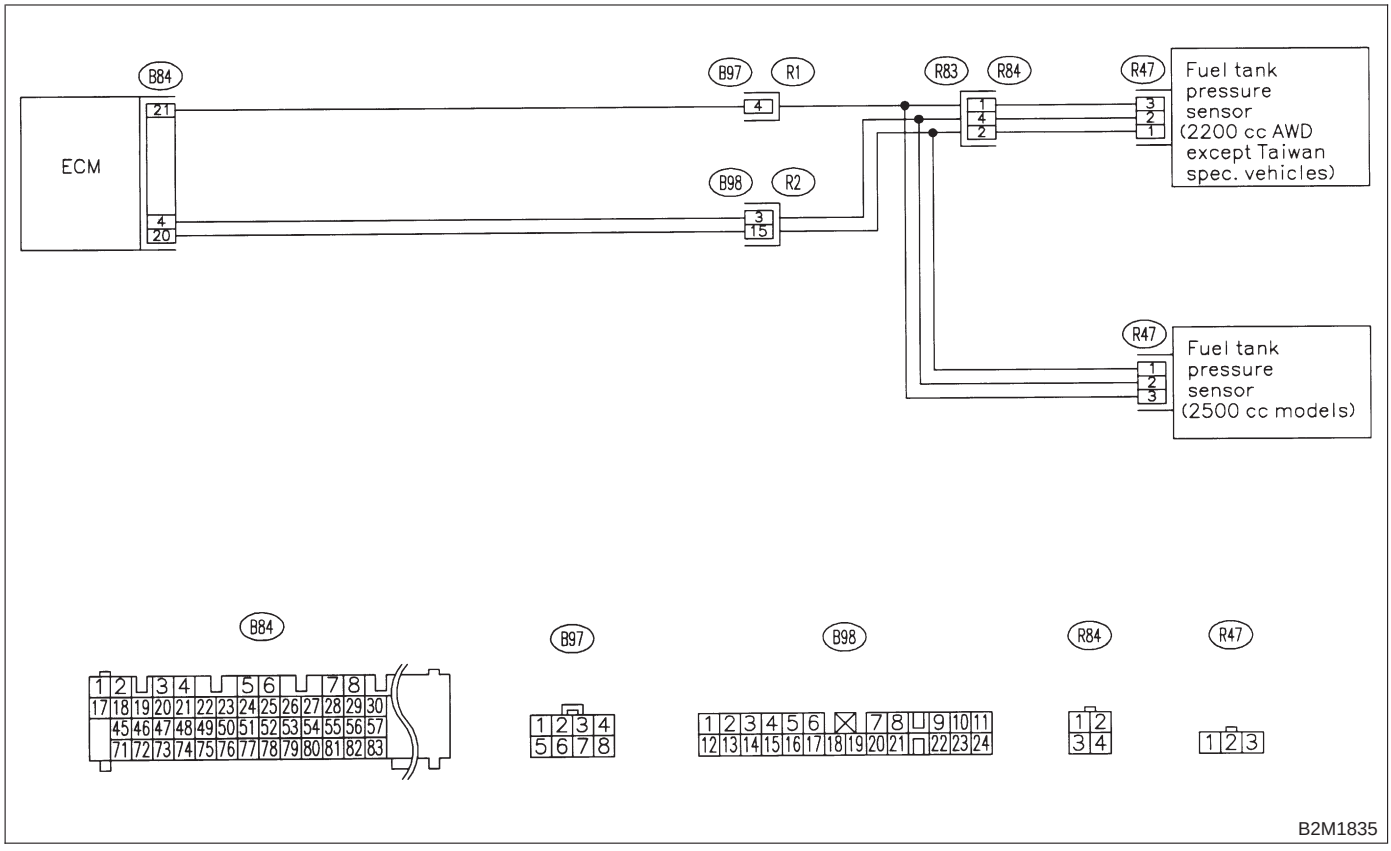
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AW: DTC P0451 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AW1 :	CHECK PRESSURE/VACUUM LINE.

NOTE:
Check the following items.
- Disconnection, leakage and clogging of the vacuum hoses and pipes between fuel tank pressure sensor and fuel tank
- Disconnection, leakage and clogging of air ventilation hoses and pipes between fuel filler pipe and fuel tank

CHECK : ***Is there a fault in pressure/vacuum line?***

YES : Repair or replace hoses and pipes.

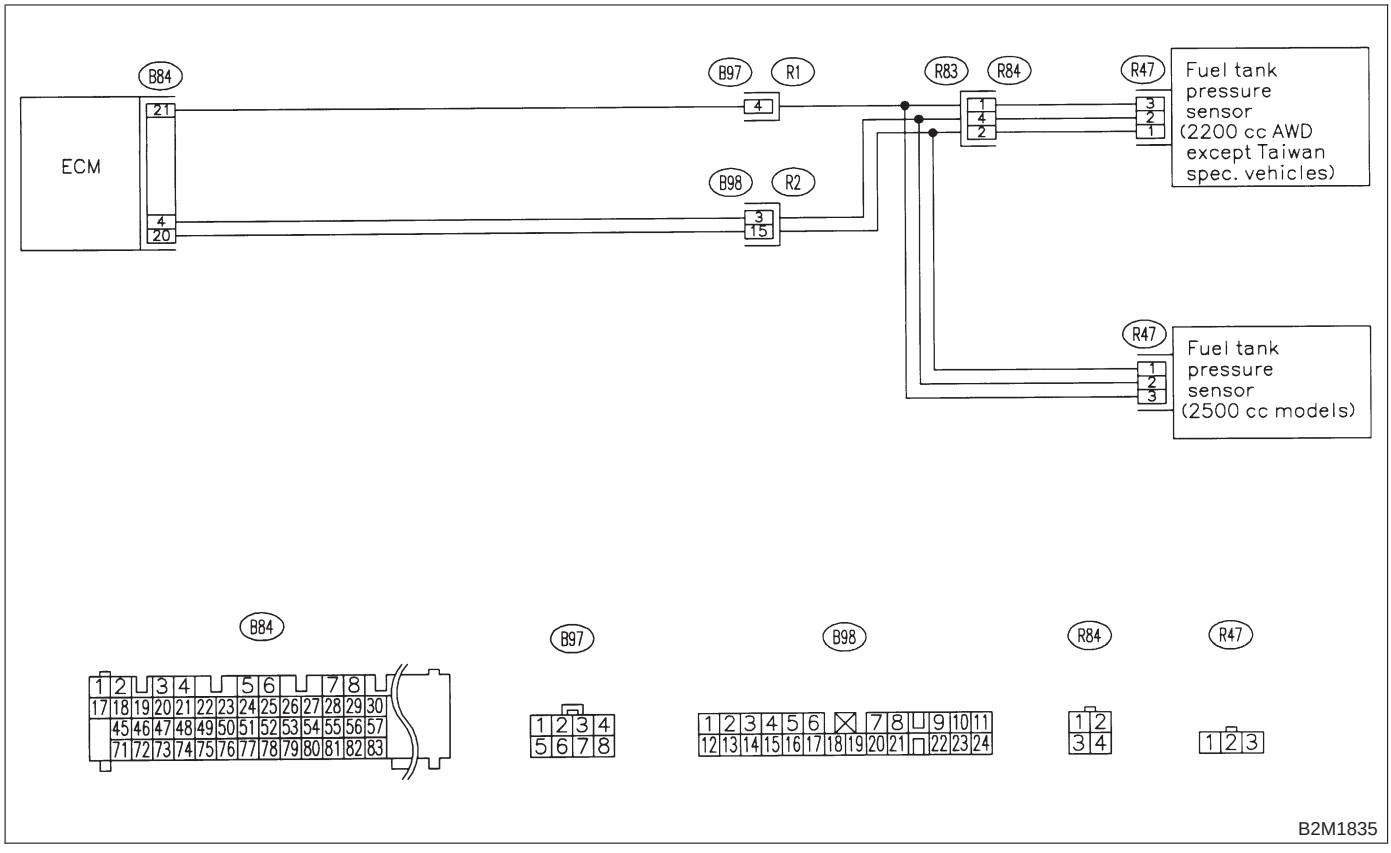
NO : Replace fuel tank pressure sensor.

AX: DTC P0452 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

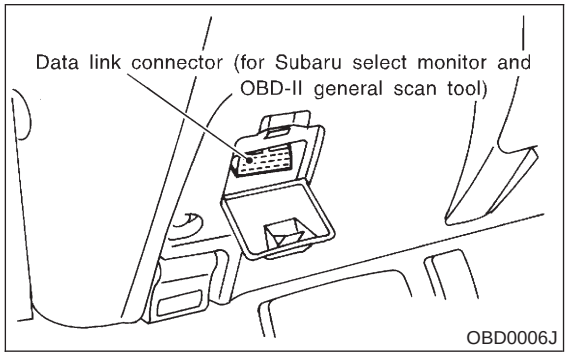
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AX1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Remove fuel filler cap.
3) Install fuel filler cap.
4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



5) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
6) Read the data of fuel tank pressure sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

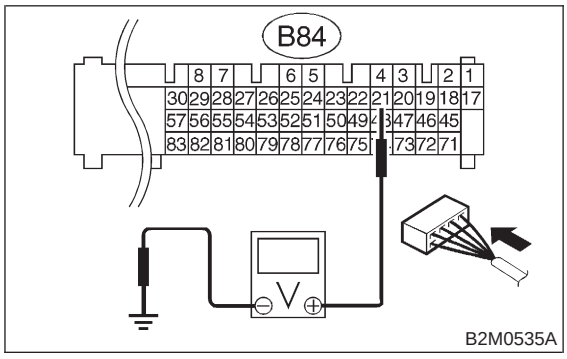
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value less than −2.8 kPa (−21.0 mmHg, −0.827 inHg)?***
YES : Go to step **10AX2**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

10AX2 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

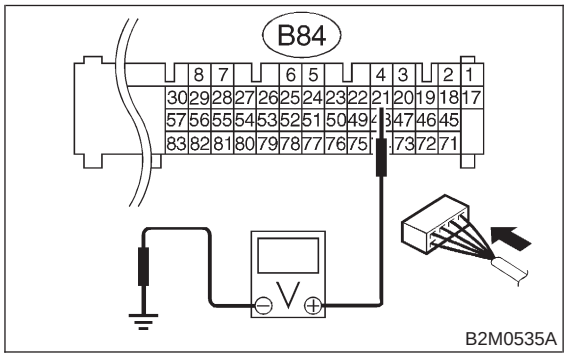
Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10AX4**.
NO : Go to step **10AX3**.

10AX3 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.



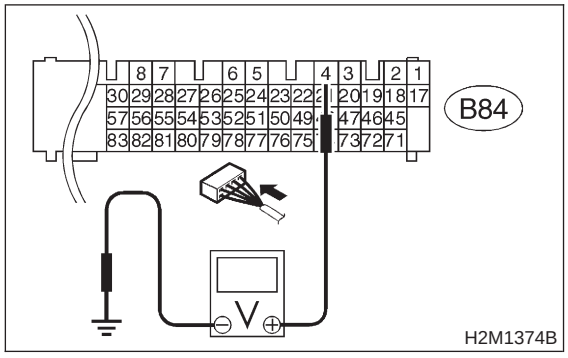
CHECK : ***Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10AX4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.2 V?***
YES : Go to step **10AX6**.
NO : Go to step **10AX5**.

10AX5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel tank pressure sensor signal using Subaru Select Monitor.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

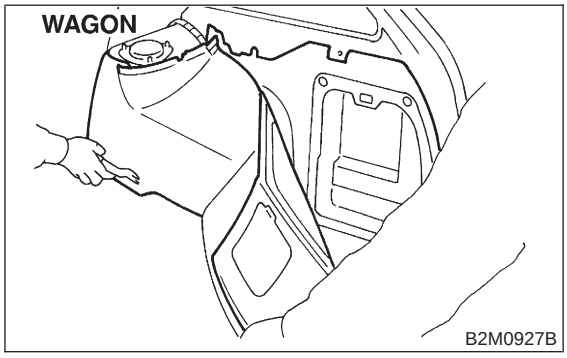
CHECK : ***Does the value change more than −2.8 kPa (−21.0 mmHg, −0.827 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10AX6**.

10AX6 : CHECK VEHICLE MODEL.

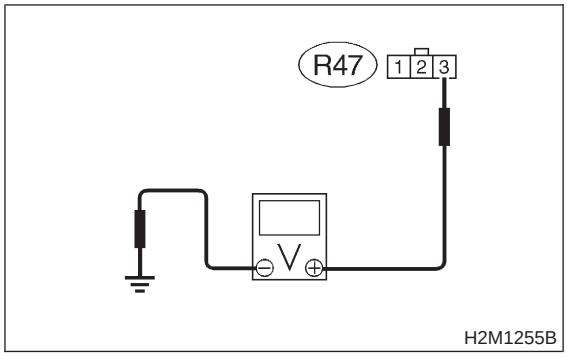
CHECK : ***Is the vehicle 2500 cc model?***
YES : Go to step **10AX7**.
NO : Go to step **10AX10**.

10AX7 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Detach right side trunk side trim panel (Sedan) or right side rear quarter trim panel (Wagon).



3) Remove right side rear quarter trim pocket (Wagon model only).
4) Detach right side rear quarter insulator (Wagon model only).
5) Disconnect connector from fuel tank pressure sensor.
6) Turn ignition switch to ON.
7) Measure voltage between fuel tank pressure sensor connector and chassis ground.



Connector & terminal
(R47) No. 3 (+) — Chassis ground (−):

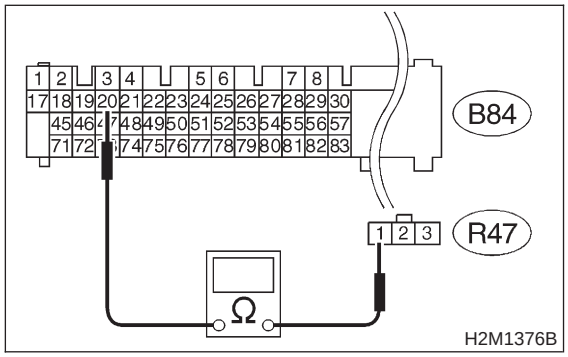
CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10AX8**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between ECM and fuel tank pressure sensor connector
● Poor contact in coupling connector (B98)

10AX8 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and pressure sensor connector.

Connector & terminal
(B84) No. 20 — (R47) No. 1:



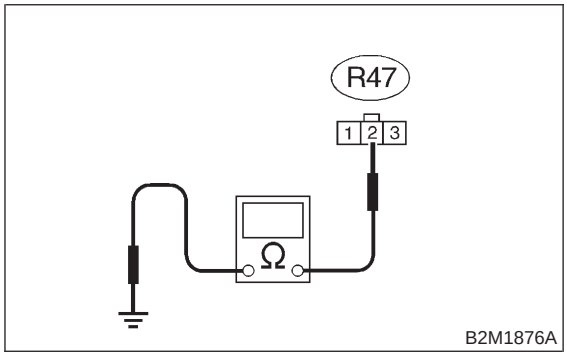
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AX9**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel tank pressure sensor connector
- Poor contact in coupling connectors (B98)

10AX9 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

Measure resistance of harness between fuel tank pressure sensor connector and chassis ground.

Connector & terminal
(R47) No. 2 — Chassis ground:

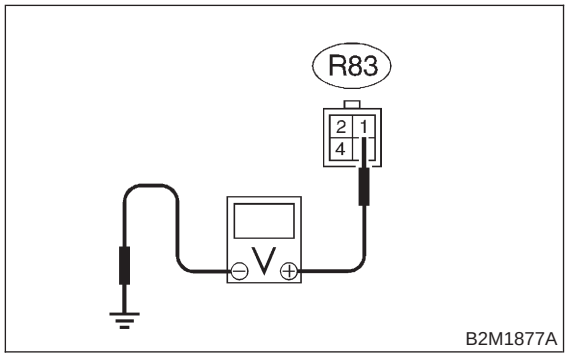


CHECK : ***Is the resistance more than 500 kΩ?***
YES : Go to step **10AX16**.
NO : Repair ground short circuit in harness between ECM and fuel tank pressure sensor connector.

10AX10 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Remove rear seat cushion (Sedan) or move rear seat cushion (Wagon).
3) Separate rear wiring harness and fuel tank cord.
4) Turn ignition switch to ON.
5) Measure voltage between rear wiring harness connector and chassis ground.

Connector & terminal
(R83) No. 1 (+) — Chassis ground (−):



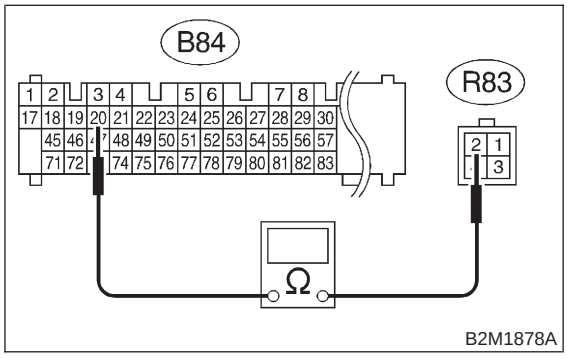
CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10AX11**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and rear wiring harness connector (R83)
- Poor contact in coupling connector (B97)

10AX11 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and rear wiring harness connector.

Connector & terminal
(B84) No. 20 — (R83) No. 2:



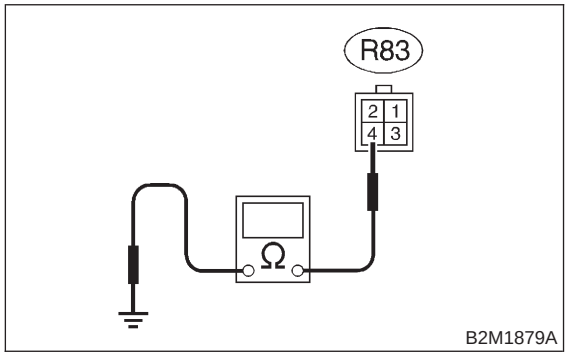
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AX12**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and rear wiring harness connector (R83)
- Poor contact in coupling connector (B98)

10AX12 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal
(R83) No. 4 — Chassis ground:

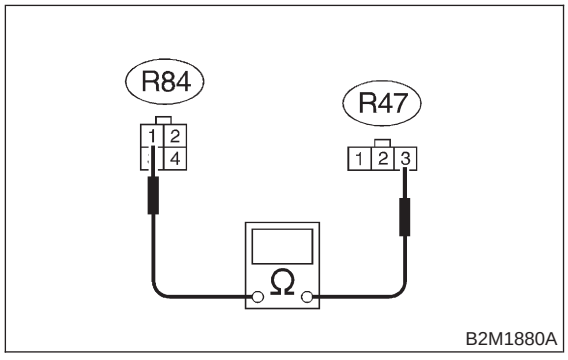


CHECK : ***Is the resistance more than 500 kΩ?***
YES : Go to step **10AX13**.
NO : Repair ground short circuit in harness between ECM and rear wiring harness connector (R83).

10AX13 : CHECK FUEL TANK CORD.

1) Remove fuel tank. <Ref. to 2-8 [W2A0].>
2) Disconnect connector from fuel tank pressure sensor.
3) Measure resistance of fuel tank cord.

Connector & terminal
(R84) No. 1 — (R47) No. 3:

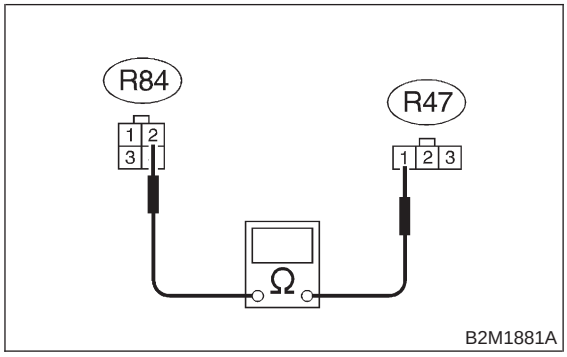


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AX14**.
NO : Repair open circuit in fuel tank cord.

10AX14 : CHECK FUEL TANK CORD.

Measure resistance of fuel tank cord.

Connector & terminal
(R84) No. 2 — (R47) No. 1:

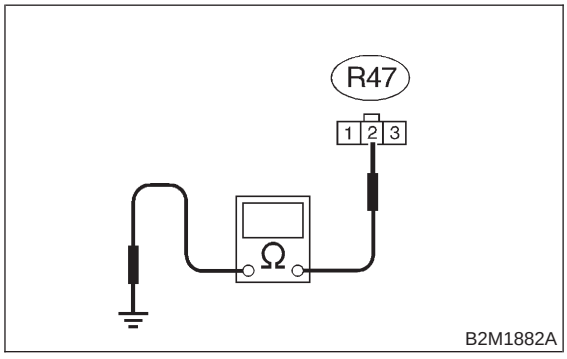


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AX15**.
NO : Repair open circuit in fuel tank cord.

10AX15 : CHECK FUEL TANK CORD.

Measure resistance of harness between fuel tank pressure sensor connector and chassis ground.

Connector & terminal
(R47) No. 2 — Chassis ground:



CHECK : ***Is the resistance more than 500 kΩ?***
YES : Go to step **10AX16**.
NO : Repair ground short circuit in fuel tank cord.

10AX16 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in fuel tank pressure sensor connector?***

YES : Repair poor contact in fuel tank pressure sensor connector.

NO : Replace fuel tank pressure sensor.

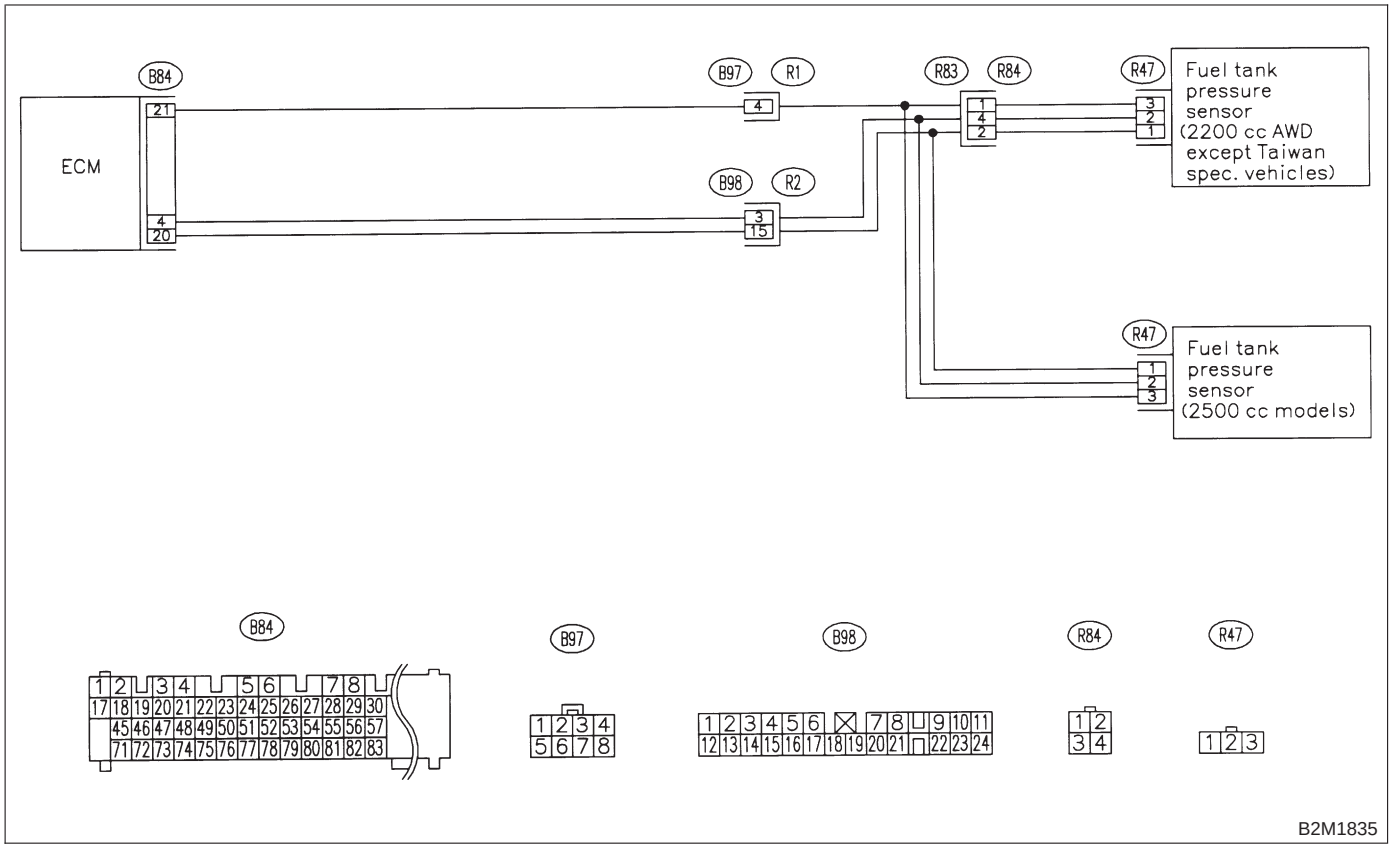
MEMO:

AY: DTC P0453 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

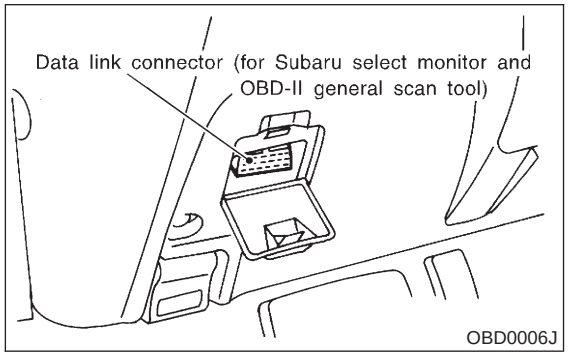
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AY1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Remove fuel filler cap.
3) Install fuel filler cap.
4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



5) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
6) Read data of fuel tank pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool.

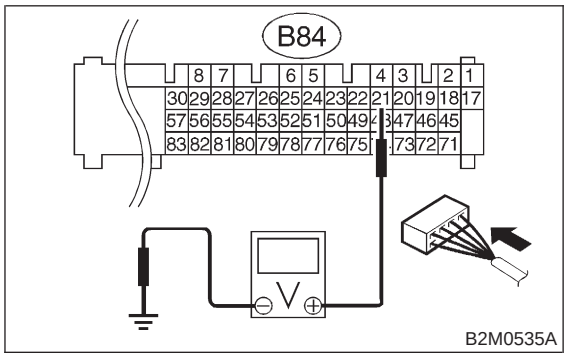
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?***
YES : Go to step **10AY16**.
NO : Go to step **10AY2**.

10AY2 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):

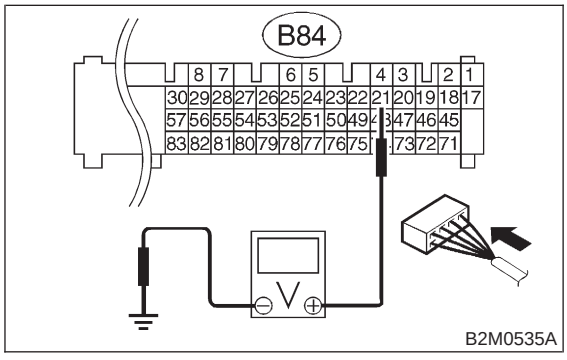


CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10AY4**.
NO : Go to step **10AY3**.

10AY3 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):

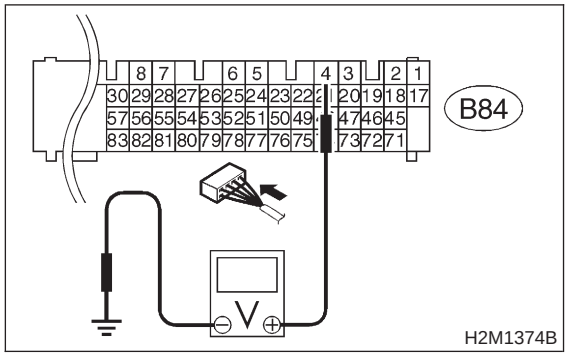


CHECK : ***Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10AY4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.2 V?***
YES : Go to step **10AY6**.
NO : Go to step **10AY5**.

10AY5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel tank pressure sensor signal using Subaru Select Monitor.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>

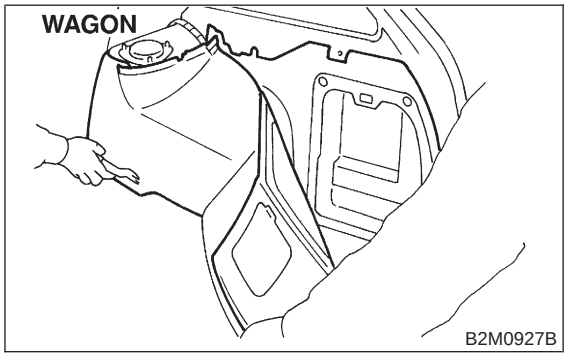
CHECK : ***Does the value change more than −2.8 kPa (−21.0 mmHg, −0.827 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10AY6**.

10AY6 : CHECK VEHICLE MODEL.

CHECK : ***Is the vehicle 2500 cc model?***
YES : Go to step **10AY7**.
NO : Go to step **10AY10**.

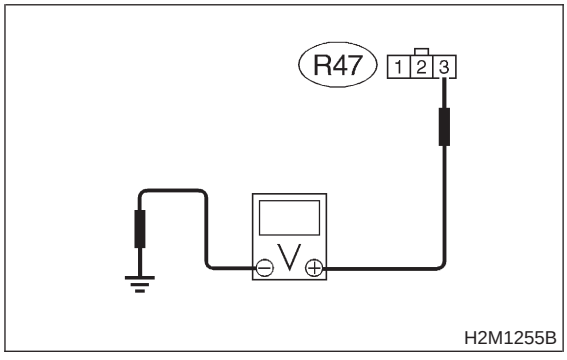
10AY7 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Detach right side trunk side trim panel (Sedan) or right side rear quarter trim panel (Wagon).



3) Remove right side rear quarter trim pocket (Wagon model only).
4) Detach right side rear quarter insulator (Wagon model only).
5) Disconnect connector from fuel tank pressure sensor.
6) Turn ignition switch to ON.
7) Measure voltage between fuel tank pressure sensor connector and chassis ground.

Connector & terminal
(R47) No. 3 (+) — Chassis ground (−):



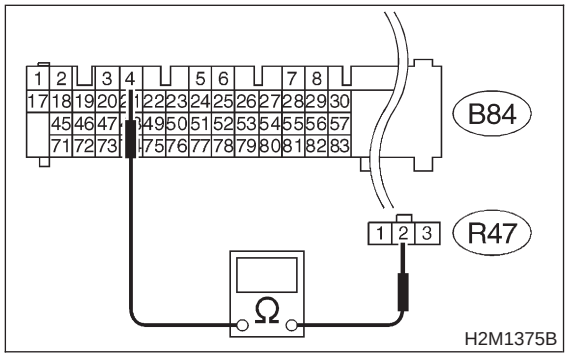
CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10AY8**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between ECM and fuel tank pressure sensor connector
● Poor contact in coupling connector (B98)

10AY8 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and pressure sensor connector.

Connector & terminal
(B84) No. 4 — (R47) No. 2:



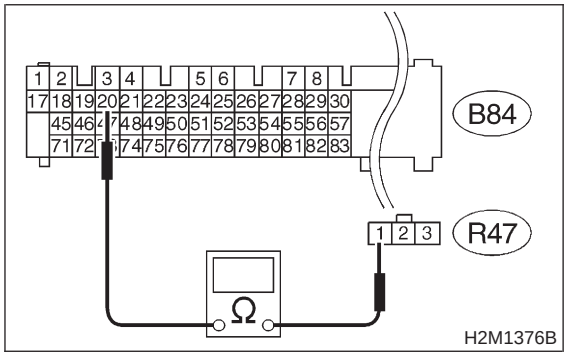
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AY9**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel tank pressure sensor connector
- Poor contact in coupling connector (B98)

10AY9 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

Measure resistance of harness between ECM and fuel tank pressure sensor connector.

Connector & terminal
(B84) No. 20 — (R47) No. 1:



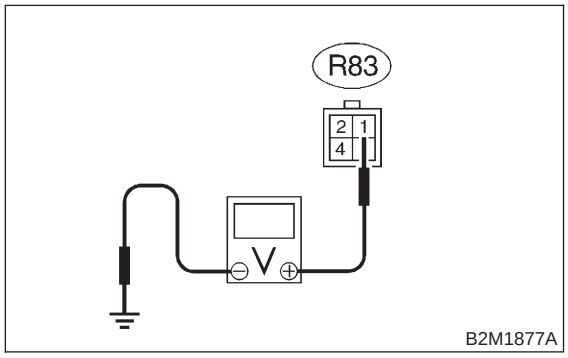
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AY15**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel tank pressure sensor connector
- Poor contact in coupling connector (B98)

10AY10 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Remove rear seat cushion (Sedan) or move rear seat cushion (Wagon).
3) Separate rear wiring harness and fuel tank cord.
4) Turn ignition switch to ON.
5) Measure voltage between rear wiring harness connector and chassis ground.

Connector & terminal
(R83) No. 1 (+) — Chassis ground (−):



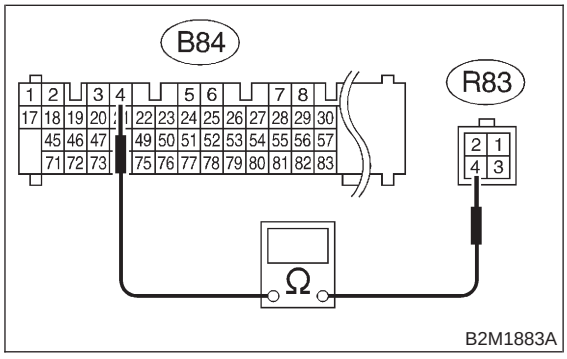
CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10AY11**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and rear wiring harness connector (R83)
- Poor contact in coupling connector (B97)

10AY11 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and rear wiring harness connector.

Connector & terminal
(B84) No. 4 — (R83) No. 4:



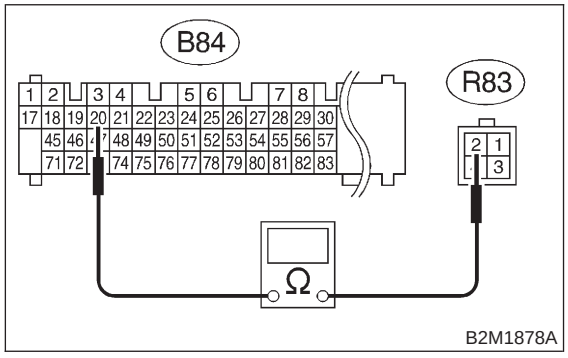
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AY12**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and rear wiring harness connector (R83)
- Poor contact in coupling connector (B98)

10AY12 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal
(B84) No. 20 — (R83) No. 2:

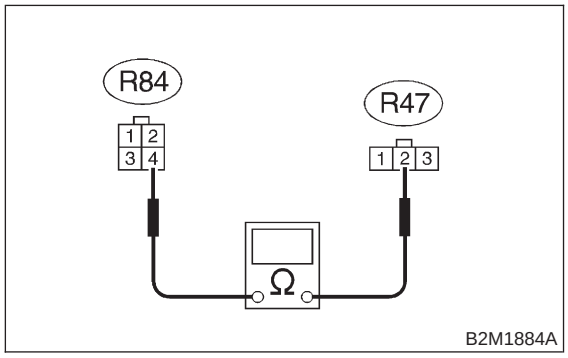


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AY13**.
NO : Repair ground short circuit in harness between ECM and rear wiring harness connector (R83).

10AY13 : CHECK FUEL TANK CORD.

1) Remove fuel tank. <Ref. to 2-8 [W2A0].>
2) Disconnect connector from fuel tank pressure sensor.
3) Measure resistance of fuel tank cord.

Connector & terminal
(R84) No. 4 — (R47) No. 2:

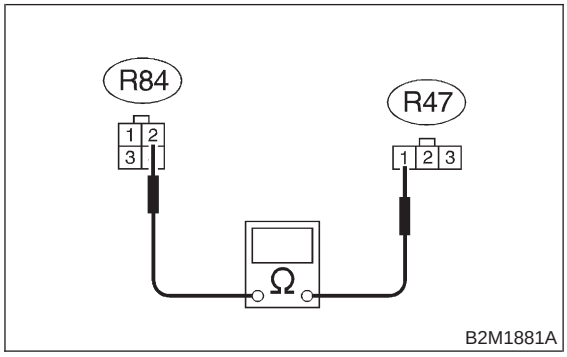


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AY14**.
NO : Repair open circuit in fuel tank cord.

10AY14 : CHECK FUEL TANK CORD.

Measure resistance of fuel tank cord.

Connector & terminal
(R84) No. 2 — (R47) No. 1:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10AY15**.
NO : Repair open circuit in fuel tank cord.

10AY15 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure sensor connector. <Ref. to FOREWORD [T3C1].>

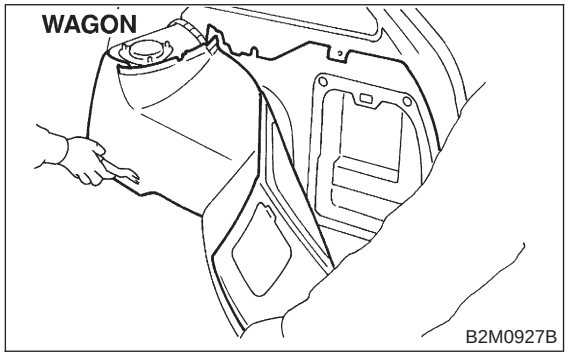
CHECK : ***Is there poor contact in fuel tank pressure sensor connector?***
YES : Repair poor contact in fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor.

10AY16 : CHECK VEHICLE MODEL.

CHECK : ***Is the vehicle 2500 cc model?***
YES : Go to step **10AY17**.
NO : Go to step **10AY18**.

10AY17 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
2) Detach right side trunk side trim panel (Sedan) or right side rear quarter trim panel (Wagon).



3) Remove right side rear quarter trim pocket (Wagon model only).
4) Detach right side rear quarter insulator (Wagon model only).
5) Disconnect connector from fuel tank pressure sensor.
6) Remove fuel filler cap.
7) Install fuel filler cap.
8) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
9) Read data of fuel tank pressure sensor signal using Subaru select monitor or the OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?***
YES : Repair battery short circuit in harness between ECM and fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor.

10AY18 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
2) Remove fuel tank. <Ref. to 2-8 [W2A0].>
3) Remove fuel tank cord from fuel tank.
4) Connect fuel tank cord to rear wiring harness.
5) Remove fuel filler cap.
6) Install fuel filler cap.
7) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
8) Read data of fuel tank pressure sensor signal using Subaru select monitor or the OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

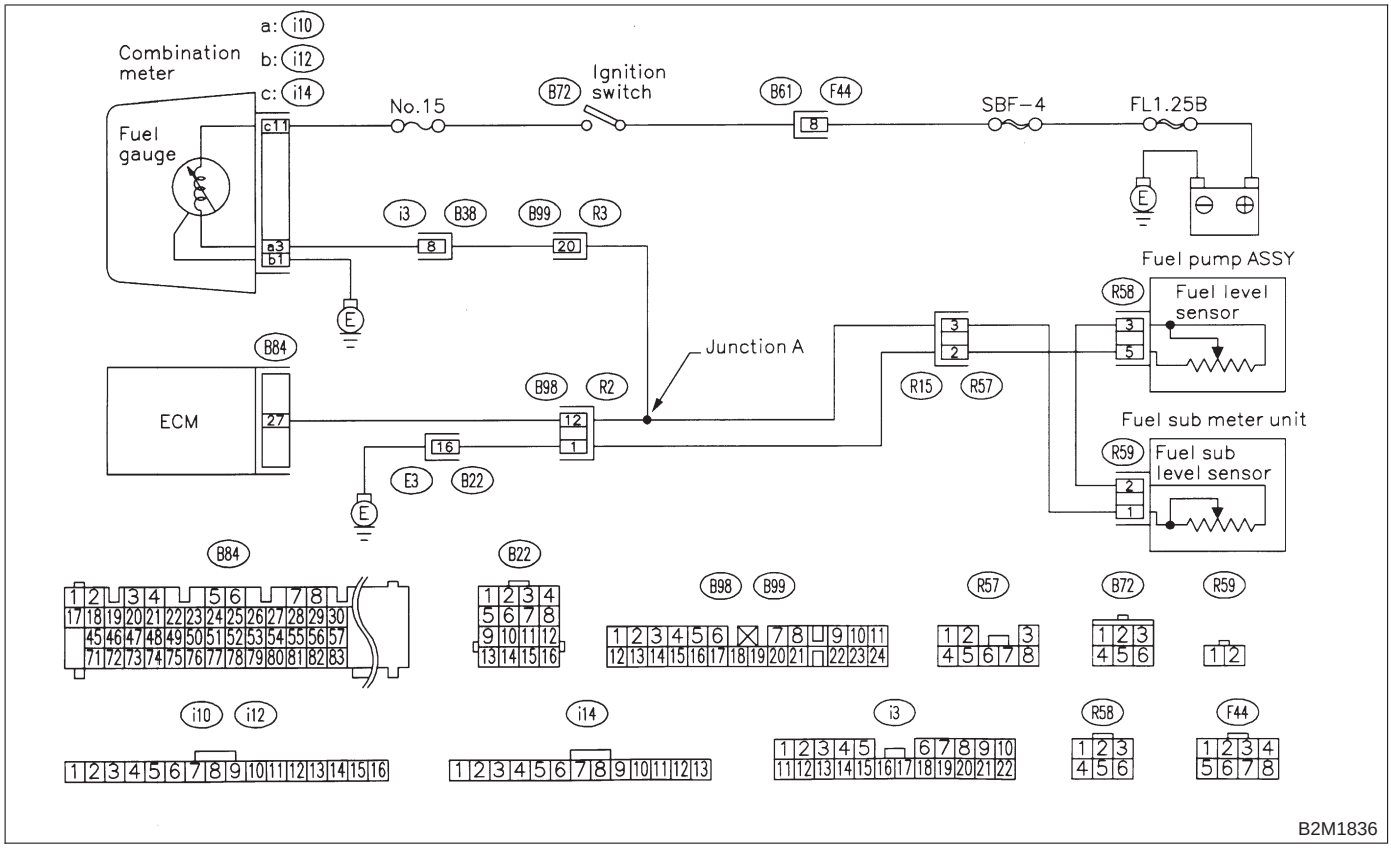
CHECK : ***Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?***
YES : Repair battery short circuit in harness between ECM and fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor.

AZ: DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10AZ1 :	**CHECK ANY OTHER DTC ON DISPLAY.**

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0462 or P0463?***

YES : Inspect DTC P0462 or P0463 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect this trouble.

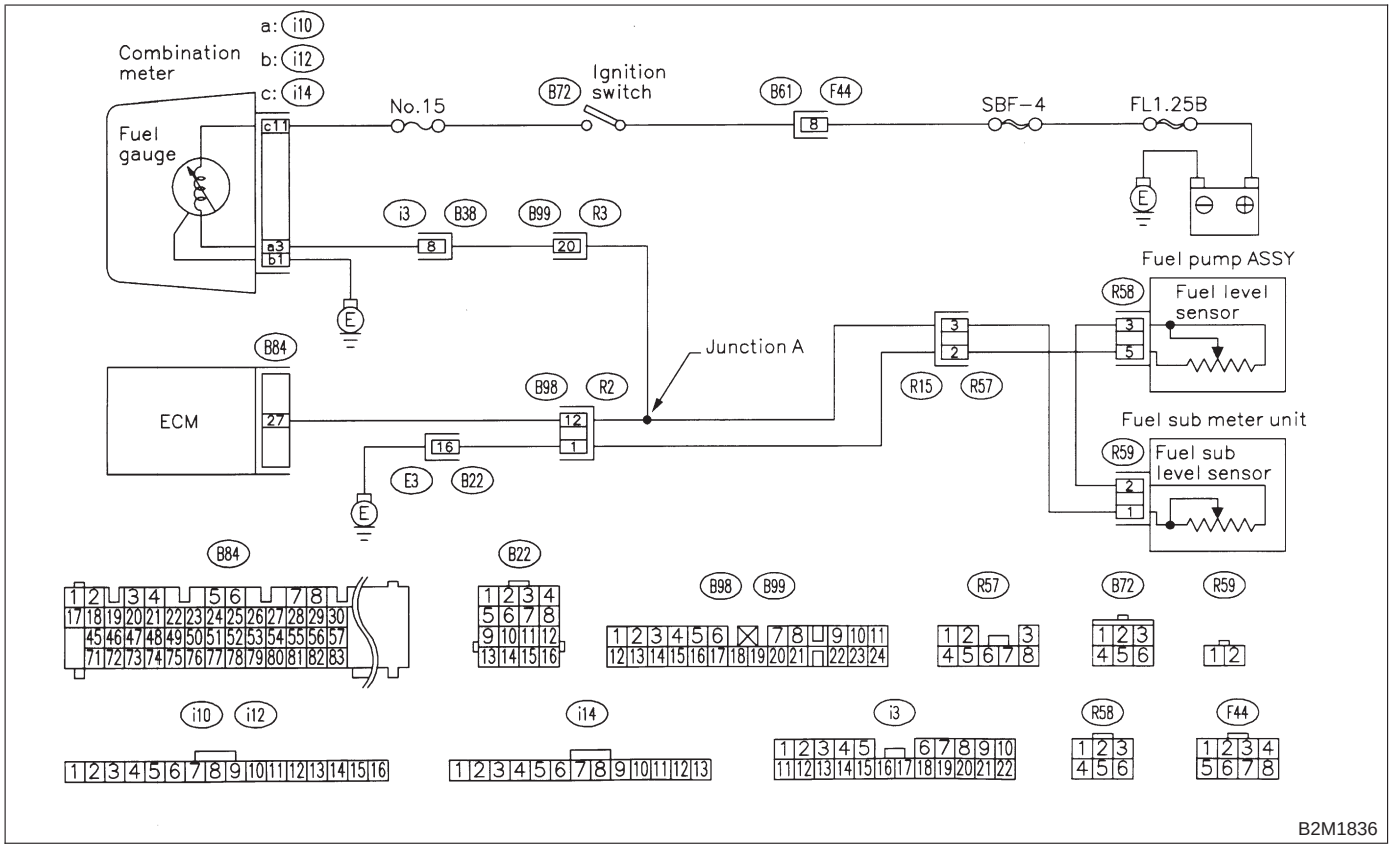
NO : Replace fuel sending unit and fuel sub meter unit.

BA: DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BA1 :	CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.

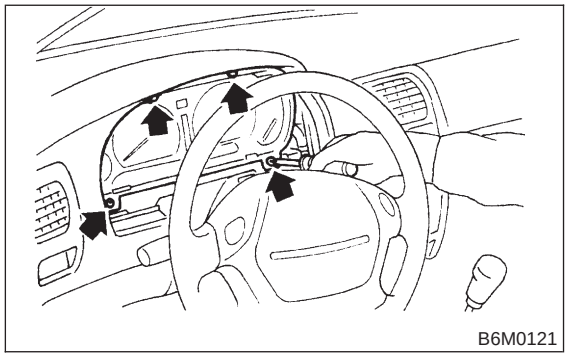
CHECK : ***Does speedometer and tachometer operate normally?***

YES : Go to step **10BA3**.

NO : Go to step **10BA2**.

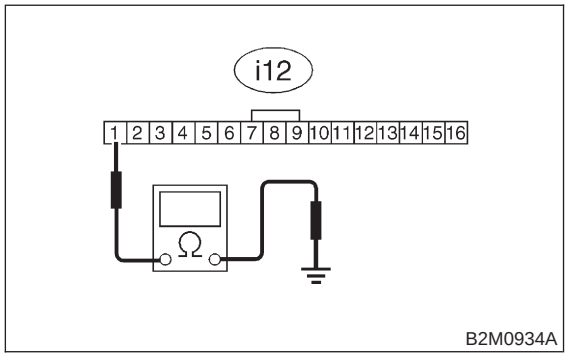
10BA2 : CHECK GROUND CIRCUIT OF COMBINATION METER.

1) Turn ignition switch to OFF.
2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W14A1].>



3) Disconnect connector from combination meter.
4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal
(i12) No. 1 — Chassis ground:



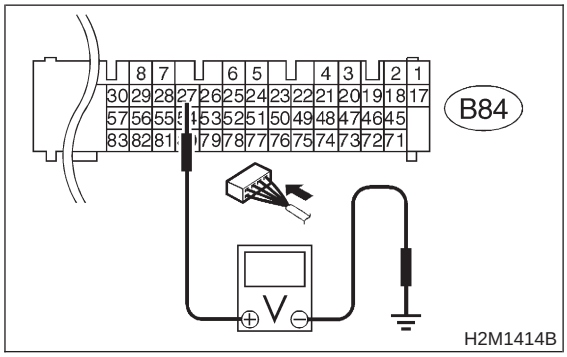
CHECK : ***Is resistance less than 5 Ω?***
YES : Repair or replace combination meter.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between combination meter connector and grounding terminal
- Poor contact in combination meter connector
- Poor contact in grounding terminal

10BA3 : CHECK INPUT SIGNAL FOR ECM.

1) Turn ignition switch to ON. (Engine OFF)
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 27 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.12 V?***
YES : Go to step **10BA5**.
NO : Go to step **10BA4**.

10BA4 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel level sensor signal using Subaru Select Monitor.

NOTE:
- Subaru Select Monitor

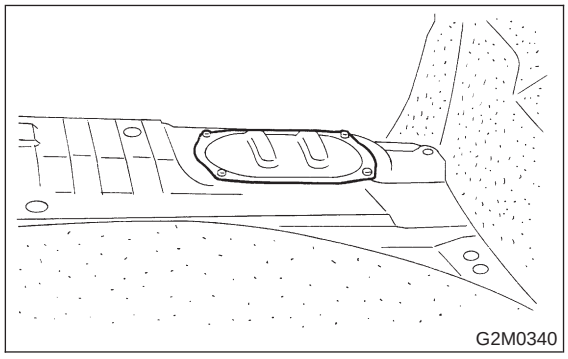
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>

CHECK : ***Does the value change less than 0.12 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?***
YES : Repair poor contact in ECM connector.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:
In this case, repair the following:
- Poor contact in fuel pump connector
- Poor contact in combination meter connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (i3, B22, B99, B98 and R57)

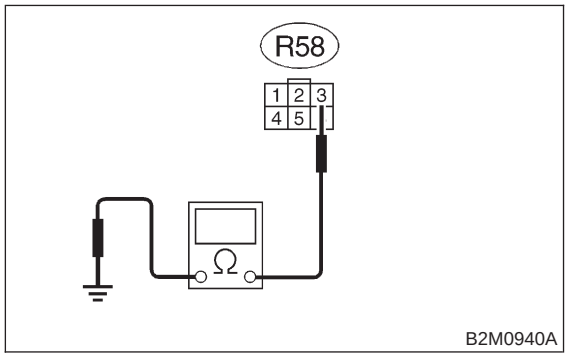
10BA5 : CHECK HARNESS BETWEEN ECM, COMBINATION METER AND FUEL PUMP CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



3) Disconnect connector from fuel pump.
4) Measure resistance of harness between fuel pump connector and chassis ground.

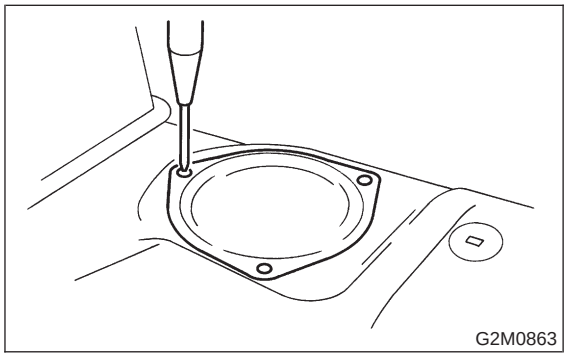
Connector & terminal
(R58) No. 3 — Chassis ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **10BA6**.
NO : Go to step **10BA11**.

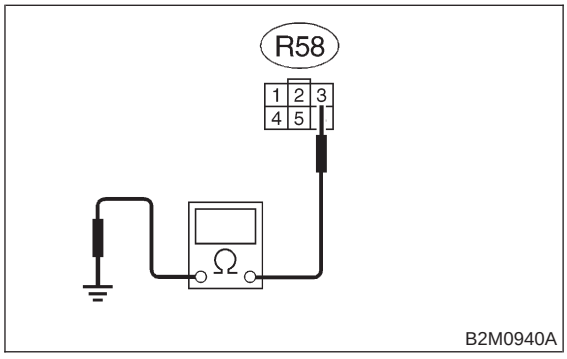
10BA6 : CHECK FUEL TANK CORD.

1) Remove service hole cover located on the left rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).



2) Disconnect connector from fuel sub meter unit.
3) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 3 — Chassis ground:

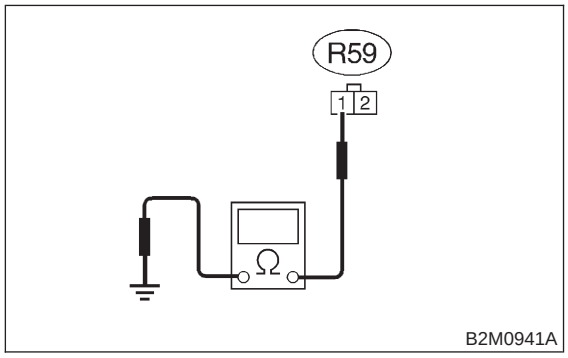


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between fuel pump and fuel sub meter unit connector.
NO : Go to step **10BA7**.

10BA7 : CHECK REAR WIRING HARNESS.

1) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15).
2) Measure resistance of harness between fuel sub meter unit connector and chassis ground.

Connector & terminal
(R59) No. 1 — Chassis ground:

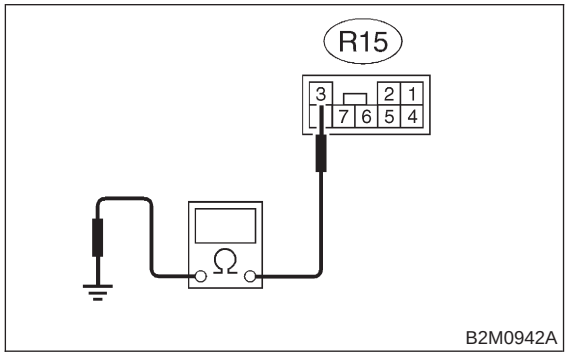


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in fuel tank cord.
NO : Go to step **10BA8**.

10BA8 : CHECK REAR, BULKHEAD AND INSTRUMENT PANEL WIRING HARNESS.

1) Separate rear wiring harness connector (R2) and bulkhead wiring harness connector (B98).
2) Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal
(R15) No. 3 — Chassis ground:

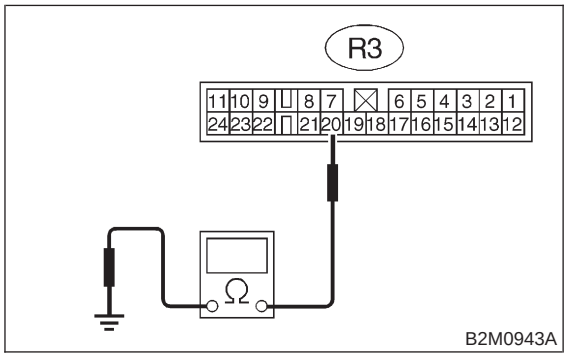


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **10BA9**.
NO : Repair ground short circuit in bulkhead wiring harness.

10BA9 : CHECK REAR WIRING HARNESS.

1) Separate rear wiring harness connector (R3) and bulkhead wiring harness connector (B99).
2) Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal
(R3) No. 20 — Chassis ground:

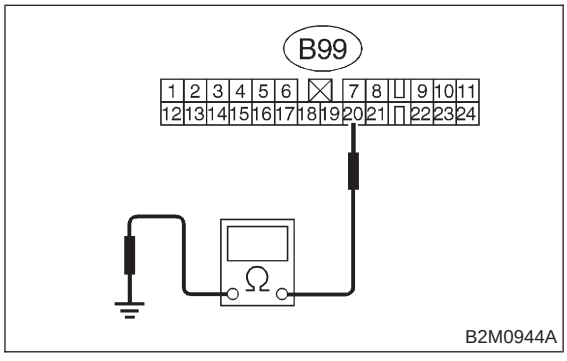


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in rear wiring harness.
NO : Go to step **10BA10**.

10BA10 : CHECK BULKHEAD WIRING HARNESS.

1) Separate bulkhead wiring harness connector (B38) and instrument panel wiring harness connector (i3).
2) Measure resistance of harness between bulkhead wiring harness connector and chassis ground.

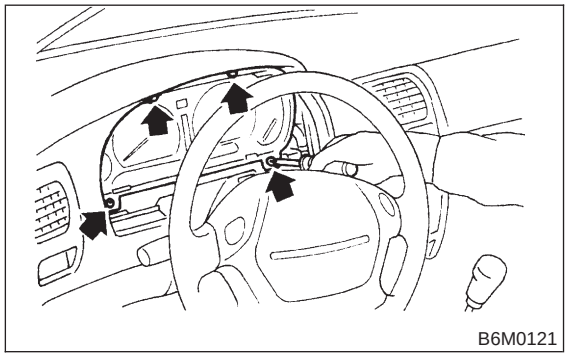
Connector & terminal
(B99) No. 20 — Chassis ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in bulkhead wiring harness.
NO : Repair ground short circuit in instrument panel wiring harness.

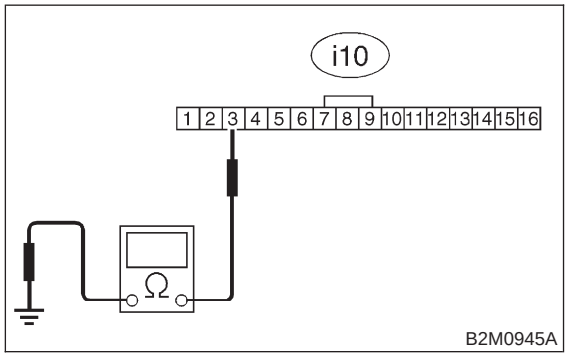
10BA11 : CHECK HARNESS BETWEEN COMBINATION METER AND FUEL PUMP CONNECTOR.

1) Connect connector to fuel pump.
2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W14A1].>



3) Disconnect connector from combination meter.
4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal
(i10) No. 3 — Chassis ground:



CHECK : ***Is the resistance less than 200 Ω?***
YES : Go to step **10BA12**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between combination meter connector and junction A on rear wiring harness
● Poor contact in coupling connectors (i3 and B99)

10BA12 : CHECK COMBINATION METER.

Disconnect speedometer cable from combination meter and remove combination meter.

CHECK : ***Is the fuel meter installation screw tightened securely?***
YES : Go to step **10BA13**.
NO : Tighten fuel meter installation screw securely.

10BA13 : CHECK COMBINATION METER PRINTED CIRCUIT PLATE.

Remove printed circuit plate assembly from combination meter assembly.

CHECK : ***Is there flaw or burning on printed circuit plate assembly?***
YES : Replace printed circuit plate assembly.
NO : Replace fuel meter assembly.

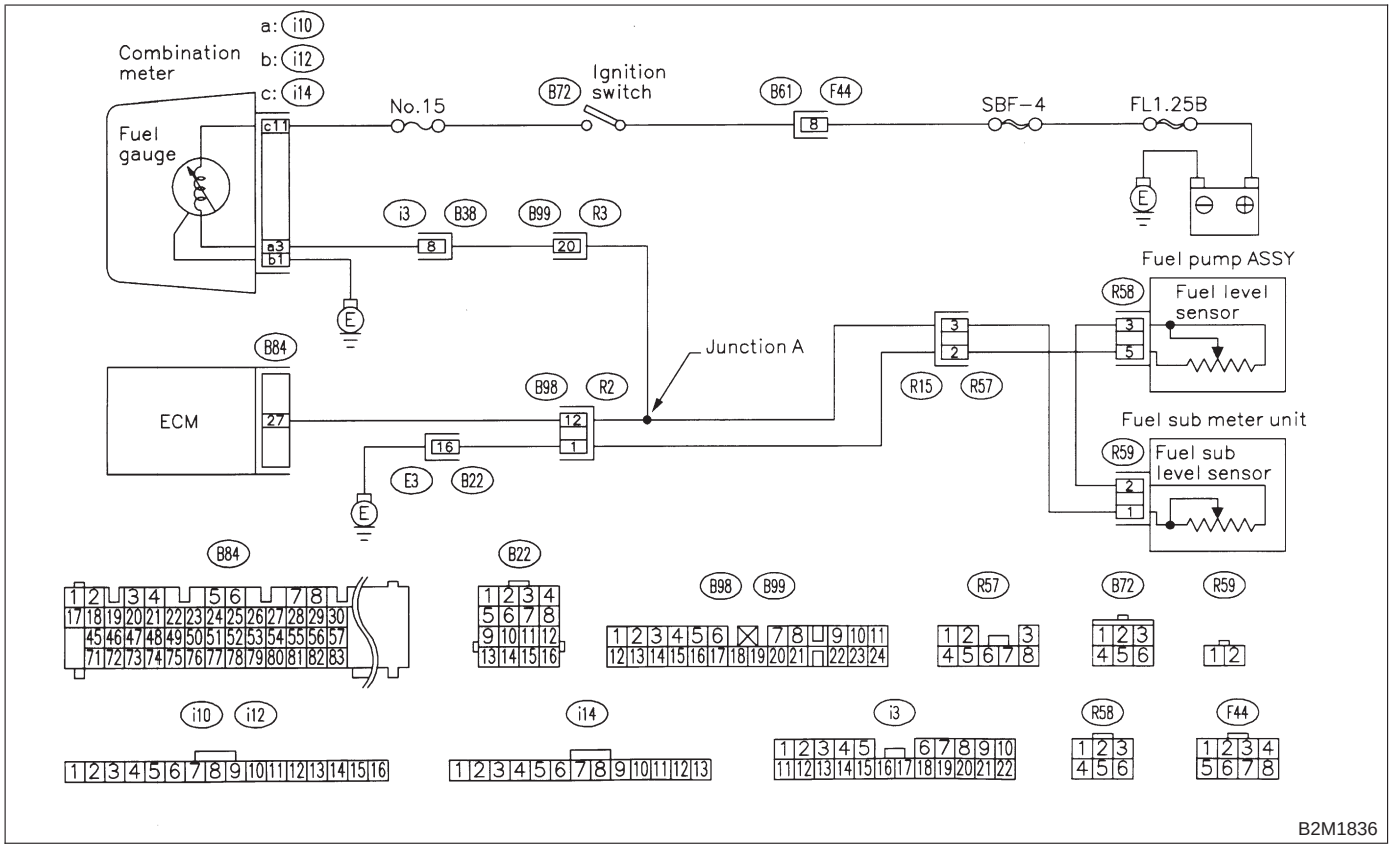
MEMO:

BB: DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BB1 :	CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.

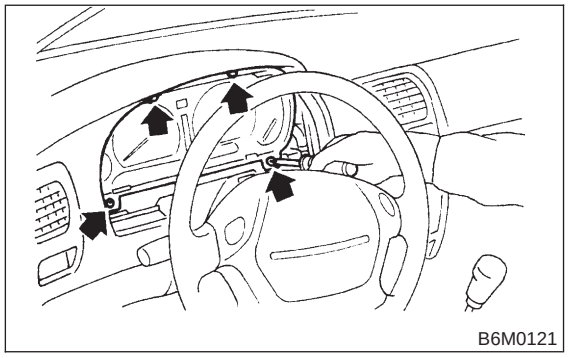
CHECK : ***Does speedometer and tachometer operate normally?***

YES : Go to step **10BB3**.

NO : Go to step **10BB2**.

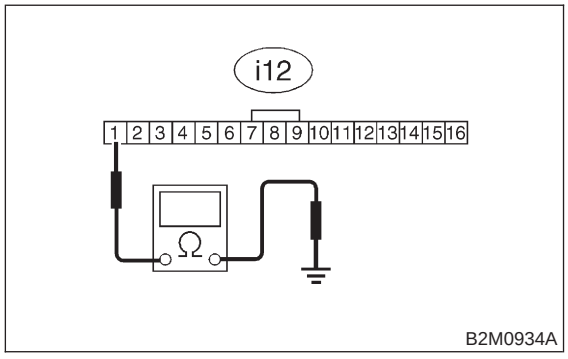
10BB2 : CHECK GROUND CIRCUIT OF COMBINATION METER.

1) Turn ignition switch to OFF.
2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W14A1].>



3) Disconnect connector from combination meter.
4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal
(i12) No. 1 — Chassis ground:



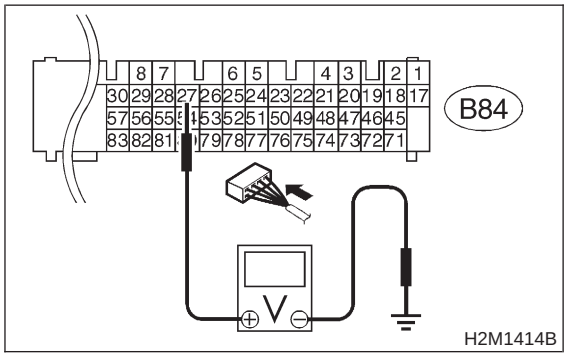
CHECK : ***Is resistance less than 5 Ω?***
YES : Repair or replace combination meter.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between combination meter connector and grounding terminal
- Poor contact in combination meter connector
- Poor contact in grounding terminal

10BB3 : CHECK INPUT SIGNAL FOR ECM.

1) Turn ignition switch to ON. (Engine OFF)
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 27 (+) — Chassis ground (–):

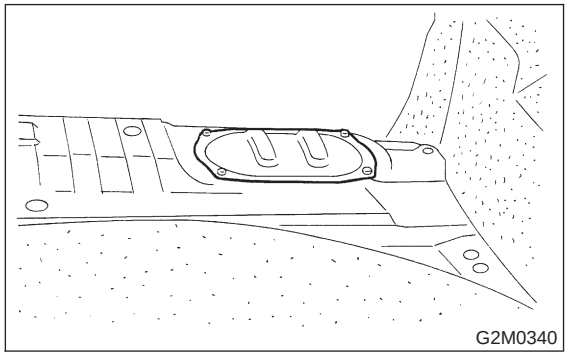


CHECK : ***Is the voltage more than 4.75 V?***
YES : Go to step **10BB4**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:
In this case, repair the following:
- Poor contact in fuel pump connector
- Poor contact in combination meter connector
- Poor contact in ECM connector
- Poor contact in coupling connector (i3, B99, B22, B98 and R57)

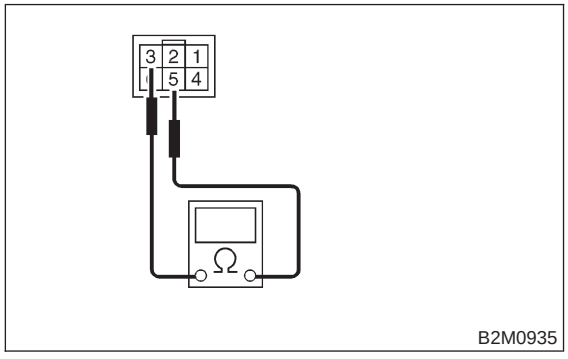
10BB4 : CHECK FUEL LEVEL SENSOR.

1) Turn ignition switch to OFF.
2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).


G2M0340

3) Disconnect connector from fuel pump.
4) Measure resistance between connector terminals of fuel pump.

Terminals
No. 3 — No. 5:

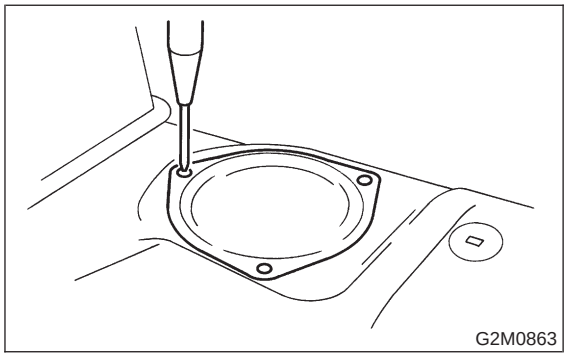


B2M0935

CHECK : ***Is the resistance less than 100 Ω?***
YES : Go to step **10BB5**.
NO : Replace fuel sending unit.

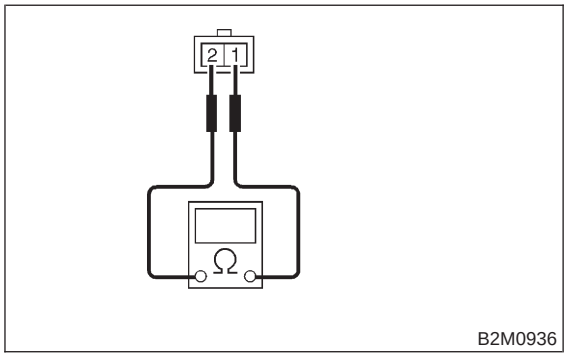
10BB5 : CHECK FUEL SUB LEVEL SENSOR.

1) Remove service hole cover located on the left rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).


G2M0863

2) Disconnect connector from fuel sub meter unit.
3) Measure resistance between connector terminals of fuel sub meter unit.

Terminals
No. 1 — No. 2:



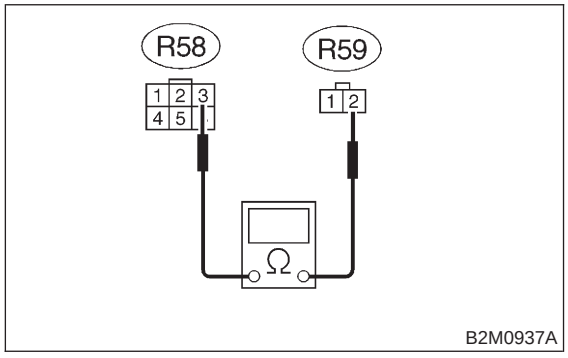
B2M0936

CHECK : ***Is the resistance less than 100 Ω?***
YES : Go to step **10BB6**.
NO : Replace fuel sub meter unit.

10BB6 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL SUB METER UNIT CONNECTOR.

Measure resistance of harness between fuel pump and fuel sub meter unit connector.

Connector & terminal
(R58) No. 3 — (R59) No. 2:

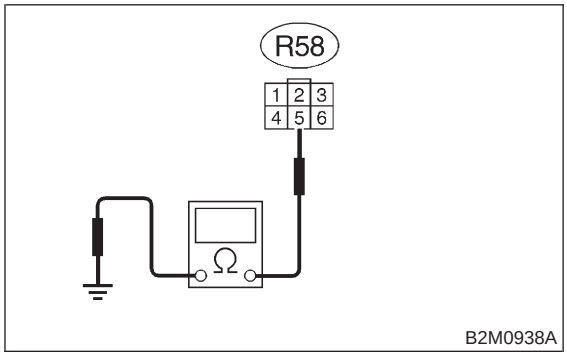


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BB7**.
NO : Repair open circuit in harness between fuel pump and fuel sub meter unit connector.

10BB7 : CHECK GROUND CIRCUIT OF FUEL LEVEL SENSOR.

Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 5 — Chassis ground:



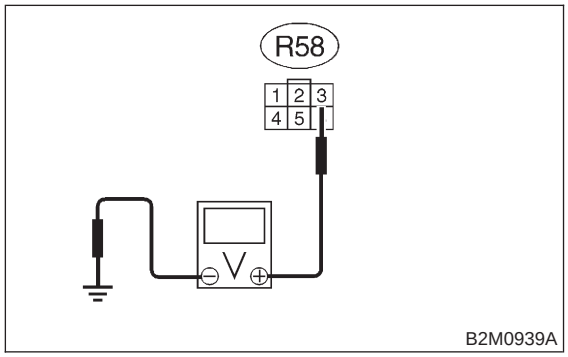
CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **10BB8**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in fuel pump connector
- Poor contact in coupling connectors (R57, B98 and B22)

10BB8 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONNECTOR.

1) Connect connector to fuel sub meter unit.
2) Turn ignition switch to ON.
3) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 3 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Repair harness and connector.

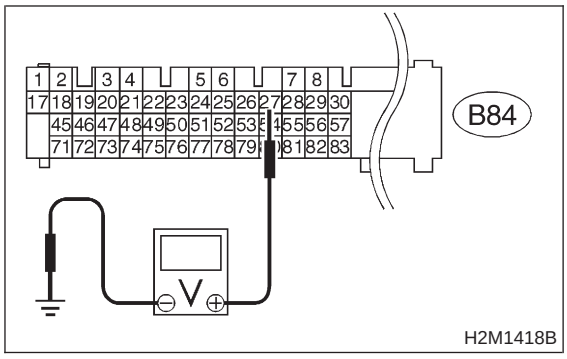
NOTE:
In this case, repair the following:
- Open circuit in harness between fuel pump connector and junction A on rear wiring harness
- Poor contact in fuel sub meter unit connector
- Poor contact in fuel pump connector
- Poor contact in coupling connector (R57)

NO : Go to step **10BB9**.

10BB9 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Turn ignition switch to ON.
4) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 27 (+) — Chassis ground:



CHECK : ***Is the voltage less than 1 V?***
YES : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM connector and junction A on rear wiring harness
- Poor contact in coupling connector (B98)

NO : Repair connector.

NOTE:
In this case, repair the following:
- Poor contact in fuel pump connector
- Poor contact in fuel sub meter unit
- Poor contact in ECM connector

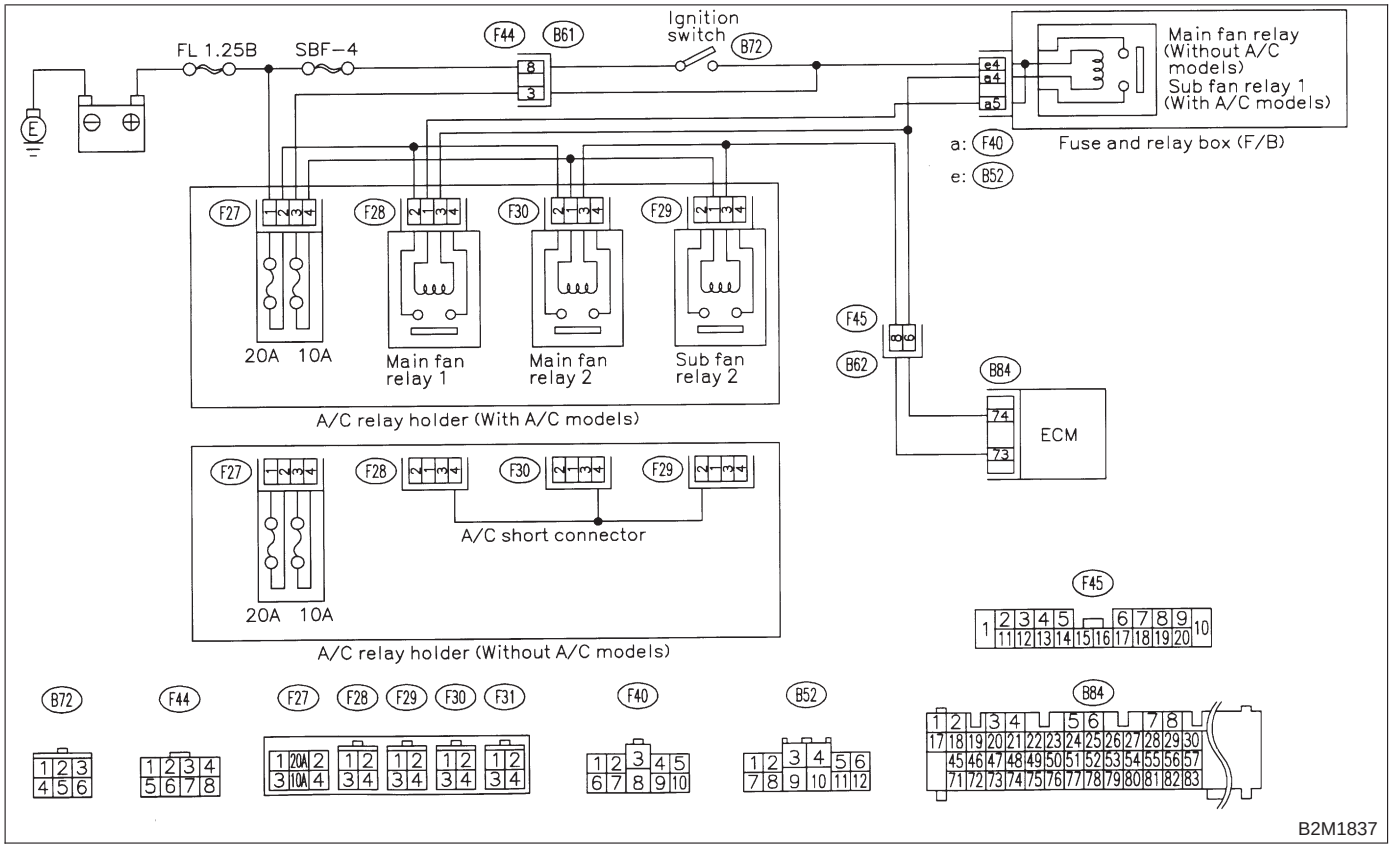
MEMO:

BC: DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Radiator fan does not operate properly.
  - Overheating

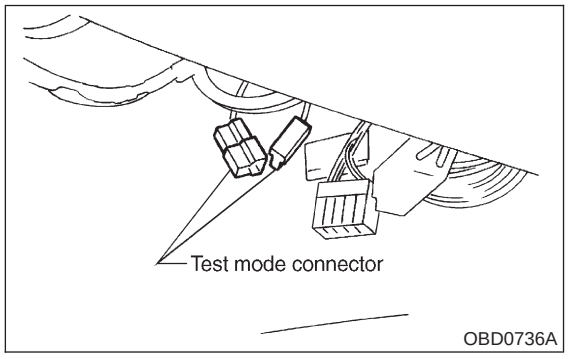
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODE. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BC1 : CHECK OUTPUT SIGNAL FROM ECM.

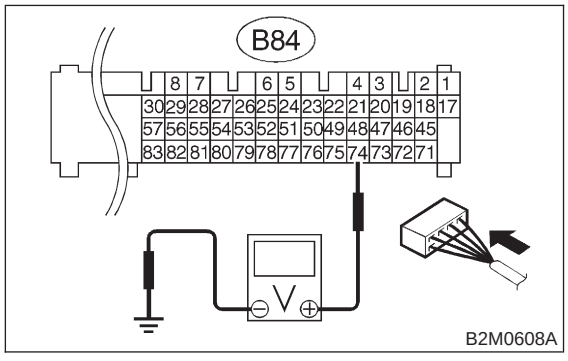
1) Turn ignition switch to OFF.
2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

NOTE:
Radiator fan relay operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal
(B84) No. 74 (+) — Chassis ground:

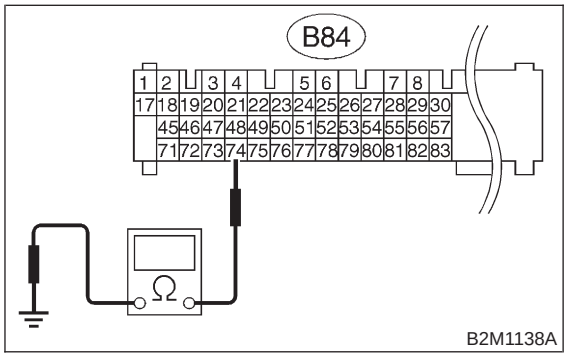


CHECK : ***Does voltage change between 0 and 10 volts?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10BC2**.

10BC2 : CHECK GROUND SHORT CIRCUIT IN RADIATOR FAN RELAY 1 CONTROL CIRCUIT.

1) Turn ignition switch to OFF.
2) Disconnect connectors from ECM.
3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B84) No. 74 — Chassis ground:

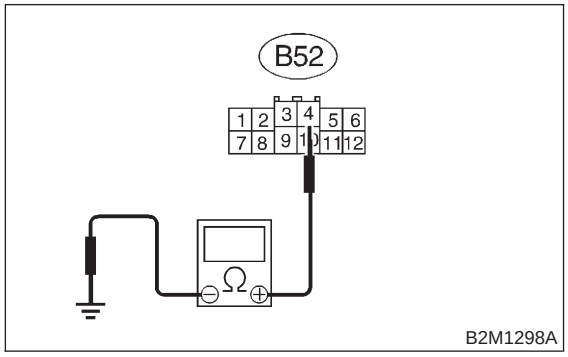


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in radiator fan relay 1 control circuit.
NO : Go to step **10BC3**.

10BC3 : CHECK POWER SUPPLY FOR RELAY.

1) Disconnect connector (B52) from fuse and relay box (F/B).
2) Turn ignition switch to ON.
3) Measure voltage between fuse and relay box (F/B) connector and chassis ground.

Connector & terminal
(B52) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10BC4**.
NO : Repair open circuit in harness between ignition switch and fuse and relay box (F/B) connector.

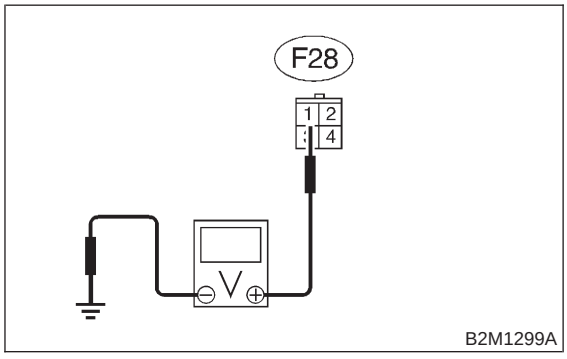
10BC4 : CHECK VEHICLE MODEL.

CHECK : ***Is the vehicle equipped with A/C?***
YES : Go to step **10BC5**.
NO : Go to step **10BC8**.

10BC5 : CHECK POWER SUPPLY FOR MAIN FAN RELAY 1.

1) Turn ignition switch to OFF.
2) Connect connector (B52) to fuse and relay box (F/B).
3) Remove main fan relay 1.
4) Turn ignition switch to ON.
5) Measure voltage between main fan relay 1 connector and chassis ground.

Connector & terminal
(F28) No. 1 (+) — Chassis ground (−):

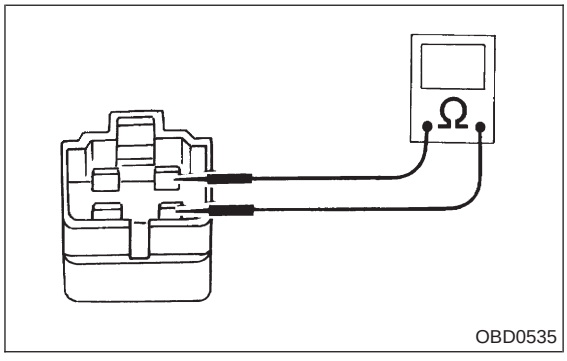


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10BC6**.
NO : Repair open circuit in harness between fuse and relay box (F/B) and main fan relay 1 connector.

10BC6 : CHECK MAIN FAN RELAY 1.

1) Turn ignition switch to OFF.
2) Measure resistance between main fan relay 1 terminals.

Terminal
No. 1 — No. 3:

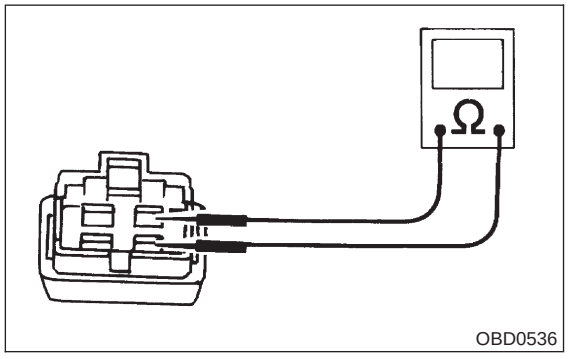


CHECK : ***Is the resistance between 87 and 107 Ω?***
YES : Go to step **10BC7**.
NO : Replace main fan relay 1.

10BC7 : CHECK SUB FAN RELAY 1.

1) Remove sub fan relay 1.
2) Measure resistance between sub fan relay 1 or main fan relay terminals.

Terminal
No. 1 — No. 3:

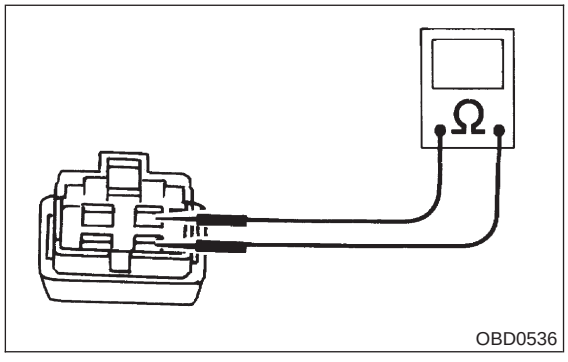


CHECK : ***Is the resistance between 83 and 117 Ω?***
YES : Go to step **10BC9**.
NO : Replace sub fan relay 1.

10BC8 : CHECK MAIN FAN RELAY.

1) Remove main fan relay.
2) Measure resistance between sub fan relay 1 or main fan relay terminals.

Terminal
No. 1 — No. 3:

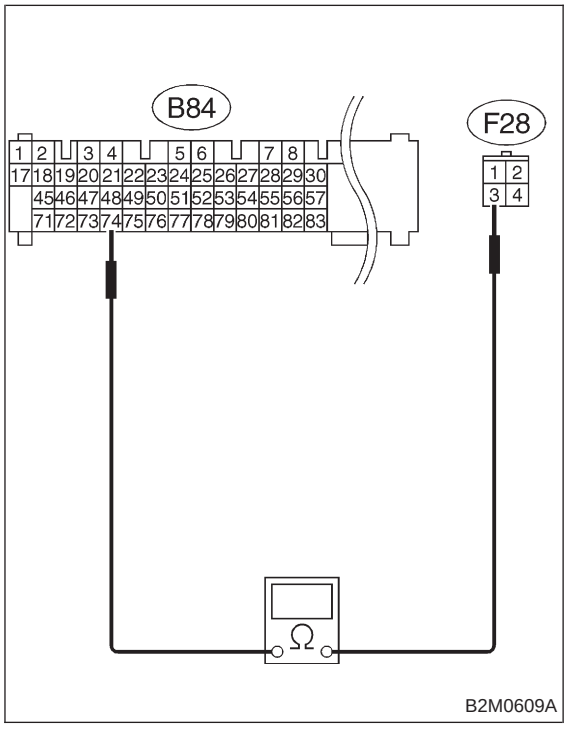


CHECK : ***Is the resistance between 83 and 117 Ω?***
YES : Go to step **10BC13**.
NO : Replace main fan relay.

10BC9 : CHECK OPEN CIRCUIT IN MAIN FAN RELAY 1 CONTROL CIRCUIT.

1) Disconnect connector (F40) from fuse and relay box (F/B).
2) Measure resistance of harness between ECM and main fan relay 1 connector.

Connector & terminal
(B84) No. 74 — (F28) No. 3:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BC10**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and main fan relay 1 connector
- Poor contact in coupling connector (F45)

10BC10 : CHECK POOR CONTACT.

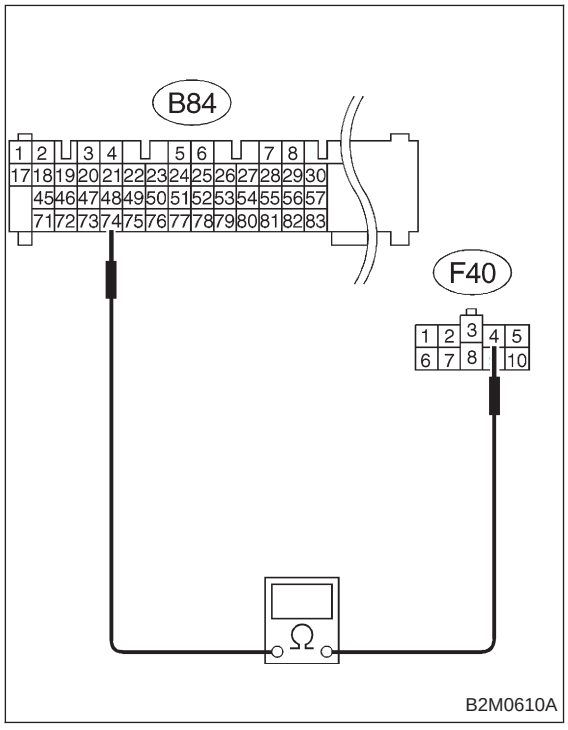
Check poor contact in ECM or main fan relay 1 connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM or main fan relay 1 connector?***
YES : Repair poor contact in ECM or main fan relay 1 connector.
NO : Go to step **10BC11**.

10BC11 : CHECK OPEN CIRCUIT IN SUB FAN RELAY 1 CONTROL CIRCUIT.

Measure resistance of harness between ECM and sub fan relay 1 connector.

Connector & terminal
(B84) No. 74 — (F40) No. 4:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BC12**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and sub fan relay 1 connector
- Poor contact in coupling connector (F45)
- Replace diode (A/C)

10BC12 : CHECK POOR CONTACT.

Check poor contact in ECM or sub fan relay 1 connector. <Ref. to FOREWORD [T3C1].>

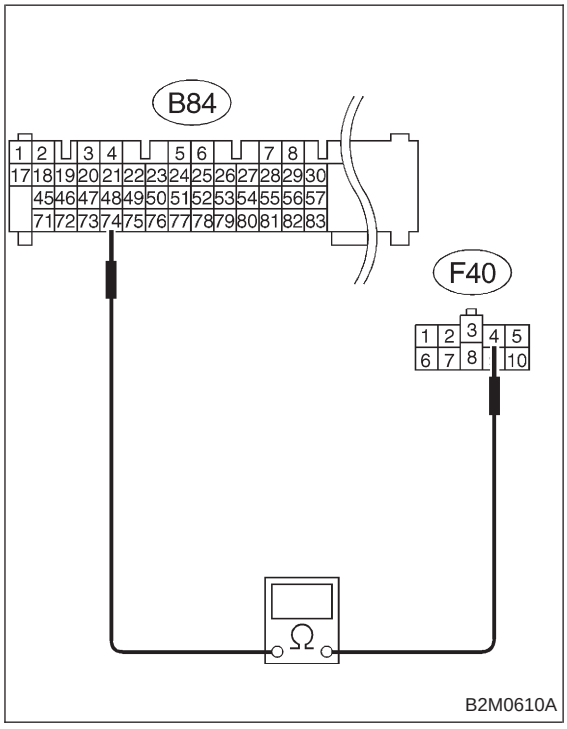
CHECK : ***Is there poor contact in ECM or sub fan relay 1 connector?***
YES : Repair poor contact in ECM or sub fan relay 1 connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10BC13 : CHECK OPEN CIRCUIT IN MAIN FAN RELAY CONTROL CIRCUIT.

Measure resistance of harness between ECM and main fan relay connector.

Connector & terminal
(B84) No. 74 — (F40) No. 4:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BC14**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and main fan relay connector
- Poor contact in coupling connector (F45)

10BC14 : CHECK POOR CONTACT.

Check poor contact in ECM or main fan relay connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM or main fan relay connector?***
YES : Repair poor contact in ECM or main fan relay connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

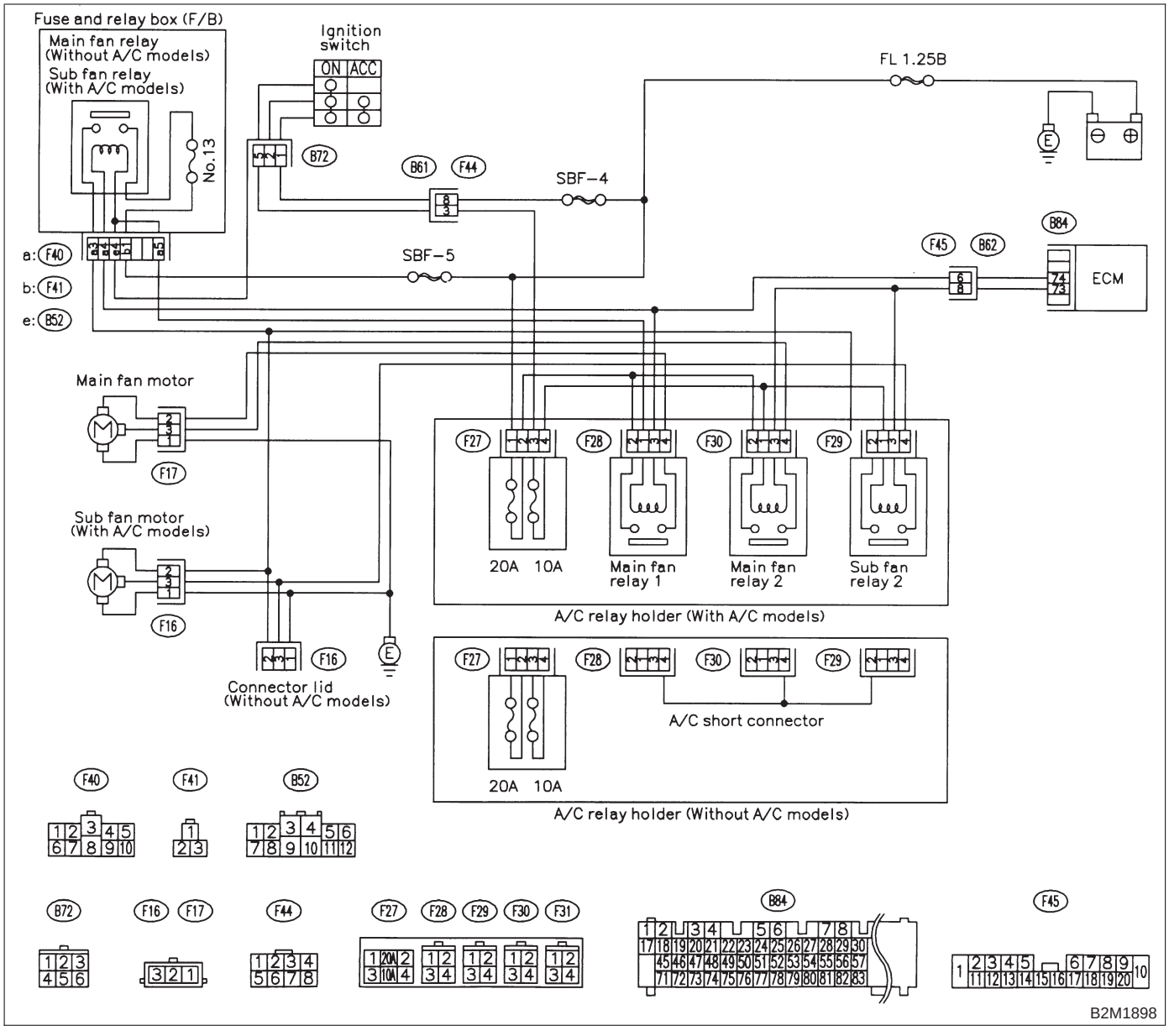
BD: DTC P0483 — COOLING FAN FUNCTION PROBLEM —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Occurrence of noise
  - Overheating

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

NOTE:
If the vehicle, with the engine idling, is placed very close to a wall or another vehicle, preventing normal cooling function, the OBD system may detect malfunction.

- **WIRING DIAGRAM:**



10BD1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Is there any other DTC on display?***

YES : Inspect the relevant DTC using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

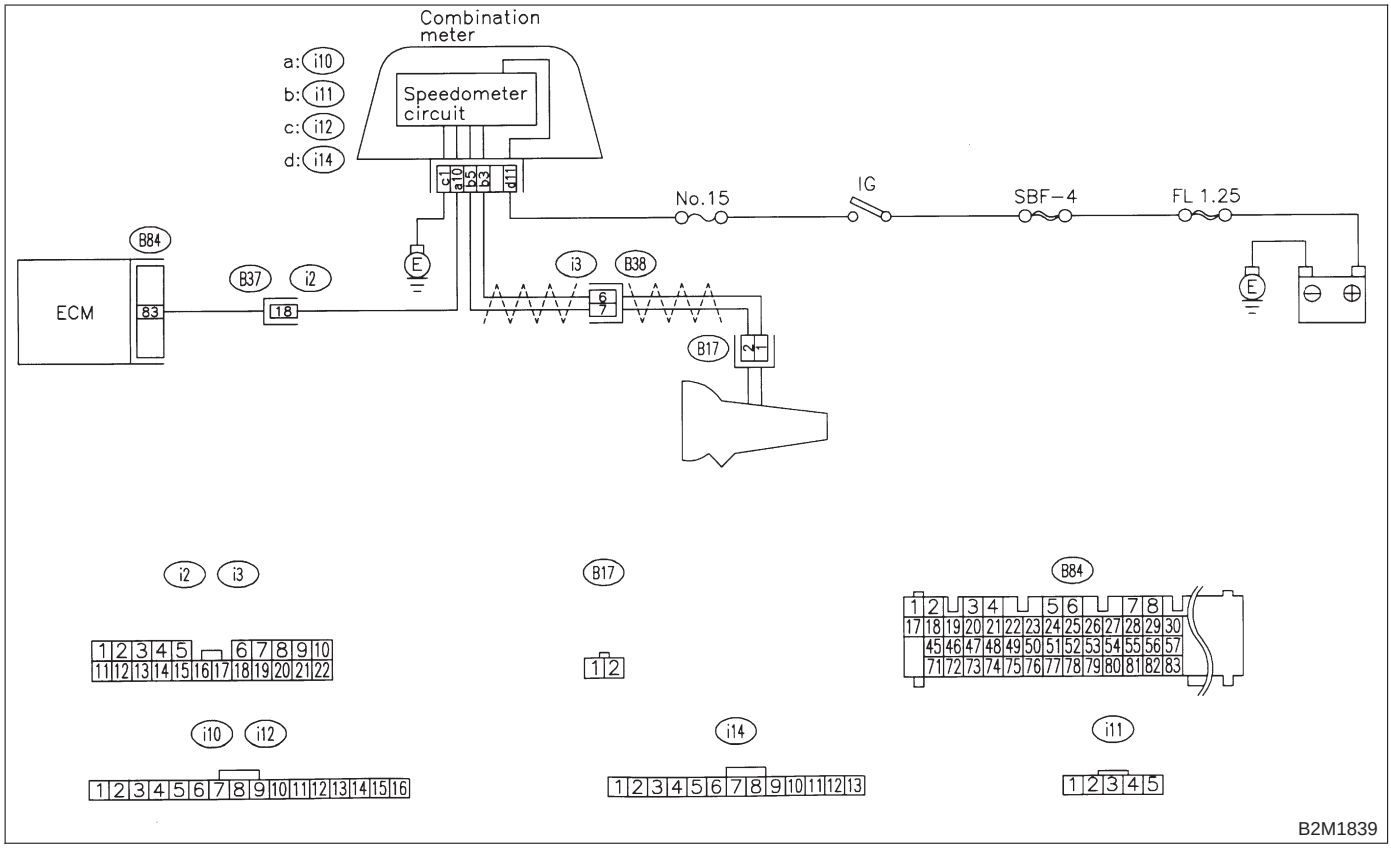
NO : Check engine cooling system. <Ref. to 2-5 [K100].>

BE: DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BE1 : CHECK SPEEDOMETER OPERATION IN COMBINATION METER.

CHECK : ***Does speedometer operate normally?***

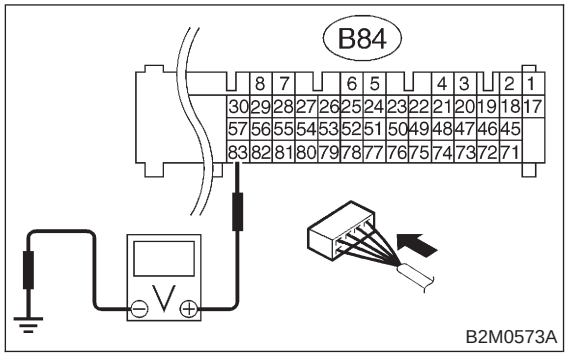
YES : Go to step **10BE2**.

NO : Check speedometer and vehicle speed sensor. <Ref. to 6-2b [T3A0].>

10BE2 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from TCM.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 83 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 2 V?***
YES : Repair harness and connector.

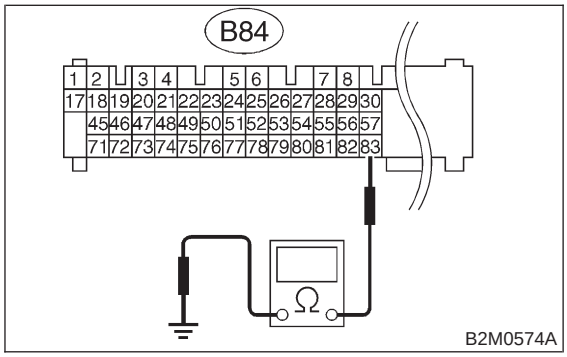
NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and combination meter connector
- Poor contact in ECM connector
- Poor contact in combination meter connector
- Poor contact in coupling connector (B37)

NO : Go to step **10BE3**.

10BE3 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B84) No. 83 — Chassis ground:



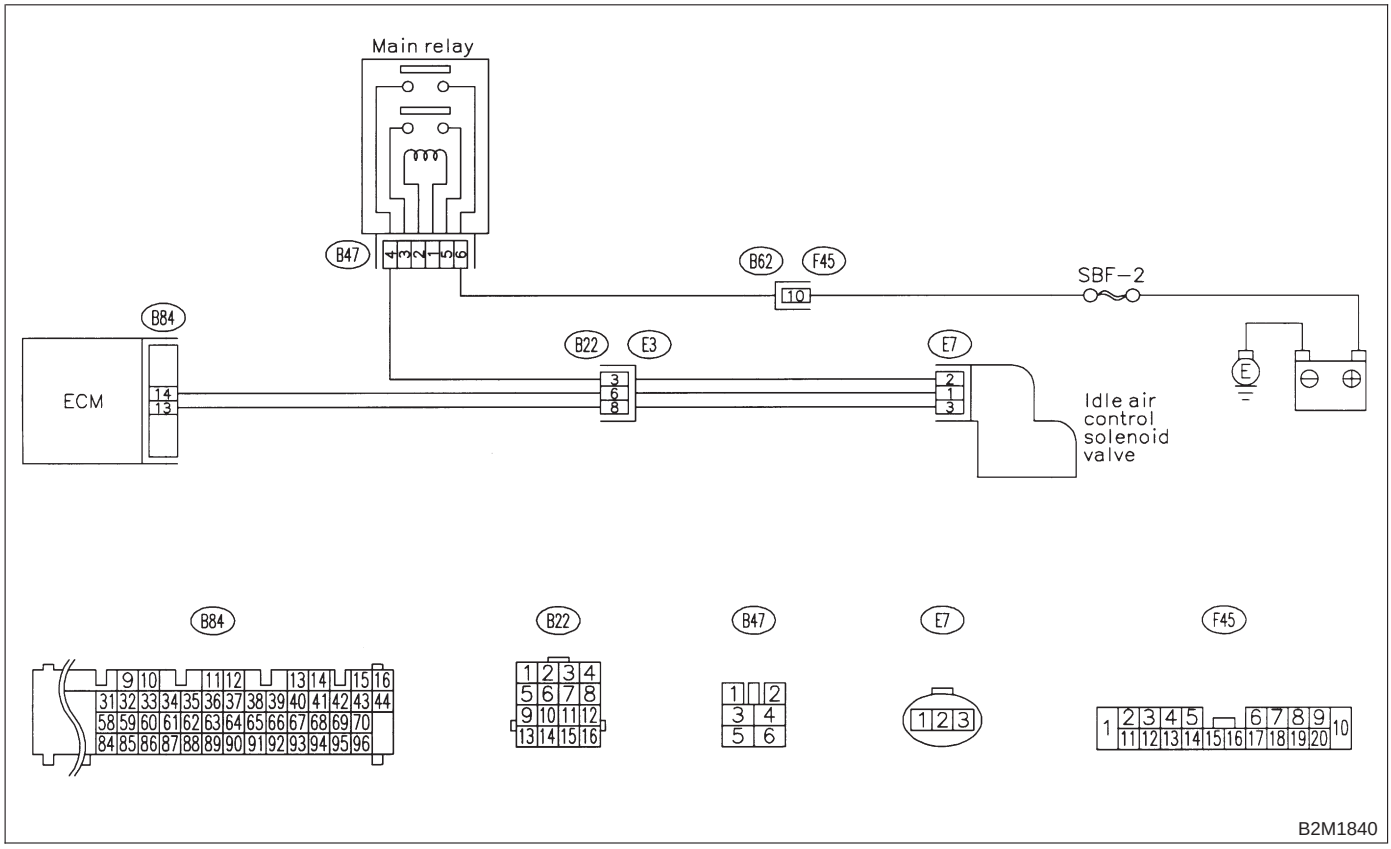
CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and combination meter connector.
NO : Repair poor contact in ECM connector.

BF: DTC P0505 — IDLE CONTROL SYSTEM MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Engine breathing

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BF1 : CHECK AIR INTAKE SYSTEM.

1) Turn ignition switch to ON.
2) Start engine, and idle it.
3) Check the following items.

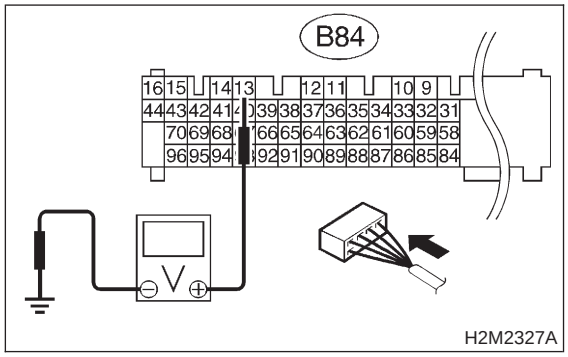
- Loose installation of intake manifold, idle air control solenoid valve and throttle body
- Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket
- Loose connections and cracks of idle air control solenoid valve by-pass hoses
- Disconnections of vacuum hoses

CHECK : ***Is there a fault in air intake system?***
YES : Repair or replace air intake system.
NO : Go to step **10BF2**.

10BF2 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 13 (+) — Chassis ground (−):

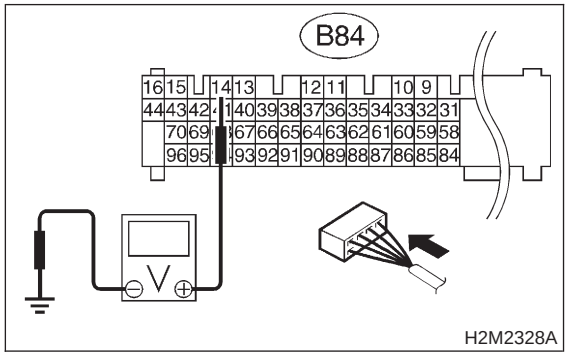


CHECK : ***Is the voltage more than 3 V?***
YES : Go to step **10BF3**.
NO : Go to step **10BF13**.

10BF3 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 14 (+) — Chassis ground (−):

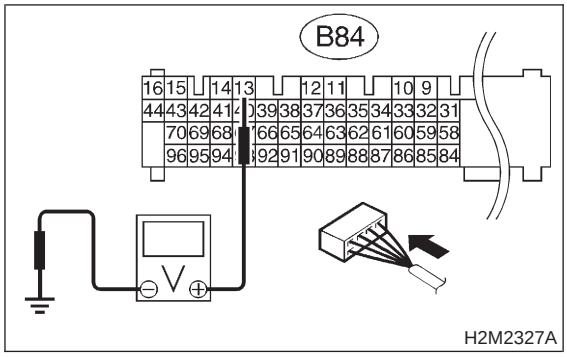


CHECK : ***Is the voltage more than 3 V?***
YES : Go to step **10BF4**.
NO : Go to step **10BF13**.

10BF4 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to OFF.
2) Disconnect connector from idle air control solenoid valve.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 13 (+) — Chassis ground (−):

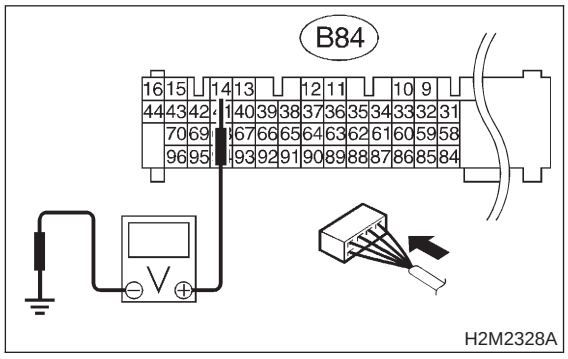


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace ECM.
NO : Go to step **10BF5**.

10BF5 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 14 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace ECM.
NO : Go to step **10BF6**.

10BF6 : CHECK POOR CONTACT.

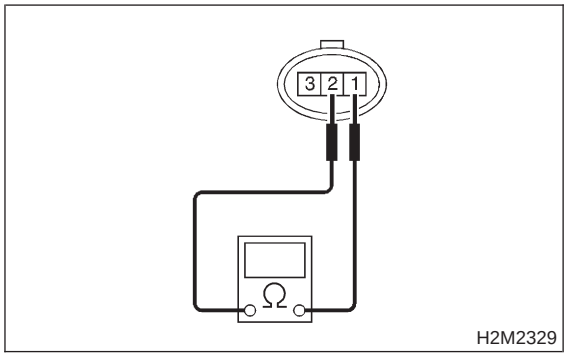
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10BF7**.

10BF7 : CHECK IDLE AIR CONTROL SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Measure resistance between idle air control solenoid valve connector terminals.

Terminals
No. 1 — No. 2:

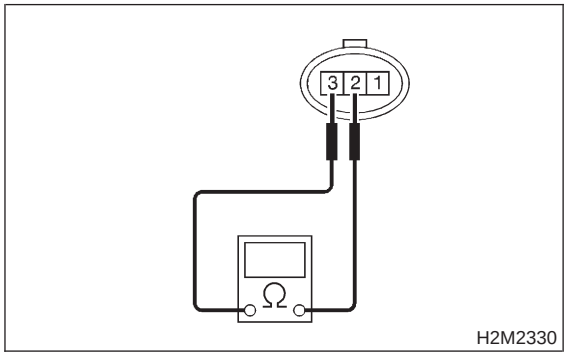


CHECK : ***Is the resistance more than 20 Ω?***
YES : Replace idle air control solenoid valve.
NO : Go to step **10BF8**.

10BF8 : CHECK IDLE AIR CONTROL SOLENOID VALVE.

Measure resistance between idle air control solenoid valve connector terminals.

Terminals
No. 2 — No. 3:

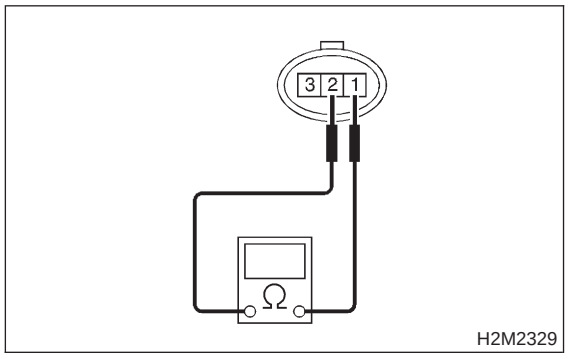


CHECK : ***Is the resistance more than 20 Ω?***
YES : Replace idle air control solenoid valve.
NO : Go to step **10BF9**.

10BF9 : CHECK IDLE AIR CONTROL SOLENOID VALVE.

Measure resistance between idle air control solenoid valve connector terminals.

Terminals
No. 1 — No. 2:

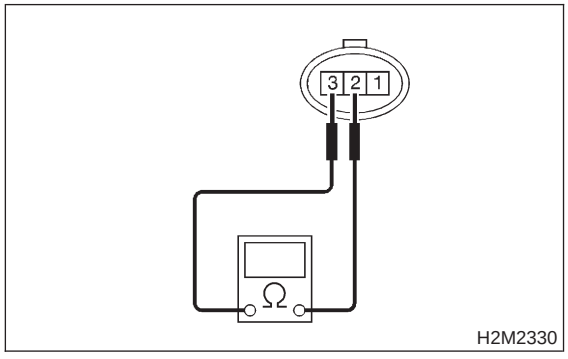


CHECK : ***Is the resistance less than 5 Ω?***
YES : Replace idle air control solenoid valve and ECM.
NO : Go to step **10BF10**.

10BF10 : CHECK IDLE AIR CONTROL SOLENOID VALVE.

Measure resistance between idle air control solenoid valve connector terminals.

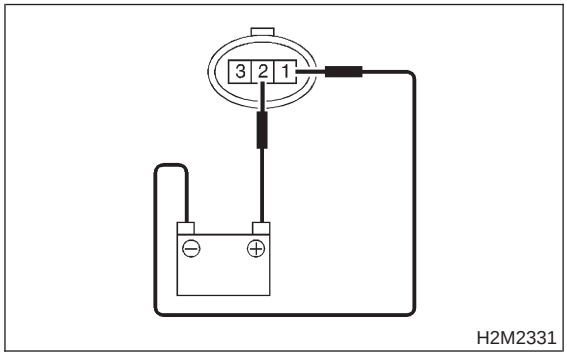
Terminals
No. 2 — No. 3:



CHECK : ***Is the resistance less than 5 Ω?***
YES : Replace idle air control solenoid valve and ECM.
NO : Go to step **10BF11**.

10BF11 : CHECK IDLE AIR CONTROL SOLENOID VALVE.

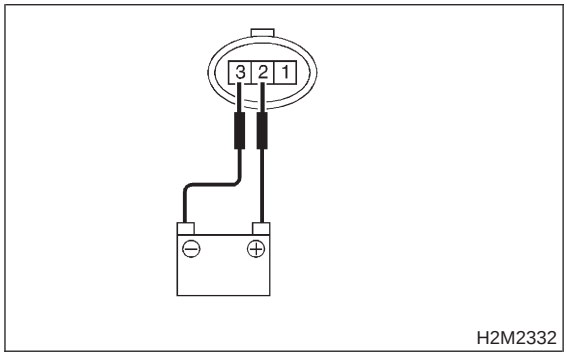
1) Remove idle air control solenoid valve. <Ref. to 2-7 [W12A0].>
2) Check operation of idle air control solenoid valve.



CHECK : ***Is idle air control solenoid valve fully opened when applying the battery to terminals No. 2 (+) and No. 1 (−)?***
YES : Go to step **10BF12**.
NO : Clean idle air control solenoid valve. <Ref. to 2-7 [W12B0].>

10BF12 : CHECK IDLE AIR CONTROL SOLENOID VALVE.

Check operation of idle air control solenoid valve.

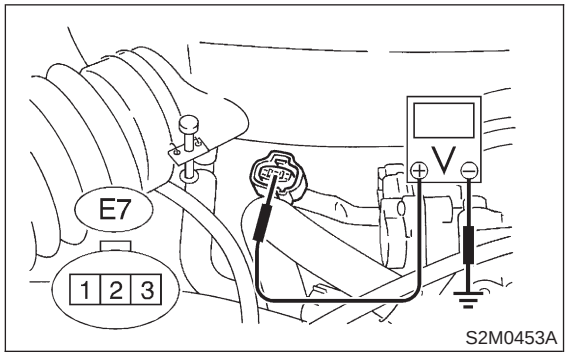


CHECK : ***Is idle air control solenoid valve fully closed when applying the battery to terminals No. 2 (+) and No. 3 (−)?***
YES : Go to step **10BF13**.
NO : Clean idle air control solenoid valve. <Ref. to 2-7 [W12B0].>

10BF13 : CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Disconnect connector from idle air control solenoid valve.
3) Turn ignition switch to ON.
4) Measure voltage between idle air control solenoid valve and engine ground.

Connector & terminal
(E7) No. 2 (+) — Engine ground (−):



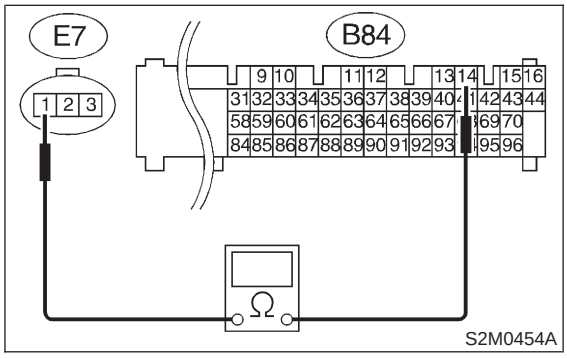
CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10BF14**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between idle air control solenoid valve and main relay connector
- Poor contact in coupling connector (B22)

10BF14 : CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and idle air control solenoid valve connector.

Connector & terminal
(B84) No. 14 — (E7) No. 1:



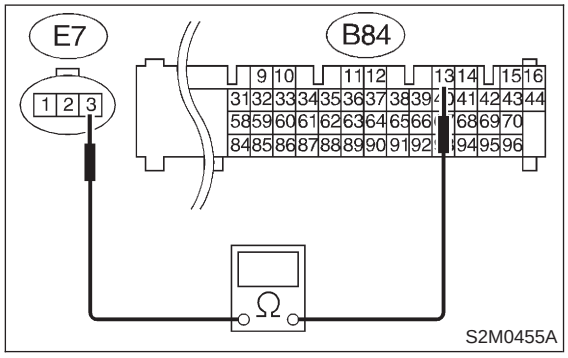
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BF15**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and idle air control solenoid valve connector
- Poor contact in coupling connector (B22)

10BF15 : CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.

Measure resistance between ECM and idle air control solenoid valve connector.

Connector & terminal
(B84) No. 13 — (E7) No. 3:

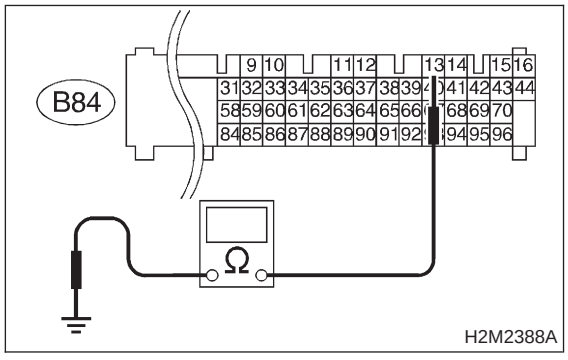


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BF16**.
NO : Repair open circuit in harness between ECM and idle air control solenoid valve connector.

10BF16 : CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 13 — Chassis ground:

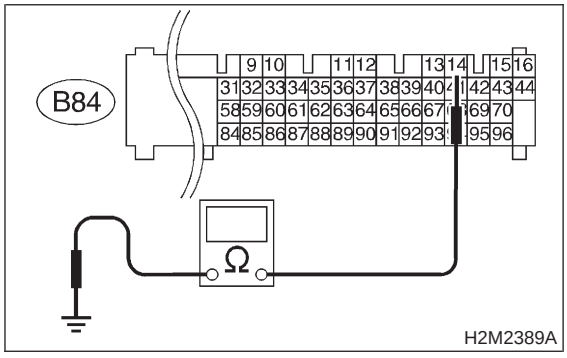


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.
NO : Go to step **10BF17**.

10BF17 : CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.

Measure resistance between ECM and chassis ground.

Connector & terminal
(B84) No. 14 — Chassis ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.
NO : Go to step **10BF18**.

10BF18 : CHECK POOR CONTACT.

Check poor contact in idle air control solenoid valve. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in idle air control solenoid valve connector?***
YES : Repair poor contact in idle air control solenoid valve connector.
NO : Contact with SOA service.

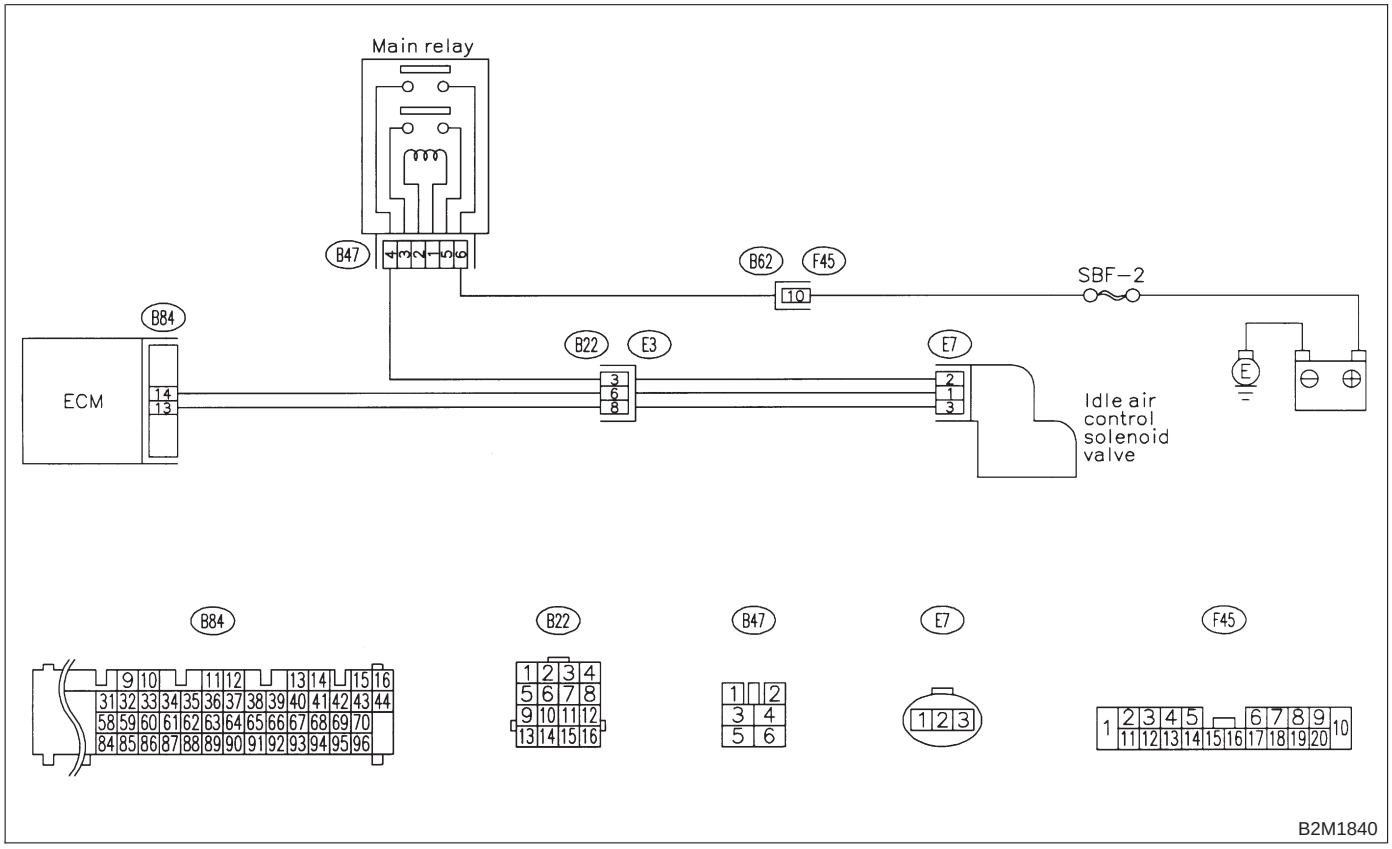
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BG: DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Engine is difficult to start.
  - Engine does not start.
  - Erroneous idling
  - Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BG1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0505?***

YES : Inspect DTC P0505 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0506.

NO : Go to step **10BG2**.

10BG2 : CHECK AIR INTAKE SYSTEM.

1) Turn ignition switch to ON.
2) Start engine, and idle it.

CHECK : ***Is clogging the by-pass line between by-pass hose and intake duct?***

YES : Repair the by-pass line.

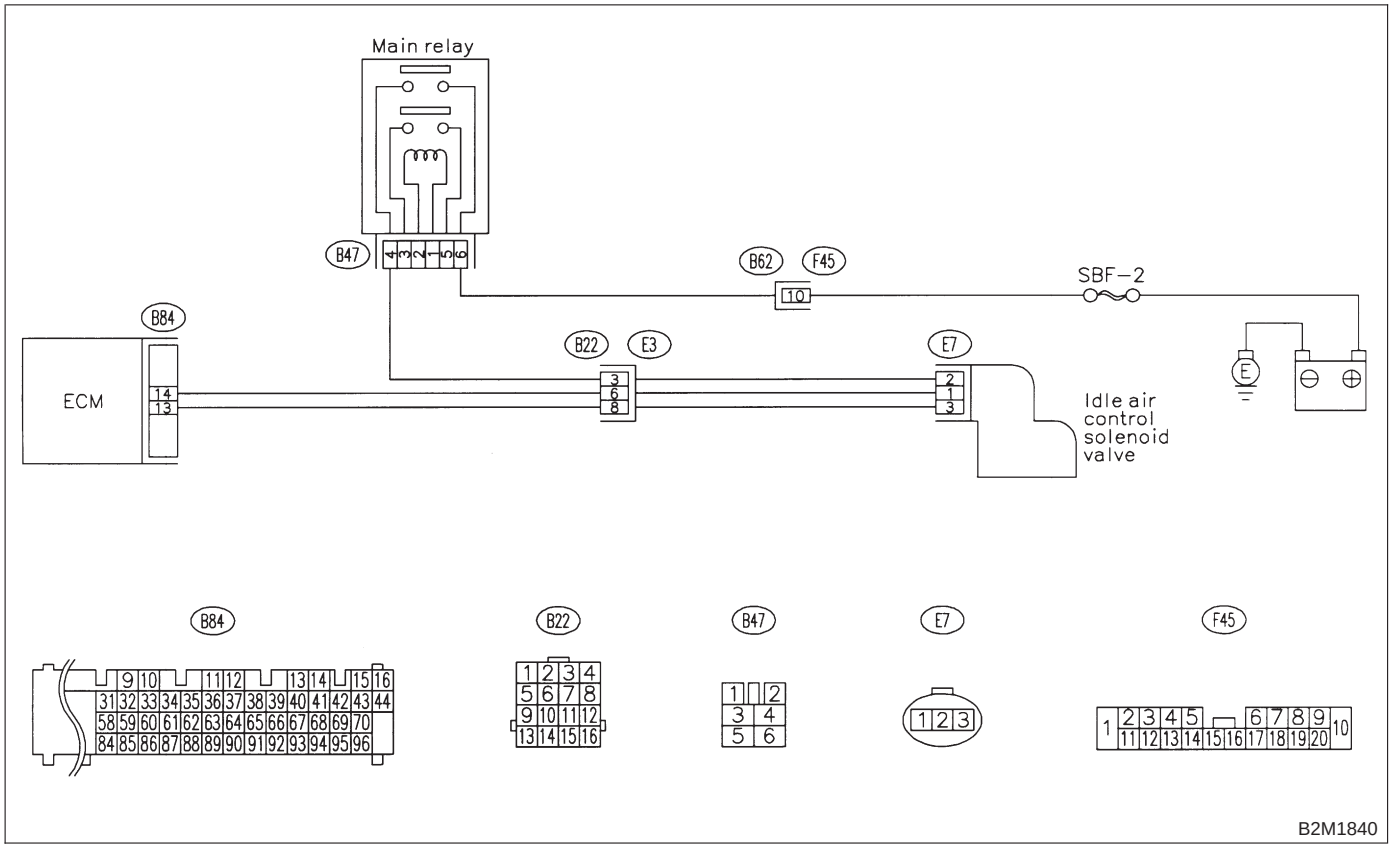
NO : Replace idle air control solenoid valve.

BH: DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Engine keeps running at higher revolution than specified idling revolution.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BH1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0505?***

YES : Inspect DTC P0505 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P0507.

NO : Go to step **10BH2**.

10BH2 : CHECK AIR INTAKE SYSTEM.

1) Turn ignition switch to ON.
2) Start engine, and idle it.
3) Check the following items.

- Loose installation of intake manifold, idle air control solenoid valve and throttle body
- Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket
- Loose connections and cracks of idle air control solenoid valve by-pass hoses
- Disconnections of vacuum hoses

CHECK : ***Is there a fault in air intake system?***

YES : Repair air suction and leaks.

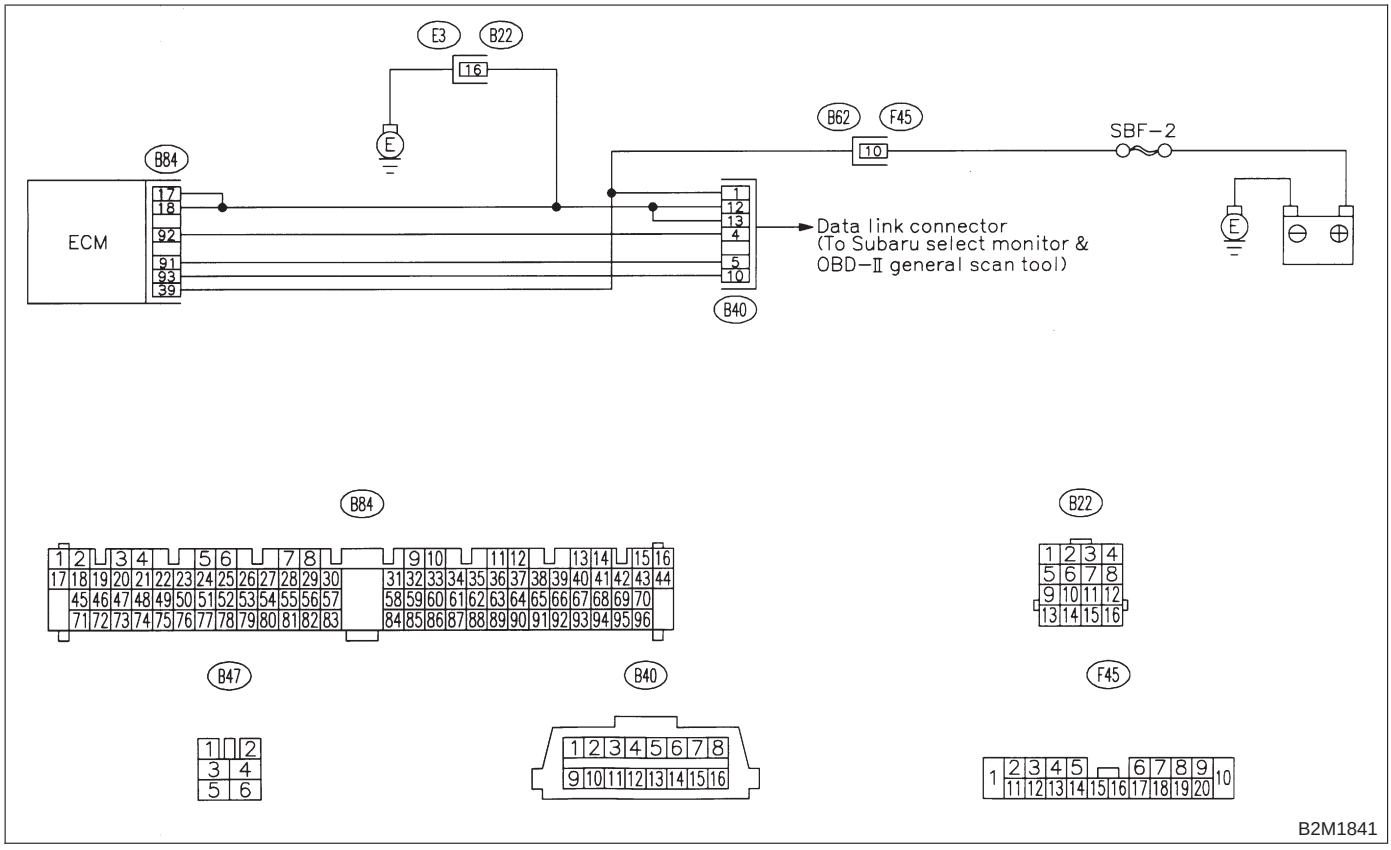
NO : Replace idle air control solenoid valve.

BI: DTC P0600 — SERIAL COMMUNICATION LINK MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

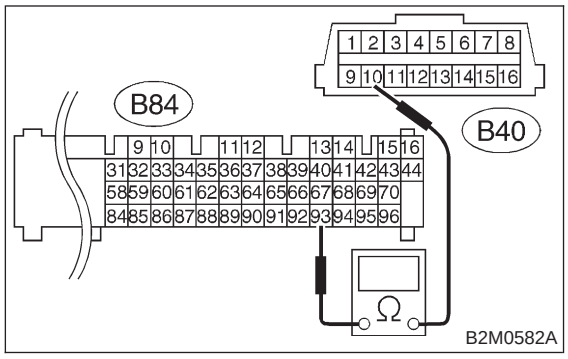
- **WIRING DIAGRAM:**



10BI1 : CHECK HARNESS BETWEEN ECM AND DATA LINK CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and data link connector (for Subaru Select Monitor & OBD-II general scan tool).

Connector & terminal
(B84) No. 93 — (B40) No. 10:

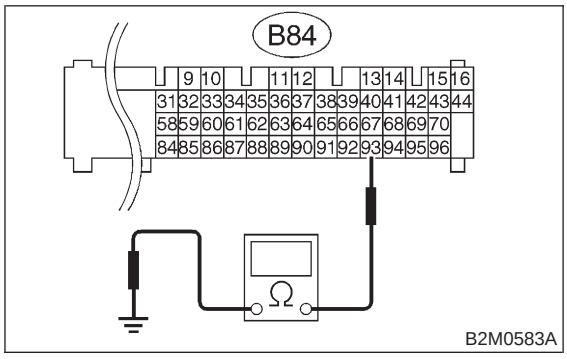


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BI2**.
NO : Repair open circuit in harness between ECM and data link connector.

10BI2 : CHECK HARNESS BETWEEN ECM AND DATA LINK CONNECTOR.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 93 — Chassis ground:



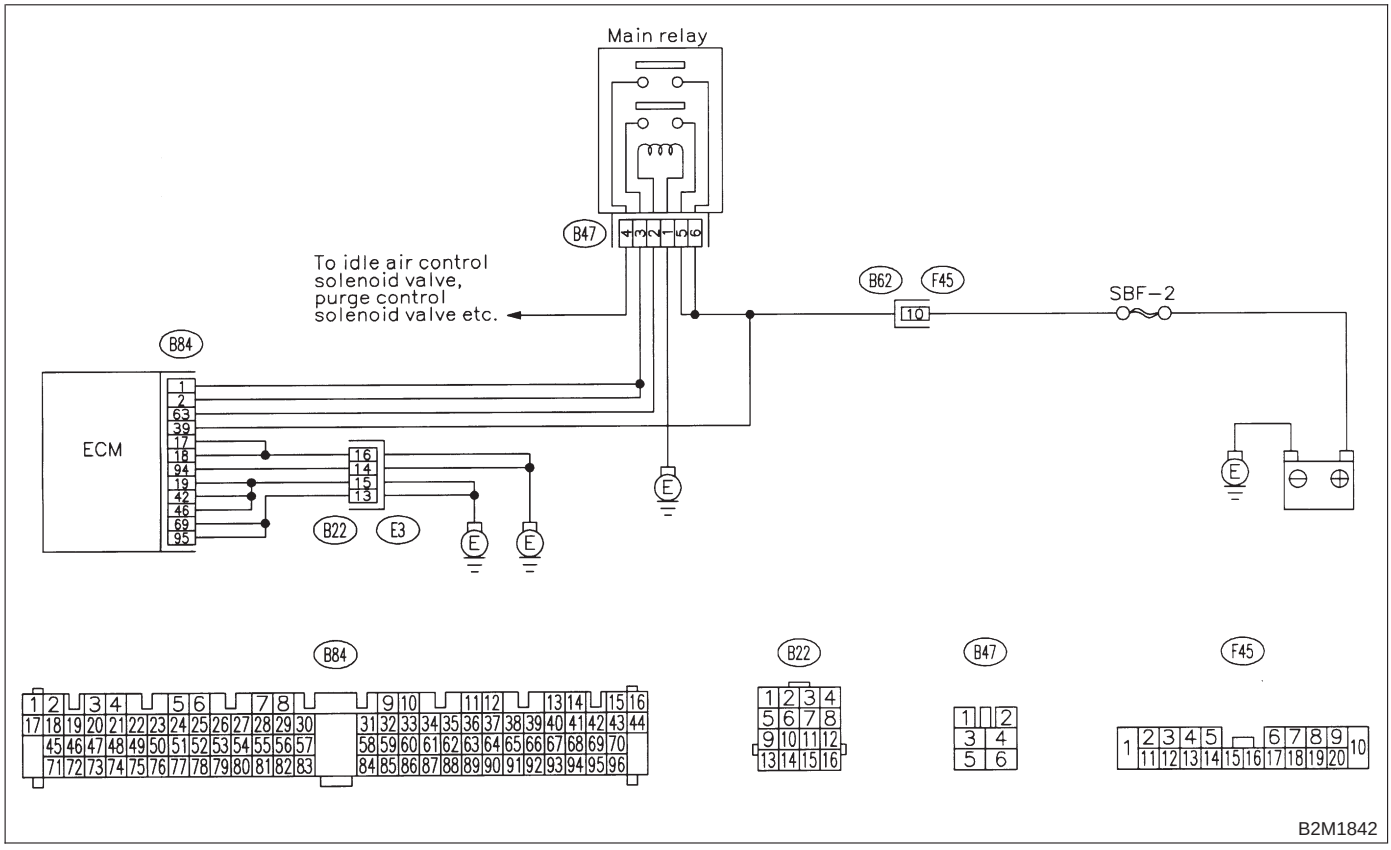
CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and data link connector.
NO : Repair poor contact in ECM connector and data link connector.

BJ: DTC P0601 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Engine does not start.
  - Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BJ1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0601?***

YES : Replace ECM.

NO : It is not necessary to inspect DTC P0601.

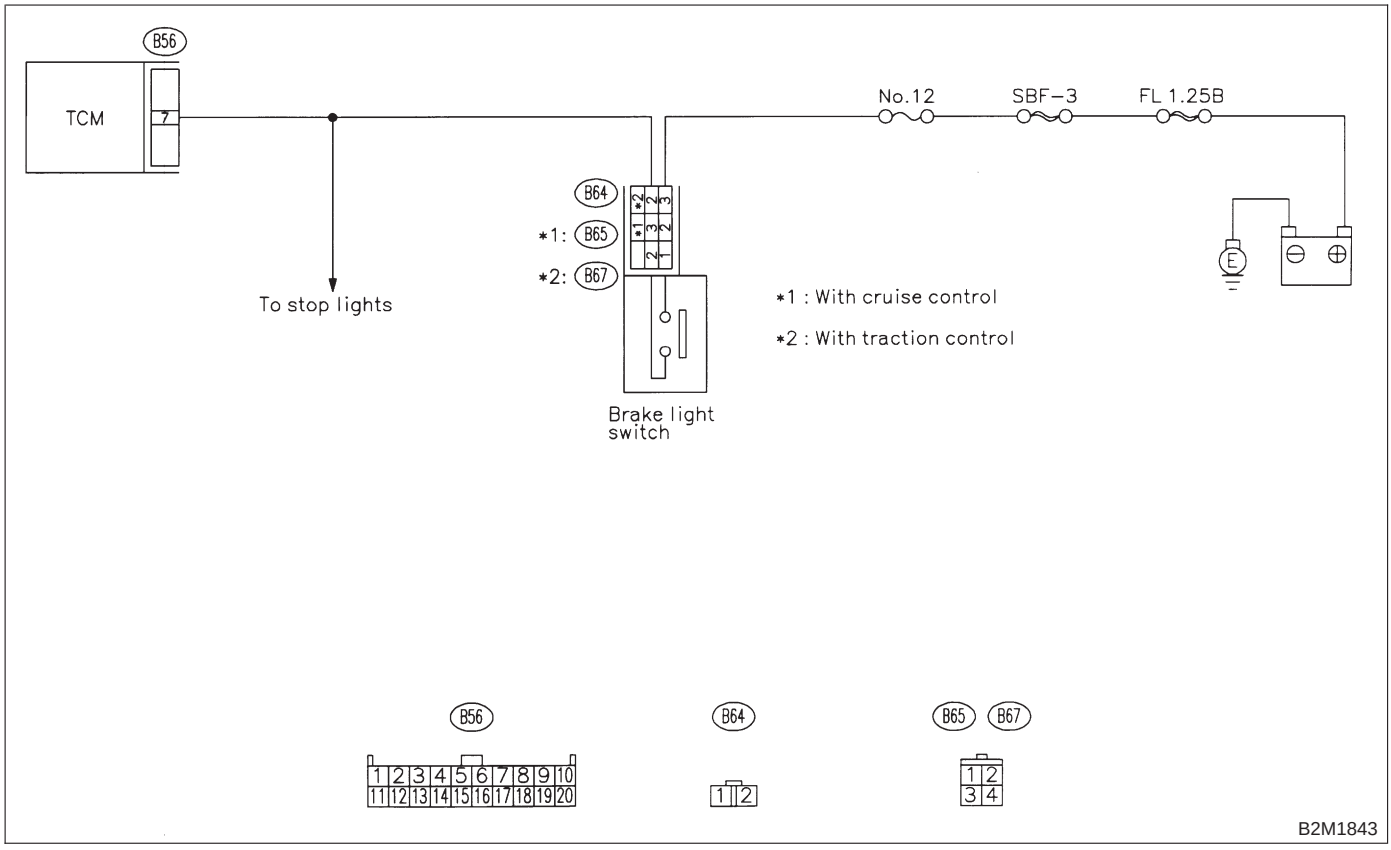
MEMO:

BK: DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BK1 : CHECK OPERATION OF BRAKE LIGHT.

CHECK : ***Does brake light come on when depressing the brake pedal?***

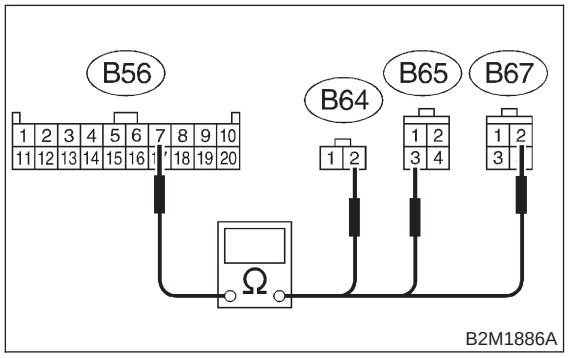
YES : Go to step **10BK2**.

NO : Repair or replace brake light circuit.

10BK2 : CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.

1) Disconnect connectors from TCM and brake light switch.
2) Measure resistance of harness between TCM and brake light switch connector.

Connector & terminal
(B56) No. 7 — (B64) No. 2:
(B56) No. 7 — (B65) No. 3 (With cruise control):
(B56) No. 7 — (B67) No. 2 (With traction control):



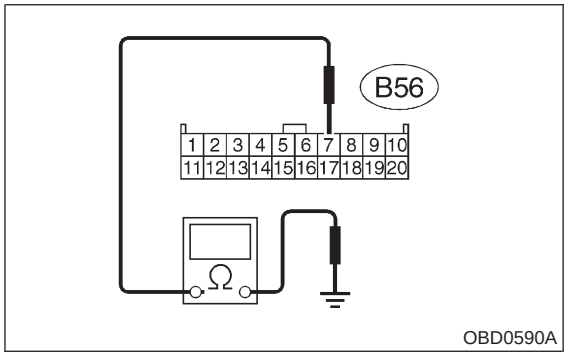
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BK3**.
NO : Repair or replace harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between TCM and brake light switch connector
- Poor contact in TCM connector
- Poor contact in brake light switch connector

10BK3 : CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B56) No. 7 — Chassis ground:

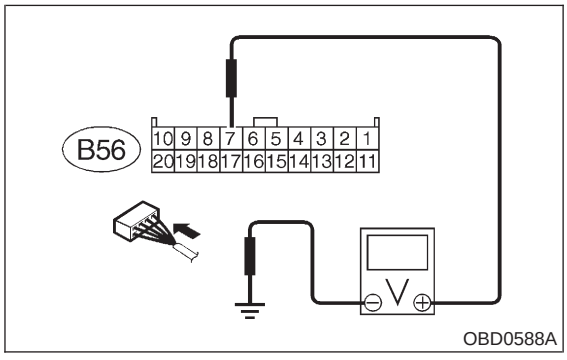


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BK4**.
NO : Repair ground short circuit in harness between TCM and brake light switch connector.

10BK4 : CHECK INPUT SIGNAL FOR TCM.

1) Connect connectors to TCM and brake light switch.
2) Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 7 (+) — Chassis ground (−):

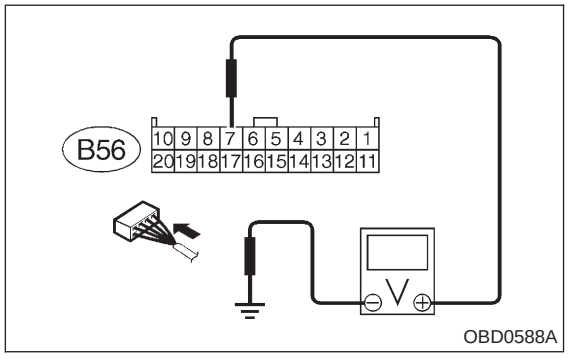


CHECK : ***Is the voltage less than 1 V when releasing the brake pedal?***
YES : Go to step **10BK5**.
NO : Adjust or replace brake light switch.

10BK5 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 7 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V when depressing the brake pedal?***
YES : Go to step **10BK6**.
NO : Adjust or replace brake light switch.

10BK6 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in TCM connector?***
YES : Repair poor contact in TCM connector.
NO : Replace TCM.

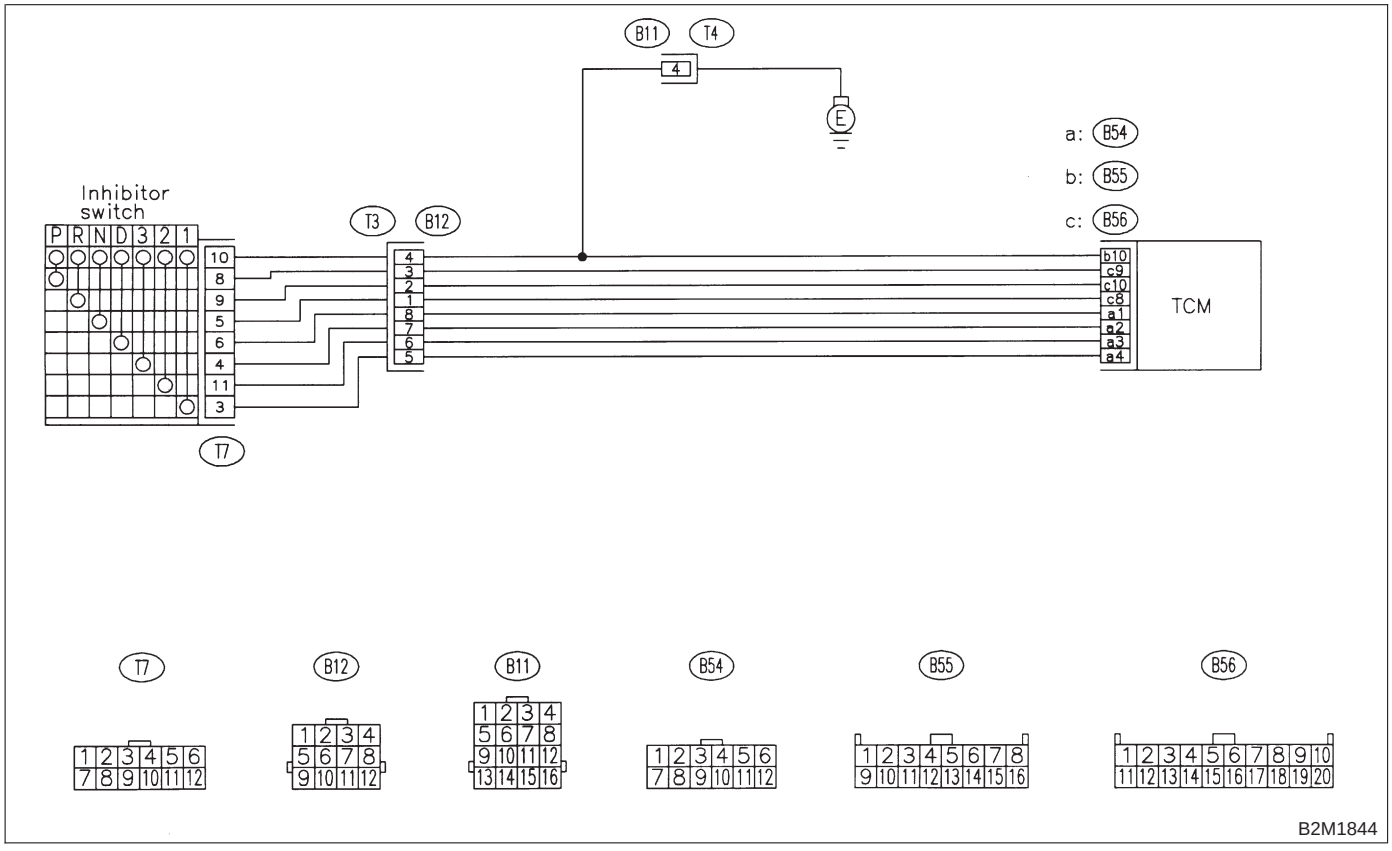
MEMO:

BL: DTC P0705 — TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Starter does not rotate when selector lever is in “P” or “N” range.
  - Starter rotates when selector lever is in “R”, “D”, “3”, “2” or “1” range.
  - Engine brake is not effected when selector lever is in “3” range.
  - Shift characteristics are erroneous.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

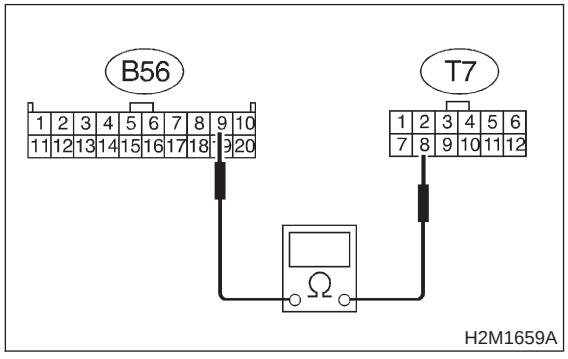
- **WIRING DIAGRAM:**



10BL1 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and transmission.
3) Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B56) No. 9 — (T7) No. 8:



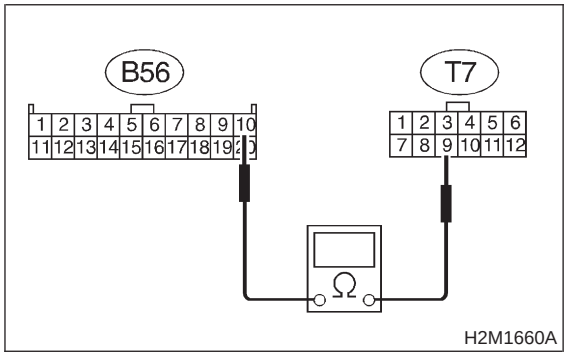
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL2**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between ECM and inhibitor switch connector
● Poor contact in coupling connector (B12)

10BL2 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B56) No. 10 — (T7) No. 9:



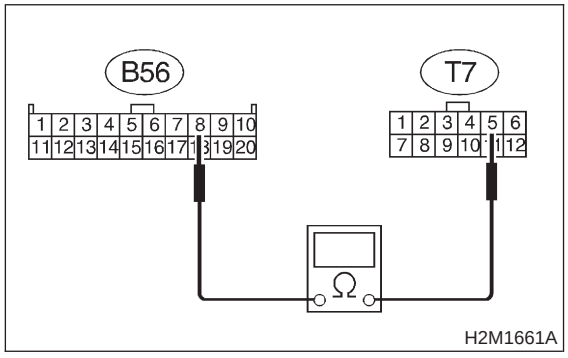
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL3**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between ECM and inhibitor switch connector
● Poor contact in coupling connector (B12)

10BL3 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B56) No. 8 — (T7) No. 5:



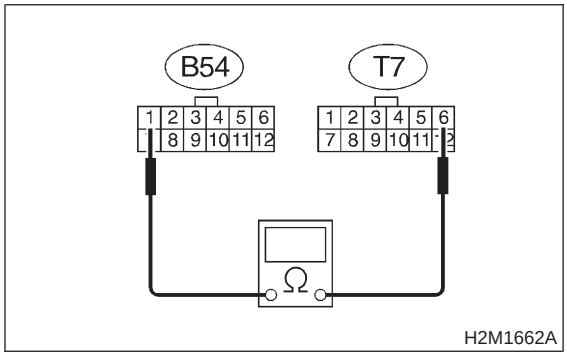
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL4**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10BL4 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B54) No. 1 — (T7) No. 6:



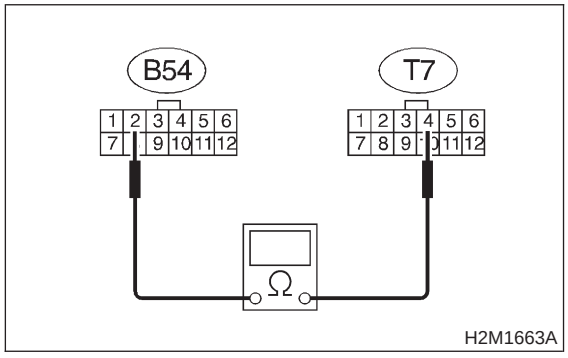
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10BL5 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B54) No. 2 — (T7) No. 4:



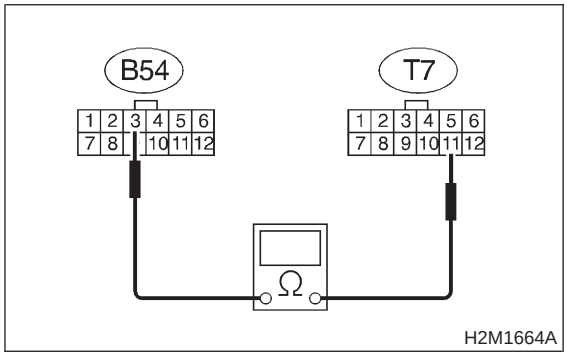
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL6**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10BL6 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B54) No. 3 — (T7) No. 11:



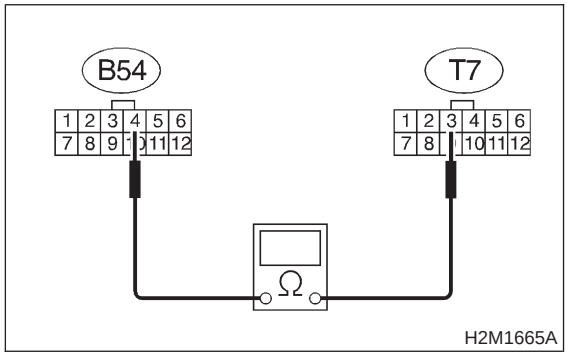
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10BL7 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and transmission harness connector.

Connector & terminal
(B54) No. 4 — (T7) No. 3:



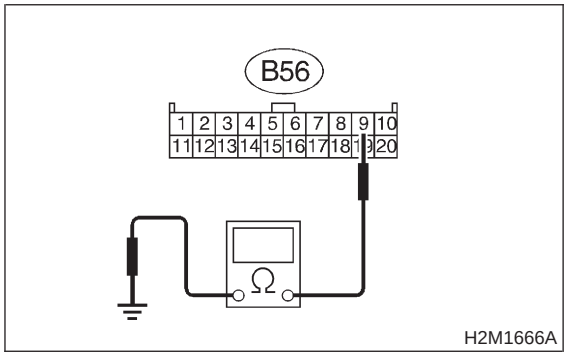
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL8**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and inhibitor switch connector.
- Poor contact in coupling connector (B12)

10BL8 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B56) No. 9 — Chassis ground:

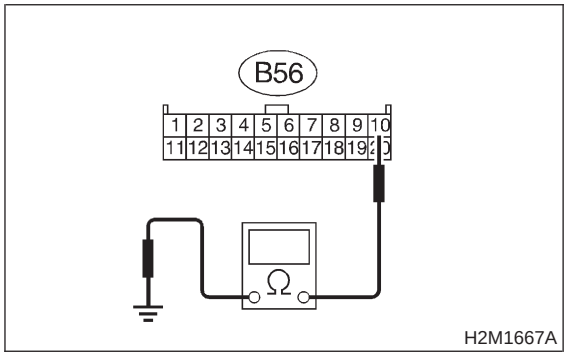


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL9**.
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

10BL9 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B56) No. 10 — Chassis ground:

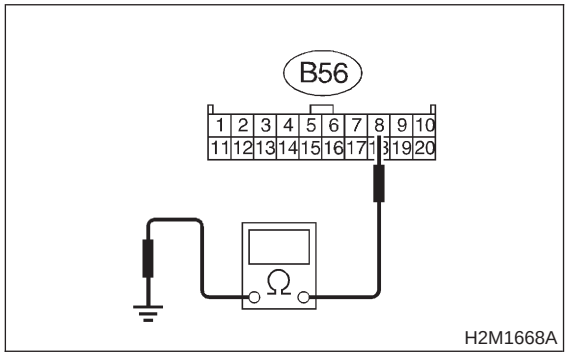


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL10**.
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

10BL10 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B56) No. 8 — Chassis ground:

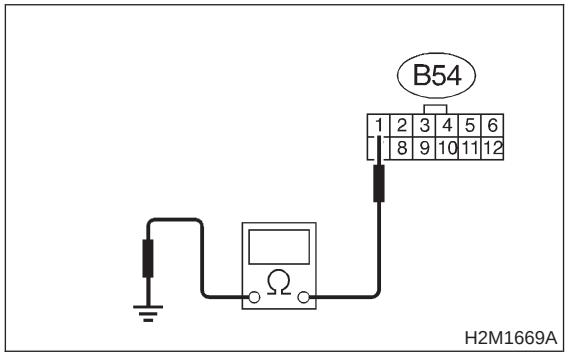


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL11**.
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

10BL11 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 1 — Chassis ground:

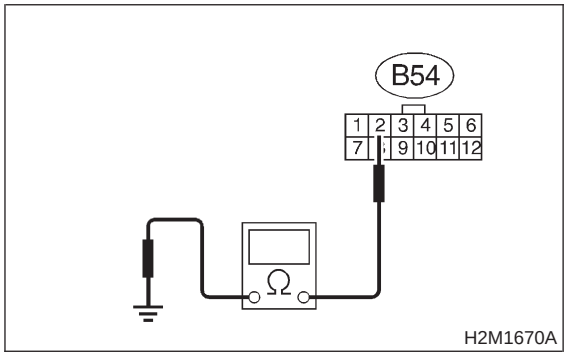


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL12**.
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

10BL12 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 2 — Chassis ground:

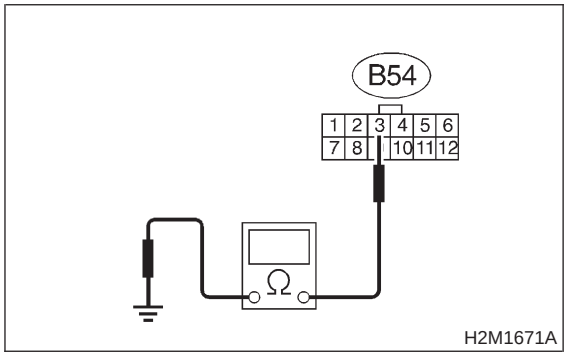


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL13**.
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

10BL13 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 3 — Chassis ground:

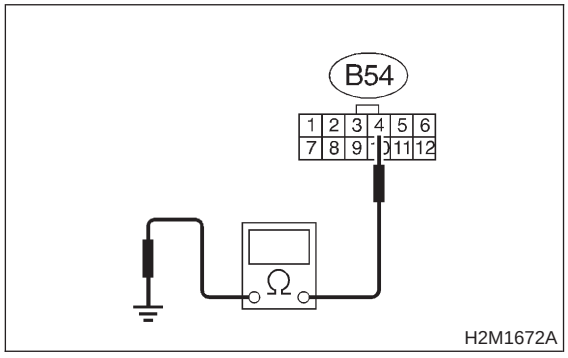


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL14**.
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

10BL14 : CHECK HARNESS BETWEEN TCM AND INHIBITOR SWITCH CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 4 — Chassis ground:

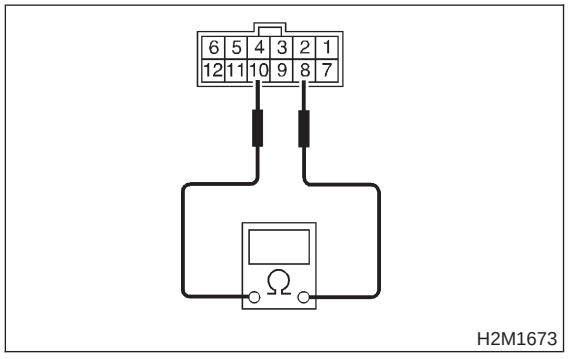


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL15**.
NO : Repair ground short circuit in harness between TCM and transmission harness connector.

10BL15 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever "P" position.

Terminals
No. 8 — No. 10:

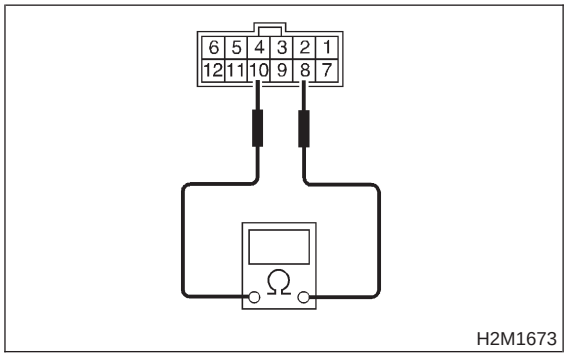


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL16**.
NO : Go to step **10BL29**.

10BL16 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "P" position.

Terminals
No. 8 — No. 10:

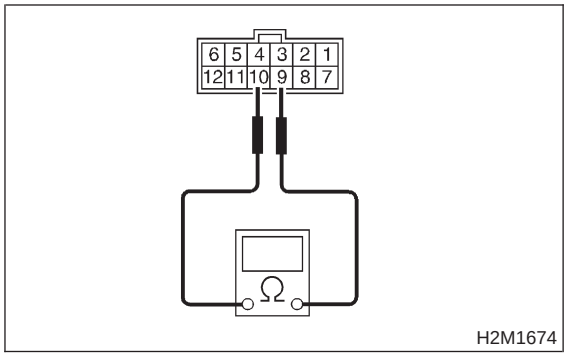


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL17**.
NO : Go to step **10BL29**.

10BL17 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever for "R" position.

Terminals
No. 9 — No. 10:

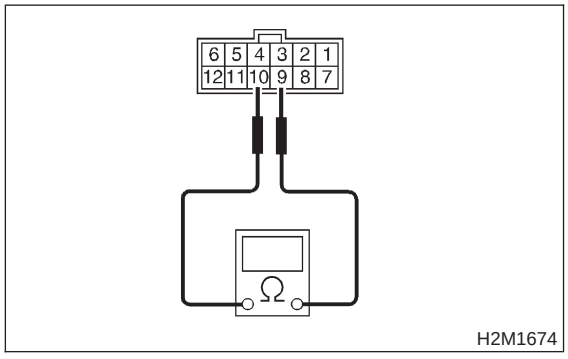


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL18**.
NO : Go to step **10BL29**.

10BL18 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "R" position.

Terminals
No. 9 — No. 10:

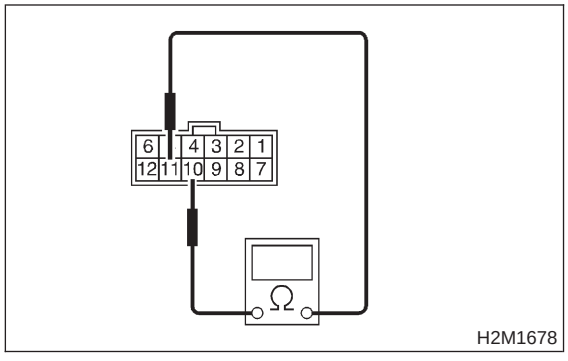


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL19**.
NO : Go to step **10BL29**.

10BL19 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever for "N" position.

Terminals
No. 5 — No. 10:

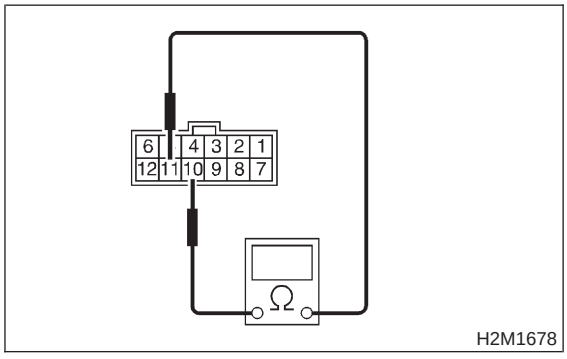


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL20**.
NO : Go to step **10BL29**.

10BL20 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "N" position.

Terminals
No. 5 — No. 10:

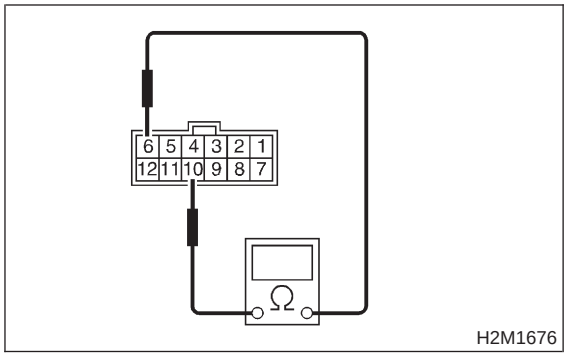


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL21**.
NO : Go to step **10BL29**.

10BL21 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "D" position.

Terminals
No. 6 — No. 10:

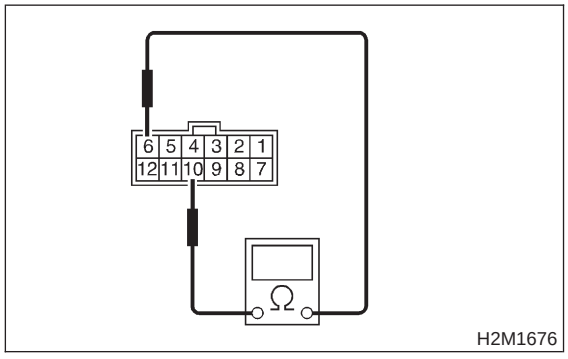


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL22**.
NO : Go to step **10BL29**.

10BL22 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "D" position.

Terminals
No. 6 — No. 10:

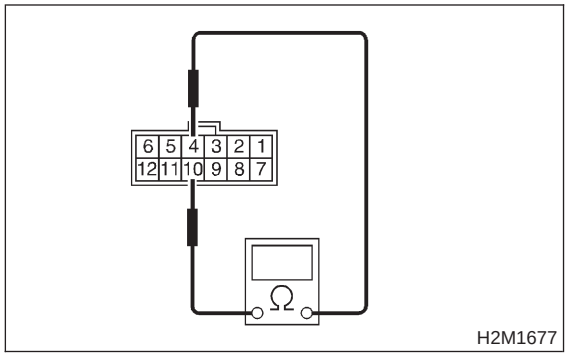


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL23**.
NO : Go to step **10BL29**.

10BL23 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever for "3" position.

Terminals
No. 4 — No. 10:

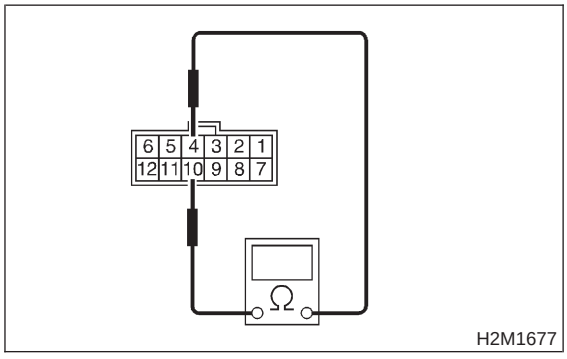


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL24**.
NO : Go to step **10BL29**.

10BL24 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "3" position.

Terminals
No. 4 — No. 10:

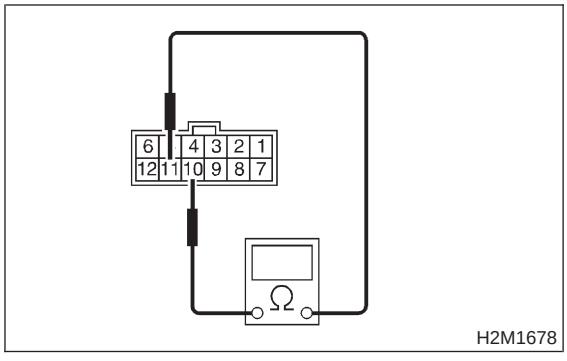


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL25**.
NO : Go to step **10BL29**.

10BL25 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "2" position.

Terminals
No. 11 — No. 10:

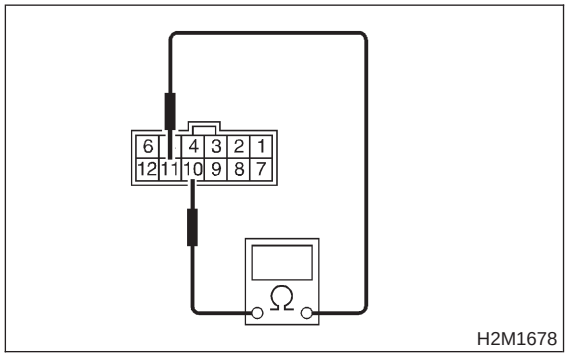


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL26**.
NO : Go to step **10BL29**.

10BL26 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "R" position.

Terminals
No. 11 — No. 10:

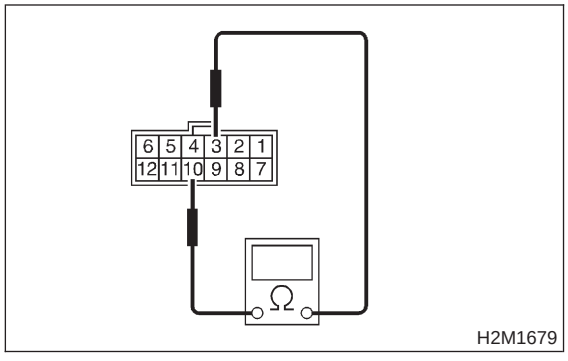


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL27**.
NO : Go to step **10BL29**.

10BL27 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "1" position.

Terminals
No. 3 — No. 10:

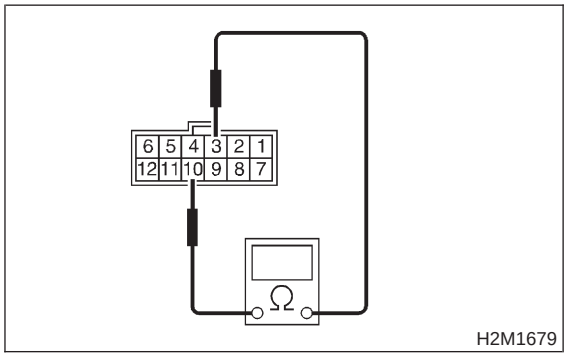


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10BL28**.
NO : Go to step **10BL29**.

10BL28 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "1" position.

Terminals
No. 3 — No. 10:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10BL30**.
NO : Go to step **10BL29**.

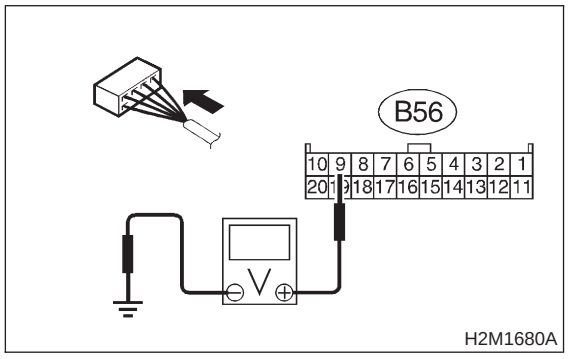
10BL29 : CHECK SELECTOR CABLE.

CHECK : ***Is there faulty connection in the selector cable?***
YES : Repair connection of selector cable.
NO : Replace inhibitor switch.

10BL30 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and transmission.
3) Turn ignition switch to ON.
4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 9 (+) — Chassis ground (−):

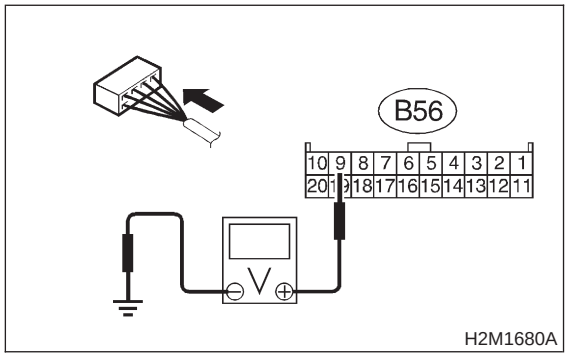


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10BL31**.
NO : Go to step **10BL44**.

10BL31 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for “P” and “N” positions.

Connector & terminal
(B56) No. 9 (+) — Chassis ground (−):

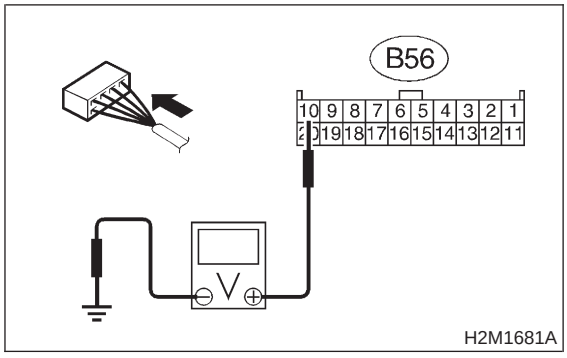


CHECK : ***Is the voltage more than 8 V?***
YES : Go to step **10BL32**.
NO : Go to step **10BL44**.

10BL32 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever “R” position.

Connector & terminal
(B56) No. 10 (+) — Chassis ground (−):

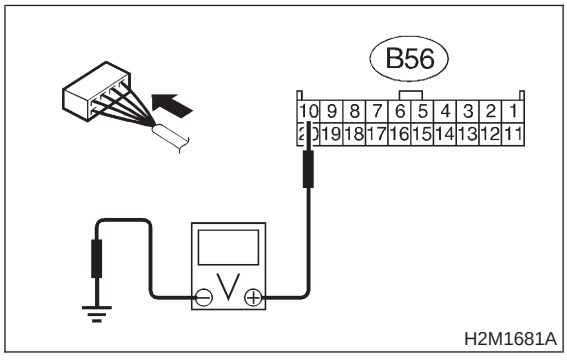


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10BL33**.
NO : Go to step **10BL44**.

10BL33 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for “R” position.

Connector & terminal
(B56) No. 10 (+) — Chassis ground (−):

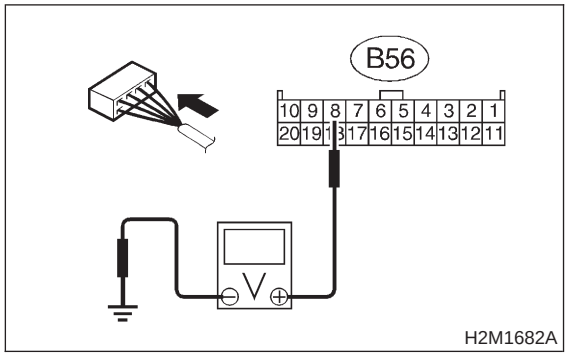


CHECK : ***Is the voltage more than 6 V?***
YES : Go to step **10BL34**.
NO : Go to step **10BL44**.

10BL34 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever “P” and “N” positions.

Connector & terminal
(B56) No. 8 (+) — Chassis ground (−):

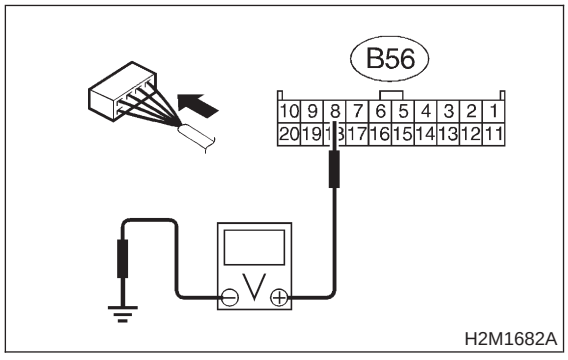


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10BL35**.
NO : Go to step **10BL44**.

10BL35 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for “N” and “P” positions.

Connector & terminal
(B56) No. 8 (+) — Chassis ground (−):

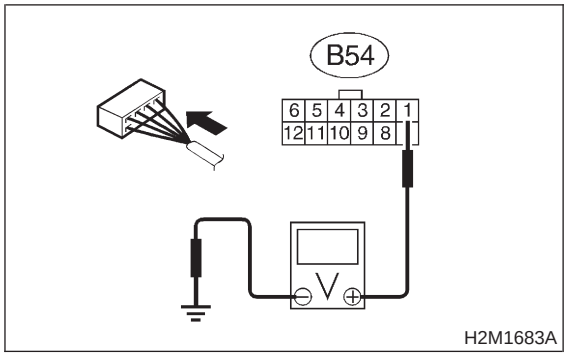


CHECK : ***Is the voltage more than 8 V?***
YES : Go to step **10BL36**.
NO : Go to step **10BL44**.

10BL36 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground in selector lever “D” position.

Connector & terminal
(B54) No. 1 (+) — Chassis ground (−):

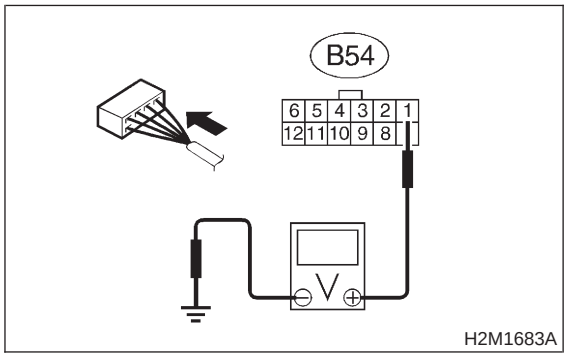


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10BL37**.
NO : Go to step **10BL44**.

10BL37 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for “N” and “P” positions.

Connector & terminal
(B54) No. 1 (+) — Chassis ground (−):

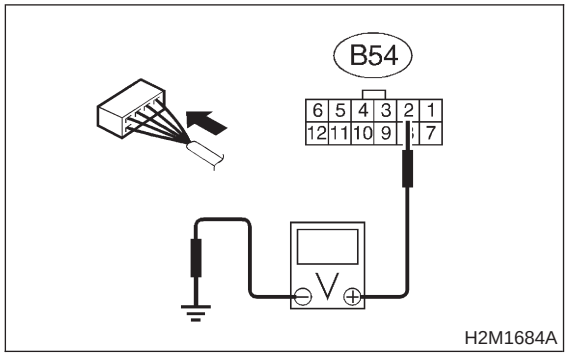


CHECK : ***Is the voltage more than 6 V?***
YES : Go to step **10BL38**.
NO : Go to step **10BL44**.

10BL38 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever “3” position.

Connector & terminal
(B54) No. 2 (+) — Chassis ground (−):

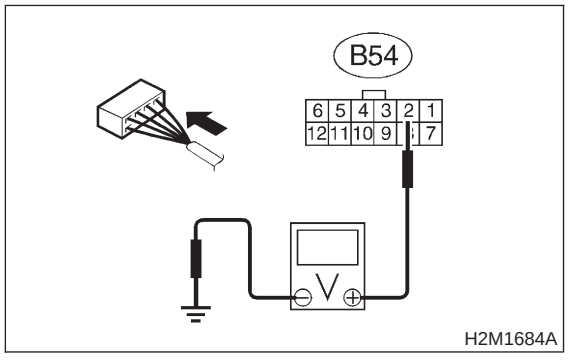


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10BL39**.
NO : Go to step **10BL44**.

10BL39 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground in selector lever except for “3” position.

Connector & terminal
(B54) No. 2 (+) — Chassis ground (−):

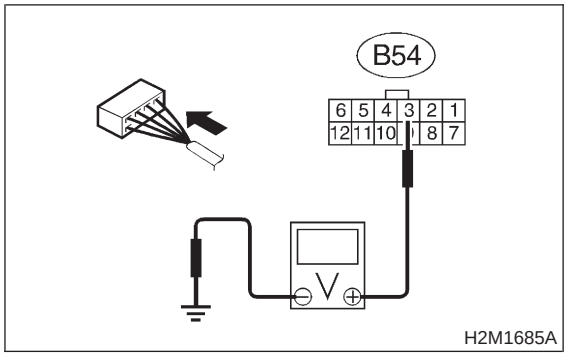


CHECK : ***Is the voltage more than 6 V?***
YES : Go to step **10BL40**.
NO : Go to step **10BL44**.

10BL40 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever “2” position.

Connector & terminal
(B54) No. 3 (+) — Chassis ground (−):

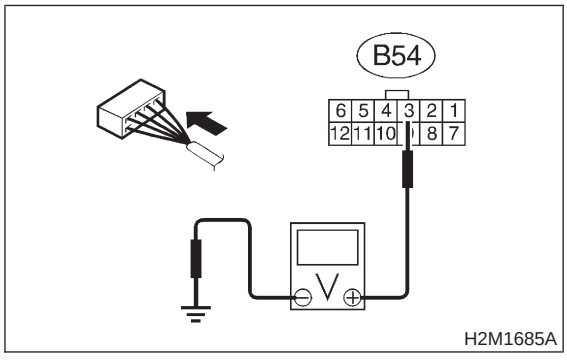


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10BL41**.
NO : Go to step **10BL44**.

10BL41 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground in selector lever except for “2” position.

Connector & terminal
(B54) No. 3 (+) — Chassis ground (−):

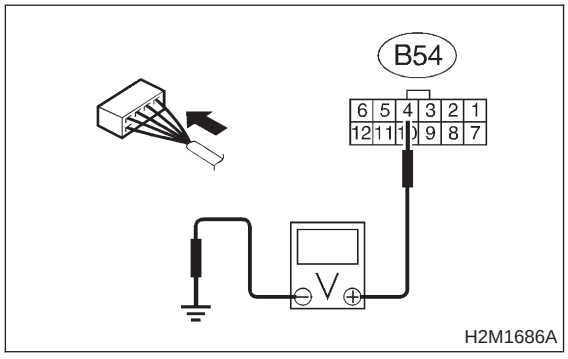


CHECK : ***Is the voltage more than 6 V?***
YES : Go to step **10BL42**.
NO : Go to step **10BL44**.

10BL42 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever “1” position.

Connector & terminal
(B54) No. 4 (+) — Chassis ground (−):

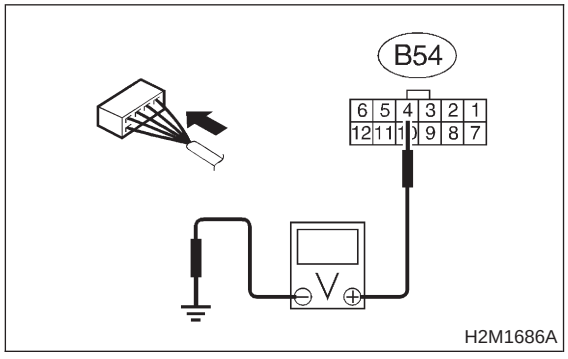


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10BL43**.
NO : Go to step **10BL44**.

10BL43 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM chassis ground in selector lever except for “1” position.

Connector & terminal
(B54) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 6 V?***
YES : Repair poor contact in TCM connector.
NO : Go to step **10BL44**.

10BL44 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

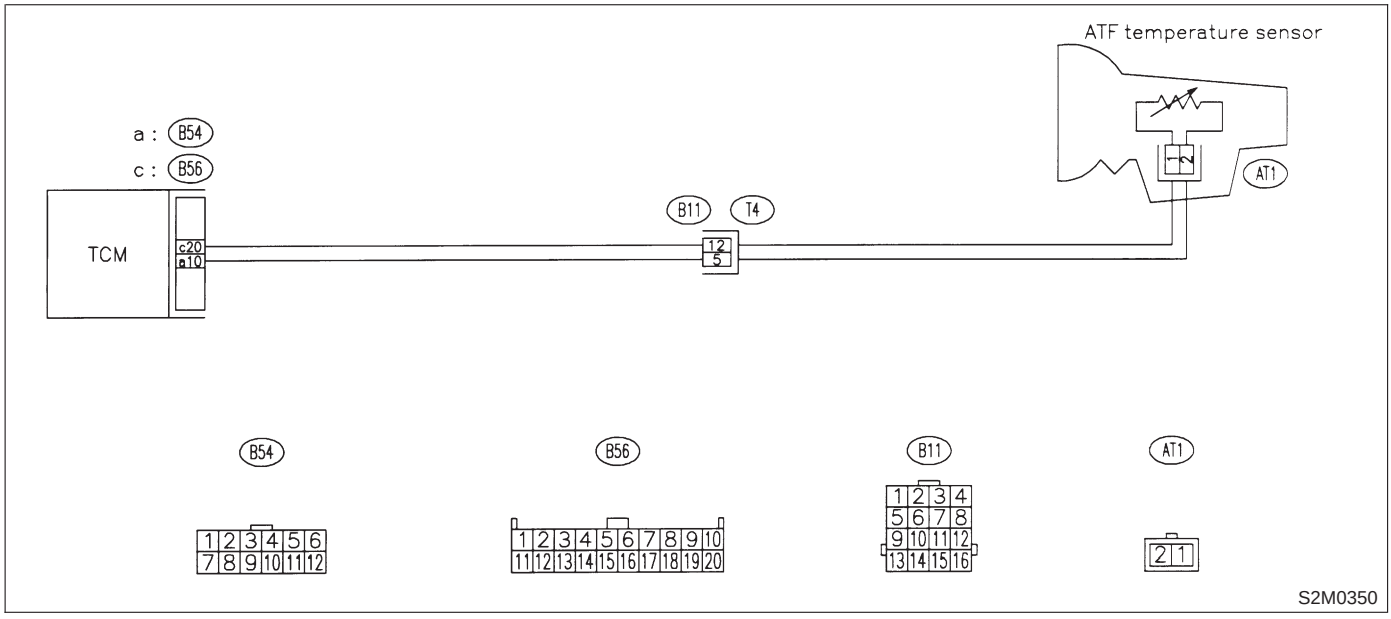
CHECK : ***Is there poor contact in TCM connector?***
YES : Repair poor contact in TCM connector.
NO : Replace TCM.

BM: DTC P0710 — TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - No shift up to 4th speed (after engine warm-up)
  - No lock-up (after engine warm-up)
  - Excessive shift shock

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BM1 : CHECK DTC P0710 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0710?***

YES : Check ATF temperature sensor circuit. <Ref. to 3-2 [T8H0].>

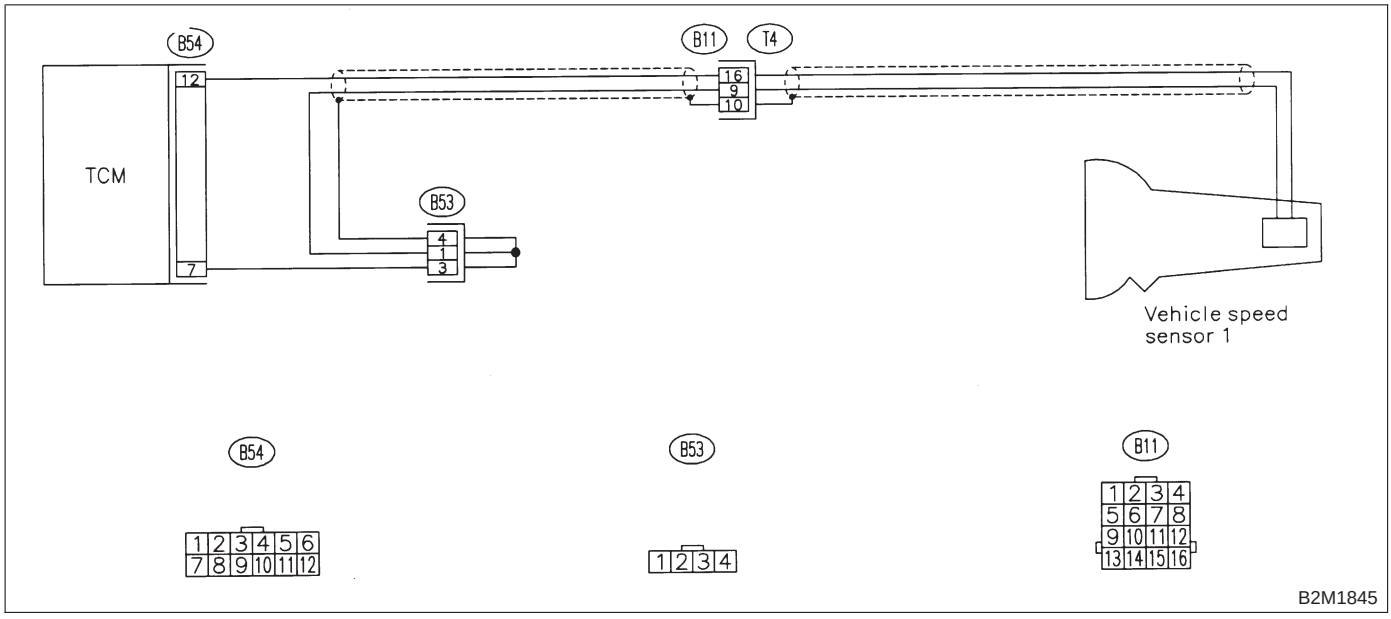
NO : It is not necessary to inspect DTC P0710.

BN: DTC P0720 — OUTPUT SPEED SENSOR (VEHICLE SPEED SENSOR 1) CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - No shift or excessive tight corner “braking”

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BN1 : CHECK DTC P0720 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0720?***

YES : Check vehicle speed sensor 1 circuit. <Ref. to 3-2 [T8N0].>

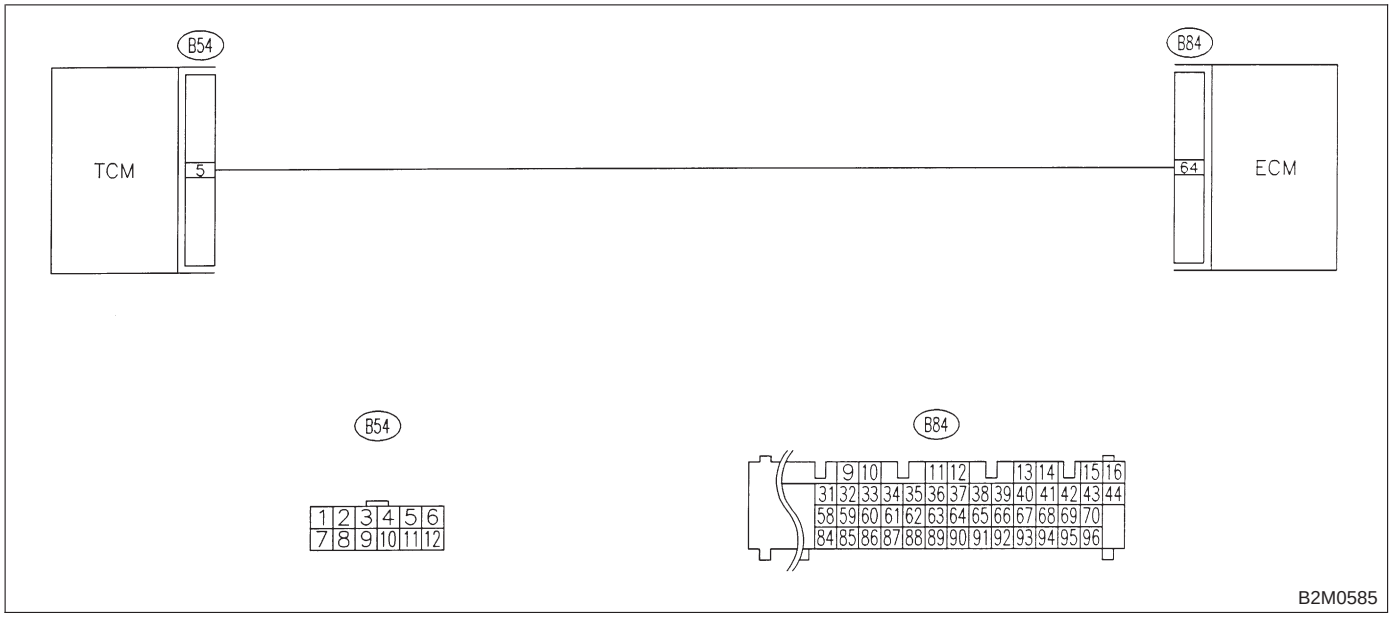
NO : It is not necessary to inspect DTC P0720.

BO: DTC P0725 — ENGINE SPEED INPUT CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - No lock-up (after engine warm-up)
  - AT diagnostic indicator light (AT OIL TEMP indicator light) remains on when vehicle speed is “0”.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BO1 : CHECK DTC P0725 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0725?***

YES : Check engine speed input signal circuit. <Ref. to 3-2 [T8J0].>

NO : It is not necessary to inspect DTC P0725.

MEMO:

BP: DTC P0731 — GEAR 1 INCORRECT RATIO —

NOTE:
For the diagnostic procedure, refer to 2-7 [T10BS0]. <Ref. to 2-7 [T10BS0].>

BQ: DTC P0732 — GEAR 2 INCORRECT RATIO —

NOTE:
For the diagnostic procedure, refer to 2-7 [T10BS0]. <Ref. to 2-7 [T10BS0].>

BR: DTC P0733 — GEAR 3 INCORRECT RATIO —

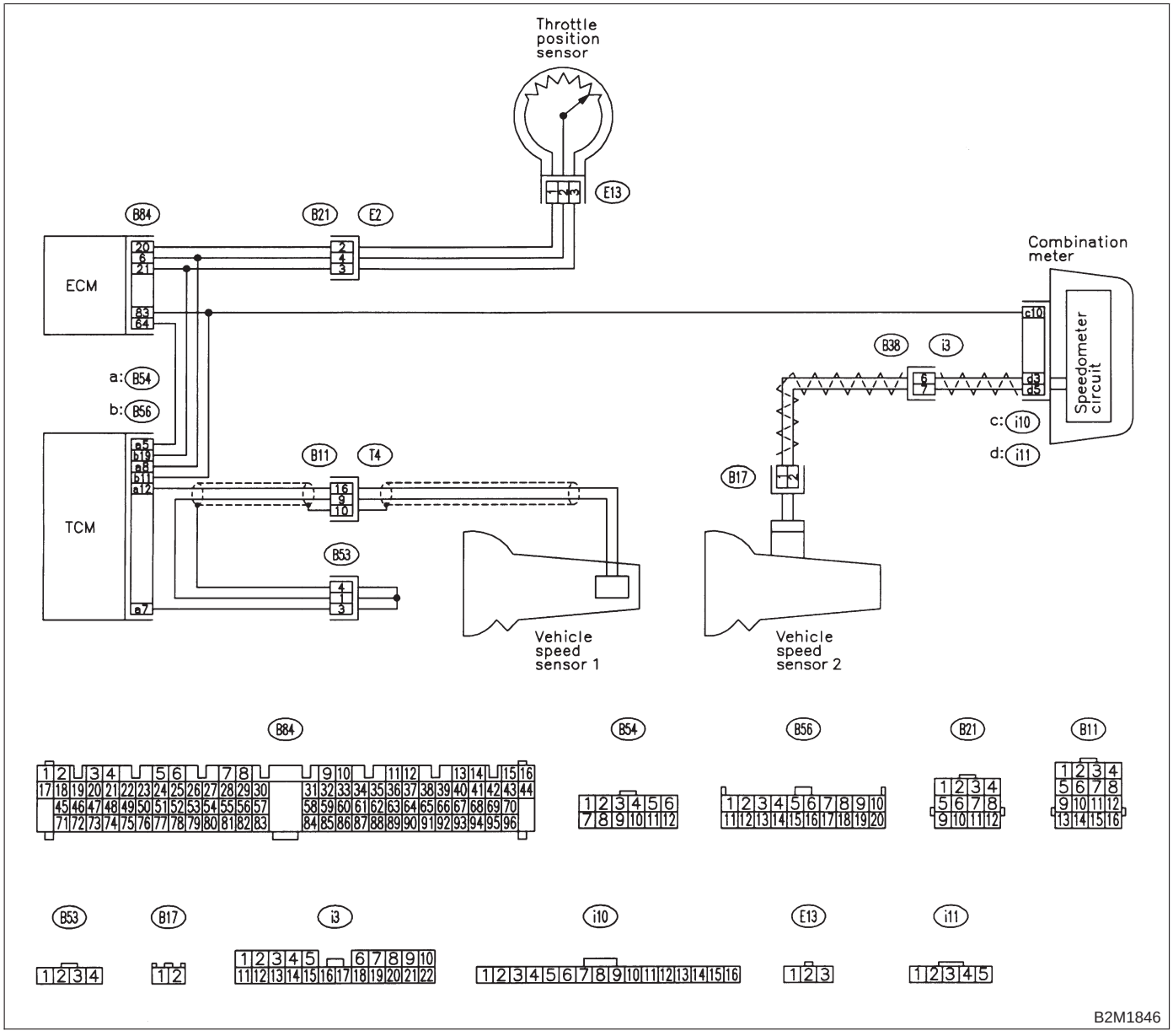
NOTE:
For the diagnostic procedure, refer to 2-7 [T10BS0]. <Ref. to 2-7 [T10BS0].>

BS: DTC P0734 — GEAR 4 INCORRECT RATIO —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Shift point too high or too low; engine brake not effected in “3” range; excessive shift shock; excessive tight corner “braking”

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

● **WIRING DIAGRAM:**



10BS1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Is there any other DTC on display?***

YES : Inspect relevant DTC using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NO : Go to step **10BS2**.

10BS2 : CHECK THROTTLE POSITION SENSOR CIRCUIT.

Check throttle position sensor circuit. <Ref. to 3-2 [T8M0].>

CHECK : ***Is there any trouble in throttle position sensor circuit?***

YES : Repair or replace throttle position sensor circuit.

NO : Go to step **10BS3**.

10BS3 : CHECK VEHICLE SPEED SENSOR 1 CIRCUIT.

Check vehicle speed sensor 1 circuit. <Ref. to 3-2 [T8N0].>

CHECK : ***Is there any trouble in vehicle speed sensor 1 circuit?***

YES : Repair or replace vehicle speed sensor 1 circuit.

NO : Go to step **10BS4**.

10BS4 : CHECK VEHICLE SPEED SENSOR 2 CIRCUIT.

Check vehicle speed sensor 2 circuit. <Ref. to 3-2 [T8O0].>

CHECK : ***Is there any trouble in vehicle speed sensor 2 circuit?***

YES : Repair or replace vehicle speed sensor 2 circuit.

NO : Go to step **10BS5**.

10BS5 : CHECK ENGINE SPEED INPUT CIRCUIT.

Check engine speed input circuit. <Ref. to 3-2 [T8J0].>

CHECK : ***Is there any trouble in engine speed input circuit?***

YES : Repair or replace engine speed input circuit.

NO : Go to step **10BS6**.

10BS6 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in TCM connector?***

YES : Repair poor contact in TCM connector.

NO : Go to step **10BS7**.

10BS7 : CHECK MECHANICAL TROUBLE.

Check mechanical trouble in automatic transmission.

CHECK : ***Is there any mechanical trouble in automatic transmission?***

YES : Repair or replace automatic transmission.

NO : Replace TCM.

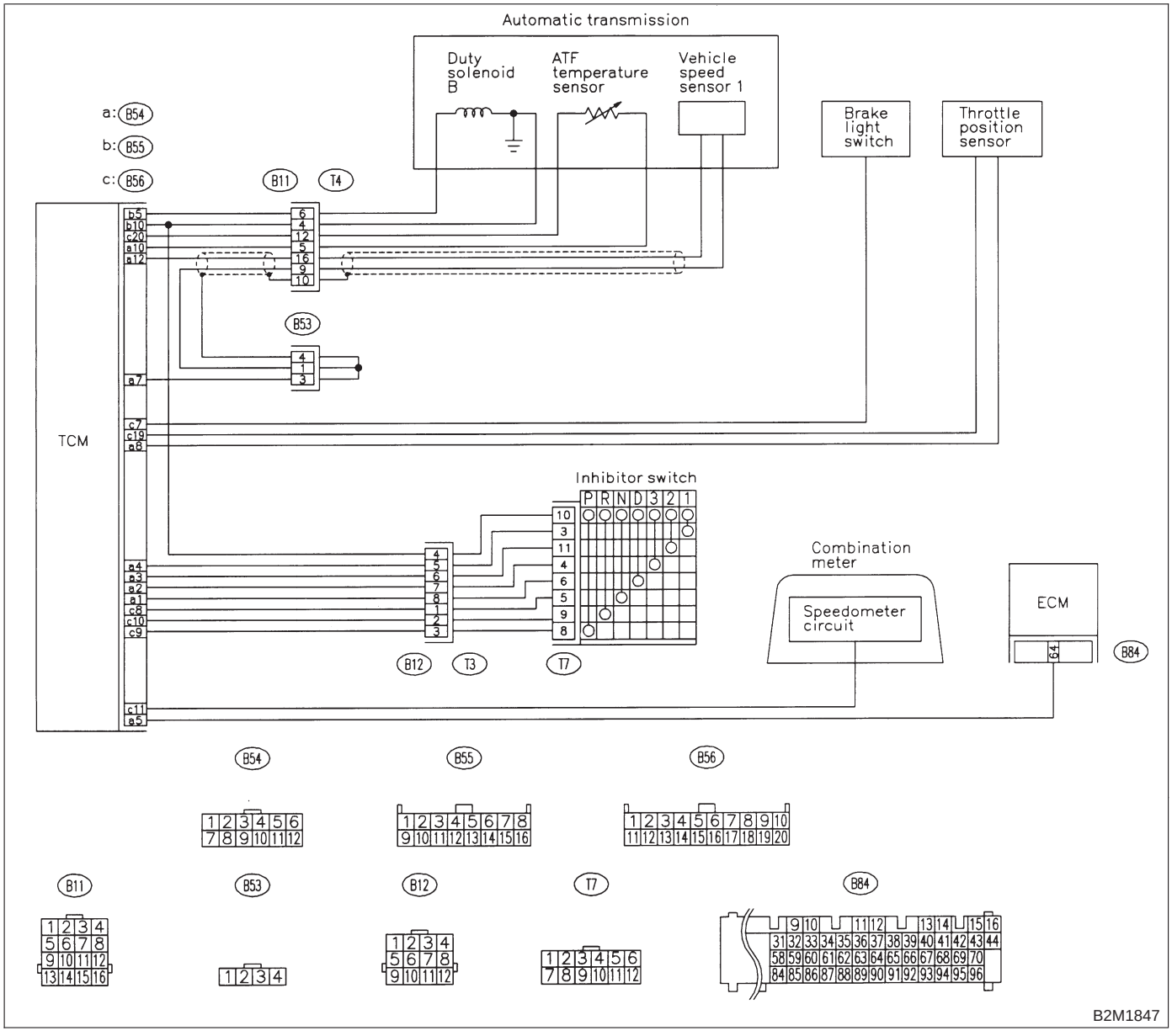
MEMO:

BT: DTC P0740 — TORQUE CONVERTER CLUTCH SYSTEM MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - No lock-up (after engine warm-up)
  - No shift or excessive tight corner “braking”

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BT1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Is there any other DTC on display?***
YES : Inspect the relevant DTC using "10. Diagnostics Chart with Trouble Code for LHD Vehicles". <Ref. to 2-7 [T1000].>
NO : Go to step **10BT2**.

10BT2 : CHECK DUTY SOLENOID B CIRCUIT.

Check duty solenoid B circuit. <Ref. to 3-2 [T8D0].>

CHECK : ***Is there any trouble in duty solenoid B circuit?***
YES : Repair or replace duty solenoid B circuit.
NO : Go to step **10BT3**.

10BT3 : CHECK THROTTLE POSITION SENSOR CIRCUIT.

Check throttle position sensor circuit. <Ref. to 3-2 [T8M0].>

CHECK : ***Is there any trouble in throttle position sensor circuit?***
YES : Repair or replace throttle position sensor circuit.
NO : Go to step **10BT4**.

10BT4 : CHECK VEHICLE SPEED SENSOR 1 CIRCUIT.

Check vehicle speed sensor 1 circuit. <Ref. to 3-2 [T8N0].>

CHECK : ***Is there any trouble in vehicle speed sensor 1 circuit?***
YES : Repair or replace vehicle speed sensor 1 circuit.
NO : Go to step **10BT5**.

10BT5 : CHECK VEHICLE SPEED SENSOR 2 CIRCUIT.

Check vehicle speed sensor 2 circuit. <Ref. to 3-2 [T8O0].>

CHECK : ***Is there any trouble in vehicle speed sensor 2 circuit?***
YES : Repair or replace vehicle speed sensor 2 circuit.
NO : Go to step **10BT6**.

10BT6 : CHECK ENGINE SPEED INPUT CIRCUIT.

Check engine speed input circuit. <Ref. to 3-2 [T8J0].>

CHECK : ***Is there any trouble in engine speed input circuit?***
YES : Repair or replace engine speed input circuit.
NO : Go to step **10BT7**.

10BT7 : CHECK INHIBITOR SWITCH CIRCUIT.

Check inhibitor switch circuit. <Ref. to 2-7 [T10BL0].>

CHECK : ***Is there any trouble in inhibitor switch circuit?***
YES : Repair or replace inhibitor switch circuit.
NO : Go to step **10BT8**.

10BT8 : CHECK BRAKE LIGHT SWITCH CIRCUIT.

Check brake light switch circuit. <Ref. to 2-7 [T10BK0].>

CHECK : ***Is there any trouble in brake light switch circuit?***
YES : Repair or replace brake light switch circuit.
NO : Go to step **10BT9**.

10BT9 : CHECK ATF TEMPERATURE SENSOR CIRCUIT.

Check ATF temperature sensor circuit. <Ref. to 3-2 [T8H0].>

CHECK : ***Is there any trouble in ATF temperature sensor circuit?***

YES : Repair or replace ATF temperature sensor circuit.

NO : Go to step **10BT10**.

10BT10 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in TCM connector?***

YES : Repair poor contact in TCM connector.

NO : Go to step **10BT11**.

10BT11 : CHECK MECHANICAL TROUBLE.

Check mechanical trouble in automatic transmission.

CHECK : ***Is there any mechanical trouble in automatic transmission?***

YES : Repair or replace automatic transmission.

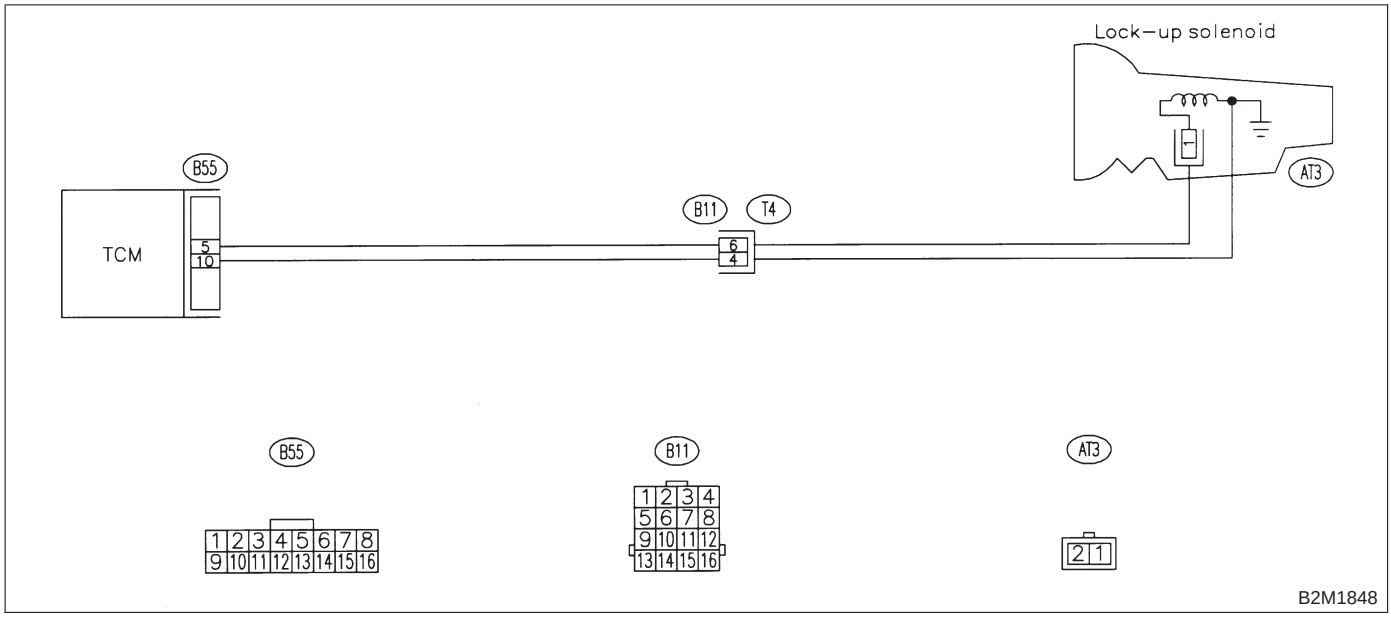
NO : Replace TCM.

BU: DTC P0743 — TORQUE CONVERTER CLUTCH SYSTEM (DUTY SOLENOID B) ELECTRICAL —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - No lock-up (after engine warm-up)

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BU1 : CHECK DTC P0743 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0743?***

YES : Check duty solenoid B circuit. <Ref. to 3-2 [T8D0].>

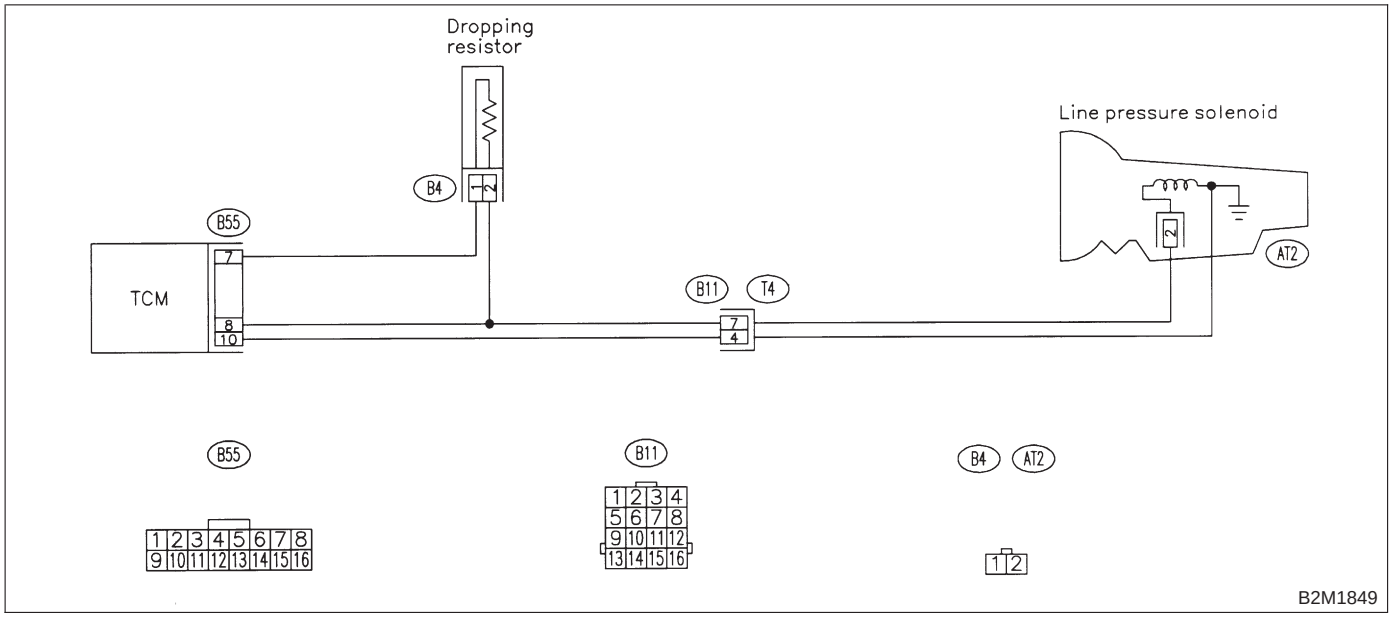
NO : It is not necessary to inspect DTC P0743.

BV: DTC P0748 — PRESSURE CONTROL SOLENOID (DUTY SOLENOID A) ELECTRICAL —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Excessive shift shock

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BV1 : CHECK DTC P0748 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0748?***

YES : Check duty solenoid A circuit. <Ref. to 3-2 [T8C0].>

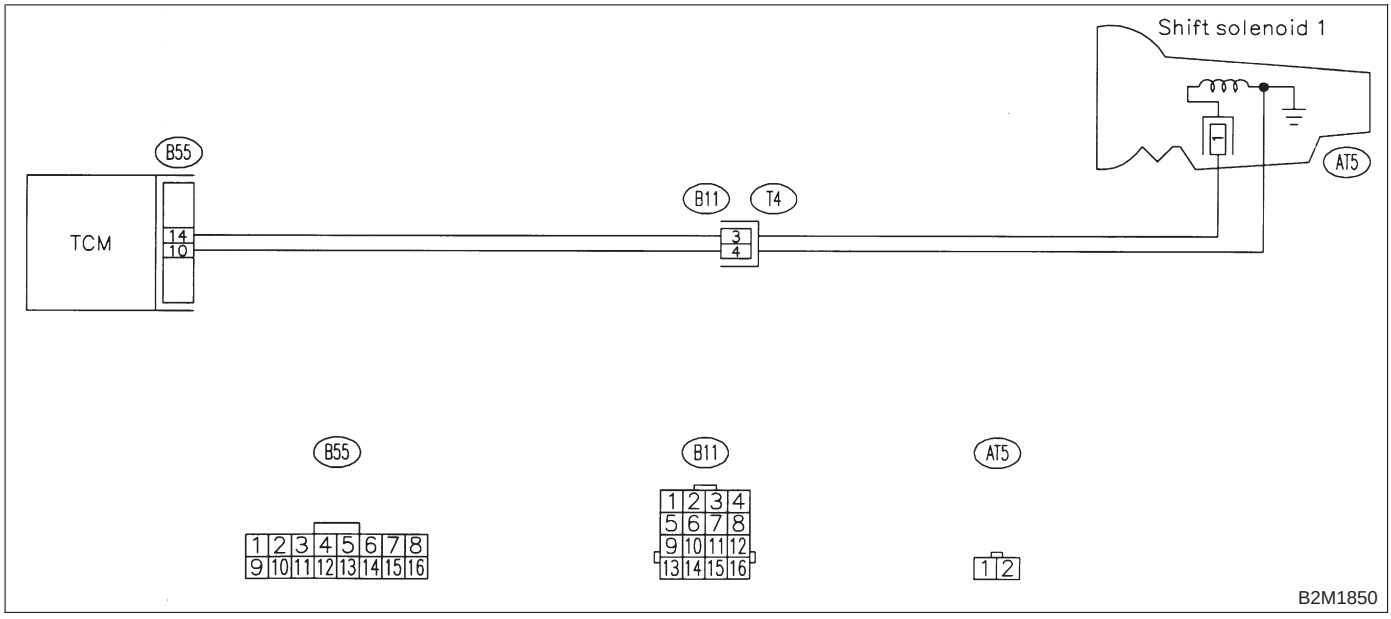
NO : It is not necessary to inspect DTC P0748.

BW: DTC P0753 — SHIFT SOLENOID A (SHIFT SOLENOID 1) ELECTRICAL —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - No shift

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BW1 : CHECK DTC P0753 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0753?***

YES : Check shift solenoid 1 circuit. <Ref. to 3-2 [T8G0].>

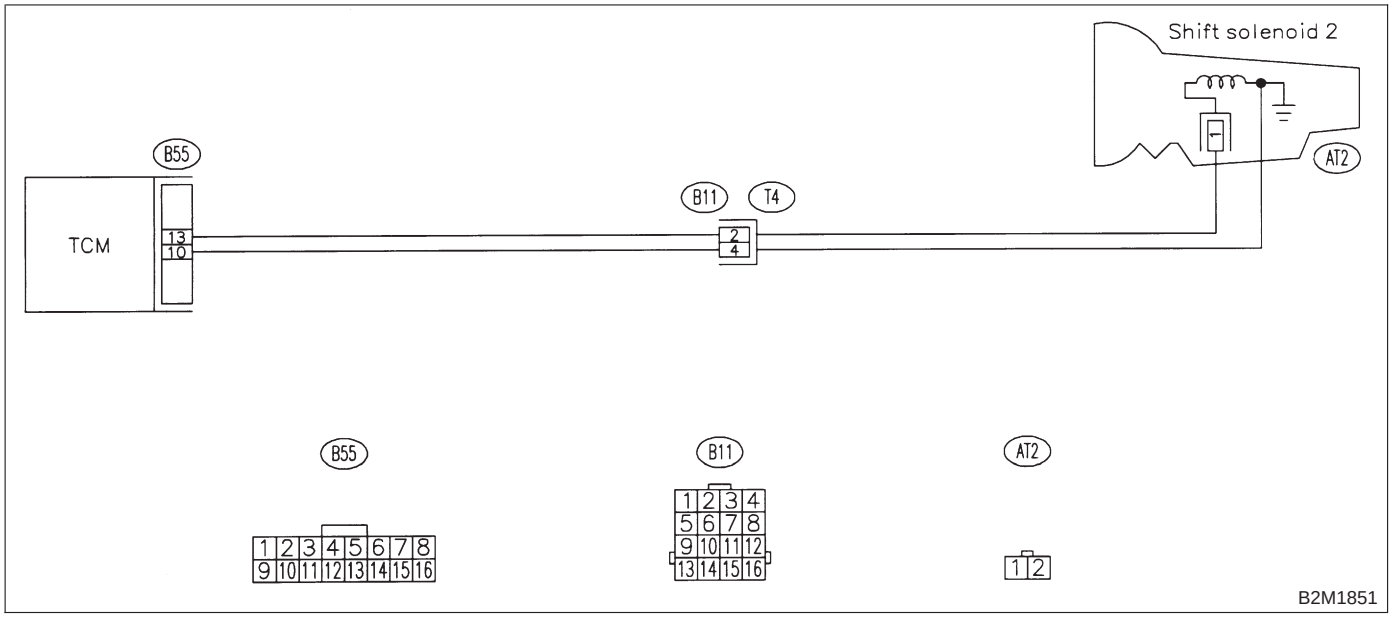
NO : It is not necessary to inspect DTC P0753.

BX: DTC P0758 — SHIFT SOLENOID B (SHIFT SOLENOID 2) ELECTRICAL —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - No shift

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BX1 : CHECK DTC P0758 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0758?***

YES : Check shift solenoid 2 circuit. <Ref. to 3-2 [T8F0].>

NO : It is not necessary to inspect DTC P0758.

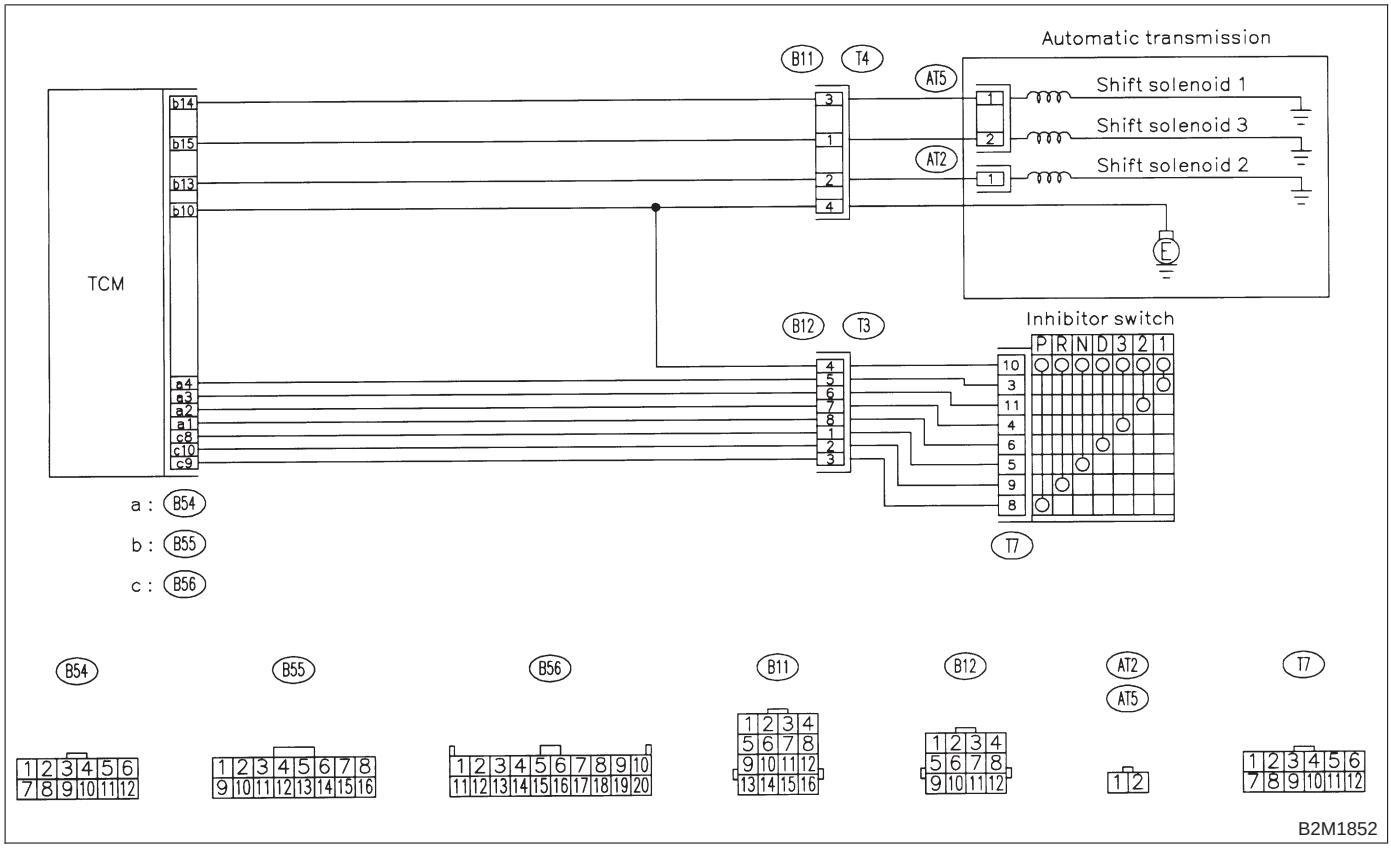
MEMO:

BY: DTC P0760 — SHIFT SOLENOID C (SHIFT SOLENOID 3) MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Ineffective engine brake with selector lever in “3”

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BY1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Is there any other DTC on display?***
YES : Inspect relevant DTC using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>
NO : Go to step **10BY2**.

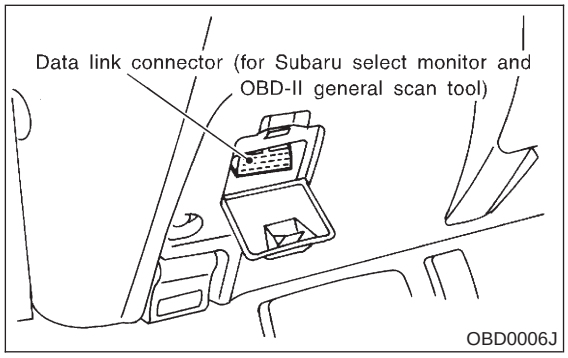
10BY2 : CHECK INHIBITOR SWITCH CIRCUIT.

Check inhibitor switch circuit. <Ref. to 2-7 [T10BL0].>

CHECK : ***Is there any trouble in inhibitor switch circuit?***
YES : Repair or replace inhibitor switch circuit.
NO : Go to step **10BY3**.

10BY3 : CHECK GEAR POSITION.

1) Turn ignition switch to OFF.
2) Connect the Subaru select monitor to data link connector.



3) Lift-up or raise the vehicle and support with safety stands.

CAUTION:
On AWD models, raise all wheels off ground.

4) Start and warm-up the engine and transmission.
5) Subaru select monitor switch to ON.
6) Read data of gear position signal using Subaru select monitor.
(1) On the ┌Main Menu┘ display screen, select the {2. Check of Each System} and press the [YES] key.
(2) On the ┌System Selection Menu┘ display screen, select the {AT/ECVT} and press the [YES] key.
(3) Press the [YES] key after displayed the information of transmission type.
(4) On the ┌E-4AT/ECVT Diagnosis┘ display screen, select the {1. Current Data Display & Save} and press the [YES] key.
(5) On the ┌Data Display Menu┘ display screen, select the {4. 1 Data Display with Detail} and press the [YES] key.
(6) Use the scroll key to show {Gear Position} items on the display screen.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7) Move selector lever to “D” and drive the vehicle.

CHECK : ***Does gear position change according to throttle position and vehicle speed?***
YES : Go to step **10BY4**.
NO : Go to step **10BY6**.

10BY4 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in TCM connector?***
YES : Repair poor contact in TCM connector.
NO : Go to step **10BY5**.

10BY5 : CHECK MECHANICAL TROUBLE.

Check mechanical trouble in automatic transmission.

CHECK : ***Is there any mechanical trouble in automatic transmission?***
YES : Repair or replace automatic transmission.
NO : Replace TCM.

10BY6 : CHECK SHIFT SOLENOID 1 CIRCUIT.

Check shift solenoid 1 circuit. <Ref. to 3-2 [T8G0].>

CHECK : ***Is there any trouble in shift solenoid 1 circuit?***
YES : Repair or replace shift solenoid 1 circuit.
NO : Go to step **10BY7**.

10BY7 : CHECK SHIFT SOLENOID 2 CIRCUIT.

Check shift solenoid 2 circuit. <Ref. to 3-2 [T8F0].>

CHECK : ***Is there any trouble in shift solenoid 2 circuit?***
YES : Repair or replace shift solenoid 2 circuit.
NO : Go to step **10BY8**.

10BY8 : CHECK SHIFT SOLENOID 3 CIRCUIT.

Check shift solenoid 3 circuit. <Ref. to 3-2 [T8E0].>

CHECK : ***Is there any trouble in shift solenoid 3 circuit?***
YES : Repair or replace shift solenoid 3 circuit.
NO : Go to step **10BY9**.

10BY9 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in TCM connector?***
YES : Repair poor contact in TCM connector.
NO : Go to step **10BY10**.

10BY10 : CHECK MECHANICAL TROUBLE.

Check mechanical trouble in automatic transmission.

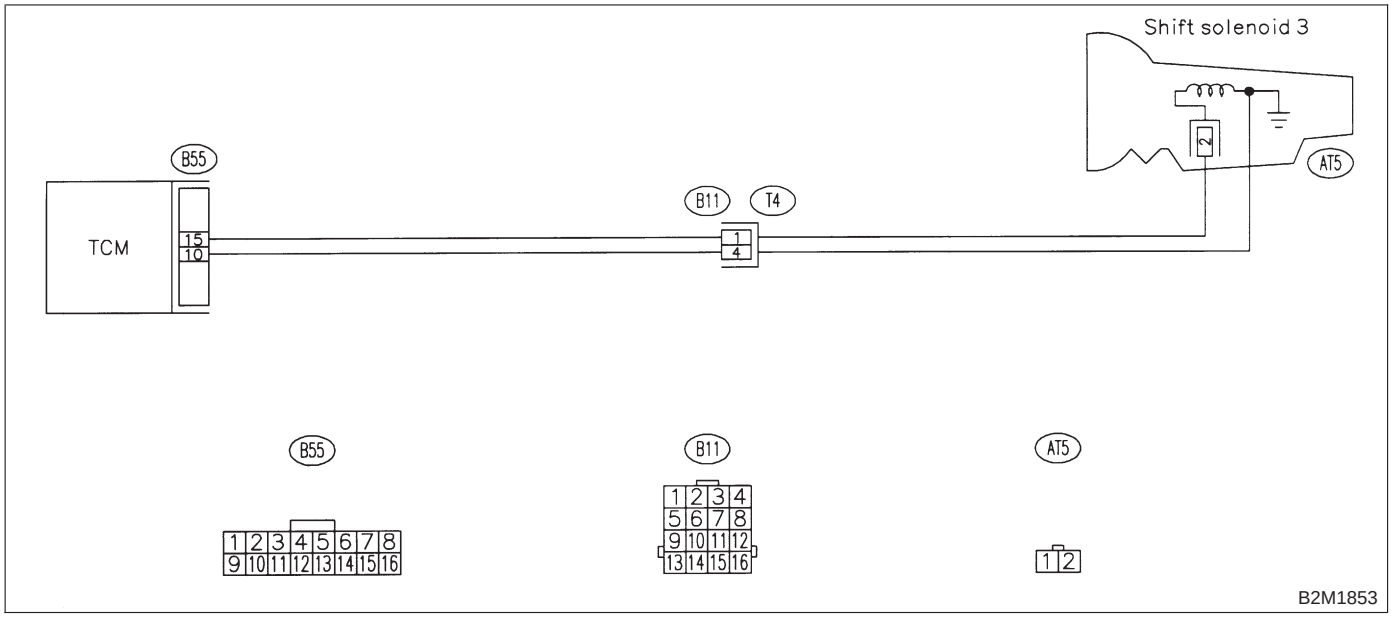
CHECK : ***Is there any mechanical trouble in automatic transmission?***
YES : Repair or replace automatic transmission.
NO : Replace TCM.

BZ: DTC P0763 — SHIFT SOLENOID C (SHIFT SOLENOID 3) ELECTRICAL —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Ineffective engine brake with selector lever in “3”

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10BZ1 : CHECK DTC P0763 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0763?***

YES : Check shift solenoid 3 circuit. <Ref. to 3-2 [T8E0].>

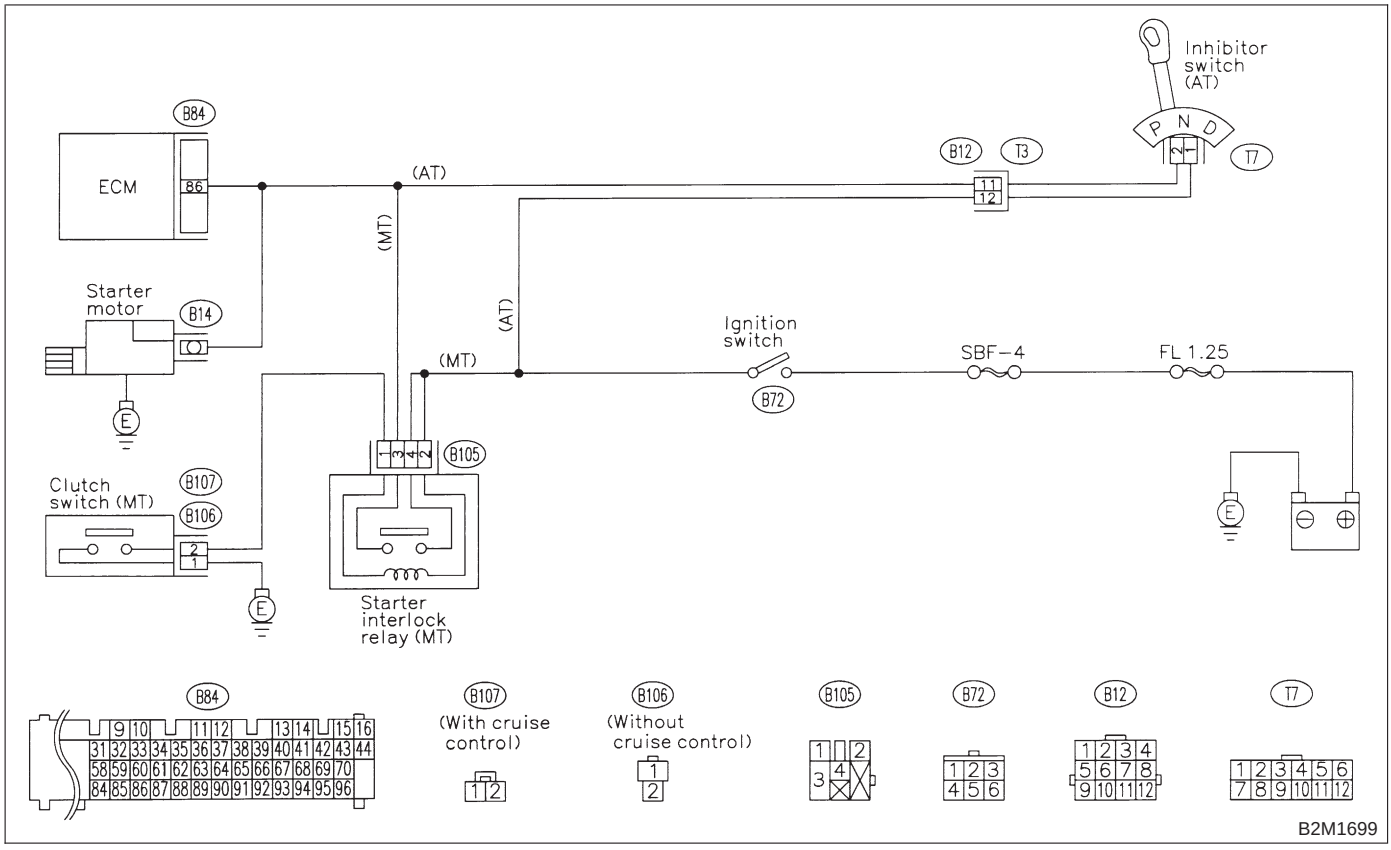
NO : It is not necessary to inspect DTC P0763.

CA: DTC P1100 — STARTER SWITCH CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CA1 : CHECK OPERATION OF STARTER MOTOR.

NOTE:
- On AT vehicles, place the inhibitor switch in the "P" or "N" position.
- On MT vehicles, depress the clutch pedal.

CHECK : ***Does starter motor operate when ignition switch to "ST"?***

YES : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open or ground short circuit in harness between ECM and starter motor connector.
- Poor contact in ECM connector.

NO : Check starter motor circuit. <Ref. to 2-7 [T8B0].>

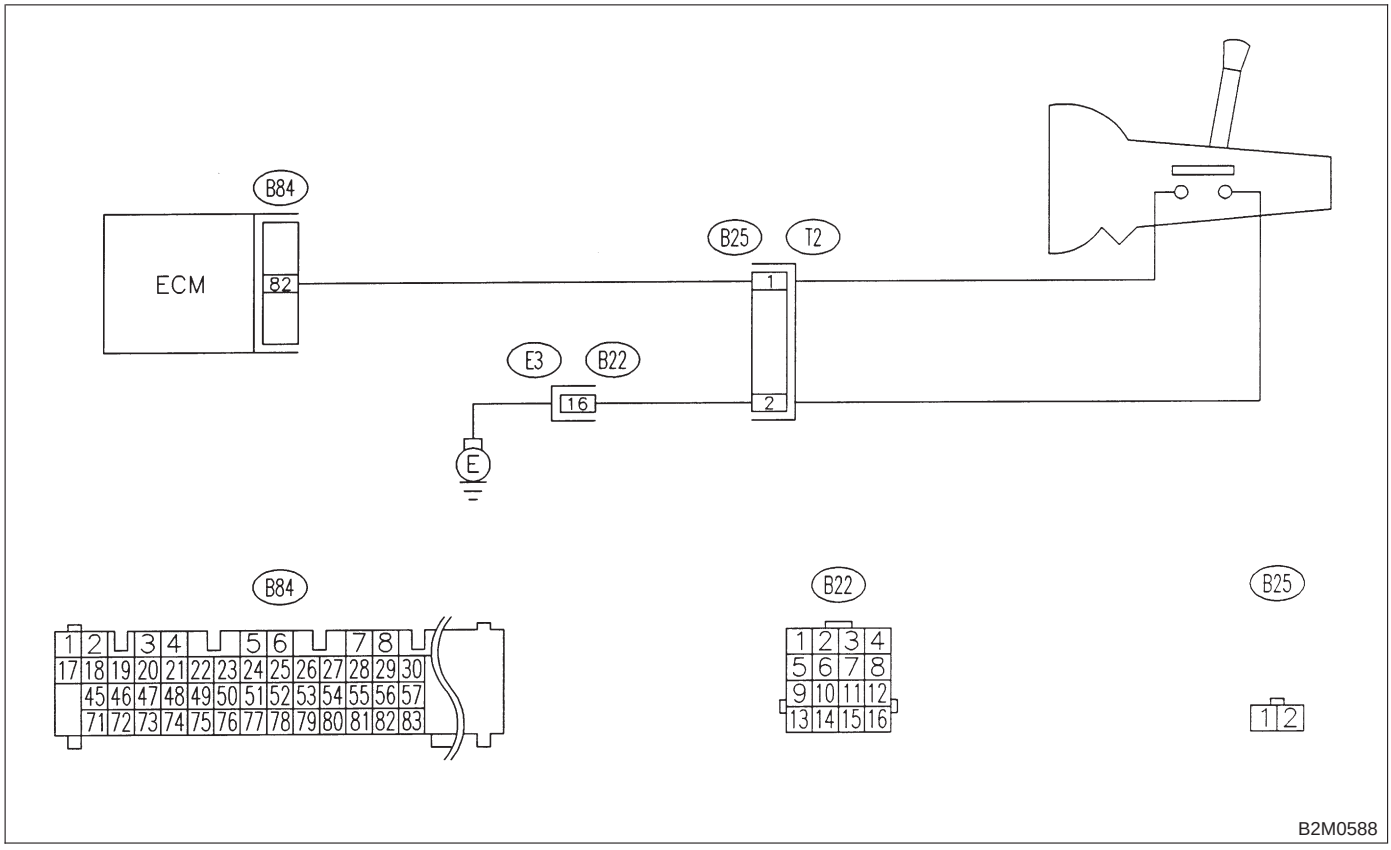
MEMO:

CB: DTC P1101 — NEUTRAL POSITION SWITCH CIRCUIT MALFUNCTION [MT VEHICLES] —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

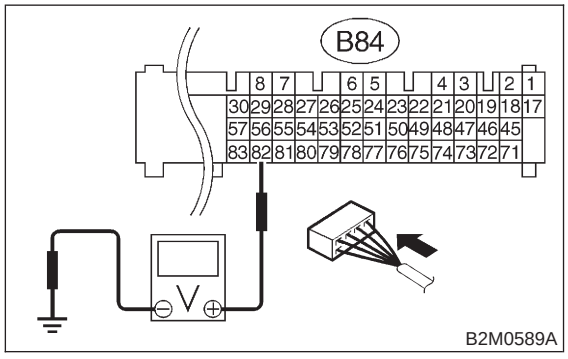
- **WIRING DIAGRAM:**



10CB1 : CHECK INPUT SIGNAL FOR ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 82 (+) — Chassis ground (−):

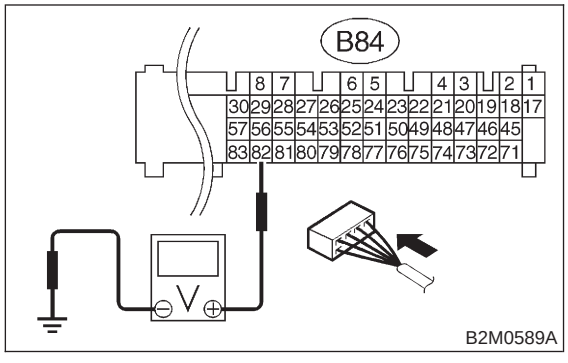


CHECK : ***Is the voltage between 4.5 and 5.5 V in neutral position?***
YES : Go to step **10CB2**.
NO : Go to step **10CB4**.

10CB2 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 82 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V in other positions?***
YES : Go to step **10CB3**.
NO : Go to step **10CB4**.

10CB3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

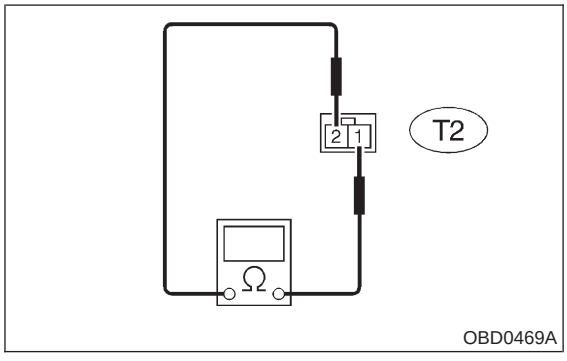
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10CB4 : CHECK NEUTRAL POSITION SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connector from transmission harness.
3) Measure resistance between transmission harness and connector terminals.

Connector & terminal
(T2) No. 1 — No. 2:

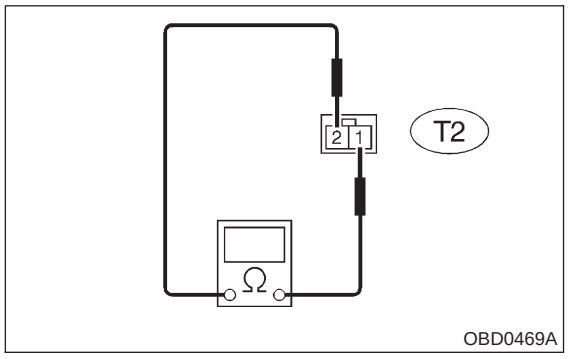


CHECK : ***Is the resistance more than 1 MΩ in neutral position?***
YES : Go to step **10CB5**.
NO : Repair short circuit in transmission harness or replace neutral position switch.

10CB5 : CHECK NEUTRAL POSITION SWITCH.

Measure resistance between transmission harness connector terminals.

Connector & terminal
(T2) No. 1 — No. 2:

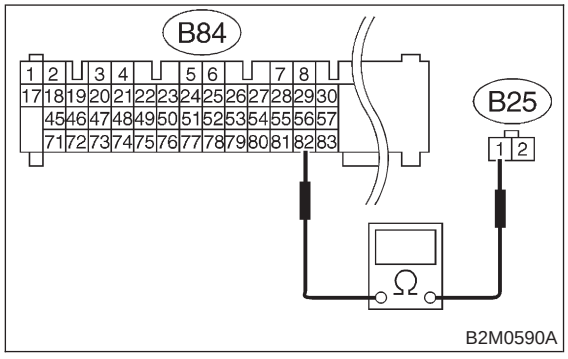


CHECK : ***Is the resistance less than 1 Ω in other positions?***
YES : Go to step **10CB6**.
NO : Repair open circuit in transmission harness or replace neutral position switch.

10CB6 : CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

1) Disconnect connector from ECM.
2) Measure resistance of harness between ECM and transmission harness connector.

Connector & terminal
(B84) No. 82 — (B25) No. 1:

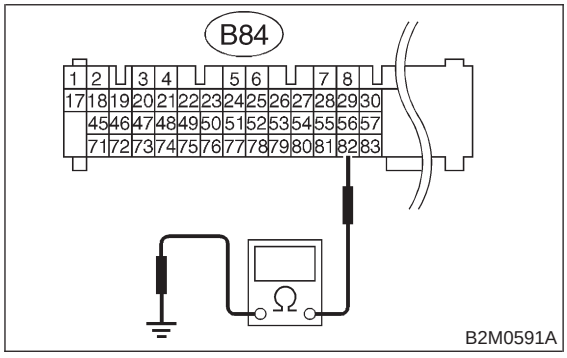


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10CB7**.
NO : Repair open circuit in harness between ECM and transmission harness connector.

10CB7 : CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

Measure resistance between ECM and chassis ground.

Connector & terminal
(B84) No. 82 — Chassis ground:

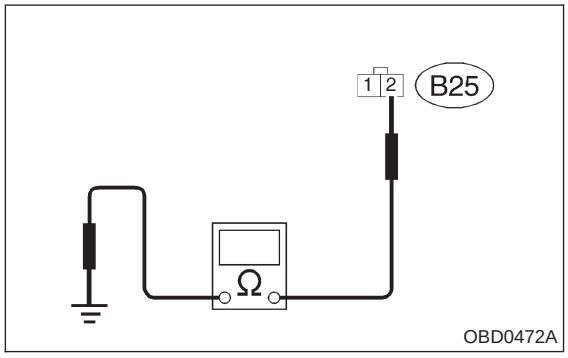


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and transmission harness connector.
NO : Go to step **10CB8**.

10CB8 : CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

Measure resistance of harness between transmission harness connector and engine ground.

Connector & terminal
(B25) No. 2 — Engine ground:



CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **10CB9**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between transmission harness connector and engine grounding terminal
- Poor contact in coupling connector (B22)

10CB9 : CHECK POOR CONTACT.

Check poor contact in transmission harness connector. <Ref. to FOREWORD [T3C1].>

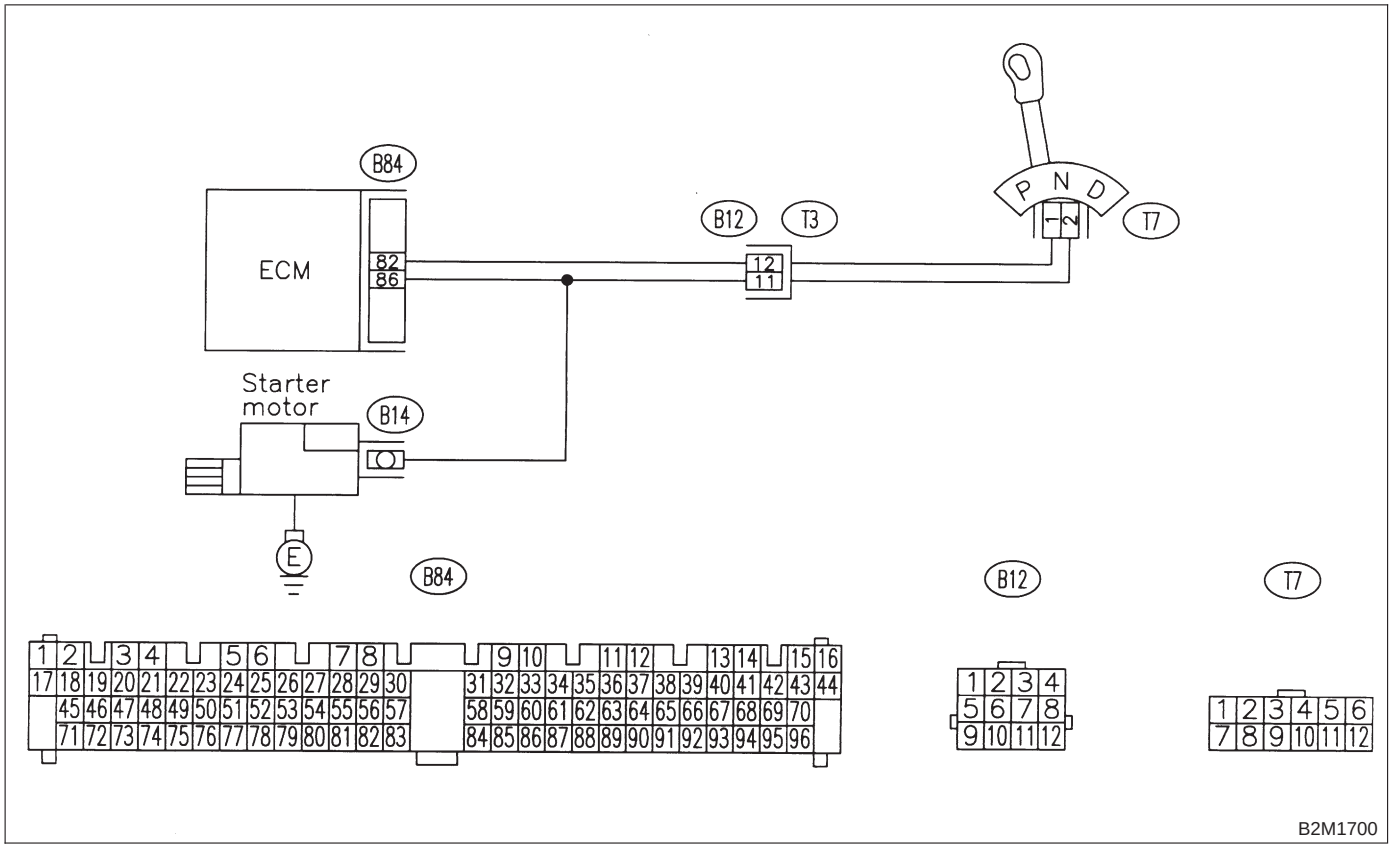
CHECK : ***Is there poor contact in transmission harness connector?***
YES : Repair poor contact in transmission harness connector.
NO : Replace ECM.

CC: DTC P1101 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT [AT VEHICLES] —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CC1 : CHECK DTC P0705 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0705?***

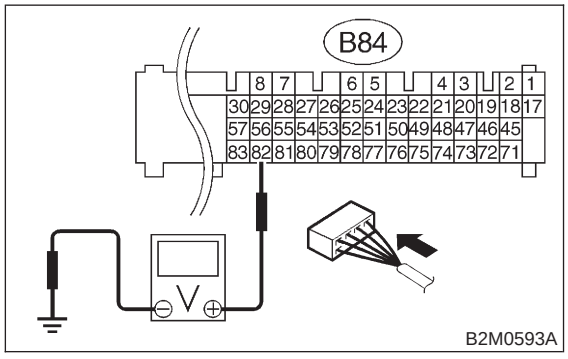
YES : Inspect DTC P0705 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NO : Go to step **10CC2**.

10CC2 : CHECK INPUT SIGNAL FOR ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground in selector lever “N” and “P” positions.

Connector & terminal
(B84) No. 82 (+) — Chassis ground (−):

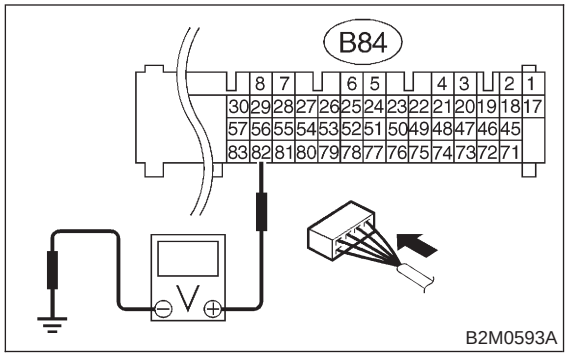


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10CC3**.
NO : Go to step **10CC5**.

10CC3 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground in selector lever except for “N” and “P” positions.

Connector & terminal
(B84) No. 82 (+) — Chassis ground (−):



CHECK : ***Is the voltage between 4.5 and 5.5 V?***
YES : Go to step **10CC4**.
NO : Go to step **10CC5**.

10CC4 : CHECK POOR CONTACT.

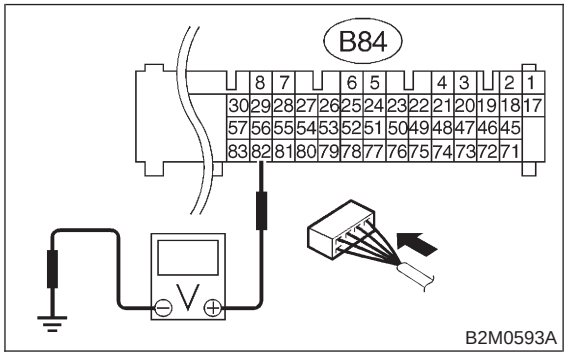
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10CC5 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 82 (+) — Chassis ground (−):

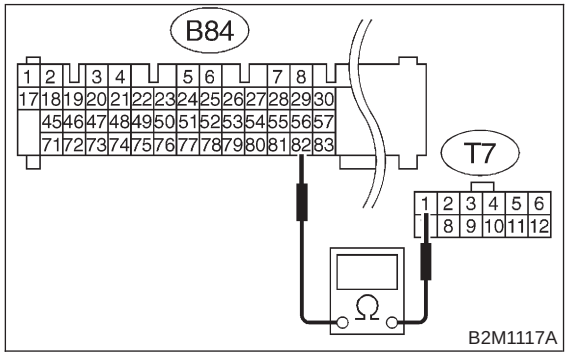


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and inhibitor switch connector.
NO : Go to step **10CC6**.

10CC6 : CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from ECM and inhibitor switch.
3) Measure resistance of harness between ECM and inhibitor switch connector.

Connector & terminal
(B84) No. 82 — (T7) No. 1:



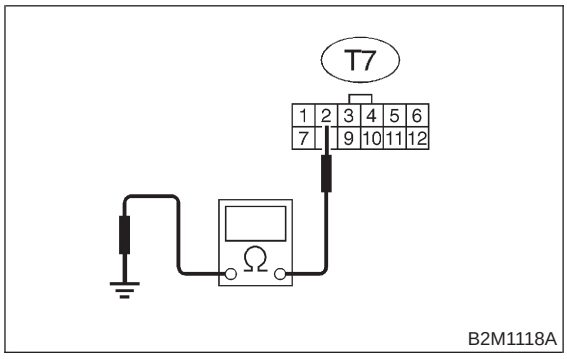
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10CC7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and inhibitor switch connector
- Poor contact in coupling connector (B12)
- Poor contact in inhibitor switch connector
- Poor contact in ECM connector

10CC7 : CHECK INHIBITOR SWITCH GROUND LINE.

Measure resistance of harness between inhibitor switch connector and engine ground.

Connector & terminal
(T7) No. 2 — Engine ground:

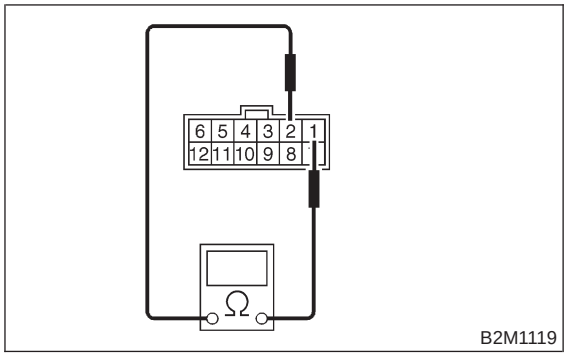


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **10CC8**.
NO : Repair open circuit in inhibitor switch ground line.

10CC8 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever "N" and "P" positions.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10CC9**.
NO : Replace inhibitor switch.

10CC9 : CHECK SELECTOR CABLE CONNECTION.

CHECK : ***Is there any fault in selector cable connection to inhibitor switch?***

YES : Repair selector cable connection. <Ref. to 3-2 [W3B0].>

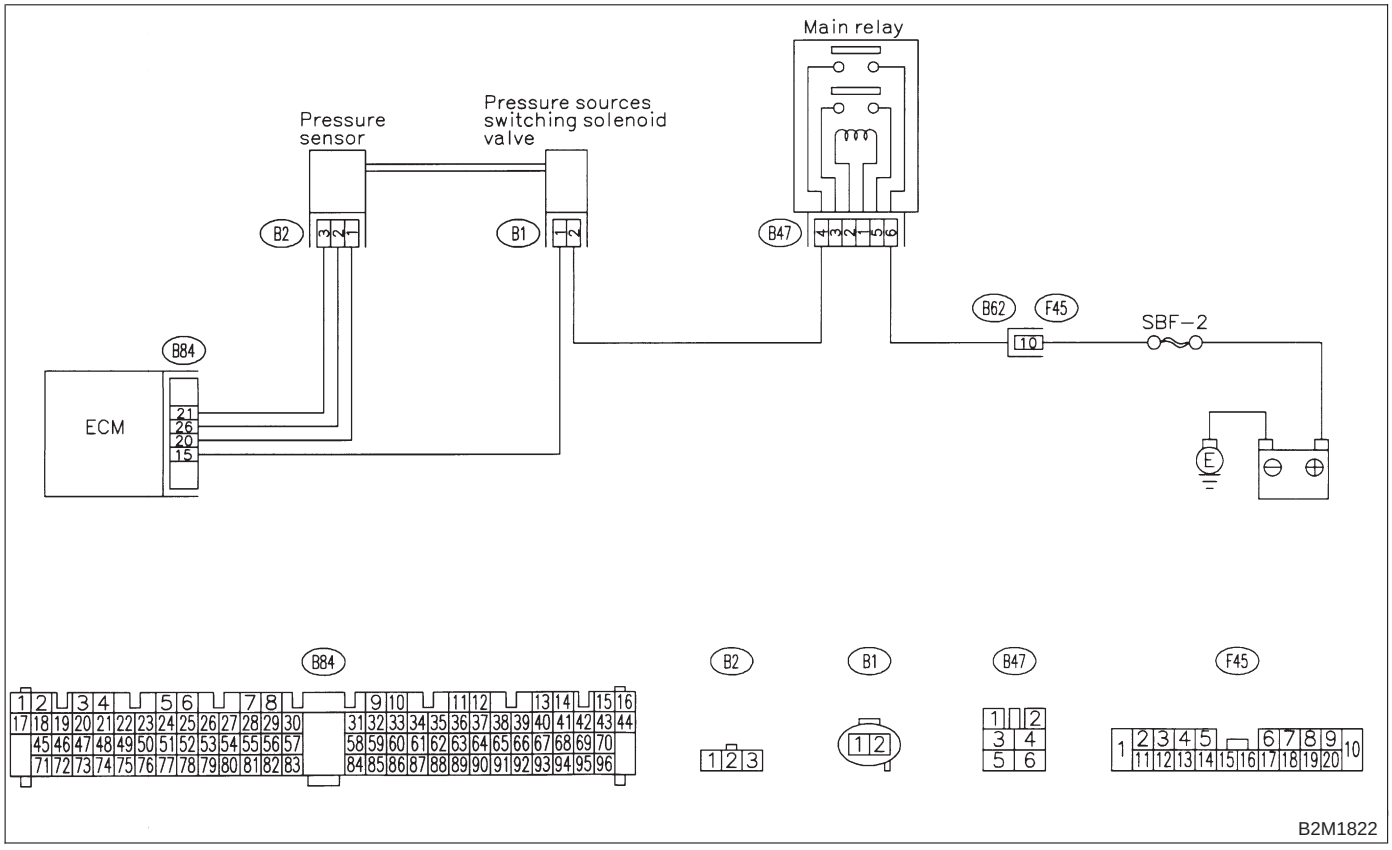
NO : Replace ECM.

CD: DTC P1102 — PRESSURE SOURCES SWITCHING SOLENOID VALVE CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

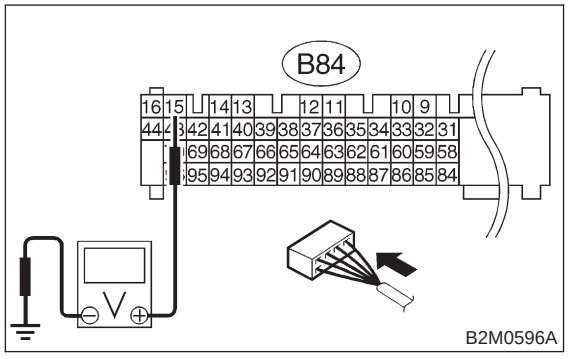
- **WIRING DIAGRAM:**



10CD1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 15 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CD2**.
NO : Go to step **10CD3**.

10CD2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

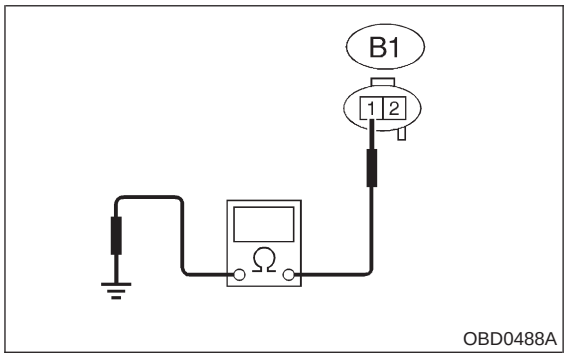
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10CD3 : CHECK HARNESS BETWEEN ECM AND PRESSURE SOURCES SWITCHING SOLENOID VALVE CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from pressure sources switching solenoid valve and ECM.
3) Measure resistance of harness between pressure sources switching solenoid valve connector and engine ground.

Connector & terminal
(B1) No. 1 — Engine ground:

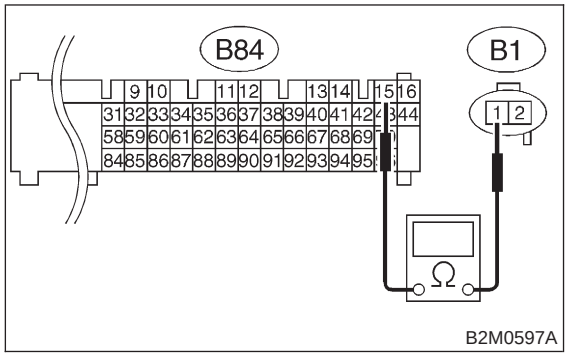


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and pressure sources switching solenoid valve connector.
NO : Go to step **10CD4**.

10CD4 : CHECK HARNESS BETWEEN ECM AND PRESSURE SOURCES SWITCHING SOLENOID VALVE CONNECTOR.

Measure resistance of harness between ECM and pressure sources switching solenoid valve connector.

Connector & terminal
(B84) No. 15 — (B1) No. 1:

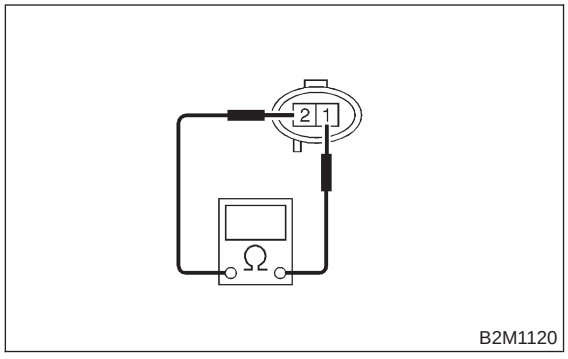


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10CD5**.
NO : Repair open circuit in harness between ECM and pressure sources switching solenoid valve connector.

10CD5 : CHECK PRESSURE SOURCES SWICTCHING SOLENOID VALVE.

Measure resistance between pressure sources switching solenoid valve connector terminals.

Terminals
No. 1 — No. 2:

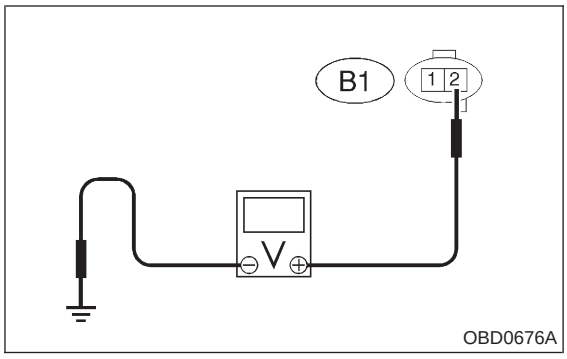


CHECK : ***Is the resistance between 10 and 100 Ω?***
YES : Go to step **10CD6**.
NO : Replace pressure sources switching solenoid valve.

10CD6 : CHECK POWER SUPPLY TO PRESSURE SOURCES SWITCHING SOLENOID VALVE.

1) Turn ignition switch to ON.
2) Measure voltage between pressure sources switching solenoid valve harness connector and engine ground.

Connector & terminal
(B1) No. 2 (+) — Engine ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CD7**.
NO : Repair open circuit in harness between main relay and pressure sources switching solenoid valve connector.

10CD7 : CHECK POOR CONTACT.

Check poor contact in pressure sources switching solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in pressure sources switching solenoid valve connector?***
YES : Repair poor contact in pressure sources switching solenoid valve connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

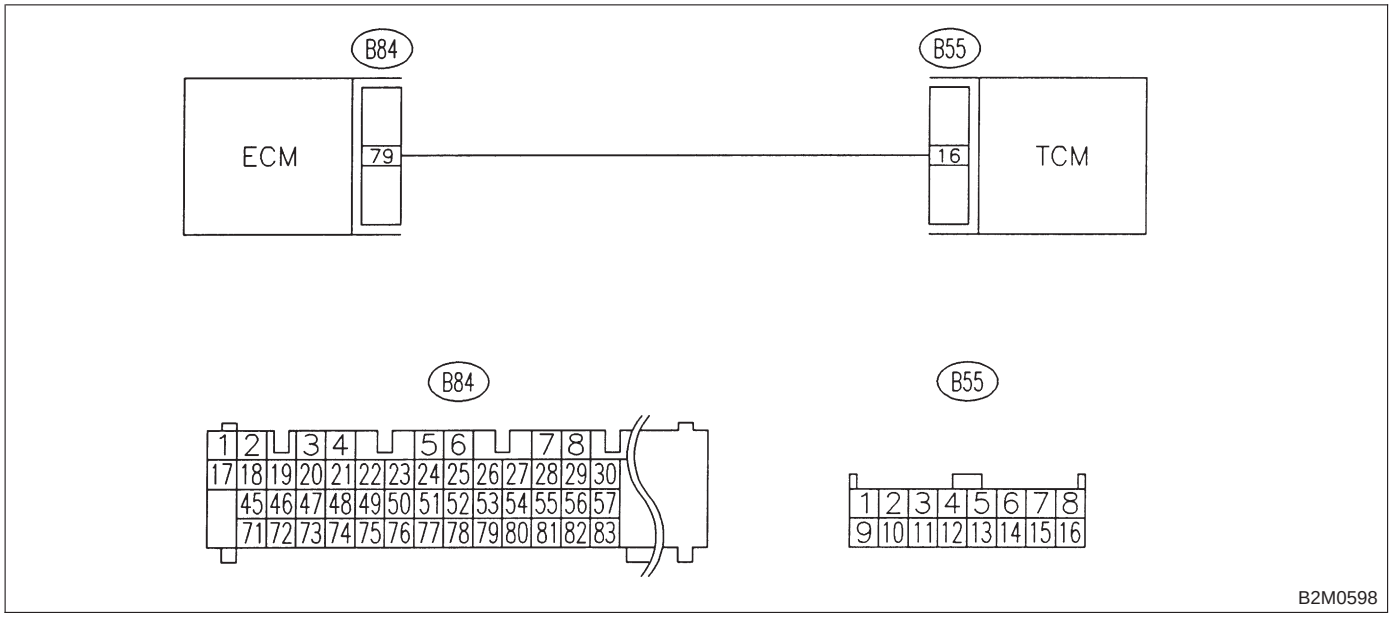
MEMO:

CE: DTC P1103 — ENGINE TORQUE CONTROL SIGNAL CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Excessive shift shock

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

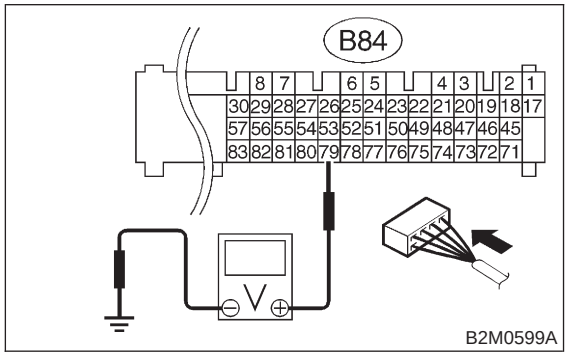
- **WIRING DIAGRAM:**



10CE1 : CHECK INPUT SIGNAL FOR ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 79 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **10CE2**.
NO : Go to step **10CE3**.

10CE2 : CHECK POOR CONTACT.

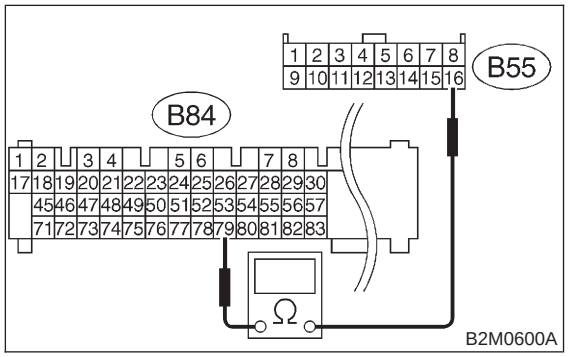
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10CE3 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from ECM and TCM.
3) Measure resistance of harness between ECM and TCM connector.

Connector & terminal
(B84) No. 79 — (B55) No. 16:

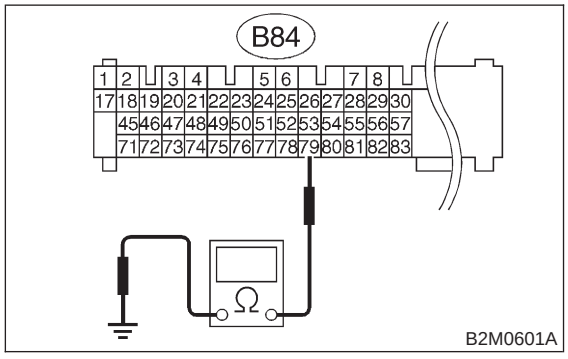


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10CE4**.
NO : Repair open circuit in harness between ECM and TCM connector.

10CE4 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 79 — Chassis ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and TCM connector.
NO : Go to step **10CE5**.

10CE5 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

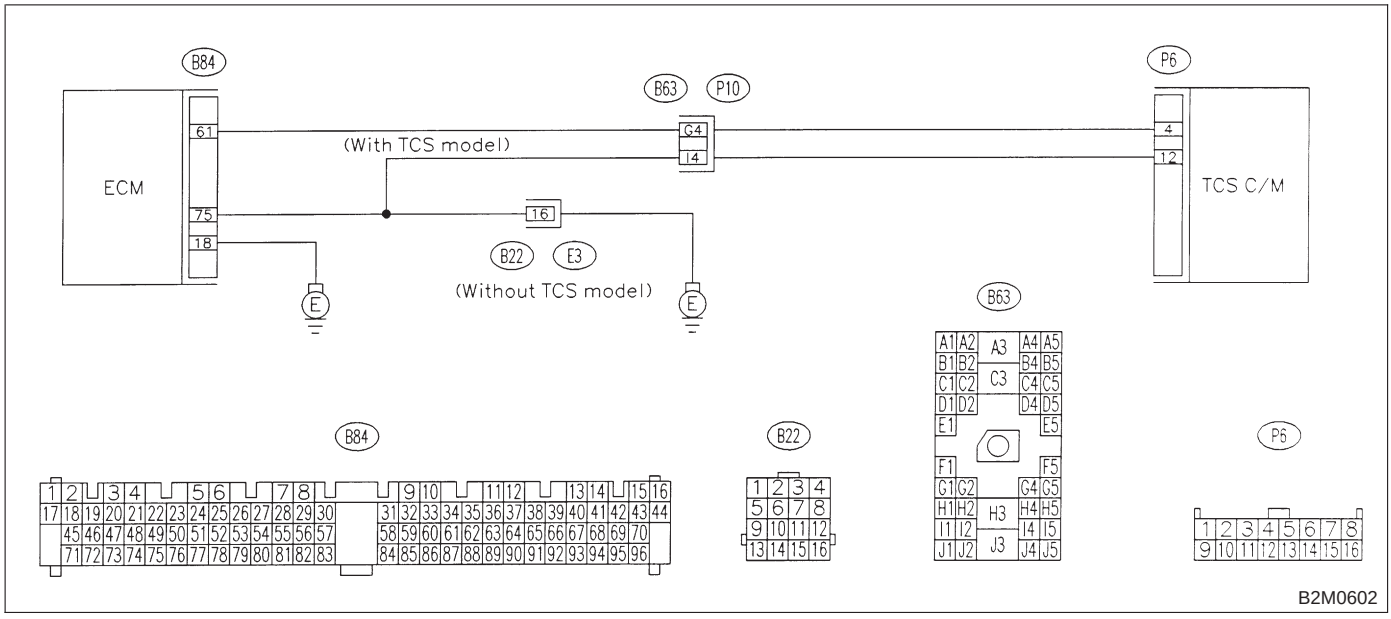
CHECK : ***Is there poor contact in TCM connector?***
YES : Repair poor contact in TCM connector.
NO : Replace TCM.

CF: DTC P1104 — TCS SIGNAL CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - No operation TCS
  - TCS warning light remains illuminated.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

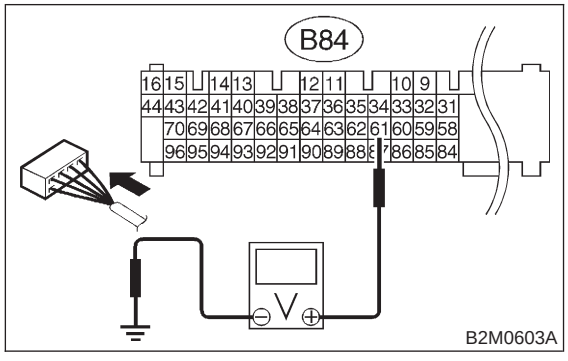
- **WIRING DIAGRAM:**



10CF1 :	CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 61 (+) — Chassis ground (−):

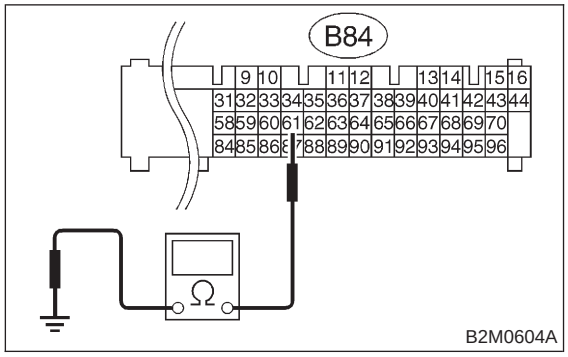


CHECK : ***Is the voltage more than 2 V?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10CF2**.

10CF2 : CHECK HARNESS BETWEEN ECM AND TCS C/M CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove front passenger side seat.
3) Tear off the floor mat.
4) Disconnect connectors from ECM and TCS C/M.
5) Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 61 — Chassis ground:



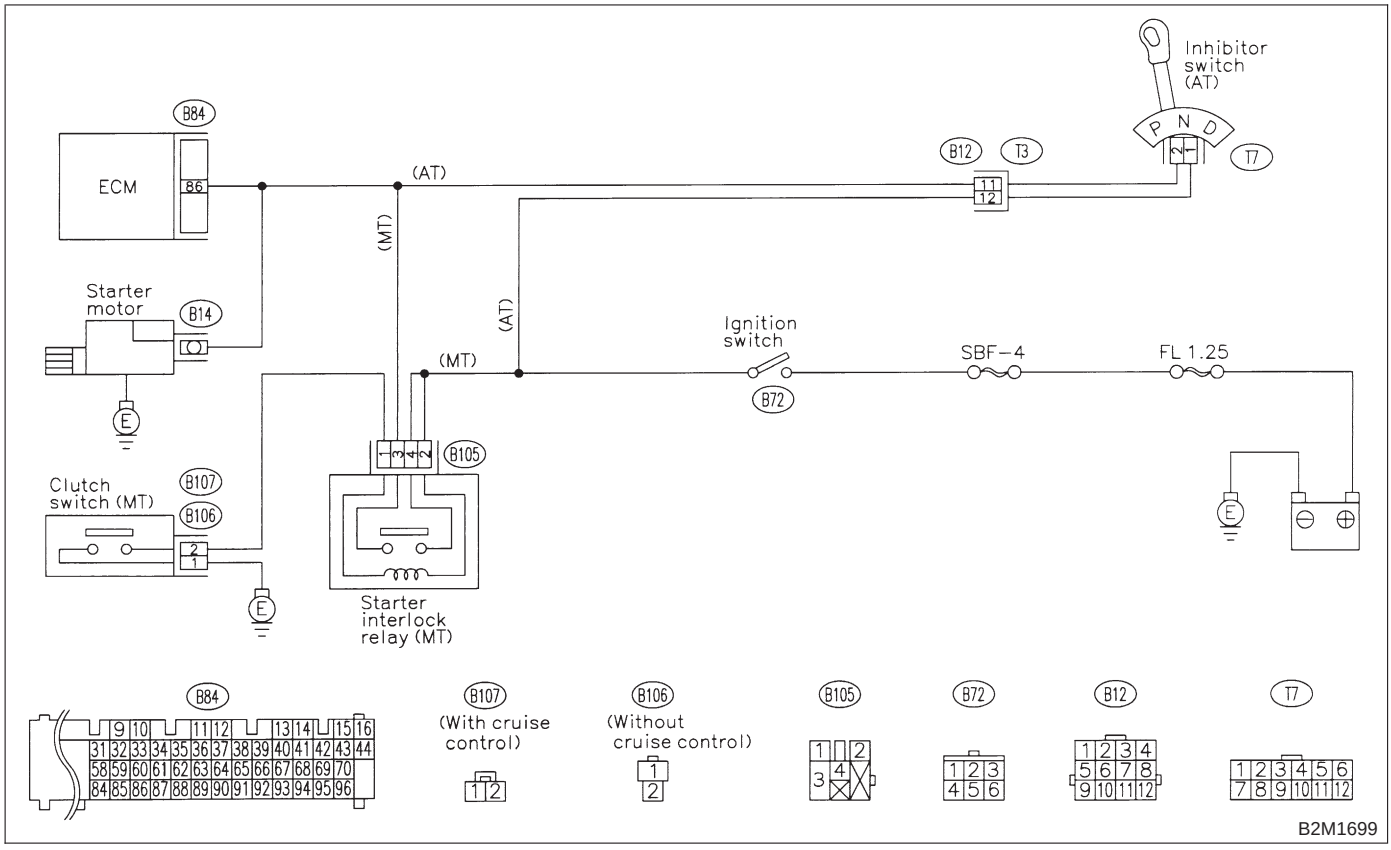
CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and TCS C/M connector.
NO : Replace TCS C/M.

CG: DTC P1120 — STARTER SWITCH CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CG1 : CHECK OPERATION OF STARTER MOTOR.

NOTE:
- On AT vehicles, place the inhibitor switch in each position.
- On MT vehicles, depress or release the clutch pedal.

CHECK : ***Does starter motor operate when ignition switch to "ON"?***

YES : Repair battery short circuit in starter motor circuit. After repair, replace ECM.

NO : Check starter motor circuit. <Ref. to 2-7 [T8B0].>

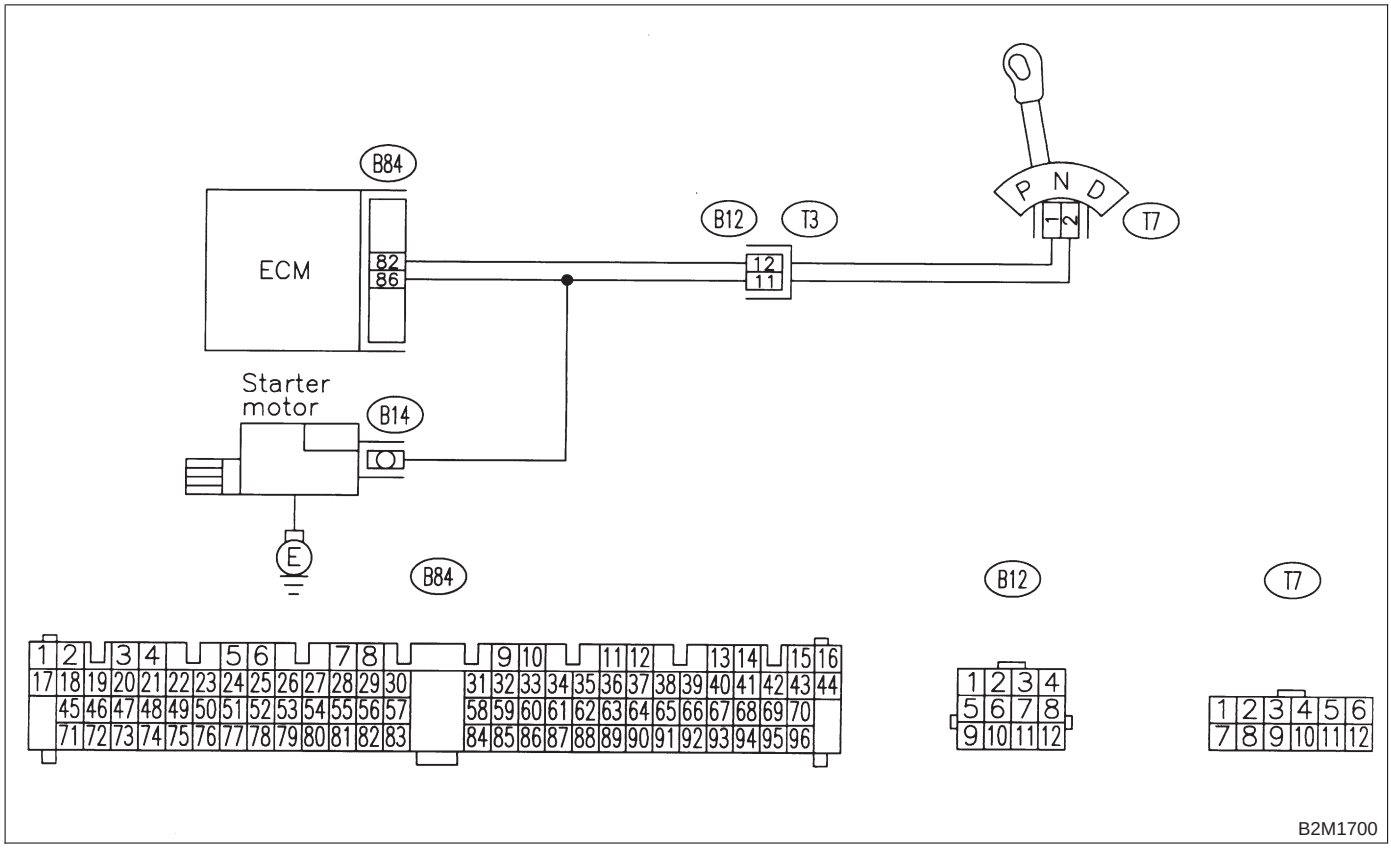
MEMO:

CH: DTC P1121 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT [AT VEHICLES] —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CH1 : CHECK DTC P0705 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0705?***

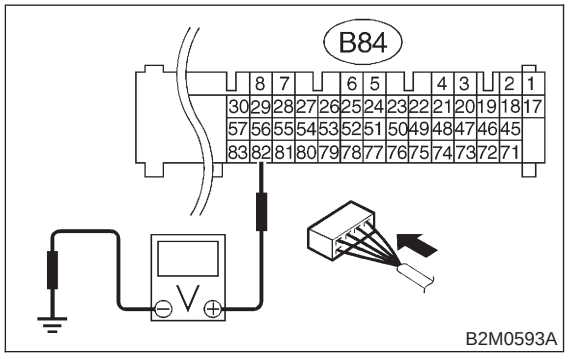
YES : Inspect DTC P0705 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NO : Go to step **10CH2**.

10CH2 : CHECK INPUT SIGNAL FOR ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 82 (+) — Chassis ground (−):

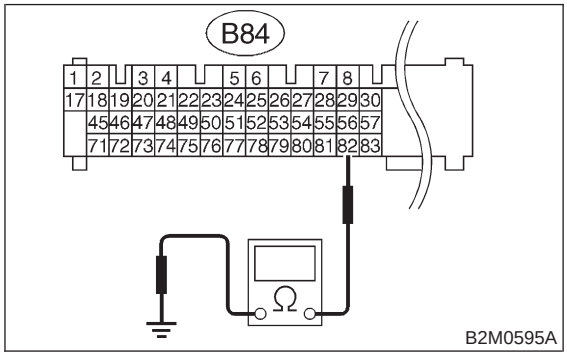


CHECK : ***Is the voltage between 4.5 and 5.5 V in other positions?***
YES : Even if MIL lights up, the circuit has returned to a normal condition at this time.
NO : Go to step **10CH3**.

10CH3 : CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from ECM and transmission harness connector.
3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B84) No. 82 — Chassis ground:

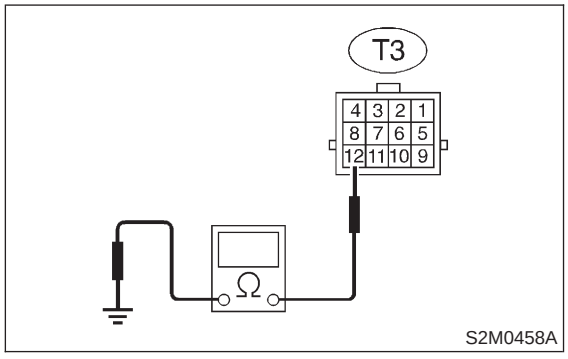


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and transmission harness connector.
NO : Go to step **10CH4**.

10CH4 : CHECK TRANSMISSION HARNESS CONNECTOR.

1) Disconnect connector from inhibitor switch.
2) Measure resistance of harness between transmission harness connector and engine ground.

Connector & terminal
(T3) No. 12 — Engine ground:

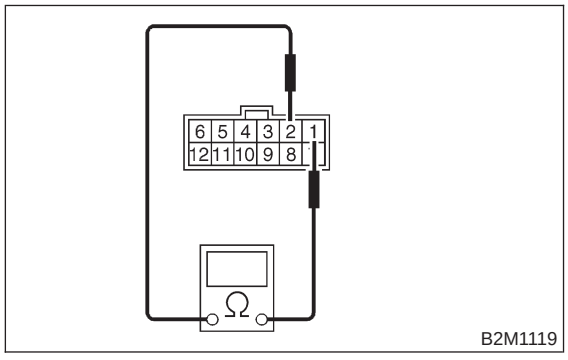


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between transmission harness and inhibitor switch connector.
NO : Go to step **10CH5**.

10CH5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "N" position.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance more than 1 MΩ in other positions?***
YES : Go to step **10CH6**.
NO : Replace inhibitor switch.

10CH6 : CHECK SELECTOR CABLE CONNECTION.

CHECK : ***Is there any fault in selector cable connection to inhibitor switch?***
YES : Repair selector cable connection. <Ref. to 3-2 [W3B0].>
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

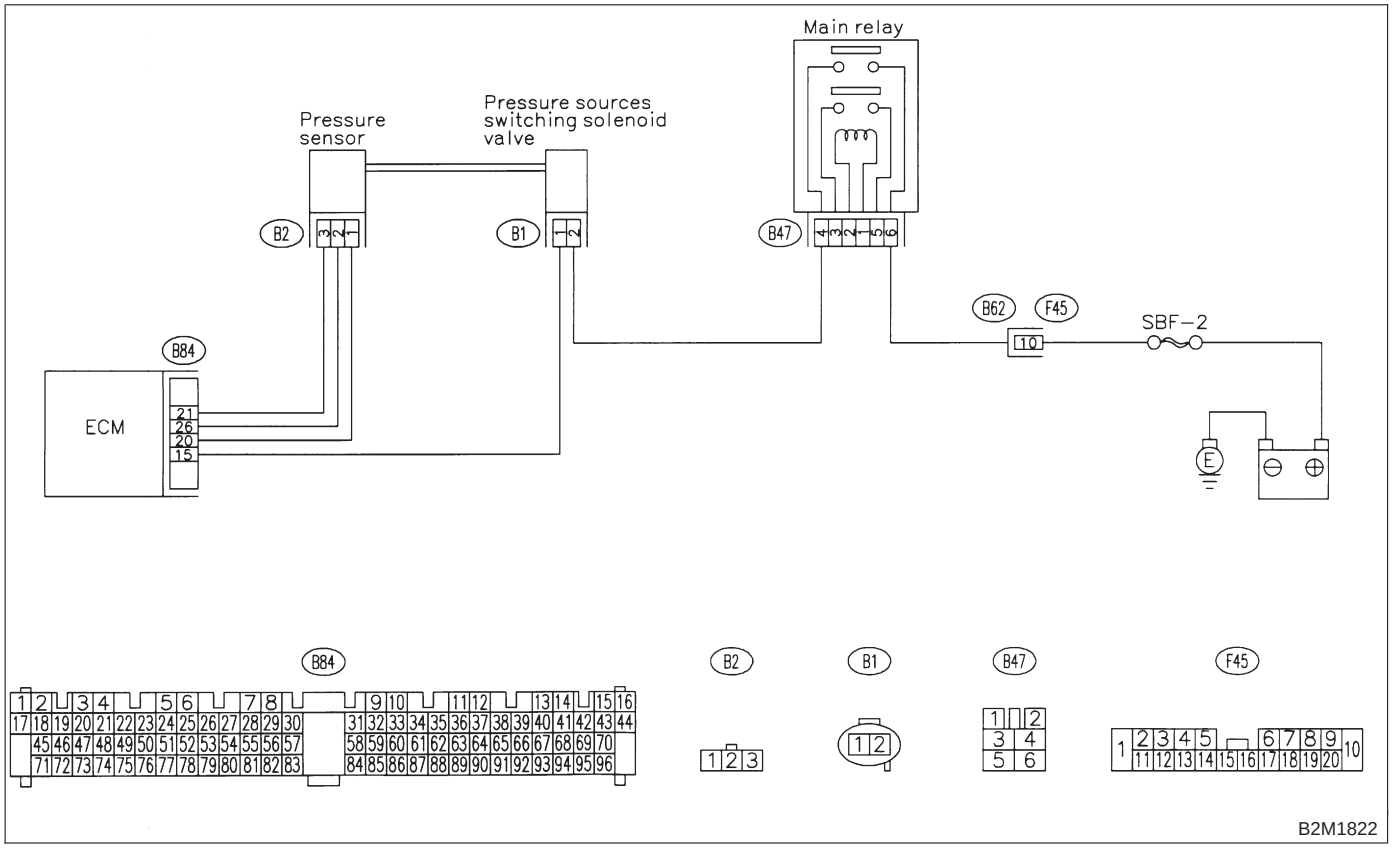
MEMO:

CI: DTC P1122 — PRESSURE SOURCES SWITCHING SOLENOID VALVE CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

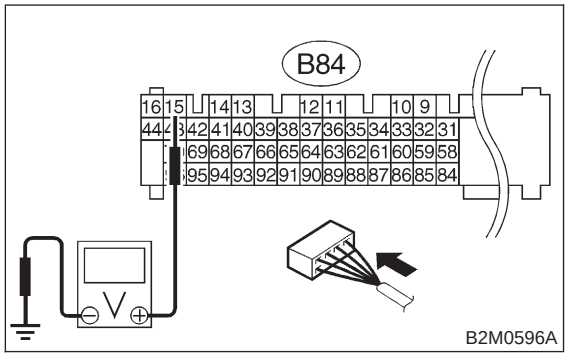
- **WIRING DIAGRAM:**



10CI1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 15 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CI3**.
NO : Go to step **10CI2**.

10CI2 : CHECK POOR CONTACT.

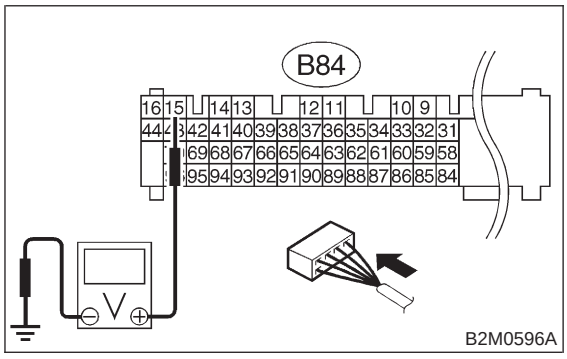
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10CI3 : CHECK HARNESS BETWEEN ECM AND PRESSURE SOURCES SWITCHING SOLENOID VALVE CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from pressure sources switching solenoid valve.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 15 (+) — Chassis ground (−):

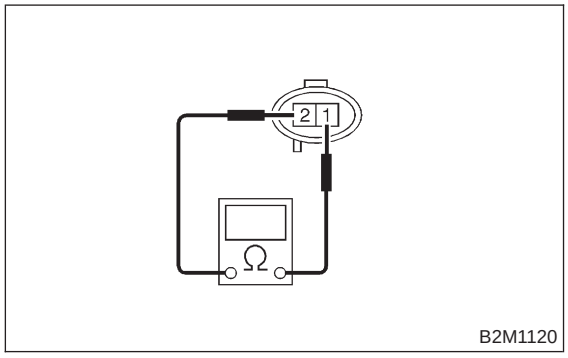


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and pressure sources switching solenoid valve connector. After repair, replace ECM.
NO : Go to step **10CI4**.

10CI4 : CHECK PRESSURE SOURCES SWICTHING SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Measure resistance between pressure sources switching solenoid valve connector terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Replace pressure sources switching solenoid valve and ECM.
NO : Go to step **10CI5**.

10CI5 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

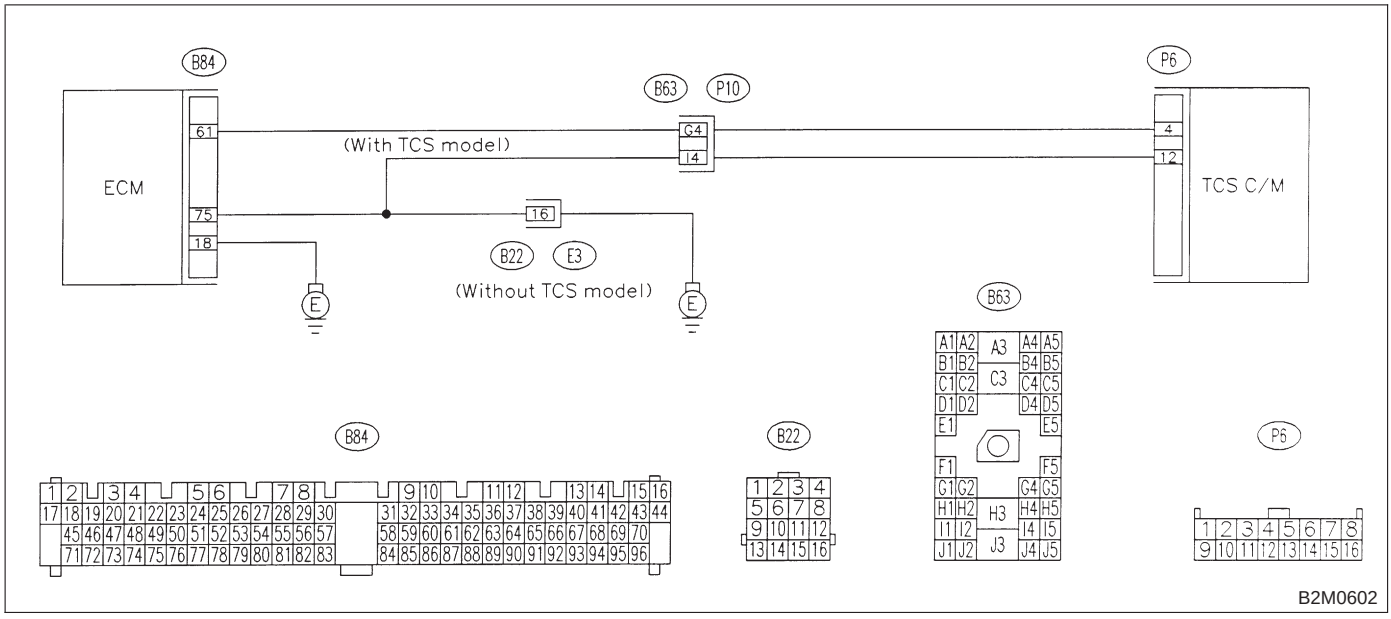
MEMO:

CJ: DTC P1124 — TCS SIGNAL CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - No operation TCS
  - TCS warning light remains illuminated.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



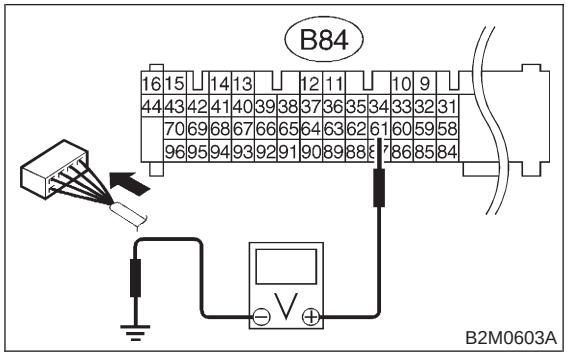
10CJ1 : CHECK IF THE VEHICLE IS EQUIPPED WITH TCS.

CHECK : ***Is the vehicle equipped with TCS?***
YES : Go to step **10CJ2**.
NO : Go to step **10CJ6**.

10CJ2 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 61 (+) — Chassis ground (−):

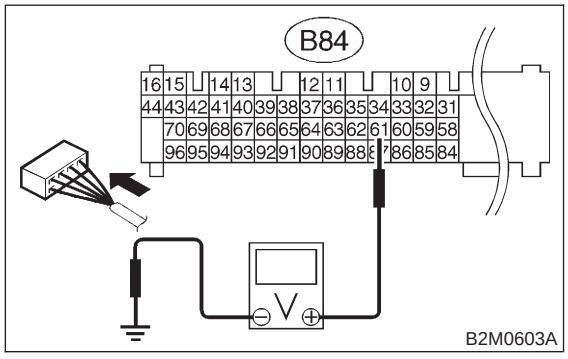


CHECK : ***Is the voltage more than 2 V?***
YES : Go to step **10CJ3**.
NO : Go to step **10CJ5**.

10CJ3 : CHECK HARNESS BETWEEN ECM AND TCS C/M CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove front passenger side seat.
3) Tear off the floor mat.
4) Disconnect connectors from ECM and TCS C/M.
5) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 61 (+) — Chassis ground (−):

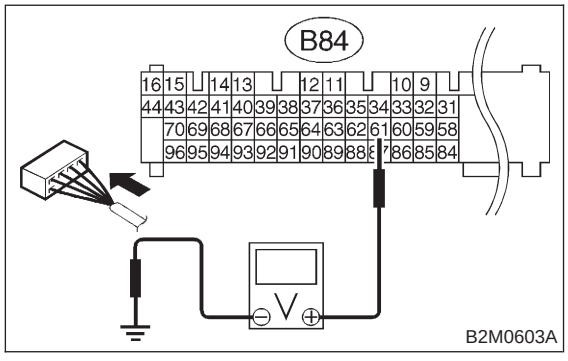


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and TCS C/M connector.
NO : Go to step **10CJ4**.

10CJ4 : CHECK HARNESS BETWEEN ECM AND TCS C/M CONNECTOR.

1) Turn ignition switch to ON.
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 61 (+) — Chassis ground (−):

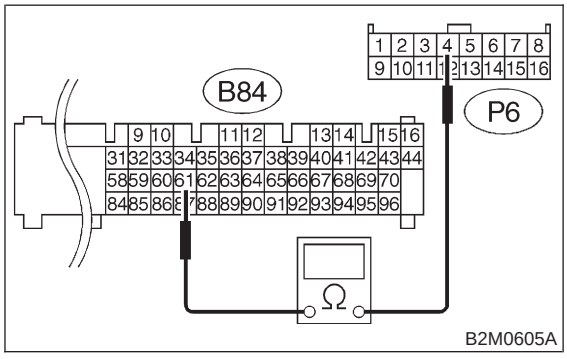


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and TCS C/M connector.
NO : Go to step **10CJ8**.

10CJ5 : CHECK HARNESS BETWEEN ECM AND TCS C/M CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove front passenger side seat.
3) Tear off the floor mat.
4) Disconnect connectors from ECM and TCS C/M.
5) Measure resistance of harness between ECM and TCS C/M connector.

Connector & terminal
(B84) No. 61 — (P6) No. 4:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10CJ6**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and TCS C/M connector
- Poor contact in ECM connector
- Poor contact in TCS C/M connector
- Poor contact in S.M.J. connector (B63)

10CJ6 : CHECK POOR CONTACT.

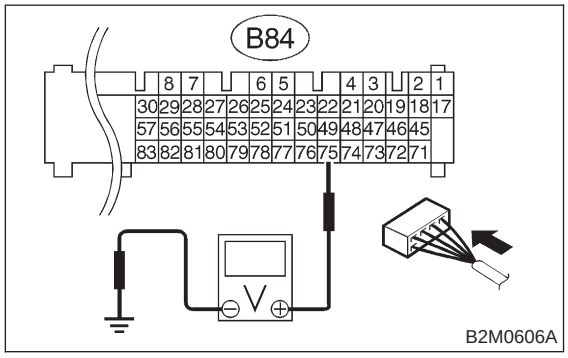
Check poor contact in TCS C/M connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in TCS C/M connector?***
YES : Repair poor contact in TCS C/M connector.
NO : Contact with SOA service.

10CJ7 : CHECK ECM CONNECTOR.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 75 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 2 V?***
YES : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM connector and engine grounding terminal
- Poor contact in engine grounding terminal
- Poor contact in coupling connector (B22)

NO : Go to step **10CJ8**.

10CJ8 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

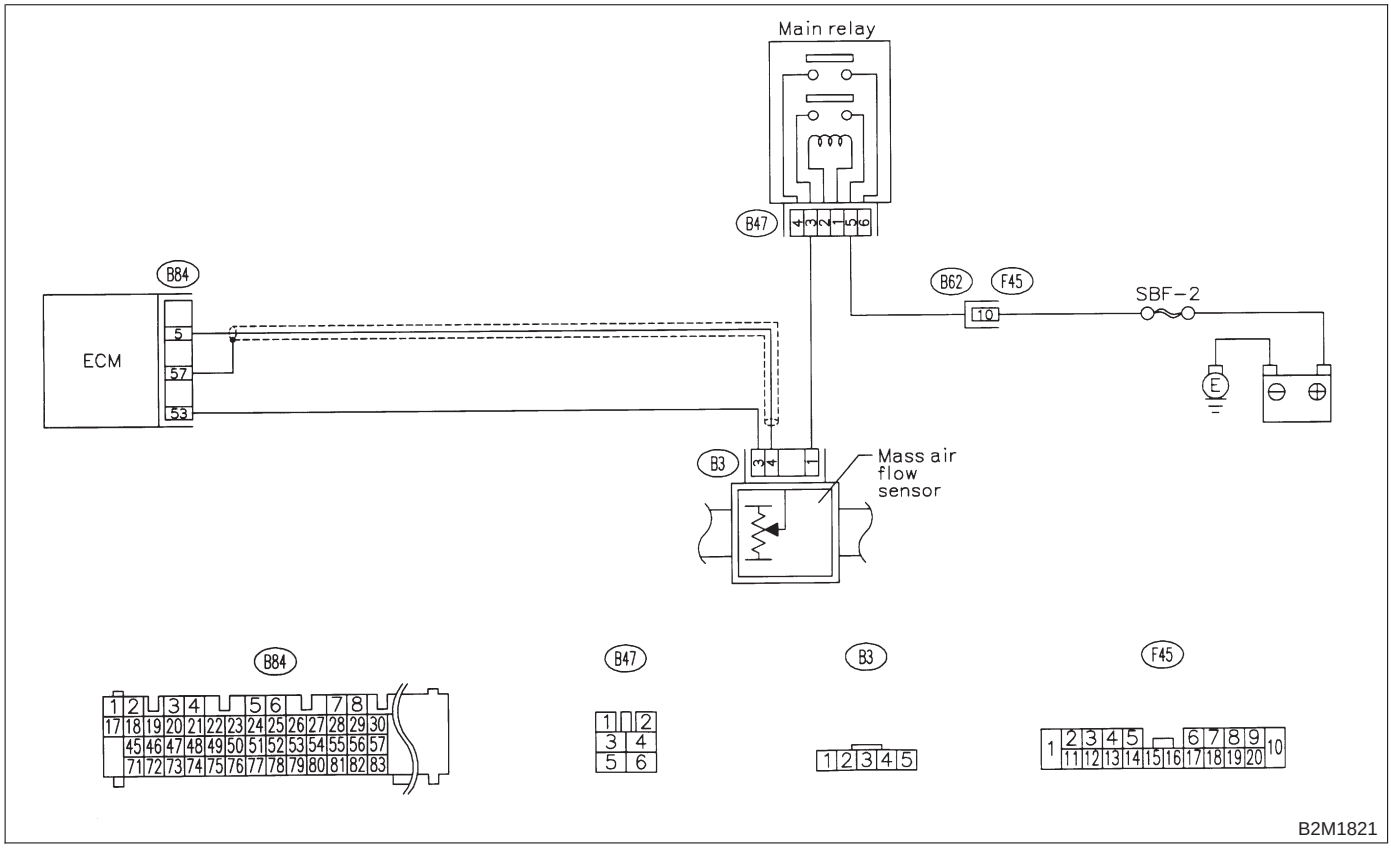
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

CK: DTC P1141 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CK1 :	CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0102 or P0103?***

YES : Inspect DTC P0102 or P0103 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P1141.

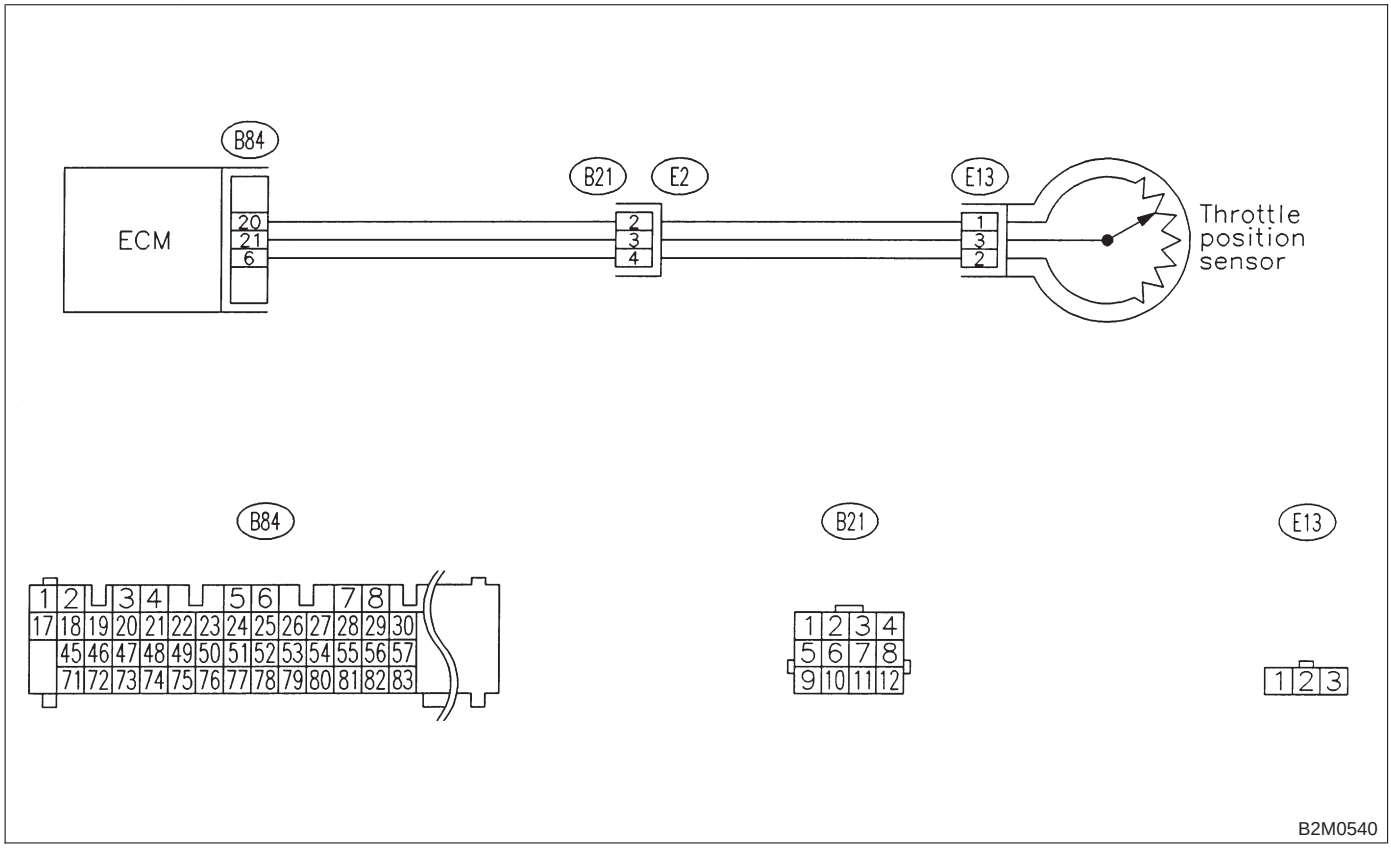
NO : Replace mass air flow sensor.

CL: DTC P1142 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CL1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0122 or P0123?***

YES : Inspect DTC P0122 or P0123 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P1142.

NO : Replace throttle position sensor.

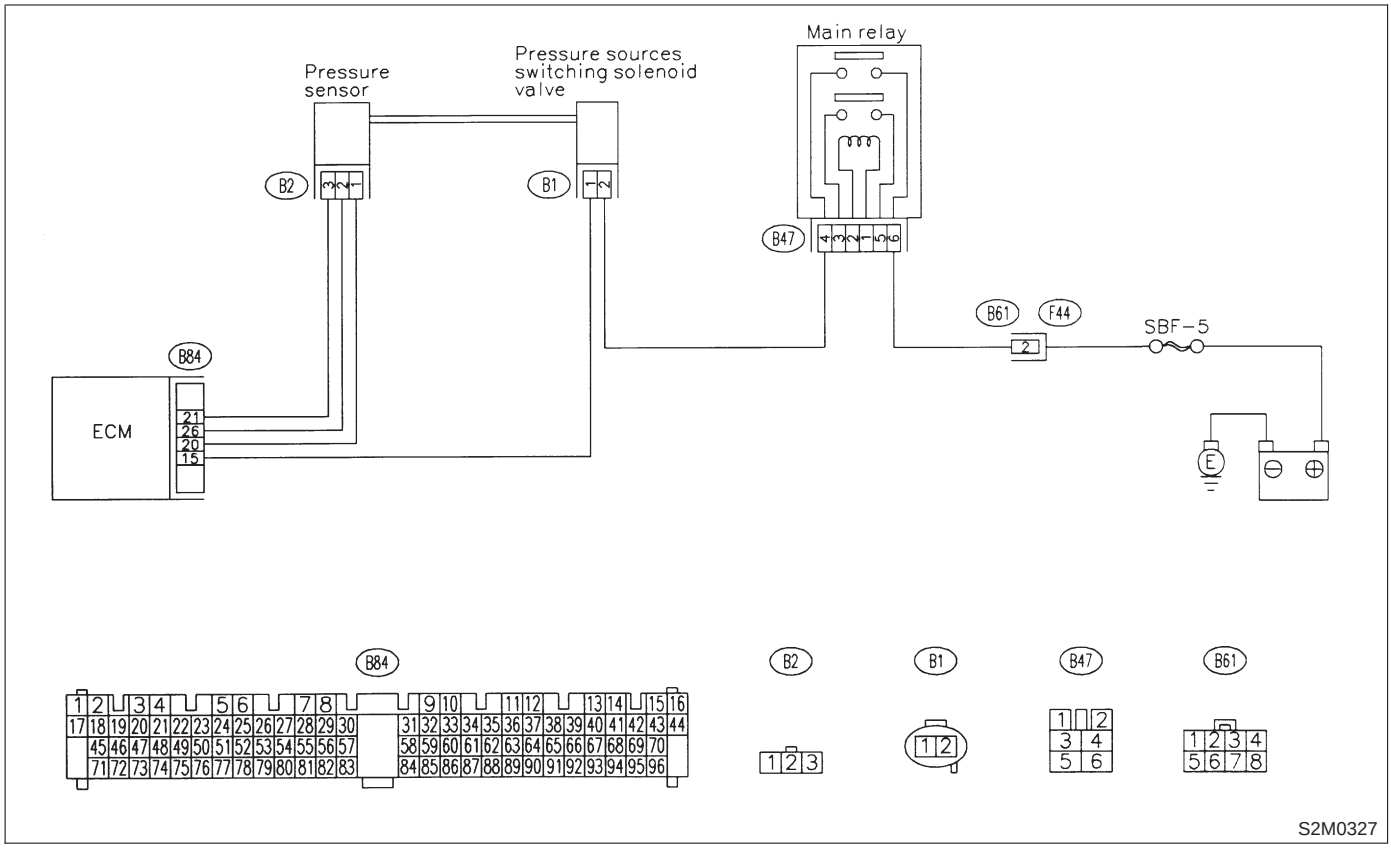
MEMO:

CM: DTC P1143 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

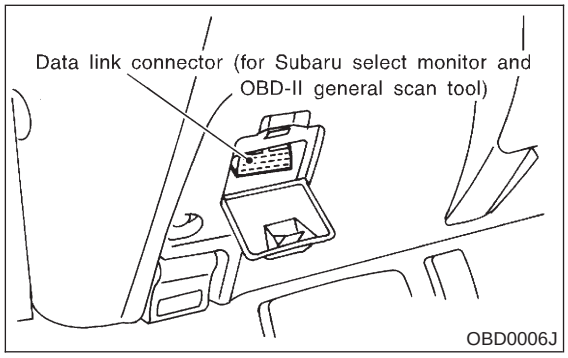
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CM1 : CHECK DATA FOR CONTROL.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch ON and Subaru Select Monitor or the OBD-II general scan tool switch ON.
4) Start engine.
5) Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value less than 32 kPa (240 mmHg, 9.45 inHg)?***
YES : Go to step **10CM3**.
NO : Go to step **10CM2**.

10CM2 : CHECK PRESSURE SENSOR.

1) Measure actual atmospheric pressure.
2) Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

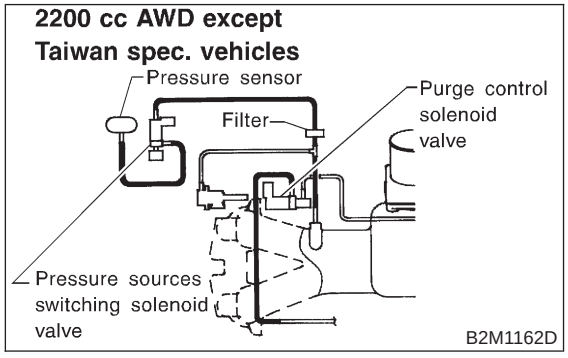
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>

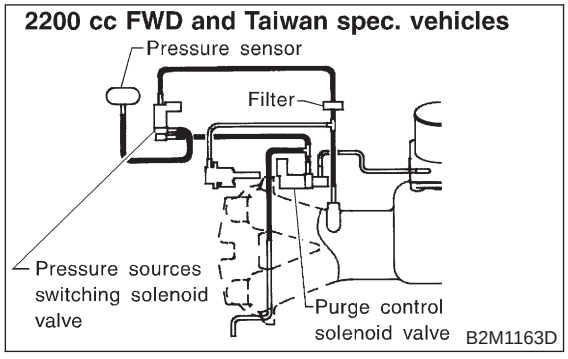
CHECK : ***Is the difference between absolute value of Subaru Selector Monitor indication and actual atmospheric pressure greater than 10 kPa (75 mmHg, 2.95 inHg)?***
YES : Replace pressure sensor.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact with SOA service.

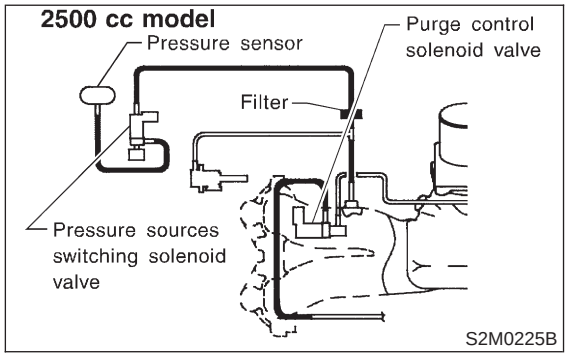
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10CM3 : CHECK VACUUM HOSES.

Check the following item. Incorrect hose connections in line between the pressure sources switching solenoid valve and pressure sensor, intake manifold and/or CPC solenoid valve.



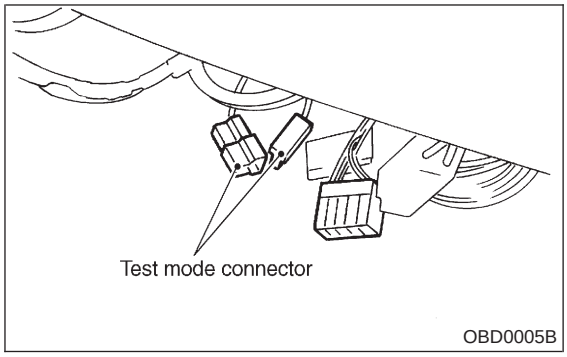




CHECK : ***Is there a fault in vacuum hose?***
YES : Repair or replace hoses or filter.
NO : Go to step **10CM4**.

10CM4 : CHECK PRESSURE SOURCES SWITCHING SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Connect test mode connector.



3) Turn ignition switch to ON.

NOTE:
Pressure sources switching solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to the "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

CHECK : ***Does pressure sources switching solenoid valve produce operating sound? (ON ←→ OFF each 1.5 sec.)***
YES : Replace pressure sensor.
NO : Replace pressure sources switching solenoid valve.

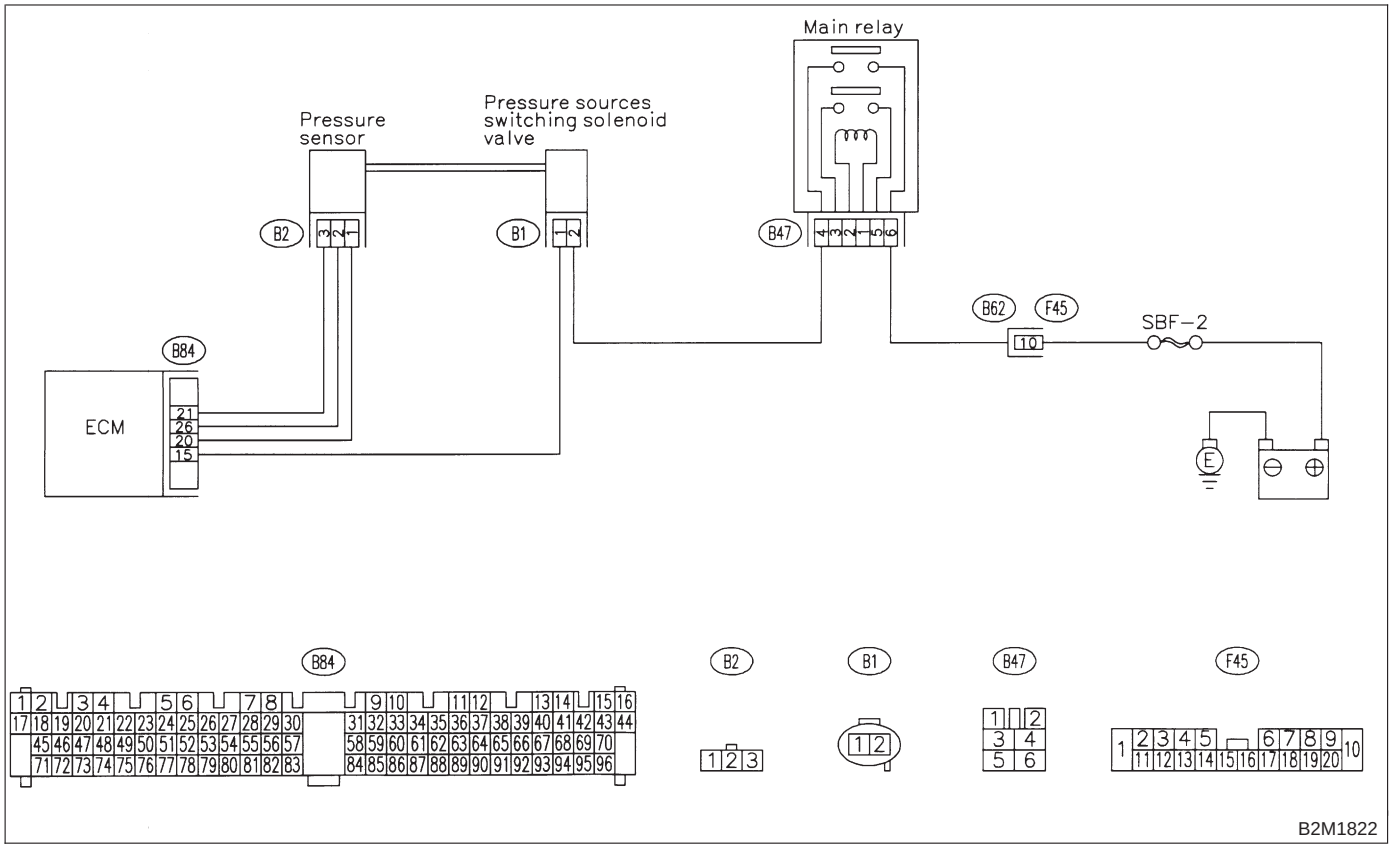
MEMO:

CN: DTC P1144 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

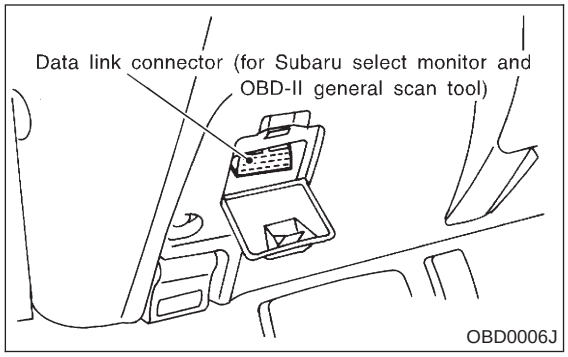
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CN1 : CHECK DATA FOR CONTROL.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch ON and Subaru Select Monitor or the OBD-II general scan tool switch ON.
4) Start engine.
5) Read data of atmospheric absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 133 kPa (998 mmHg, 39.29 inHg)?***
YES : Replace pressure sensor.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact with SOA service.

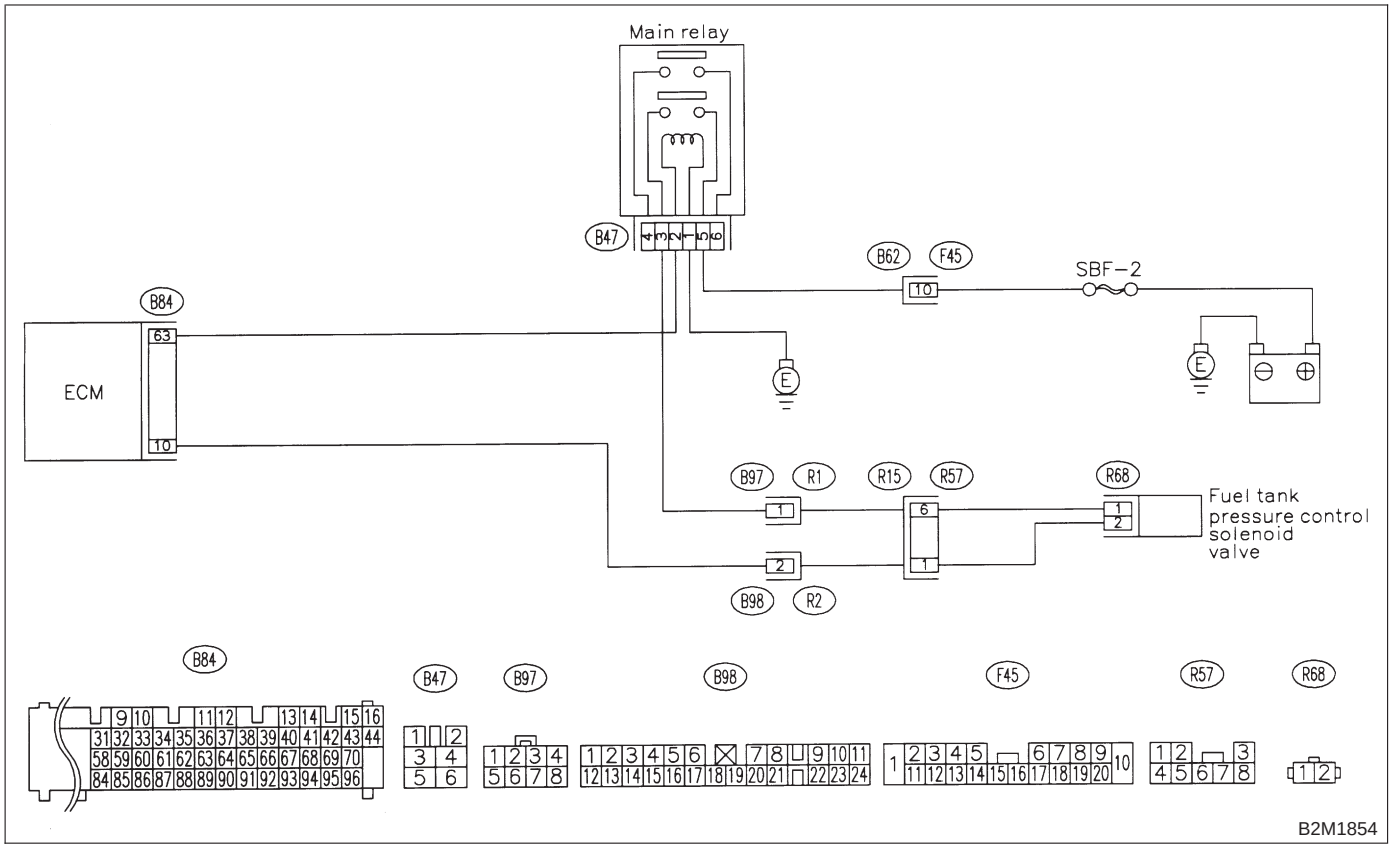
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CO: DTC P1400 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

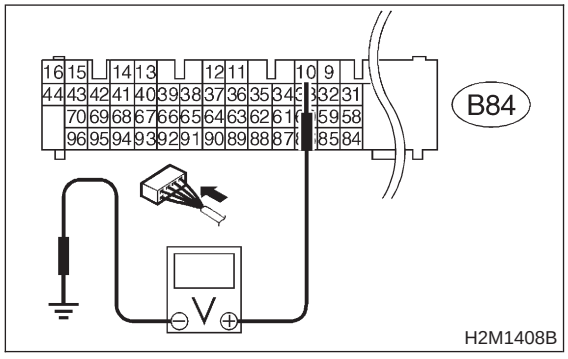
- **WIRING DIAGRAM:**



10CO1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 10 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CO2**.
NO : Go to step **10CO3**.

10CO2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

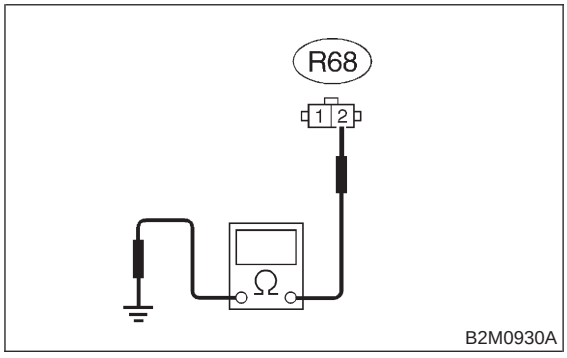
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10CO3 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from fuel tank pressure control solenoid valve and ECM.
3) Measure resistance of harness between fuel tank pressure control solenoid valve connector and chassis ground.

Connector & terminal
(R68) No. 2 — Chassis ground:

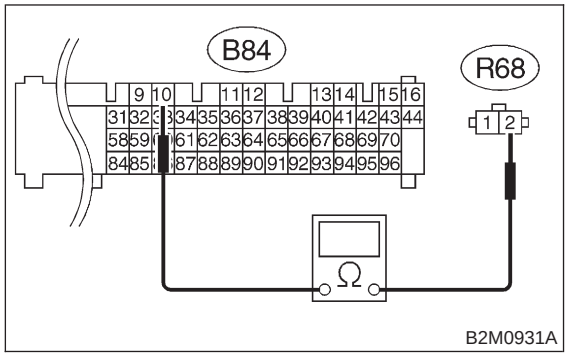


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and fuel tank pressure control solenoid valve connector.
NO : Go to step **10CO4**.

10CO4 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and fuel tank pressure control solenoid valve connector.

Connector & terminal
(B84) No. 10 — (R68) No. 2:



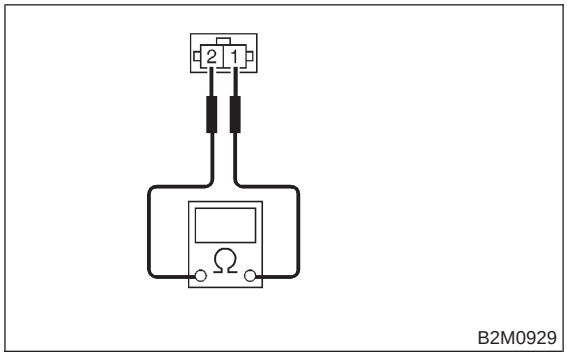
CHECK : ***Is the voltage less than 1 Ω?***
YES : Go to step **10CO5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel tank pressure control solenoid valve connector
- Poor contact in coupling connectors (B98 and R57)

10CO5 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

Measure resistance between fuel tank pressure control solenoid valve terminals.

Terminals
No. 1 — No. 2:

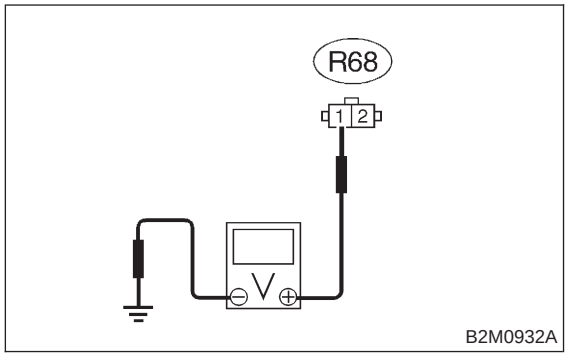


CHECK : ***Is the resistance between 10 and 100 Ω?***
YES : Go to step **10CO6**.
NO : Replace fuel tank pressure control solenoid valve.

10CO6 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

1) Turn ignition switch to ON.
2) Measure voltage between fuel tank pressure control solenoid valve and chassis ground.

Connector & terminal
(R68) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CO7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between main relay and fuel tank pressure control solenoid valve connector
● Poor contact in coupling connectors (B97 and R57)
● Poor contact in main relay connector

10CO7 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure control solenoid valve connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in fuel tank pressure control solenoid valve connector?***
YES : Repair poor contact in fuel tank pressure control solenoid valve connector.
NO : Contact with SOA service.

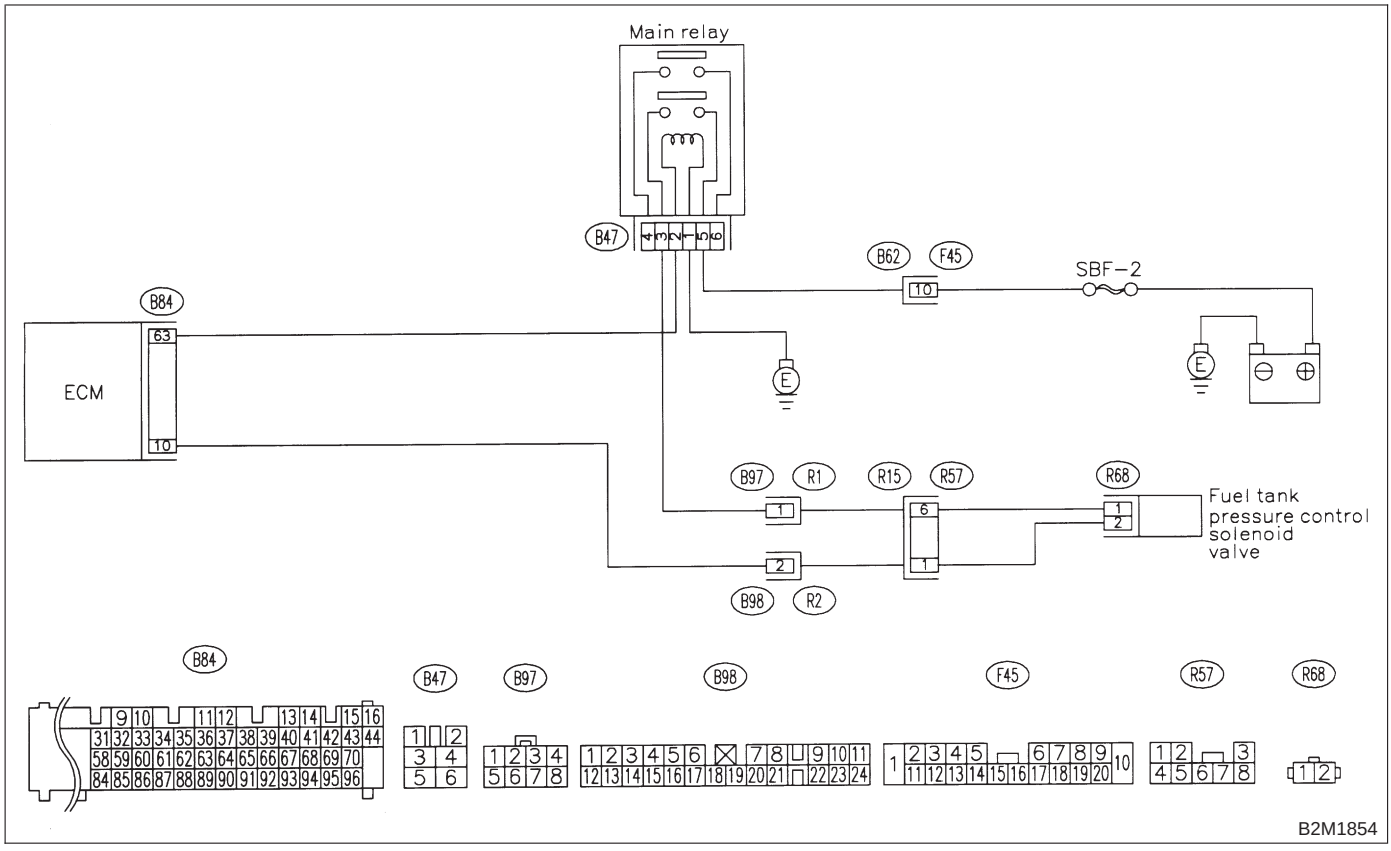
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CP: DTC P1420 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

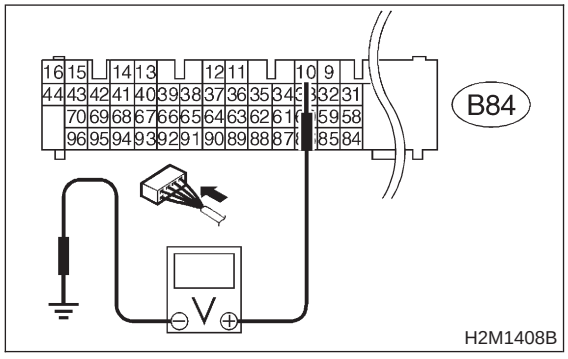
- **WIRING DIAGRAM:**



10CP1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 10 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CP3**.
NO : Go to step **10CP2**.

10CP2 : CHECK POOR CONTACT.

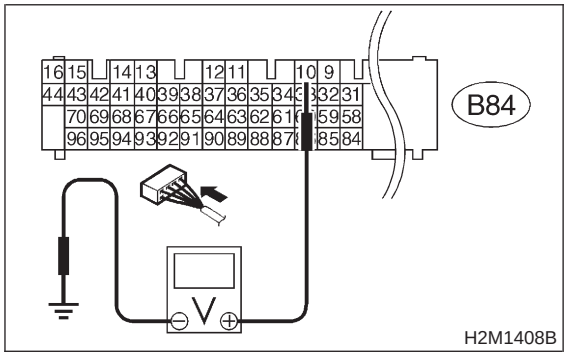
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10CP3 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from fuel tank pressure control solenoid valve.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 10 (+) — Chassis ground (−):

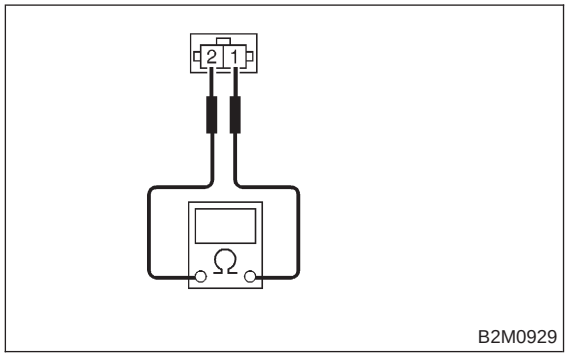


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and fuel tank pressure control solenoid valve connector. After repair, replace ECM.
NO : Go to step **10CP4**.

10CP4 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Measure resistance between fuel tank pressure control solenoid valve terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Replace fuel tank pressure control solenoid valve and ECM.
NO : Go to step **10CP5**.

10CP5 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

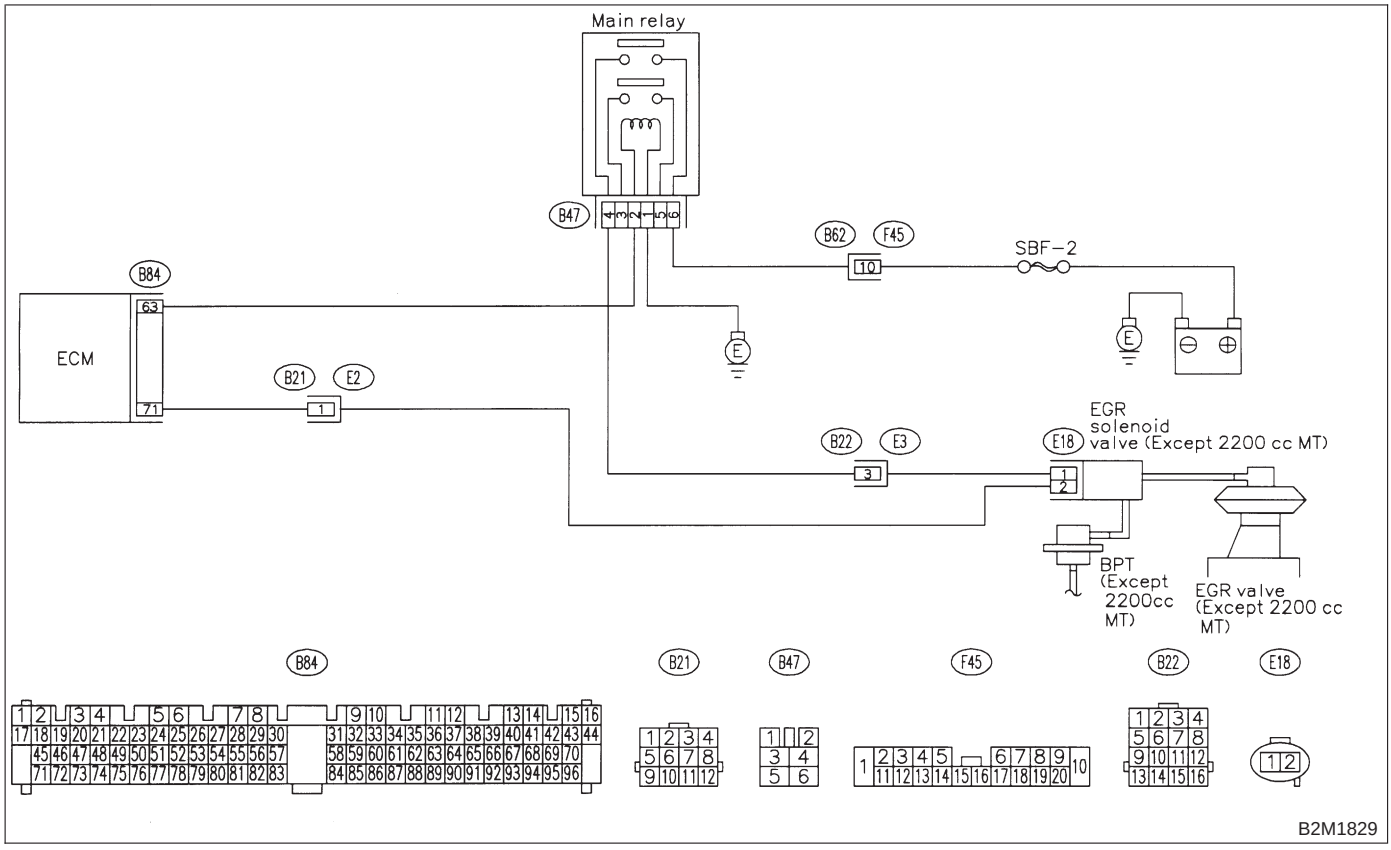
MEMO:

CQ: DTC P1421 — EXHAUST GAS RECIRCULATION CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Poor driving performance on low engine speed

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CQ1 : CHECK ENGINE/TRANSMISSION TYPE.

CHECK : ***Is engine/transmission type 2200 cc/MT?***

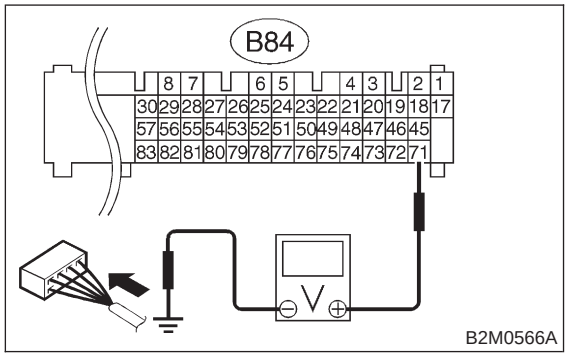
YES : Check AT/MT identification circuit. <Ref. to 2-7 [T10DG0].>

NO : Go to step **10CQ2**.

10CQ2 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 71 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CQ4**.
NO : Go to step **10CQ3**.

10CQ3 : CHECK POOR CONTACT.

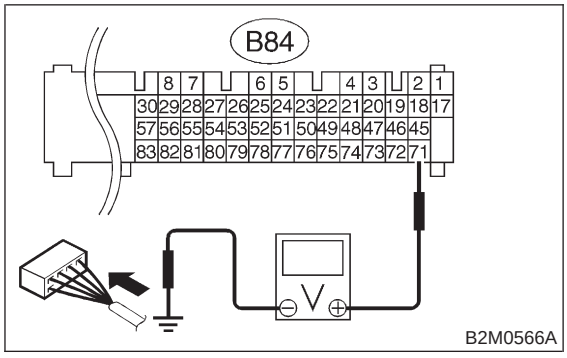
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10CQ4 : CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from EGR solenoid valve.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 71 (+) — Chassis ground (−):

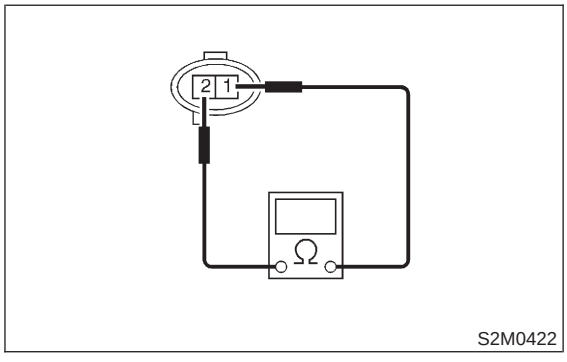


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and EGR solenoid valve connector. After repair, replace ECM.
NO : Go to step **10CQ5**.

10CQ5 : CHECK EGR SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Measure resistance between EGR solenoid valve terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Replace EGR solenoid valve and ECM.
NO : Go to step **10CQ6**.

10CQ6 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***

YES : Repair poor contact in ECM connector.

NO : Replace ECM.

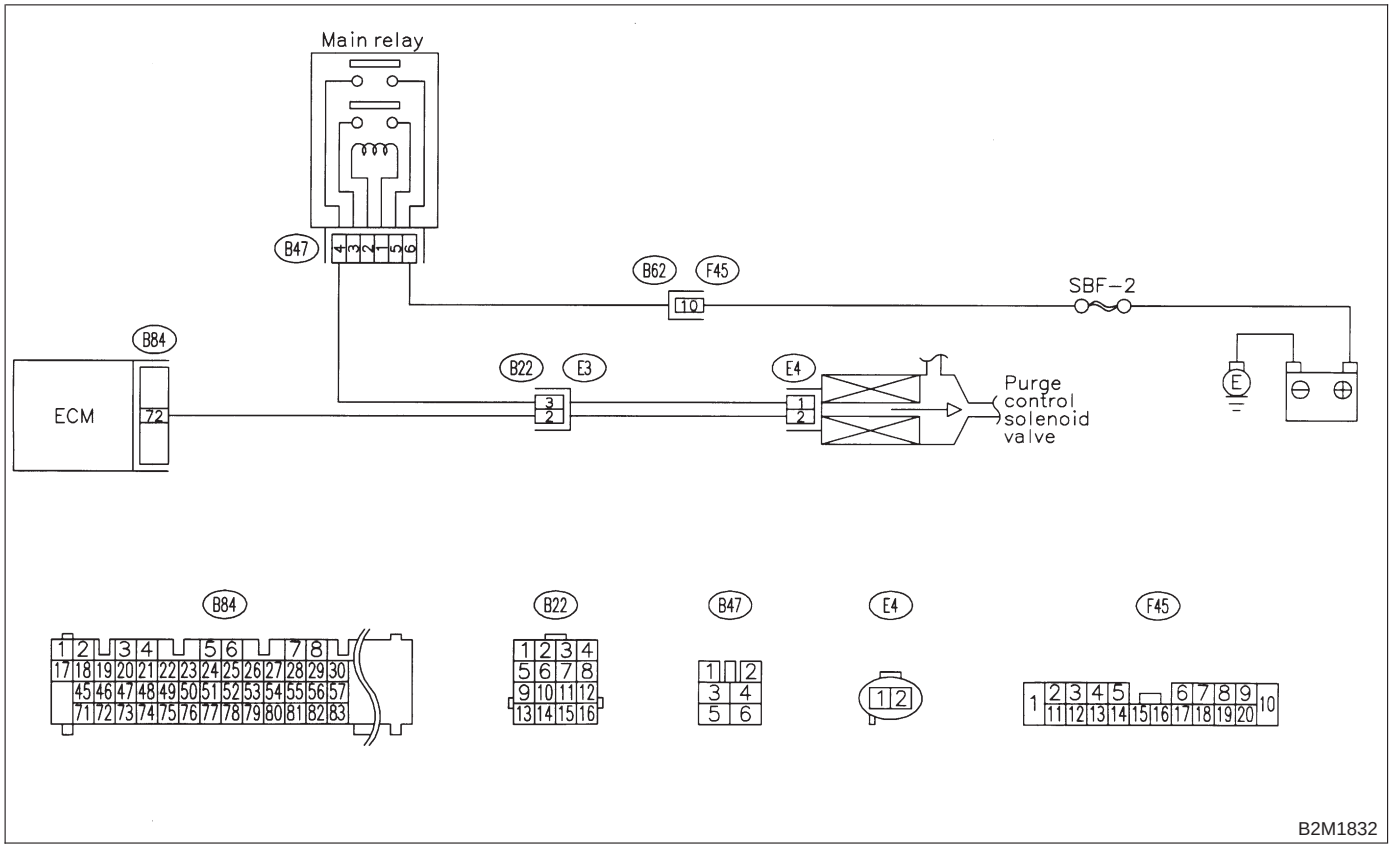
MEMO:

CR: DTC P1422 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

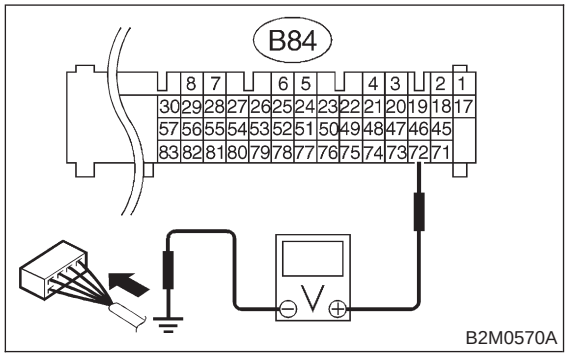
- **WIRING DIAGRAM:**



10CR1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 72 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CR3**.
NO : Go to step **10CR2**.

10CR2 : CHECK POOR CONTACT.

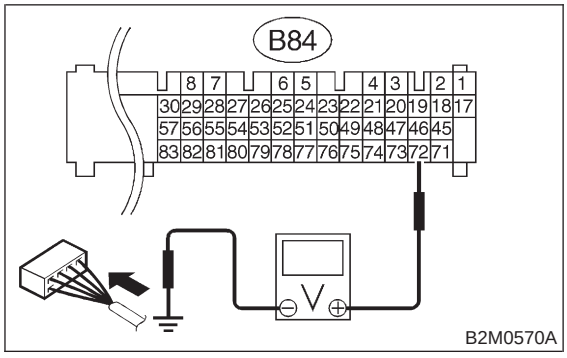
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10CR3 : CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from purge control solenoid valve.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 72 (+) — Chassis ground (−):

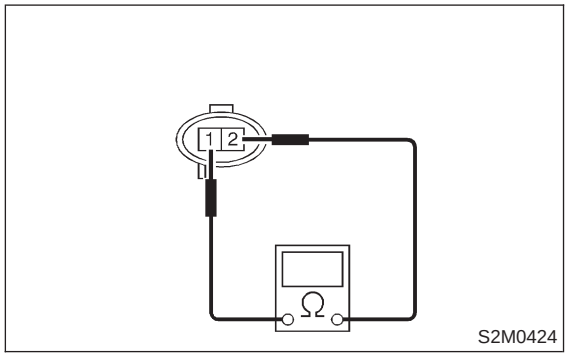


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace ECM.
NO : Go to step **10CR4**.

10CR4 : CHECK PURGE CONTROL SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Measure resistance between purge control solenoid valve terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Replace purge control solenoid valve and ECM.
NO : Go to step **10CR5**.

10CR5 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

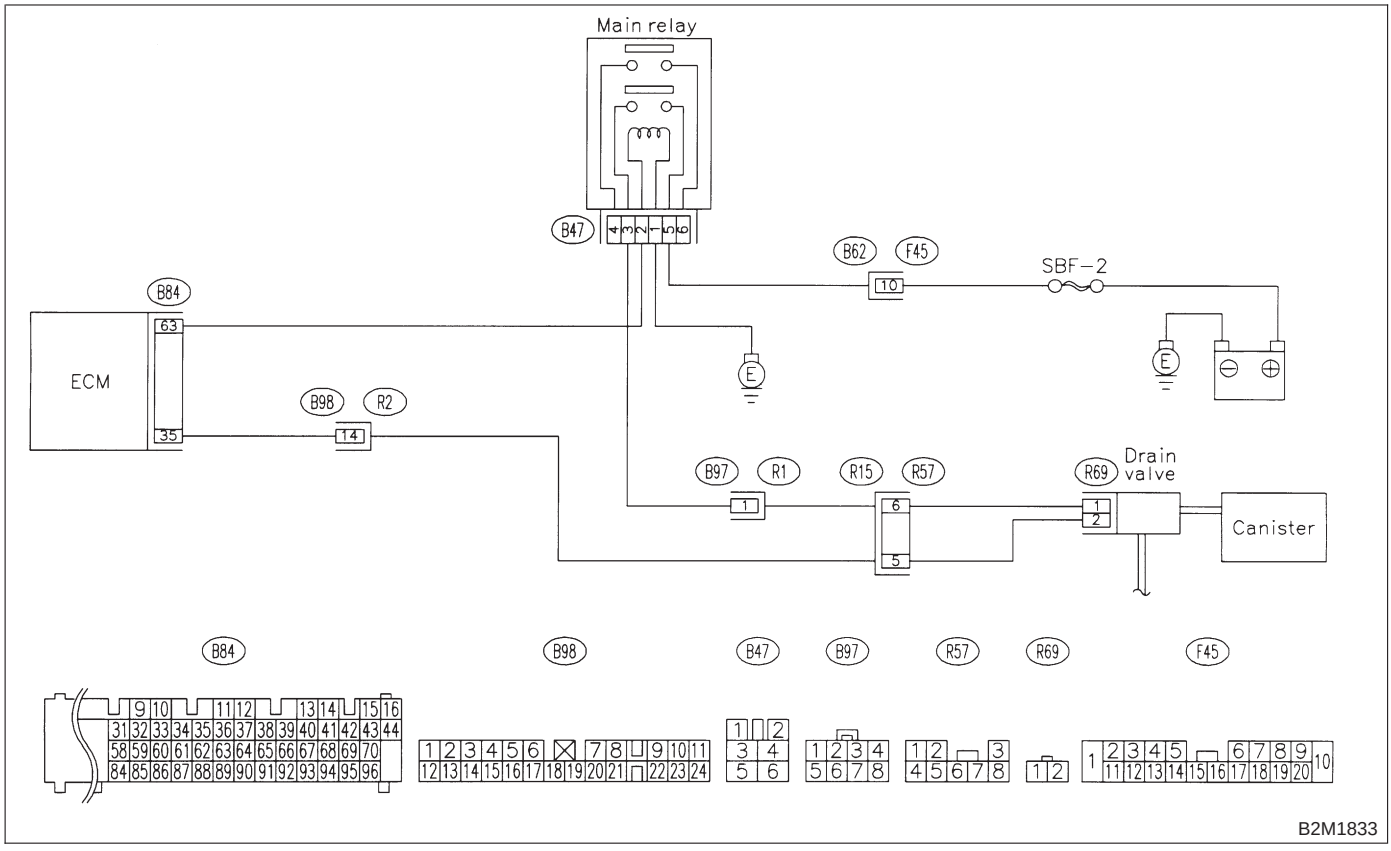
MEMO:

CS: DTC P1423 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL HIGH INPUT [2200 cc AWD EXCEPT TAIWAN SPEC. VEHICLES] —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

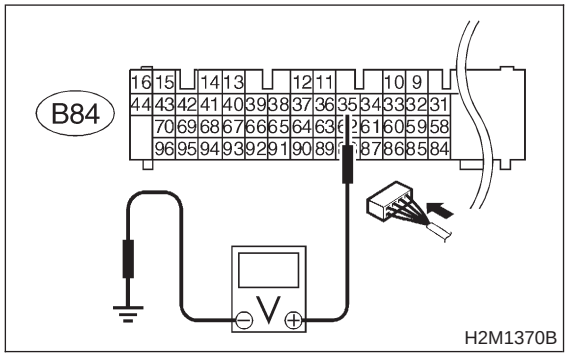
- **WIRING DIAGRAM:**



10CS1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 35 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CS3**.
NO : Go to step **10CS2**.

10CS2 : CHECK POOR CONTACT.

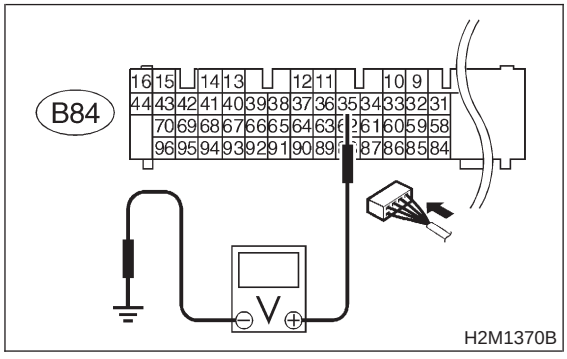
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10CS3 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from drain valve.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 35 (+) — Chassis ground (−):

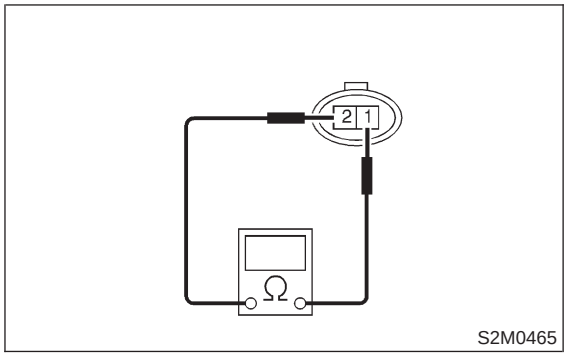


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and drain valve connector. After repair, replace ECM.
NO : Go to step **10CS4**.

10CS4 : CHECK DRAIN VALVE.

1) Turn ignition switch to OFF.
2) Measure resistance between drain valve terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Replace drain valve and ECM.
NO : Go to step **10CS5**.

10CS5 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***

YES : Repair poor contact in ECM connector.

NO : Replace ECM.

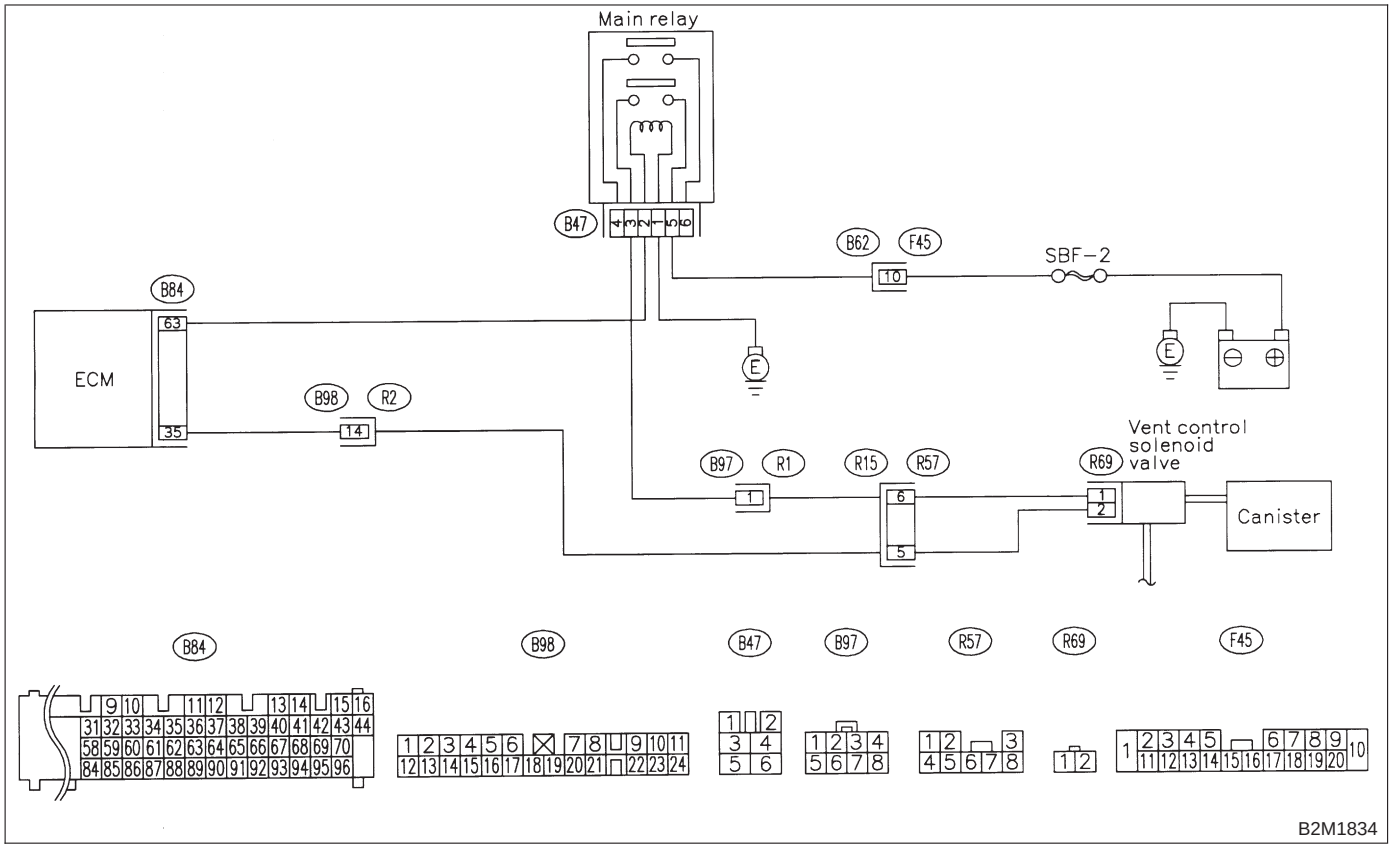
MEMO:

CT: DTC P1423 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL HIGH INPUT [2500 cc MODELS] —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

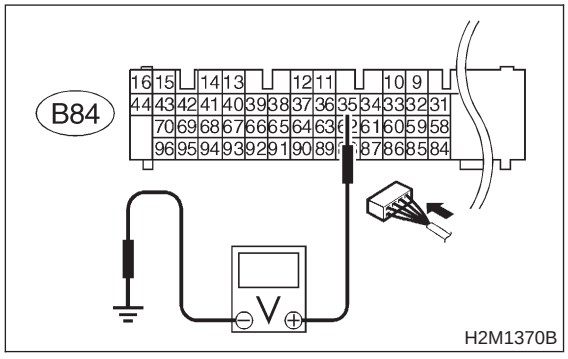
- **WIRING DIAGRAM:**



10CT1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 35 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10CT3**.
NO : Go to step **10CT2**.

10CT2 : CHECK POOR CONTACT.

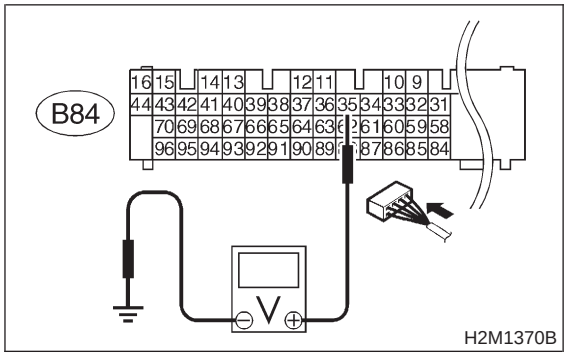
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

10CT3 : CHECK HARNESS BETWEEN VENT CONTROL SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from vent control solenoid valve.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 35 (+) — Chassis ground (−):

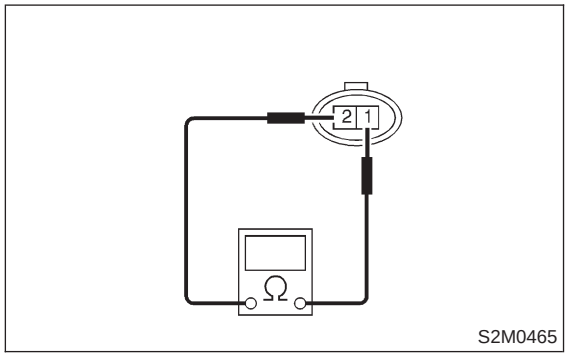


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and vent control solenoid valve connector. After repair, replace ECM.
NO : Go to step **10CT4**.

10CT4 : CHECK VENT CONTROL SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Measure resistance between vent control solenoid valve terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Replace vent control solenoid valve and ECM.
NO : Go to step **10CT5**.

10CT5 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

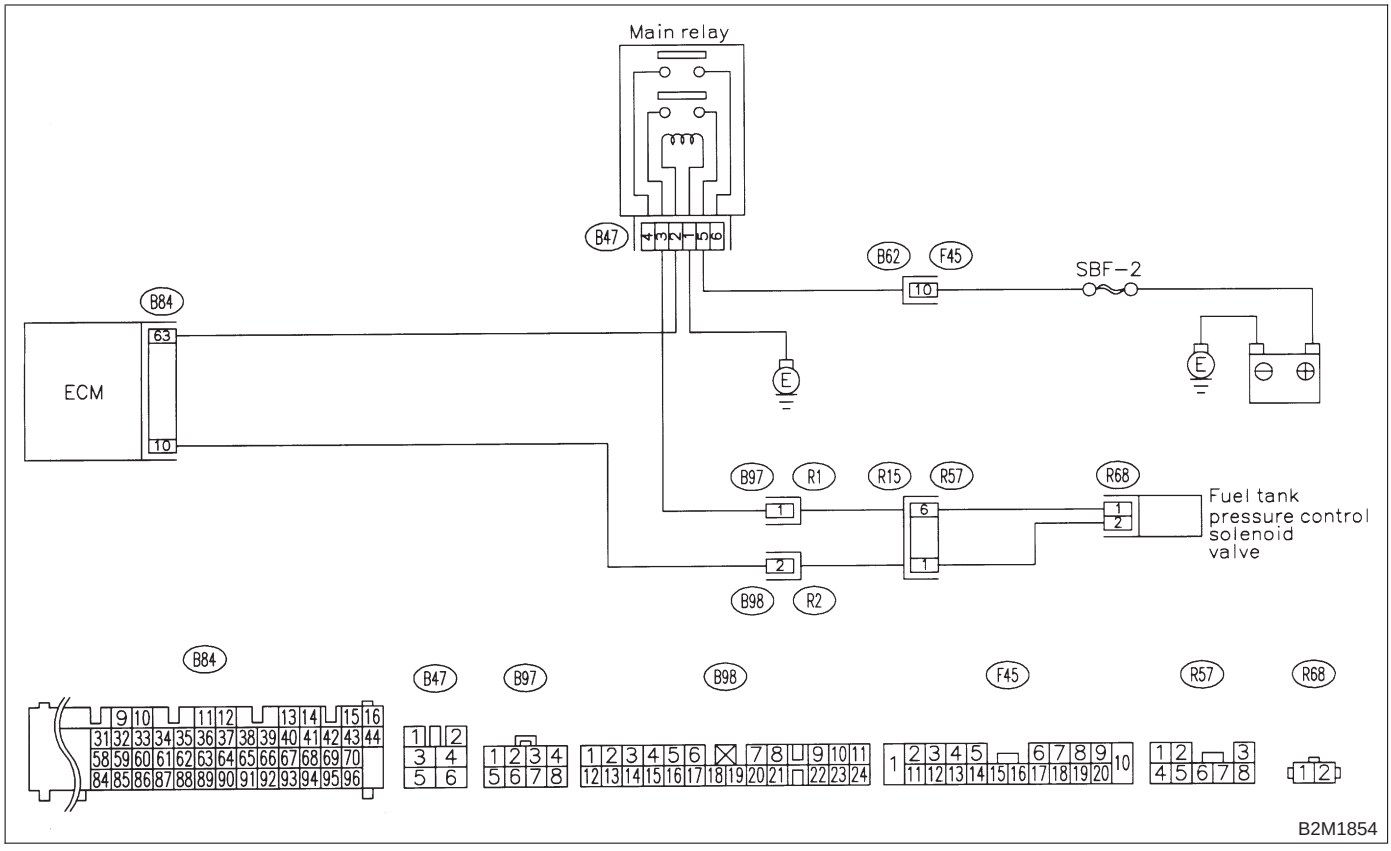
MEMO:

CU: DTC P1440 — FUEL TANK PRESSURE CONTROL SYSTEM FUNCTION PROBLEM (LOW INPUT) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

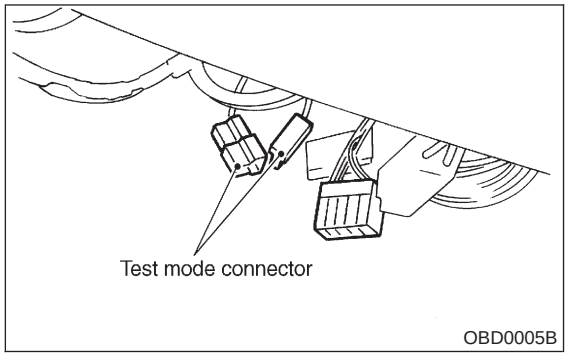
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CU1 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Connect test mode connector.



3) Turn ignition switch to ON.

NOTE:
Fuel tank pressure control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>

CHECK : ***Does fuel tank pressure control solenoid valve produce operating sound?***
YES : Go to step **10CU2**.
NO : Replace fuel tank pressure control solenoid valve.

10CU2 : CHECK FUEL FILLER CAP.

1) Turn ignition switch to OFF.
2) Open the fuel flap.

CHECK : ***Is the fuel filler cap tightened securely?***
YES : Tighten fuel filler cap securely.
NO : Go to step **10CU3**.

10CU3 : CHECK FUEL FILLER PIPE SEAL.

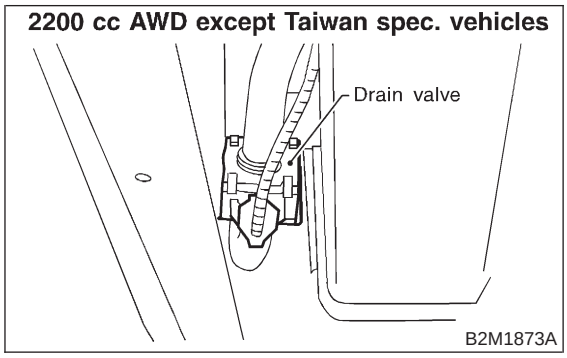
CHECK : ***Is there any damage to the seal between fuel filler cap and fuel filler pipe?***
YES : Repair or replace fuel filler cap and fuel filler pipe.
NO : Go to step **10CU4**.

10CU4 : CHECK DRAIN VALVE OR VENT CONTROL SOLENOID VALVE.

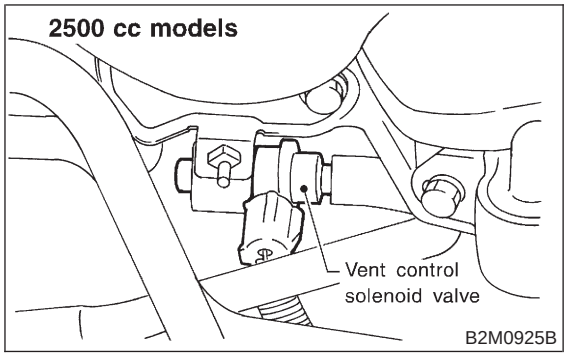
Turn ignition switch to ON.

NOTE:
Drain valve or vent control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>

2200 cc AWD except Taiwan spec. vehicles



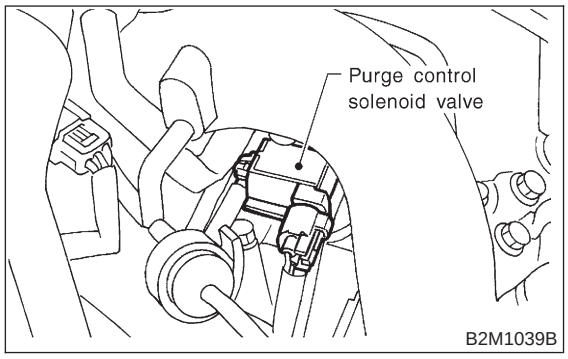
2500 cc models



CHECK : ***Does drain valve or vent control solenoid valve produce operating sound?***
YES : Go to step **10CU5**.
NO : Replace drain valve or vent control solenoid valve.

10CU5 : CHECK PURGE CONTROL SOLENOID VALVE.

NOTE:
Purge control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>



CHECK : ***Does purge control solenoid valve produce operating sound?***
YES : Go to step **10CU6**.
NO : Replace purge control solenoid valve.

10CU6 : CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

Turn ignition switch to OFF.

CHECK : ***Does fuel leak in fuel line?***
YES : Repair or replace fuel line.
NO : Go to step **10CU7**.

10CU7 : CHECK CANISTER.

CHECK : ***Is there any damage at canister?***
YES : Repair or replace canister.
NO : Go to step **10CU8**.

10CU8 : CHECK FUEL TANK.

CHECK : ***Is there any damage at fuel tank?***
YES : Repair or replace fuel tank.
NO : Go to step **10CU9**.

10CU9 : CHECK OTHER MECHANICAL TROUBLE.

CHECK : ***Are there holes, cracks or disconnections of hoses or pipes in evaporative emission control system?***
YES : Repair or replace hoses or pipes.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

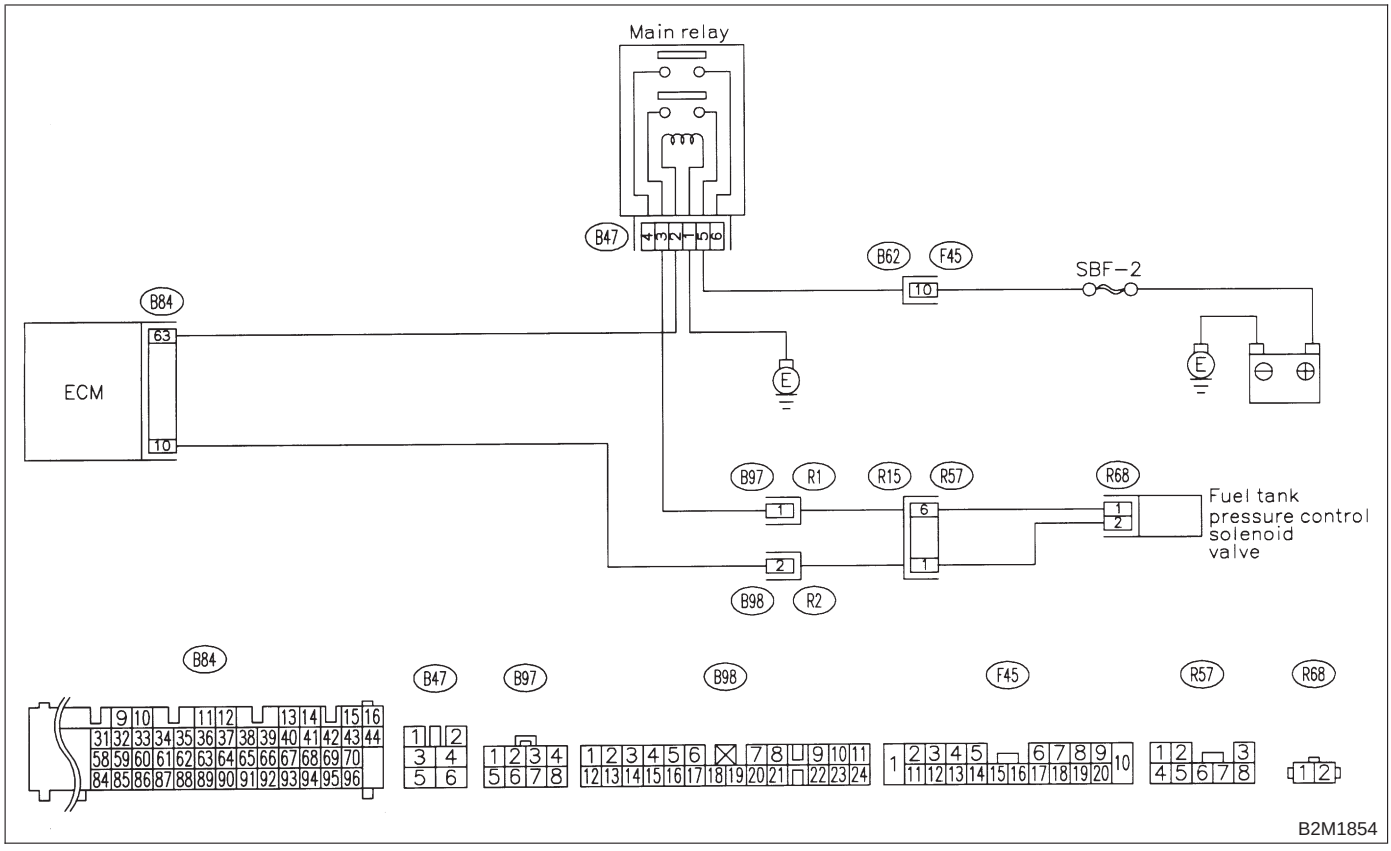
MEMO:

CV: DTC P1441 — FUEL TANK PRESSURE CONTROL SYSTEM FUNCTION PROBLEM (HIGH INPUT) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

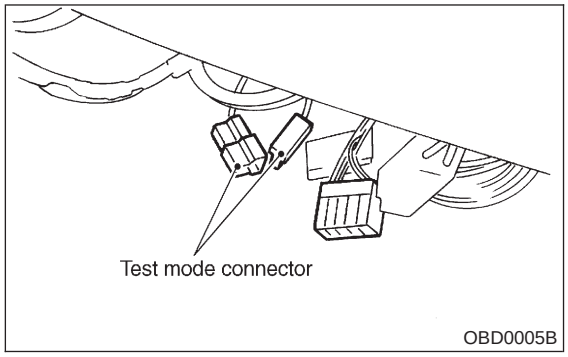
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CV1 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Connect test mode connector.



3) Turn ignition switch to ON.

NOTE:
Fuel tank pressure control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>

CHECK : ***Does fuel tank pressure control solenoid valve produce operating sound?***

YES : Go to step **10CV2**.

NO : Replace fuel tank pressure control solenoid valve.

10CV2 : CHECK FUEL FILLER CAP.

1) Turn ignition switch to OFF.
2) Open the fuel flap.

CHECK : ***Is there any damage at fuel filler cap and fuel filler pipe?***

YES : Repair or replace fuel filler cap and fuel filler pipe.

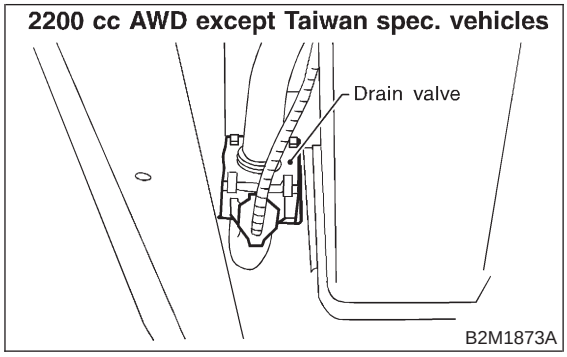
NO : Go to step **10CV3**.

10CV3 : CHECK DRAIN VALVE OR VENT CONTROL SOLENOID VALVE.

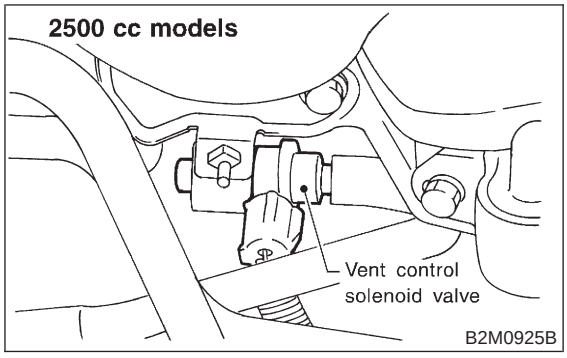
Turn ignition switch to ON.

NOTE:
Drain valve or vent control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>

2200 cc AWD except Taiwan spec. vehicles



2500 cc models



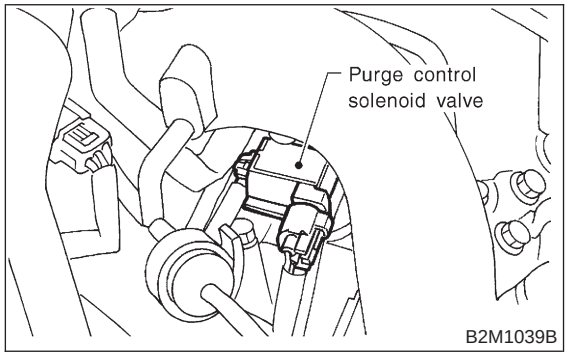
CHECK : ***Does drain valve or vent control solenoid valve produce operating sound?***

YES : Go to step **10CV4**.

NO : Replace drain valve or vent control solenoid valve.

10CV4 : CHECK PURGE CONTROL SOLENOID VALVE.

NOTE:
Purge control solenoid valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “COMPULSORY VALVE OPERATION CHECK MODE”. <Ref. to 2-7 [T3F0].>



CHECK : ***Does purge control solenoid valve produce operating sound?***
YES : Go to step **10CV5**.
NO : Replace purge control solenoid valve.

10CV5 : CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

Turn ignition switch to OFF.

CHECK : ***Is there any damage at canister?***
YES : Repair or replace canister.
NO : Go to step **10CV6**.

10CV6 : CHECK FUEL TANK.

CHECK : ***Is there any damage at fuel tank?***
YES : Repair or replace fuel tank.
NO : Go to step **10CV7**.

10CV7 : CHECK OTHER MECHANICAL TROUBLE.

CHECK : ***Is there clogging of hoses or pipes in evaporative emission control system?***
YES : Repair or replace hoses or pipes.
NO : Contact with SOA service.

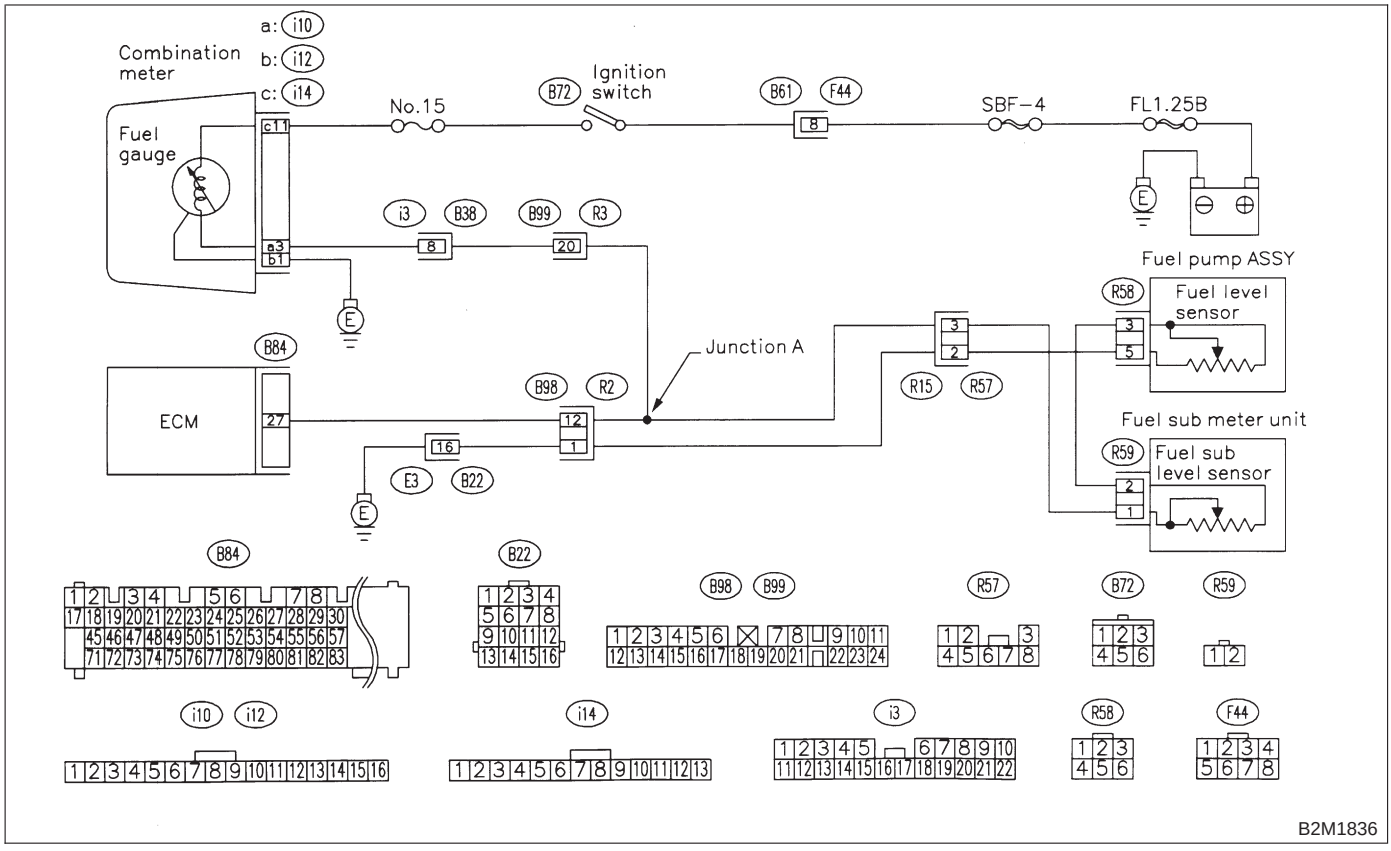
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CW: DTC P1442 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM 2 —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CW1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0461, P0462 or P0463?***

YES : Inspect DTC P0461, P0462 or P0463 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect this trouble.

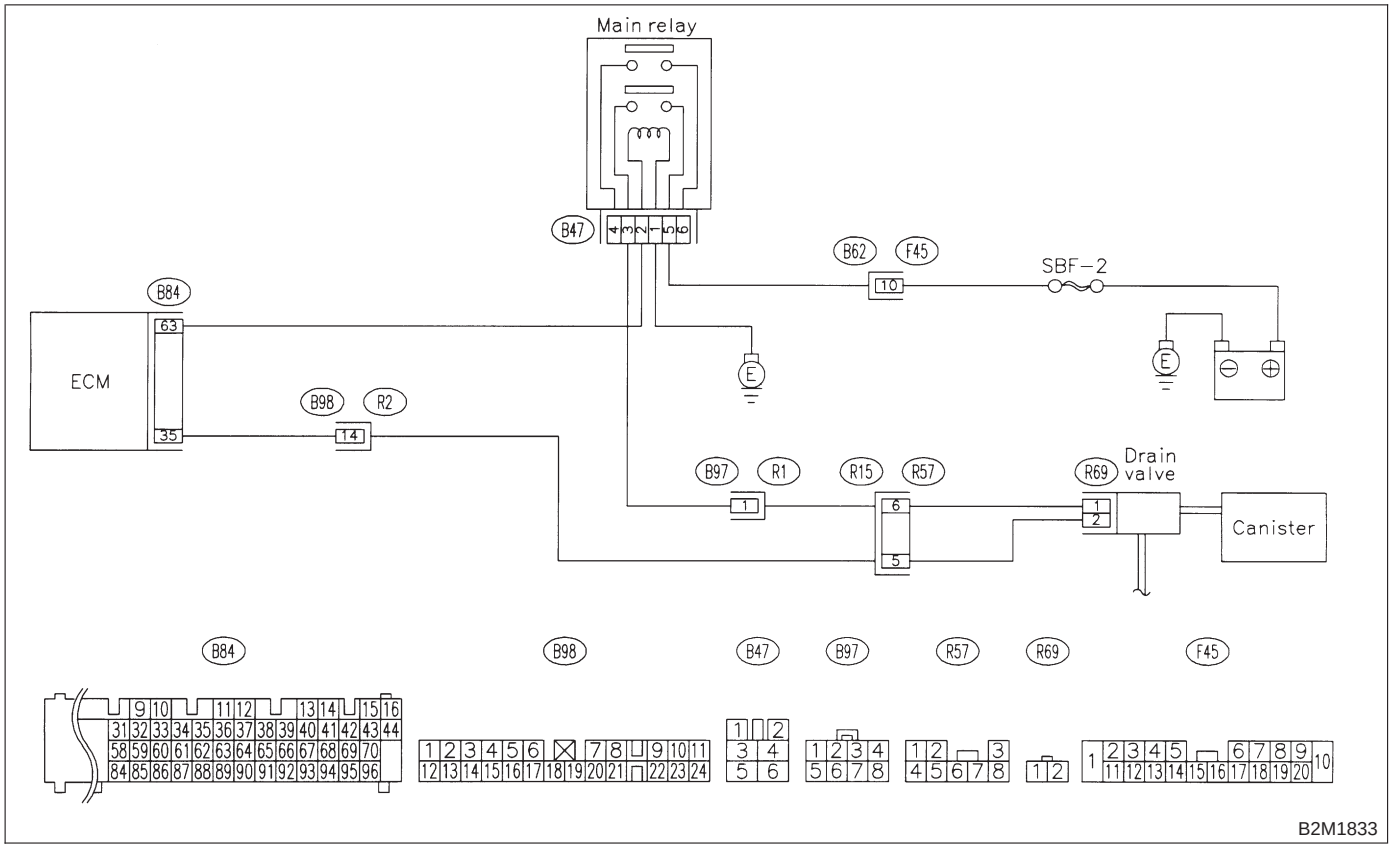
NO : Replace fuel sending unit and fuel sub meter unit.

CX: DTC P1443 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL FUNCTION PROBLEM —

- **DTC DETECTING CONDITION:**
  - Immediately after fault occurrence
- **TROUBLE SYMPTOM:**
  - Improper fuel supply

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CX1 :	CHECK ANY OTHER DTC ON DISPLAY.

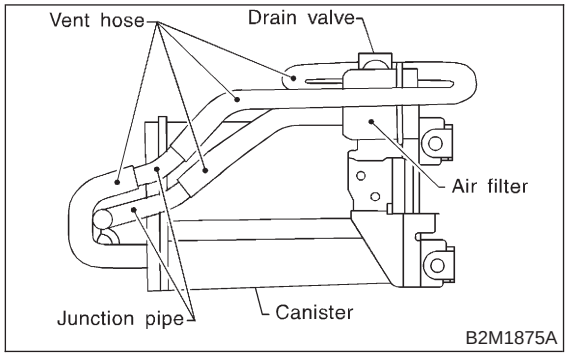
CHECK : ***Is there any other DTC on display?***

YES : Inspect the relevant DTC using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NO : Go to step **10CX2**.

10CX2 : CHECK VENT LINE HOSES.

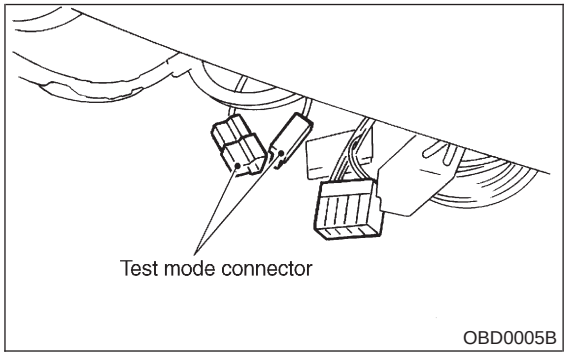
Check the following items.
- Clogging of vent hoses between canister and drain valve
- Clogging of vent hose between drain valve and air filter
- Clogging of vent hose between air filter and junction pipe
- Clogging of junction pipe
- Clogging of air filter



CHECK : ***Is there a fault in vent line?***
YES : Repair or replace the faulty part.
NO : Go to step **10CX3**.

10CX3 : CHECK DRAIN VALVE OPERATION.

1) Turn ignition switch to OFF.
2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



3) Turn ignition switch to ON.

NOTE:
Drain valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to the "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

CHECK : ***Does drain valve produce operating sound?***
YES : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

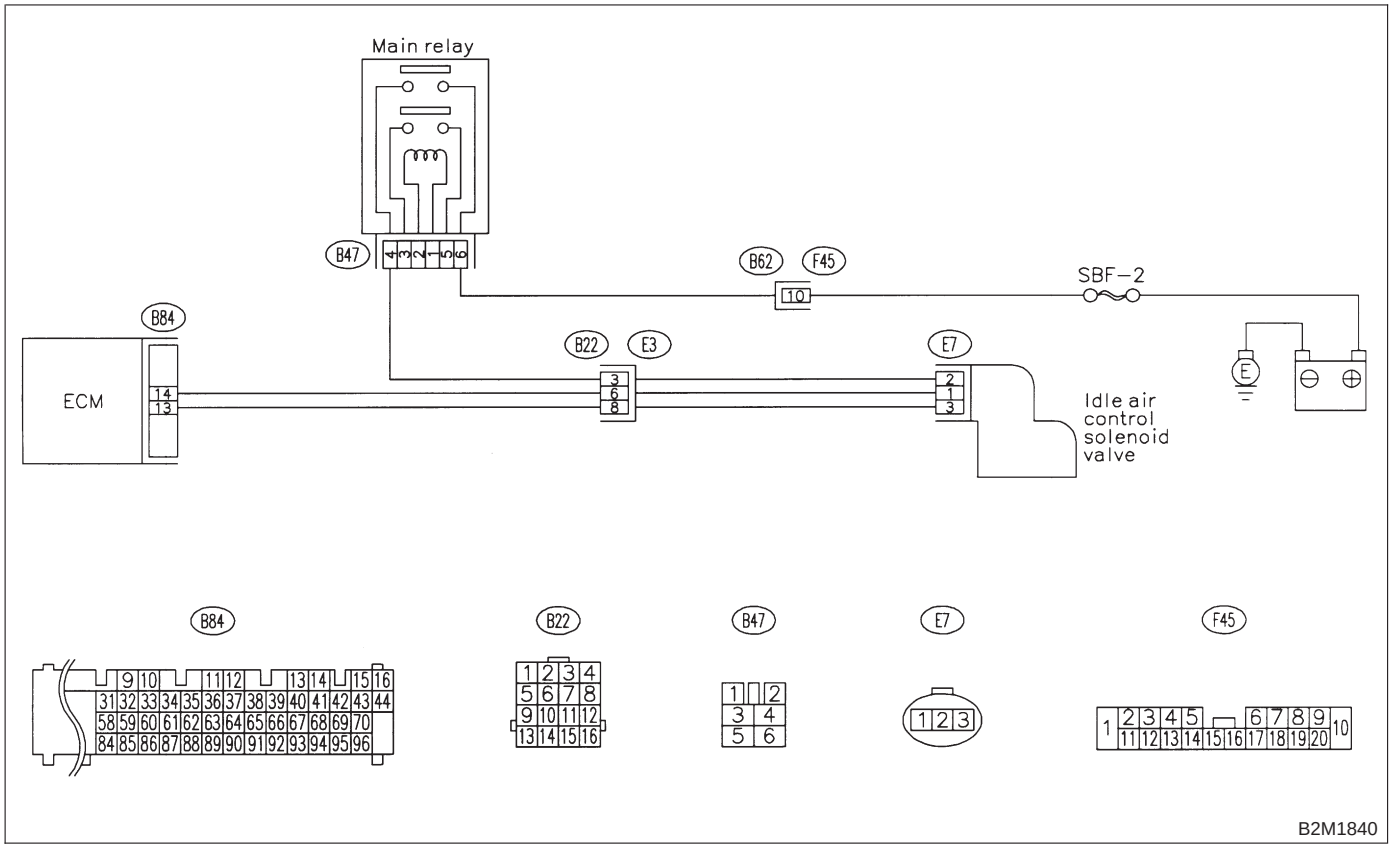
NO : Replace drain valve.

CY: DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Engine keeps running at higher revolution than specified idling revolution.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CY1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0505?***

YES : Inspect DTC P0505 using “10. Diagnostics Chart with Trouble Code for LHD Vehicles”. <Ref. to 2-7 [T1000].>

NOTE:
In this case, it is not necessary to inspect DTC P1507.

NO : Go to step **10CY2**.

10CY2 : CHECK AIR INTAKE SYSTEM.

1) Turn ignition switch to ON.
2) Start engine, and idle it.
3) Check the following items.

- Loose installation of intake manifold, idle air control solenoid valve and throttle body
- Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket
- Loose connections and cracks of idle air control solenoid valve by-pass hoses
- Disconnections of vacuum hoses

CHECK : ***Is there a fault in air intake system?***

YES : Repair air suction and leaks.

NO : Replace idle air control solenoid valve.

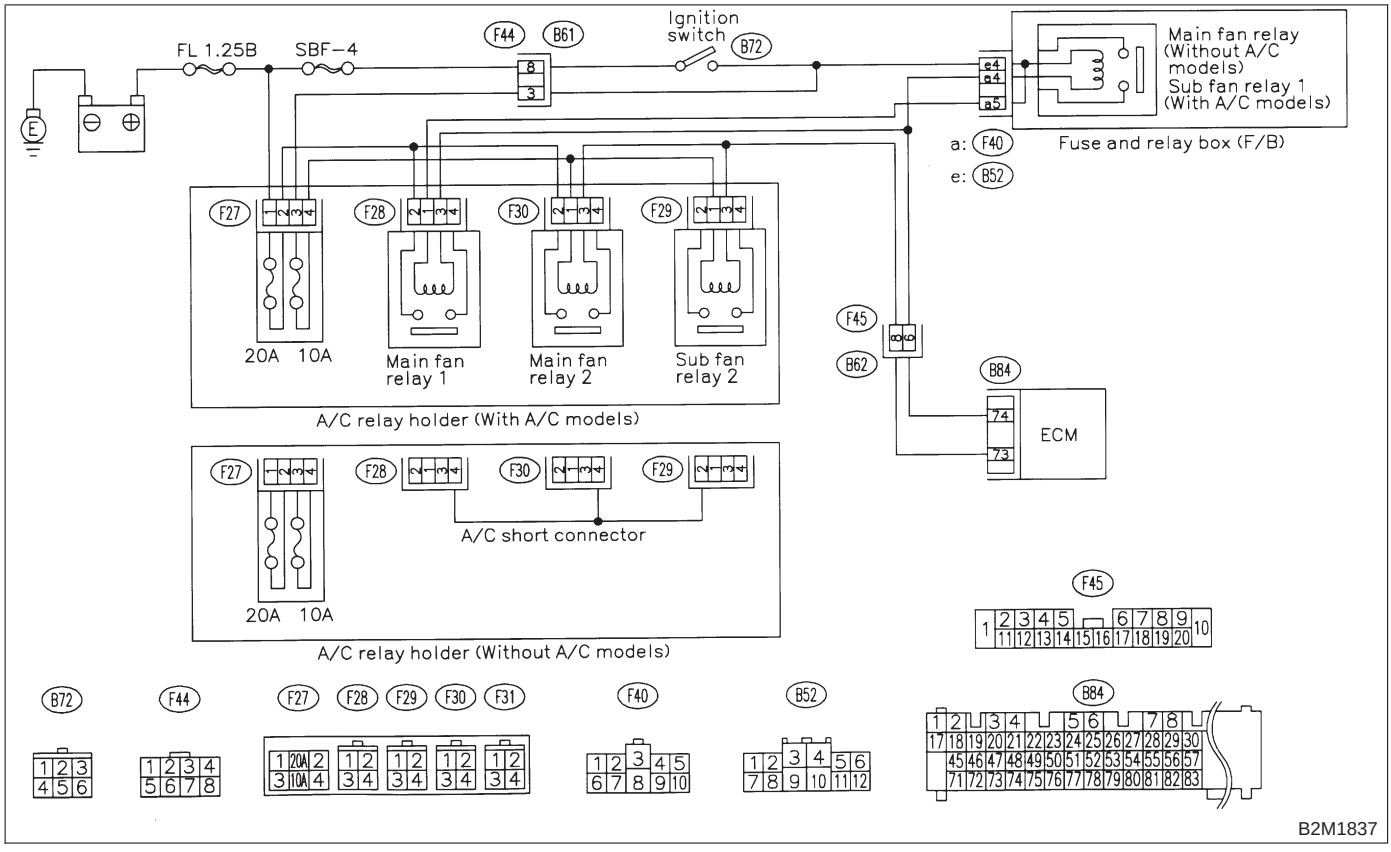
MEMO:

CZ: DTC P1520 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Radiator fan does not operate properly.
  - Overheating

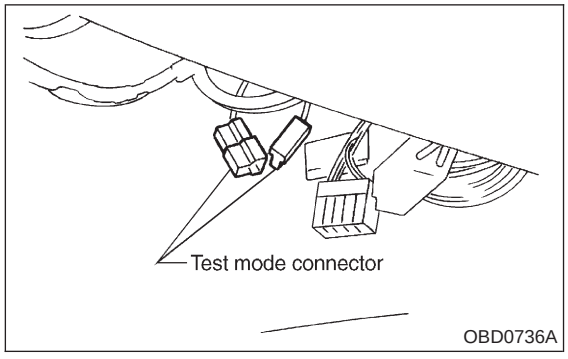
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODE. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10CZ1 : CHECK OUTPUT SIGNAL FROM ECM.

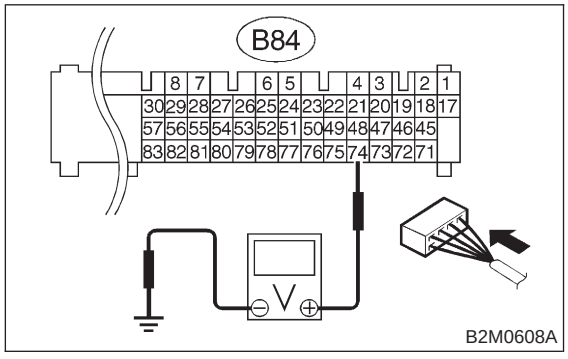
1) Turn ignition switch to OFF.
2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

NOTE:
Radiator fan relay operation check can be executed using Subaru Select Monitor. For procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

Connector & terminal
(B84) No. 74 (+) — Chassis ground:

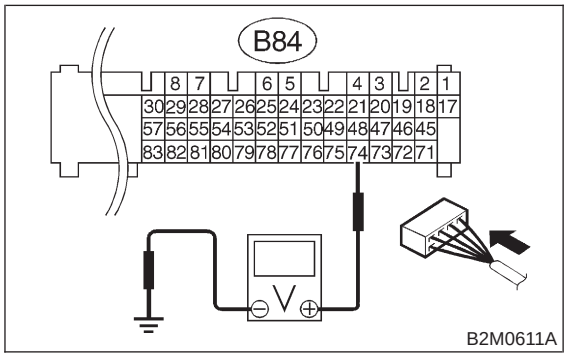


CHECK : ***Does voltage change between 0 and 10 volts?***
YES : Go to step **10CZ2**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.

10CZ2 : CHECK SHORT CIRCUIT IN RADIATOR FAN RELAY 1 CONTROL CIRCUIT.

1) Turn ignition switch to OFF.
2) Remove main fan relay 1 and sub fan relay 1. (with A/C models)
Remove main fan relay. (without A/C models)
3) Disconnect test mode connector.
4) Turn ignition switch to ON.
5) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 74 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in radiator fan relay 1 control circuit. After repair, replace ECM.
NO : Go to step **10CZ3**.

10CZ3 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

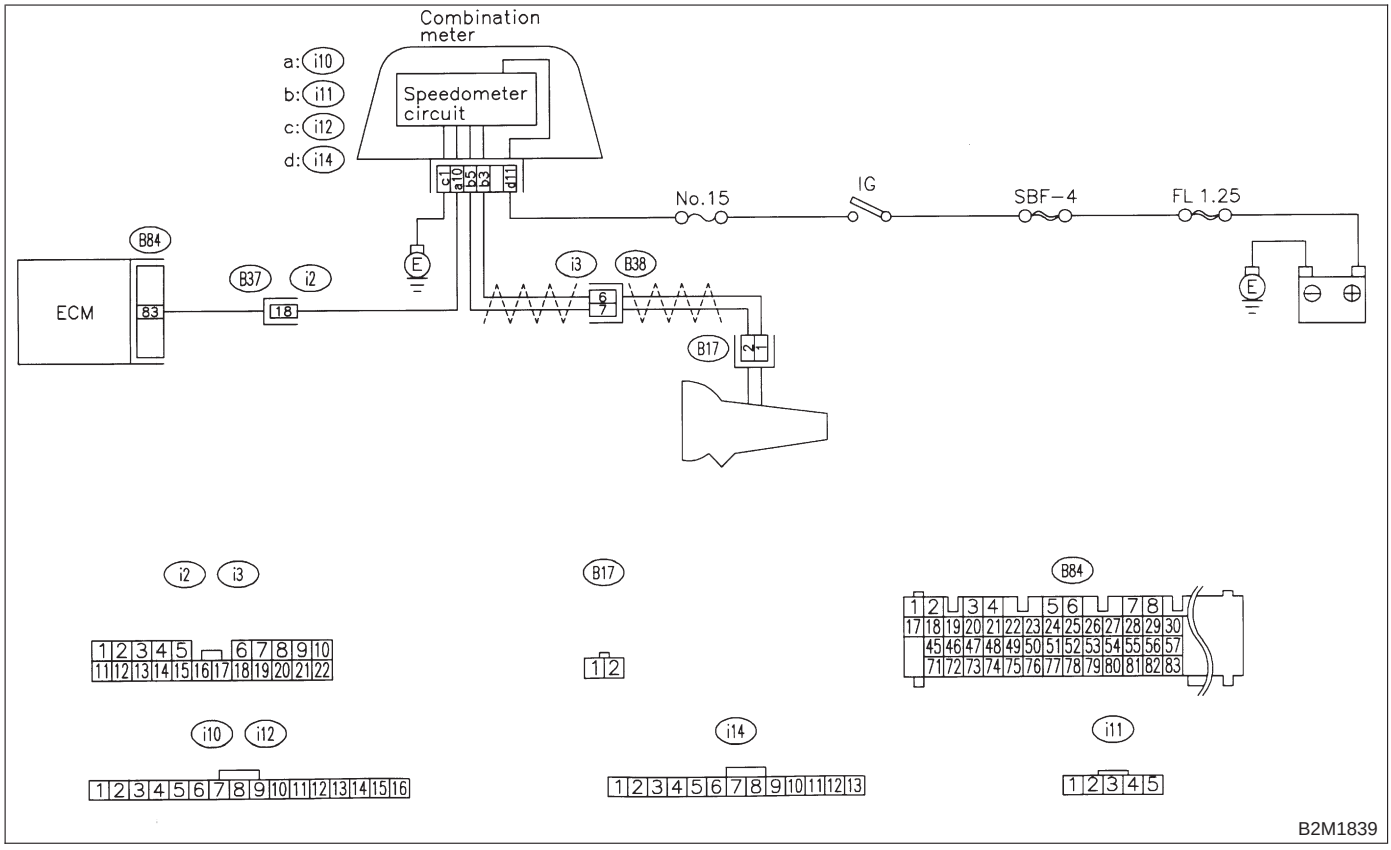
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

DA: DTC P1540 — VEHICLE SPEED SENSOR MALFUNCTION 2 —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10DA1 : CHECK SPEEDOMETER OPERATION IN COMBINATION METER.

CHECK : ***Does speedometer operate normally?***

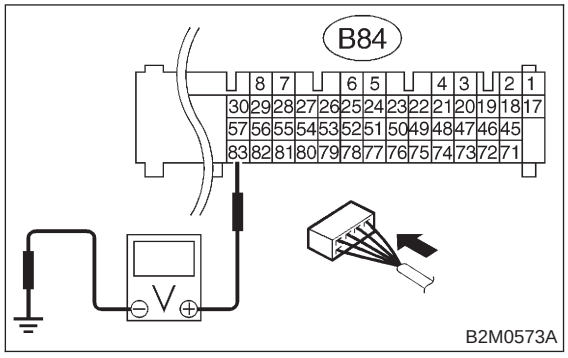
YES : Go to step **10DA2**.

NO : Check speedometer and vehicle speed sensor <Ref. to 6-2b [T3A0].>.

10DA2 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from TCM.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 83 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 2 V?***
YES : Repair harness and connector.

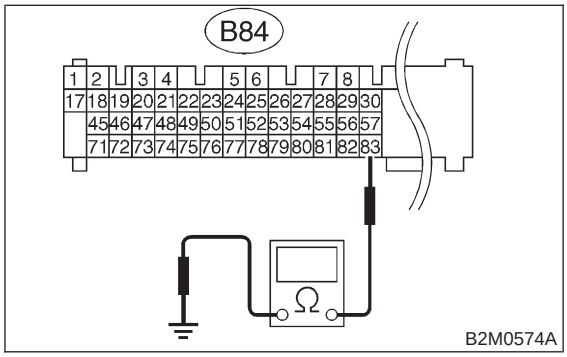
NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and combination meter connector
- Poor contact in ECM connector
- Poor contact in combination meter connector
- Poor contact in coupling connector (B37)

NO : Go to step **10DA3**.

10DA3 : CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal
(B84) No. 83 — Chassis ground:



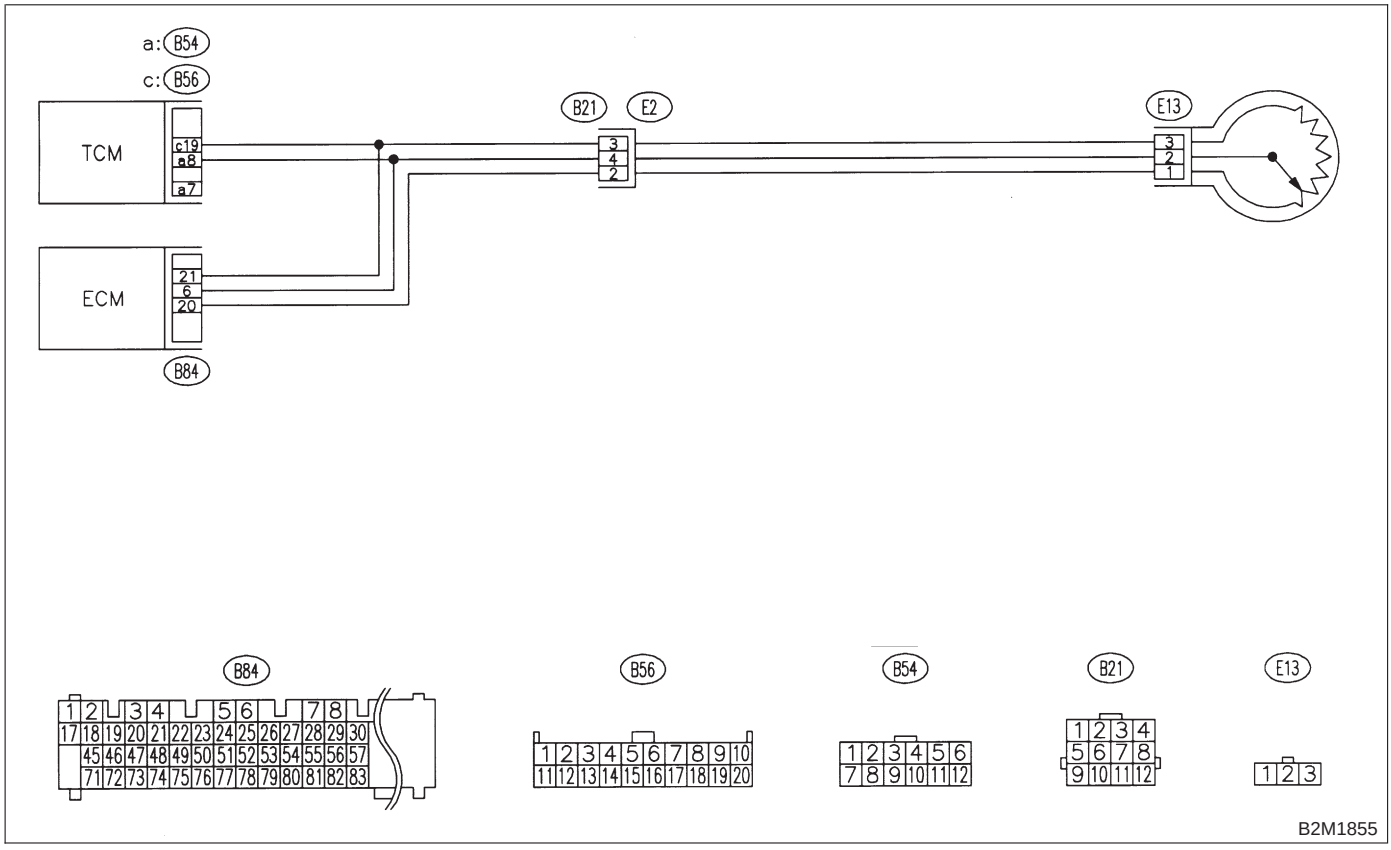
CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and combination meter connector.
NO : Repair poor contact in ECM connector.

DB: DTC P1700 — THROTTLE POSITION SENSOR CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
  - Shift point too high or too low; engine brake not effected in “3” range; excessive shift shock; excessive tight corner “braking”

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10DB1 : CHECK DTC P1700 ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P1700?***

YES : Check throttle position sensor circuit. <Ref. to 3-2 [T8M0].>

NO : It is not necessary to inspect DTC P1700.

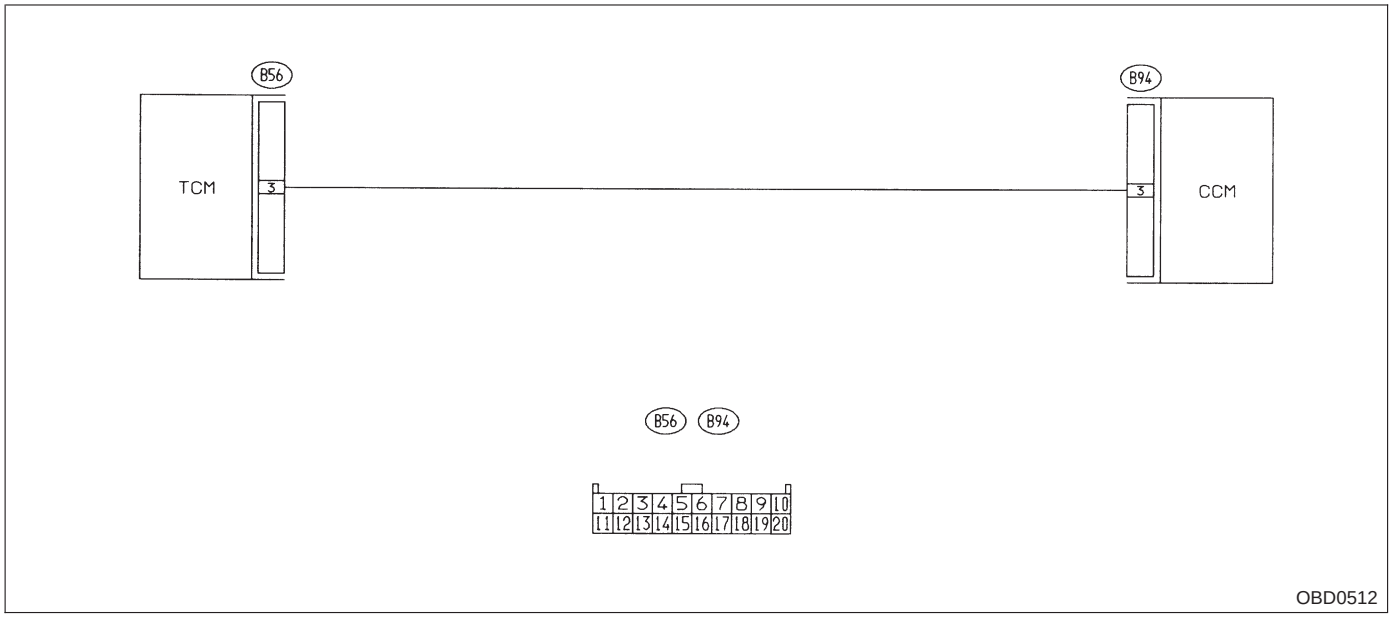
MEMO:

DC: DTC P1701 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

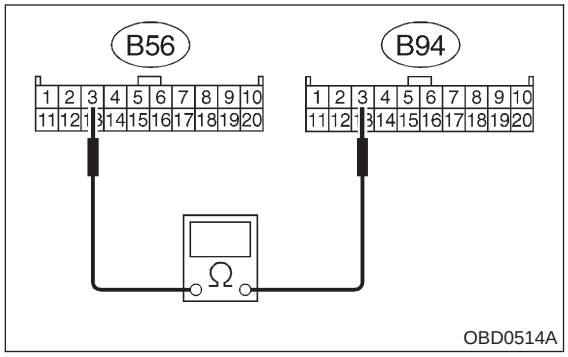
- **WIRING DIAGRAM:**



10DC1 : CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and CCM.
3) Measure resistance of harness between TCM and CCM connector.

Connector & terminal
(B56) No. 3 — (B94) No. 3:

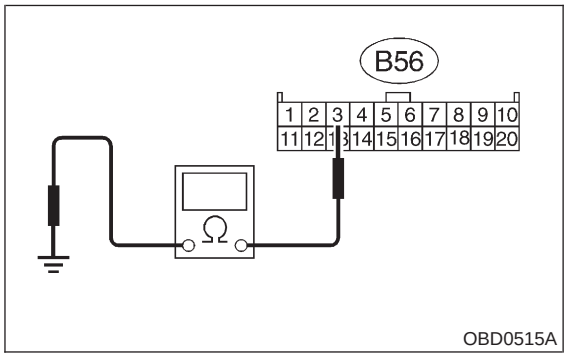


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **10DC2**.
NO : Repair open circuit in harness between TCM and CCM connector.

10DC2 : CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B56) No. 3 — Chassis ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair short circuit in harness between TCM and CCM connector.
NO : Go to step **10DC3**.

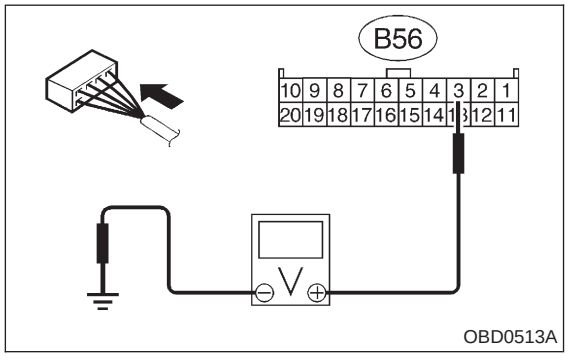
10DC3 : CHECK INPUT SIGNAL FOR TCM.

1) Connect connector to TCM and CCM.
2) Lift-up the vehicle or set the vehicle on free rollers.

CAUTION:
On AWD models, raise all wheels off ground.

3) Start the engine.
4) Cruise control main switch to ON.
5) TCS OFF switch to ON. (with TCS models only)
6) Move selector lever to “D” and slowly increase vehicle speed to 50 km/h (31 MPH).
7) Cruise control set switch to ON.
8) Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 3 (+) — Chassis ground (−):



CHECK : ***Is the resistance less than 1 V?***
YES : Go to step **10DC4**.
NO : Check cruise control set circuit. <Ref. to 6-2a [T7A0].>

10DC4 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

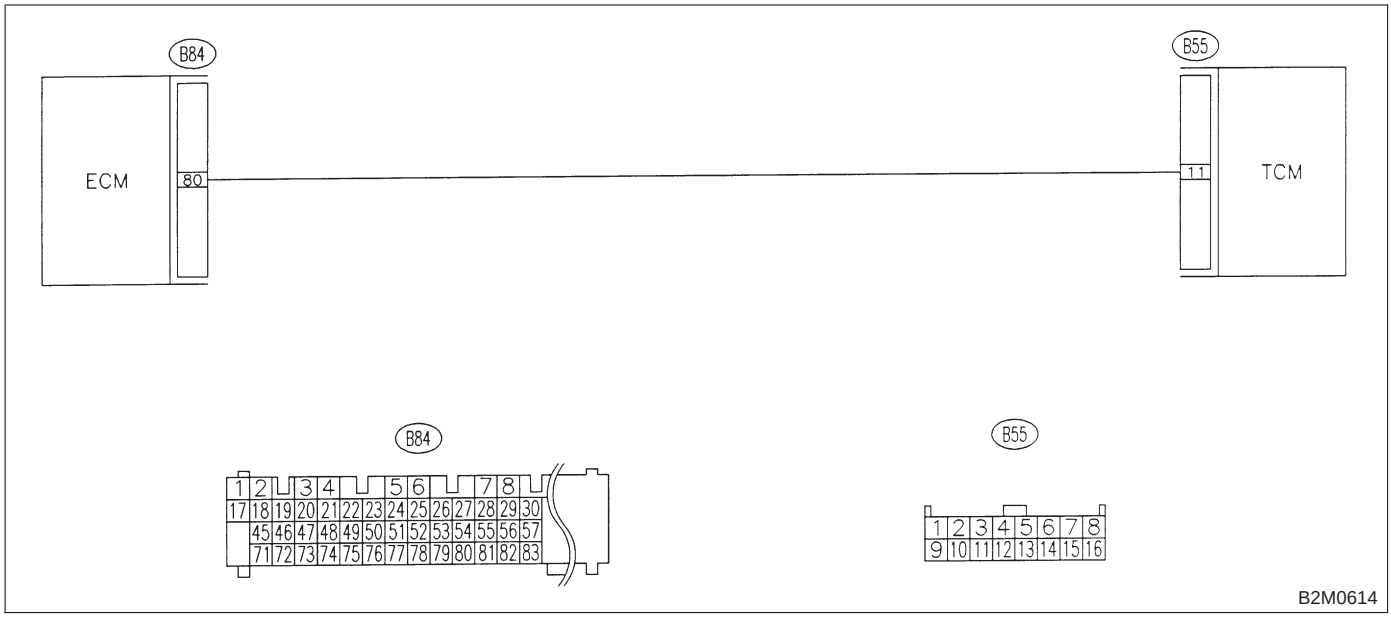
CHECK : ***Is there poor contact in TCM connector?***
YES : Repair poor contact in TCM connector.
NO : Replace TCM.

DD: DTC P1702 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



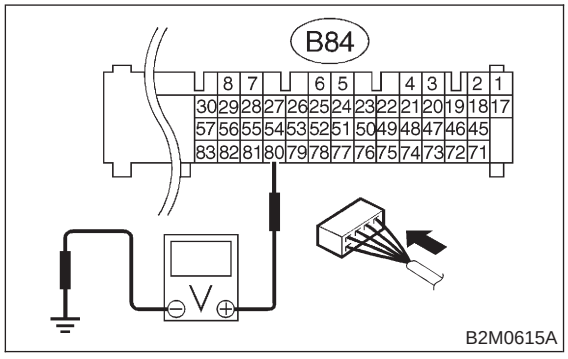
10DD1 : CHECK TRANSMISSION TYPE.

CHECK : ***Is transmission type AT?***
YES : Go to step **10DD2**.
NO : Check AT/MT identification circuit. <Ref. to 2-7 [T10DG0].>

10DD2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 80 (+) — Chassis ground (−):



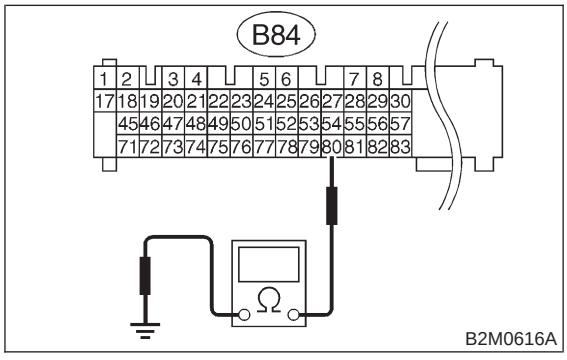
CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10DD3**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

NOTE:
In this case, repair the following:
- Poor contact in ECM connector
- Poor contact in TCM connector

10DD3 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM and TCM.
3) Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B84) No. 80 — Chassis ground:

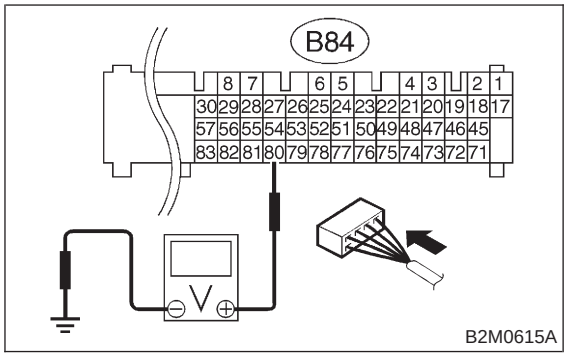


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and TCM connector.
NO : Go to step **10DD4**.

10DD4 : CHECK OUTPUT SIGNAL FOR ECM.

1) Connect connector to ECM.
2) Turn ignition switch to ON.
3) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 80 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 5 V?***
YES : Replace TCM.
NO : Contact SOA service.

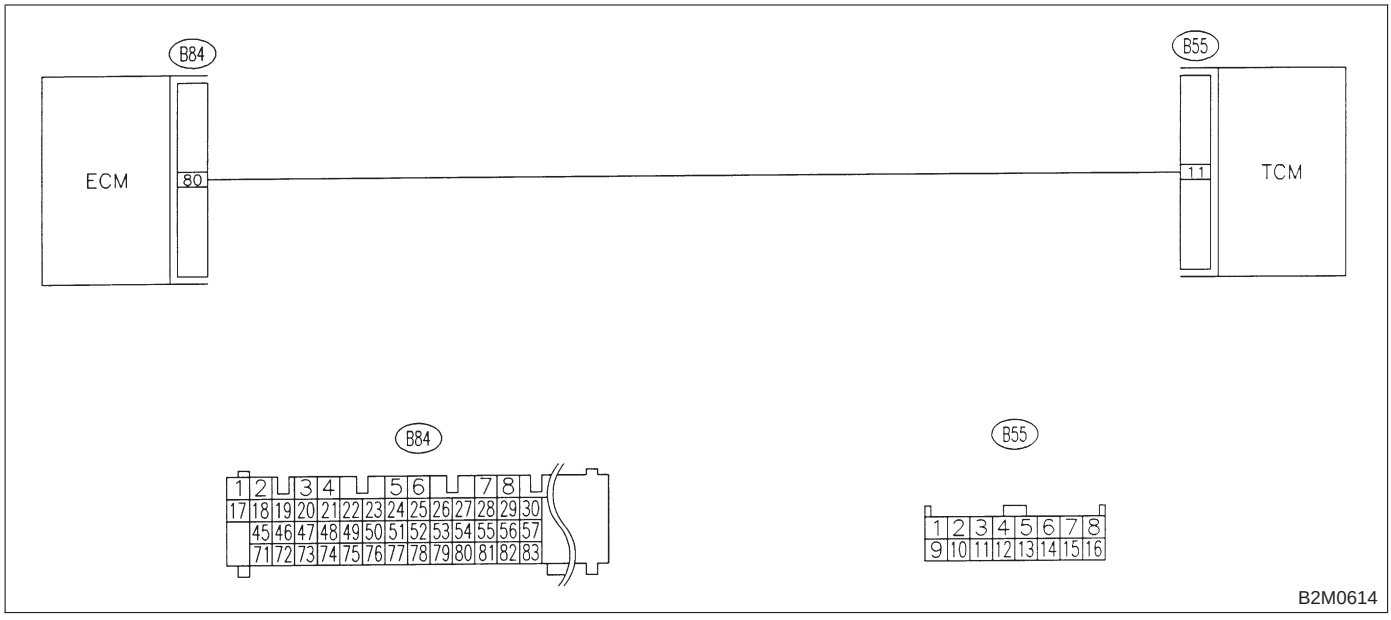
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DE: DTC P1722 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



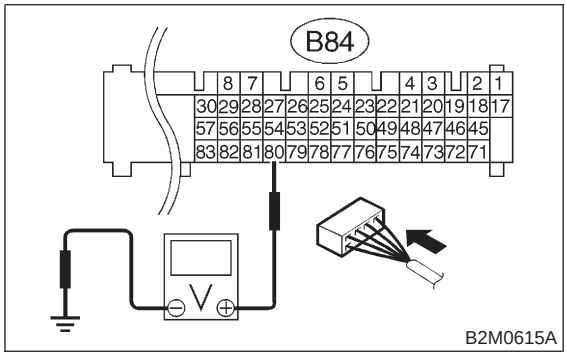
10DE1 : CHECK TRANSMISSION TYPE.

CHECK : ***Is transmission type AT?***
YES : Go to step **10DE2**.
NO : Check AT/MT identification circuit. <Ref. to 2-7 [T10DG0].>

10DE2 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 80 (+) — Chassis ground (−):

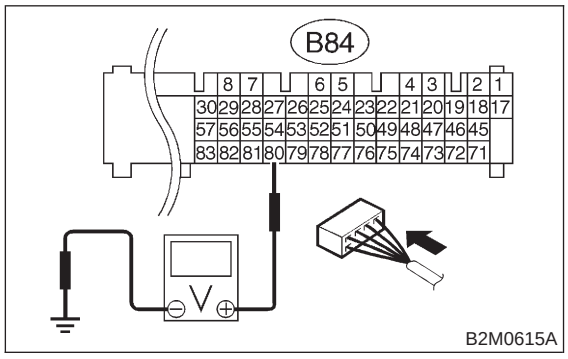


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM.
NO : Go to step **10DE3**.

10DE3 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 80 (+) — Chassis ground (−):

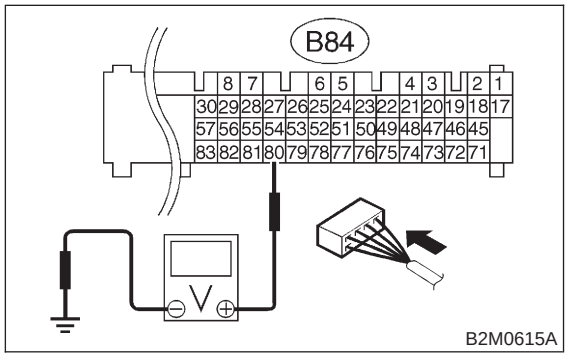


CHECK : ***Is the voltage more than 4 V?***
YES : Go to step **10DE6**.
NO : Go to step **10DE4**.

10DE4 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 80 (+) — Chassis ground (−):

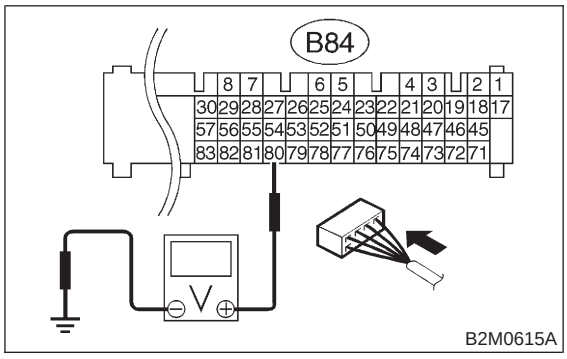


CHECK : ***Is the voltage less than 1 V?***
YES : Repair poor contact in ECM connector.
NO : Go to step **10DE5**.

10DE5 : CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 80 (+) — Chassis ground (−):



CHECK : ***Does the voltage change from 1 V to 4 V while monitoring the value with voltage meter?***
YES : Even if MIL lights up, the circuit has returned to a normal condition at this time.

NOTE:
In this case, repair the following:
- Poor contact in ECM connector
- Poor contact in TCM connector

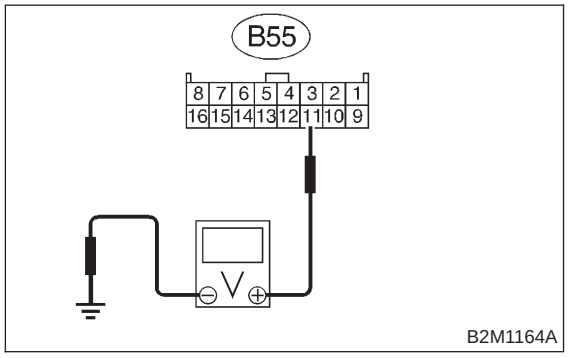
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

10DE6 : CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 11 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 4 V?***
YES : Go to step **10DE7**.
NO : Repair open circuit in harness between ECM and TCM connector.

10DE7 : CHECK POOR CONTACT.

Check poor contact in TCM connector. <Ref. to FOREWORD [T3C1].>

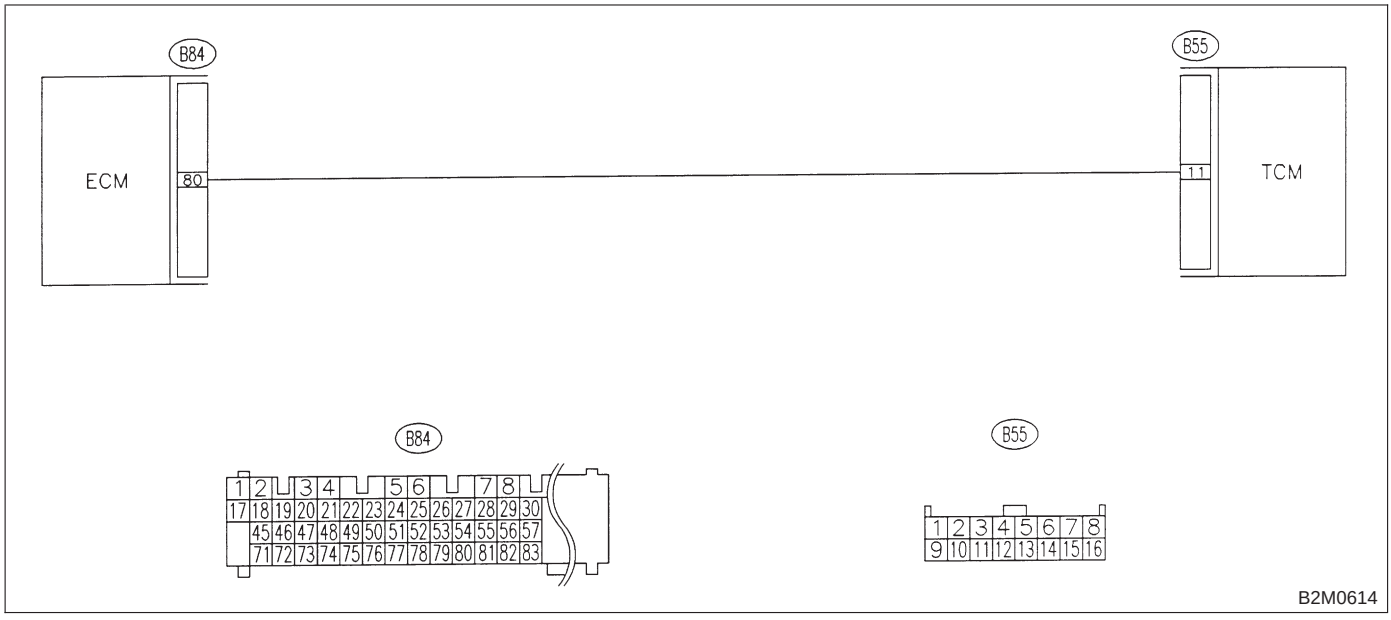
CHECK : ***Is there poor contact in TCM connector?***
YES : Repair poor contact in TCM connector.
NO : Check TCM power supply line and grounding line.

DF: DTC P1742 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



10DF1 : CHECK TRANSMISSION TYPE.

CHECK : ***Is transmission type AT?***
YES : Go to step **10DF2**.
NO : Check AT/MT identification circuit. <Ref. to 2-7 [T10DG0].>

10DF2 : CHECK DRIVING CONDITION.

1) Start and warm-up the engine until the radiator fan makes one complete rotation.
2) Drive the vehicle.

CHECK : ***Is AT shift control functioning properly?***
YES : Go to step **10DF3**.
NO : Replace TCM.

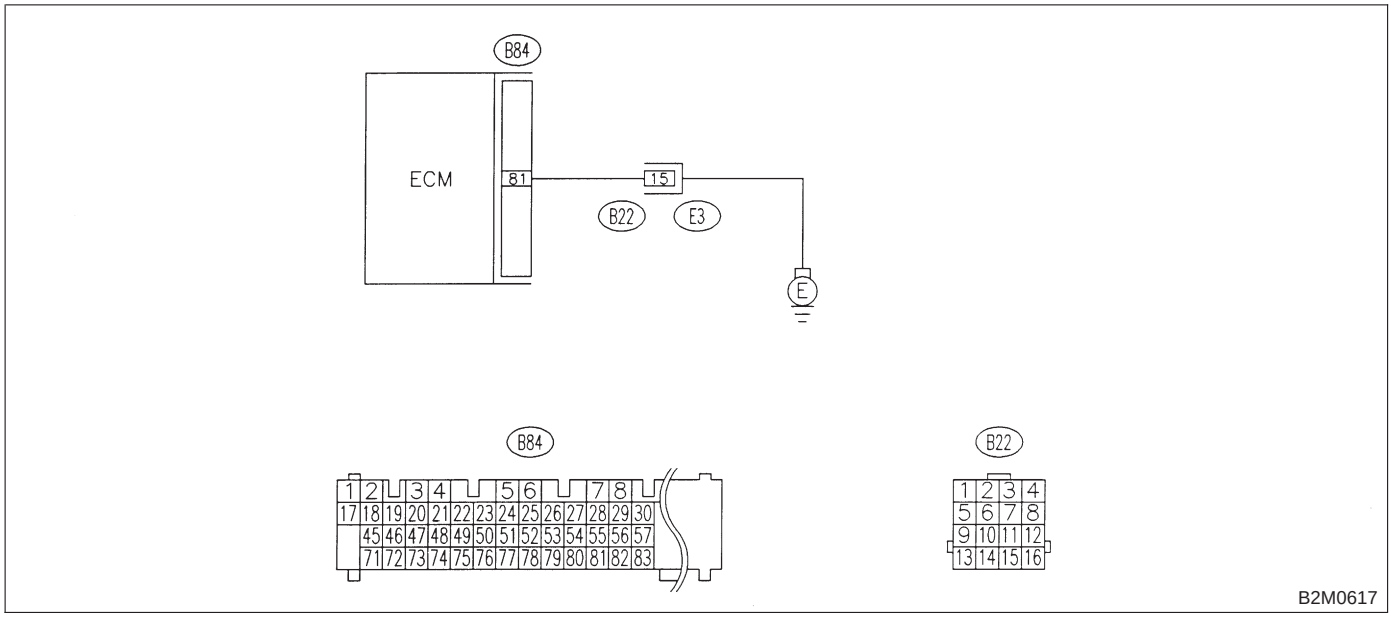
10DF3 : CHECK ACCESSORY.

CHECK : ***Are car phone and/or CB installed on vehicle?***
YES : Repair grounding line of car phone or CB system.
NO : Replace TCM.

DG: — AT/MT IDENTIFICATION CIRCUIT MALFUNCTION [MT VEHICLES] —

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

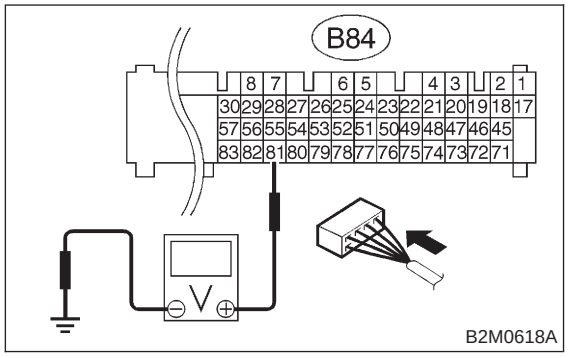
- **WIRING DIAGRAM:**



10DG1 : CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 81 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 2 V?***
YES : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM connector and engine grounding terminal
- Poor contact in engine grounding terminal
- Poor contact in coupling connector (B22)

NO : Go to step **10DG2**.

10DG2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11. Diagnostic Chart with Trouble Code for RHD Vehicles

A: DIAGNOSTIC TROUBLE CODE (DTC) LIST

DTC No.	Item	Index
P0101	Mass air flow sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T11B0].>
P0102	Mass air flow sensor circuit low input	<Ref. to 2-7 [T11C0].>
P0103	Mass air flow sensor circuit high input	<Ref. to 2-7 [T11D0].>
P0106	Pressure sensor circuit range/performance problem	<Ref. to 2-7 [T11E0].>
P0107	Pressure sensor circuit low input	<Ref. to 2-7 [T11F0].>
P0108	Pressure sensor circuit high input	<Ref. to 2-7 [T11G0].>
P0117	Engine coolant temperature sensor circuit low input	<Ref. to 2-7 [T11H0].>
P0118	Engine coolant temperature sensor circuit high input	<Ref. to 2-7 [T11I0].>
P0121	Throttle position sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T11J0].>
P0122	Throttle position sensor circuit low input	<Ref. to 2-7 [T11K0].>
P0123	Throttle position sensor circuit high input	<Ref. to 2-7 [T11L0].>
P0125	Insufficient coolant temperature for closed loop fuel control	<Ref. to 2-7 [T11M0].>
P0130	Front oxygen sensor circuit malfunction	<Ref. to 2-7 [T11N0].>
P0133	Front oxygen sensor circuit slow response	<Ref. to 2-7 [T11O0].>
P0135	Front oxygen sensor heater circuit malfunction	<Ref. to 2-7 [T11P0].>
P0136	Rear oxygen sensor circuit malfunction	<Ref. to 2-7 [T11Q0].>
P0139	Rear oxygen sensor circuit slow response	<Ref. to 2-7 [T11R0].>
P0141	Rear oxygen sensor heater circuit malfunction	<Ref. to 2-7 [T11S0].>
P0170	Fuel trim malfunction	<Ref. to 2-7 [T11T0].>
P0181	Fuel temperature sensor A circuit range/performance problem	<Ref. to 2-7 [T11U0].>
P0182	Fuel temperature sensor A circuit low input	<Ref. to 2-7 [T11V0].>
P0183	Fuel temperature sensor A circuit high input	<Ref. to 2-7 [T11W0].>
P0261	Fuel injector circuit low input - #1	<Ref. to 2-7 [T11X0].>
P0262	Fuel injector circuit high input - #1	<Ref. to 2-7 [T11AB0].>
P0264	Fuel injector circuit low input - #2	<Ref. to 2-7 [T11Y0].>

DTC No.	Item	Index
P0265	Fuel injector circuit high input - #2	<Ref. to 2-7 [T11AC0].>
P0267	Fuel injector circuit low input - #3	<Ref. to 2-7 [T11Z0].>
P0268	Fuel injector circuit high input - #3	<Ref. to 2-7 [T11AD0].>
P0270	Fuel injector circuit low input - #4	<Ref. to 2-7 [T11AA0].>
P0271	Fuel injector circuit high input - #4	<Ref. to 2-7 [T11AE0].>
P0301	Cylinder 1 misfire detected	<Ref. to 2-7 [T11AF0].>
P0302	Cylinder 2 misfire detected	<Ref. to 2-7 [T11AG0].>
P0303	Cylinder 3 misfire detected	<Ref. to 2-7 [T11AH0].>
P0304	Cylinder 4 misfire detected	<Ref. to 2-7 [T11AI0].>
P0325	Knock sensor circuit malfunction	<Ref. to 2-7 [T11AJ0].>
P0335	Crankshaft position sensor circuit malfunction	<Ref. to 2-7 [T11AK0].>
P0336	Crankshaft position sensor circuit range/performance problem	<Ref. to 2-7 [T11AL0].>
P0340	Camshaft position sensor circuit malfunction	<Ref. to 2-7 [T11AM0].>
P0341	Camshaft position sensor circuit range/performance problem	<Ref. to 2-7 [T11AN0].>
P0400	Exhaust gas recirculation flow malfunction	<Ref. to 2-7 [T11AO0].>
P0403	Exhaust gas recirculation circuit low input	<Ref. to 2-7 [T11AP0].>
P0420	Catalyst system efficiency below threshold	<Ref. to 2-7 [T11AQ0].>
P0440	Evaporative emission control system malfunction	<Ref. to 2-7 [T11AR0].>
P0441	Evaporative emission control system incorrect purge flow	<Ref. to 2-7 [T11AS0].>
P0443	Evaporative emission control system purge control valve circuit low input	<Ref. to 2-7 [T11AT0].>
P0446	Evaporative emission control system vent control low input	<Ref. to 2-7 [T11AU0].>
P0451	Evaporative emission control system pressure sensor range/performance problem	<Ref. to 2-7 [T11AV0].>
P0452	Evaporative emission control system pressure sensor low input	<Ref. to 2-7 [T11AW0].>
P0453	Evaporative emission control system pressure sensor high input	<Ref. to 2-7 [T11AX0].>
P0461	Fuel level sensor circuit range/performance problem	<Ref. to 2-7 [T11AY0].>
P0462	Fuel level sensor circuit low input	<Ref. to 2-7 [T11AZ0].>
P0463	Fuel level sensor circuit high input	<Ref. to 2-7 [T11BA0].>

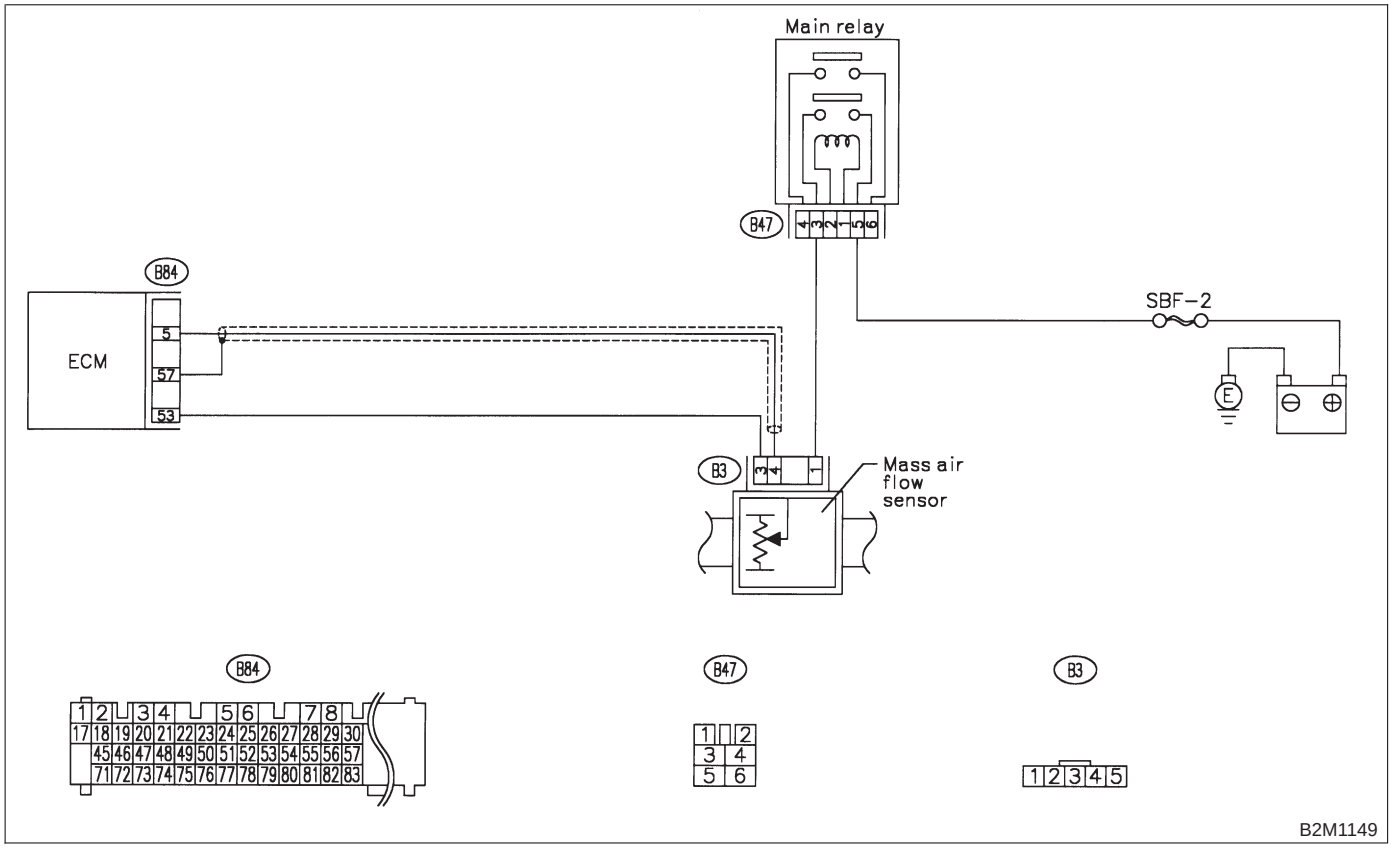
DTC No.	Item	Index
P0480	Cooling fan relay 1 circuit low input	<Ref. to 2-7 [T11BB0].>
P0483	Cooling fan function problem	<Ref. to 2-7 [T11BC0].>
P0500	Vehicle speed sensor malfunction	<Ref. to 2-7 [T11BD0].>
P0505	Idle control system malfunction	<Ref. to 2-7 [T11BE0].>
P0506	Idle control system RPM lower than expected	<Ref. to 2-7 [T11BF0].>
P0507	Idle control system RPM higher than expected	<Ref. to 2-7 [T11BG0].>
P0600	Serial communication link malfunction	<Ref. to 2-7 [T11BH0].>
P0601	Internal control module memory check sum error	<Ref. to 2-7 [T11BI0].>
P0703	Brake switch input malfunction	<Ref. to 2-7 [T11BJ0].>
P0705	Transmission range sensor circuit malfunction	<Ref. to 2-7 [T11BK0].>
P0710	Transmission fluid temperature sensor circuit malfunction	<Ref. to 2-7 [T11BL0].>
P0720	Output speed sensor (vehicle speed sensor 1) circuit malfunction	<Ref. to 2-7 [T11BM0].>
P0725	Engine speed input circuit malfunction	<Ref. to 2-7 [T11BN0].>
P0731	Gear 1 incorrect ratio	<Ref. to 2-7 [T11BO0].>
P0732	Gear 2 incorrect ratio	<Ref. to 2-7 [T11BP0].>
P0733	Gear 3 incorrect ratio	<Ref. to 2-7 [T11BQ0].>
P0734	Gear 4 incorrect ratio	<Ref. to 2-7 [T11BR0].>
P0740	Torque converter clutch system malfunction	<Ref. to 2-7 [T11BS0].>
P0743	Torque converter clutch system electrical	<Ref. to 2-7 [T11BT0].>
P0748	Pressure control solenoid electrical	<Ref. to 2-7 [T11BU0].>
P0753	Shift solenoid A electrical	<Ref. to 2-7 [T11BV0].>
P0758	Shift solenoid B electrical	<Ref. to 2-7 [T11BW0].>
P0760	Shift solenoid C malfunction	<Ref. to 2-7 [T11BX0].>
P0763	Shift solenoid C electrical	<Ref. to 2-7 [T11BY0].>
P1100	Starter switch circuit low input	<Ref. to 2-7 [T11BZ0].>
P1101	Neutral position switch circuit high input [AT vehicles]	<Ref. to 2-7 [T11CA0].>
P1102	Pressure sources switching solenoid valve circuit low input	<Ref. to 2-7 [T11CB0].>

DTC No.	Item	Index
P1103	Engine torque control signal circuit malfunction	<Ref. to 2-7 [T11CC0].>
P1120	Starter switch circuit high input	<Ref. to 2-7 [T11CD0].>
P1121	Neutral position switch circuit low input [AT vehicles]	<Ref. to 2-7 [T11CE0].>
P1122	Pressure sources switching solenoid valve circuit high input	<Ref. to 2-7 [T11CF0].>
P1141	Mass air flow sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T11CG0].>
P1142	Throttle position sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T11CH0].>
P1143	Pressure sensor circuit range/performance problem (low input)	<Ref. to 2-7 [T11CI0].>
P1144	Pressure sensor circuit range/performance problem (high input)	<Ref. to 2-7 [T11CJ0].>
P1400	Fuel tank pressure control solenoid valve circuit low input	<Ref. to 2-7 [T11CK0].>
P1420	Fuel tank pressure control solenoid valve circuit high input	<Ref. to 2-7 [T11CL0].>
P1421	Exhaust gas recirculation circuit high input	<Ref. to 2-7 [T11CM0].>
P1422	Evaporative emission control system purge control valve circuit high input	<Ref. to 2-7 [T11CN0].>
P1423	Evaporative emission control system vent control high input	<Ref. to 2-7 [T11CO0].>
P1440	Fuel tank pressure control system function problem (low input)	<Ref. to 2-7 [T11CP0].>
P1441	Fuel tank pressure control system function problem (high input)	<Ref. to 2-7 [T11CQ0].>
P1442	Fuel level sensor circuit range/performance problem 2	<Ref. to 2-7 [T11CR0].>
P1443	Evaporative emission control system vent control function problem	<Ref. to 2-7 [T11CS0].>
P1507	Idle control system malfunction (fail-safe)	<Ref. to 2-7 [T11CT0].>
P1520	Cooling fan relay 1 circuit high input	<Ref. to 2-7 [T11CU0].>
P1540	Vehicle speed sensor malfunction 2	<Ref. to 2-7 [T11CV0].>
P1700	Throttle position sensor circuit malfunction for automatic transmission	<Ref. to 2-7 [T11CW0].>
P1701	Cruise control set signal circuit malfunction for automatic transmission	<Ref. to 2-7 [T11CX0].>
P1702	Automatic transmission diagnosis input signal circuit low input	<Ref. to 2-7 [T11CY0].>
P1722	Automatic transmission diagnosis input signal circuit high input	<Ref. to 2-7 [T11CZ0].>
P1742	Automatic transmission diagnosis input signal circuit malfunction	<Ref. to 2-7 [T11DA0].>

B: DTC P0101 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

NOTE:
Check mass air flow sensor circuit.
<Ref. to 2-7 [T10B0].>

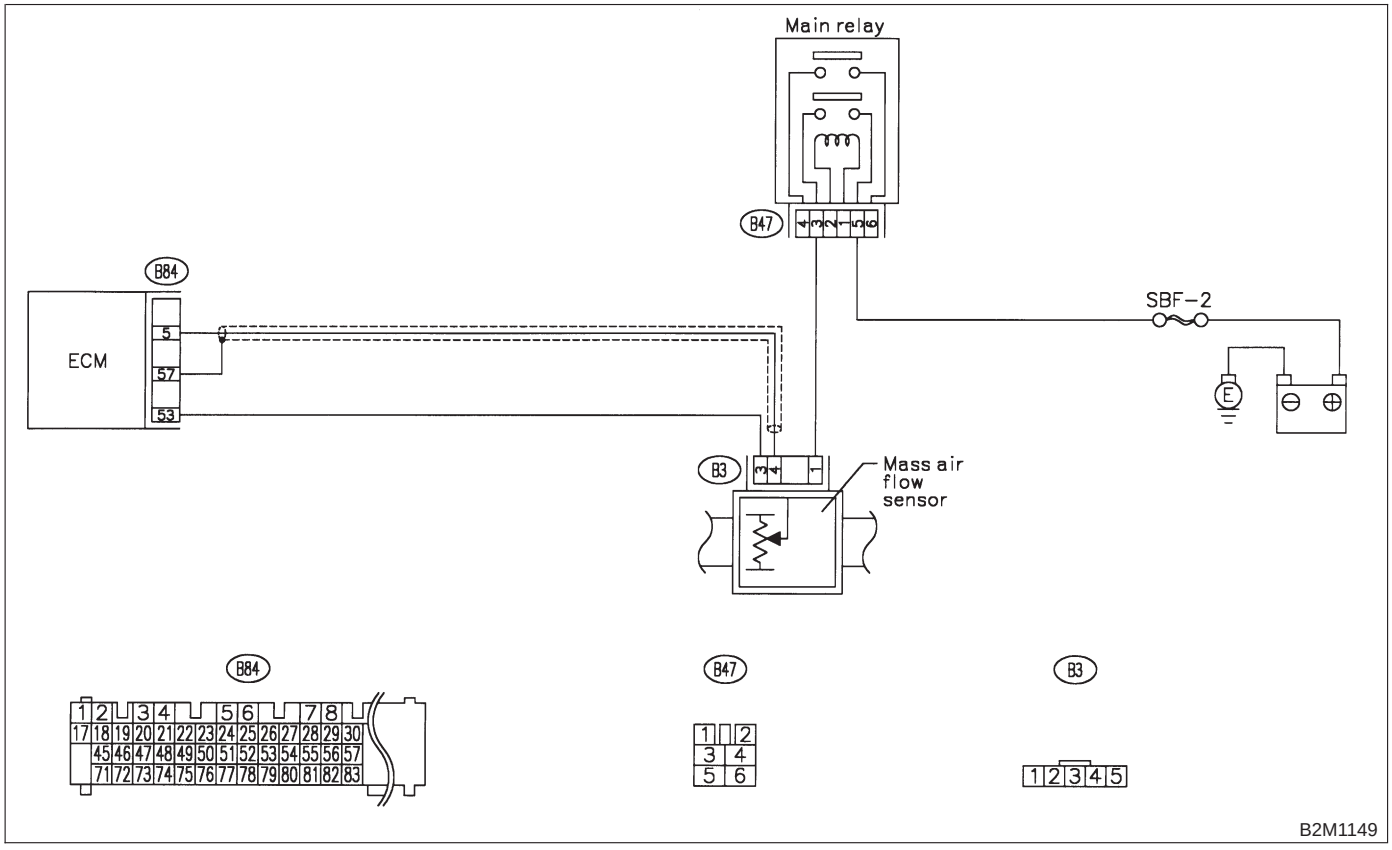
- **WIRING DIAGRAM:**



C: DTC P0102 — MASS AIR FLOW SENSOR CIRCUIT LOW INPUT —

NOTE:
Check mass air flow sensor circuit.
<Ref. to 2-7 [T10C0].>

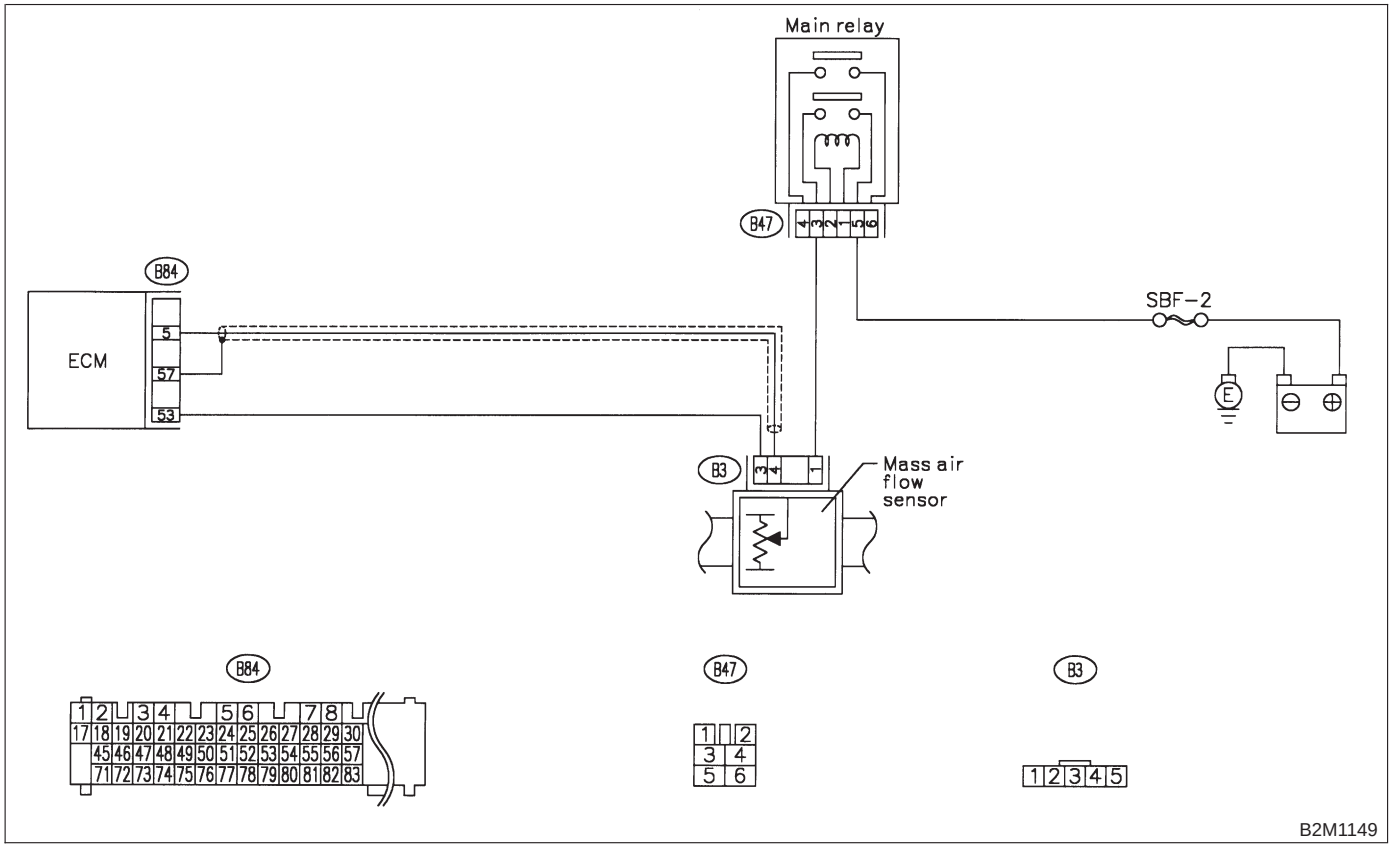
- **WIRING DIAGRAM:**



D: DTC P0103 — MASS AIR FLOW SENSOR CIRCUIT HIGH INPUT —

NOTE:
Check mass air flow sensor circuit.
<Ref. to 2-7 [T10D0].>

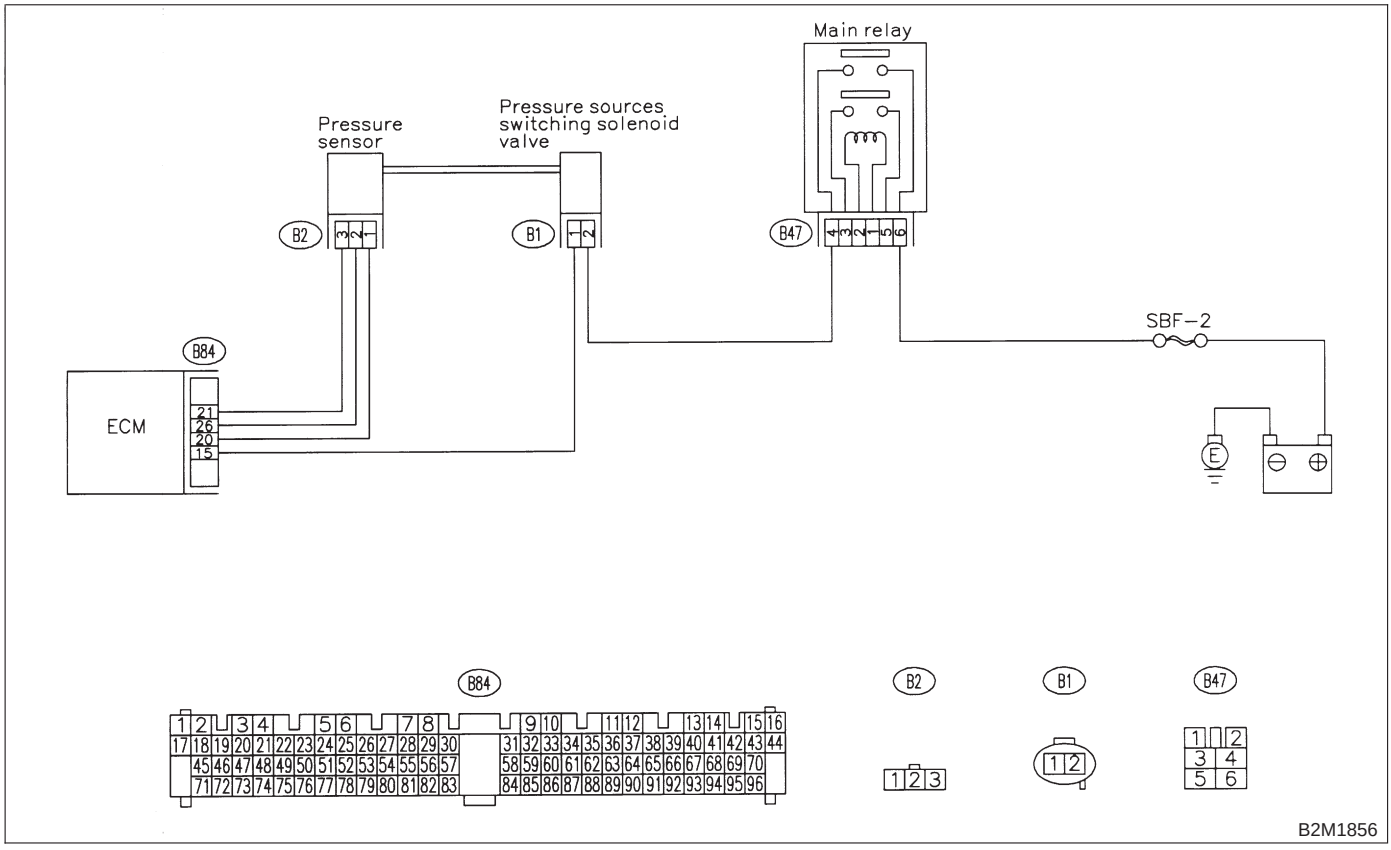
- **WIRING DIAGRAM:**



E: DTC P0106 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

NOTE:
Check pressure sensor circuit.
<Ref. to 2-7 [T10E0].>

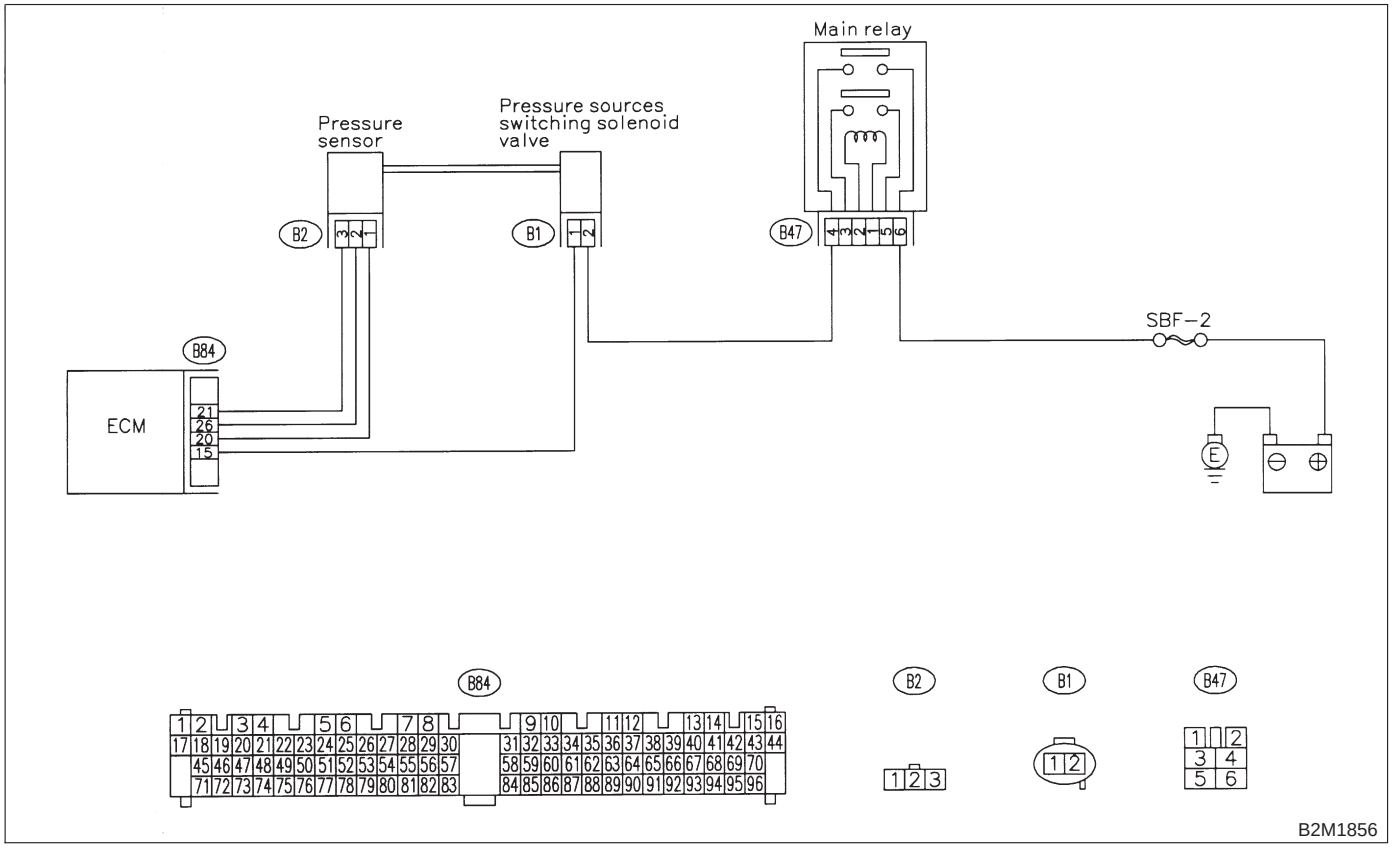
- **WIRING DIAGRAM:**



F: DTC P0107 — PRESSURE SENSOR CIRCUIT LOW INPUT —

NOTE:
Check pressure sensor circuit.
<Ref. to 2-7 [T10F0].>

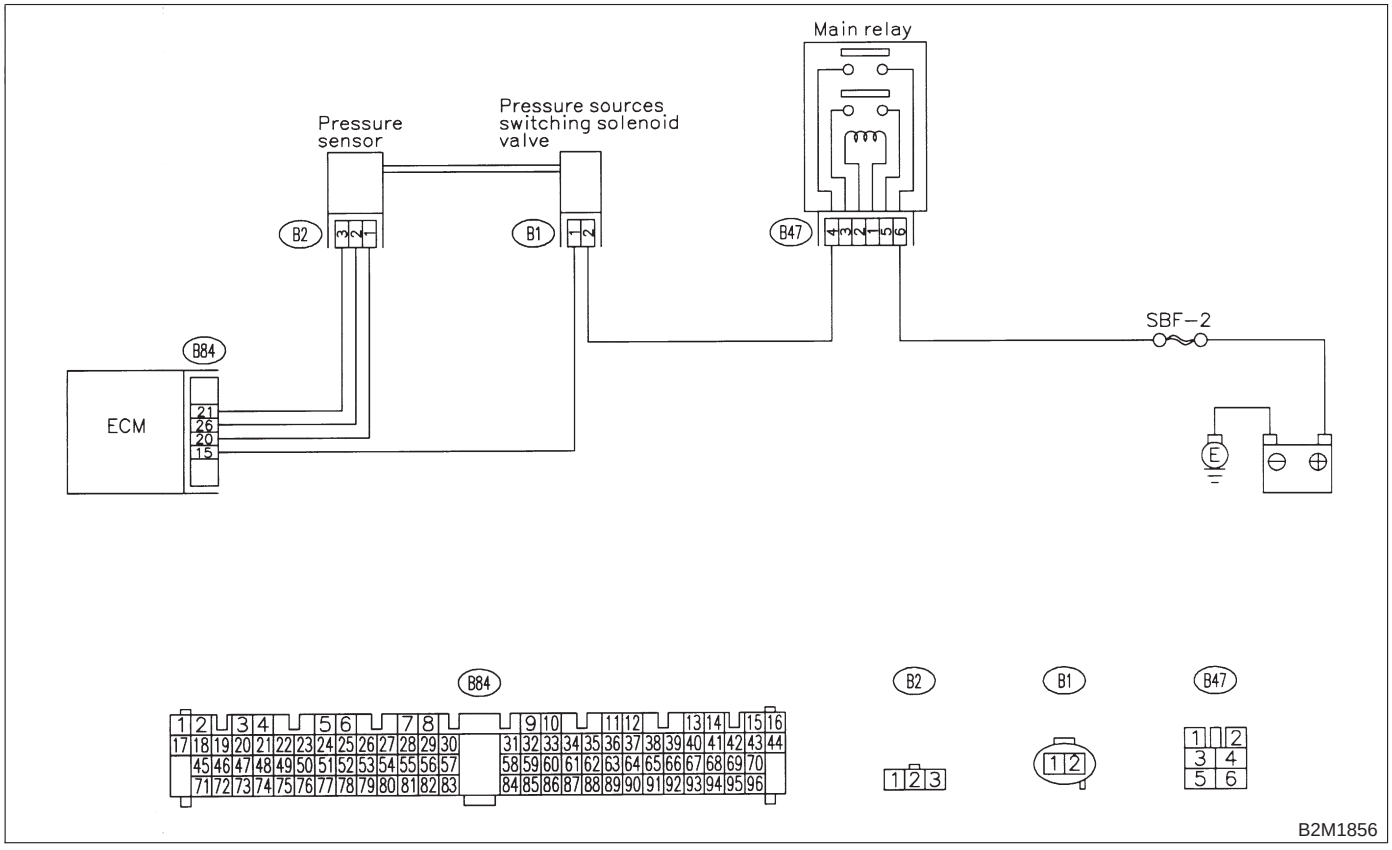
- **WIRING DIAGRAM:**



G: DTC P0108 — PRESSURE SENSOR CIRCUIT HIGH INPUT —

NOTE:
Check pressure sensor circuit.
<Ref. to 2-7 [T10G0].>

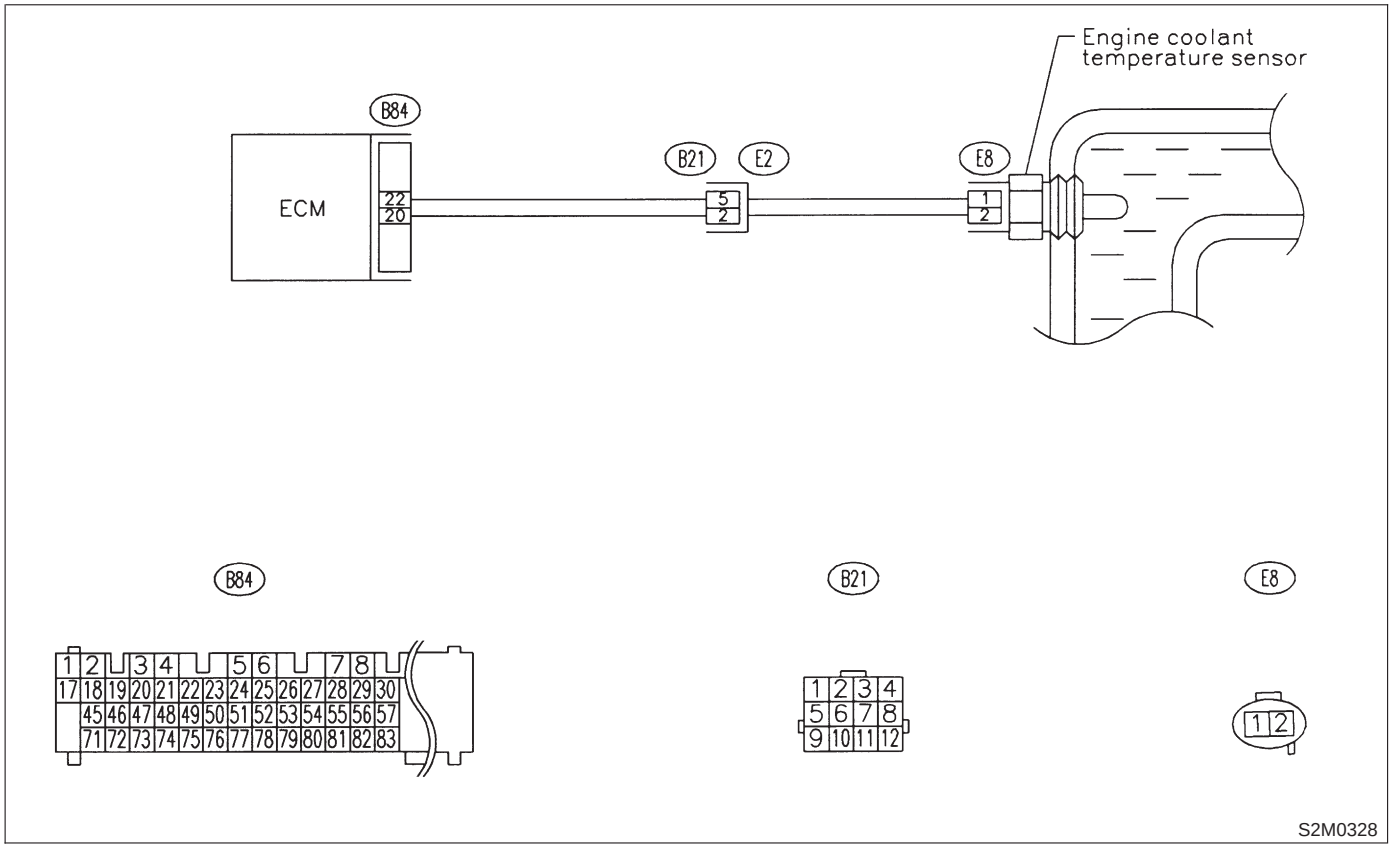
- **WIRING DIAGRAM:**



H: DTC P0117 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT —

NOTE:
Check engine coolant temperature sensor circuit.
<Ref. to 2-7 [T10H0].>

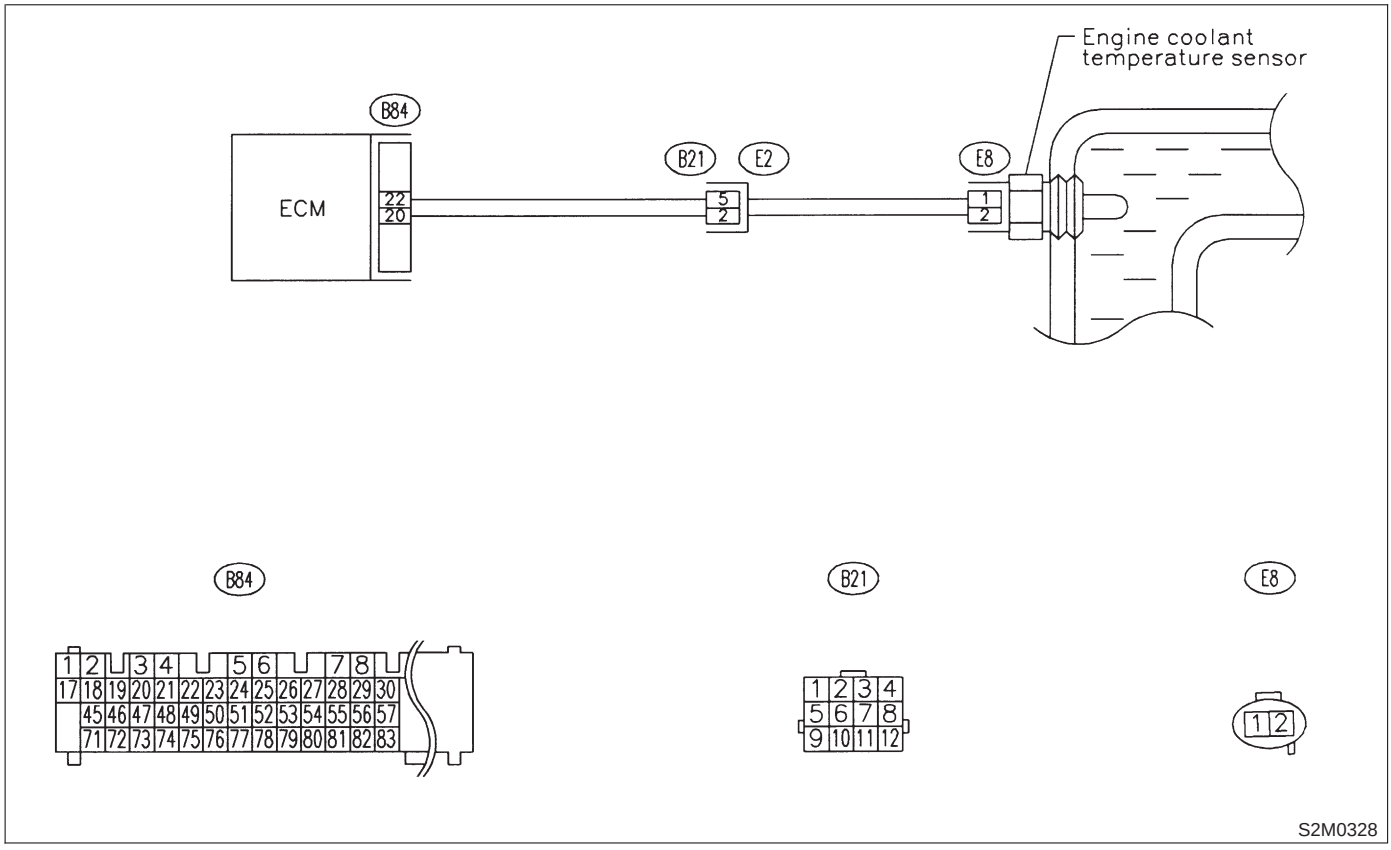
- **WIRING DIAGRAM:**



I: DTC P0118 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH INPUT —

NOTE:
Check engine coolant temperature sensor circuit.
<Ref. to 2-7 [T10I0].>

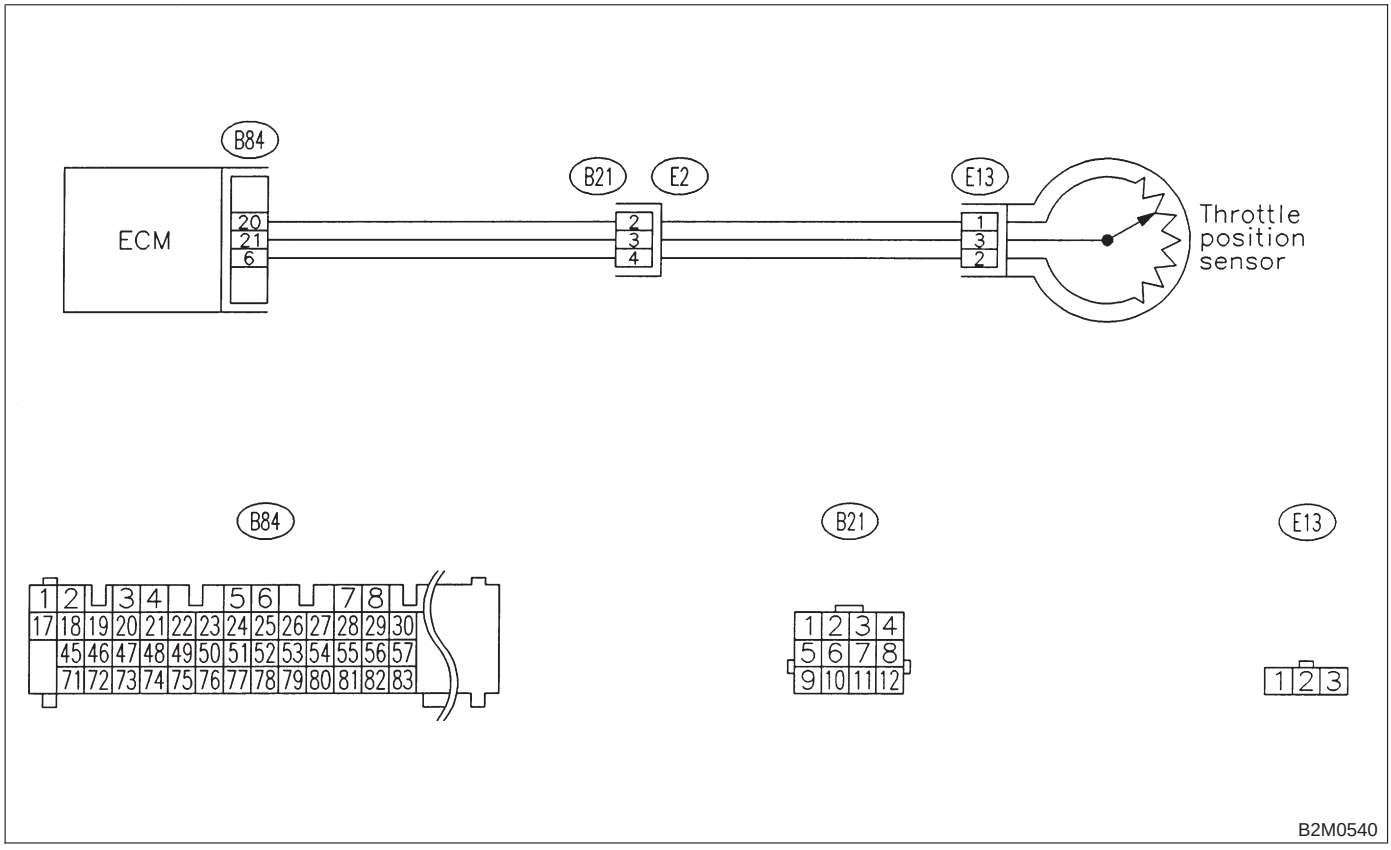
- **WIRING DIAGRAM:**



J: DTC P0121 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

NOTE:
Check throttle position sensor circuit.
<Ref. to 2-7 [T10J0].>

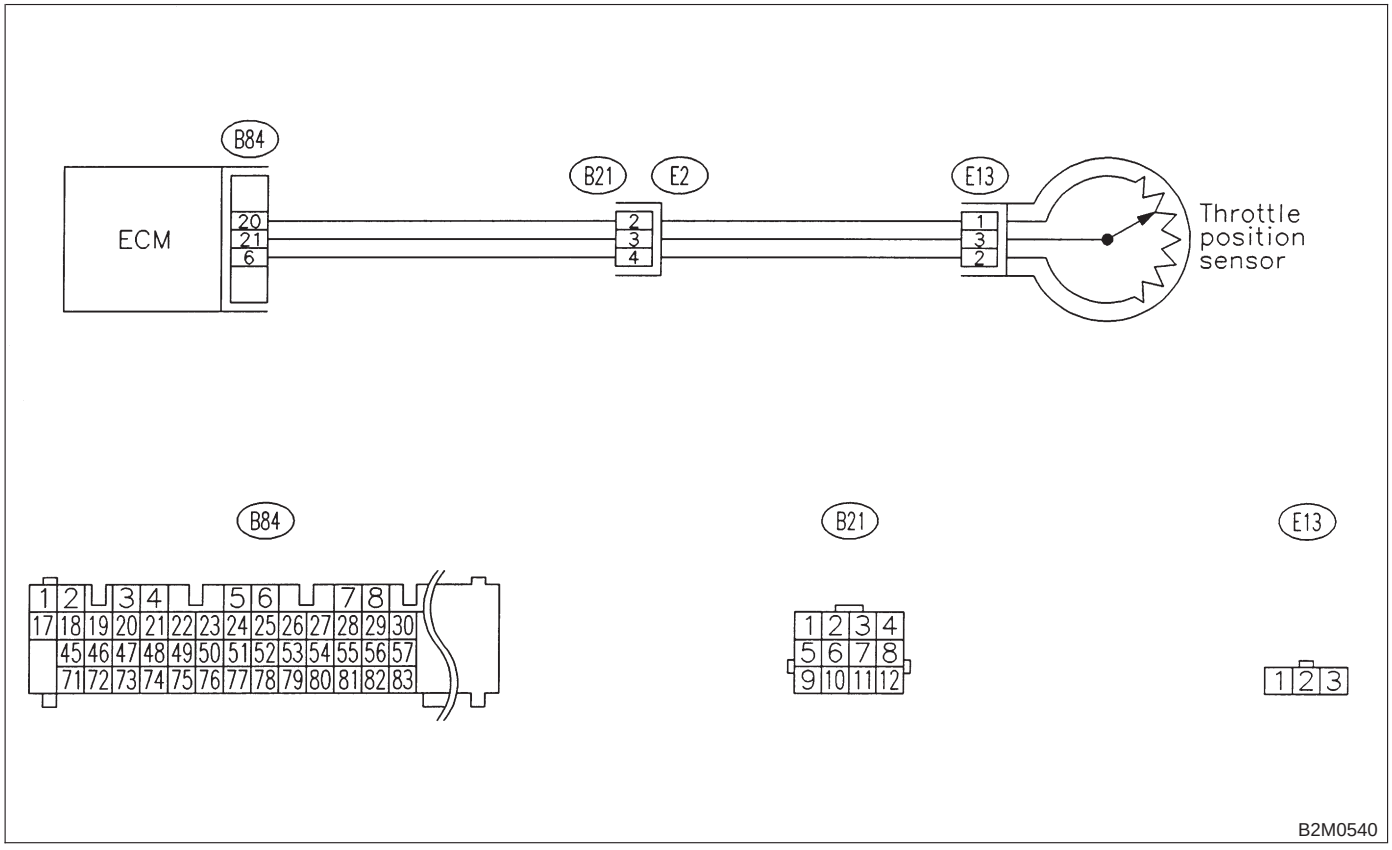
- **WIRING DIAGRAM:**



K: DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT —

NOTE:
Check throttle position sensor circuit.
<Ref. to 2-7 [T10K0].>

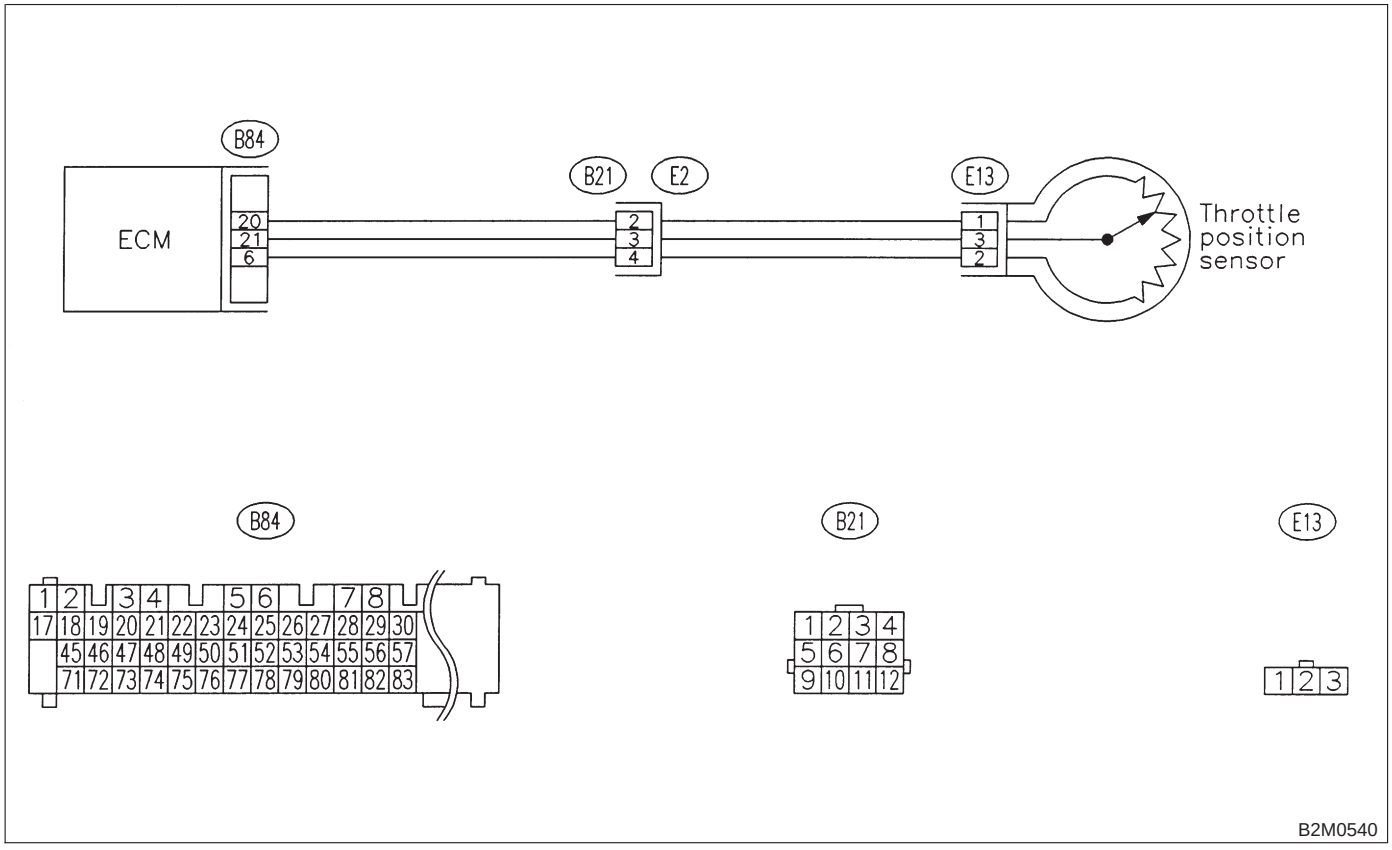
- **WIRING DIAGRAM:**



L: DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT —

NOTE:
Check throttle position sensor circuit.
<Ref. to 2-7 [T10L0].>

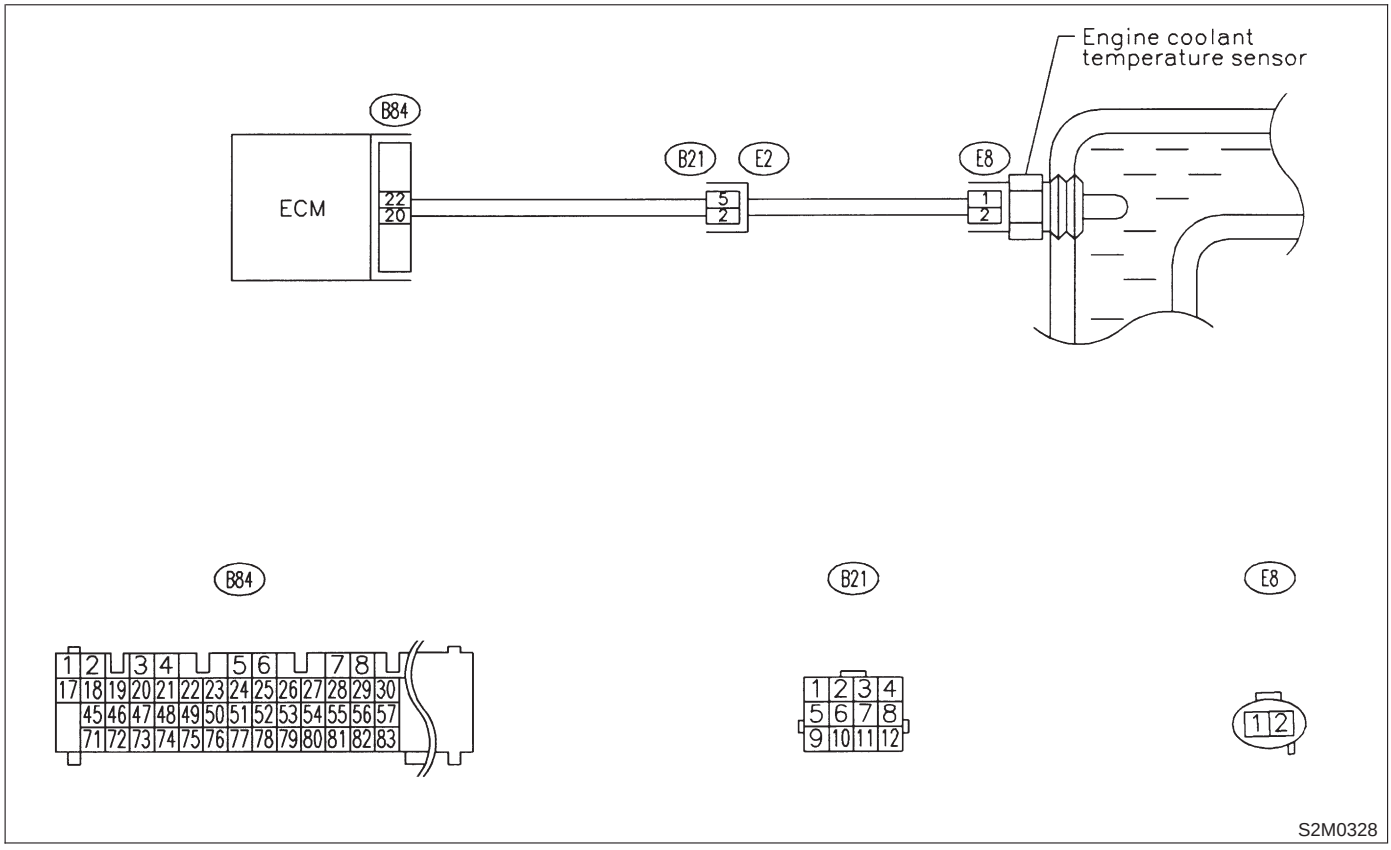
- **WIRING DIAGRAM:**



M: DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL —

NOTE:
Check insufficient coolant temperature for closed loop fuel control.
<Ref. to 2-7 [T10M0].>

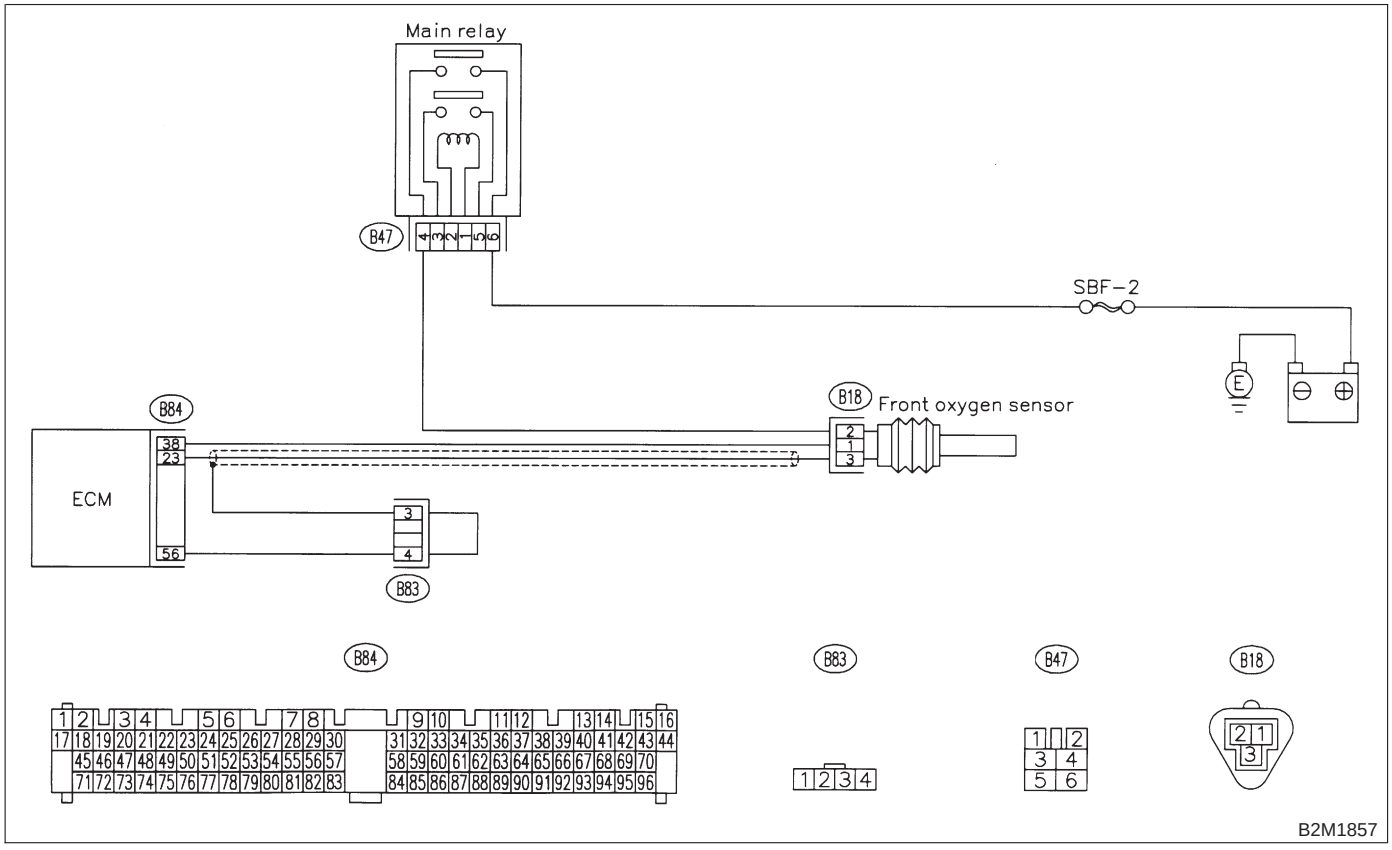
- **WIRING DIAGRAM:**



N: DTC P0130 — FRONT OXYGEN SENSOR CIRCUIT MALFUNCTION —

NOTE:
Check front oxygen sensor circuit.
<Ref. to 2-7 [T10N0].>

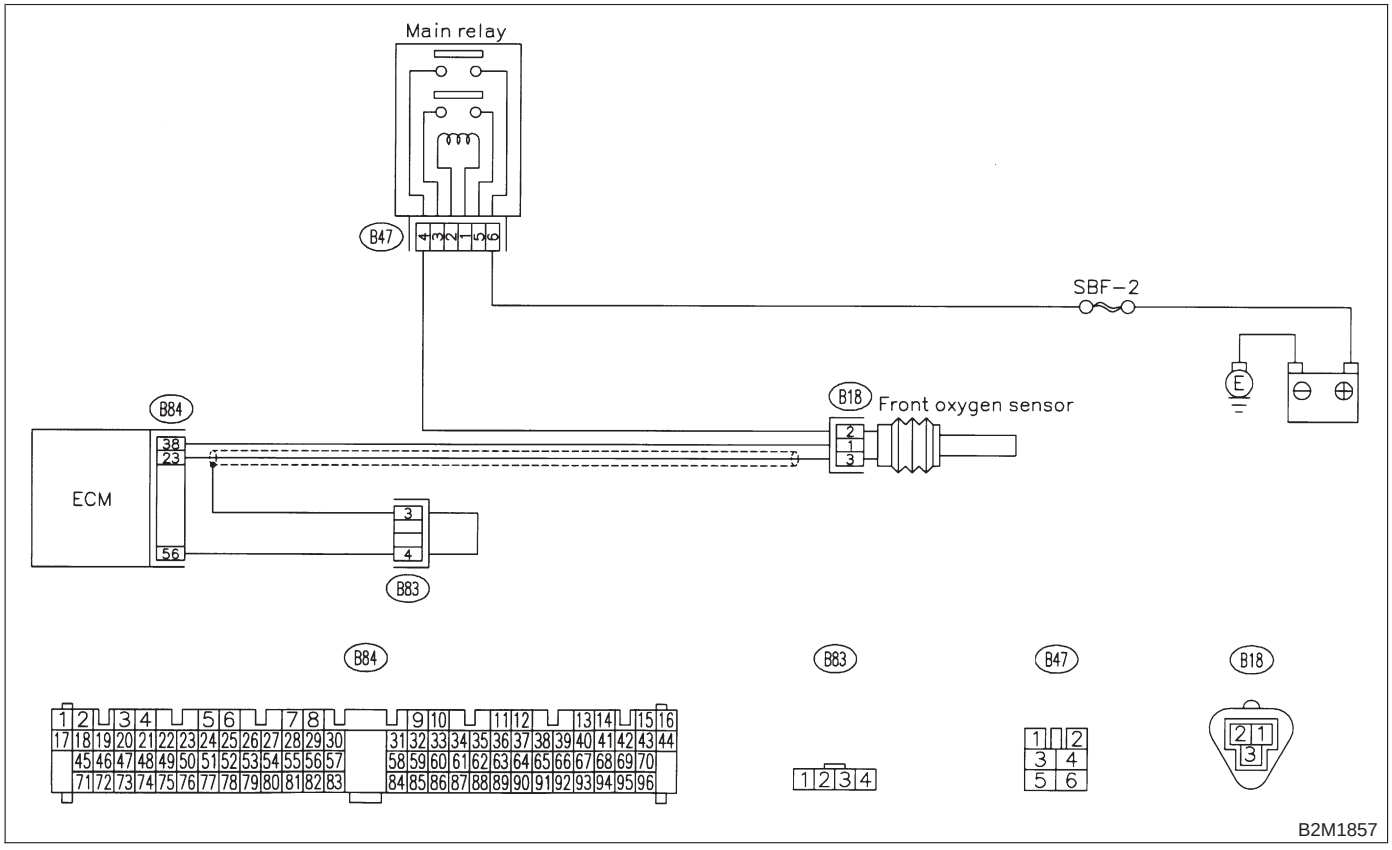
- **WIRING DIAGRAM:**



O: DTC P0133 — FRONT OXYGEN SENSOR CIRCUIT SLOW RESPONSE —

NOTE:
Check front oxygen sensor circuit.
<Ref. to 2-7 [T10O0].>

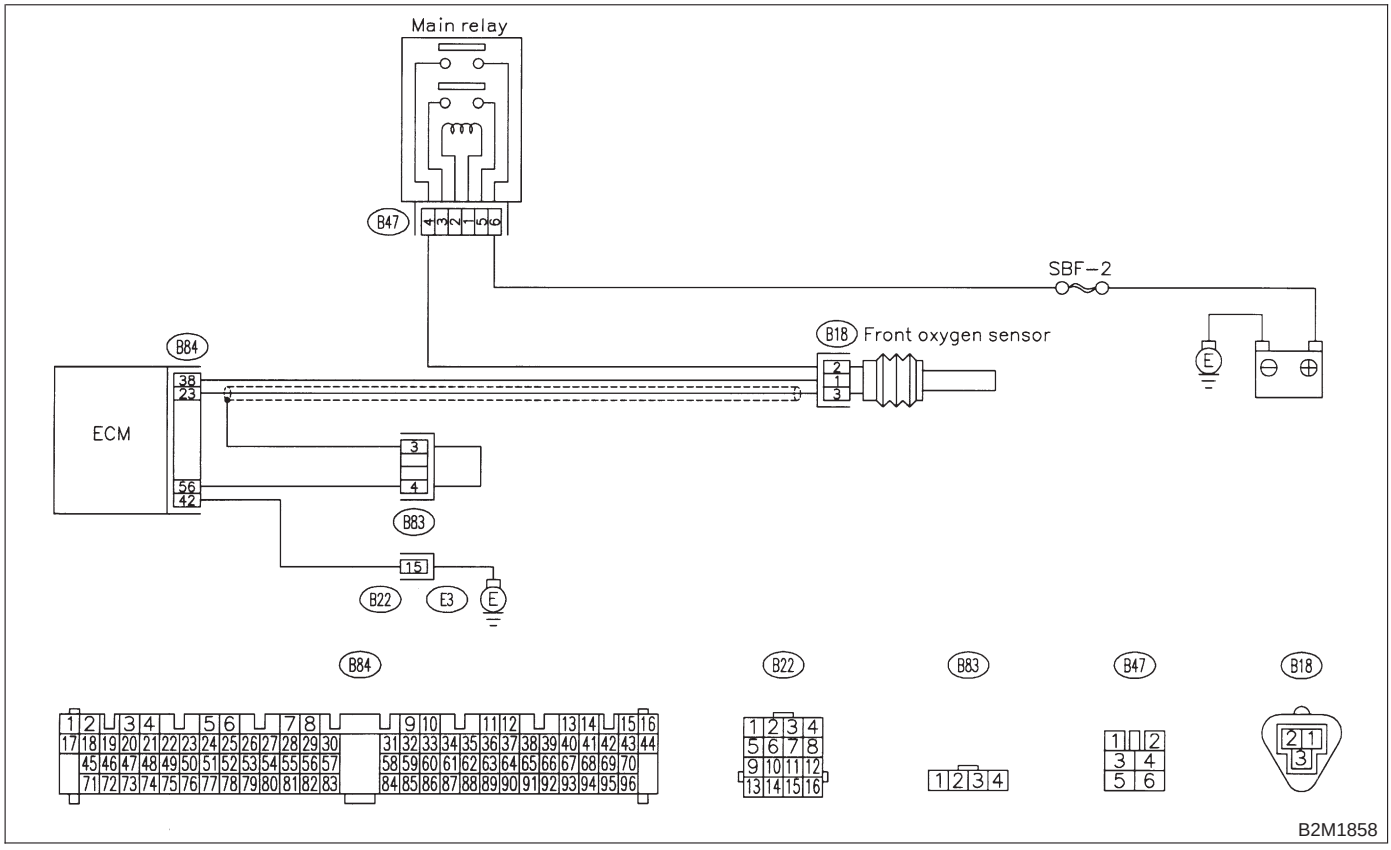
- **WIRING DIAGRAM:**



P: DTC P0135 — FRONT OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION —

NOTE:
Check front oxygen sensor heater circuit.
<Ref. to 2-7 [T10P0].>

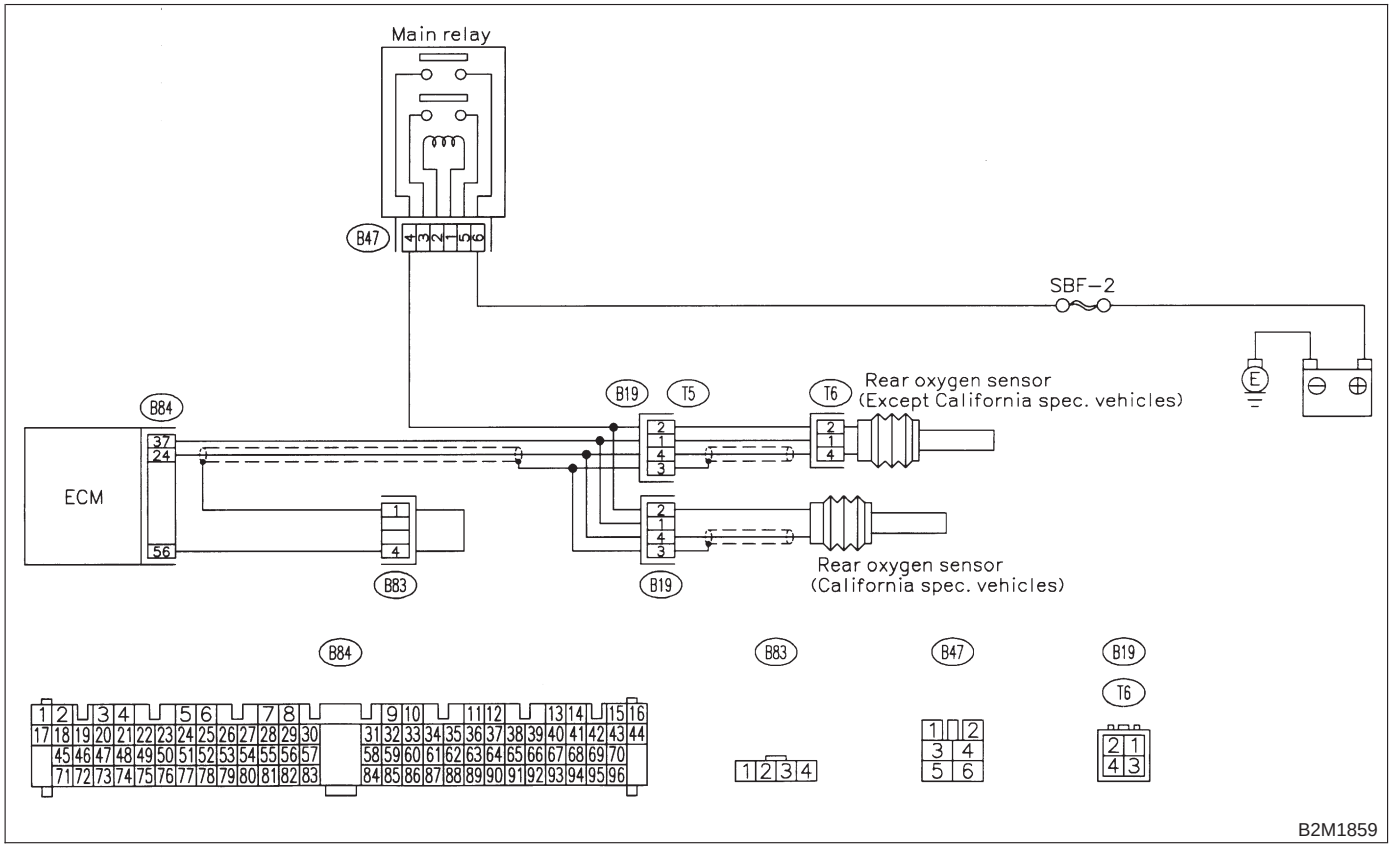
- **WIRING DIAGRAM:**



Q: DTC P0136 — REAR OXYGEN SENSOR CIRCUIT MALFUNCTION —

NOTE:
Check rear oxygen sensor circuit.
<Ref. to 2-7 [T10Q0].>

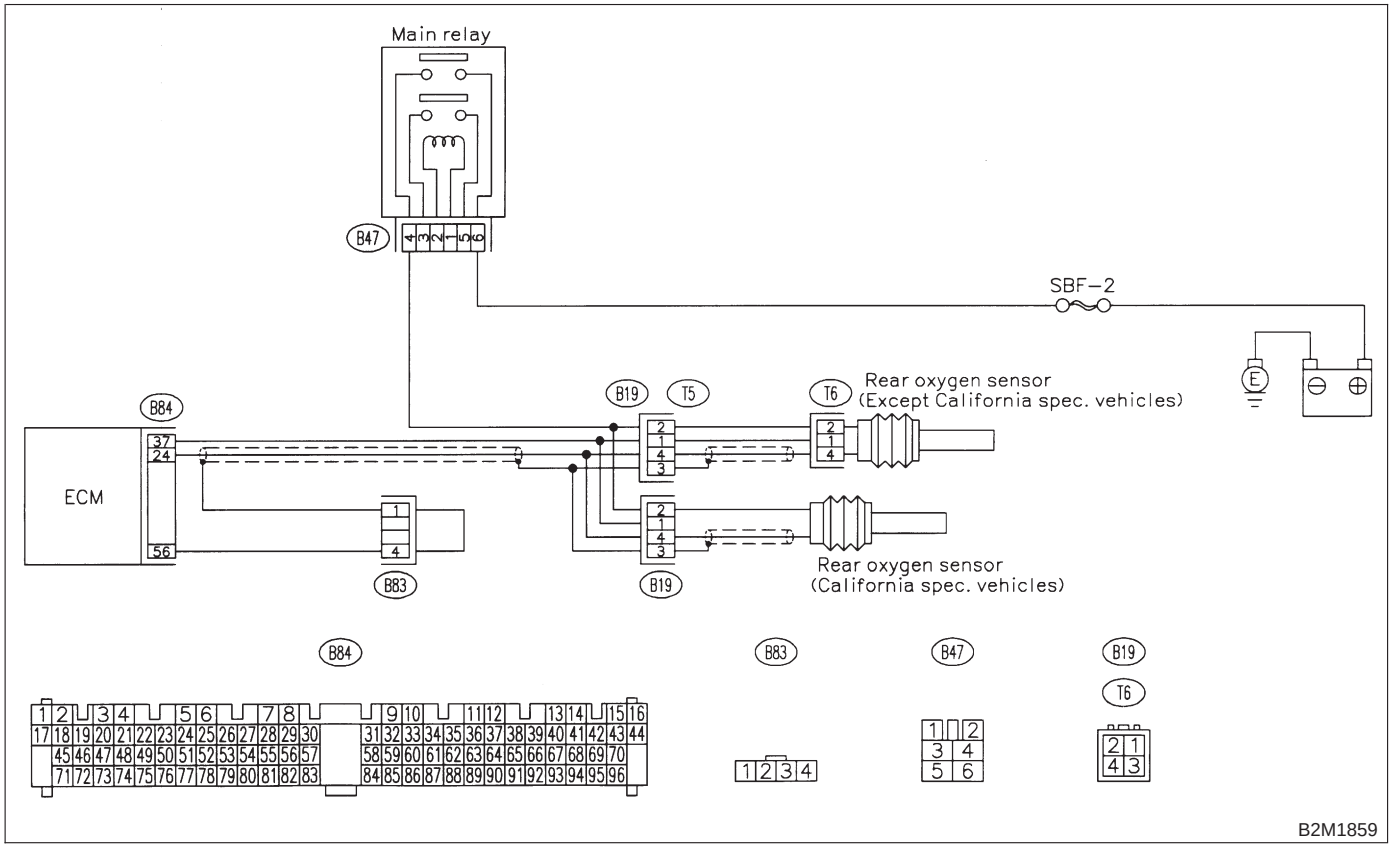
- **WIRING DIAGRAM:**



R: DTC P0139 — REAR OXYGEN SENSOR CIRCUIT SLOW RESPONSE —

NOTE:
Check rear oxygen sensor circuit.
<Ref. to 2-7 [T10R0].>

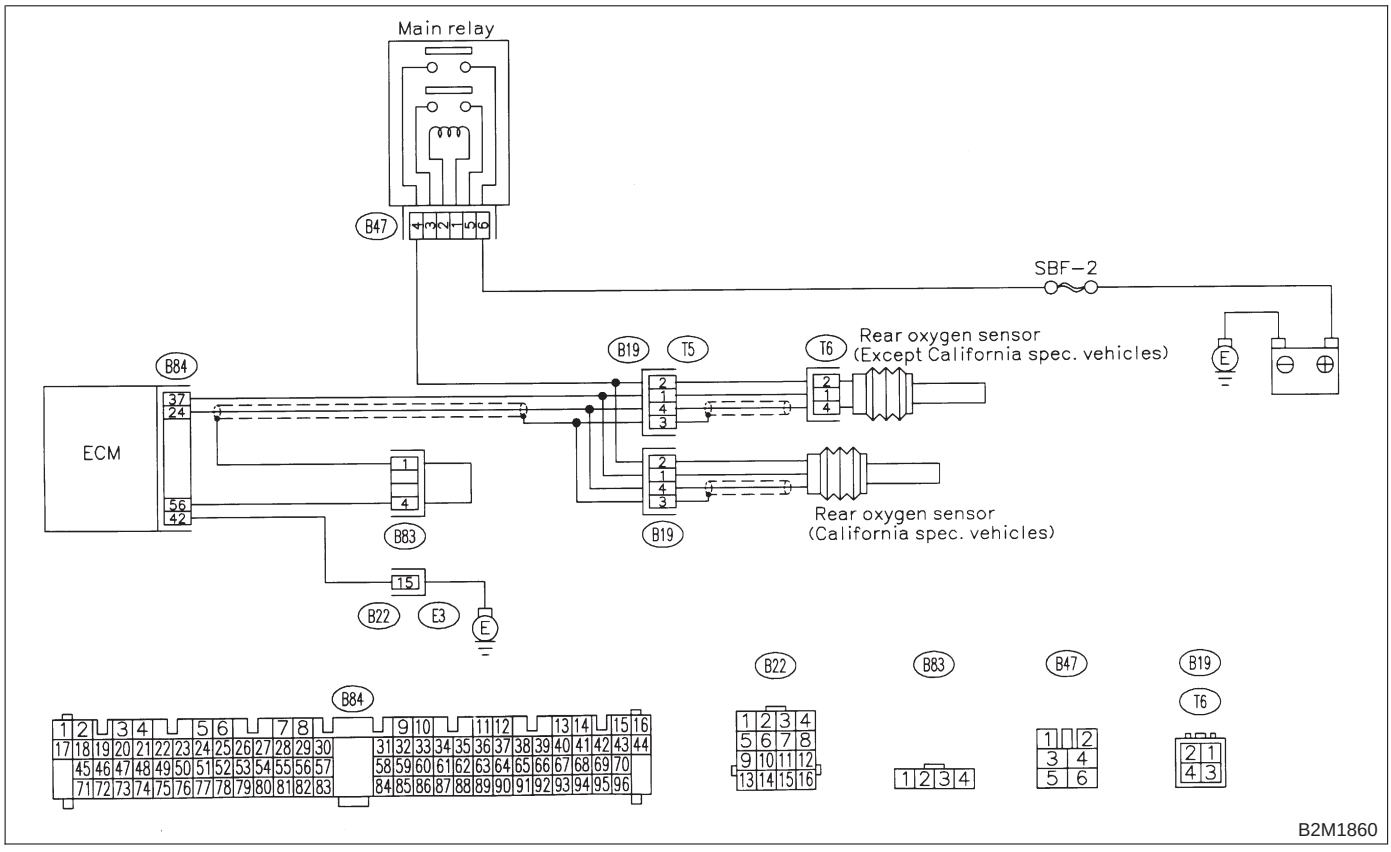
- **WIRING DIAGRAM:**



S: DTC P0141 — REAR OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION —

NOTE:
Check rear oxygen sensor heater circuit.
<Ref. to 2-7 [T10S0].>

- **WIRING DIAGRAM:**



T: DTC P0170 — FUEL TRIM MALFUNCTION —

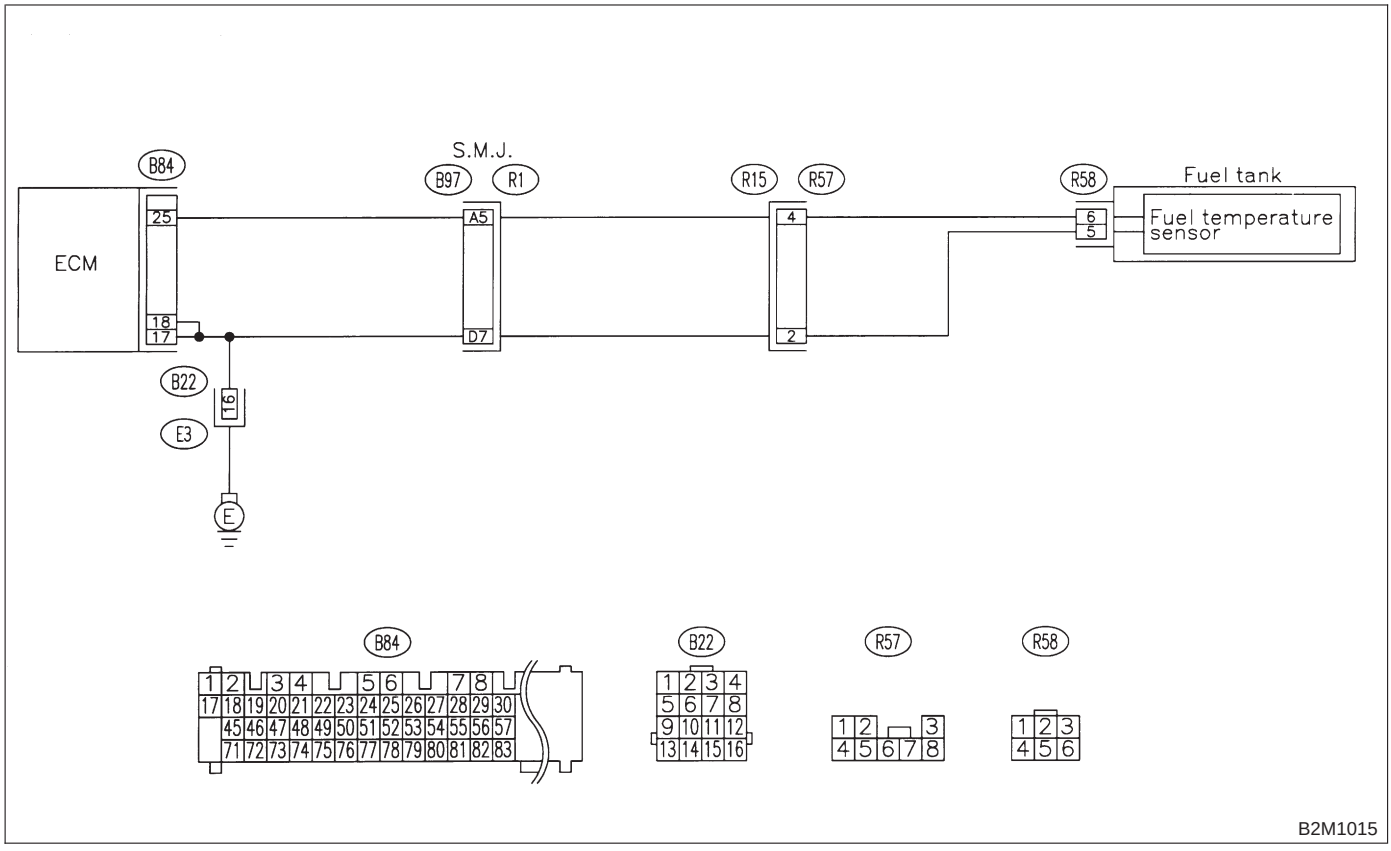
NOTE:
Check fuel trim control system.
<Ref. to 2-7 [T10T0].>

U: DTC P0181 — FUEL TEMPERATURE SENSOR A CIRCUIT RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11U1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0182 or P0183?***

YES : Inspect DTC P0182 or P0183 using “11. Diagnostics Chart with Trouble Code for RHD Vehicles”. <Ref. to 2-7 [T1100].>

NOTE:
In this case, it is not necessary to inspect DTC P0181.

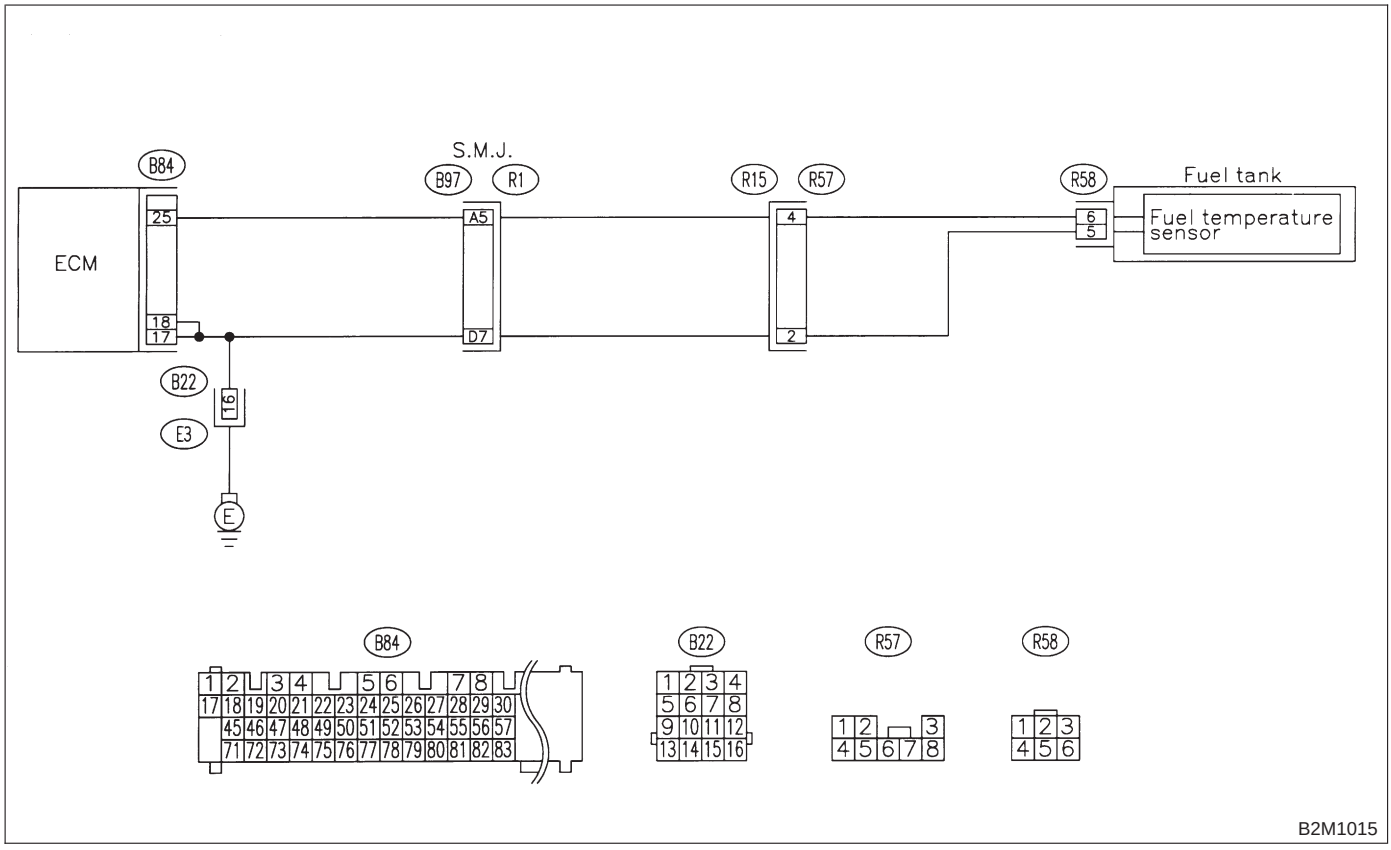
NO : Replace fuel temperature sensor.

V: DTC P0182 — FUEL TEMPERATURE SENSOR A CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

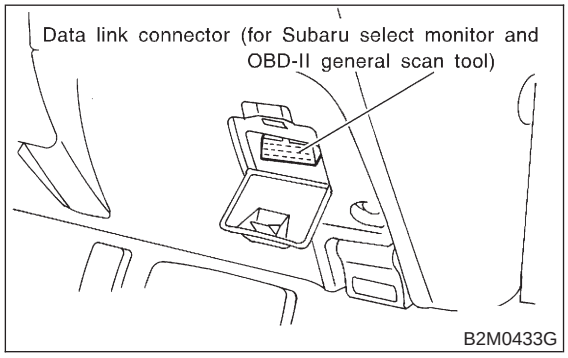
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11V1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



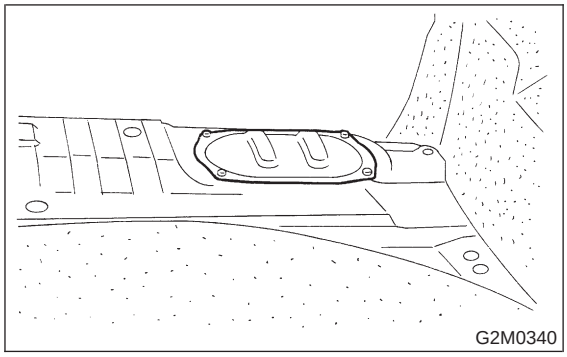
3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

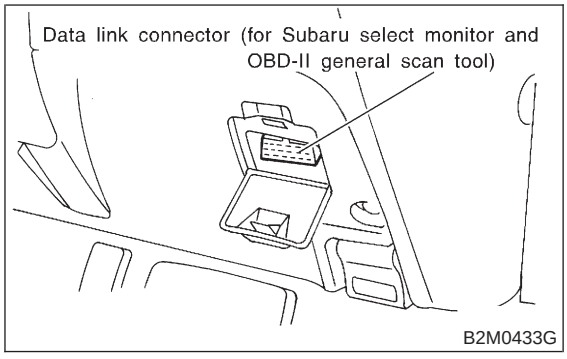
CHECK : ***Is the value greater than 150°C (300°F)?***
YES : Go to step **11V2**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

11V2 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove access hole lid.



3) Disconnect connector from fuel pump.
4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



5) Turn ignition switch and Subaru Select Monitor or OBD-II general scan tool switch to ON.
6) Read data of fuel temperature sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

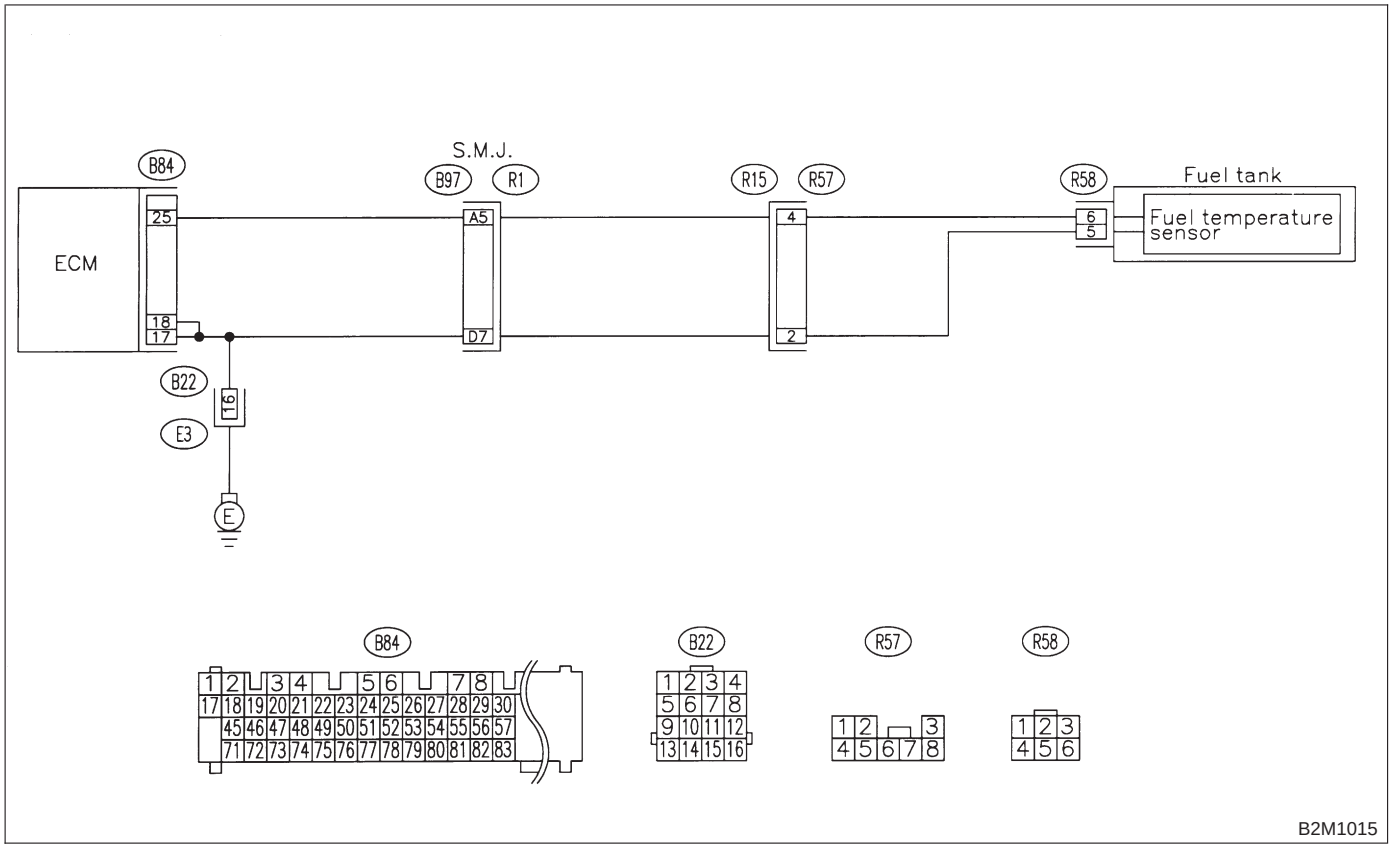
CHECK : ***Is the value less than −40°C (−40°F)?***
YES : Replace fuel temperature sensor.
NO : Repair ground short circuit in harness between fuel pump and ECM connector.

W: DTC P0183 — FUEL TEMPERATURE SENSOR A CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

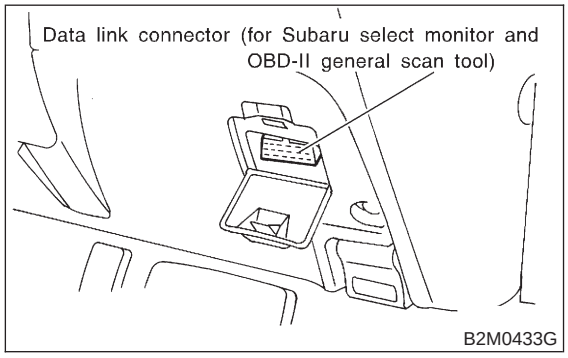
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11W1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



3) Turn ignition switch to ON and Subaru Select Monitor or OBD-II general scan tool switch to ON.
4) Start engine.
5) Read data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool.

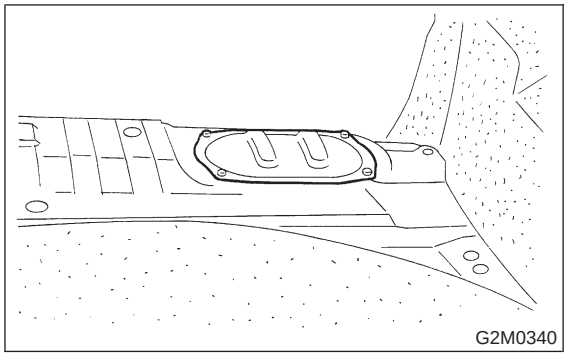
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value less than −40°C (−40°F)?***
YES : Go to step **11W2**.
NO : Repair poor contact.

NOTE:
In this case, repair the following:
● Poor contact in fuel pump connector
● Poor contact in ECM connector
● Poor contact in coupling connectors (B22, B97 and R57)

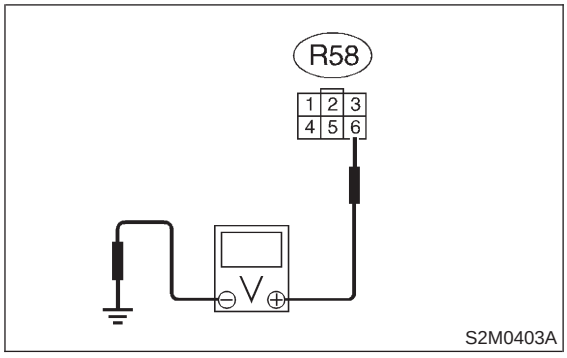
11W2 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove access hole lid.



3) Disconnect connector from fuel pump.
4) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (−):

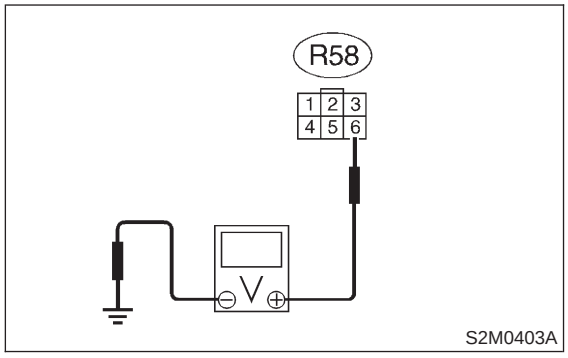


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and fuel pump connector.
NO : Go to step **11W3**.

11W3 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to ON.
2) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (−):

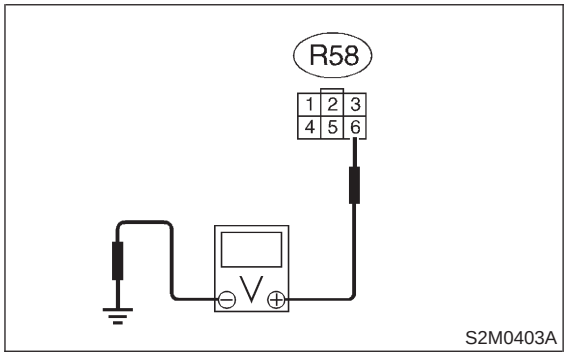


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and fuel pump connector.
NO : Go to step **11W4**.

11W4 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 6 (+) — Chassis ground (−):



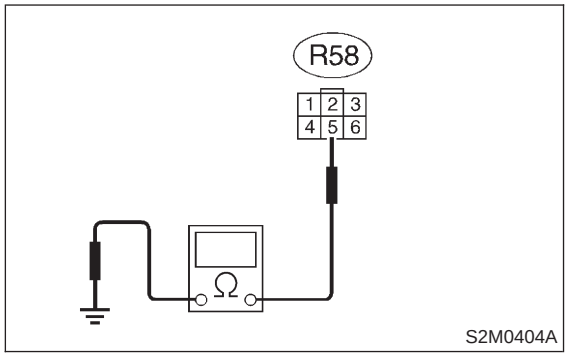
CHECK : ***Is the voltage more than 4 V?***
YES : Go to step **11W5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel pump connector
- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B97 and R57)

11W5 : CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 5 — Chassis ground:



CHECK : ***Is the resistance less than 5 Ω?***
YES : Replace fuel temperature sensor.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel pump connector
- Poor contact in fuel pump connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B22, B97 and R57)

X: DTC P0261 — FUEL INJECTOR CIRCUIT LOW INPUT - #1 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11AA0].
<Ref. to 2-7 [T11AA0].>

Y: DTC P0264 — FUEL INJECTOR CIRCUIT LOW INPUT - #2 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11AA0].
<Ref. to 2-7 [T11AA0].>

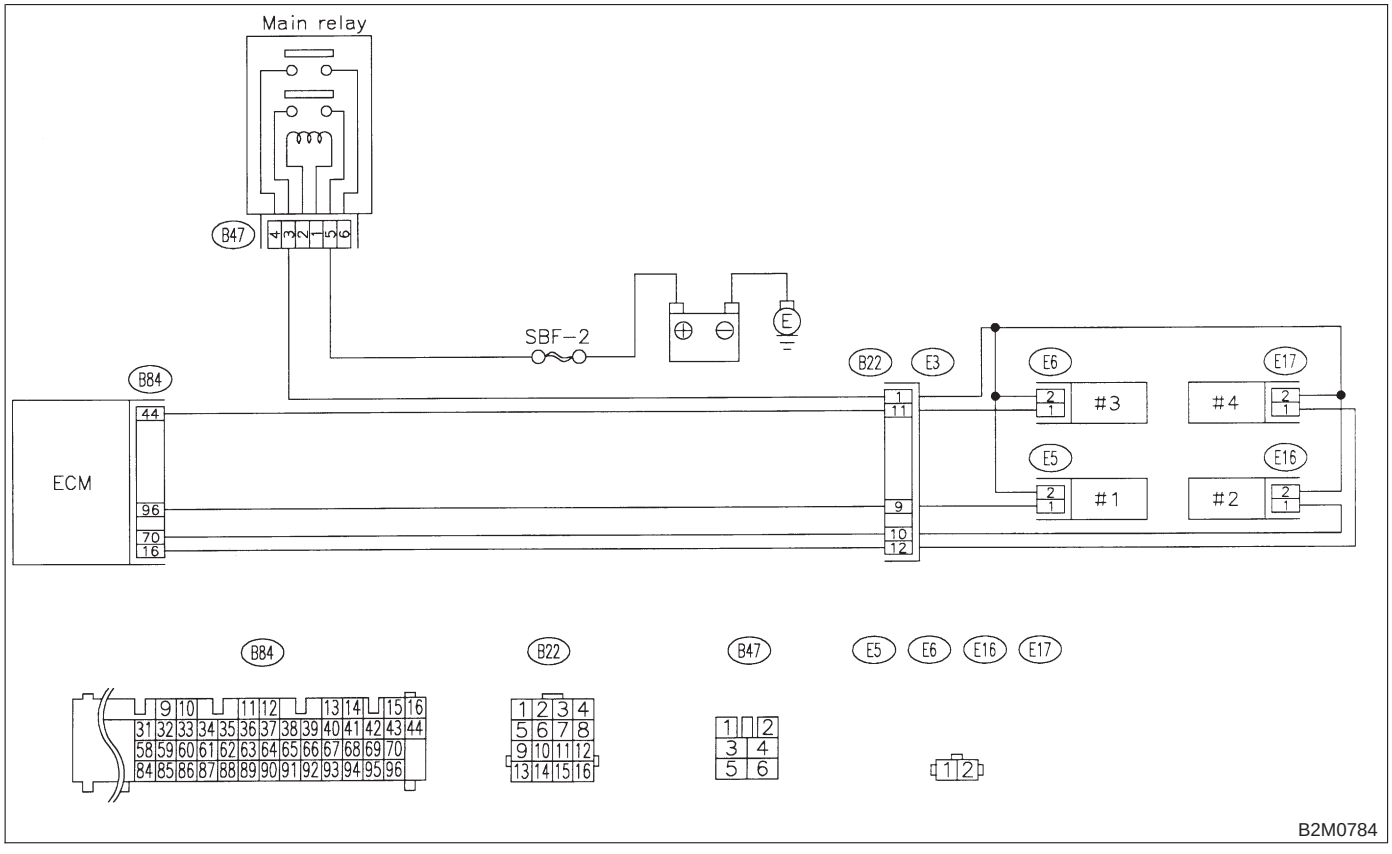
Z: DTC P0267 — FUEL INJECTOR CIRCUIT LOW INPUT - #3 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11AA0].
<Ref. to 2-7 [T11AA0].>

AA: DTC P0270 — FUEL INJECTOR CIRCUIT LOW INPUT - #4 —

NOTE:
Check fuel injector circuit.
<Ref. to 2-7 [T10AA0].>

- **WIRING DIAGRAM:**



AB: DTC P0262 — FUEL INJECTOR CIRCUIT HIGH INPUT - #1 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11AE0].
<Ref. to 2-7 [T11AE0].>

AC: DTC P0265 — FUEL INJECTOR CIRCUIT HIGH INPUT - #2 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11AE0].
<Ref. to 2-7 [T11AE0].>

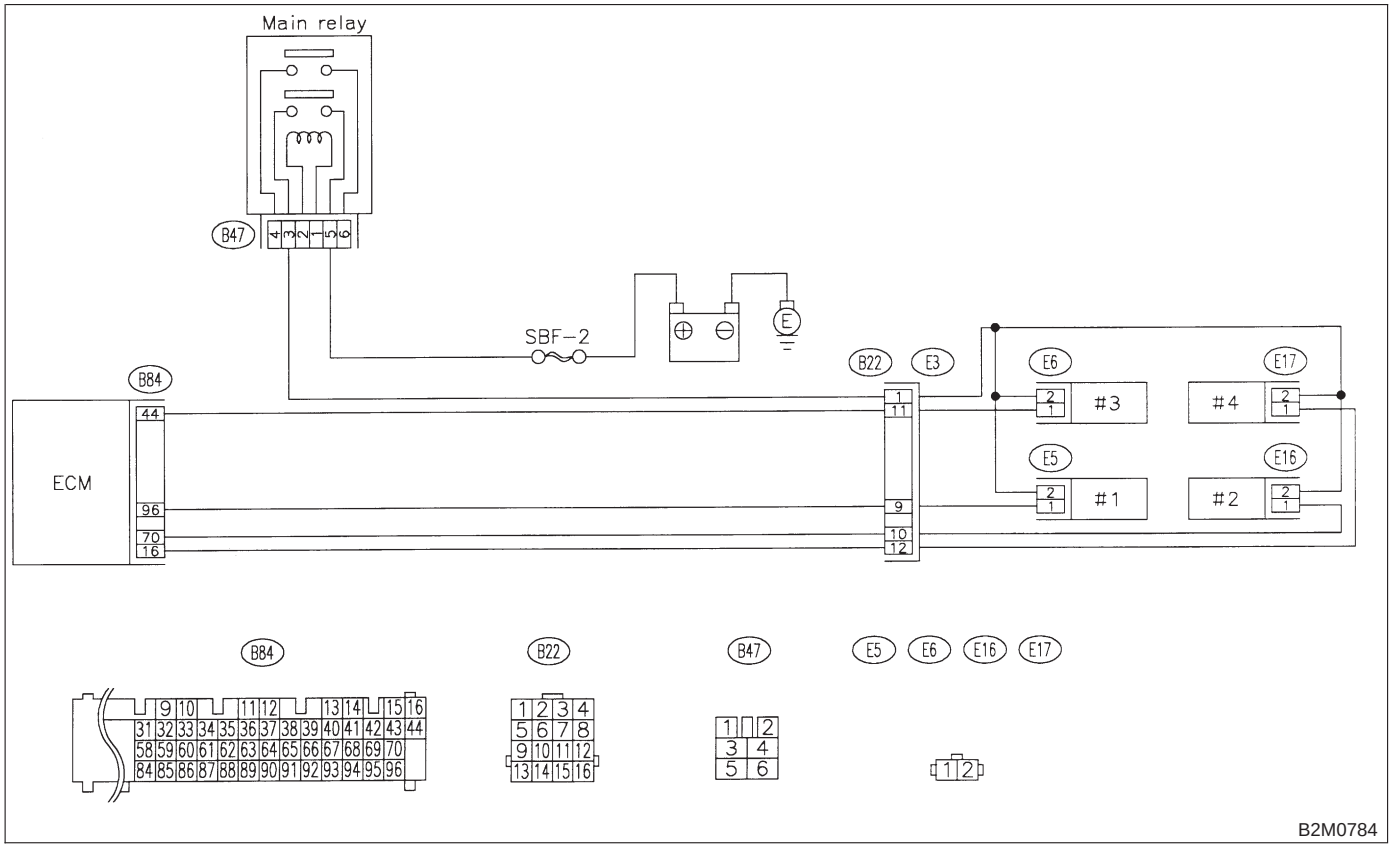
AD: DTC P0268 — FUEL INJECTOR CIRCUIT HIGH INPUT - #3 —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11AE0].
<Ref. to 2-7 [T11AE0].>

AE: DTC P0271 — FUEL INJECTOR CIRCUIT HIGH INPUT - #4 —

NOTE:
Check fuel injector circuit.
<Ref. to 2-7 [T10AE0].>

- **WIRING DIAGRAM:**



AF: DTC P0301 — CYLINDER 1 MISFIRE DETECTED —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11AI0].
<Ref. to 2-7 [T11AI0].>

AG: DTC P0302 — CYLINDER 2 MISFIRE DETECTED —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11AI0].
<Ref. to 2-7 [T11AI0].>

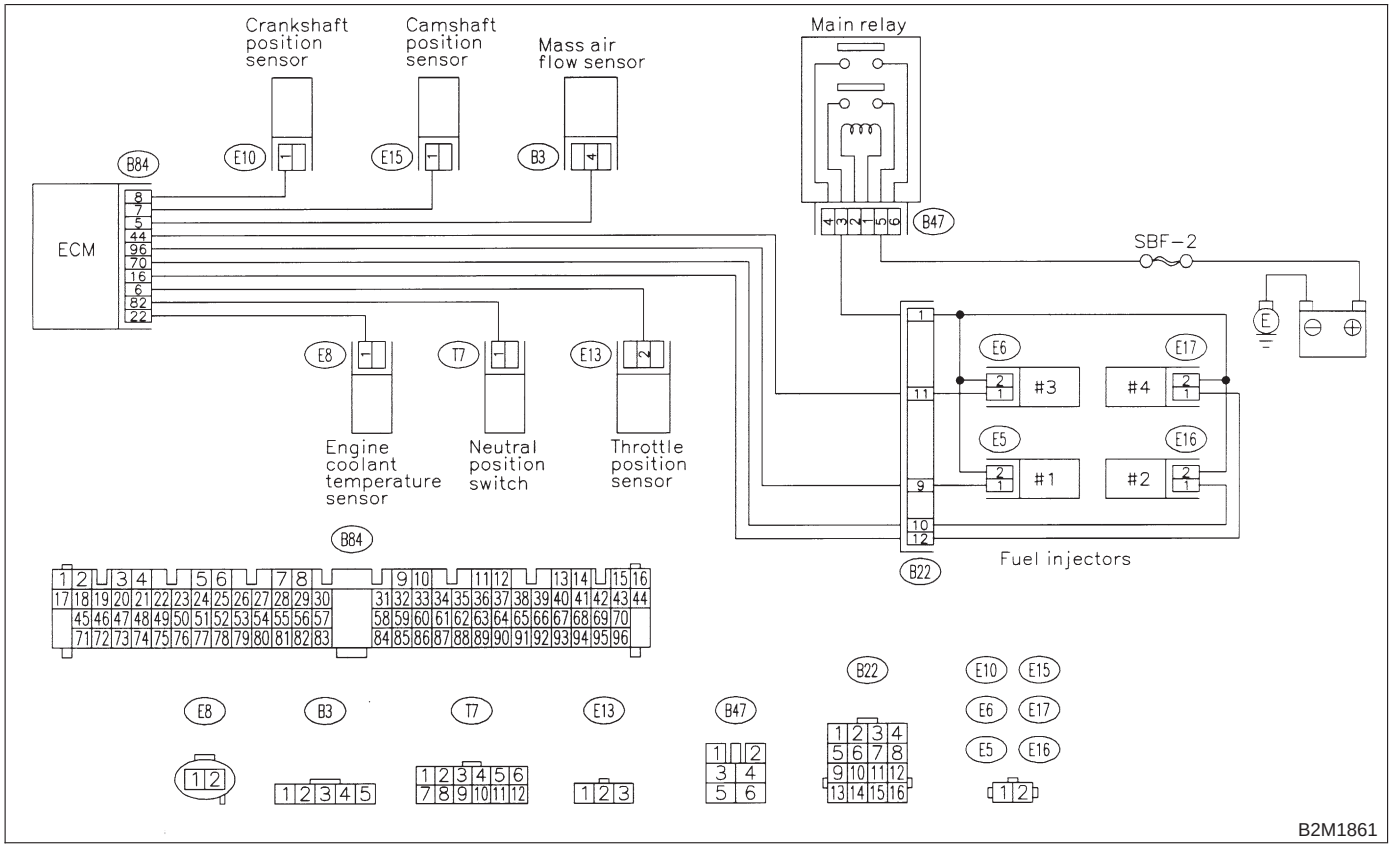
AH: DTC P0303 — CYLINDER 3 MISFIRE DETECTED —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11AI0].
<Ref. to 2-7 [T11AI0].>

AI: DTC P0304 — CYLINDER 4 MISFIRE DETECTED —

NOTE:
Check fuel injection control system.
<Ref. to 2-7 [T10AI0].>

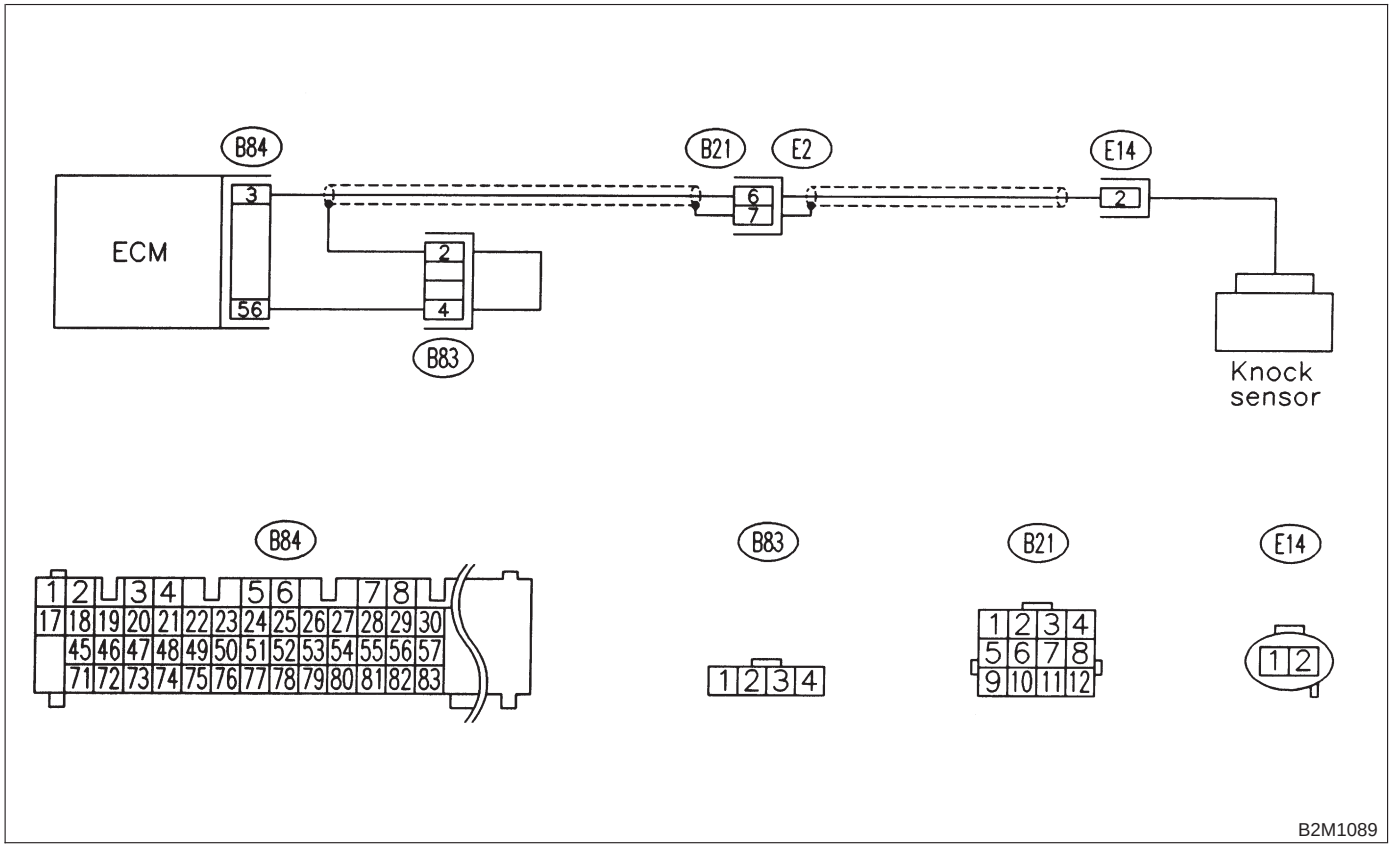
- **WIRING DIAGRAM:**



AJ: DTC P0325 — KNOCK SENSOR CIRCUIT MALFUNCTION —

NOTE:
Check knock sensor circuit.
<Ref. to 2-7 [T10AJ0].>

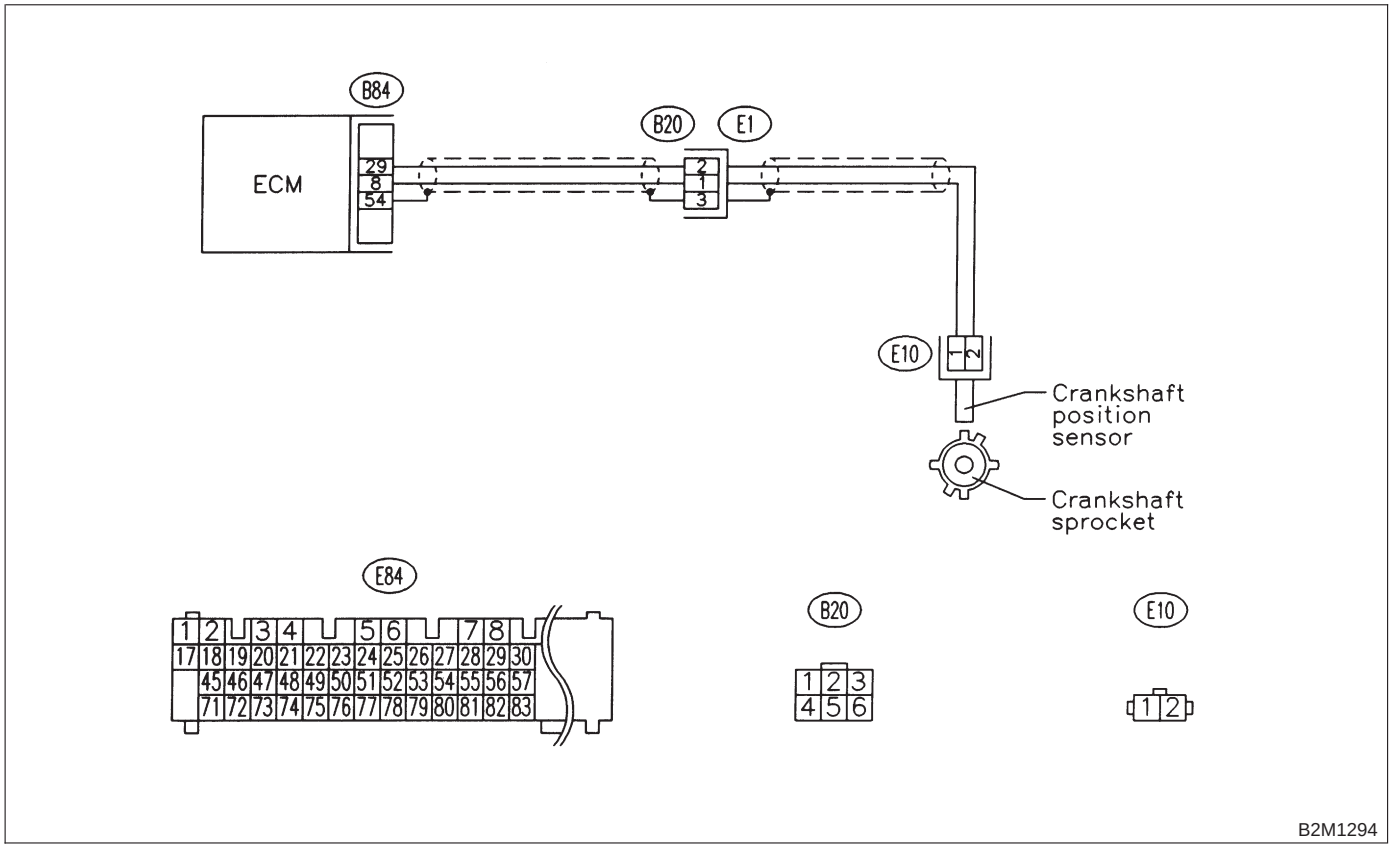
- **WIRING DIAGRAM:**



AK: DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —

NOTE:
Check crankshaft position sensor circuit.
<Ref. to 2-7 [T10AK0].>

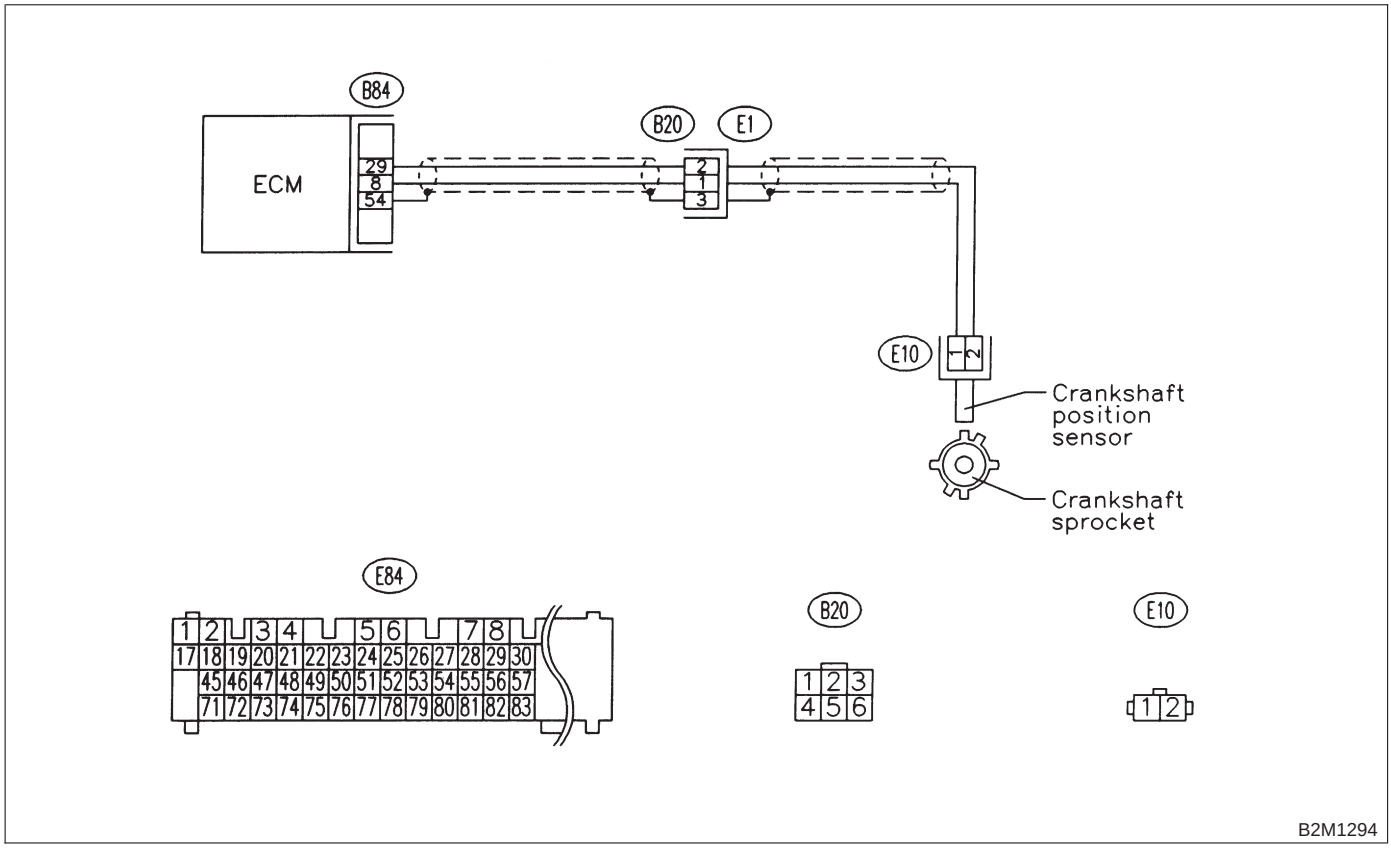
- **WIRING DIAGRAM:**



AL: DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

NOTE:
Check crankshaft position sensor circuit.
<Ref. to 2-7 [T10AL0].>

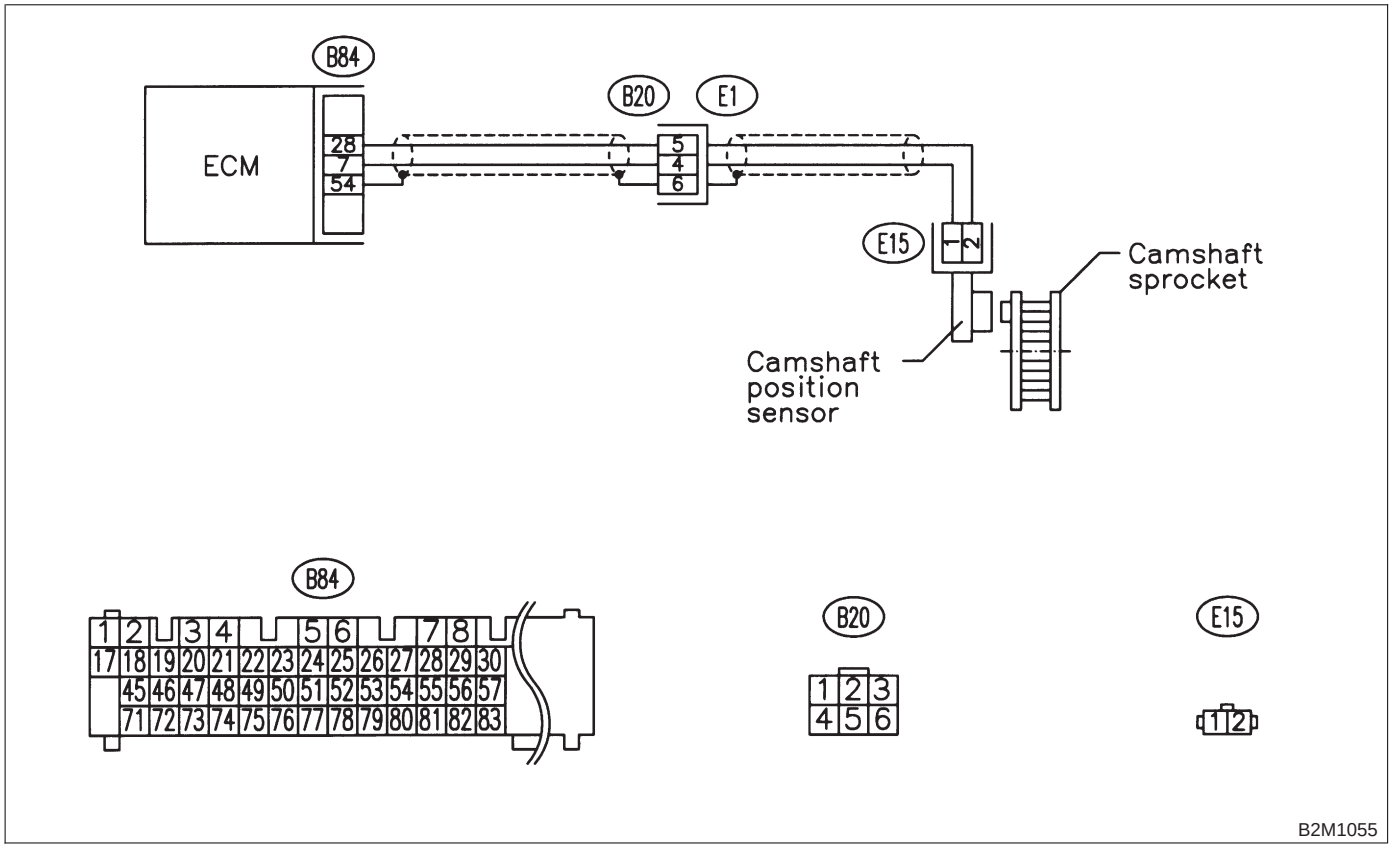
- **WIRING DIAGRAM:**



AM: DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —

NOTE:
Check camshaft position sensor circuit.
<Ref. to 2-7 [T10AM0].>

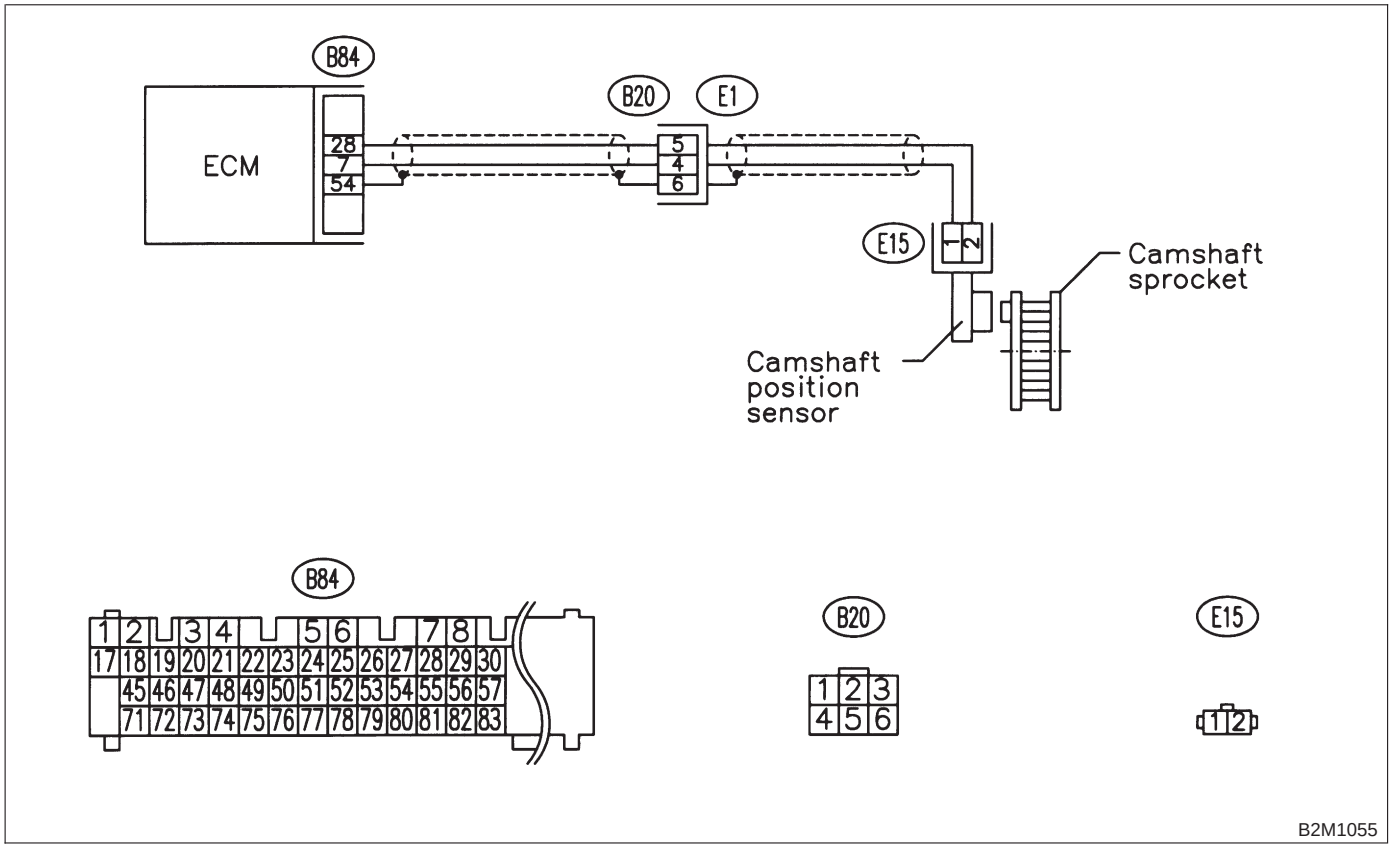
- **WIRING DIAGRAM:**



AN: DTC P0341 — CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

NOTE:
Check camshaft position sensor circuit.
<Ref. to 2-7 [T10AN0].>

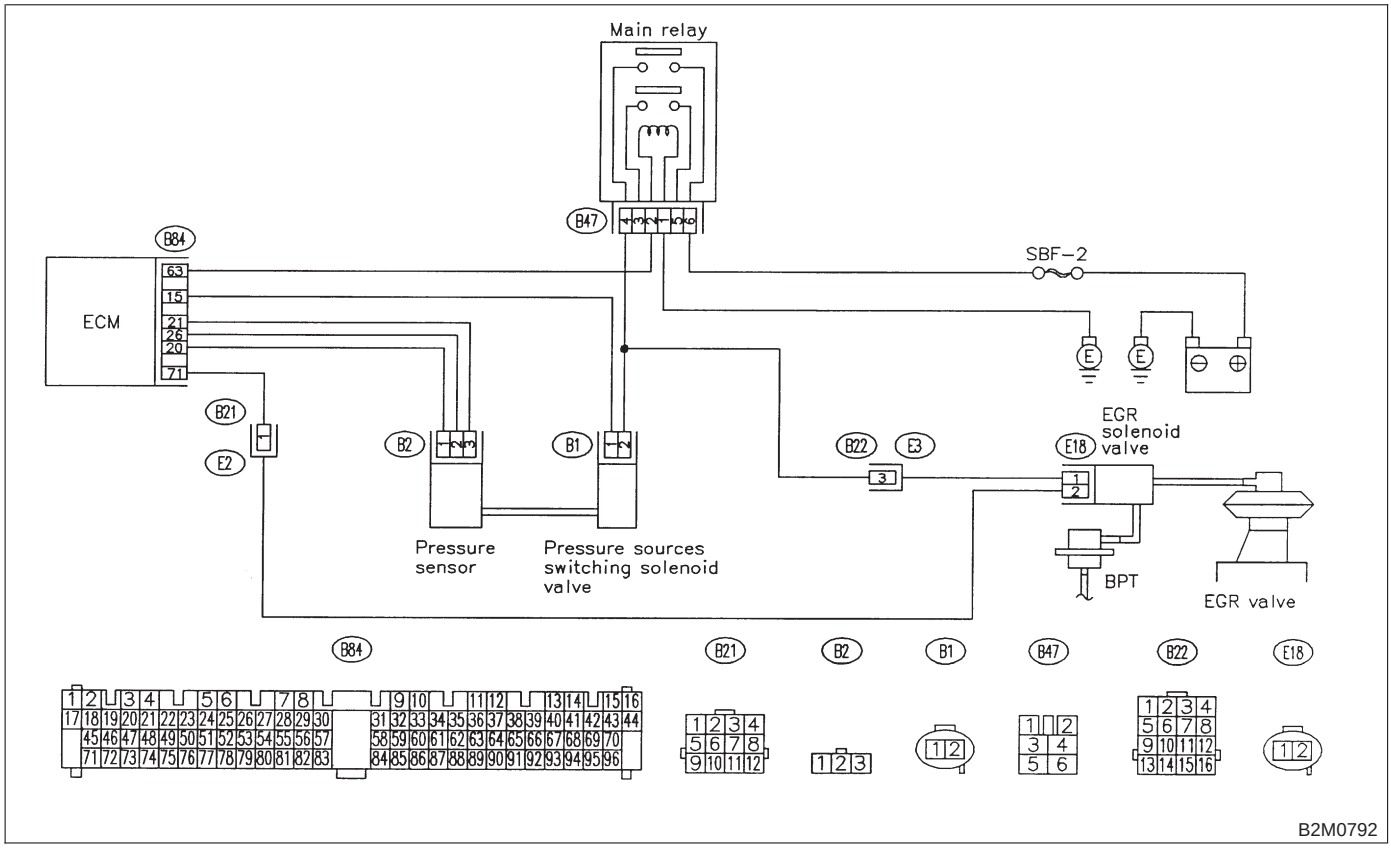
- **WIRING DIAGRAM:**



AO: DTC P0400 — EXHAUST GAS RECIRCULATION FLOW MALFUNCTION —

NOTE:
Check exhaust gas recirculation control system.
<Ref. to 2-7 [T10AO0].>

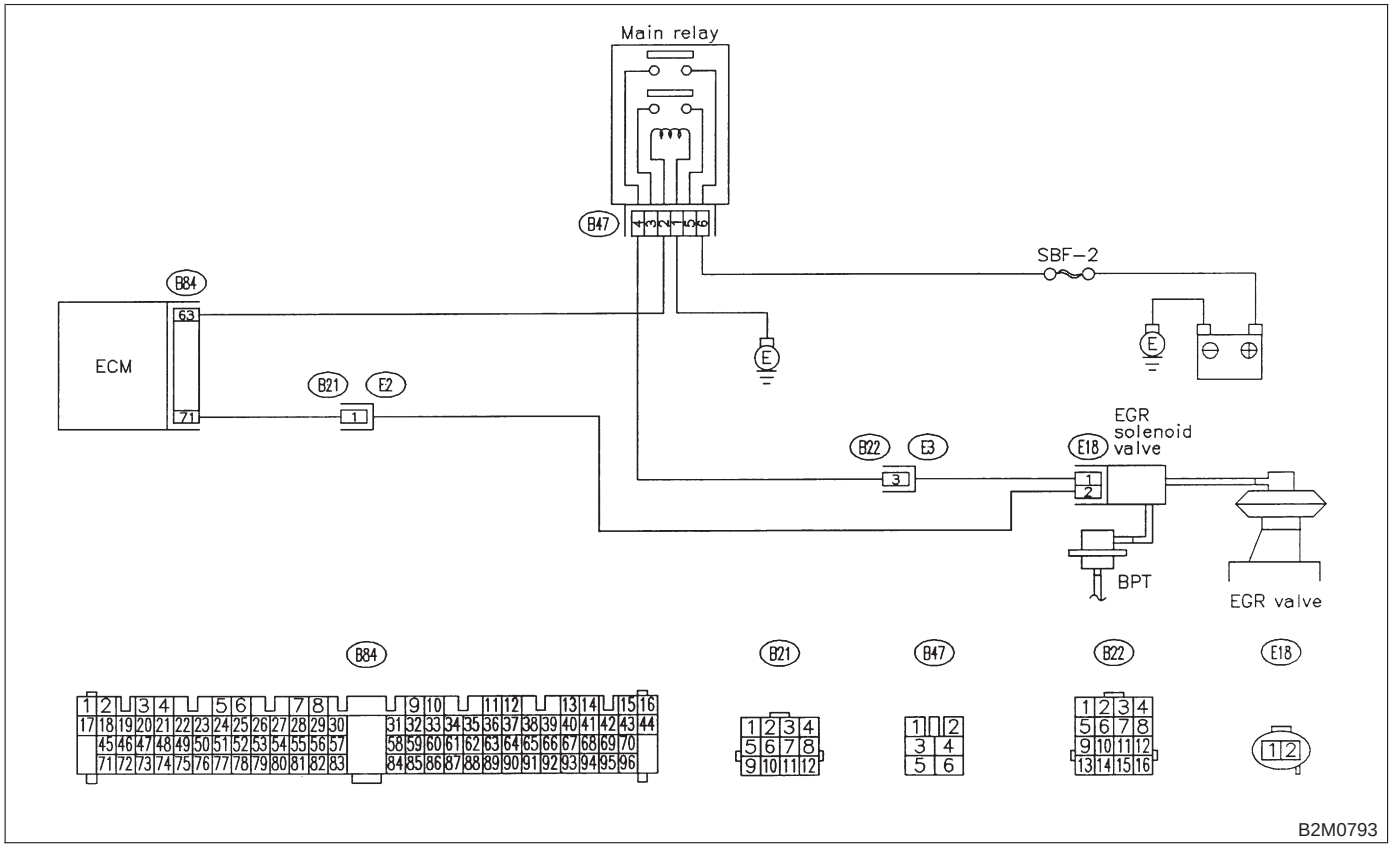
- **WIRING DIAGRAM:**



AP: DTC P0403 — EXHAUST GAS RECIRCULATION CIRCUIT LOW INPUT —

NOTE:
Check exhaust gas recirculation control solenoid valve circuit.
<Ref. to 2-7 [T10AP0].>

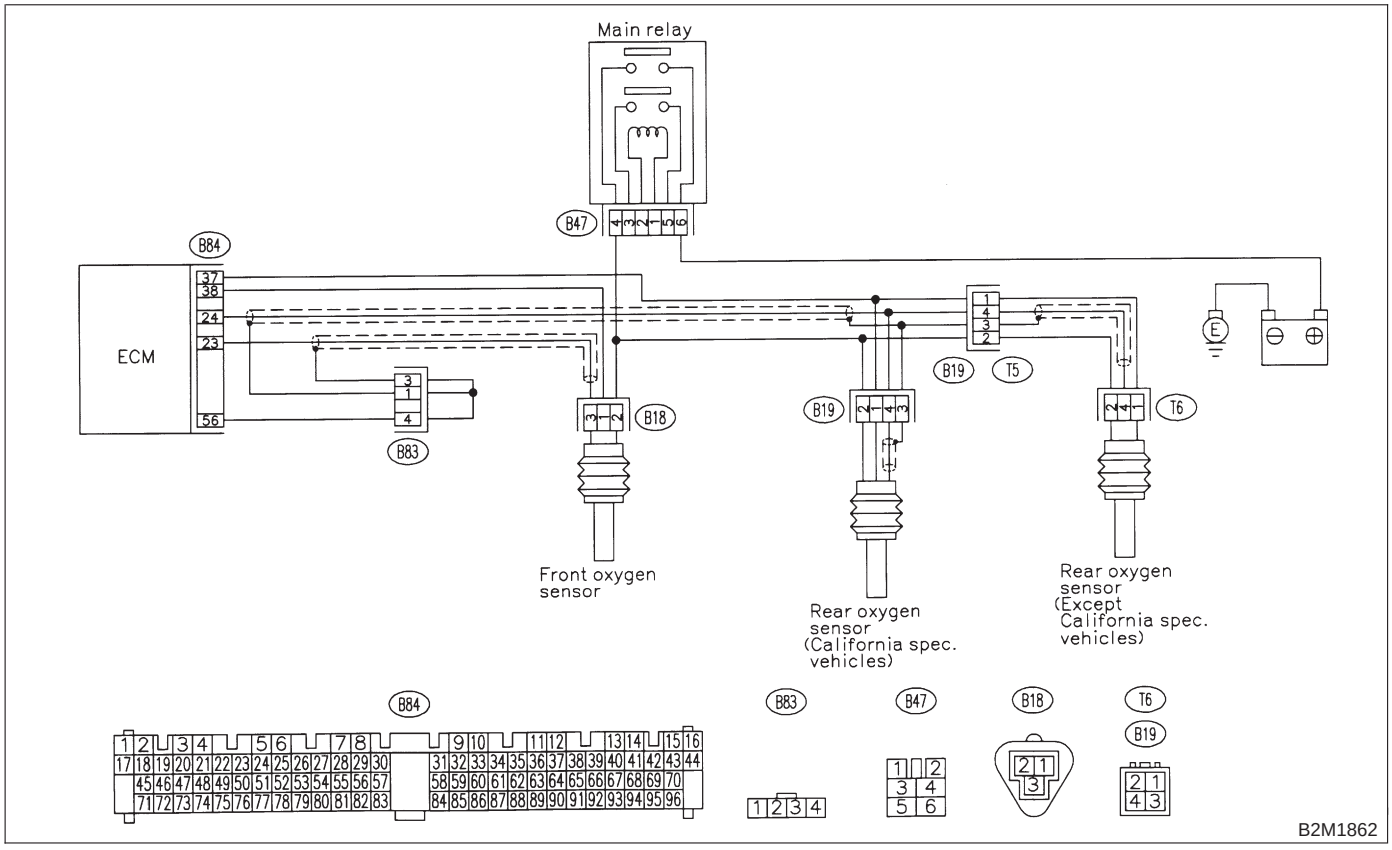
- **WIRING DIAGRAM:**



AQ: DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD —

NOTE:
Check catalyst system.
<Ref. to 2-7 [T10AQ0].>

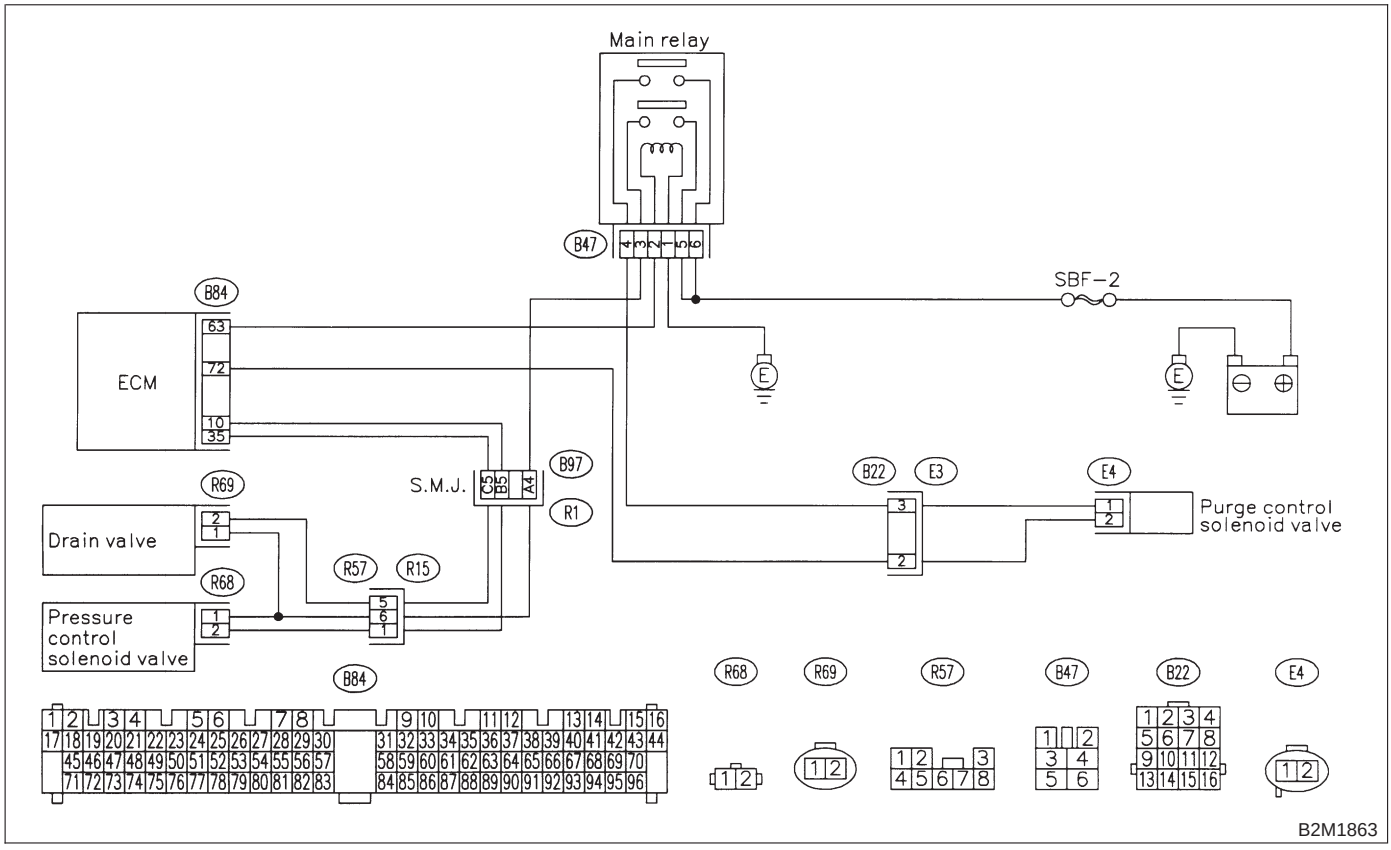
- **WIRING DIAGRAM:**



AR: DTC P0440 — EVAPORATIVE EMISSION CONTROL SYSTEM MALFUNCTION —

NOTE:
Check evaporative emission control system.
<Ref. to 2-7 [T10AR0].>

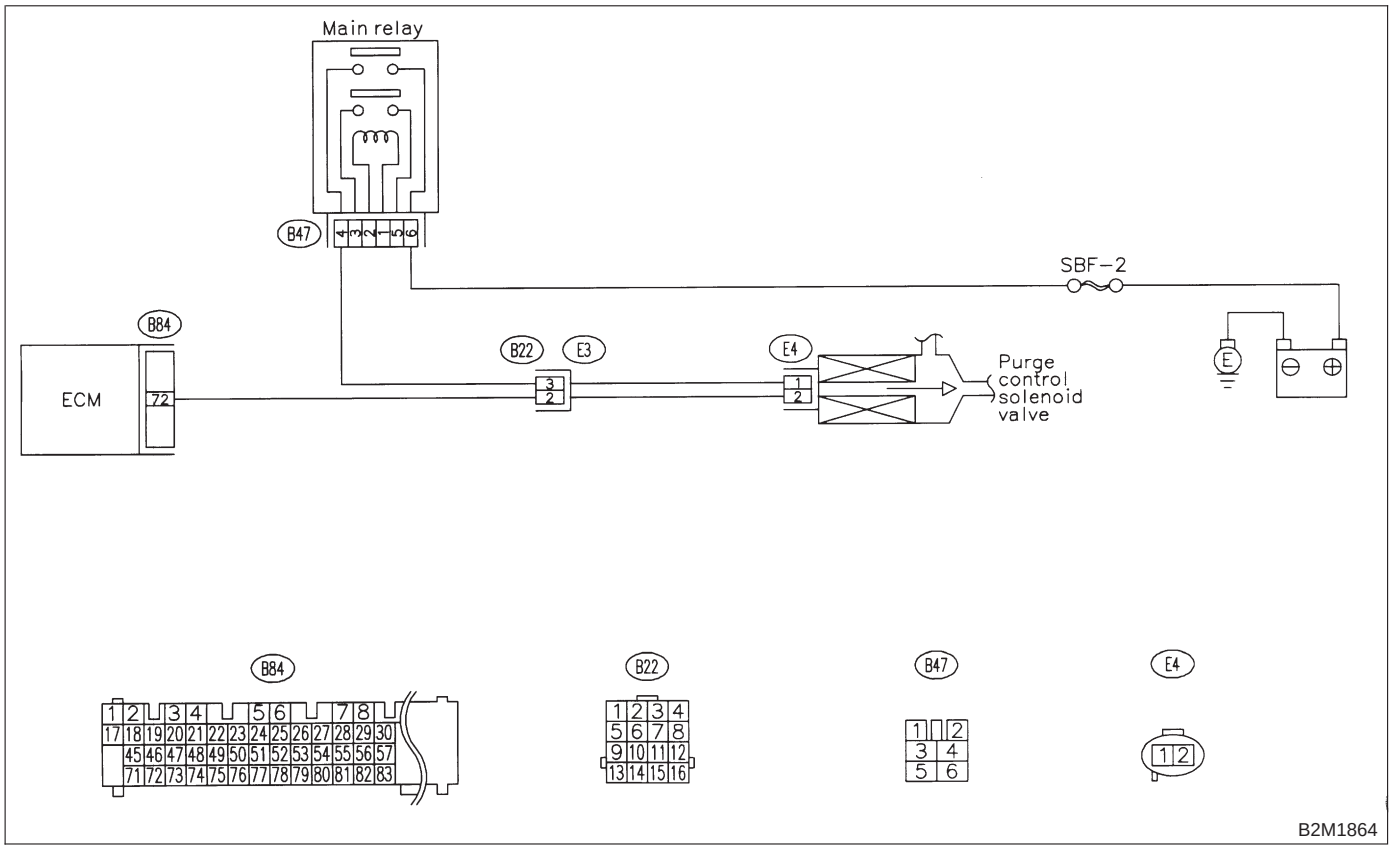
- **WIRING DIAGRAM:**



AS: DTC P0441 — EVAPORATIVE EMISSION CONTROL SYSTEM INCORRECT PURGE FLOW —

NOTE:
Check canister purge control system.
<Ref. to 2-7 [T10AS0].>

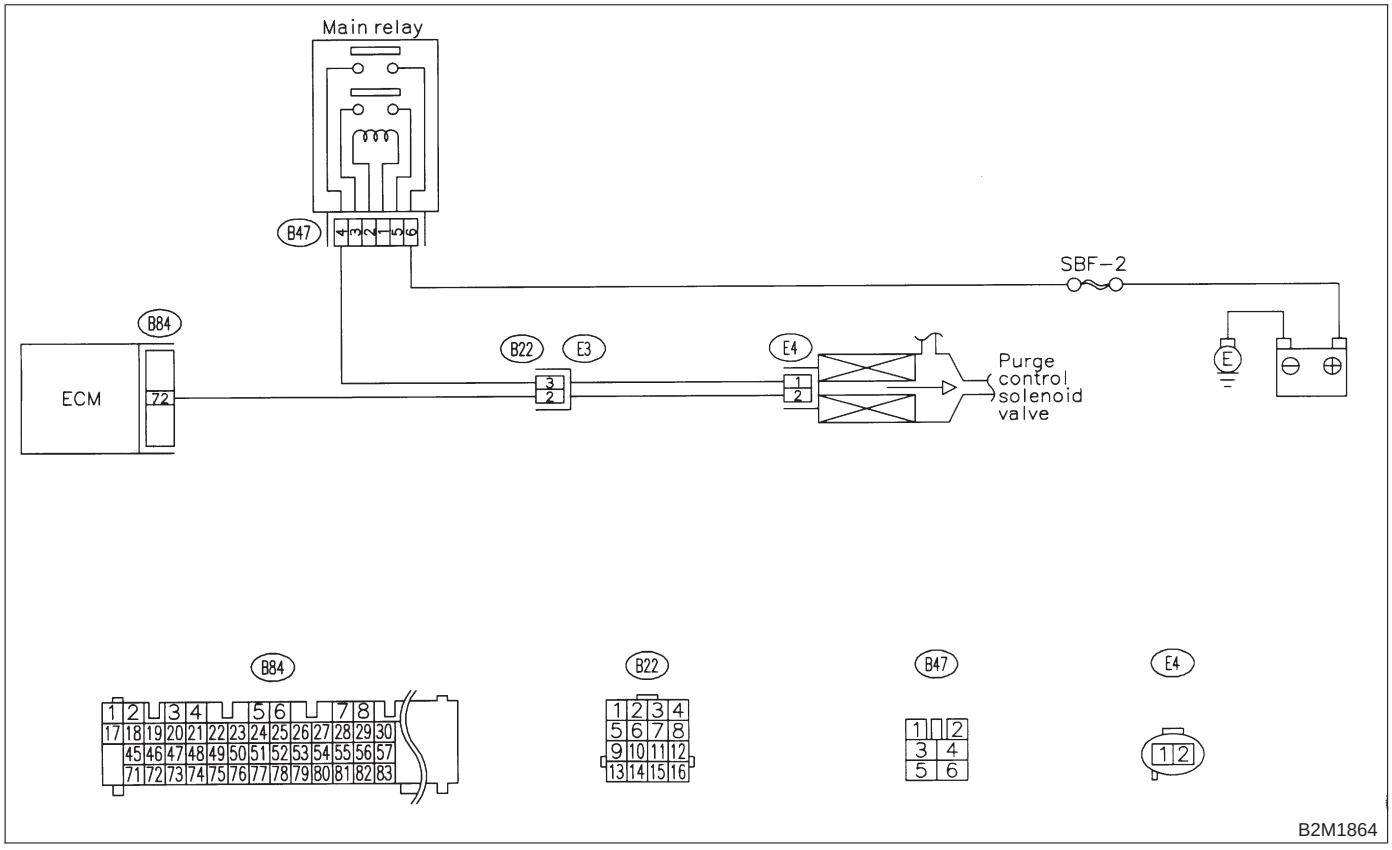
- **WIRING DIAGRAM:**



AT: DTC P0443 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW INPUT —

NOTE:
Check purge control solenoid valve circuit.
<Ref. to 2-7 [T10AT0].>

- **WIRING DIAGRAM:**

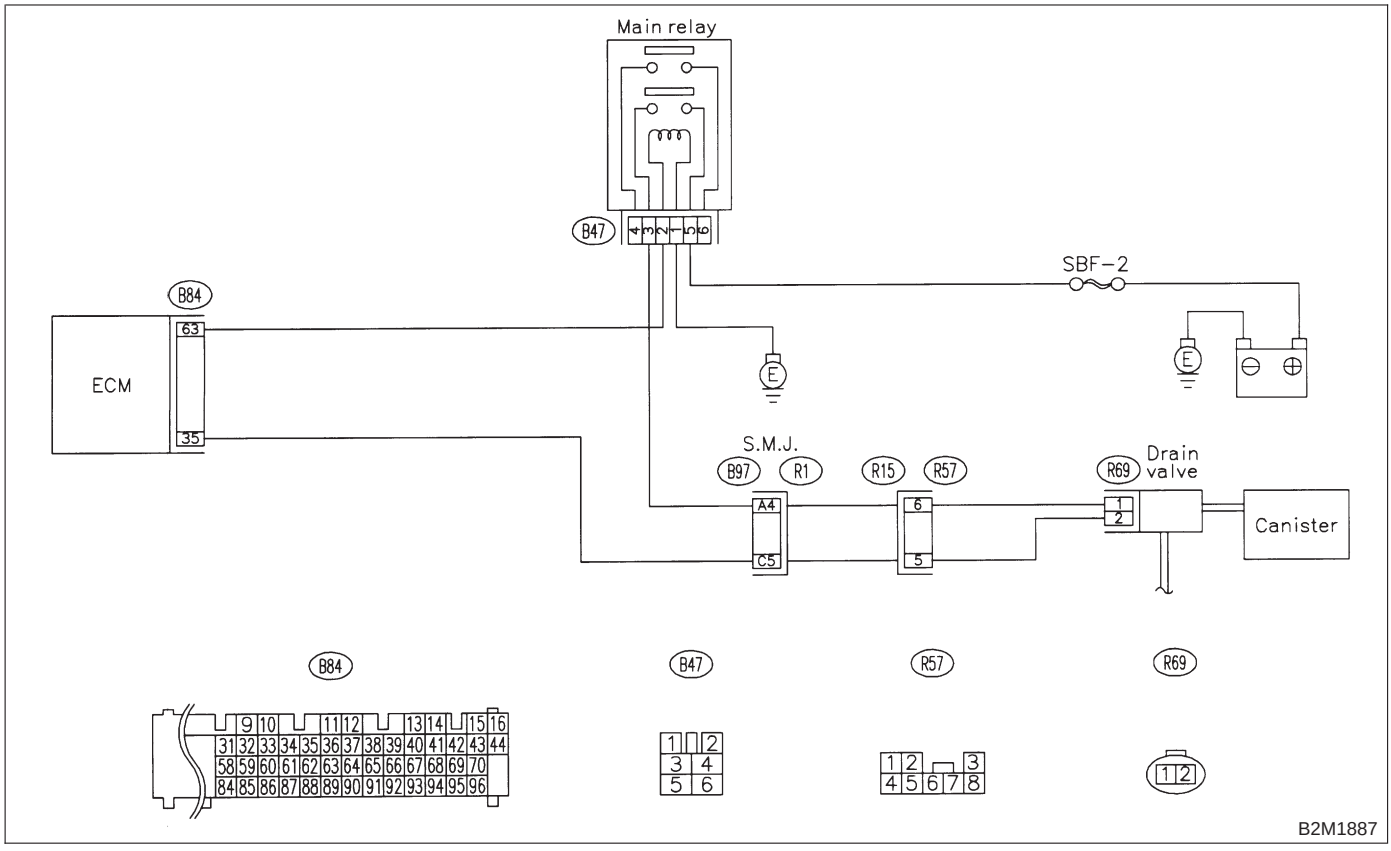


AU: DTC P0446 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

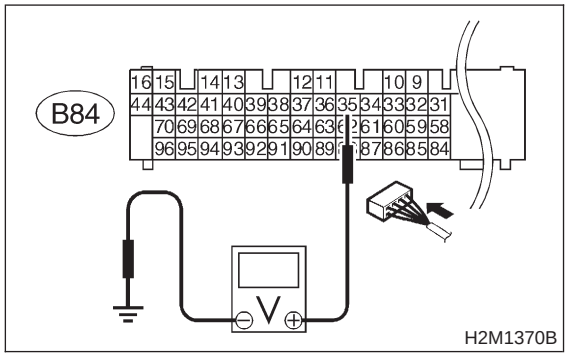
- **WIRING DIAGRAM:**



11AU1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 35 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **11AU2**.
NO : Go to step **11AU3**.

11AU2 : CHECK POOR CONTACT.

Check poor contact in ECM connector.
<Ref. to FOREWORD [T3C1].>

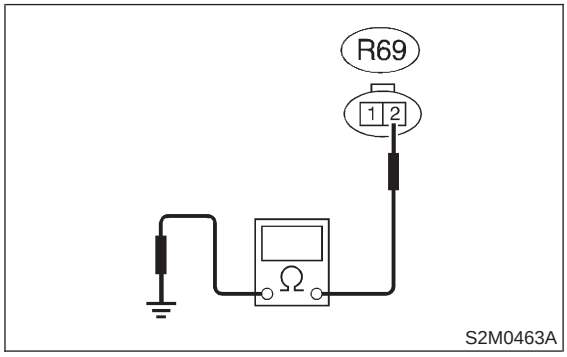
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.)

NOTE:
In this case, repair the following:
- Poor contact in drain valve connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (B97 and R57)

11AU3 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from drain valve and ECM.
3) Measure resistance of harness between drain valve connector and chassis ground.

Connector & terminal
(R69) No. 2 — Chassis ground:

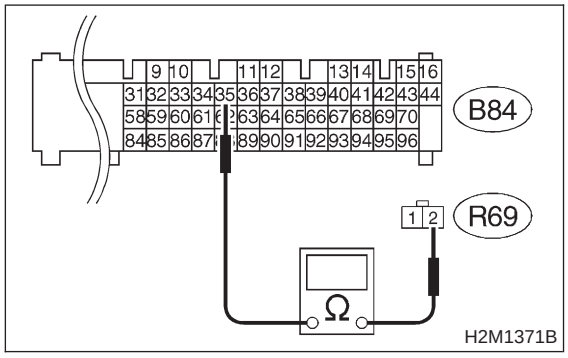


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and drain valve connector.
NO : Go to step **11AU4**.

11AU4 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and drain valve connector.

Connector & terminal
(B84) No. 35 — (R69) No. 2:



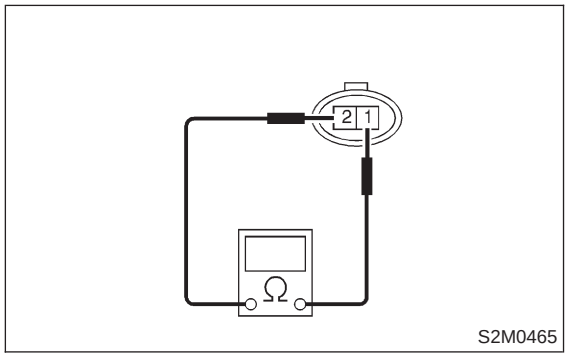
CHECK : ***Is the voltage less than 1 Ω?***
YES : Go to step **11AU5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and drain valve connector
- Poor contact in coupling connectors (B97 and R57)

11AU5 : CHECK DRAIN VALVE.

Measure resistance between drain valve terminals.

Terminals
No. 1 — No. 2:

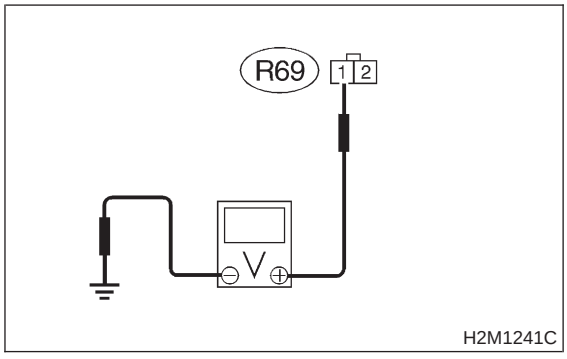


CHECK : ***Is the resistance between 10 and 100 Ω?***
YES : Go to step **11AU6**.
NO : Replace drain valve.

11AU6 : CHECK POWER SUPPLY TO DRAIN VALVE.

1) Turn ignition switch to ON.
2) Measure voltage between drain valve and chassis ground.

Connector & terminal
(R69) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **11AU7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between main relay and drain valve
- Poor contact in coupling connectors (B97 and R57)
- Poor contact in main relay connector

11AU7 : CHECK POOR CONTACT.

Check poor contact in vent control solenoid valve connector.
<Ref. to FOREWORD [T3C1].>

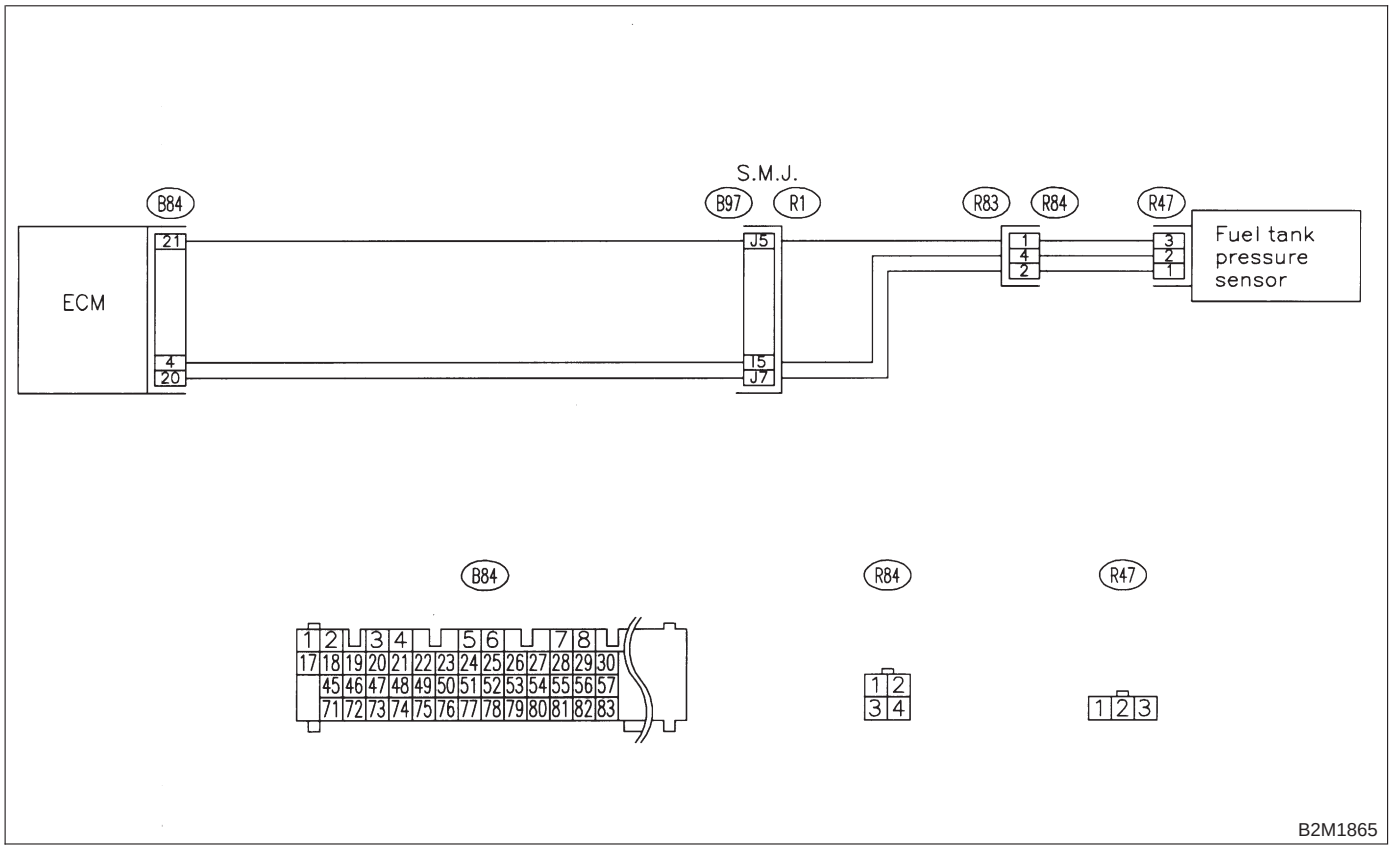
CHECK : ***Is there poor contact in drain valve connector?***
YES : Repair poor contact in drain valve connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AV: DTC P0451 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR RANGE/PERFORMANCE PROBLEM —

NOTE:
Check fuel tank pressure control system.
<Ref. to 2-7 [T10AW0].>

- **WIRING DIAGRAM:**

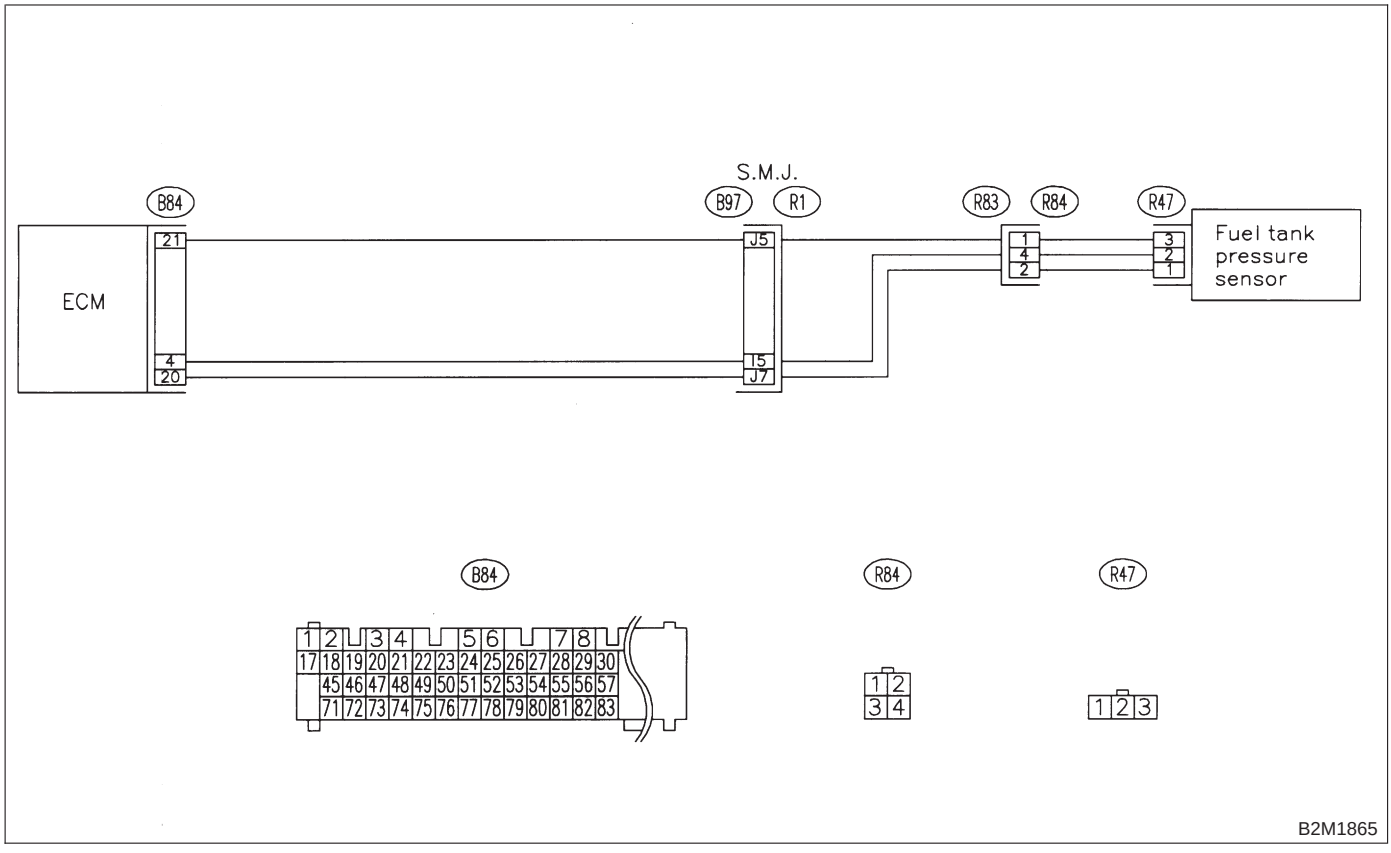


AW: DTC P0452 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

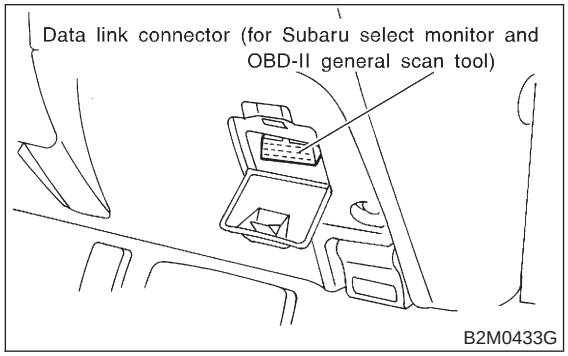
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11AW1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL, AND READ DATA.

1) Turn ignition switch to OFF.
2) Remove fuel filler cap.
3) Install fuel filler cap.
4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



5) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
6) Read the data of fuel tank pressure sensor signal using Subaru Select Monitor or the OBD-II general scan tool.

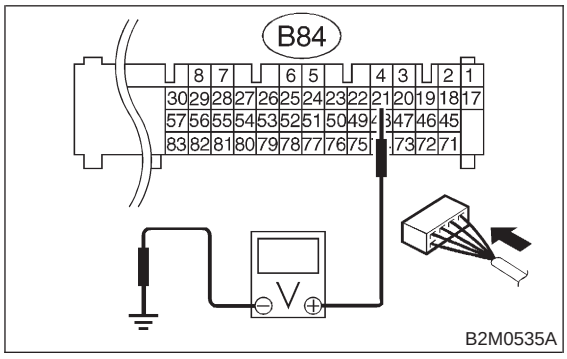
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value less than −2.8 kPa (−21.0 mmHg, −0.827 inHg)?***
YES : Go to step **11AW2**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time.

11AW2 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

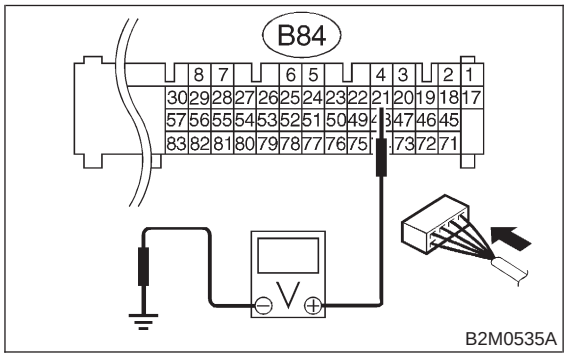
Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **11AW4**.
NO : Go to step **11AW3**.

11AW3 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.



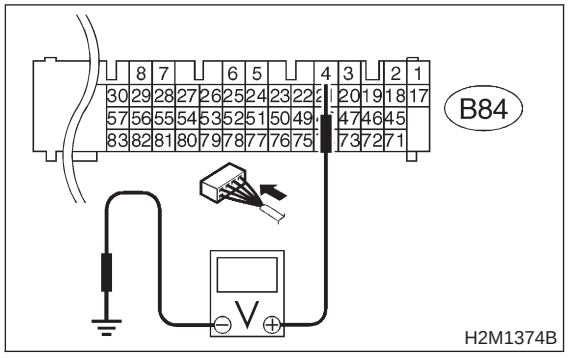
CHECK : ***Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11AW4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.2 V?***
YES : Go to step **11AW6**.
NO : Go to step **11AW5**.

11AW5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel tank pressure sensor signal using Subaru Select Monitor.

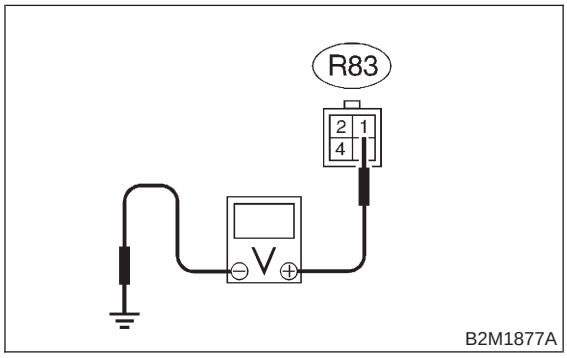
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>

CHECK : ***Does the value change more than −2.8 kPa (−21.0 mmHg, −0.827 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?***
YES : Repair poor contact in ECM connector.
NO : Go to step **11AW6**.

11AW6 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Remove rear seat cushion (Sedan) or move rear seat cushion (Wagon).
3) Separate rear wiring harness and fuel tank cord.
4) Turn ignition switch to ON.
5) Measure voltage between rear wiring harness connector and chassis ground.

Connector & terminal
(R83) No. 1 (+) — Chassis ground (−):



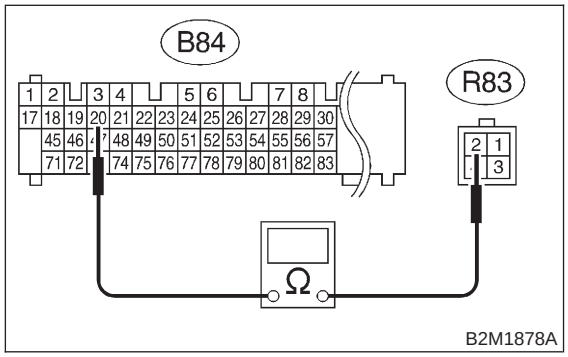
CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **11AW7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between ECM and rear wiring harness connector (R83)
● Poor contact in coupling connector (B97)

11AW7 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and rear wiring harness connector.

Connector & terminal
(B84) No. 20 — (R83) No. 2:



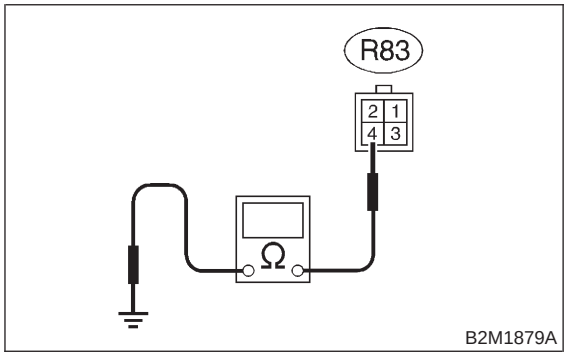
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **11AW8**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and rear wiring harness connector (R83)
- Poor contact in coupling connector (B97)

11AW8 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal
(R83) No. 4 — Chassis ground:

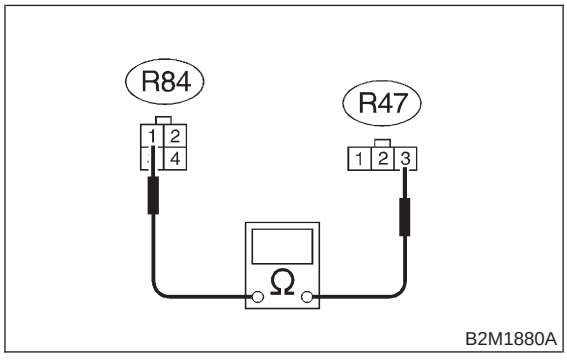


CHECK : ***Is the resistance more than 500 kΩ?***
YES : Go to step **11AW9**.
NO : Repair ground short circuit in harness between ECM and rear wiring harness connector (R83).

11AW9 : CHECK FUEL TANK CORD.

1) Remove fuel tank. <Ref. to 2-8 [W2A0].>
2) Disconnect connector from fuel tank pressure sensor.
3) Measure resistance of fuel tank cord.

Connector & terminal
(R84) No. 1 — (R47) No. 3:

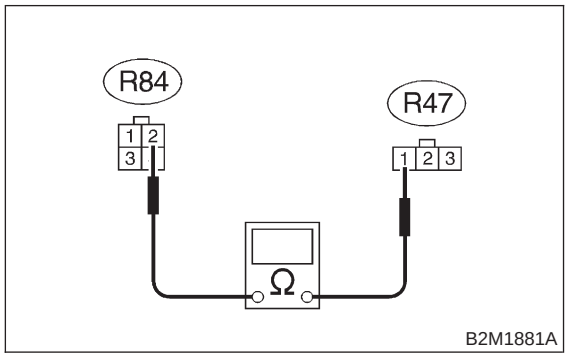


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **11AW10**.
NO : Repair open circuit in fuel tank cord.

11AW10 : CHECK FUEL TANK CORD.

Measure resistance of fuel tank cord.

Connector & terminal
(R84) No. 2 — (R47) No. 1:

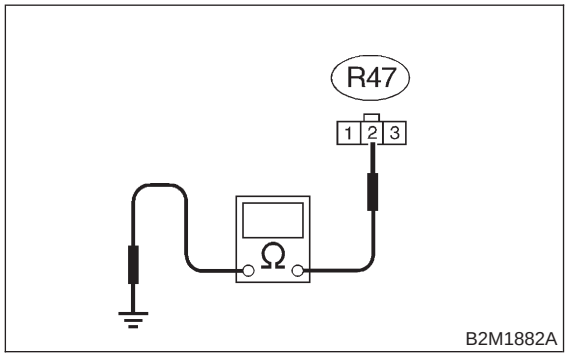


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **11AW11**.
NO : Repair open circuit in fuel tank cord.

11AW11 : CHECK FUEL TANK CORD.

Measure resistance of harness between fuel tank pressure sensor connector and chassis ground.

Connector & terminal
(R47) No. 2 — Chassis ground:



CHECK : ***Is the resistance more than 500 kΩ?***
YES : Go to step **11AW12**.
NO : Repair ground short circuit in fuel tank cord.

11AW12 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in fuel tank pressure sensor connector?***
YES : Repair poor contact in fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor.

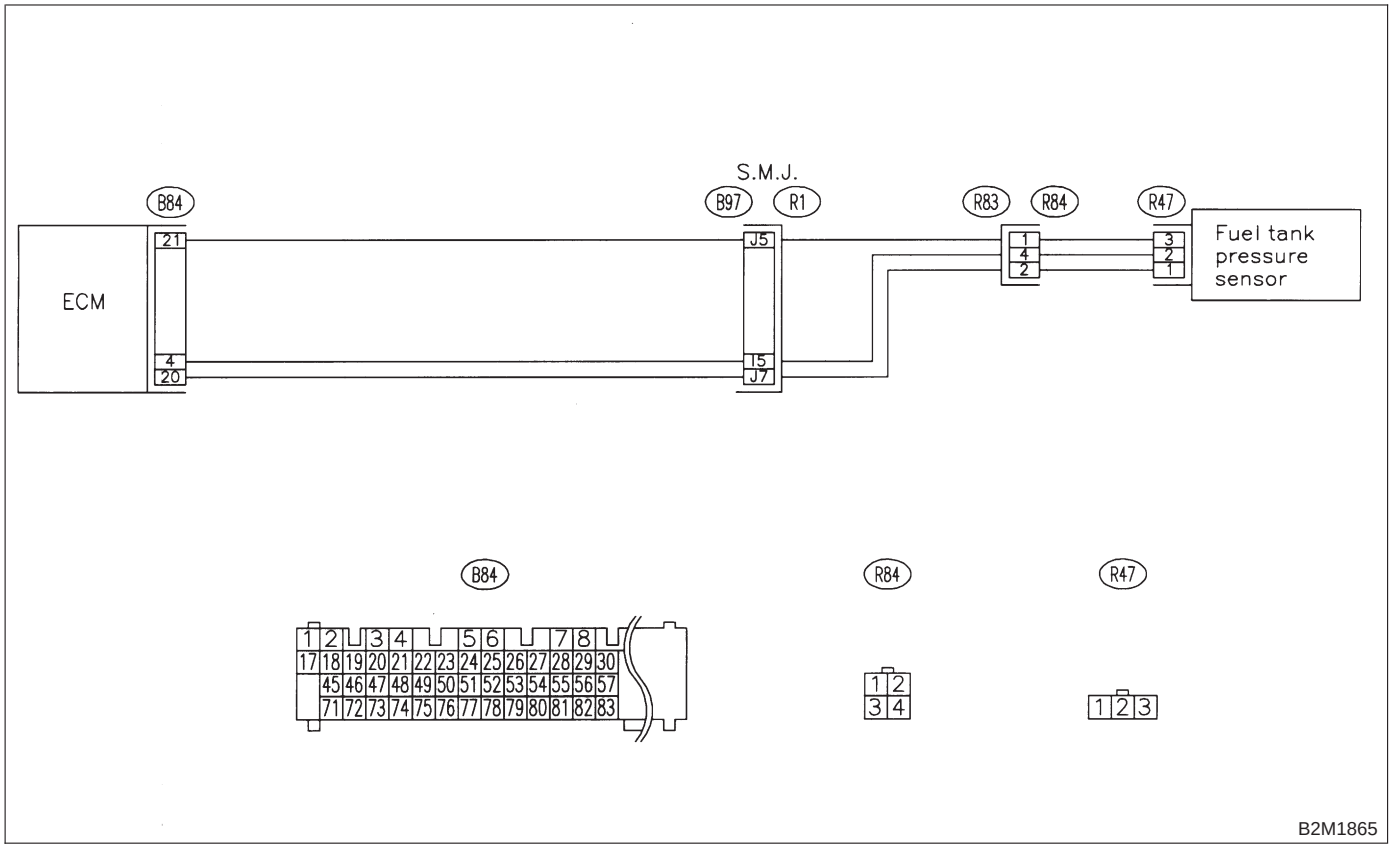
MEMO:

AX: DTC P0453 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

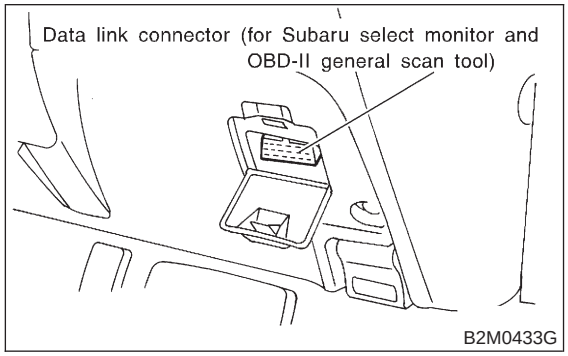
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11AX1 : CONNECT SUBARU SELECT MONITOR OR THE OBD-II GENERAL SCAN TOOL AND READ DATA.

1) Turn ignition switch to OFF.
2) Remove fuel filler cap.
3) Install fuel filler cap.
4) Connect Subaru Select Monitor or the OBD-II general scan tool to data link connector.



5) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
6) Read data of fuel tank pressure sensor signal using Subaru Select Monitor or OBD-II general scan tool.

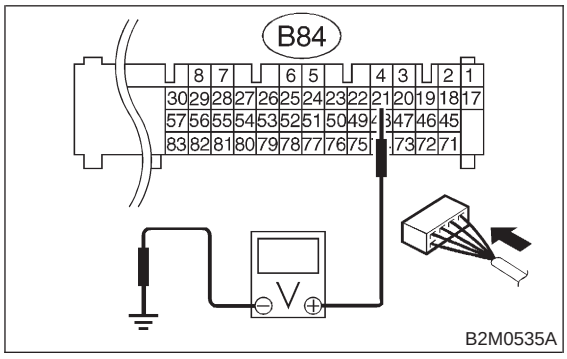
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

CHECK : ***Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?***
YES : Go to step **11AX12**.
NO : Go to step **11AX2**.

11AX2 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):

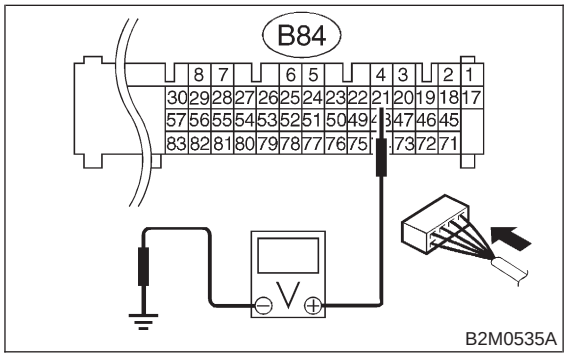


CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **11AX4**.
NO : Go to step **11AX3**.

11AX3 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.

Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 21 (+) — Chassis ground (−):

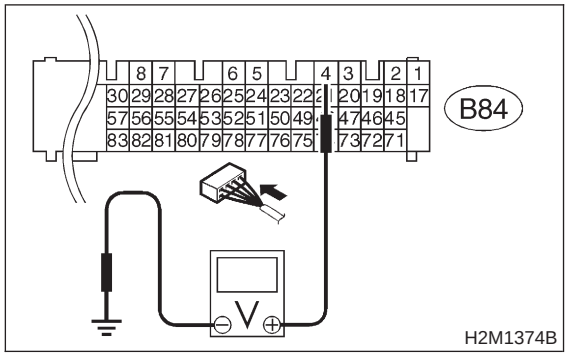


CHECK : ***Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

11AX4 : CHECK INPUT SIGNAL FOR ECM.

Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.2 V?***
YES : Go to step **11AX6**.
NO : Go to step **11AX5**.

11AX5 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel tank pressure sensor signal using Subaru Select Monitor.

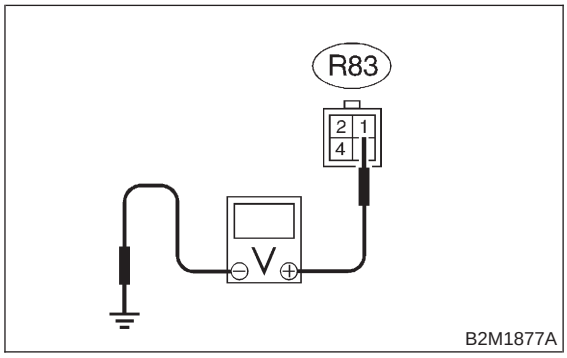
NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>

CHECK : ***Does the value change more than −2.8 kPa (−21.0 mmHg, −0.827 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru select monitor?***
YES : Repair poor contact in ECM connector.
NO : Go to step **11AX6**.

11AX6 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Remove rear seat cushion (Sedan) or move rear seat cushion (Wagon).
3) Separate rear wiring harness and fuel tank cord.
4) Turn ignition switch to ON.
5) Measure voltage between rear wiring harness connector and chassis ground.

Connector & terminal
(R83) No. 1 (+) — Chassis ground (−):



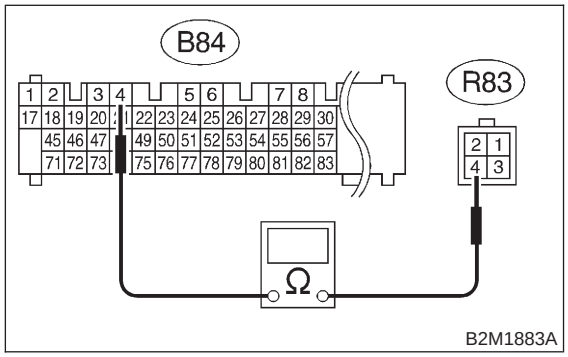
CHECK : ***Is the voltage more than 4.5 V?***
YES : Go to step **11AX7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between ECM and rear wiring harness connector (R83)
● Poor contact in coupling connector (B97)

11AX7 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Measure resistance of harness between ECM and rear wiring harness connector.

Connector & terminal
(B84) No. 4 — (R83) No. 4:



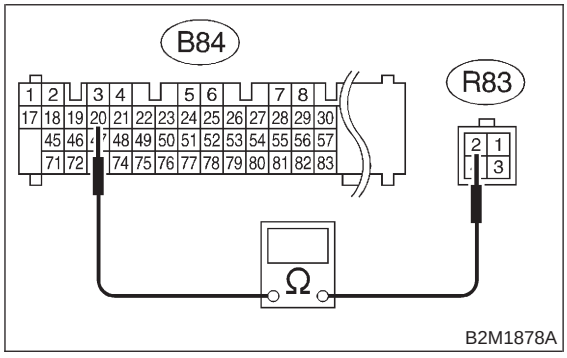
CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **11AX8**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and rear wiring harness connector (R83)
- Poor contact in coupling connector (B97)

11AX8 : CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.

Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal
(B84) No. 20 — (R83) No. 2:

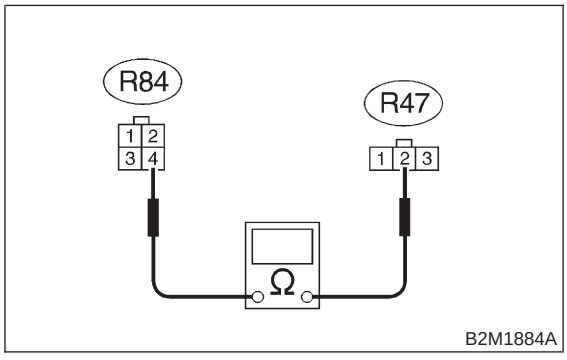


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **11AX9**.
NO : Repair ground short circuit in harness between ECM and rear wiring harness connector (R83).

11AX9 : CHECK FUEL TANK CORD.

1) Remove fuel tank. <Ref. to 2-8 [W2A0].>
2) Disconnect connector from fuel tank pressure sensor.
3) Measure resistance of fuel tank cord.

Connector & terminal
(R84) No. 4 — (R47) No. 2:

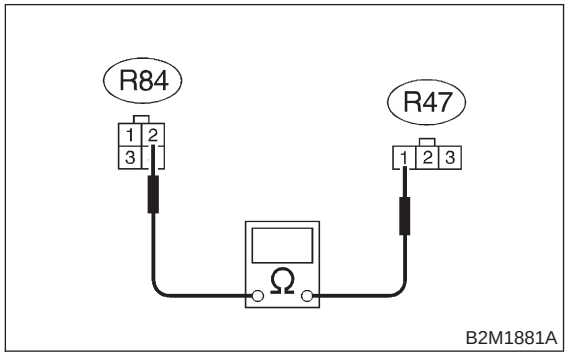


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **11AX10**.
NO : Repair open circuit in fuel tank cord.

11AX10 : CHECK FUEL TANK CORD.

Measure resistance of fuel tank cord.

Connector & terminal
(R84) No. 2 — (R47) No. 1:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **11AX11**.
NO : Repair open circuit in fuel tank cord.

11AX11 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure sensor connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in fuel tank pressure sensor connector?***
YES : Repair poor contact in fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor.

11AX12 : CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.

1) Turn ignition switch to OFF and Subaru Select Monitor or the OBD-II general scan tool switch to OFF.
2) Remove fuel tank. <Ref. to 2-8 [W2A0].>
3) Remove fuel tank cord from fuel tank.
4) Connect fuel tank cord to rear wiring harness.
5) Remove fuel filler cap.
6) Install fuel filler cap.
7) Turn ignition switch to ON and Subaru Select Monitor or the OBD-II general scan tool switch to ON.
8) Read data of fuel tank pressure sensor signal using Subaru select monitor or the OBD-II general scan tool.

NOTE:
● Subaru Select Monitor
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>
● OBD-II general scan tool
For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

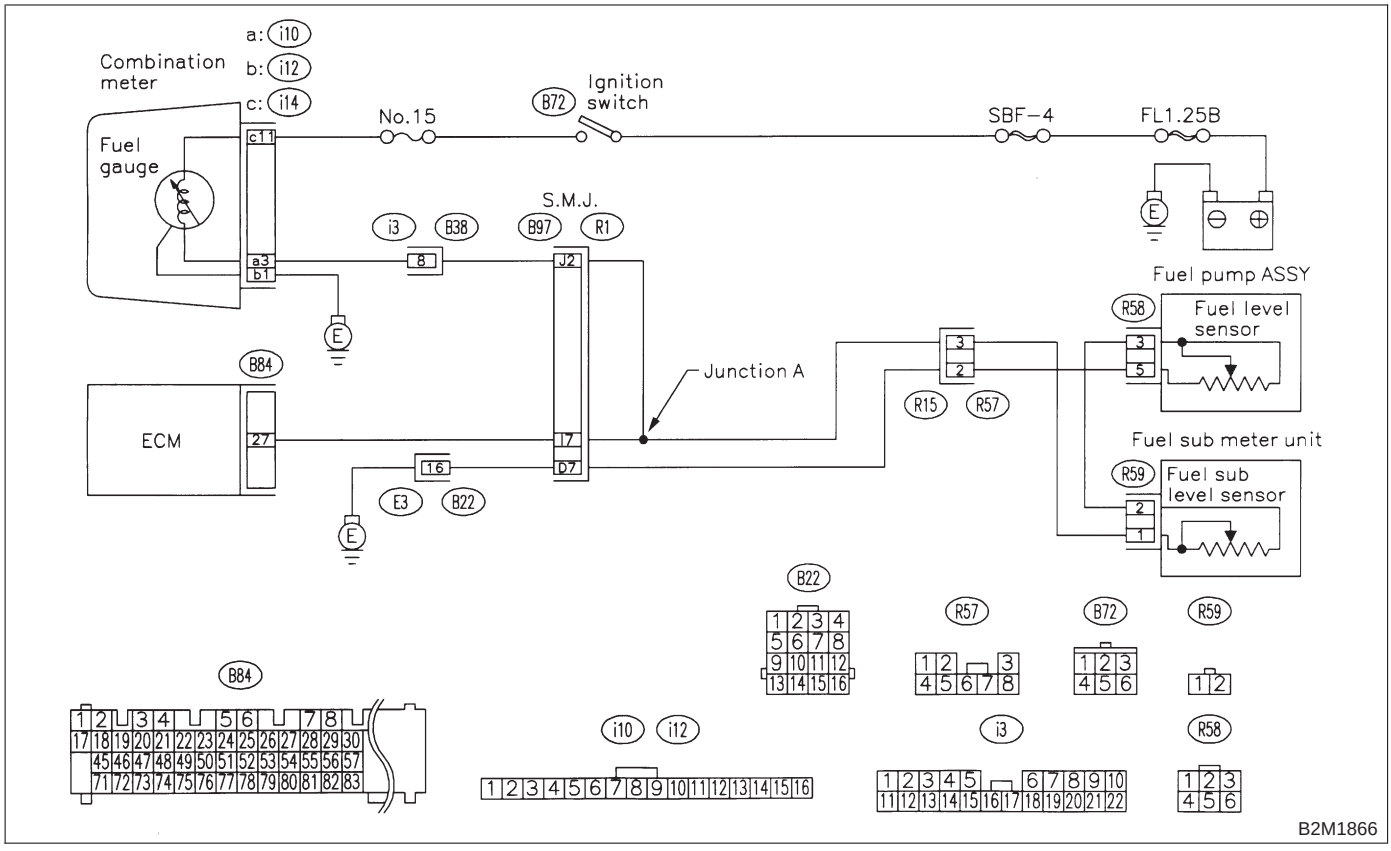
CHECK : ***Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?***
YES : Repair battery short circuit in harness between ECM and fuel tank pressure sensor connector.
NO : Replace fuel tank pressure sensor.

AY: DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11AY1 : CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0462 or P0463?***

YES : Inspect DTC P0462 or P0463 using “11. Diagnostics Chart with Trouble Code for RHD Vehicles”. <Ref. to 2-7 [T1100].>

NOTE:
In this case, it is not necessary to inspect this trouble.

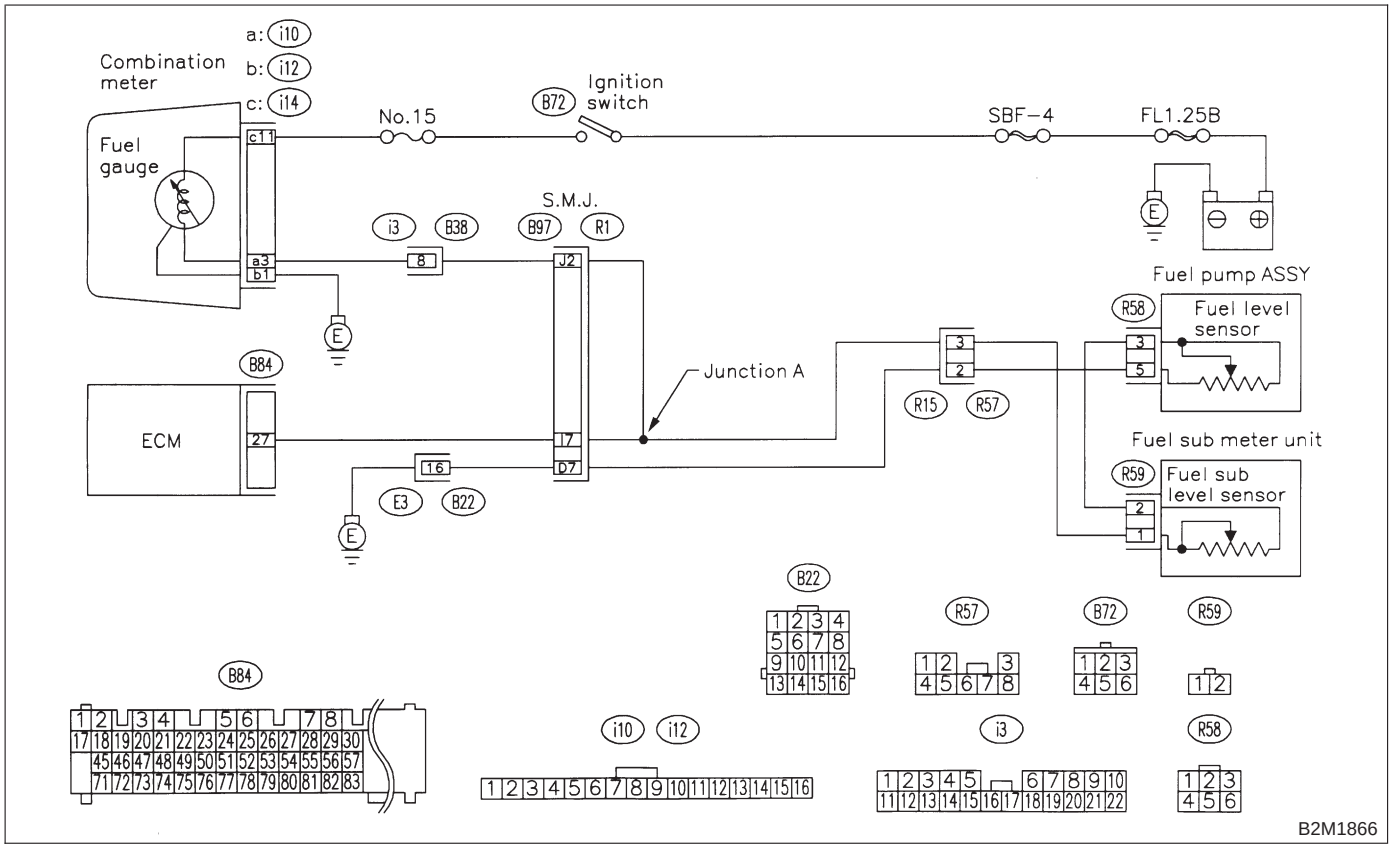
NO : Replace fuel sending unit and fuel sub meter unit.

AZ: DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11AZ1 :	CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.

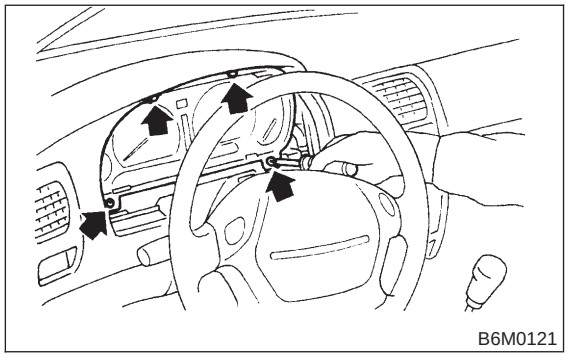
CHECK : ***Does speedometer and tachometer operate normally?***

YES : Go to step **11AZ3**.

NO : Go to step **11AZ2**.

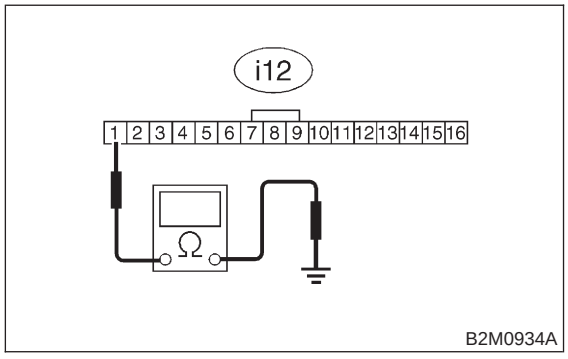
11AZ2 : CHECK GROUND CIRCUIT OF COMBINATION METER.

1) Turn ignition switch to OFF.
2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W14A1].>



3) Disconnect connector from combination meter.
4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal
(i12) No. 1 — Chassis ground:



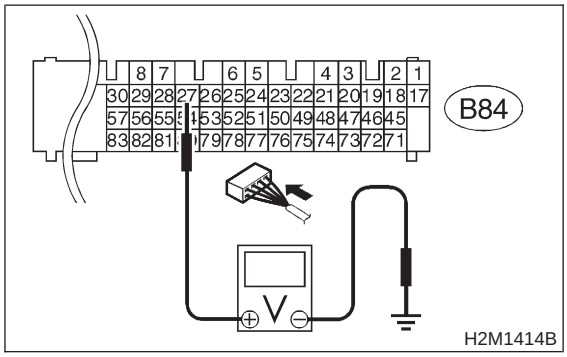
CHECK : ***Is resistance less than 5 Ω?***
YES : Repair or replace combination meter.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between combination meter connector and grounding terminal
- Poor contact in combination meter connector
- Poor contact in grounding terminal

11AZ3 : CHECK INPUT SIGNAL FOR ECM.

1) Turn ignition switch to ON. (Engine OFF)
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 27 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 0.12 V?***
YES : Go to step **11AZ5**.
NO : Go to step **11AZ4**.

11AZ4 : CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)

Read data of fuel level sensor signal using Subaru Select Monitor.

NOTE:
- Subaru Select Monitor

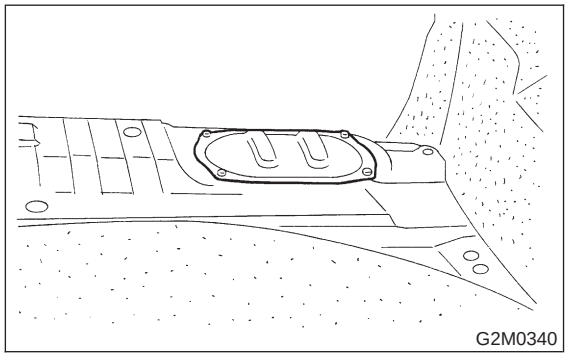
For detailed operation procedure, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to 2-7 [T3C4].>

CHECK : ***Does the value change less than 0.12 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?***
YES : Repair poor contact in ECM connector.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:
In this case, repair the following:
- Poor contact in fuel pump connector
- Poor contact in combination meter connector
- Poor contact in ECM connector
- Poor contact in coupling connectors (i3, B22, B97 and R57)

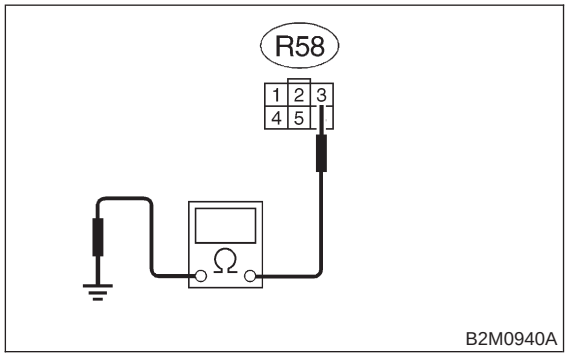
11AZ5 : CHECK HARNESS BETWEEN ECM, COMBINATION METER AND FUEL PUMP CONNECTOR.

1) Turn ignition switch to OFF.
2) Remove fuel pump access hole lid located on the right rear of luggage compartment floor.



3) Disconnect connector from fuel pump.
4) Measure resistance of harness between fuel pump connector and chassis ground.

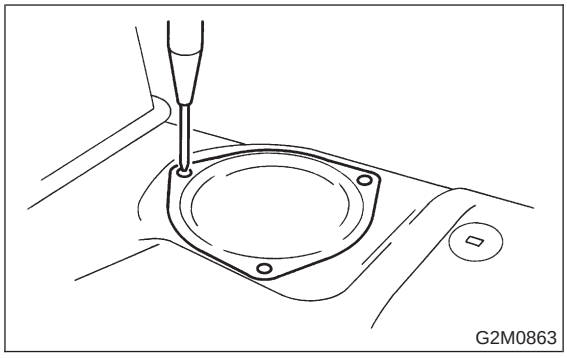
Connector & terminal
(R58) No. 3 — Chassis ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **11AZ6**.
NO : Go to step **11AZ11**.

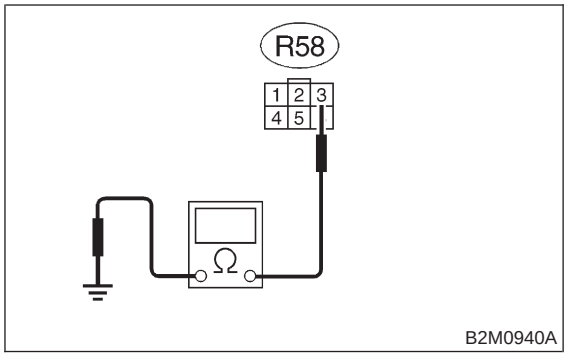
11AZ6 : CHECK FUEL TANK CORD.

1) Remove service hole cover located on the left rear of luggage compartment floor.



2) Disconnect connector from fuel sub meter unit.
3) Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 3 — Chassis ground:

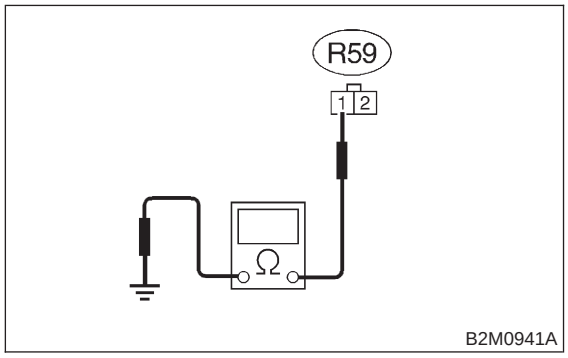


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between fuel pump and fuel sub meter unit connector.
NO : Go to step **11AZ7**.

11AZ7 : CHECK REAR WIRING HARNESS.

1) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15).
2) Measure resistance of harness between fuel sub meter unit connector and chassis ground.

Connector & terminal
(R59) No. 1 — Chassis ground:

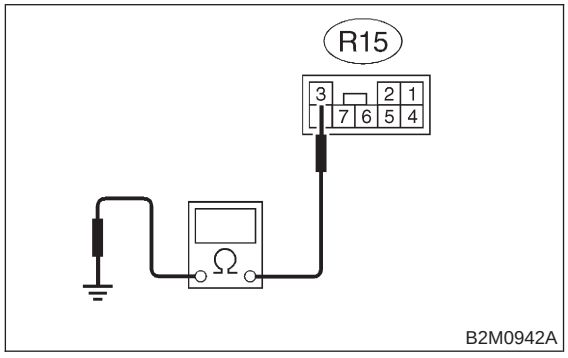


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in fuel tank cord.
NO : Go to step **11AZ8**.

11AZ8 : CHECK REAR, BULKHEAD AND INSTRUMENT PANEL WIRING HARNESS.

1) Separate rear wiring harness connector (R1) and bulkhead wiring harness connector (B97).
2) Measure resistance of harness between rear wiring harness connector and chassis ground.

Connector & terminal
(R15) No. 3 — Chassis ground:

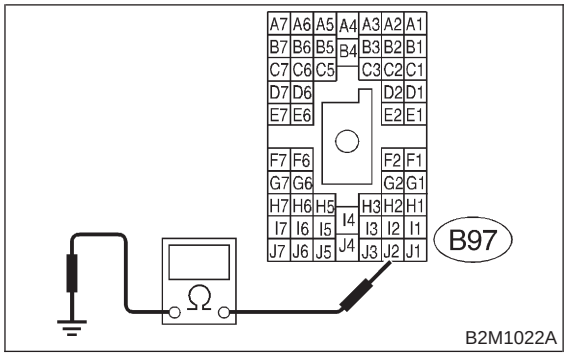


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in rear wiring harness.
NO : Go to step **11AZ9**.

11AZ9 : CHECK REAR WIRING HARNESS.

Measure resistance of harness between bulkhead wiring connector and chassis ground.

Connector & terminal
(B97) No. J2 — Chassis ground:

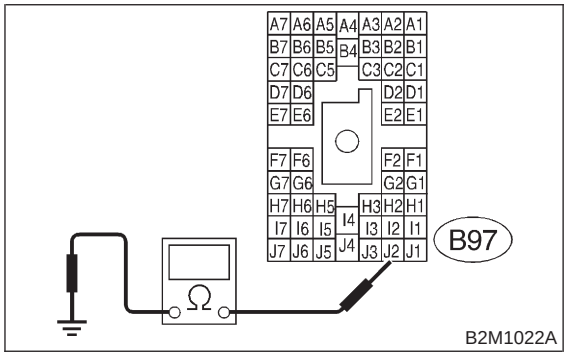


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **11AZ10**.
NO : Repair ground short circuit in harness between S.M.J. and ECM connector.

11AZ10 : CHECK BULKHEAD WIRING HARNESS.

1) Separate bulkhead wiring harness connector (B38) and instrument panel wiring harness connector (i3).
2) Measure resistance of harness between bulkhead wiring harness connector and chassis ground.

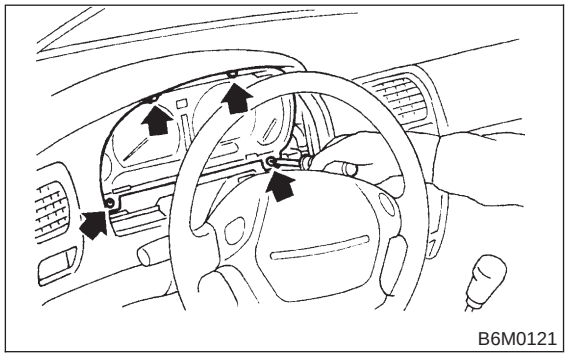
Connector & terminal
(B97) No. J2 — Chassis ground:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in bulkhead wiring harness.
NO : Repair ground short circuit in instrument panel wiring harness.

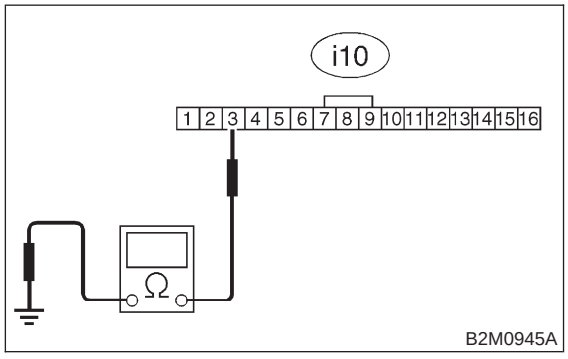
11AZ11 : CHECK HARNESS BETWEEN COMBINATION METER AND FUEL PUMP CONNECTOR.

1) Connect connector to fuel pump.
2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W14A1].>



3) Disconnect connector from combination meter.
4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal
(i10) No. 3 — Chassis ground:



CHECK : ***Is the resistance less than 200 Ω?***
YES : Go to step **11AZ12**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between combination meter connector and junction A on rear wiring harness
● Poor contact in coupling connectors (i3 and B97)

11AZ12 : CHECK COMBINATION METER.

Disconnect speedometer cable from combination meter and remove combination meter.

CHECK : ***Is the fuel meter installation screw tightened securely?***
YES : Go to step **11AZ13**.
NO : Tighten fuel meter installation screw securely.

11AZ13 : CHECK COMBINATION METER PRINTED CIRCUIT PLATE.

Remove printed circuit plate assembly from combination meter assembly.

CHECK : ***Is there flaw or burning on printed circuit plate assembly?***
YES : Replace printed circuit plate assembly.
NO : Replace fuel meter assembly.

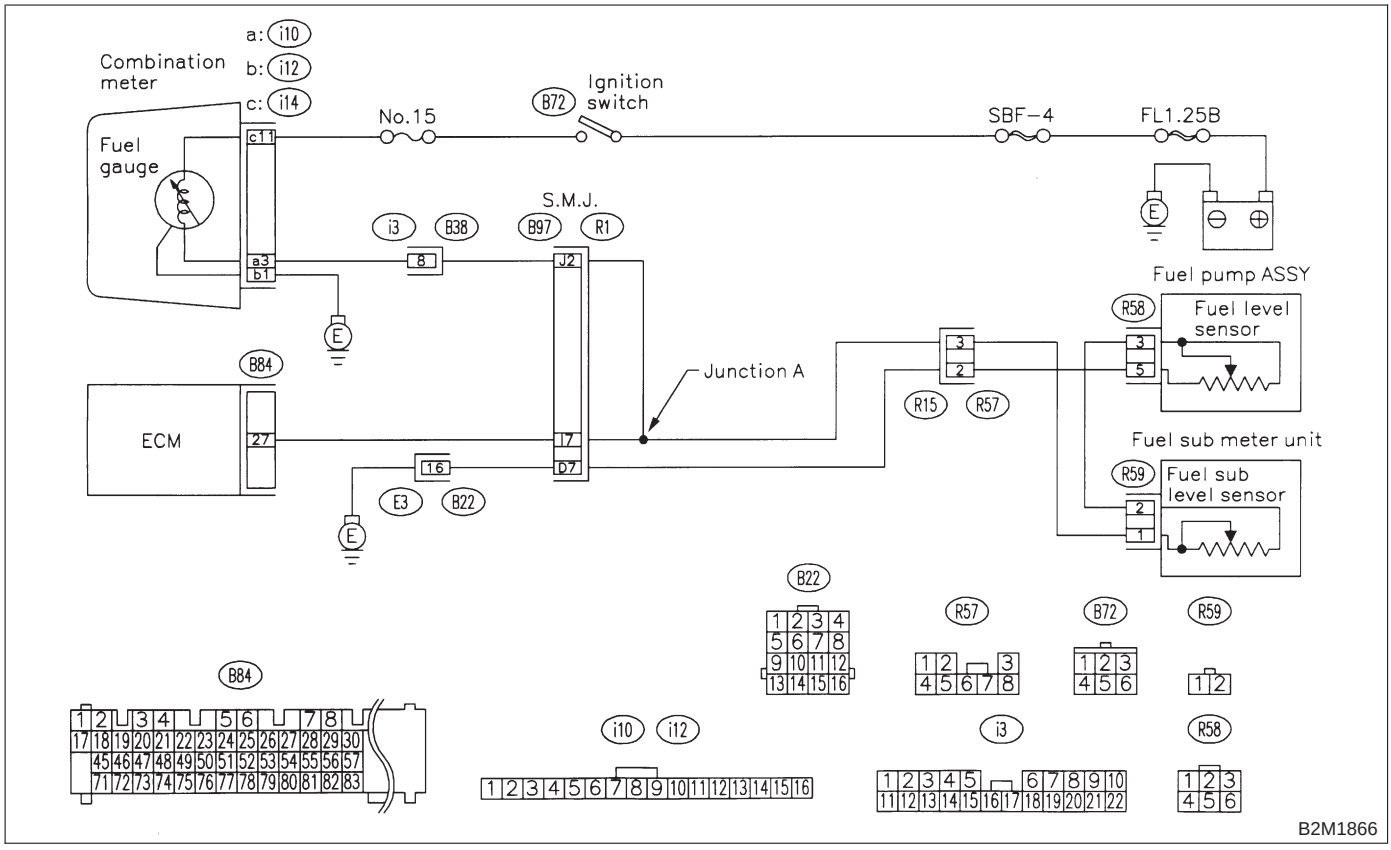
MEMO:

BA: DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11BA1 :	CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.

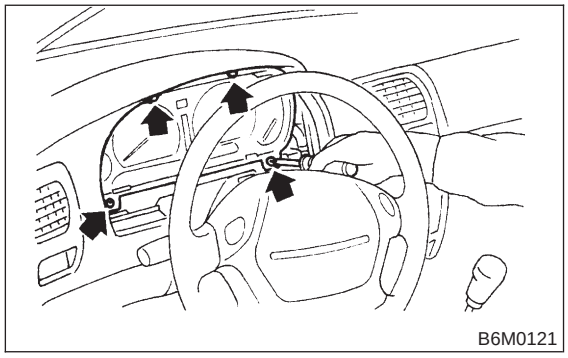
CHECK : ***Does speedometer and tachometer operate normally?***

YES : Go to step **11BA3**.

NO : Go to step **11BA2**.

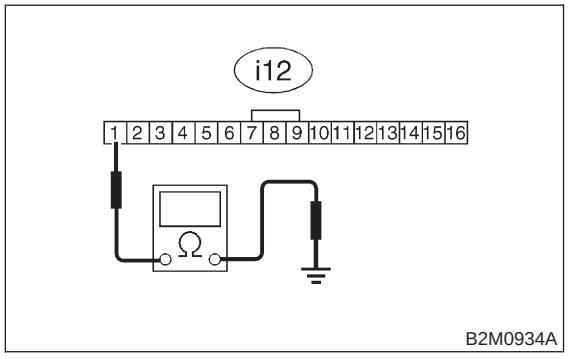
11BA2 : CHECK GROUND CIRCUIT OF COMBINATION METER.

1) Turn ignition switch to OFF.
2) Pull out combination meter from instrument panel. <Ref. to 6-2 [W14A1].>



3) Disconnect connector from combination meter.
4) Measure resistance of harness between combination meter connector and chassis ground.

Connector & terminal
(i12) No. 1 — Chassis ground:



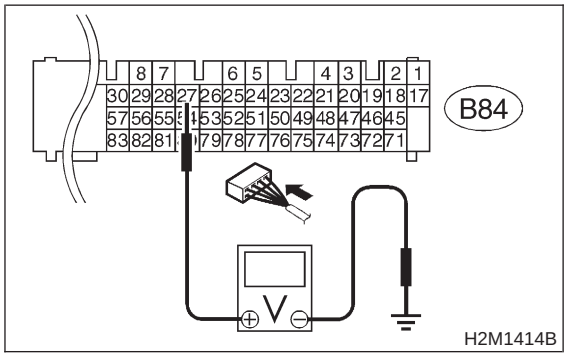
CHECK : ***Is resistance less than 5 Ω?***
YES : Repair or replace combination meter.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between combination meter connector and grounding terminal
- Poor contact in combination meter connector
- Poor contact in grounding terminal

11BA3 : CHECK INPUT SIGNAL FOR ECM.

1) Turn ignition switch to ON. (Engine OFF)
2) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 27 (+) — Chassis ground (–):

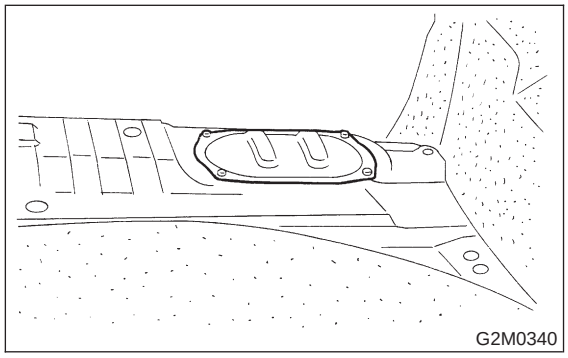


CHECK : ***Is the voltage more than 4.75 V?***
YES : Go to step **11BA4**.
NO : Even if MIL lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause.

NOTE:
In this case, repair the following:
- Poor contact in fuel pump connector
- Poor contact in combination meter connector
- Poor contact in ECM connector
- Poor contact in coupling connector (i3, B22, B97 and R57)

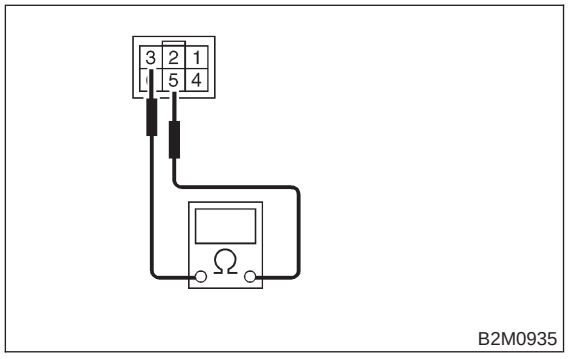
11BA4 : CHECK FUEL LEVEL SENSOR.

1) Turn ignition switch to OFF.
2) Remove fuel pump access hole lid located on the right rear of luggage compartment floor.



3) Disconnect connector from fuel pump.
4) Measure resistance between connector terminals of fuel pump.

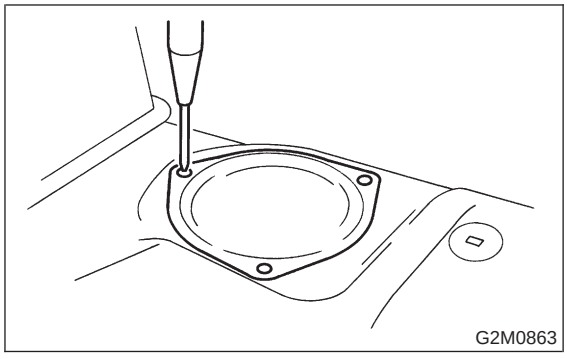
Terminals
No. 3 — No. 5:



CHECK : ***Is the resistance less than 100 Ω?***
YES : Go to step **11BA5**.
NO : Replace fuel sending unit.

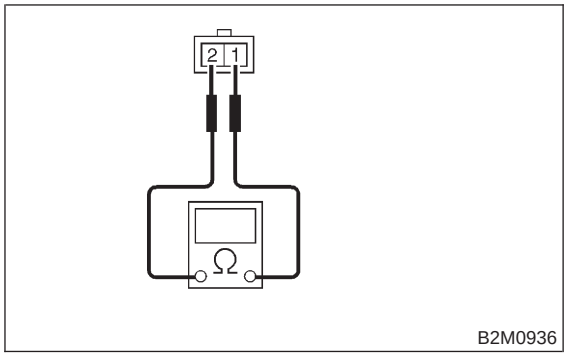
11BA5 : CHECK FUEL SUB LEVEL SENSOR.

1) Remove service hole cover located on the left rear of luggage compartment floor.



2) Disconnect connector from fuel sub meter unit.
3) Measure resistance between connector terminals of fuel sub meter unit.

Terminals
No. 1 — No. 2:

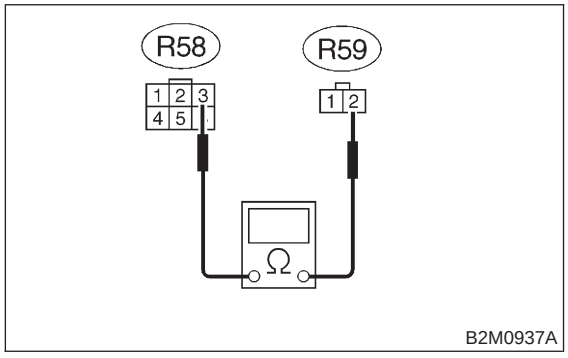


CHECK : ***Is the resistance less than 100 Ω?***
YES : Go to step **11BA6**.
NO : Replace fuel sub meter unit.

11BA6 : CHECK HARNESS BETWEEN FUEL PUMP AND FUEL SUB METER UNIT CONNECTOR.

Measure resistance of harness between fuel pump and fuel sub meter unit connector.

Connector & terminal
(R58) No. 3 — (R59) No. 2:

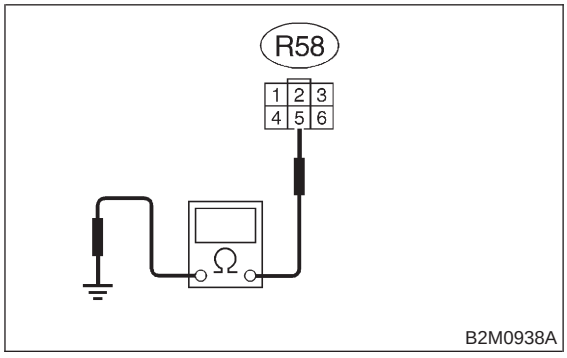


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **11BA7**.
NO : Repair open circuit in harness between fuel pump and fuel sub meter unit connector.

11BA7 : CHECK GROUND CIRCUIT OF FUEL LEVEL SENSOR.

Measure resistance of harness between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 5 — Chassis ground:



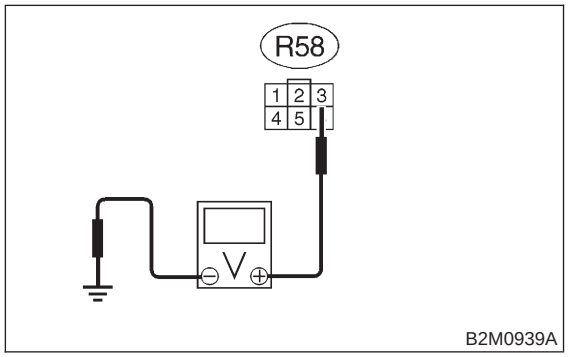
CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **11BA8**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in fuel pump connector
- Poor contact in coupling connectors (R57, B97 and B22)

11BA8 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONNECTOR.

1) Connect connector to fuel sub meter unit.
2) Turn ignition switch to ON.
3) Measure voltage between fuel pump connector and chassis ground.

Connector & terminal
(R58) No. 3 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Repair harness and connector.

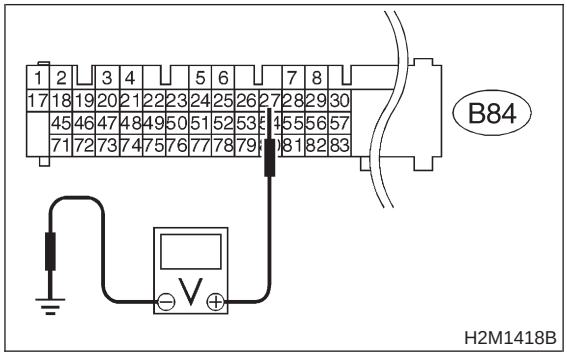
NOTE:
In this case, repair the following:
- Open circuit in harness between fuel pump connector and junction A on rear wiring harness
- Poor contact in fuel sub meter unit connector
- Poor contact in fuel pump connector
- Poor contact in coupling connector (R57)

NO : Go to step **11BA9**.

11BA9 : CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ECM.
3) Turn ignition switch to ON.
4) Measure voltage between ECM connector and chassis ground.

Connector & terminal
(B84) No. 27 (+) — Chassis ground:



CHECK : ***Is the voltage less than 1 V?***
YES : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM connector and junction A on rear wiring harness
- Poor contact in coupling connector (B97)

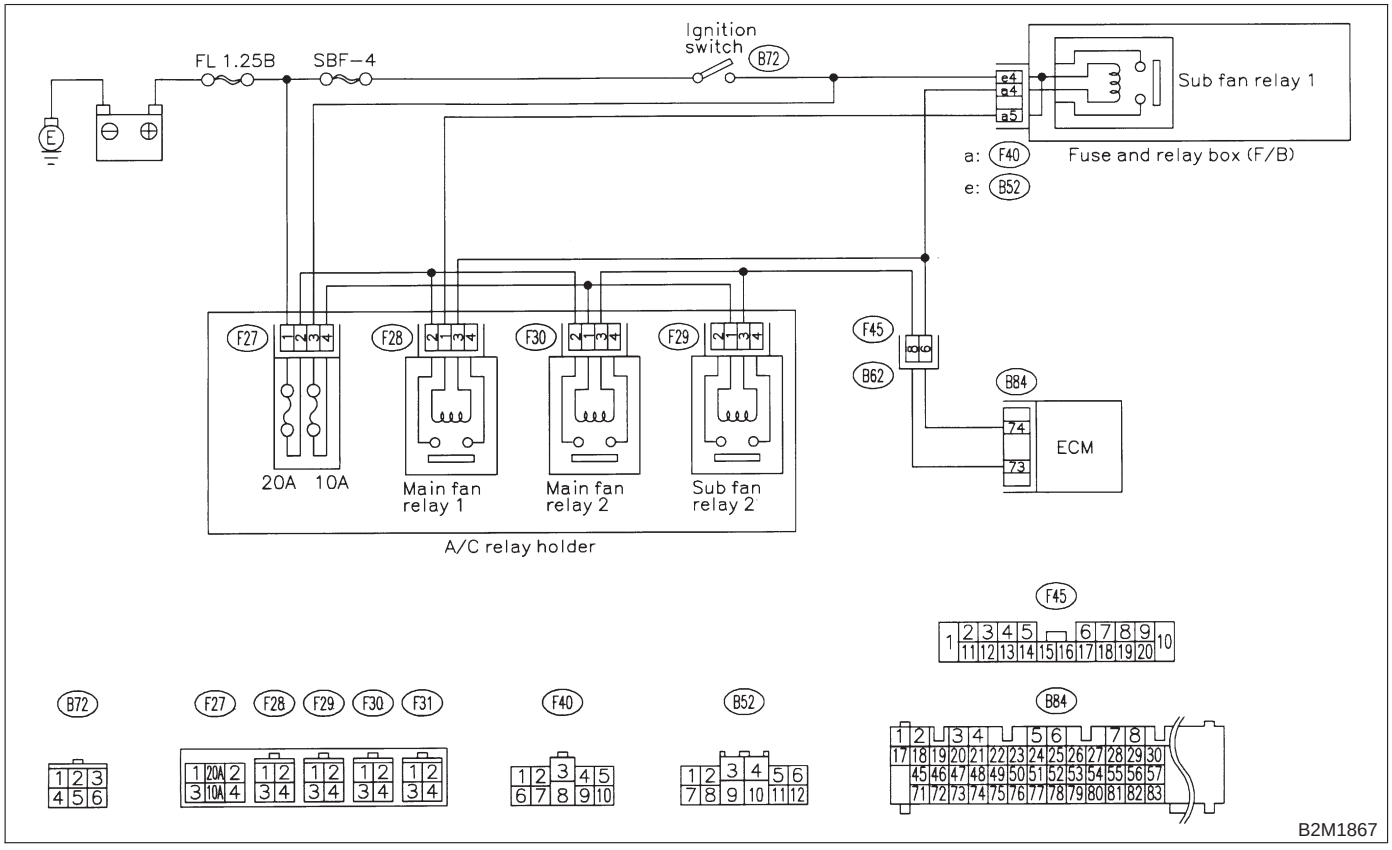
NO : Repair connector.

NOTE:
In this case, repair the following:
- Poor contact in fuel pump connector
- Poor contact in fuel sub meter unit
- Poor contact in ECM connector

BB: DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT —

NOTE:
Check radiator fan relay 1 circuit.
<Ref. to 2-7 [T10BC0].>

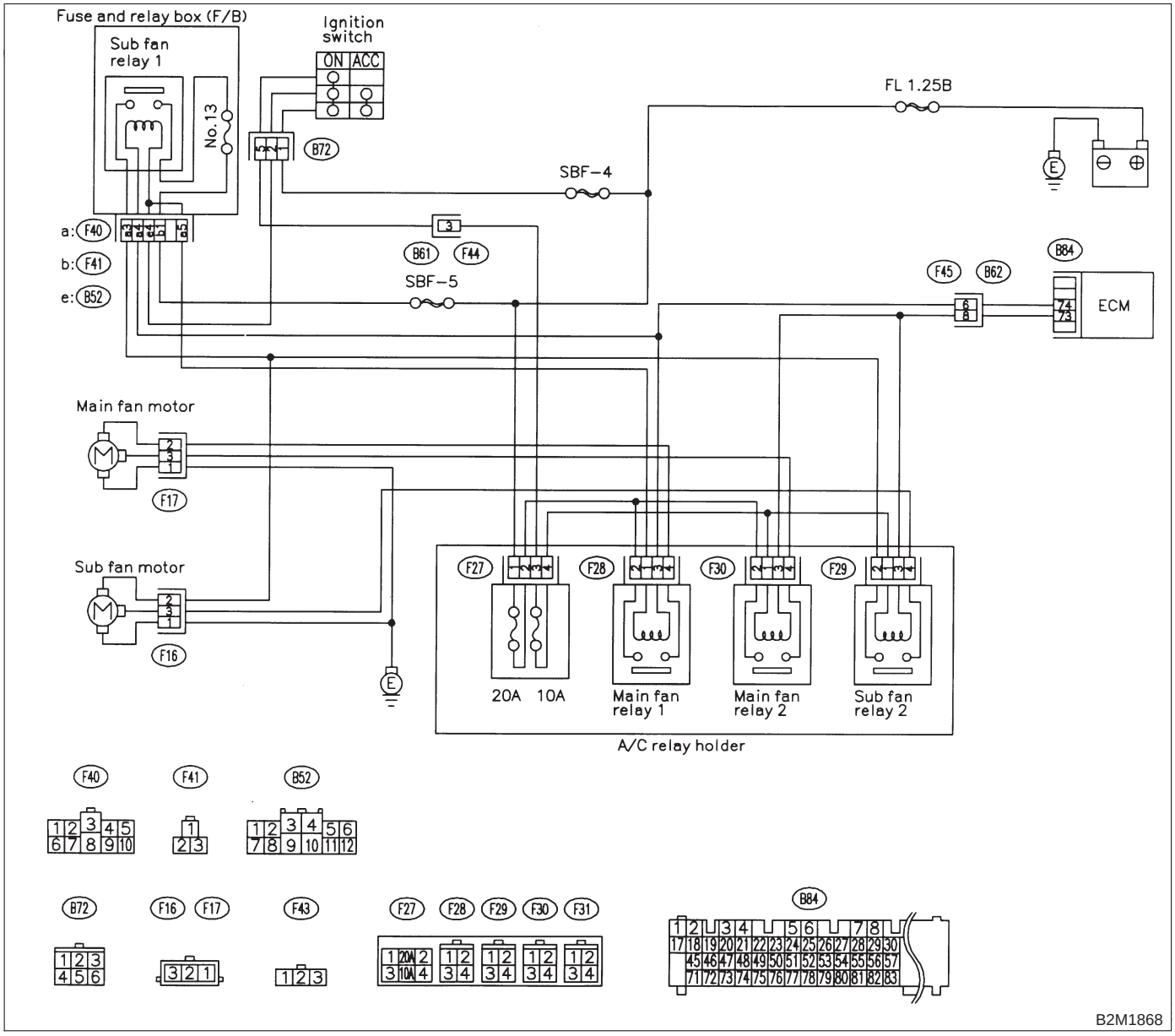
- **WIRING DIAGRAM:**



BC: DTC P0483 — COOLING FAN FUNCTION PROBLEM —

NOTE:
Check radiator fan control system.
<Ref. to 2-7 [T10BD0].>

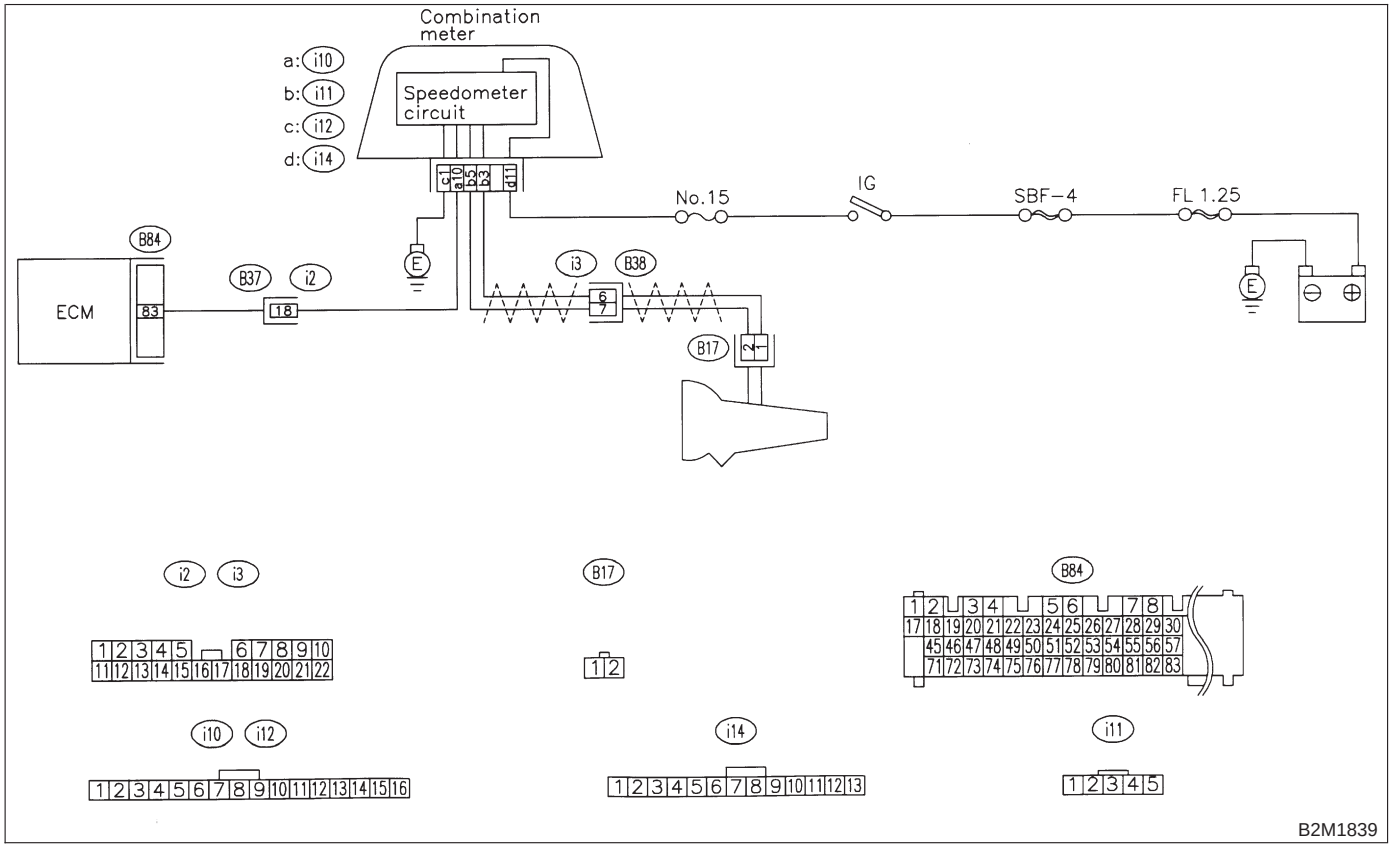
- **WIRING DIAGRAM:**



BD: DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION —

NOTE:
Check vehicle speed sensor 2 circuit.
<Ref. to 2-7 [T10BE0].>

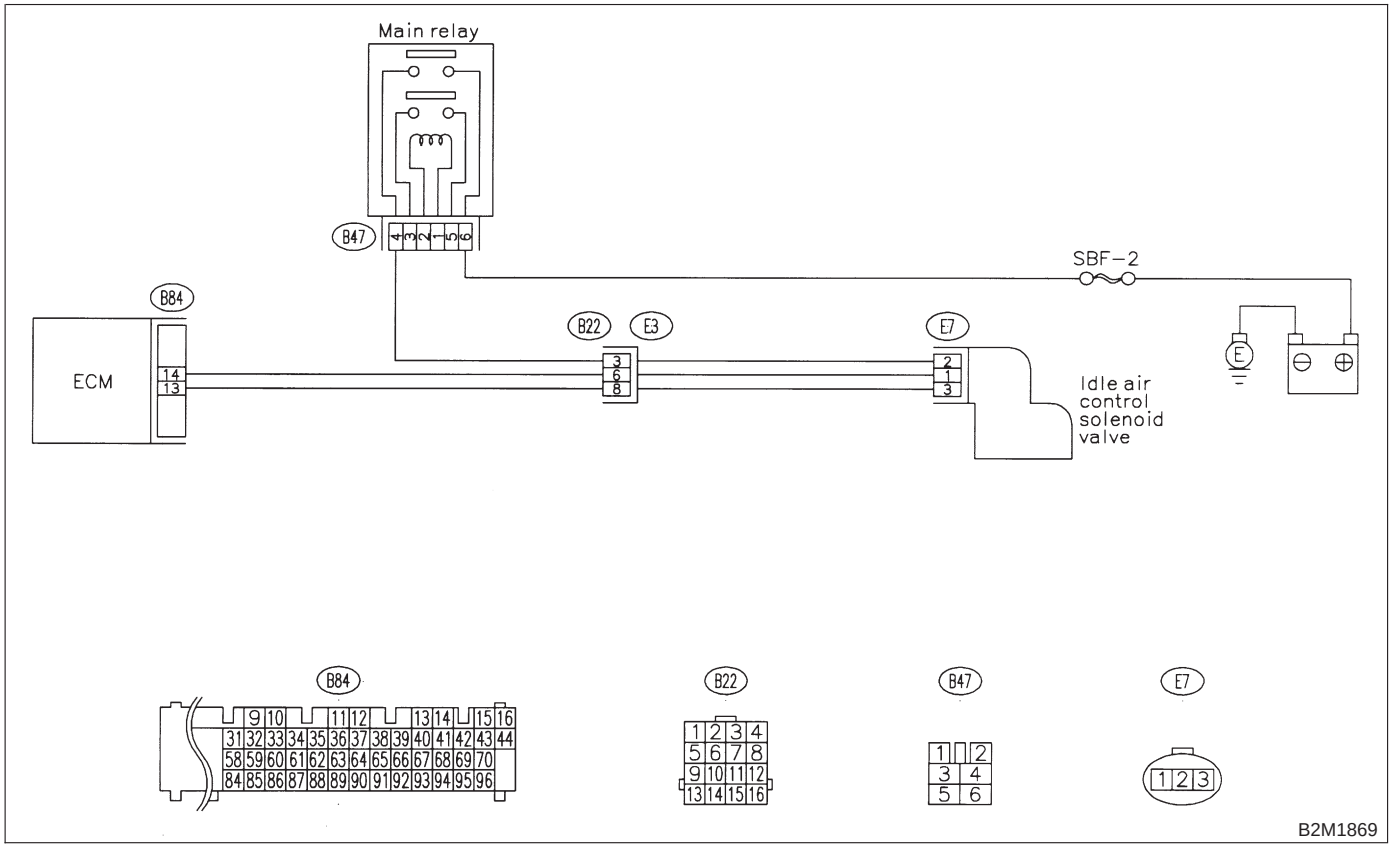
- **WIRING DIAGRAM:**



BE: DTC P0505 — IDLE CONTROL SYSTEM MALFUNCTION —

NOTE:
Check idle air control solenoid valve circuit.
<Ref. to 2-7 [T10BF0].>

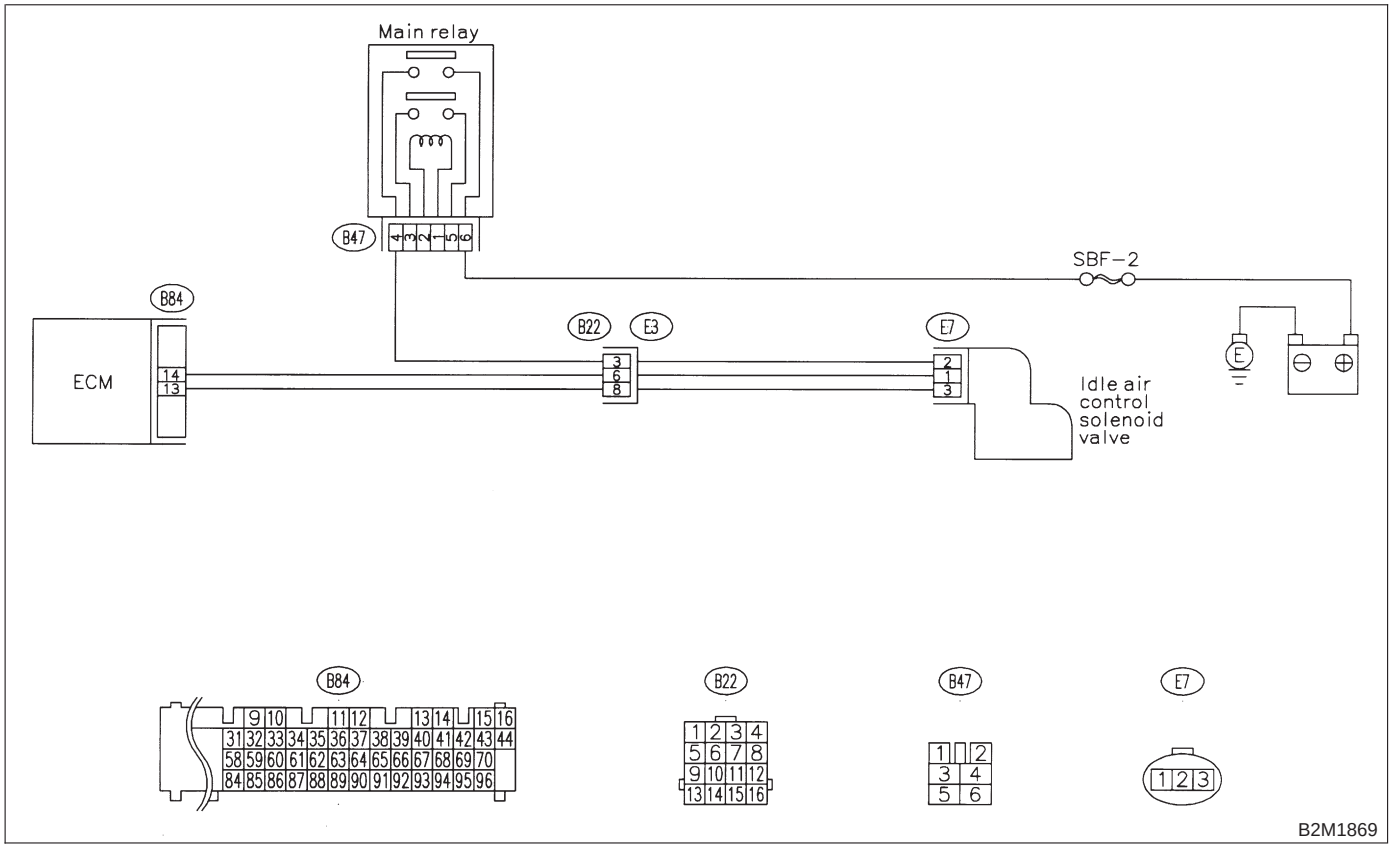
- **WIRING DIAGRAM:**



BF: DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED —

NOTE:
Check idle air control system.
<Ref. to 2-7 [T10BG0].>

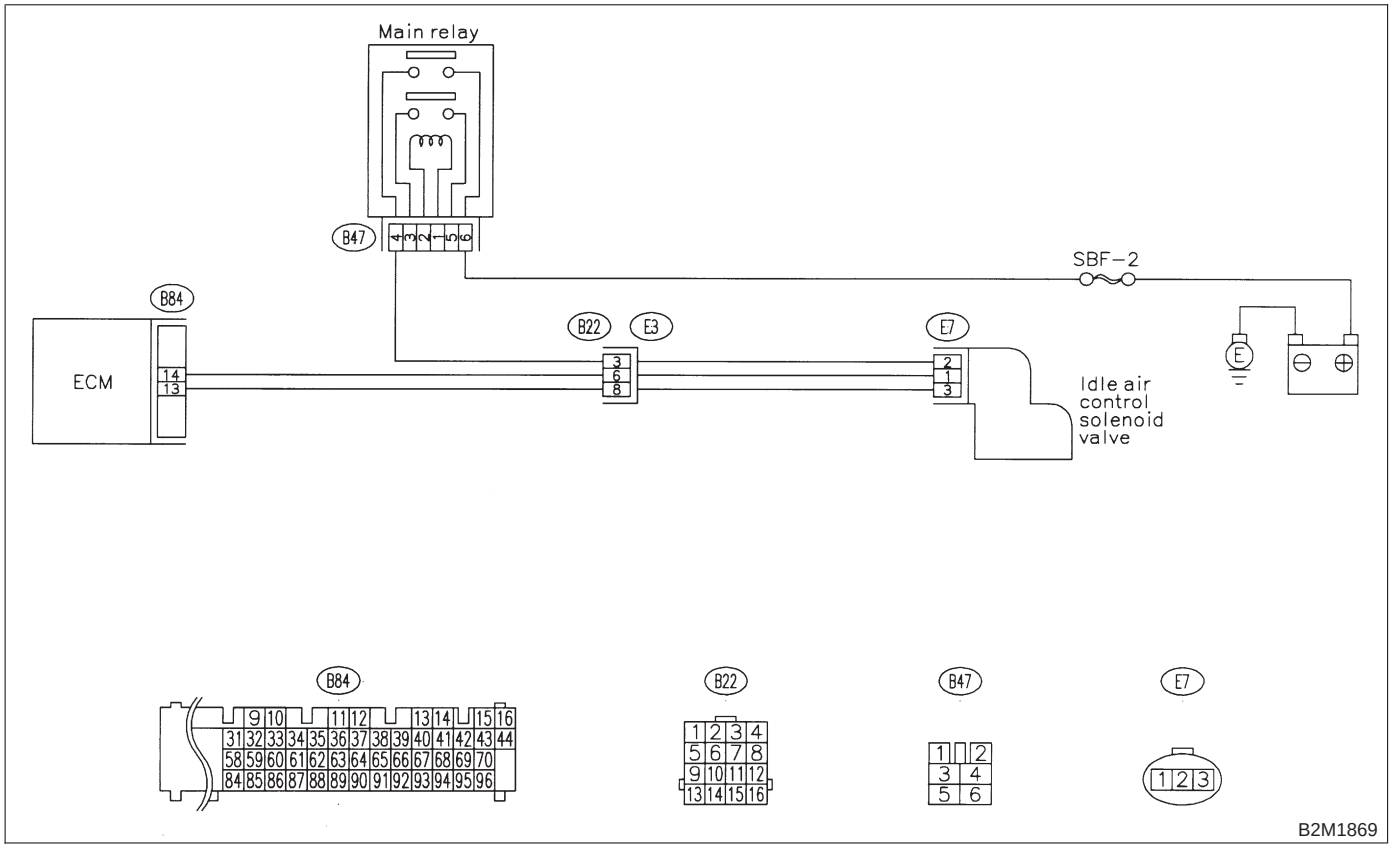
- **WIRING DIAGRAM:**



BG: DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED —

NOTE:
Check idle air control system.
<Ref. to 2-7 [T10BH0].>

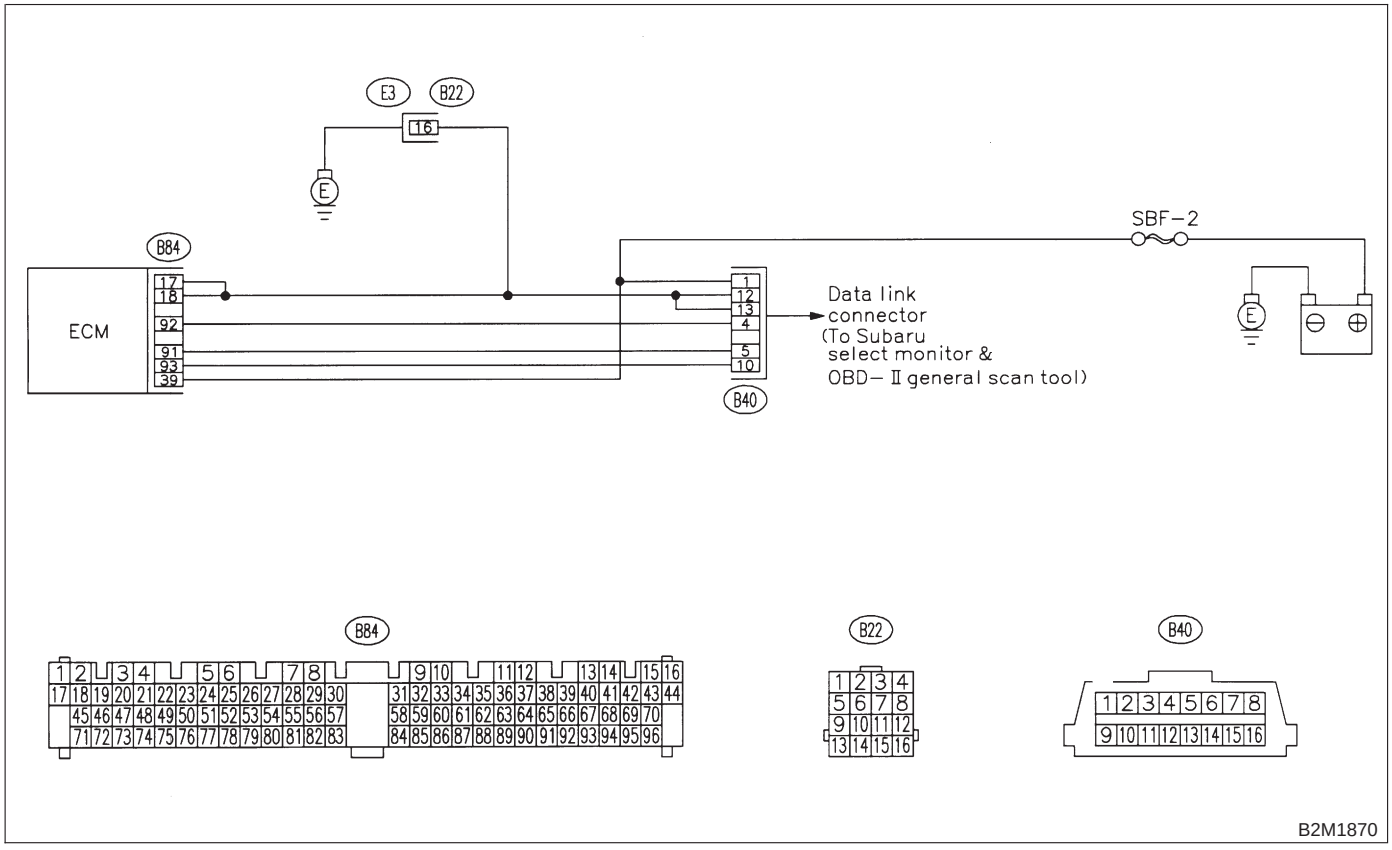
- **WIRING DIAGRAM:**



BH: DTC P0600 — SERIAL COMMUNICATION LINK MALFUNCTION —

NOTE:
Check serial communication circuit.
<Ref. to 2-7 [T10BI0].>

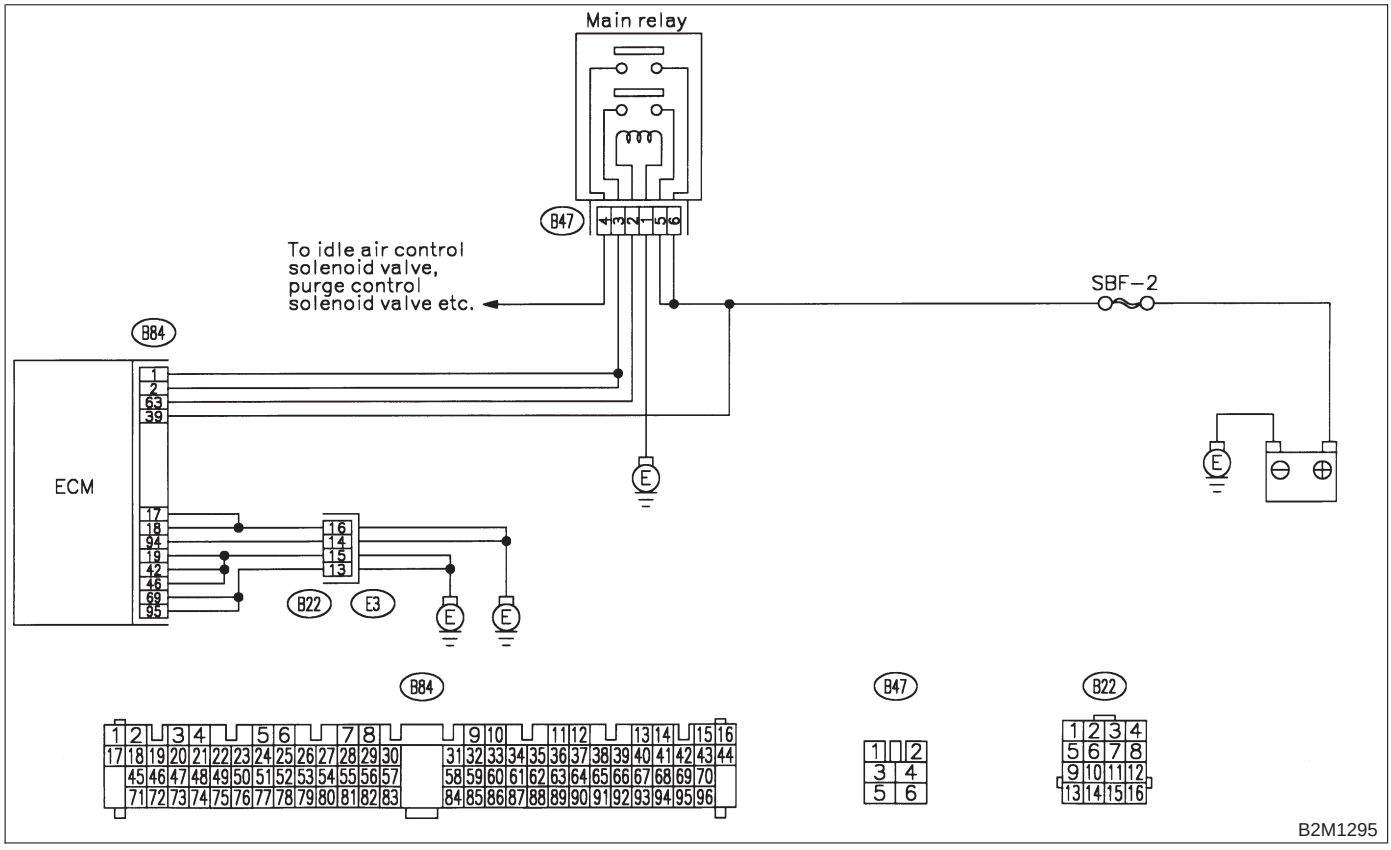
- **WIRING DIAGRAM:**



BI: DTC P0601 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR —

NOTE:
Check internal control module memory.
<Ref. to 2-7 [T10BJ0].>

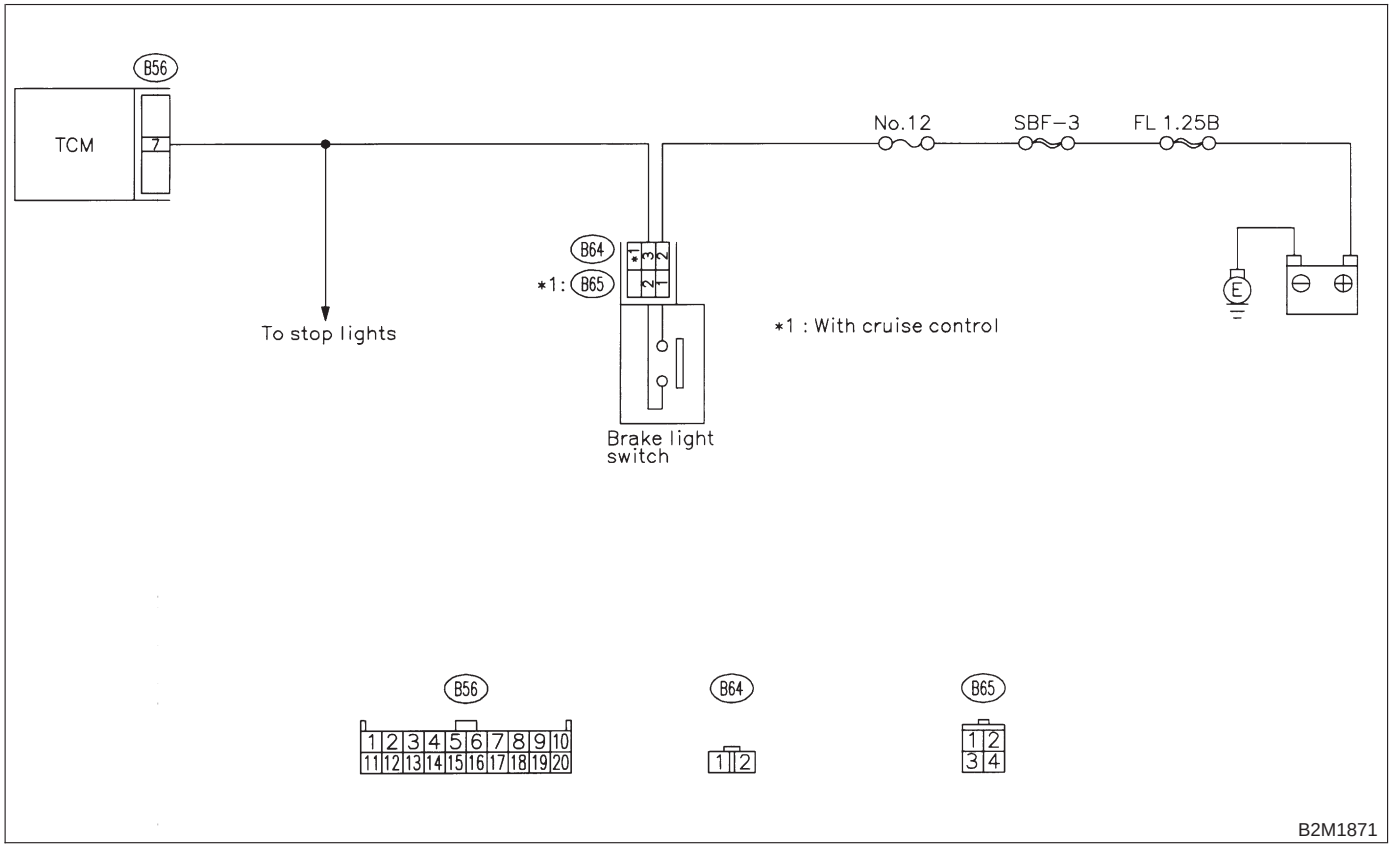
- **WIRING DIAGRAM:**



BJ: DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION —

NOTE:
Check brake switch input signal circuit.
<Ref. to 2-7 [T10BK0].>

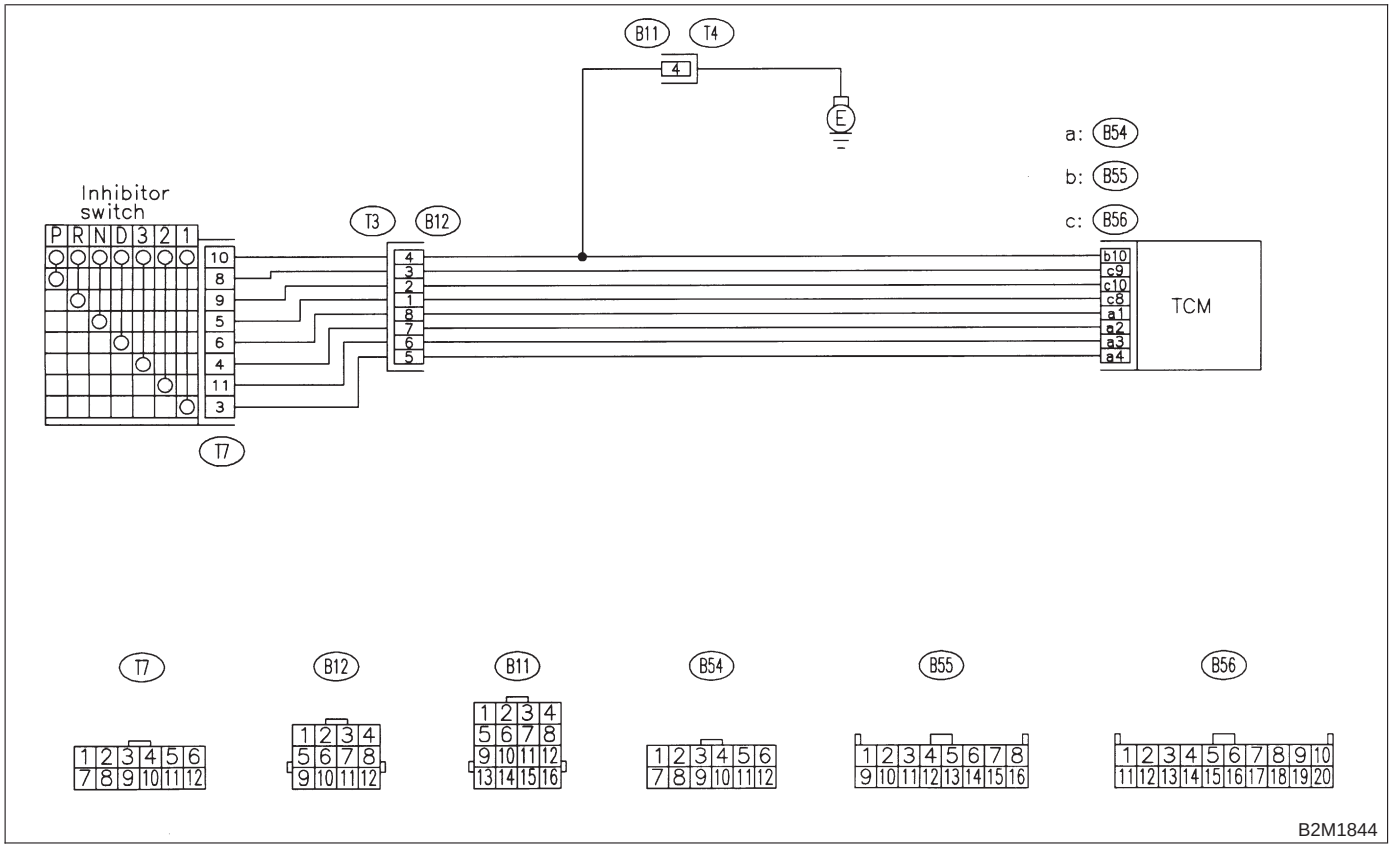
- **WIRING DIAGRAM:**



BK: DTC P0705 — TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION —

NOTE:
Check inhibitor switch circuit.
<Ref. to 2-7 [T10BL0].>

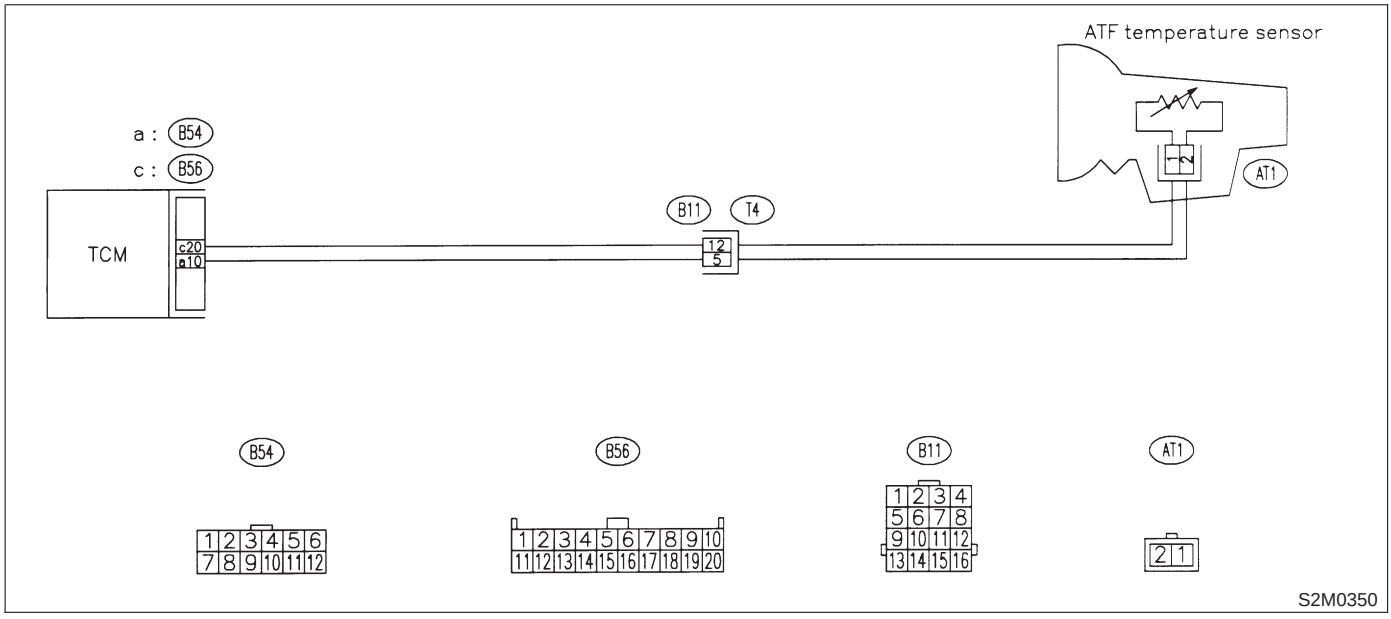
- **WIRING DIAGRAM:**



BL: DTC P0710 — TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT MALFUNCTION —

NOTE:
Check automatic transmission fluid temperature sensor circuit.
<Ref. to 2-7 [T10BM0].>

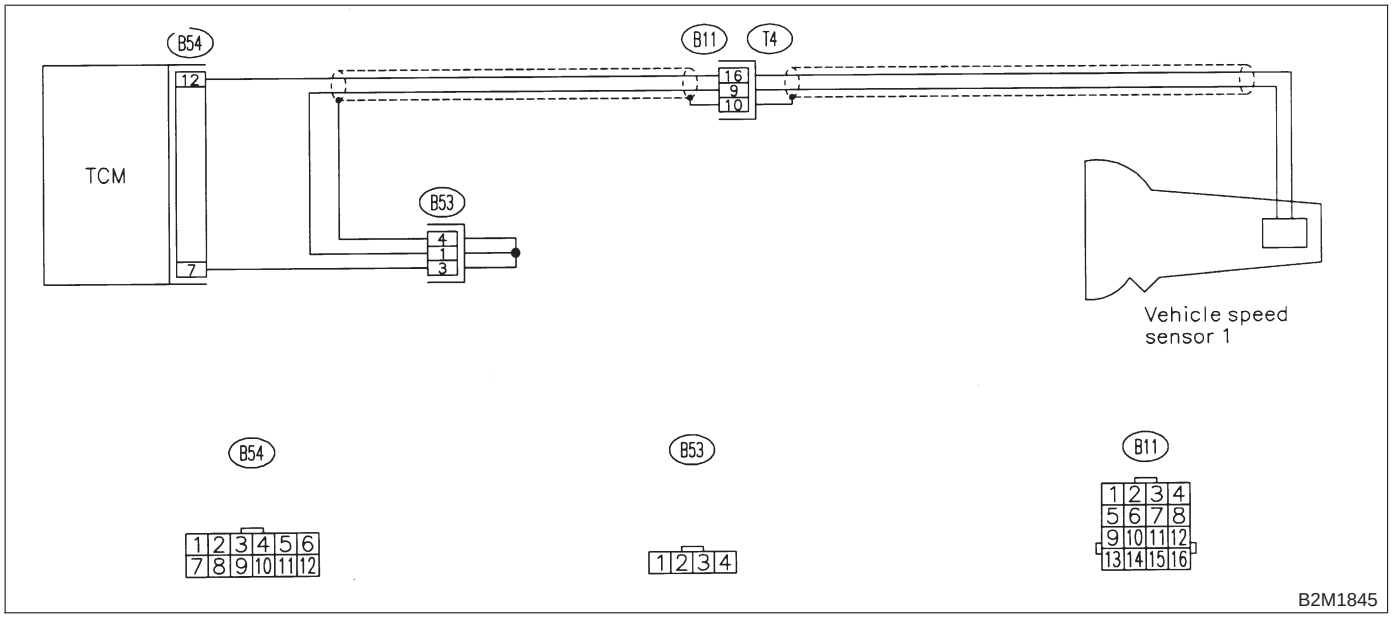
- **WIRING DIAGRAM:**



BM: DTC P0720 — OUTPUT SPEED SENSOR (VEHICLE SPEED SENSOR 1) CIRCUIT MALFUNCTION —

NOTE:
Check vehicle speed sensor 1 circuit.
<Ref. to 2-7 [T10BN0].>

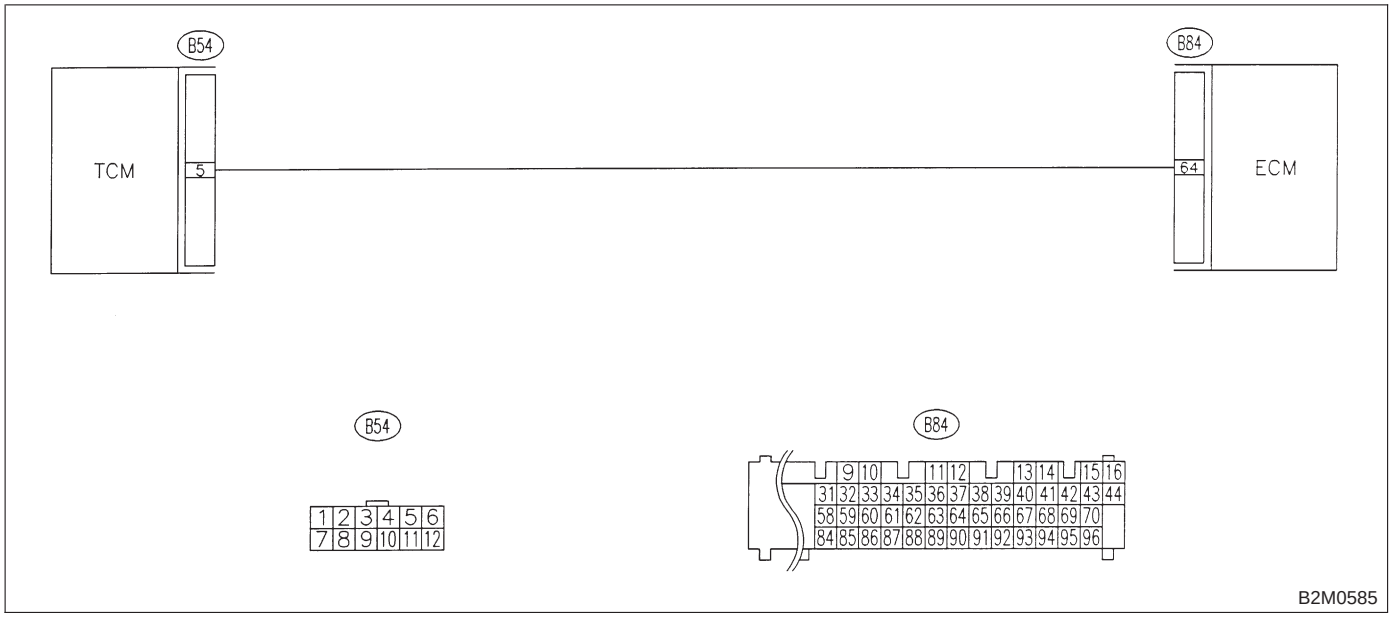
- **WIRING DIAGRAM:**



BN: DTC P0725 — ENGINE SPEED INPUT CIRCUIT MALFUNCTION —

NOTE:
Check engine speed signal input circuit.
<Ref. to 2-7 [T10BO0].>

- **WIRING DIAGRAM:**



MEMO:

BO: DTC P0731 — GEAR 1 INCORRECT RATIO —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11BR0].
<Ref. to 2-7 [T11BR0].>

BP: DTC P0732 — GEAR 2 INCORRECT RATIO —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11BR0].
<Ref. to 2-7 [T11BR0].>

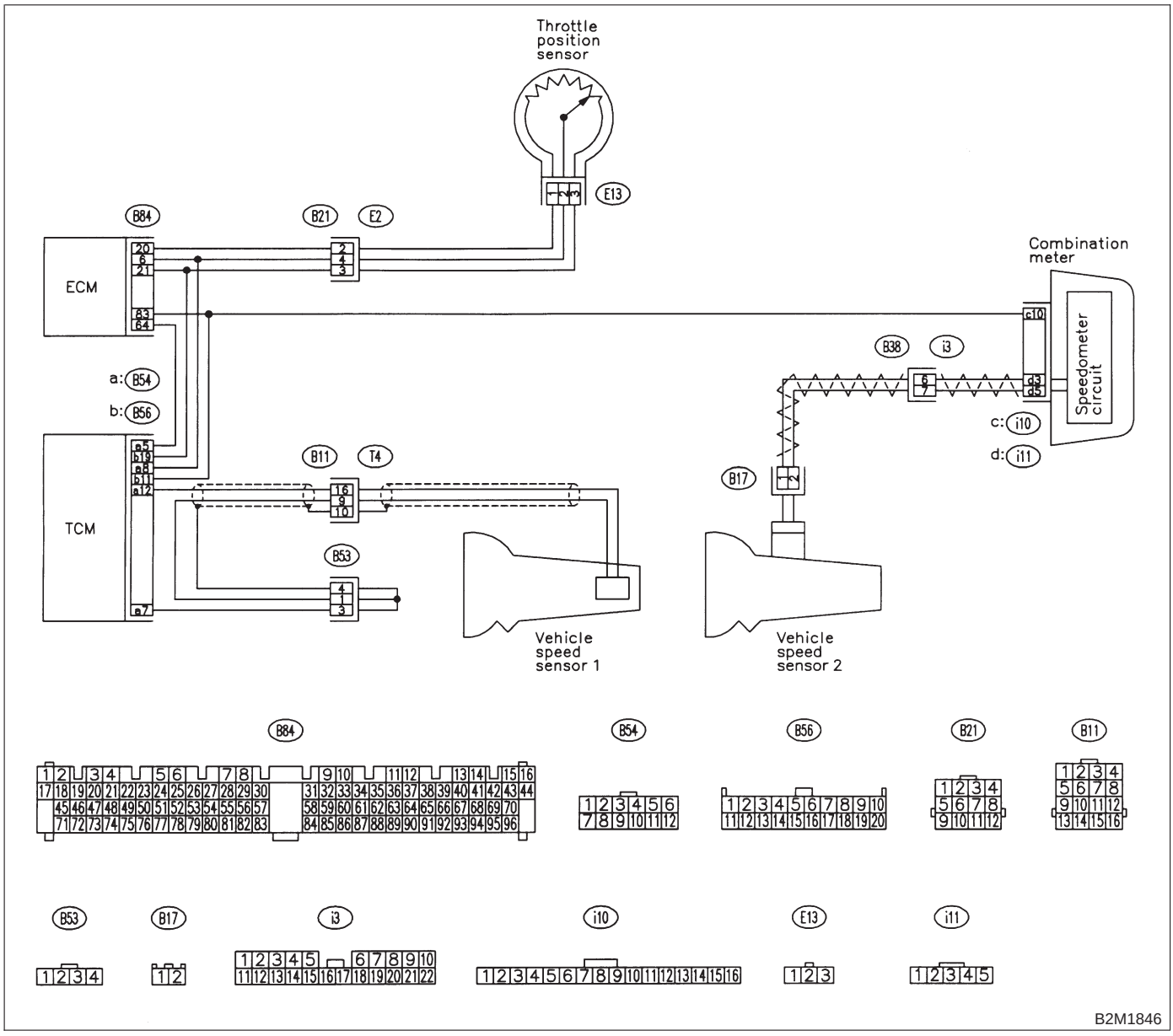
BQ: DTC P0733 — GEAR 3 INCORRECT RATIO —

NOTE:
For the diagnostic procedure, refer to 2-7 [T11BR0].
<Ref. to 2-7 [T11BR0].>

BR: DTC P0734 — GEAR 4 INCORRECT RATIO —

NOTE:
Check shift change control system.
<Ref. to 2-7 [T10BS0].>

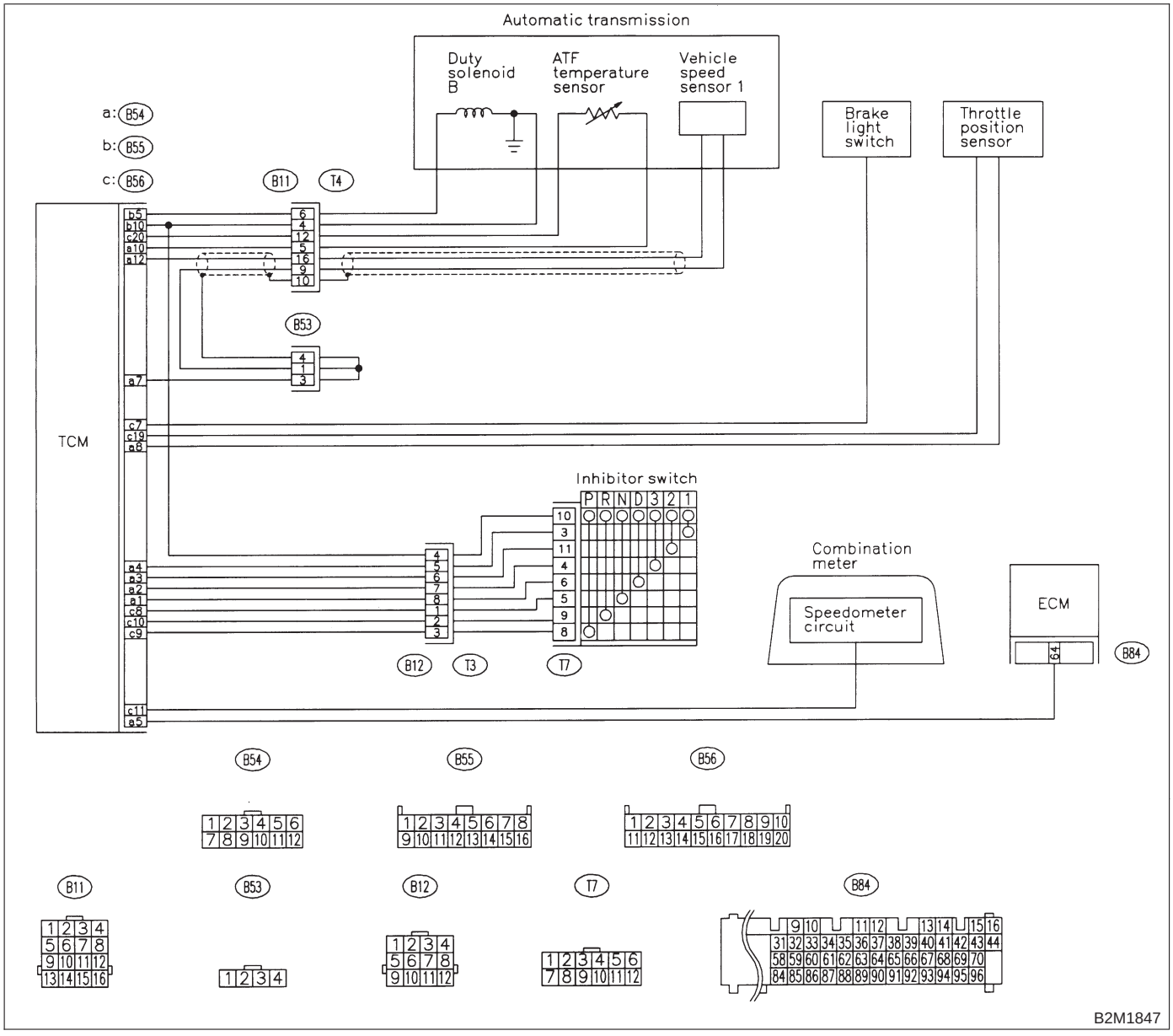
● WIRING DIAGRAM:



BS: DTC P0740 — TORQUE CONVERTER CLUTCH SYSTEM MALFUNCTION —

NOTE:
Check torque converter lock-up control system.
<Ref. to 2-7 [T10BT0].>

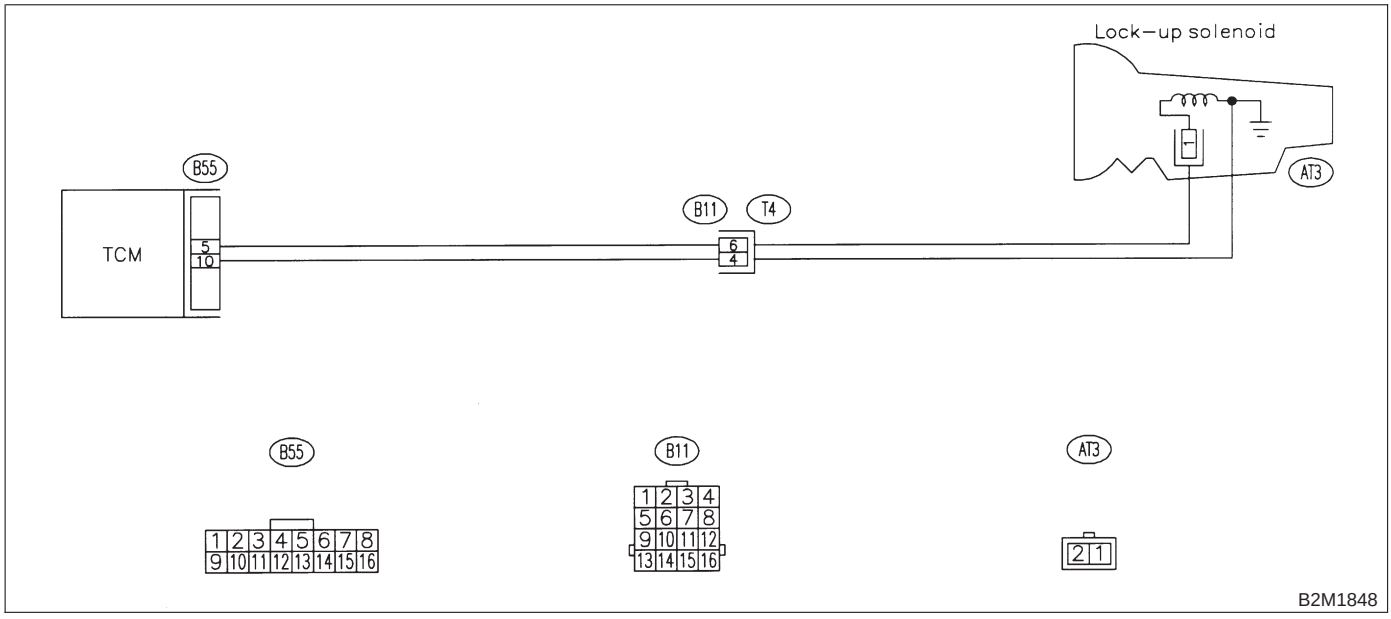
- **WIRING DIAGRAM:**



BT: DTC P0743 — TORQUE CONVERTER CLUTCH SYSTEM (DUTY SOLENOID B) ELECTRICAL —

NOTE:
Check duty solenoid B circuit.
<Ref. to 2-7 [T10BU0].>

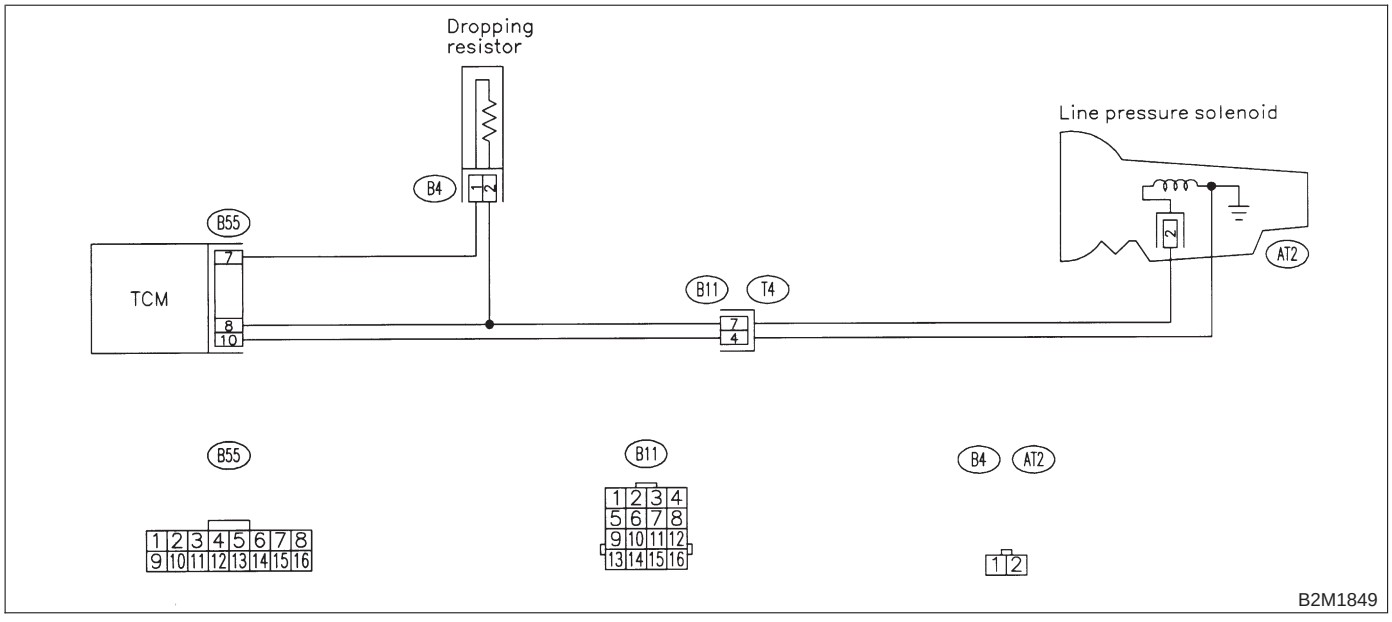
- **WIRING DIAGRAM:**



BU: DTC P0748 — PRESSURE CONTROL SOLENOID (DUTY SOLENOID A) ELECTRICAL —

NOTE:
Check duty solenoid A circuit.
<Ref. to 2-7 [T10BV0].>

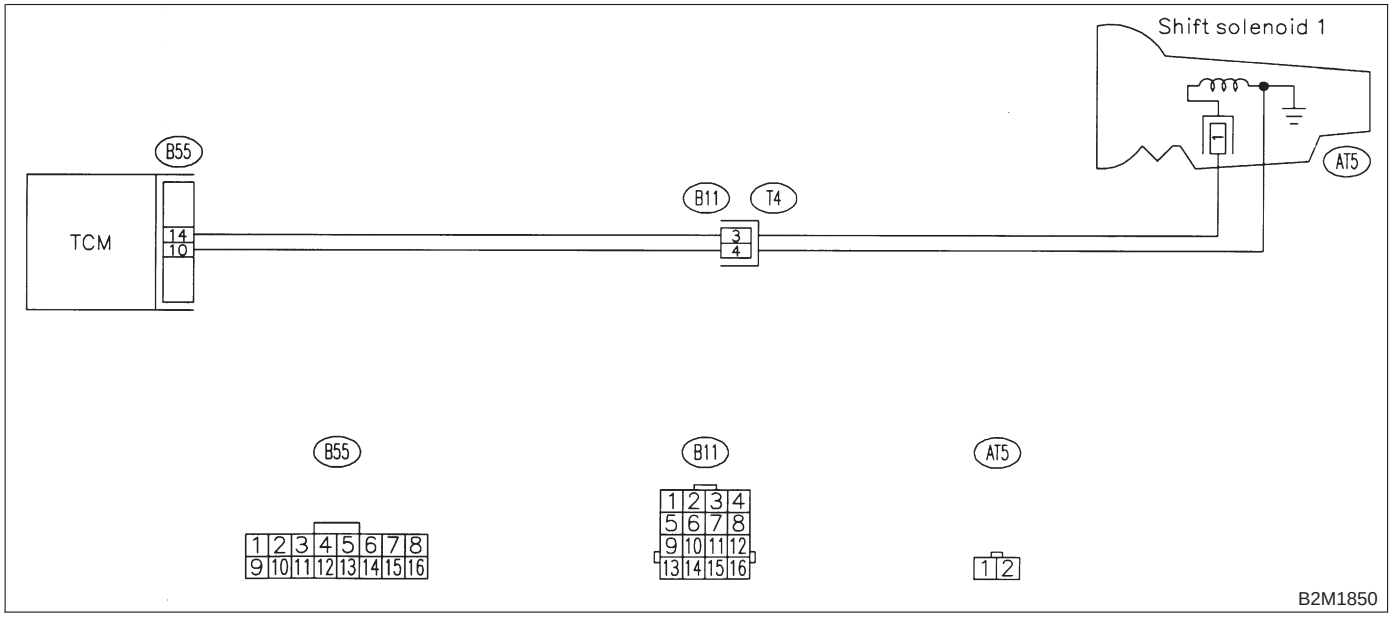
- **WIRING DIAGRAM:**



BV: DTC P0753 — SHIFT SOLENOID A (SHIFT SOLENOID 1) ELECTRICAL —

NOTE:
Check shift solenoid 1 circuit.
<Ref. to 2-7 [T10BW0].>

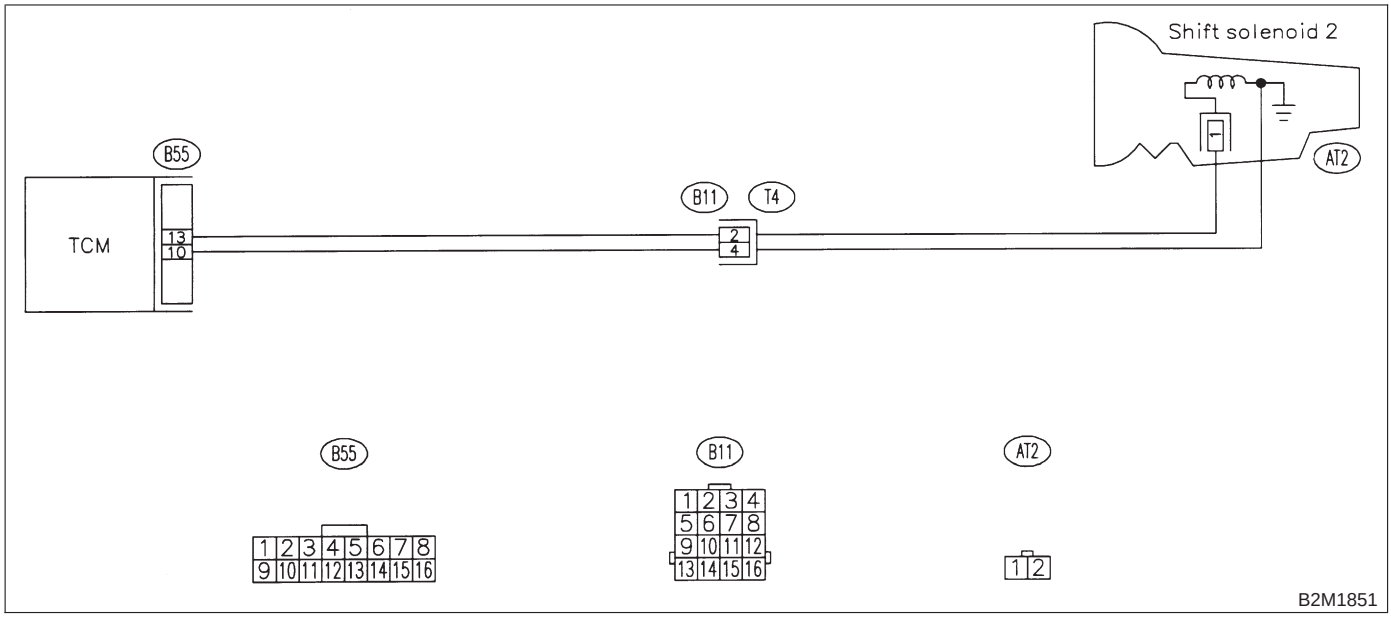
- **WIRING DIAGRAM:**



BW: DTC P0758 — SHIFT SOLENOID B (SHIFT SOLENOID 2) ELECTRICAL —

NOTE:
Check shift solenoid 2 circuit.
<Ref. to 2-7 [T10BX0].>

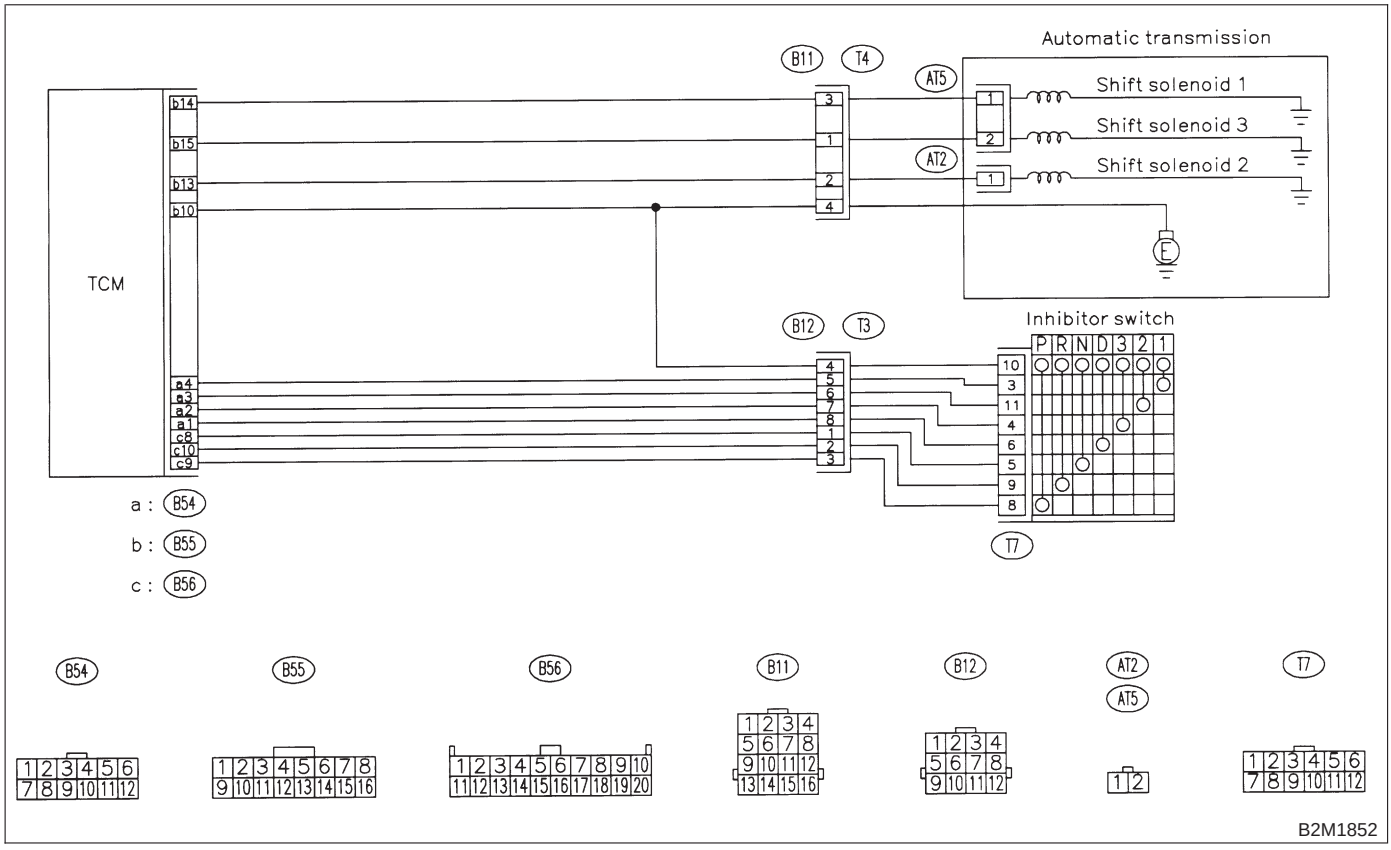
- **WIRING DIAGRAM:**



BX: DTC P0760 — SHIFT SOLENOID C (SHIFT SOLENOID 3) MALFUNCTION —

NOTE:
Check shift solenoid 3 control system.
<Ref. to 2-7 [T10BY0].>

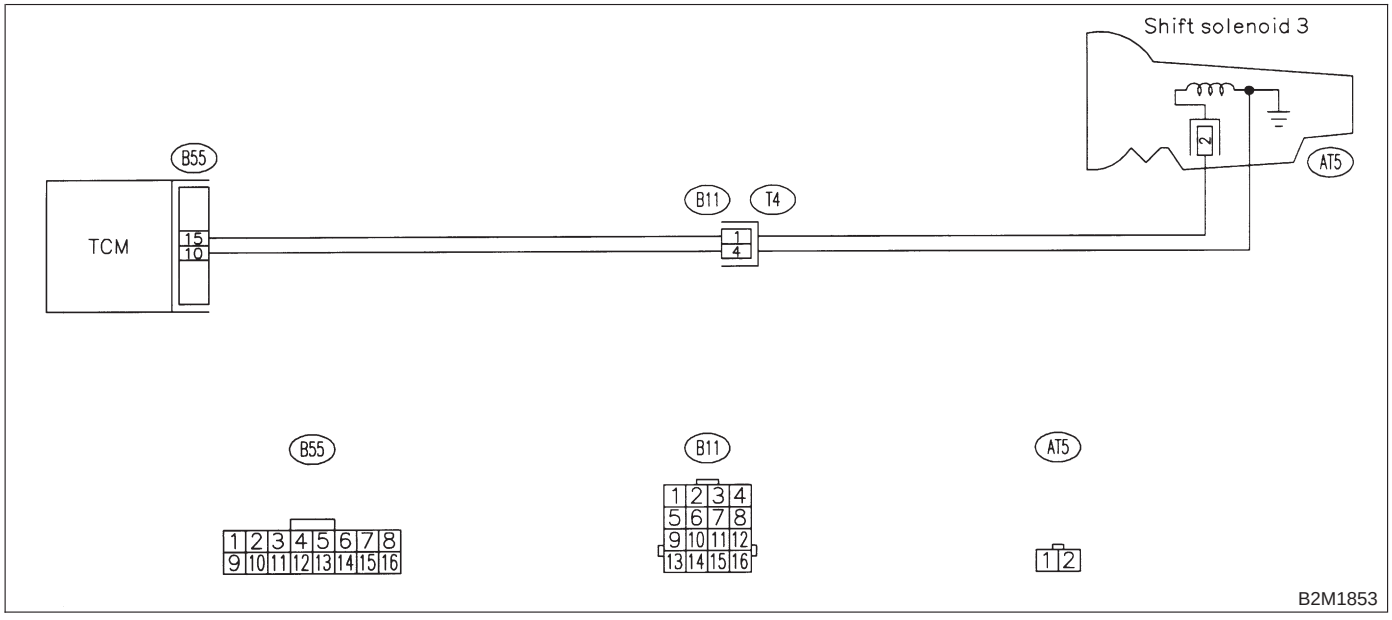
- **WIRING DIAGRAM:**



BY: DTC P0763 — SHIFT SOLENOID C (SHIFT SOLENOID 3) ELECTRICAL —

NOTE:
Check shift solenoid 3 circuit.
<Ref. to 2-7 [T10BZ0].>

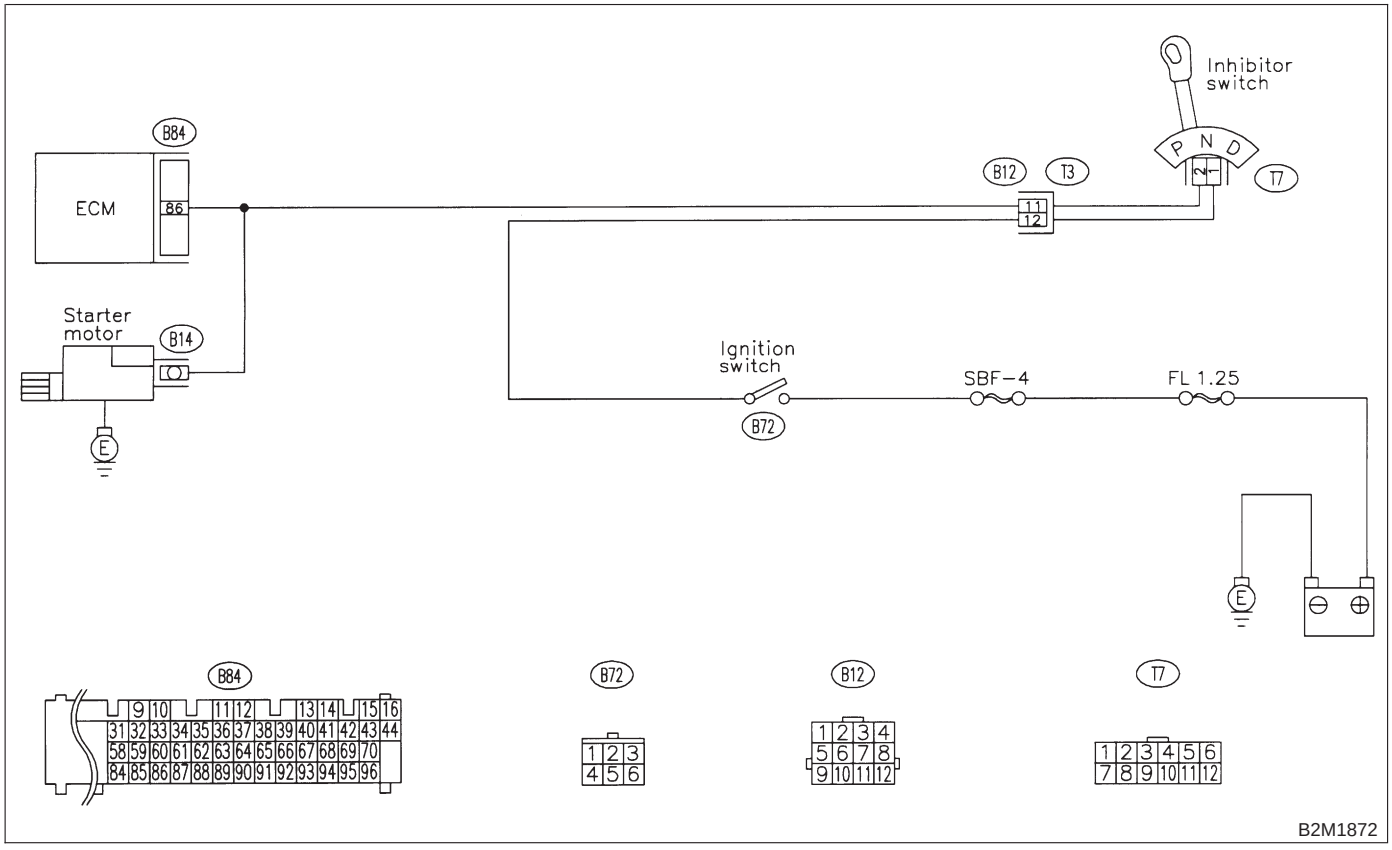
- **WIRING DIAGRAM:**



BZ: DTC P1100 — STARTER SWITCH CIRCUIT LOW INPUT —

NOTE:
Check starter switch circuit.
<Ref. to 2-7 [T10CA0].>

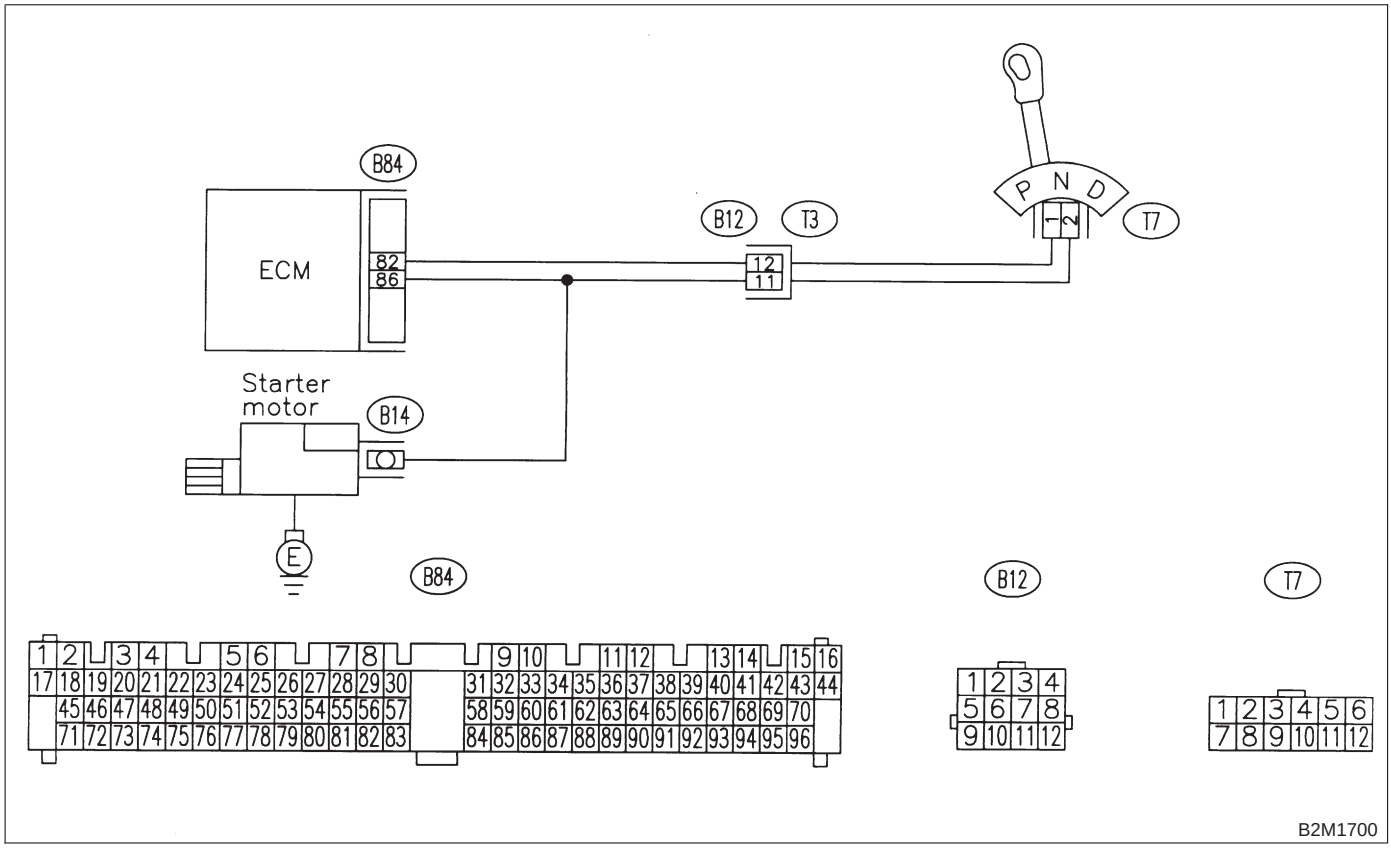
- **WIRING DIAGRAM:**



CA: DTC P1101 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT [AT VEHICLES] —

NOTE:
Check neutral position switch circuit.
<Ref. to 2-7 [T10CC0].>

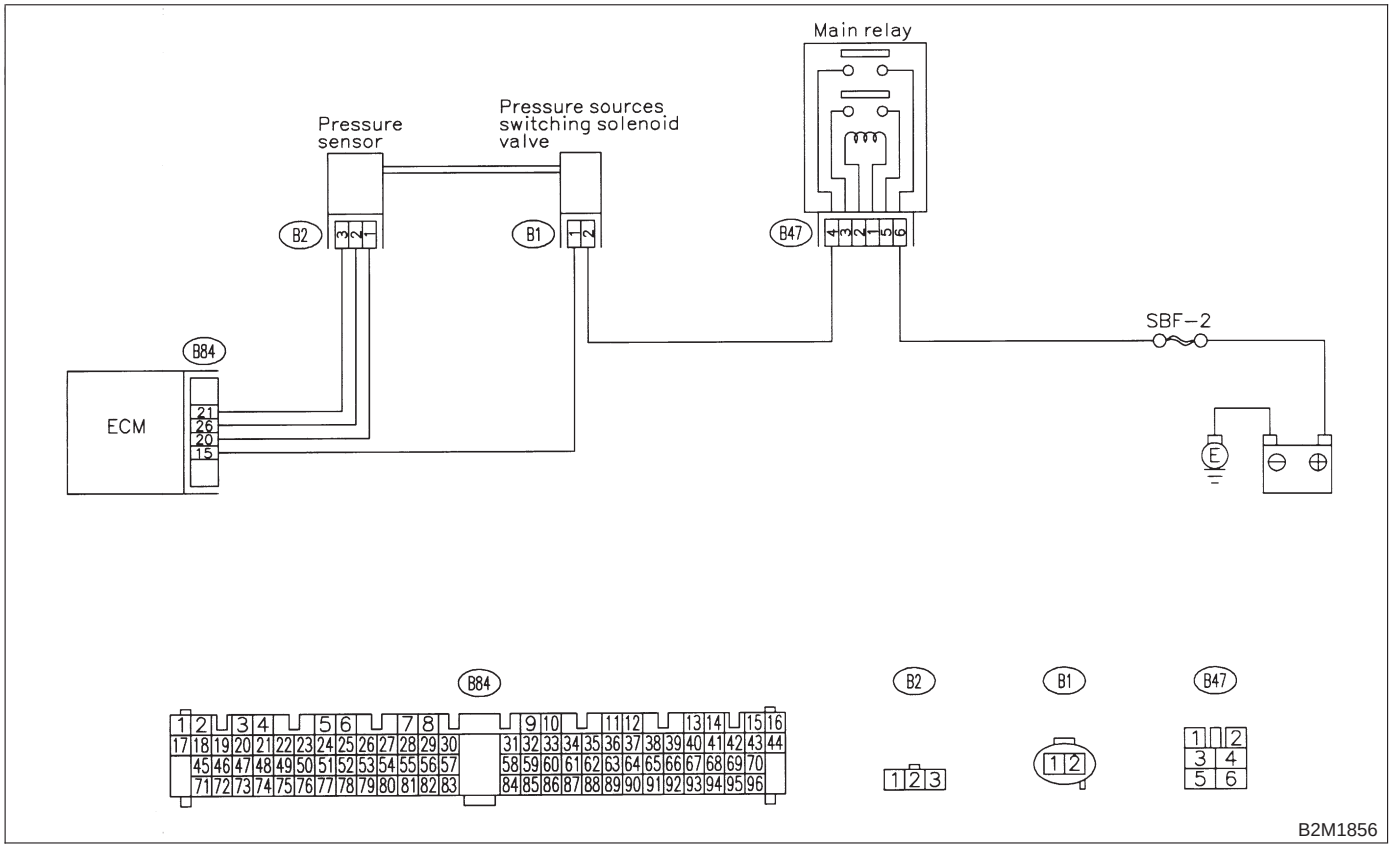
- **WIRING DIAGRAM:**



CB: DTC P1102 — PRESSURE SOURCES SWITCHING SOLENOID VALVE CIRCUIT LOW INPUT —

NOTE:
Check pressure sources switching solenoid valve circuit.
<Ref. to 2-7 [T10CD0].>

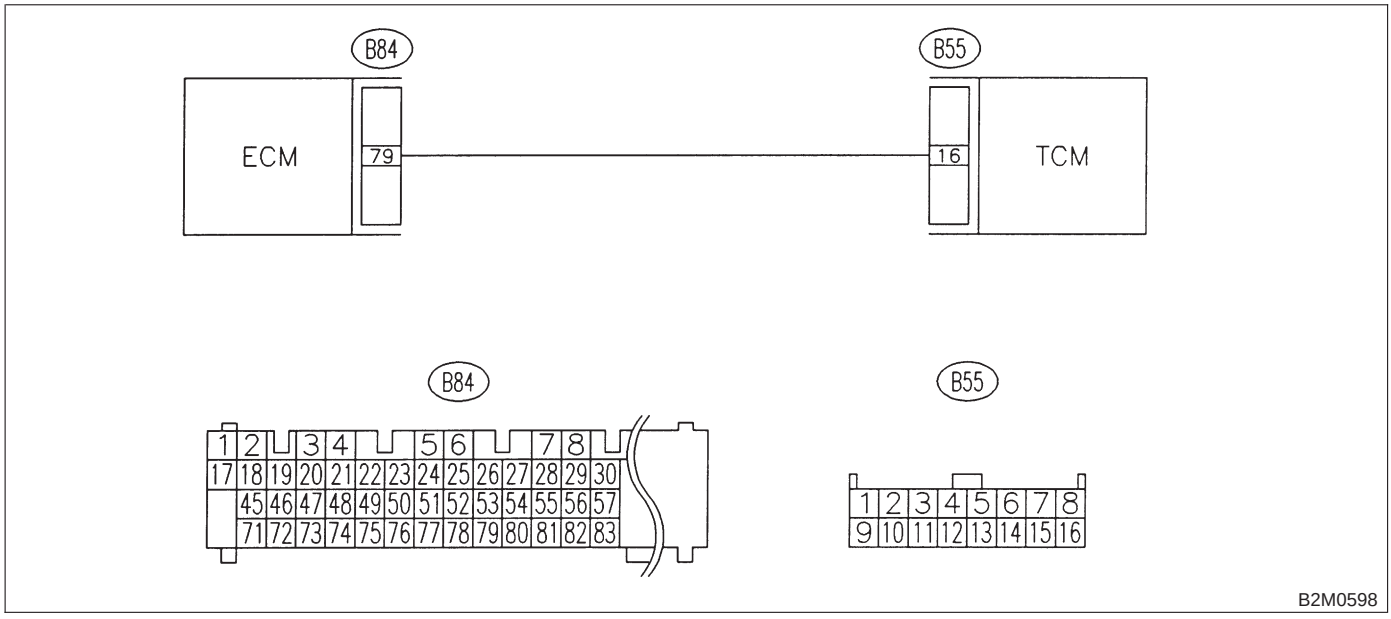
- **WIRING DIAGRAM:**



CC: DTC P1103 — ENGINE TORQUE CONTROL SIGNAL CIRCUIT MALFUNCTION —

NOTE:
Check engine torque control signal circuit.
<Ref. to 2-7 [T10CE0].>

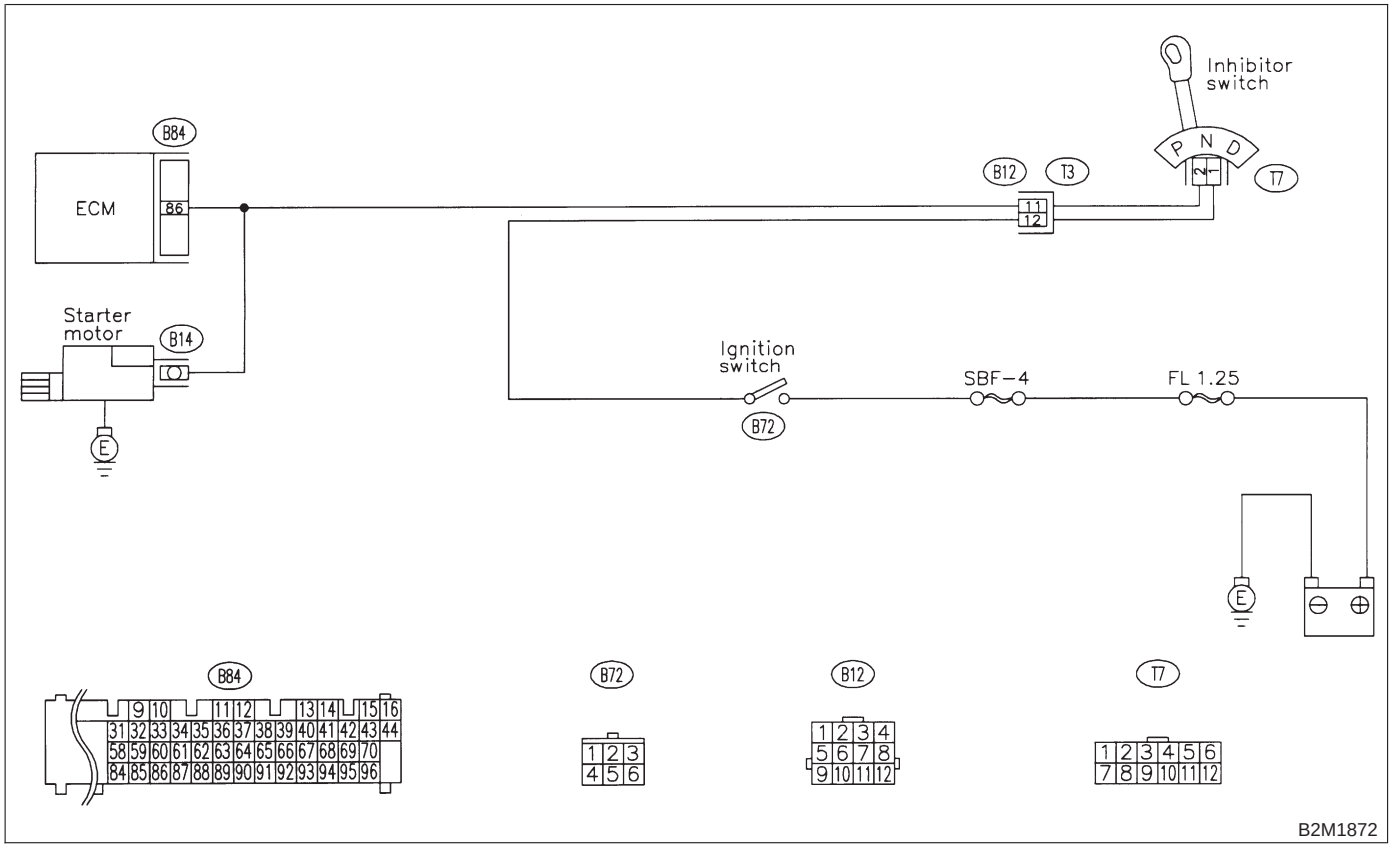
- **WIRING DIAGRAM:**



CD: DTC P1120 — STARTER SWITCH CIRCUIT HIGH INPUT —

NOTE:
Check starter switch circuit.
<Ref. to 2-7 [T10CG0].>

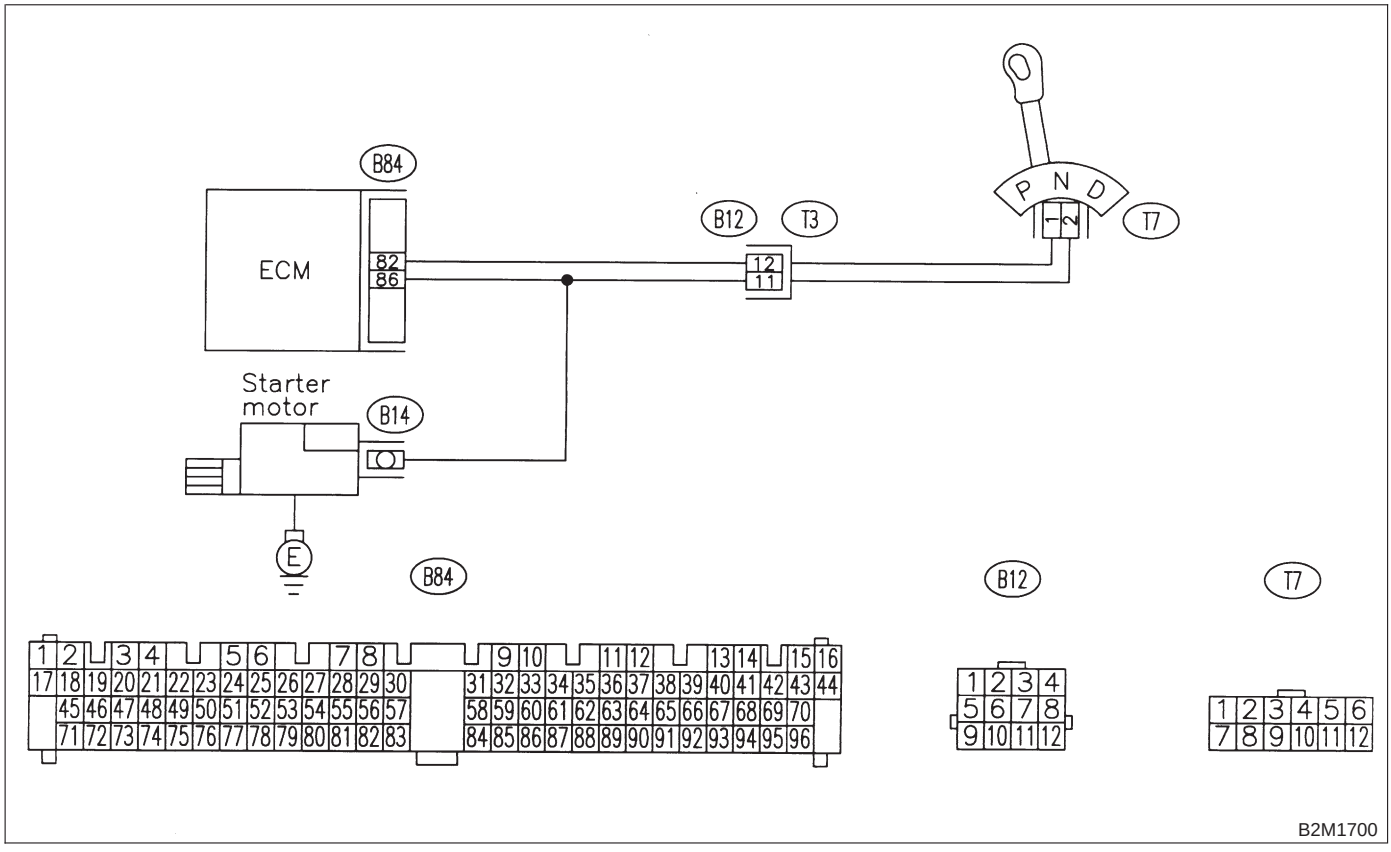
- **WIRING DIAGRAM:**



CE: DTC P1121 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT [AT VEHICLES] —

NOTE:
Check neutral position switch circuit.
<Ref. to 2-7 [T10CH0].>

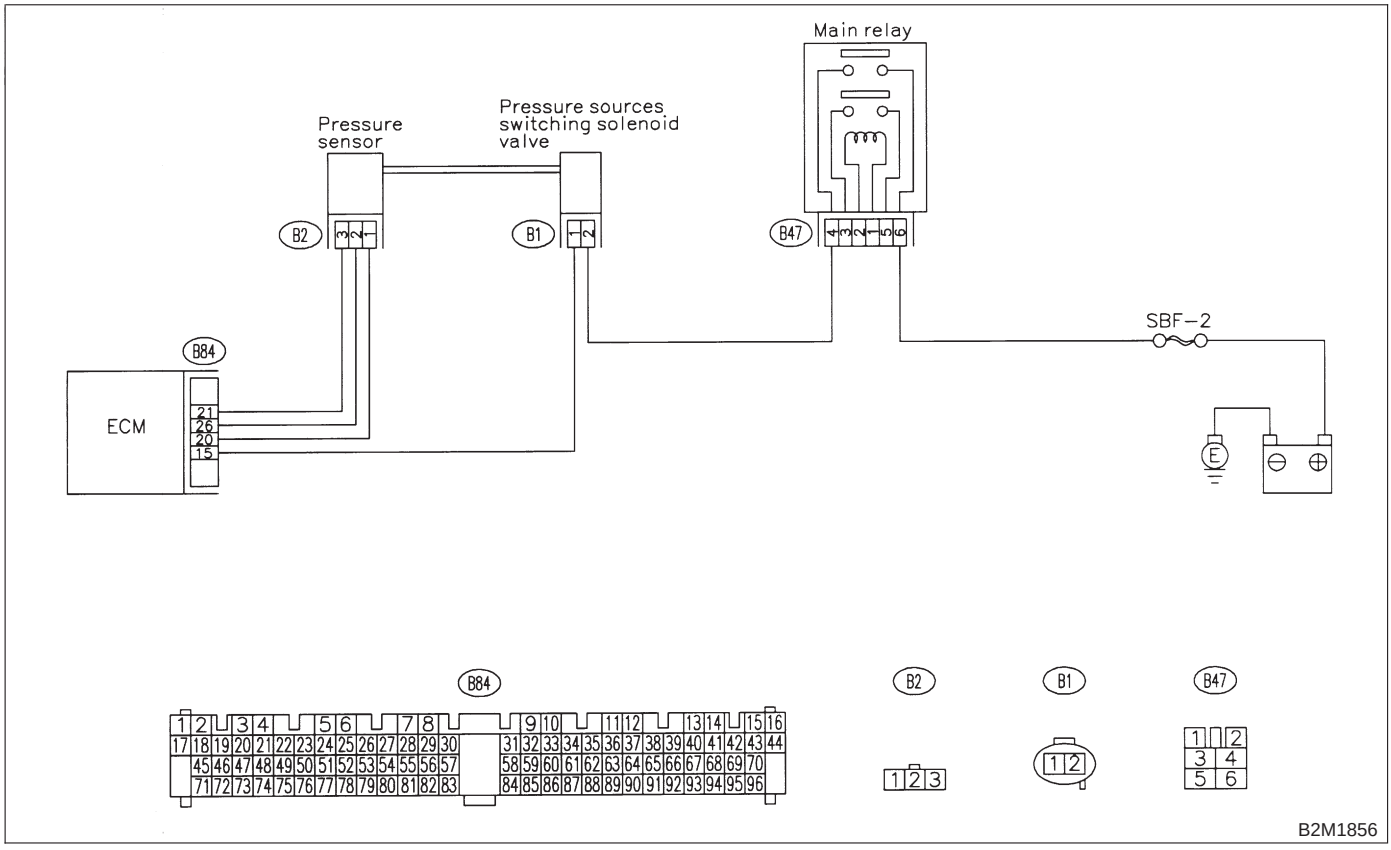
- **WIRING DIAGRAM:**



CF: DTC P1122 — PRESSURE SOURCES SWITCHING SOLENOID VALVE CIRCUIT HIGH INPUT —

NOTE:
Check pressure sources switching solenoid valve circuit.
<Ref. to 2-7 [T10CI0].>

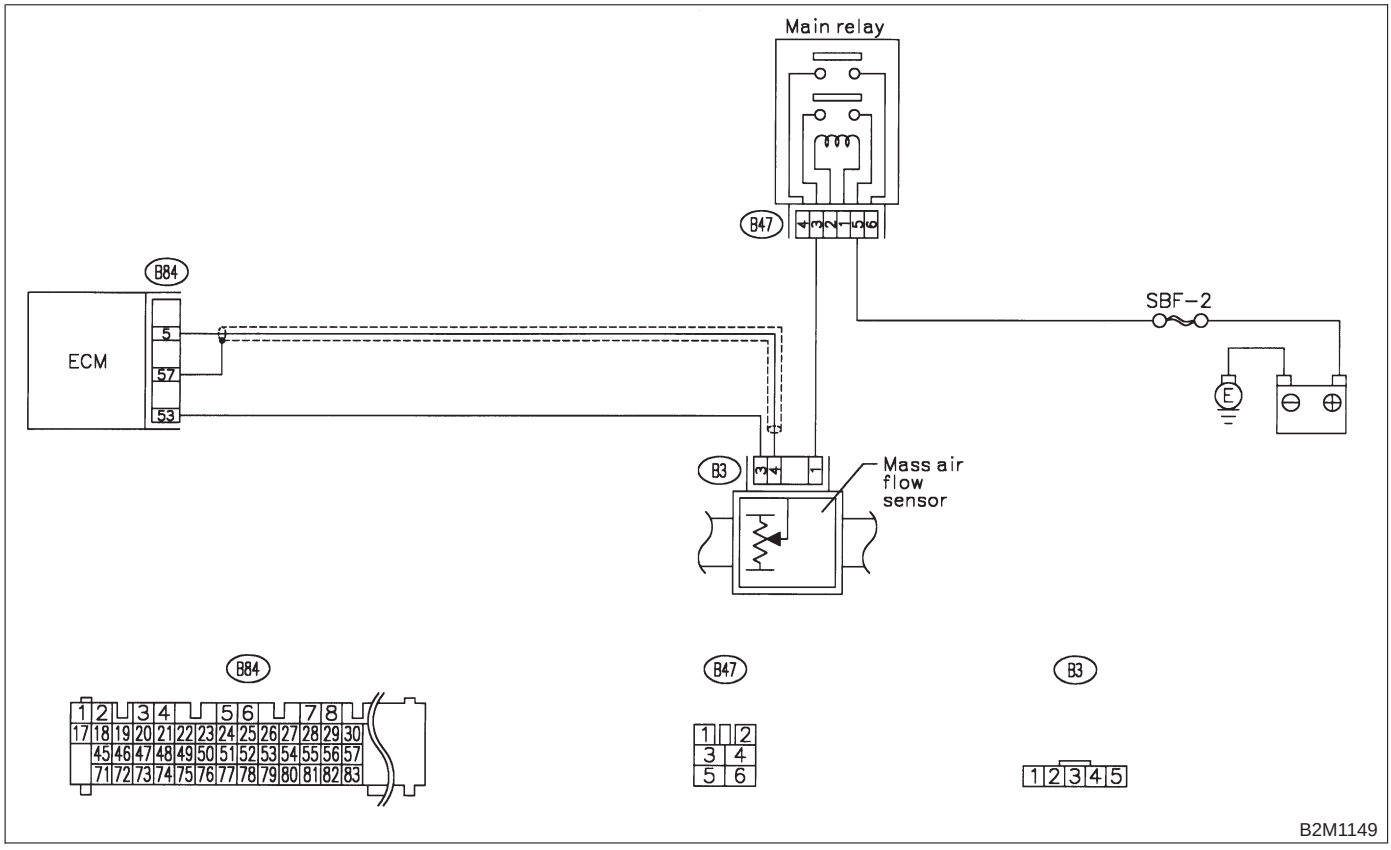
- **WIRING DIAGRAM:**



CG: DTC P1141 — MASS AIR FLOW SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

NOTE:
Check mass air flow sensor circuit.
<Ref. to 2-7 [T10CK0].>

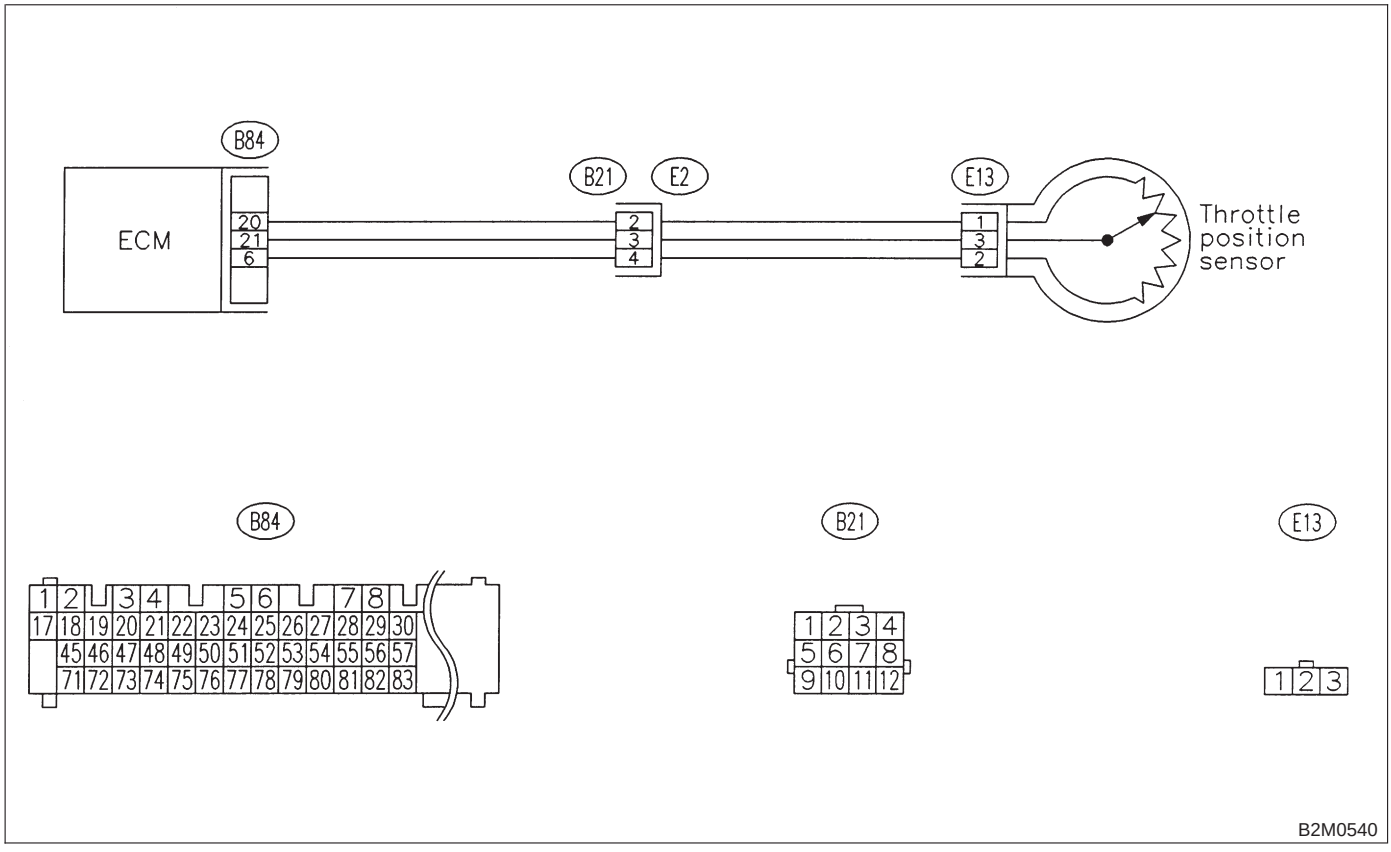
- **WIRING DIAGRAM:**



CH: DTC P1142 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

NOTE:
Check throttle position sensor circuit.
<Ref. to 2-7 [T10CL0].>

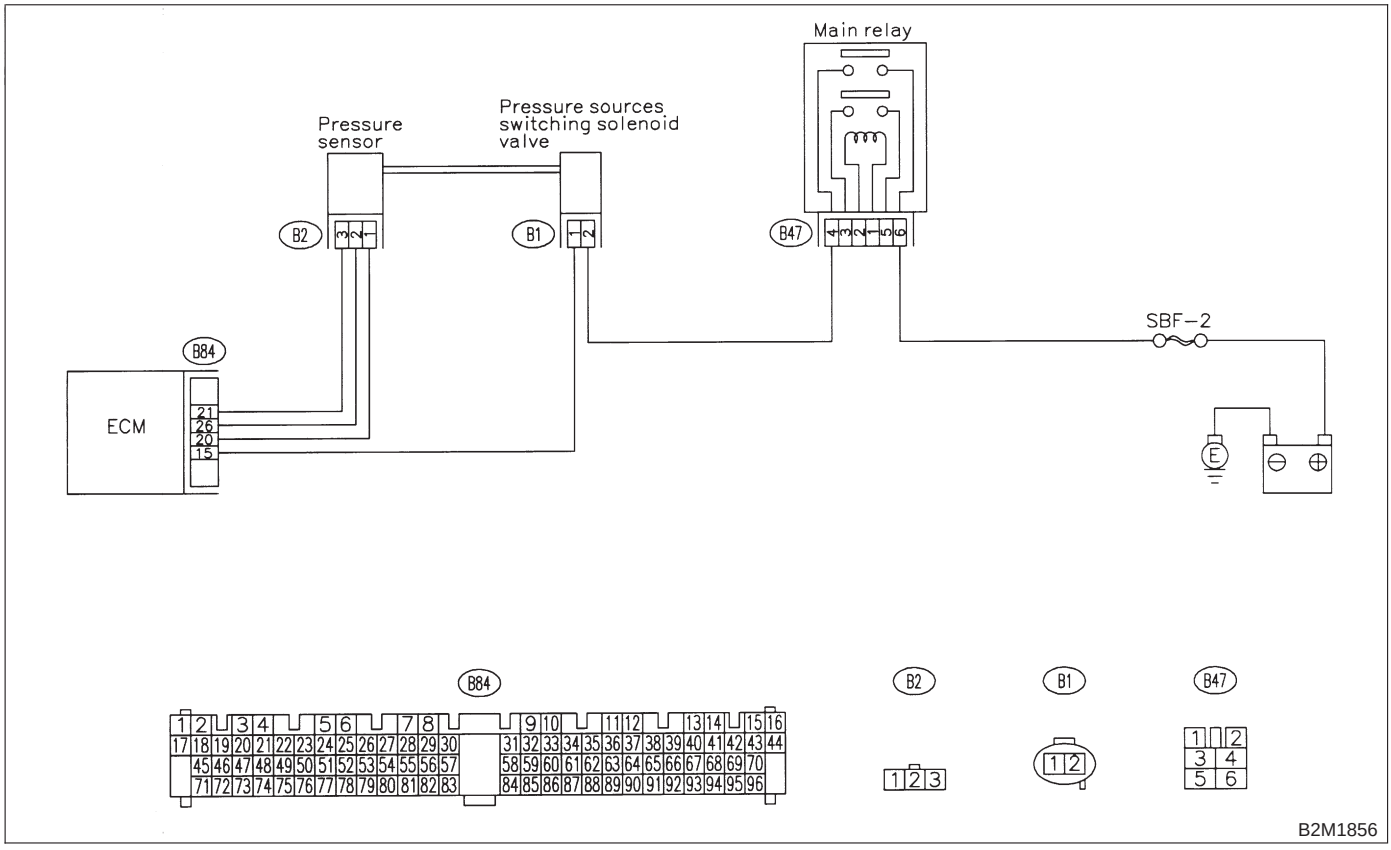
- **WIRING DIAGRAM:**



CI: DTC P1143 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

NOTE:
Check pressure sensor circuit.
<Ref. to 2-7 [T10CM0].>

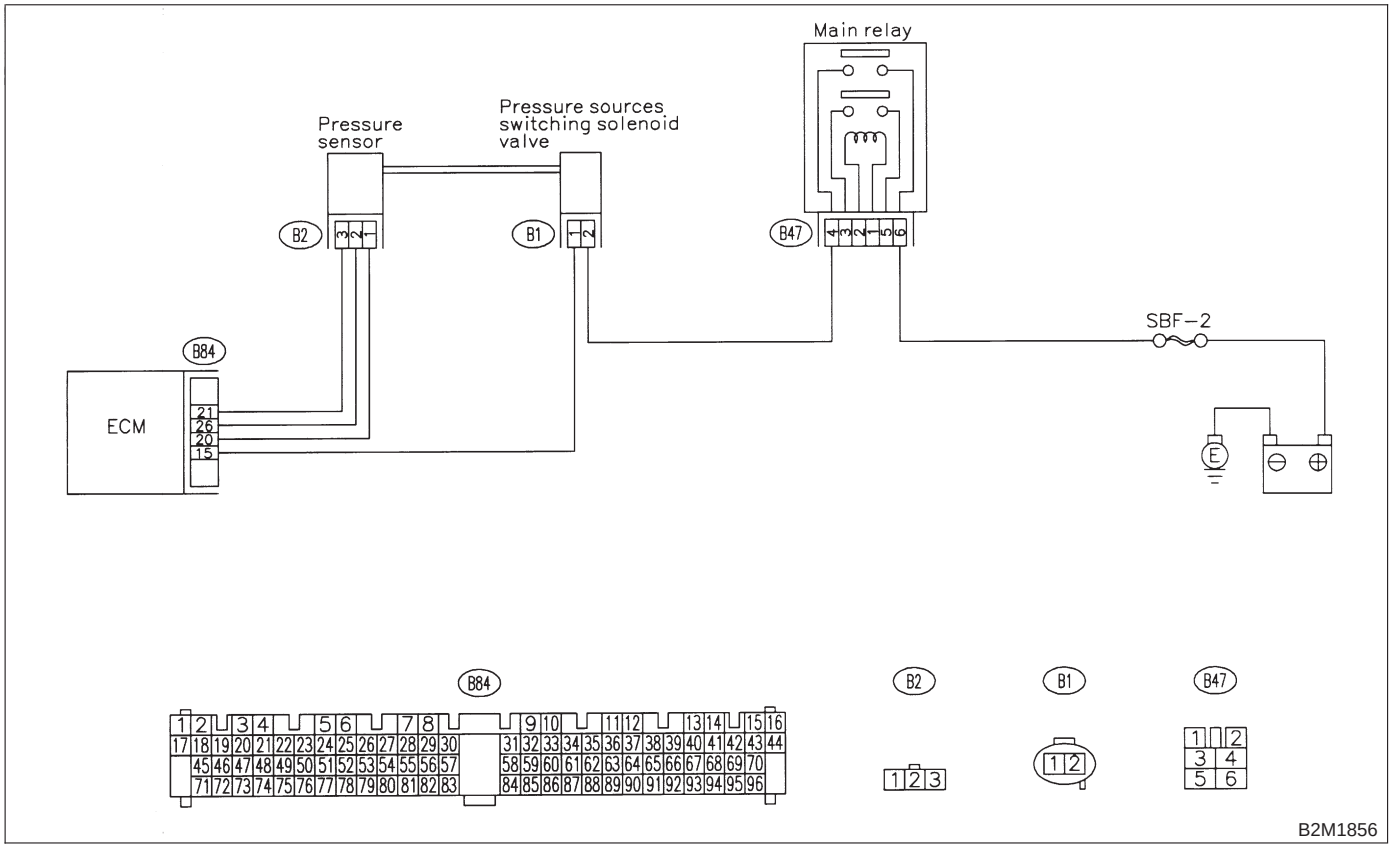
- **WIRING DIAGRAM:**



CJ: DTC P1144 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

NOTE:
Check pressure sensor circuit.
<Ref. to 2-7 [T10CN0].>

- **WIRING DIAGRAM:**

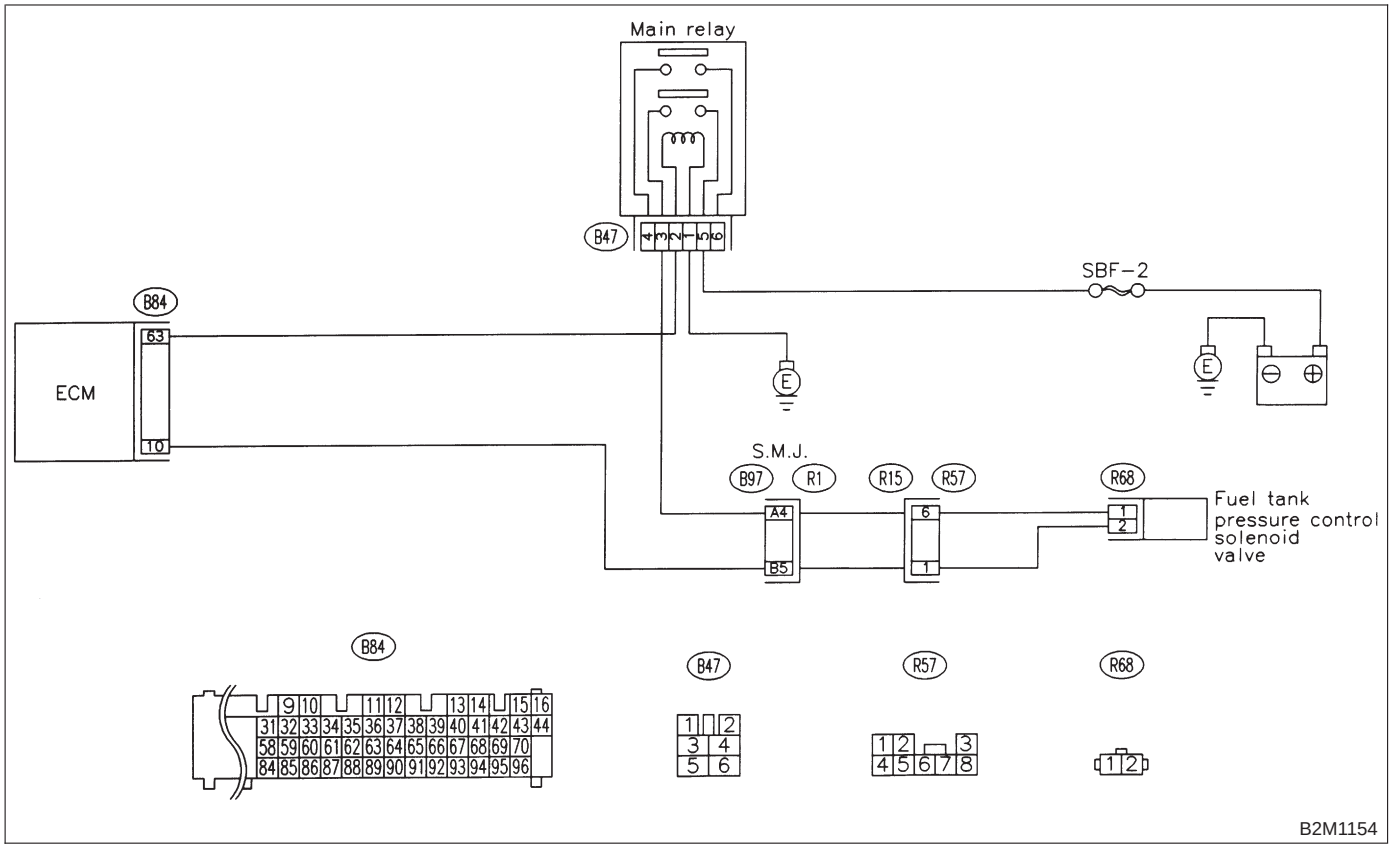


CK: DTC P1400 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

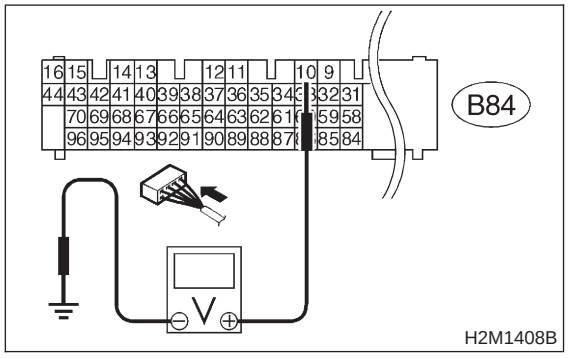
- **WIRING DIAGRAM:**



11CK1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 10 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **11CK2**.
NO : Go to step **11CK3**.

11CK2 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

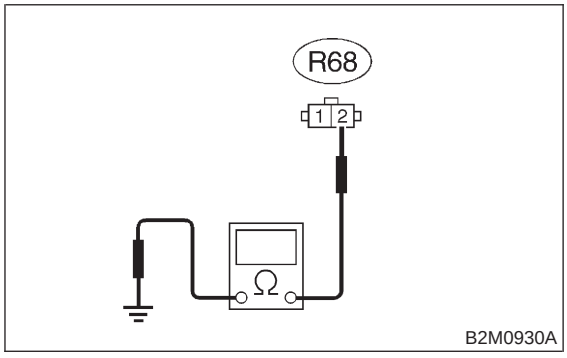
CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

11CK3 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connectors from fuel tank pressure control solenoid valve and ECM.
3) Measure resistance of harness between fuel tank pressure control solenoid valve connector and chassis ground.

Connector & terminal
(R68) No. 2 — Chassis ground:

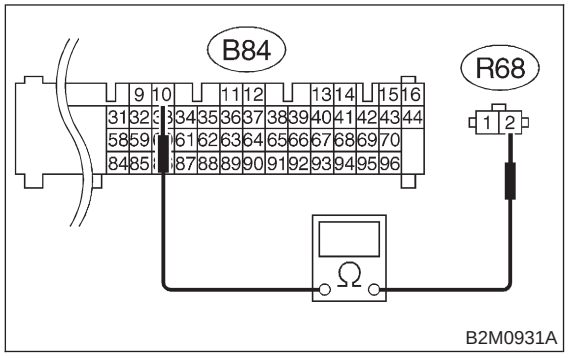


CHECK : ***Is the resistance less than 10 Ω?***
YES : Repair ground short circuit in harness between ECM and fuel tank pressure control solenoid valve connector.
NO : Go to step **11CK4**.

11CK4 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

Measure resistance of harness between ECM and fuel tank pressure control solenoid valve connector.

Connector & terminal
(B84) No. 10 — (R68) No. 2:



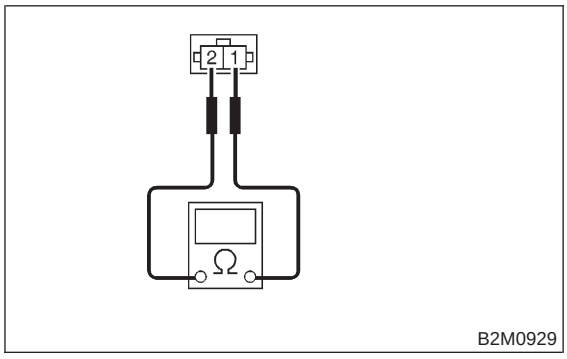
CHECK : ***Is the voltage less than 1 Ω?***
YES : Go to step **11CK5**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ECM and fuel tank pressure control solenoid valve connector
- Poor contact in coupling connectors (B97 and R57)

11CK5 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

Measure resistance between fuel tank pressure control solenoid valve terminals.

Terminals
No. 1 — No. 2:

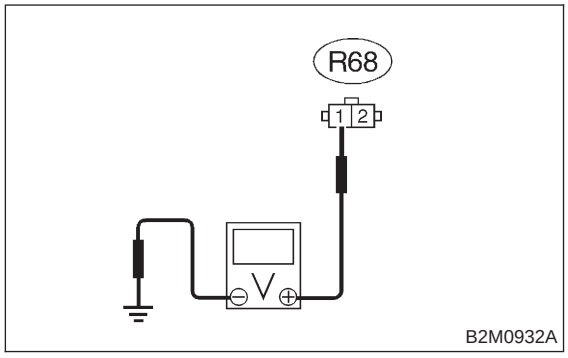


CHECK : ***Is the resistance between 10 and 100 Ω?***
YES : Go to step **11CK6**.
NO : Replace fuel tank pressure control solenoid valve.

11CK6 : CHECK POWER SUPPLY TO FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

1) Turn ignition switch to ON.
2) Measure voltage between fuel tank pressure control solenoid valve and chassis ground.

Connector & terminal
(R68) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **11CK7**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between main relay and fuel tank pressure control solenoid valve connector
- Poor contact in coupling connectors (B97 and R57)
- Poor contact in main relay connector

11CK7 : CHECK POOR CONTACT.

Check poor contact in fuel tank pressure control solenoid valve connector.
<Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in fuel tank pressure control solenoid valve connector?***
YES : Repair poor contact in fuel tank pressure control solenoid valve connector.
NO : Contact with SOA service.

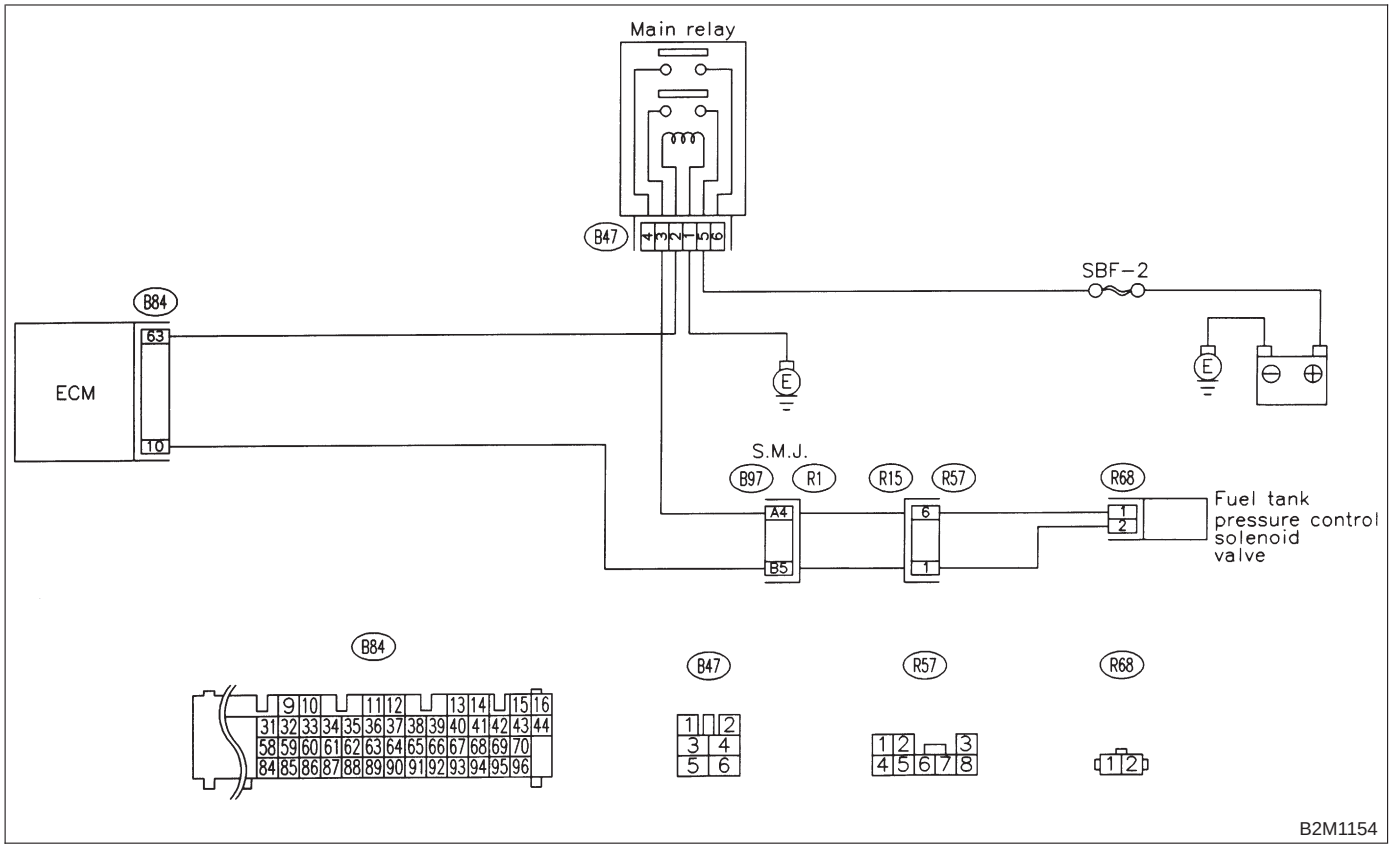
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CL: DTC P1420 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

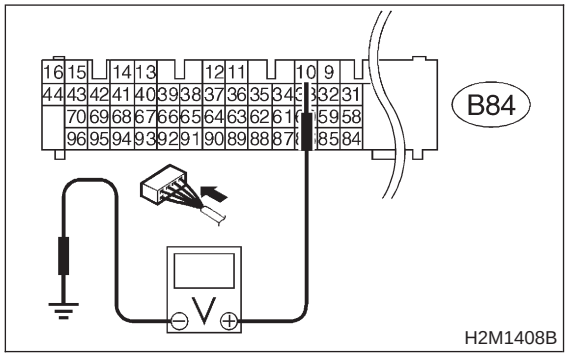
- **WIRING DIAGRAM:**



11CL1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 10 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **11CL3**.
NO : Go to step **11CL2**.

11CL2 : CHECK POOR CONTACT.

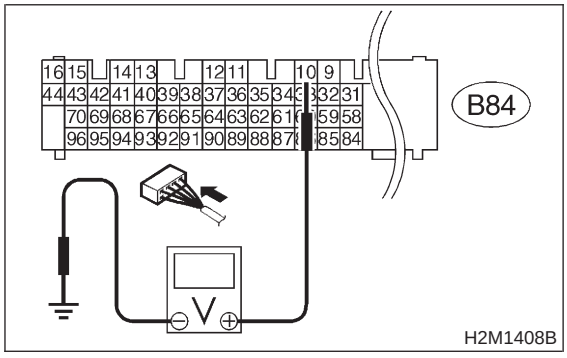
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

11CL3 : CHECK HARNESS BETWEEN FUEL TANK PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from fuel tank pressure control solenoid valve.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 10 (+) — Chassis ground (−):

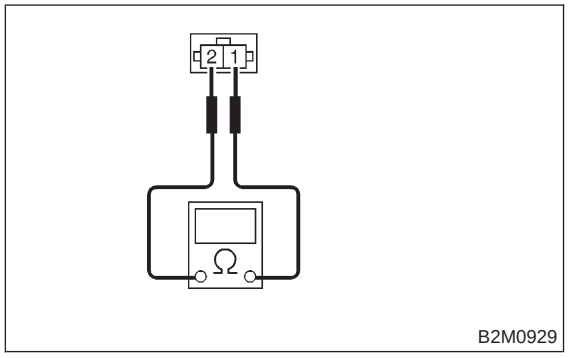


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and fuel tank pressure control solenoid valve connector. After repair, replace ECM.
NO : Go to step **11CL4**.

11CL4 : CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE.

1) Turn ignition switch to OFF.
2) Measure resistance between fuel tank pressure control solenoid valve terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Replace fuel tank pressure control solenoid valve and ECM.
NO : Go to step **11CL5**.

11CL5 : CHECK POOR CONTACT.

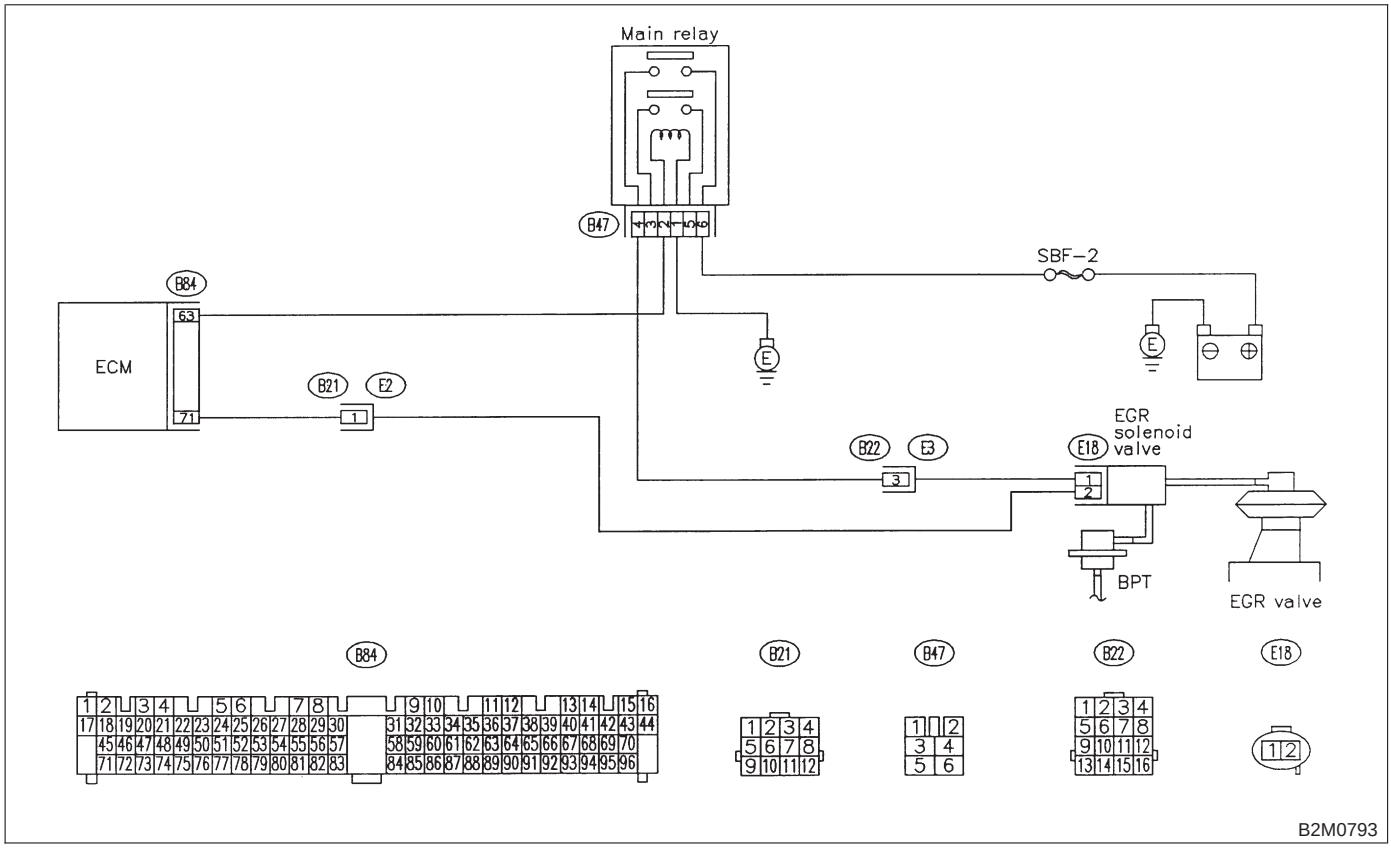
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

CM: DTC P1421 — EXHAUST GAS RECIRCULATION CIRCUIT HIGH INPUT —

NOTE:
Check exhaust gas recirculation control solenoid valve circuit.
<Ref. to 2-7 [T10CQ0].>

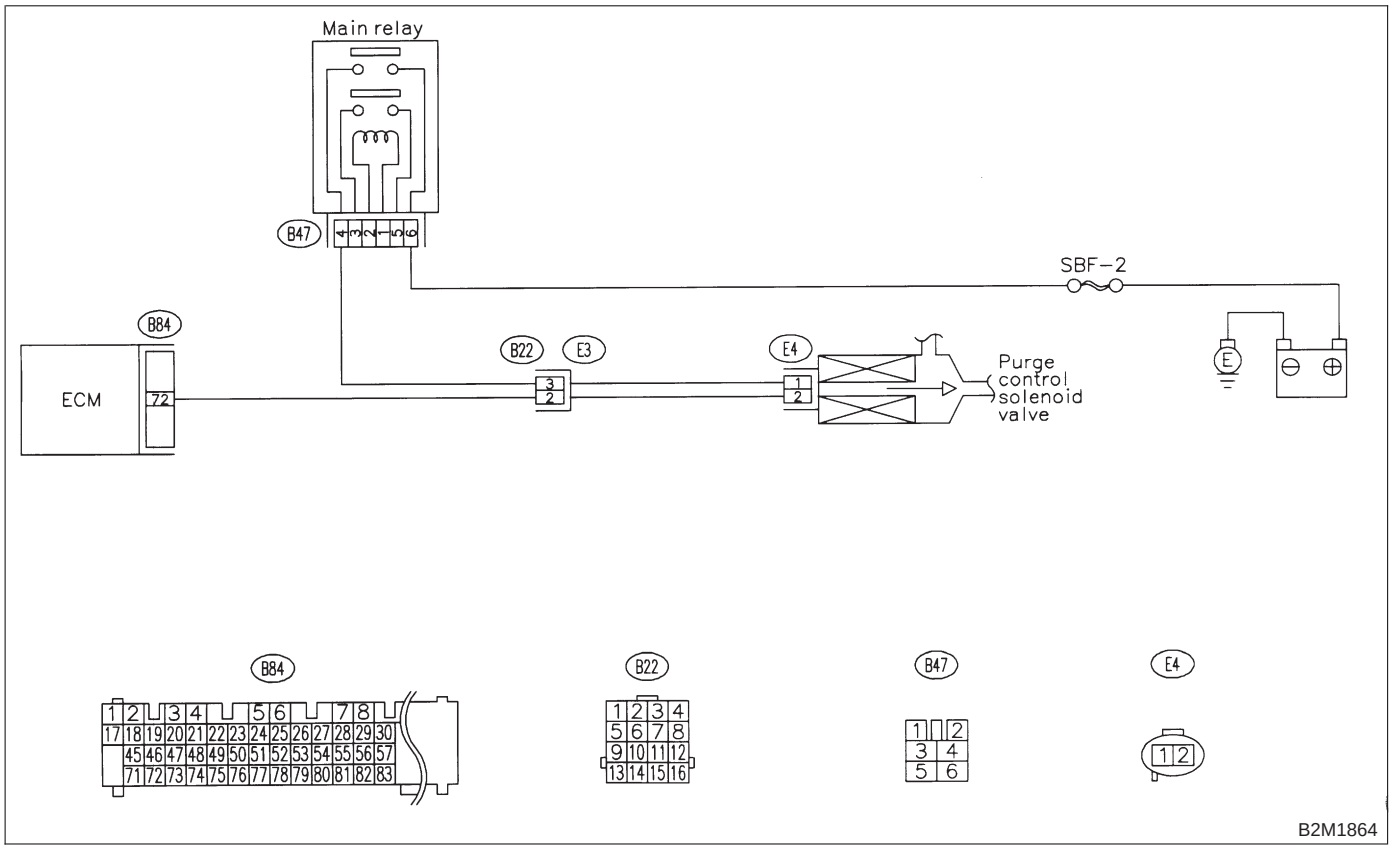
- **WIRING DIAGRAM:**



CN: DTC P1422 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT —

NOTE:
Check canister purge control system.
<Ref. to 2-7 [T10CR0].>

- **WIRING DIAGRAM:**



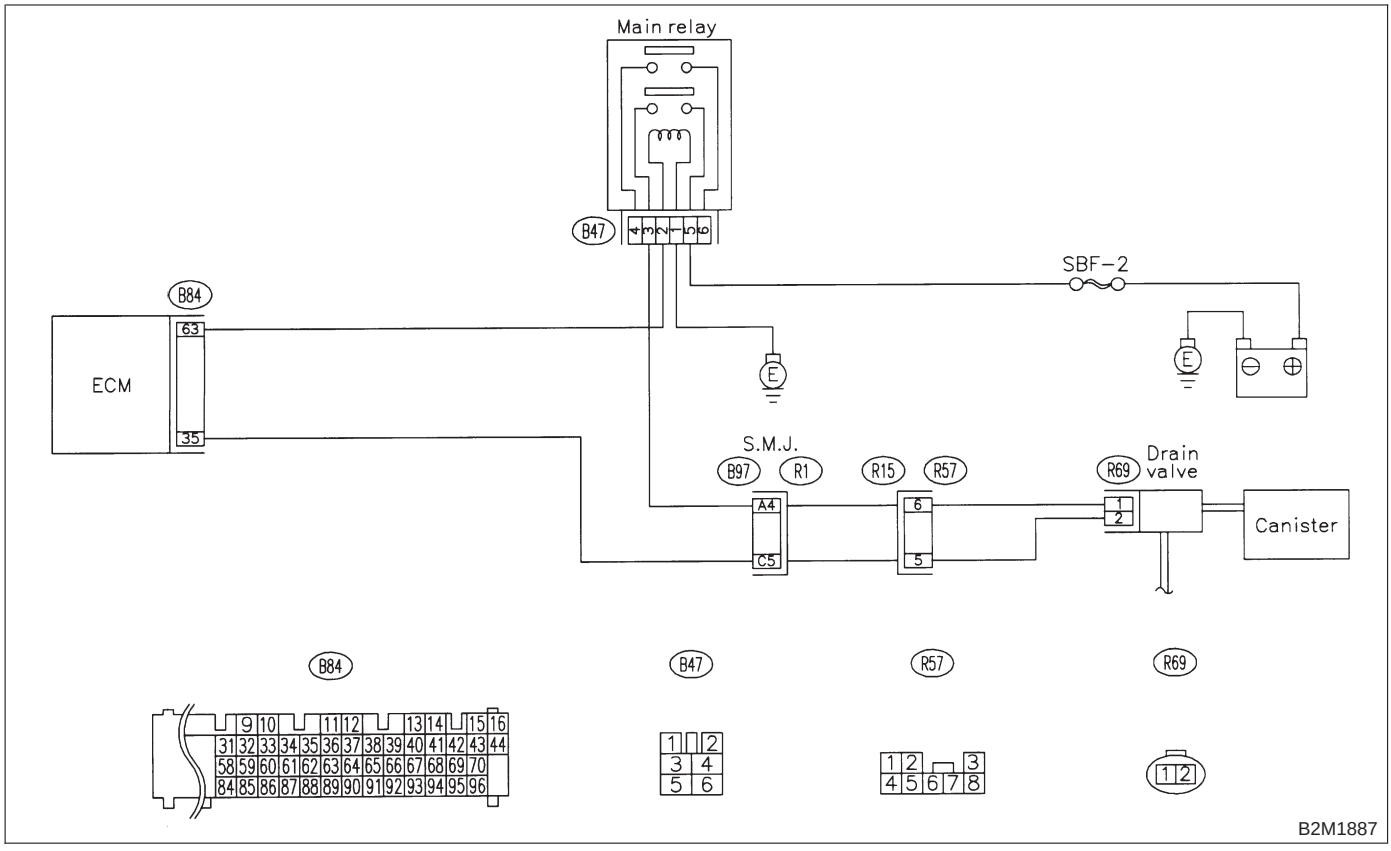
MEMO:

CO: DTC P1423 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

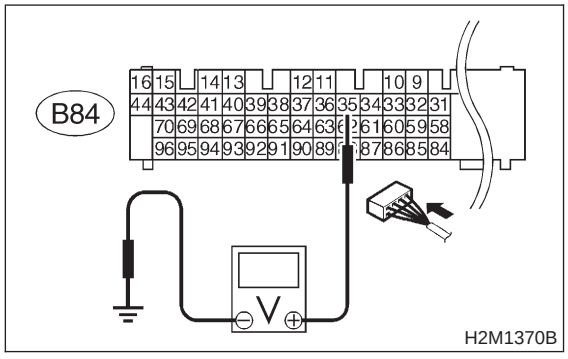
- **WIRING DIAGRAM:**



11CO1 : CHECK OUTPUT SIGNAL FROM ECM.

1) Turn ignition switch to ON.
2) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 35 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **11CO3**.
NO : Go to step **11CO2**.

11CO2 : CHECK POOR CONTACT.

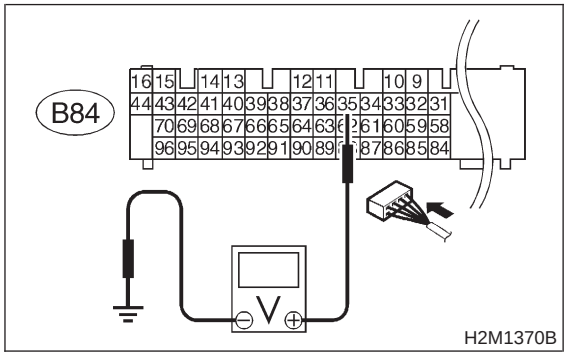
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***
YES : Repair poor contact in ECM connector.
NO : Replace ECM.

11CO3 : CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from drain valve.
3) Turn ignition switch to ON.
4) Measure voltage between ECM and chassis ground.

Connector & terminal
(B84) No. 35 (+) — Chassis ground (−):

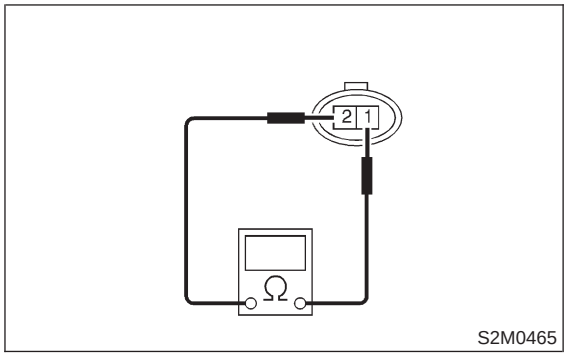


CHECK : ***Is the voltage more than 10 V?***
YES : Repair battery short circuit in harness between ECM and drain valve connector. After repair, replace ECM.
NO : Go to step **11CO4**.

11CO4 : CHECK DRAIN VALVE.

1) Turn ignition switch to OFF.
2) Measure resistance between drain valve terminals.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Replace drain valve and ECM.
NO : Go to step **11CO5**.

11CO5 : CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in ECM connector?***

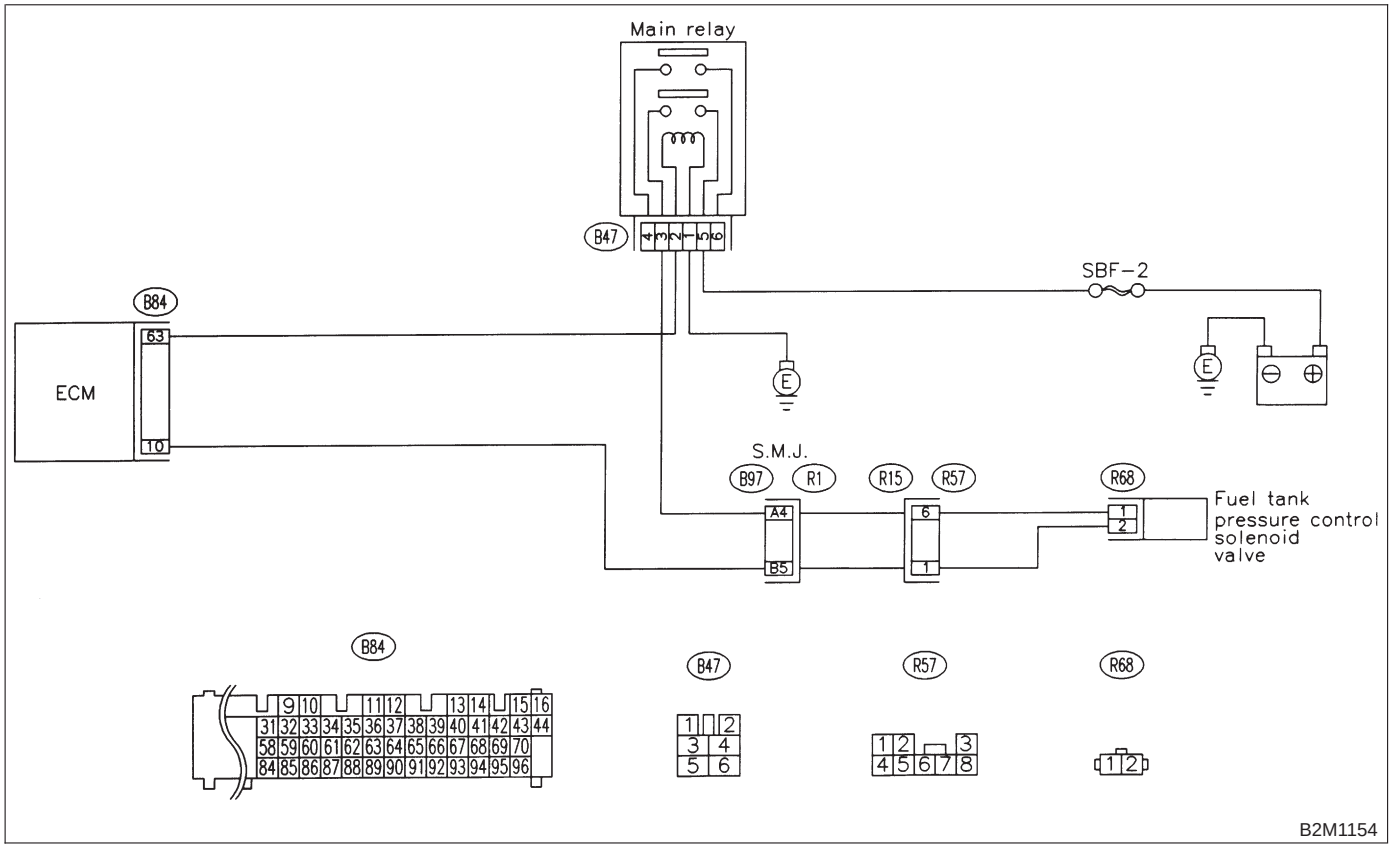
YES : Repair poor contact in ECM connector.

NO : Replace ECM.

CP: DTC P1440 — FUEL TANK PRESSURE CONTROL SYSTEM FUNCTION PROBLEM (LOW INPUT) —

NOTE:
Check fuel tank pressure control system.
<Ref. to 2-7 [T10CU0].>

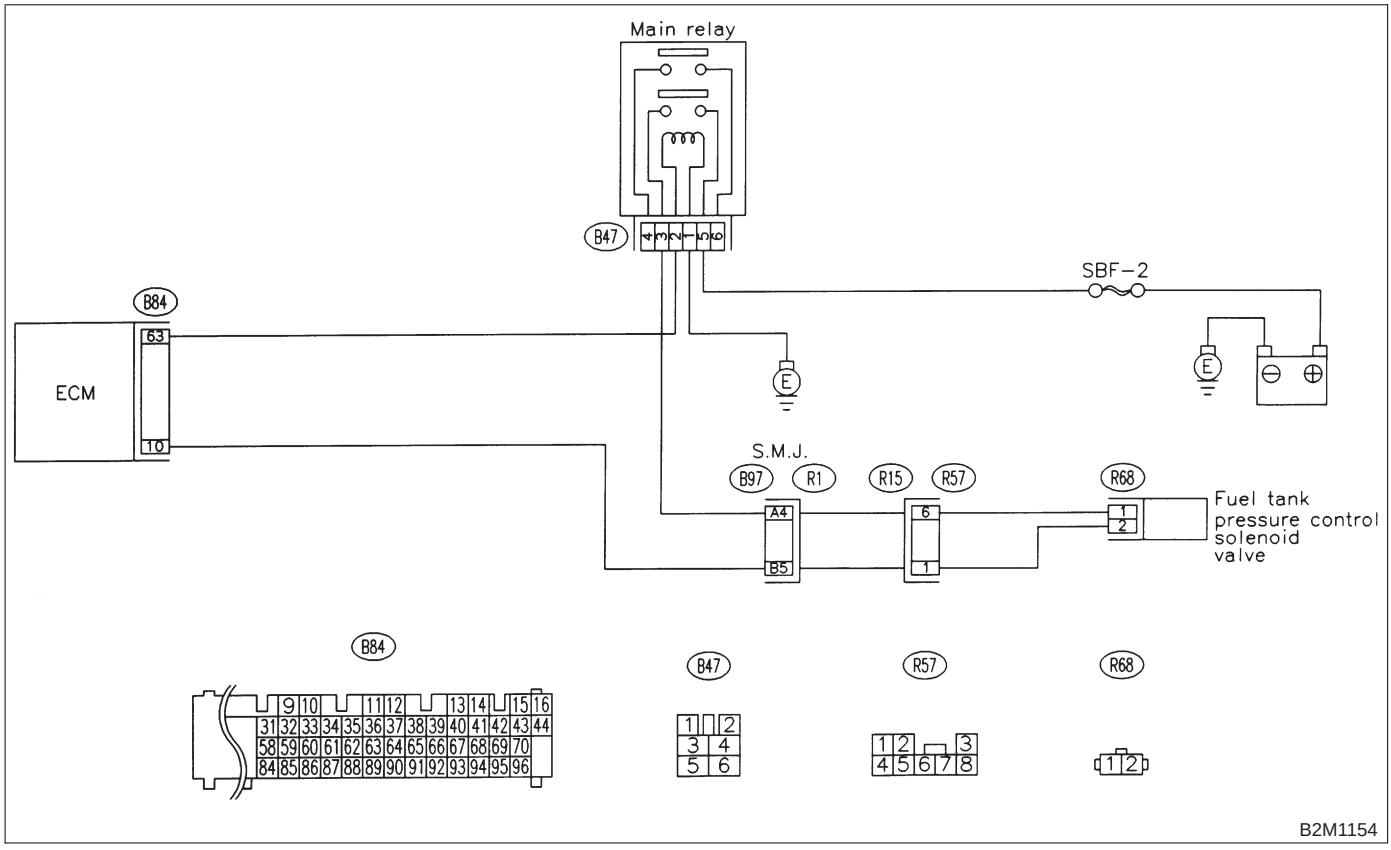
- **WIRING DIAGRAM:**



CQ: DTC P1441 — FUEL TANK PRESSURE CONTROL SYSTEM FUNCTION PROBLEM (HIGH INPUT) —

NOTE:
Check fuel tank pressure control system.
<Ref. to 2-7 [T10CV0].>

- **WIRING DIAGRAM:**

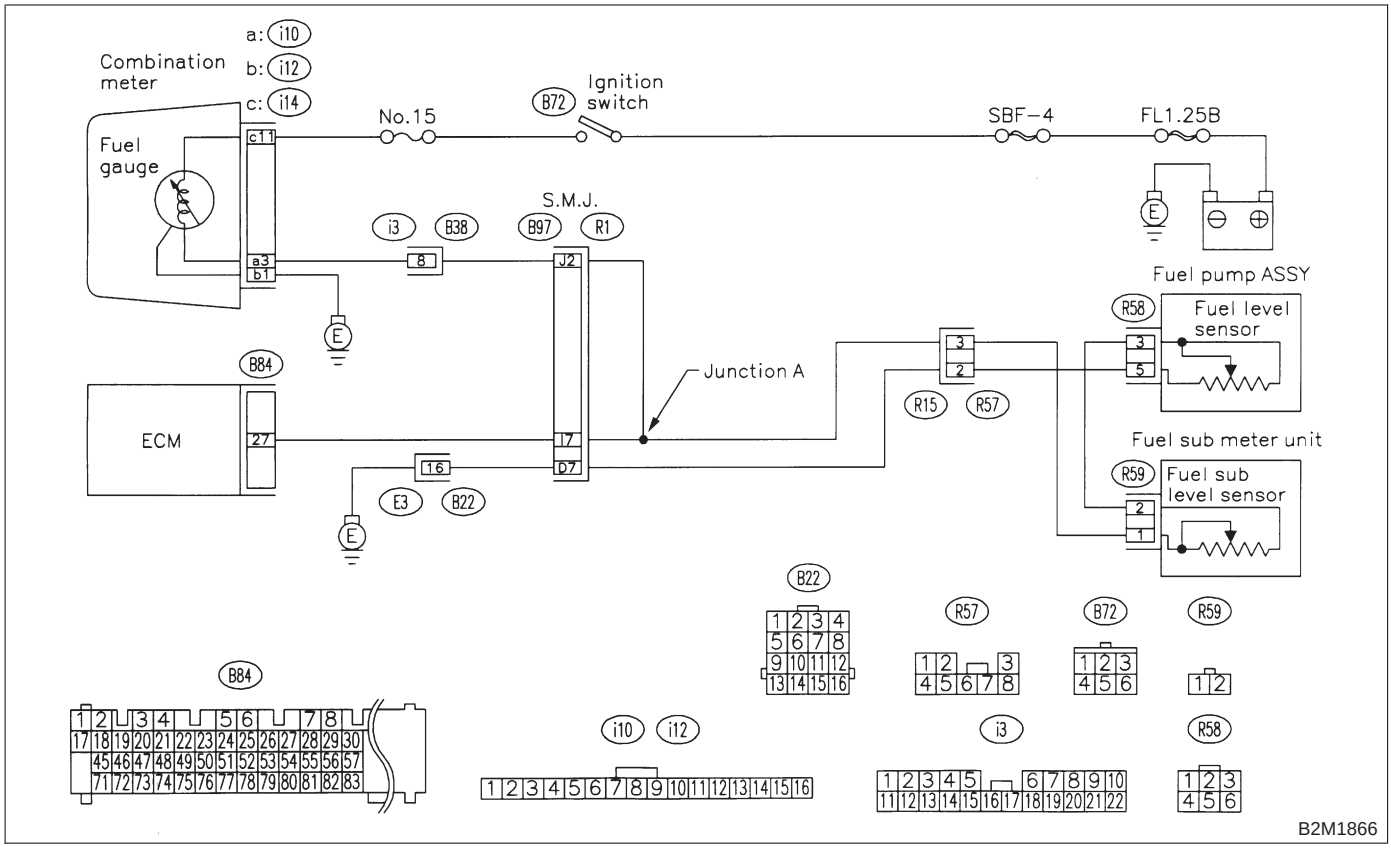


CR: DTC P1442 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM 2 —

- **DTC DETECTING CONDITION:**
  - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11CR1 :	CHECK ANY OTHER DTC ON DISPLAY.

CHECK : ***Does the Subaru select monitor or OBD-II general scan tool indicate DTC P0461, P0462 or P0463?***

YES : Inspect DTC P0461, P0462 or P0463 using “11. Diagnostics Chart with Trouble Code for RHD Vehicles”. <Ref. to 2-7 [T1100].>

NOTE:
In this case, it is not necessary to inspect this trouble.

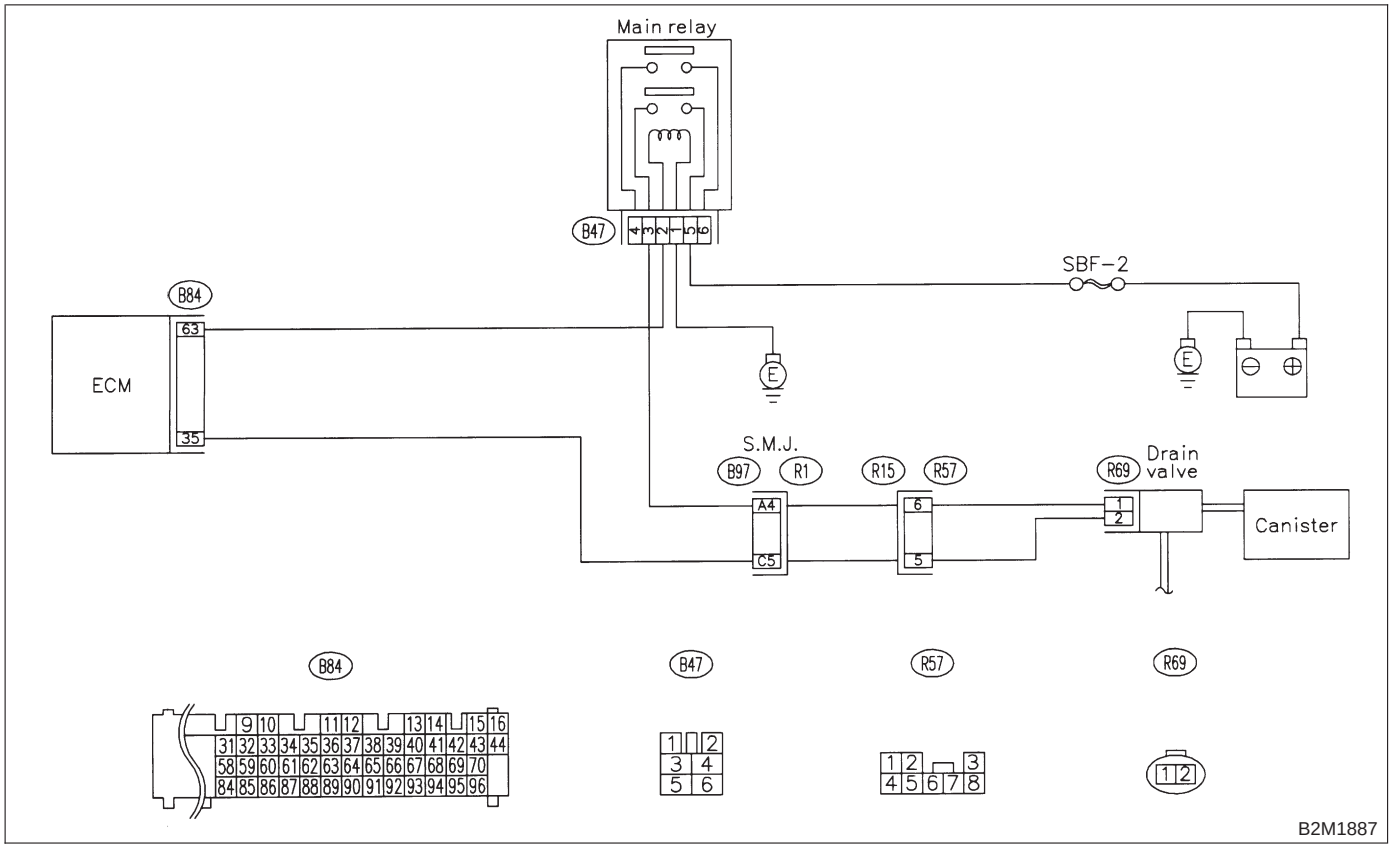
NO : Replace fuel sending unit and fuel sub meter unit.

CS: DTC P1443 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL FUNCTION PROBLEM —

- **DTC DETECTING CONDITION:**
  - Immediately after fault occurrence
- **TROUBLE SYMPTOM:**
  - Improper fuel supply

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0].> and <Ref. to 2-7 [T3E0].>

- **WIRING DIAGRAM:**



11CS1 :	**CHECK ANY OTHER DTC ON DISPLAY.**

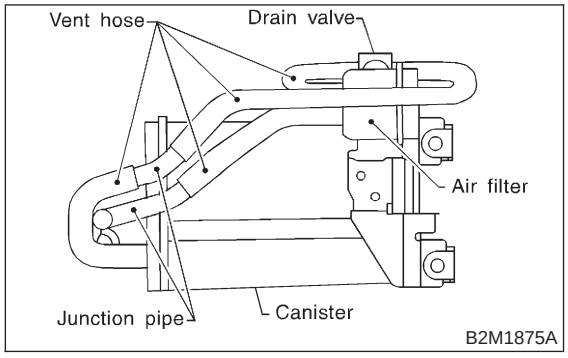
CHECK : ***Is there any other DTC on display?***

YES : Inspect the relevant DTC using “11. Diagnostics Chart with Trouble Code for RHD Vehicles”. <Ref. to 2-7 [T1100].>

NO : Go to step **11CS2**.

11CS2 : CHECK VENT LINE HOSES.

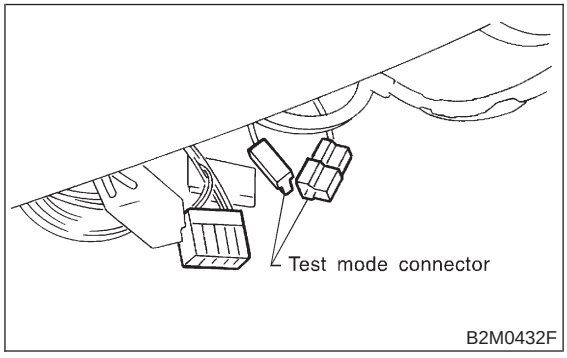
Check the following items.
- Clogging of vent hoses between canister and drain valve
- Clogging of vent hose between drain valve and air filter
- Clogging of vent hose between air filter and junction pipe
- Clogging of junction pipe
- Clogging of air filter



CHECK : ***Is there a fault in vent line?***
YES : Repair or replace the faulty part.
NO : Go to step **11CS3**.

11CS3 : CHECK DRAIN VALVE OPERATION.

1) Turn ignition switch to OFF.
2) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



3) Turn ignition switch to ON.

NOTE:
Drain valve operation check can also be executed using Subaru Select Monitor. For the procedure, refer to the "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to 2-7 [T3F0].>

CHECK : ***Does drain valve produce operating sound?***
YES : Contact with SOA service.

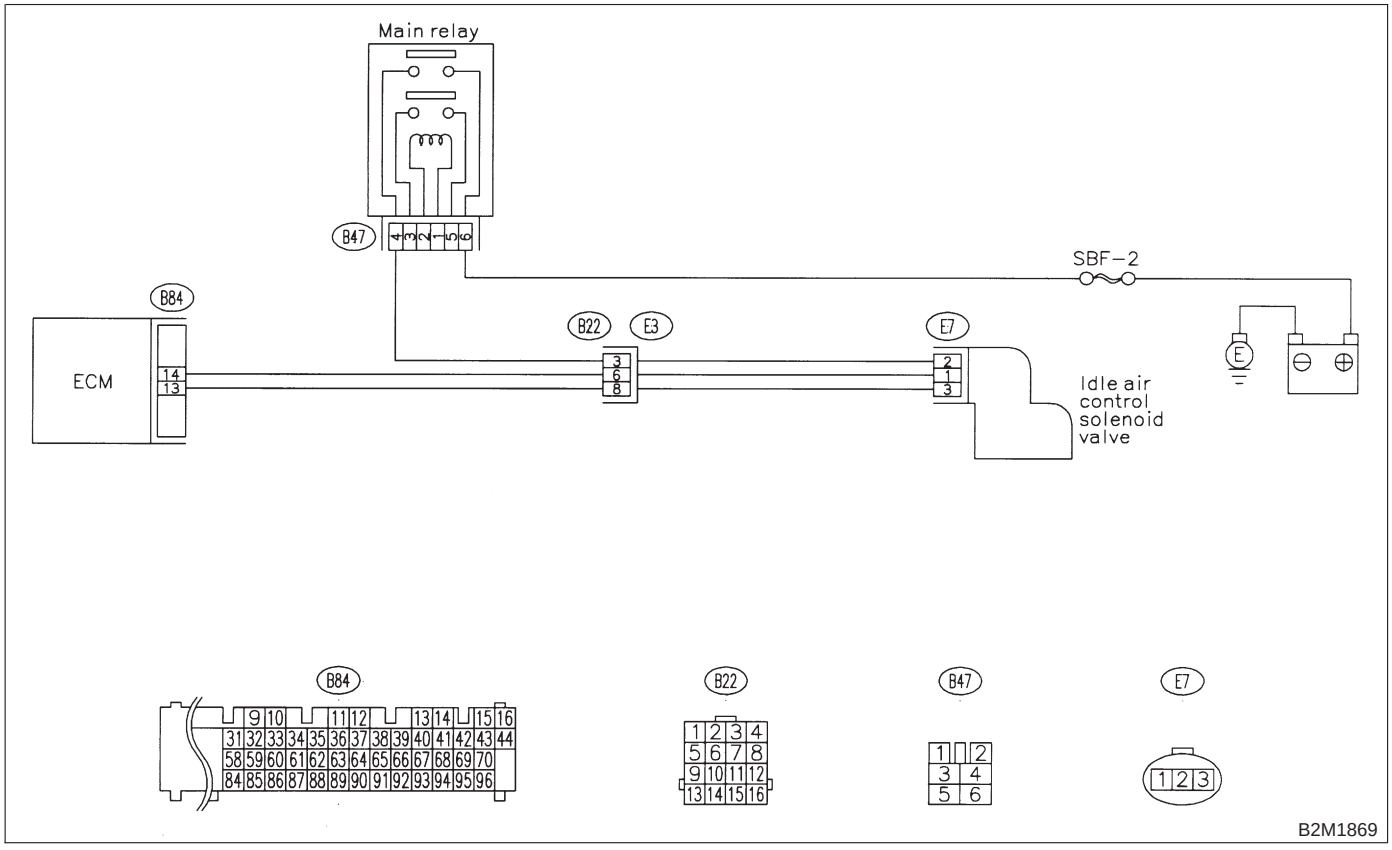
NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

NO : Replace drain valve.

CT: DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —

NOTE:
Check idle air control system.
<Ref. to 2-7 [T10CY0].>

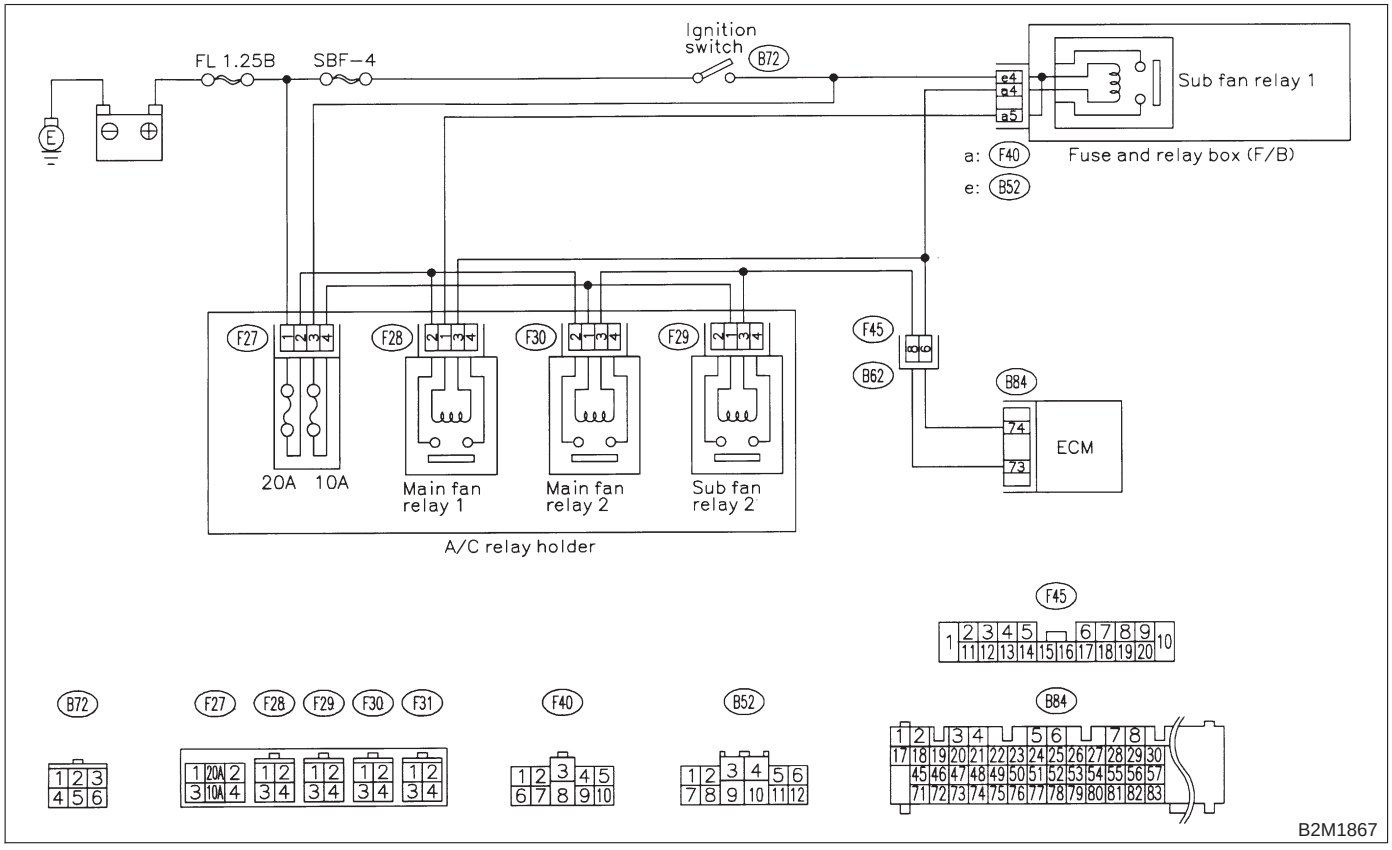
- **WIRING DIAGRAM:**



CU: DTC P1520 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT —

NOTE:
Check radiator fan relay 1 circuit.
<Ref. to 2-7 [T10CZ0].>

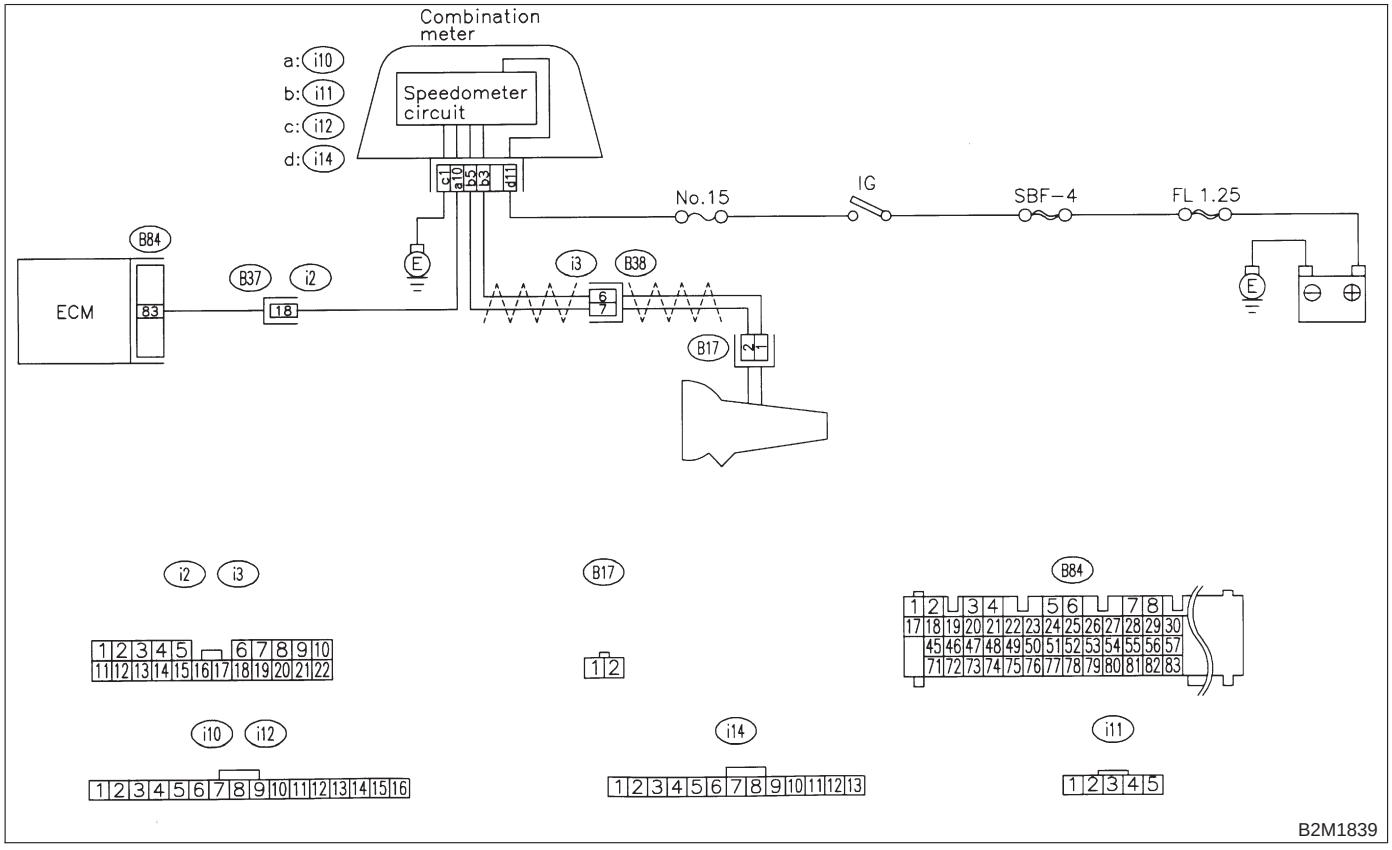
- **WIRING DIAGRAM:**



CV: DTC P1540 — VEHICLE SPEED SENSOR MALFUNCTION 2 —

NOTE:
Check vehicle speed sensor 2 circuit.
<Ref. to 2-7 [T10DA0].>

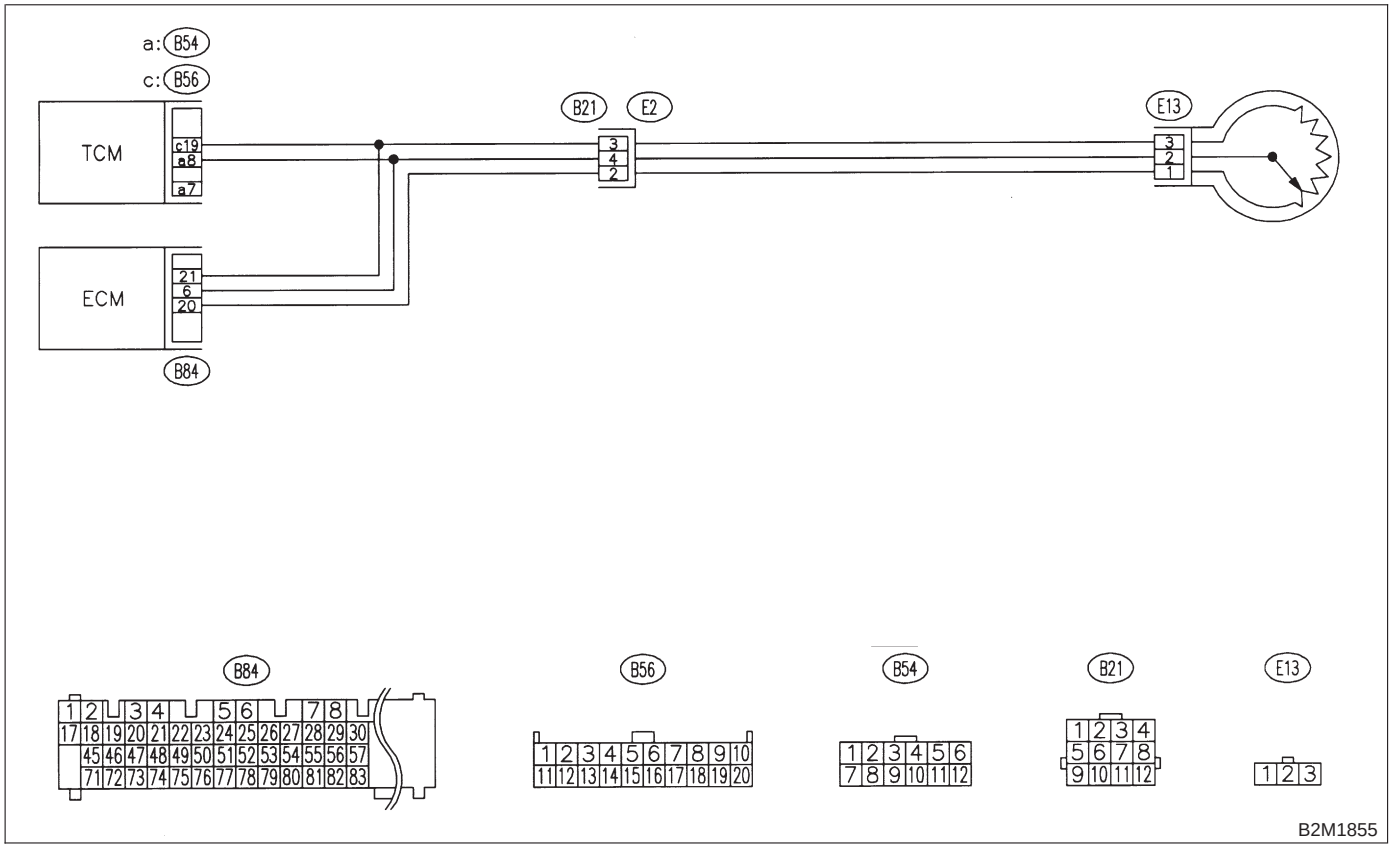
- **WIRING DIAGRAM:**



CW: DTC P1700 — THROTTLE POSITION SENSOR CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —

NOTE:
Check throttle position sensor circuit for automatic transmission.
<Ref. to 2-7 [T10DB0].>

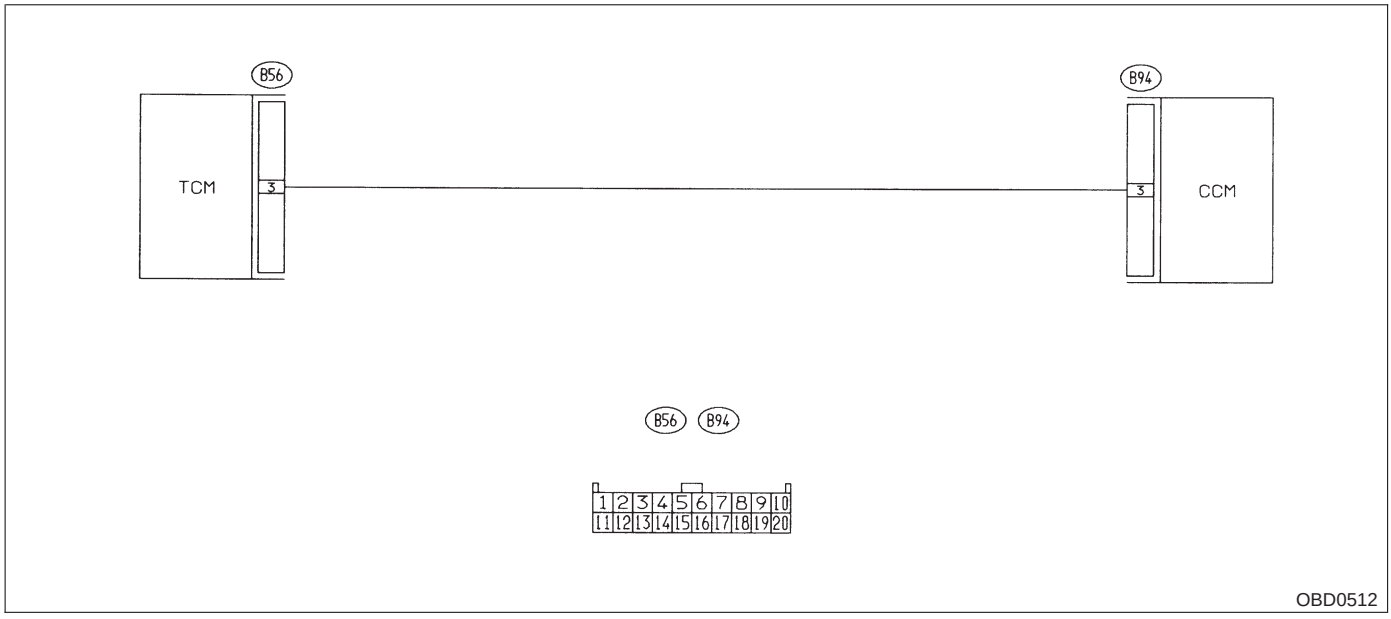
- **WIRING DIAGRAM:**



CX: DTC P1701 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —

NOTE:
Check cruise control set signal circuit.
<Ref. to 2-7 [T10DC0].>

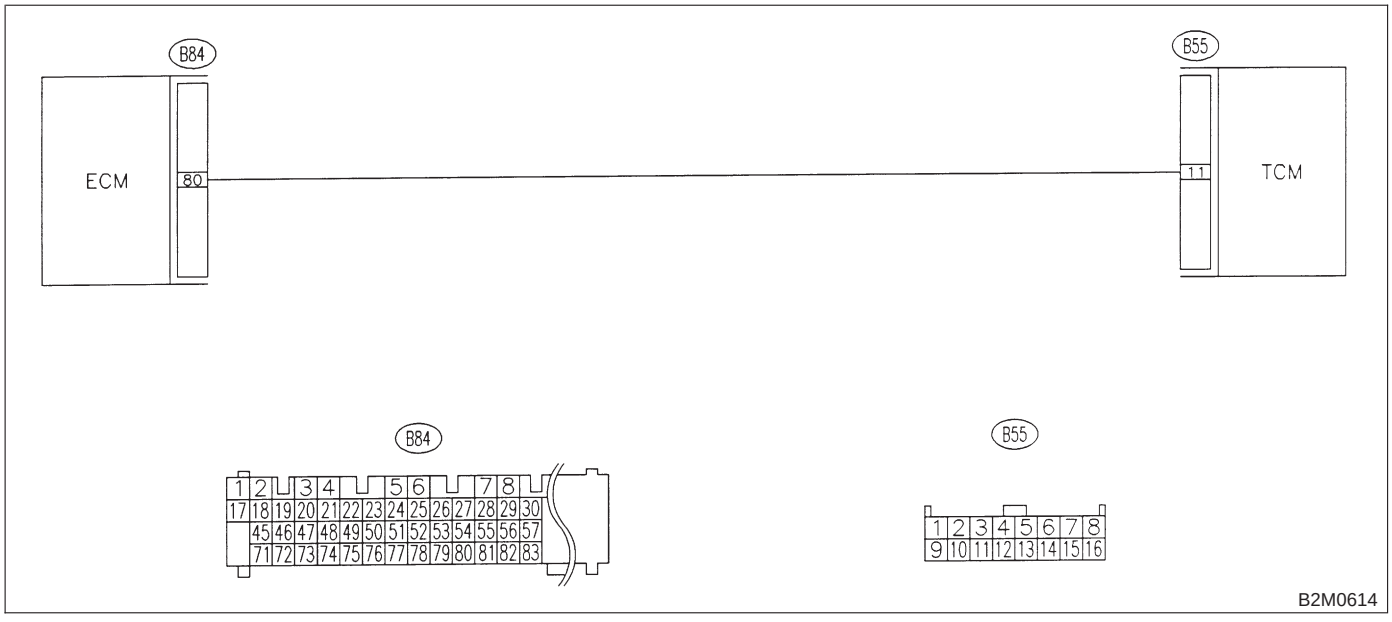
- **WIRING DIAGRAM:**



CY: DTC P1702 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT —

NOTE:
Check automatic transmission diagnosis input signal circuit.
<Ref. to 2-7 [T10DD0].>

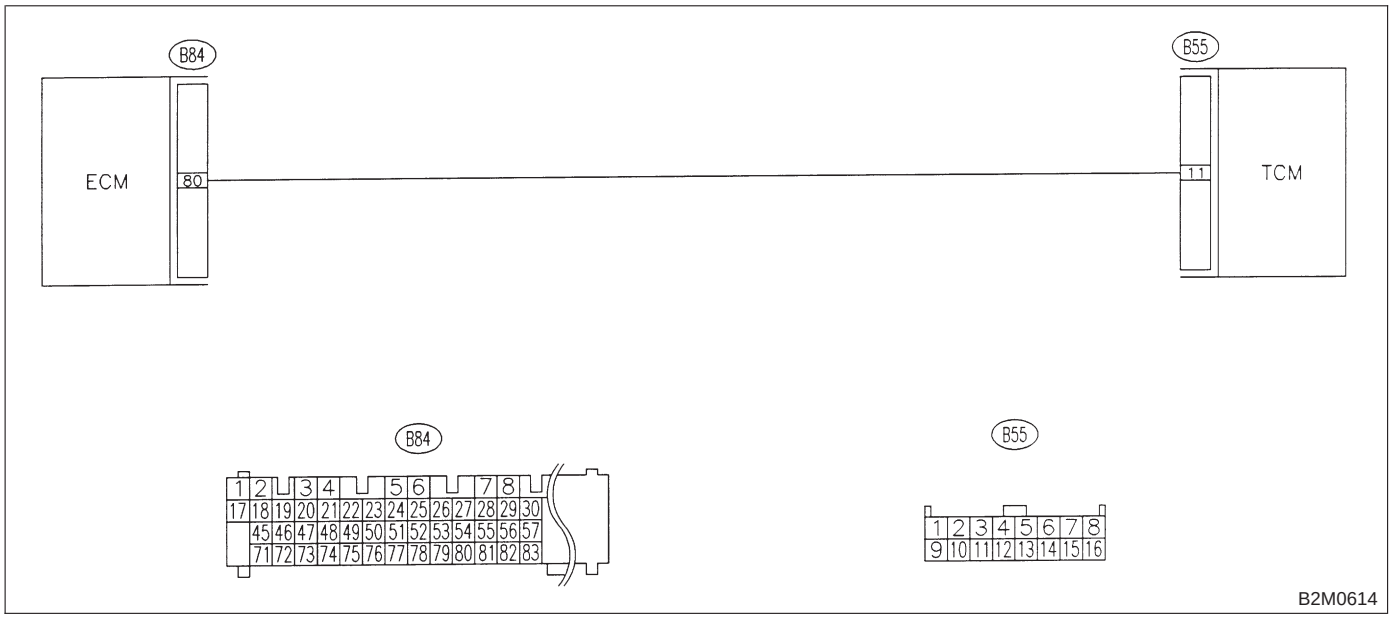
- **WIRING DIAGRAM:**



CZ: DTC P1722 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT —

NOTE:
Check automatic transmission diagnosis input signal circuit.
<Ref. to 2-7 [T10DE0].>

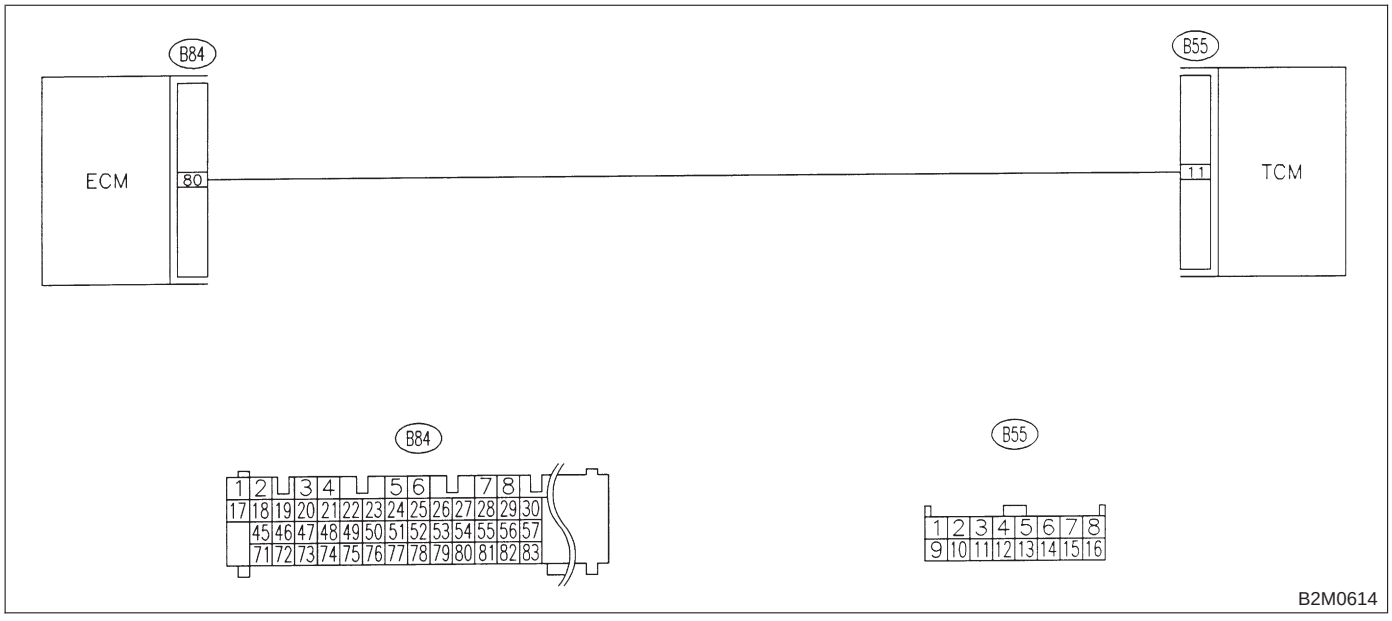
- **WIRING DIAGRAM:**



DA: DTC P1742 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT MALFUNCTION —

NOTE:
Check automatic transmission diagnosis input signal circuit.
<Ref. to 2-7 [T10DF0].>

- **WIRING DIAGRAM:**



MEMO:

AUTOMATIC TRANSMISSION AND DIFFERENTIAL 3-2

1. Supplemental Restraint System “Airbag”

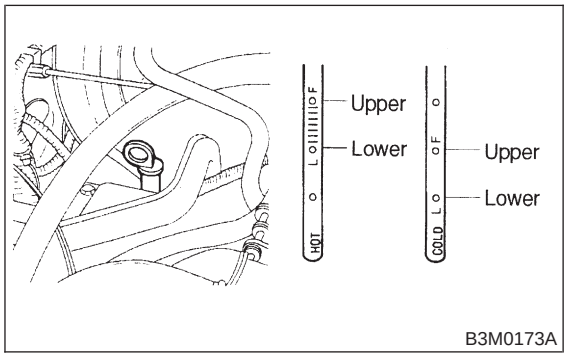
Airbag system wiring harness is routed near the transmission control module (TCM).

CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
● Be careful not to damage Airbag system wiring harness when performing diagnostics and servicing the TCM.

2. Pre-inspection

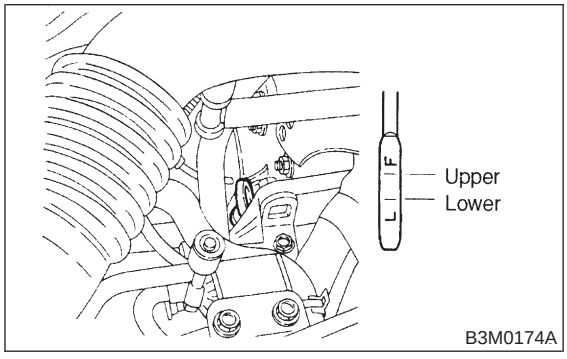
A: ATF LEVEL

Make sure that ATF level is in the specification.



B: FRONT DIFFERENTIAL OIL LEVEL

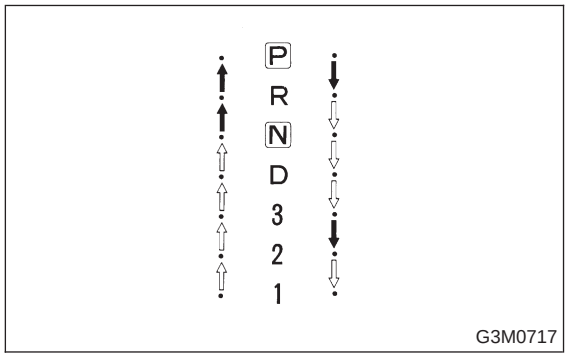
Make sure that front differential oil level is in the specification.



C: OPERATION OF SHIFT SELECTOR LEVER

WARNING:
Stop the engine while checking operation of selector lever.

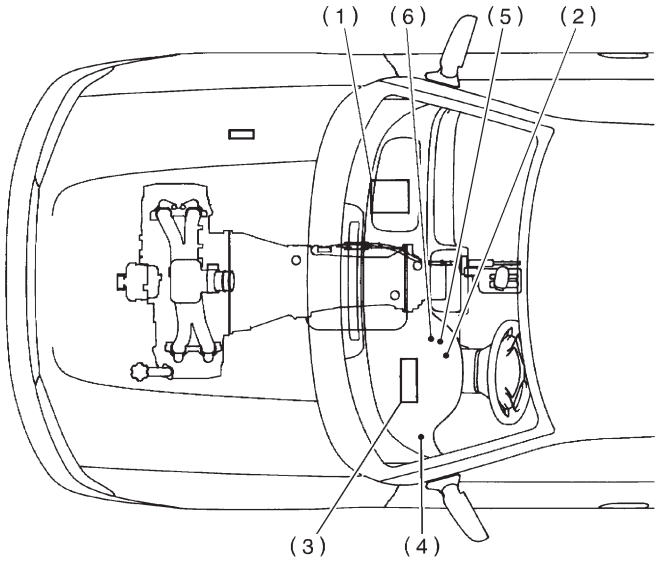
1) Check that selector lever does not move from “N” to “R” without pushing the button.
2) Check that selector lever does not move from “R” to “P” without pushing the button.
3) Check that selector lever does not move from “P” to “R” without pushing the button.
4) Check that selector lever does not move from “3” to “2” without pushing the button.



3. Electrical Components Location

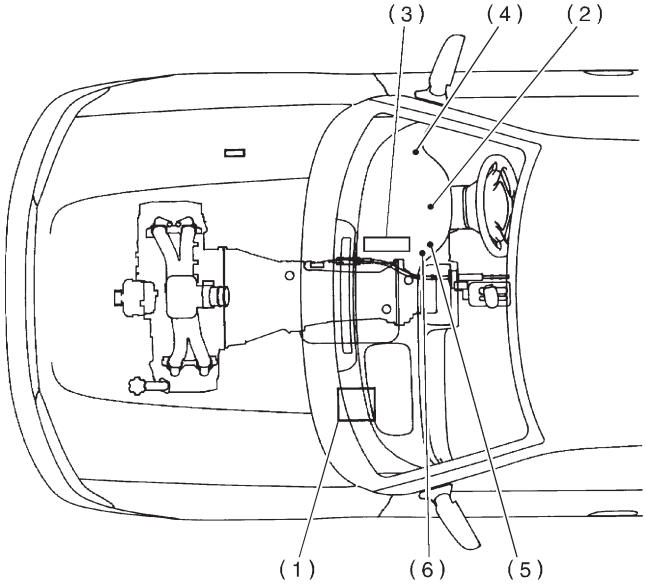
A: MODULE

LHD



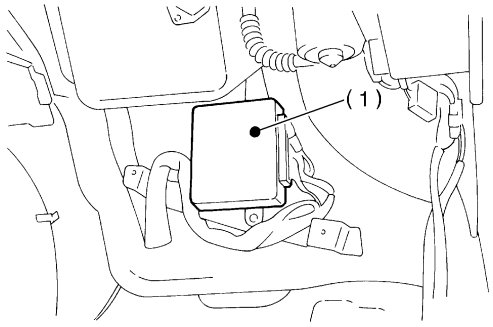
B3M0178C

RHD

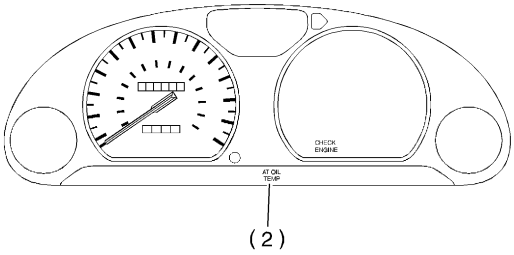


B3M0466B

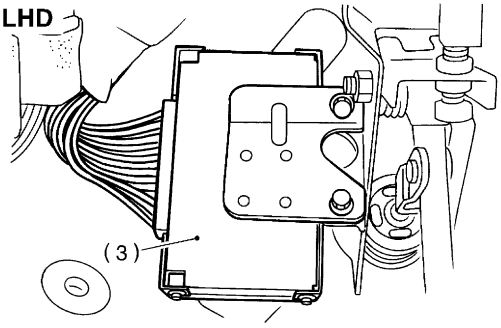
(1) ECM
(2) AT OIL TEMP indicator light (AT diagnostic indicator light)
(3) TCM
(4) Data link connector (for Subaru select monitor and OBD-II general scan tool)
(5) Diagnosis connector
(6) Diagnosis terminal



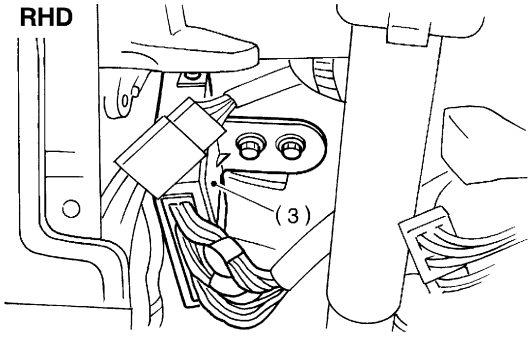
B3M0183E



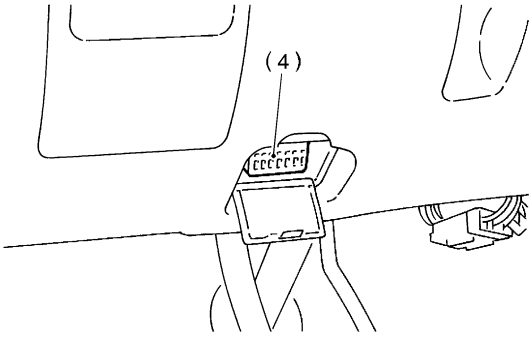
OBD0008F



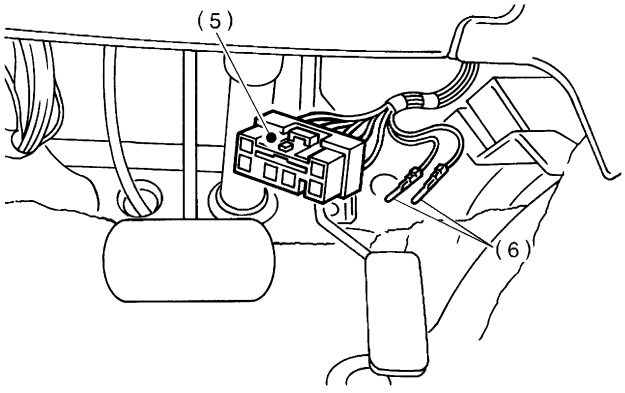
S3M0056C



B3M0445J



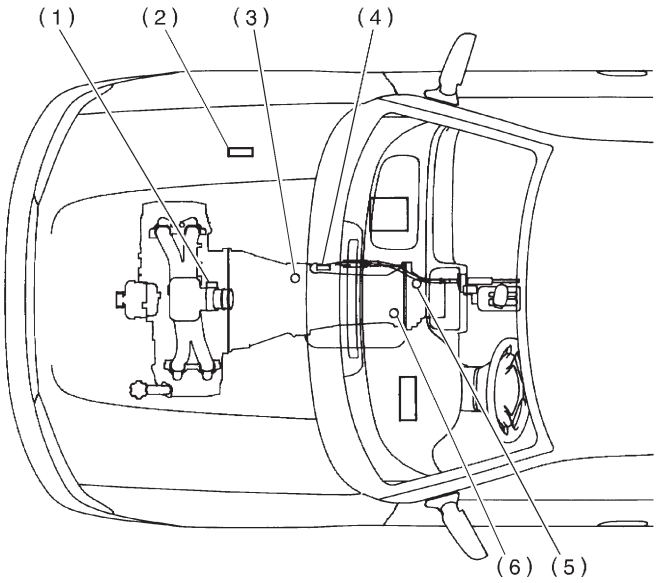
S2M0258C



H3M1161F

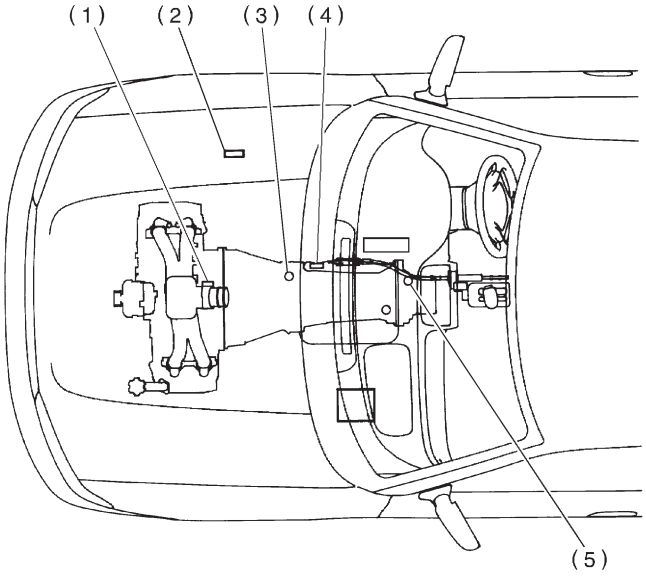
B: SENSOR

LHD



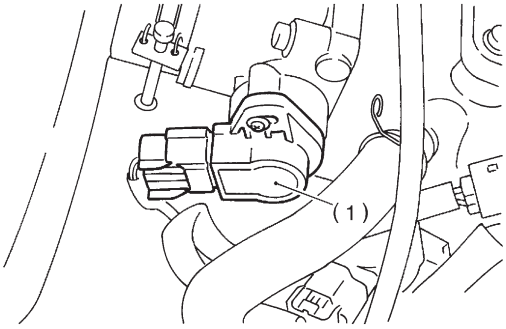
B3M0178D

RHD

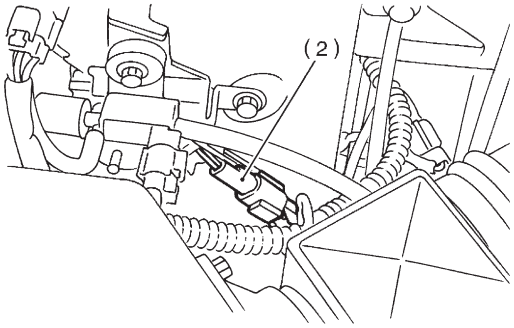


B3M0466C

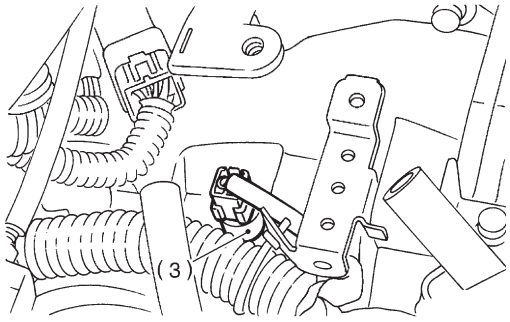
(1) Throttle position sensor
(2) Dropping resistor
(3) Vehicle speed sensor 2
(4) Inhibitor switch
(5) Vehicle speed sensor 1 (AWD)
(6) Vehicle speed sensor 1 (FWD)



S2M0262B



S3M0059A



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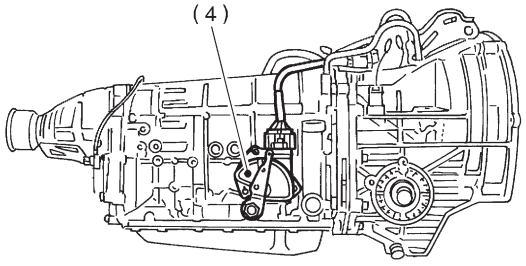
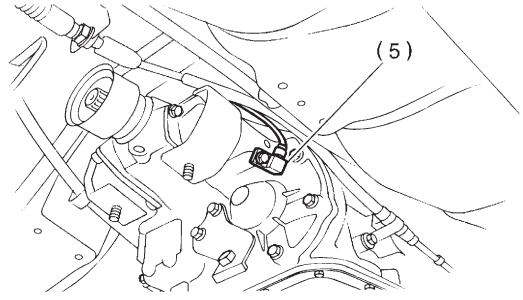
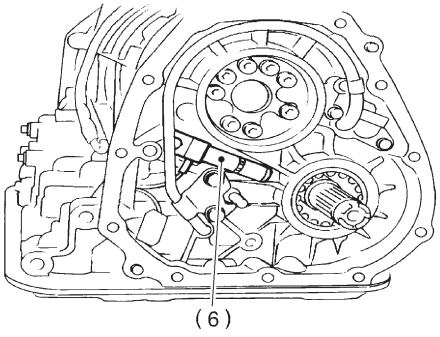


B2M1043J

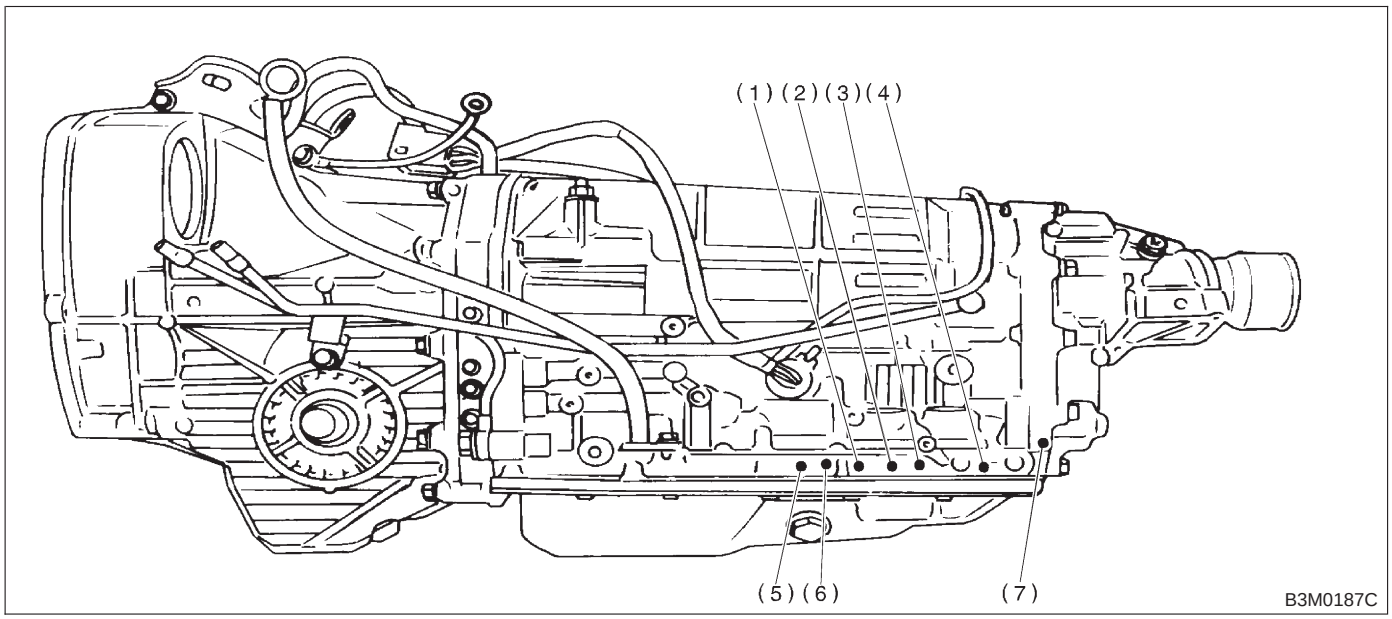


B3M0184G

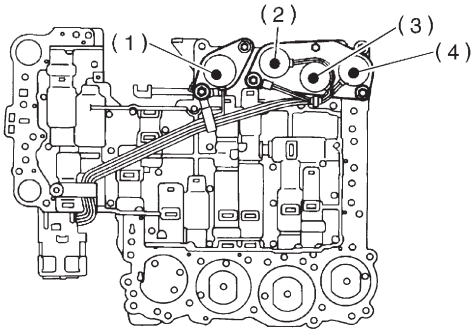


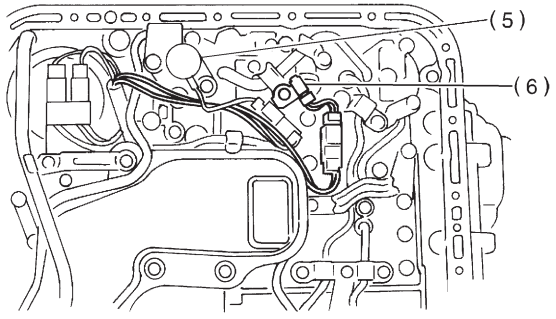
B3M0185E

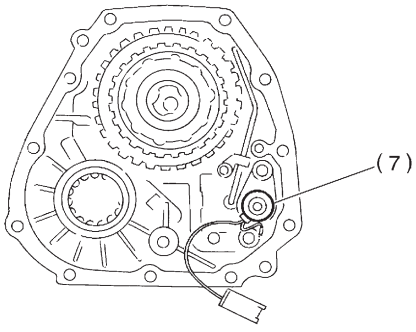
C: SOLENOID



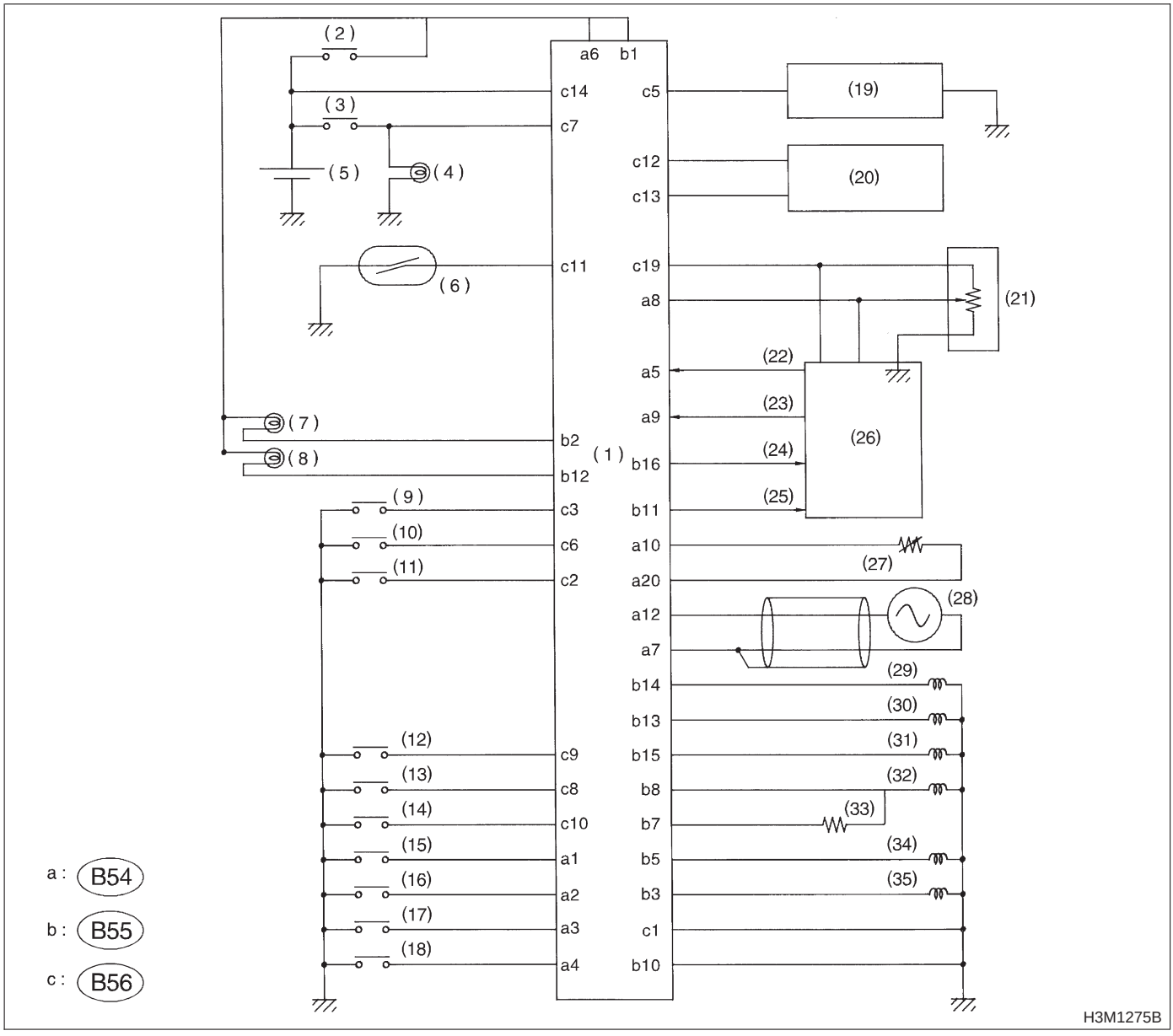
(1) Duty solenoid A
(2) Solenoid 2
(3) Solenoid 1
(4) Solenoid 3
(5) Duty solenoid B
(6) ATF temperature sensor
(7) Duty solenoid C (AWD)





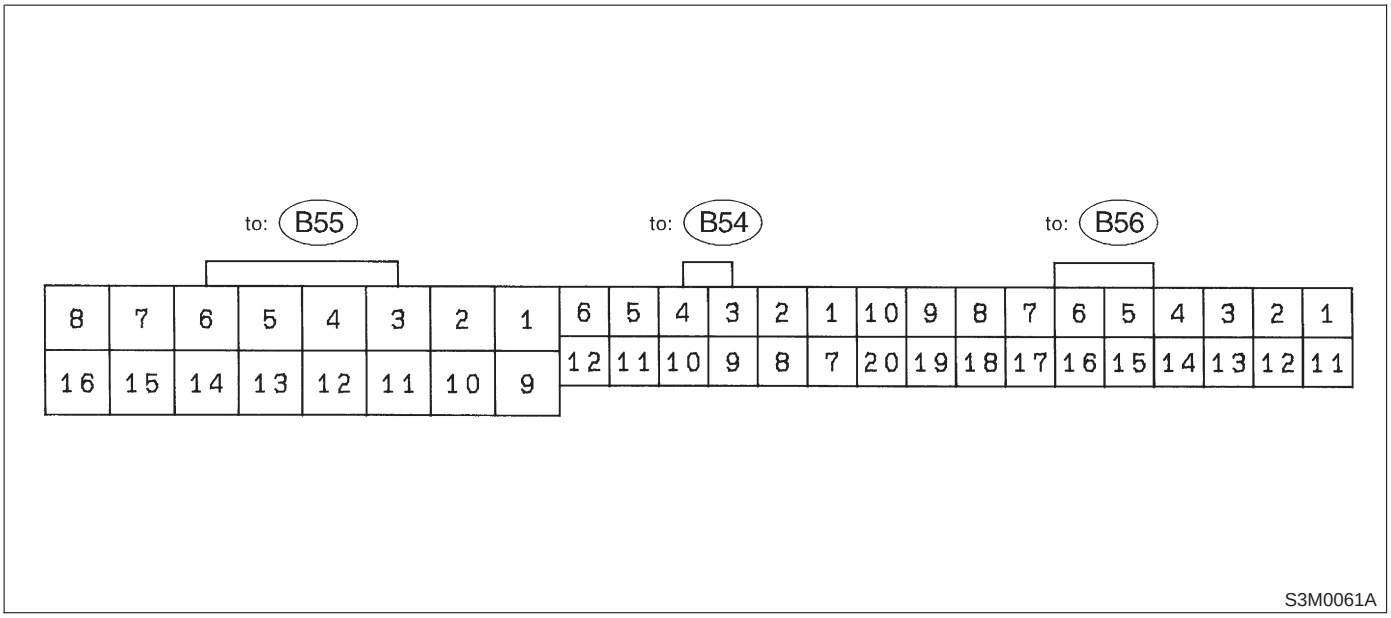


4. Schematic



(1) Transmission control module
(2) Ignition switch
(3) Brake switch
(4) Brake light
(5) Battery
(6) Vehicle speed sensor 2
(7) FWD indicator light
(8) AT OIL TEMP indicator light
(9) Cruise set switch
(10) Diagnosis switch
(11) FWD switch
(12) “P” range switch
(13) “R” range switch
(14) “N” range switch
(15) “D” range switch
(16) “3” range switch
(17) “2” range switch
(18) “1” range switch
(19) ABS control module
(20) Data link connector
(21) Throttle position sensor
(22) Engine speed signal
(23) Mass air flow signal
(24) Torque control signal
(25) AT diagnostics signal
(26) Engine control module
(27) ATF temperature sensor
(28) Vehicle speed sensor 1
(29) Shift solenoid 1
(30) Shift solenoid 2
(31) Shift solenoid 3
(32) Duty solenoid A
(33) Dropping resistor
(34) Duty solenoid B
(35) Duty solenoid C

5. Transmission Control Module (TCM) I/O Signal



S3M0061A

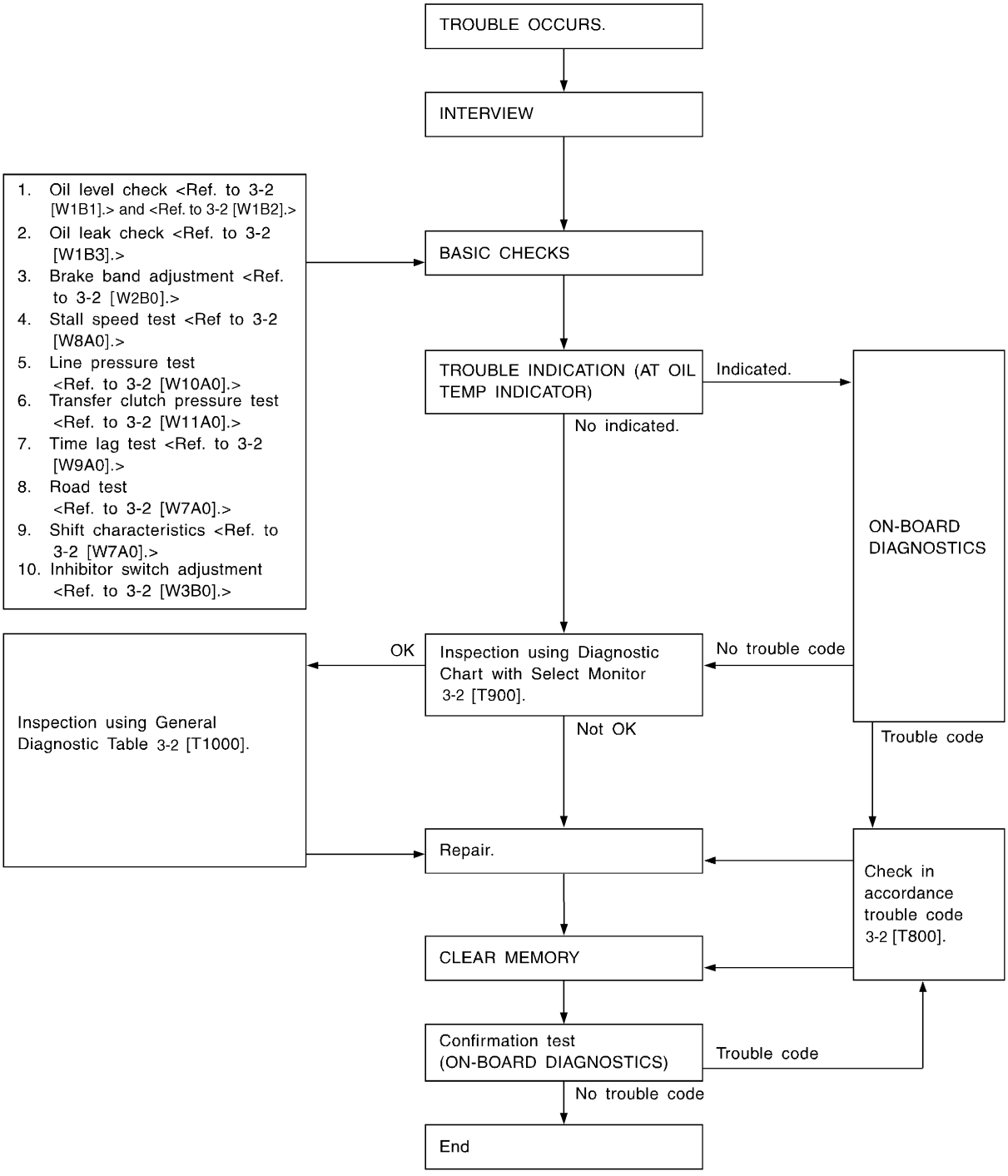
Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B56	14	Ignition switch OFF	10 — 16	—
Ignition power supply		B54	6	Ignition switch ON (with engine OFF)	10 — 16	—
		B55	1			
Inhibitor switch	"P" range switch	B56	9	Select lever in "P" range	Less than 1	—
				Select lever in any other than "P" range (except "N" range)	More than 8	
	"N" range switch	B56	8	Select lever in "N" range	Less than 1	—
				Select lever in any other than "N" range (except "P" range)	More than 8	
	"R" range switch	B56	10	Select lever in "R" range	Less than 1	—
				Select lever in any other than "R" range	More than 6	
	"D" range switch	B54	1	Select lever in "D" range	Less than 1	—
				Select lever in any other than "D" range	More than 6	
	"3" range switch	B54	2	Select lever in "3" range	Less than 1	—
				Select lever in any other than "3" range	More than 6	
	"2" range switch	B54	3	Select lever in "2" range	Less than 1	—
				Select lever in any other than "2" range	More than 6	
	"1" range switch	B54	4	Select lever in "1" range	Less than 1	—
				Select lever in any other than "1" range	More than 6	
Brake switch		B56	7	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	
ABS signal		B56	5	ABS switch ON	Less than 1	—
				ABS switch OFF	More than 6.5	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Diagnosis switch	B56	6	Diagnosis connector connected.	Less than 1	—
			Diagnosis connector disconnected.	More than 6	
AT diagnostic signal	B55	12	Ignition switch ON (With engine OFF)	Less than 1	—
			Ignition switch ON (With engine ON)	More than 10	
Throttle position sensor	B54	8	Throttle fully closed.	0.5±0.2	—
			Throttle fully open.	4.6±0.3	
Throttle position sensor power supply	B56	19	Ignition switch ON (With engine OFF)	5.05±0.25	—
ATF temperature sensor	B54	10	ATF temperature 20°C (68°F)	3.45±0.55	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	1.2±0.2	272 — 374
Vehicle speed sensor 1	B54	12	Vehicle stopped.	0	450 — 720
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed sensor 2	B56	11	When vehicle is slowly moved at least 2 meters (7ft).	Less than 1←→More than 9	—
Engine speed signal	B54	5	Ignition switch ON (with engine OFF).	More than 10.5	—
			Ignition switch ON (with engine ON).	8 — 11	
Cruise set signal	B56	3	When cruise control is set (SET lamp ON).	Less than 1	—
			When cruise control is not set (SET lamp OFF).	More than 6.5	
Torque control signal	B55	16	Ignition switch ON	5±1	—
Mass air flow signal	B54	9	Engine idling after warm-up	0.5 — 1.2	—
Shift solenoid 1	B55	14	1st or 4th gear	More than 9	20 — 32
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B55	13	1st or 2nd gear	More than 9	20 — 32
			3rd or 4th gear	Less than 1	
Shift solenoid 3	B55	15	Select lever in “N” range (with throttle fully closed).	Less than 1	20 — 32
			Select lever in “D” range (with throttle fully closed).	More than 9	
Duty solenoid A	B55	8	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	
Dropping resistor	B55	7	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	12 — 18
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Duty solenoid B	B55	5	When lock up occurs.	More than 8.5	9 — 17
			When lock up is released.	Less than 0.5	
Duty solenoid C	B55	3	Fuse on FWD switch	More than 8.5	9 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
Sensor ground line 1	B54	7	—	0	Less than 1
Sensor ground line 2	B56	20	—	0	Less than 1
System ground line	B56	1	—	0	Less than 1
Power system ground line	B55	10	—	0	Less than 1
FWD switch	B56	2	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	

6. Diagnostic Chart for On-board Diagnostics System

A: BASIC DIAGNOSTICS PROCEDURE

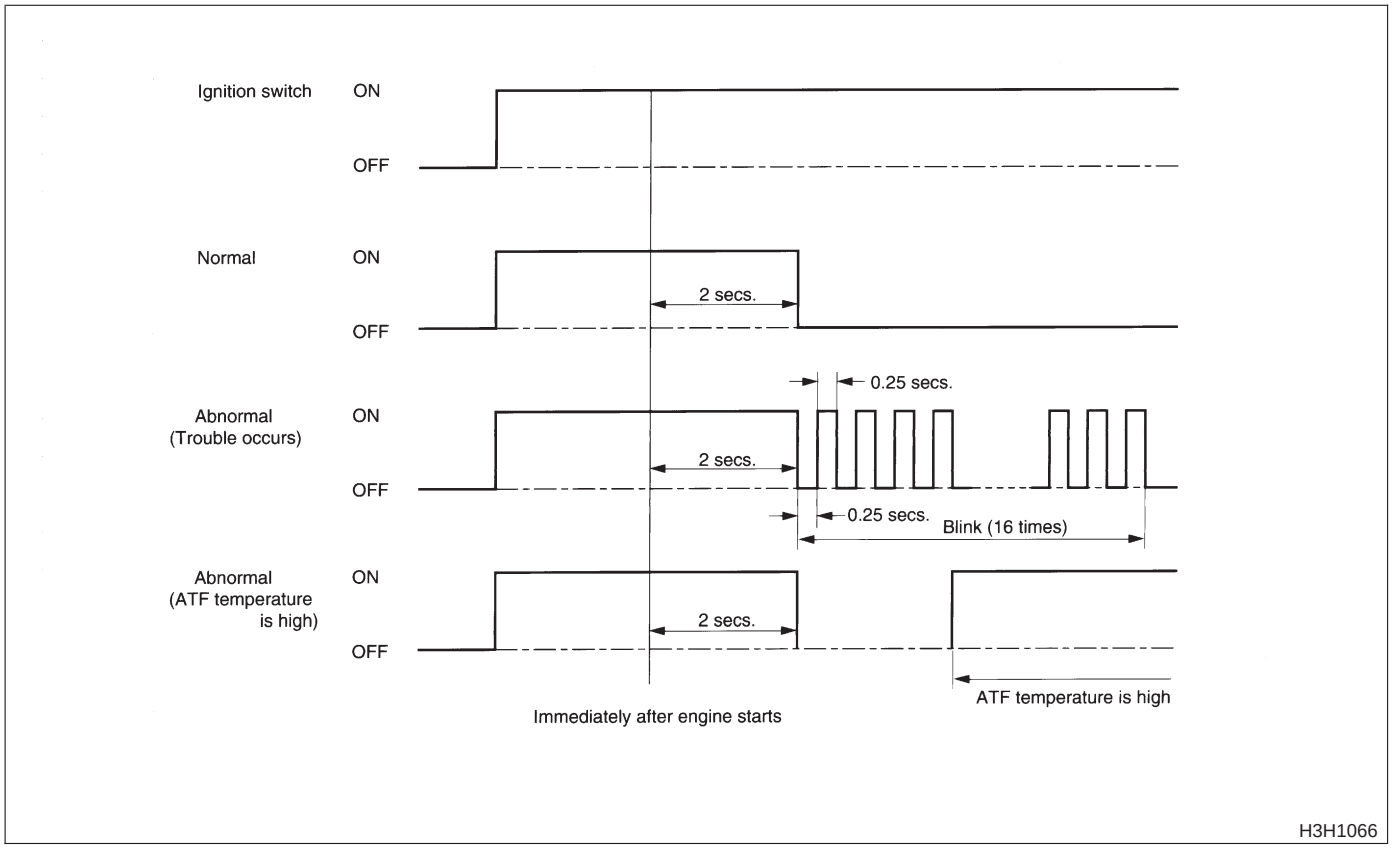


EPA0118

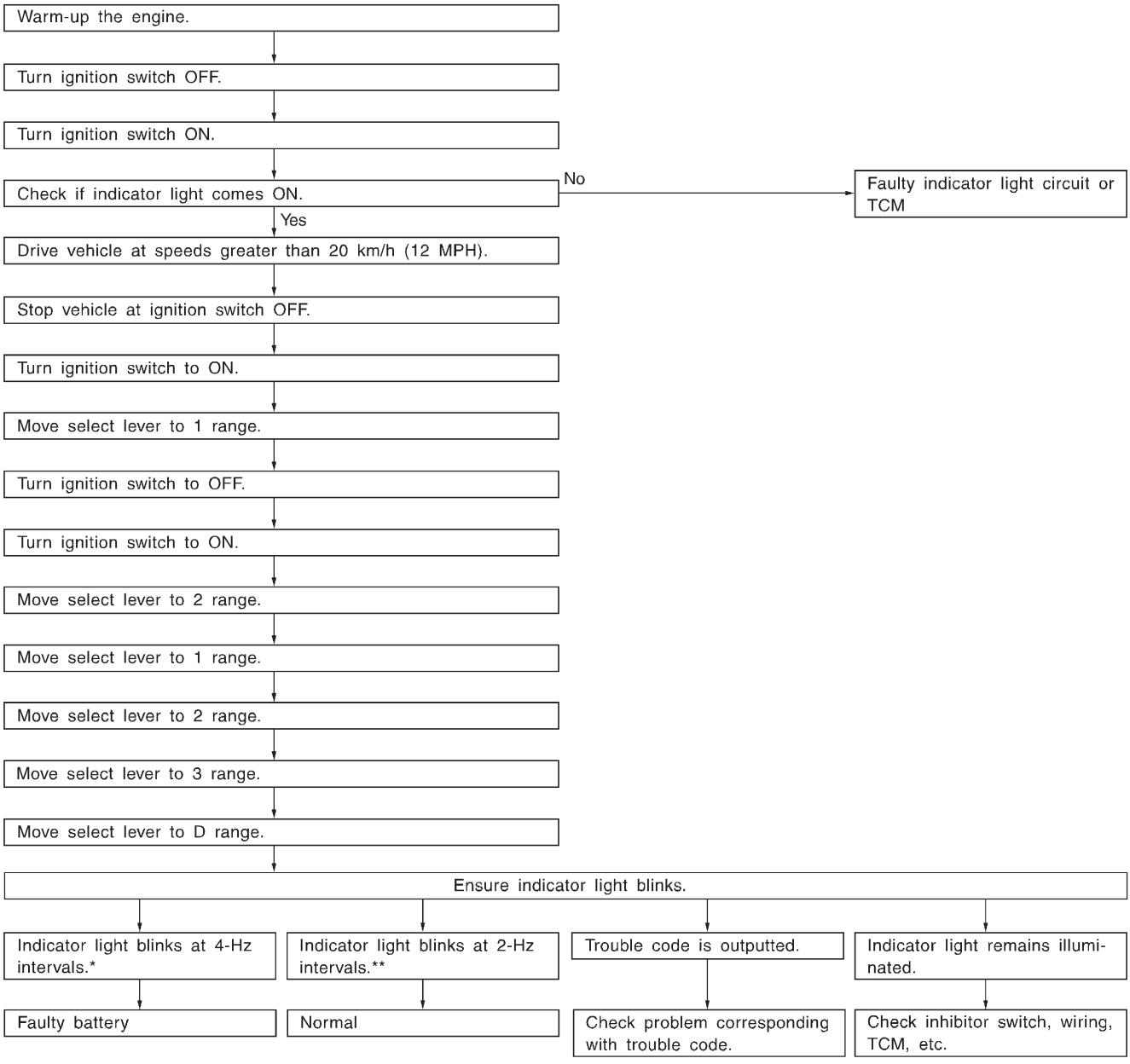
B: ABNORMAL DISPLAY ON AT OIL TEMP INDICATOR

When any on-board diagnostics item is malfunctioning, the display on the AT OIL TEMP indicator lamp blinks immediately after the engine starts. The malfunctioning part or unit can be determined by a trouble code during on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP indicator does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the select monitor. Indicator signal is as shown in the figure.

WARNING:
Warning can be noticed only when the engine is initially started.



C: ON-BOARD DIAGNOSTICS



* : Blinks every 0.125 (1/8) seconds (until ignition switch is turned OFF).
** : Blinks every 0.25 (1/4) seconds (until ignition switch is turned OFF).

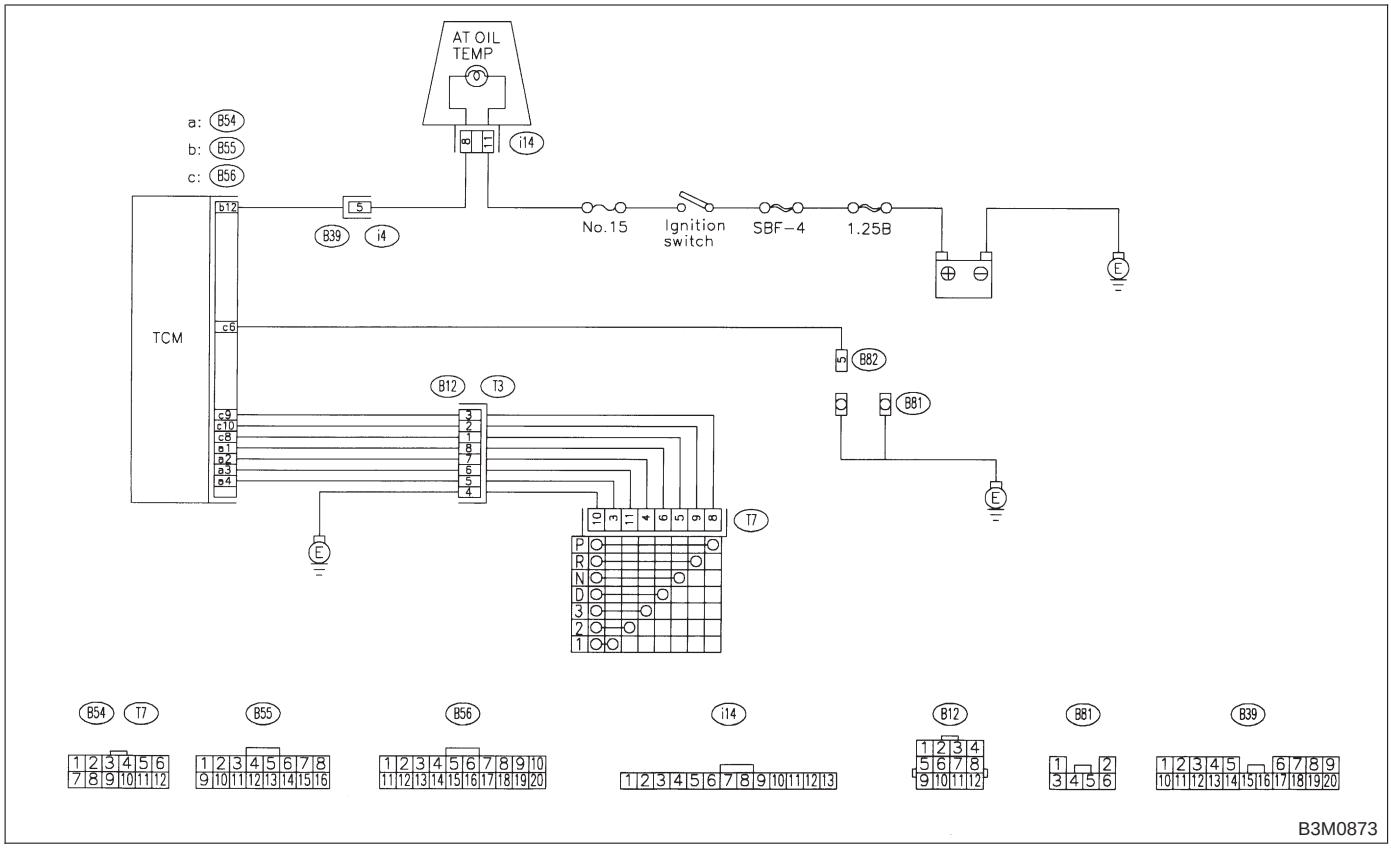
S3M0063A

7. Diagnostics for On-board Diagnostics Failed

A: AT OIL TEMP INDICATOR LIGHT

DIAGNOSIS:
The AT OIL TEMP indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
- When ignition switch is turned to ON (engine OFF), AT OIL TEMP indicator light does not illuminate.
- When on-board diagnostics is performed, AT OIL TEMP indicator light remains illuminated.

WIRING DIAGRAM:



7A1 : CHECK AT OIL TEMP INDICATOR LIGHT.

Turn ignition switch to ON (engine OFF).

CHECK : ***Does AT OIL TEMP indicator light illuminate?***

YES : Go to step **7A2**.

NO : Go to step **7A3**.

7A2 : CHECK AT OIL TEMP INDICATOR LIGHT.

Perform on-board diagnostics. <Ref. to 3-2 [T6C0].>

CHECK : ***Does AT OIL TEMP indicator light blink?***

YES : A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM, inhibitor switch and combination meter.

NO : Go to step **7A8**.

7A3 : CHECK FUSE (NO. 15).

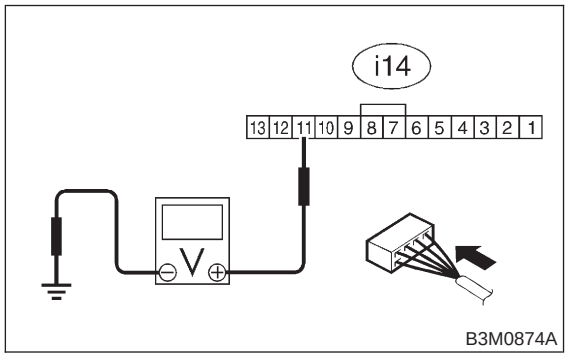
Remove fuse (No. 15).

CHECK : ***Is the fuse (No. 15) blown out?***
YES : Replace fuse (No. 15). If replaced fuse (No. 15) is blown out easily, repair short circuit in harness between fuse (No. 15) and combination meter.
NO : Go to step **7A4**.

7A4 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH.

1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Turn ignition switch to ON (engine OFF).
4) Measure voltage between combination meter connector and chassis ground.

Connector & terminal
(i14) No. 11 (+) — Chassis ground (−):

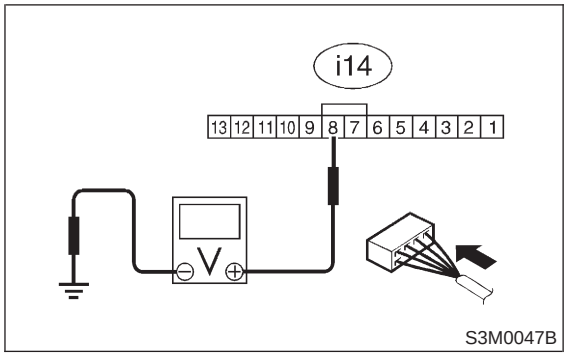


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **7A5**.
NO : Repair open circuit in harness between combination meter and fuse.

7A5 : CHECK COMBINATION METER.

Measure voltage between combination meter connector and chassis ground.

Connector & terminal
(i14) No. 8 (+) — Chassis ground (−):

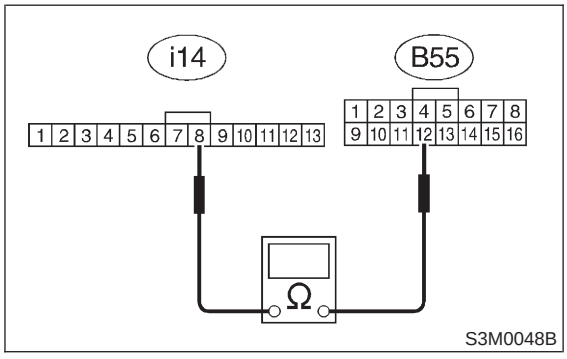


CHECK : ***Is voltage less than 1 V?***
YES : Go to step **7A6**.
NO : Replace bulb or combination meter.

7A6 : CHECK OPEN CIRCUIT OF HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from TCM and combination meter connector.
3) Measure resistance of harness between TCM and combination meter.

Connector & terminal
(B55) No. 12 — (i14) No. 8:

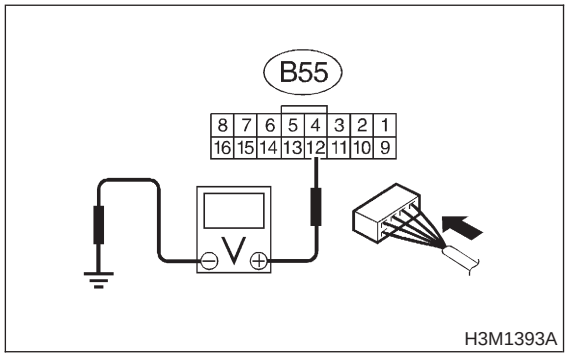


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7A7**.
NO : Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.

7A7 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and combination meter.
3) Install combination meter.
4) Turn ignition switch to ON (engine OFF).
5) Measure voltage between TCM connector and chassis ground.

Connector & terminal
(B55) No. 12 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Even if AT OIL TEMP indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
NO : Replace TCM.

7A8 : CHECK INHIBITOR SWITCH.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor to data link connector.
3) Turn ignition switch to ON.
4) Subaru Select Monitor to ON.
5) Read data of range switch using Subaru Select Monitor.
● Range switch is indicated in ON ⇔ OFF.

CHECK : ***When each range is selected, does LED of Subaru Select Monitor light up?***
YES : Go to step **7A9**.
NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

7A9 : CHECK DIAGNOSIS SWITCH.

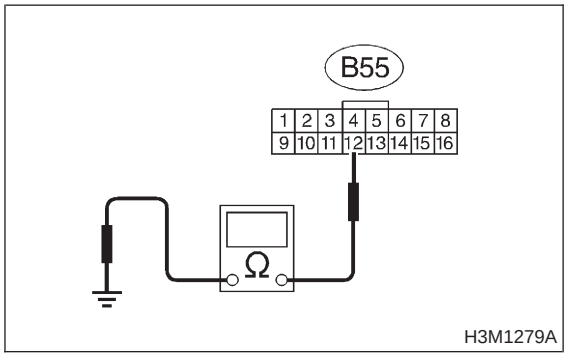
1) Read data of diagnosis switch (hold switch) using Subaru select monitor.
2) Turn diagnosis switch to ON.

CHECK : ***Does the LED of diagnosis switch light up?***
YES : Go to step **7A10**.
NO : Go to step DIAGNOSIS SWITCH. <Ref. to 3-2 [T9Z0].>

7A10 : CHECK SHORT CIRCUIT OF HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from TCM.
3) Remove combination meter.
4) Disconnect connector from combination meter.
5) Measure resistance of harness connector between TCM and combination meter.

Connector & terminal/specified resistance
(B55) No. 12 — Chassis ground:

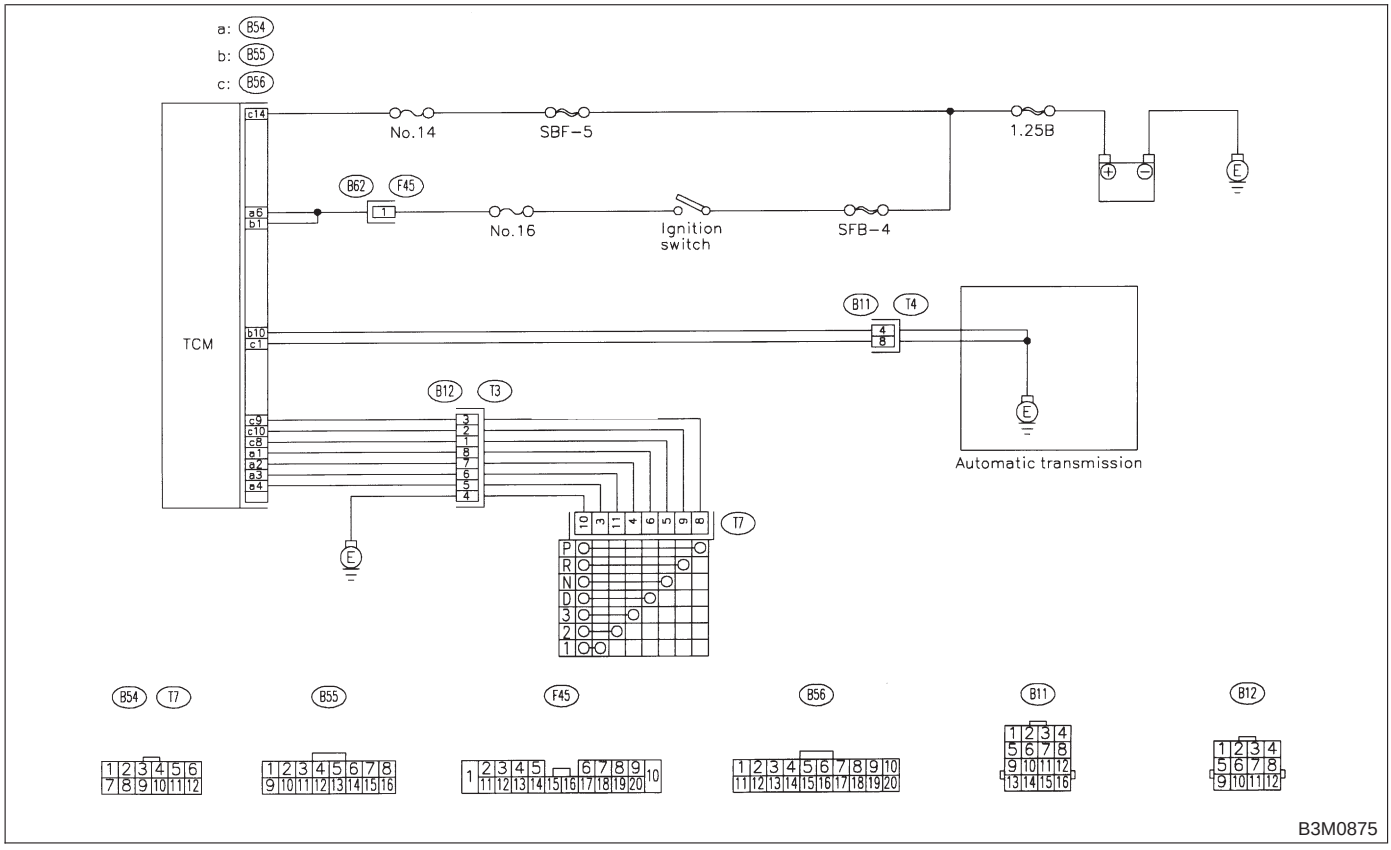


CHECK : ***Is the resistance less than 1 MΩ?***
YES : Replace TCM.
NO : Repair short circuit in harness between combination meter connector and TCM connector.

MEMO:

B: CONTROL MODULE POWER SUPPLY AND GROUND LINE

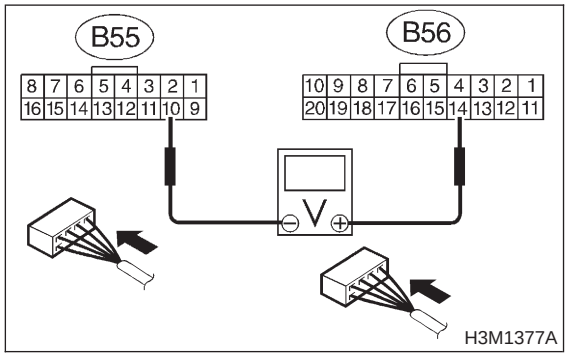
WIRING DIAGRAM:



7B1 : CHECK BACK-UP POWER SUPPLY CIRCUIT.

1) Turn ignition switch to OFF.
2) Measure back-up power supply voltage between TCM connector terminal.

Connector & terminal
(B56) No. 14 (+) — (B55) No. 10 (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **7B3**.
NO : Go to step **7B2**.

7B2 : CHECK FUSE (NO. 14).

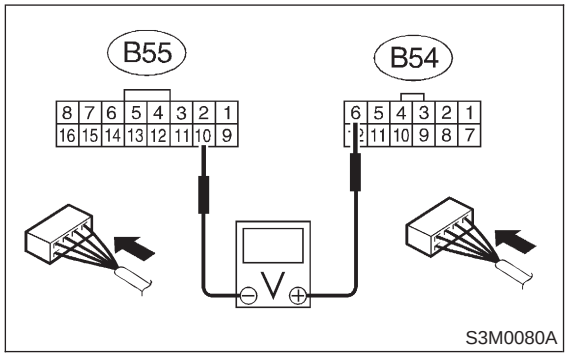
Remove fuse (No. 14).

CHECK : ***Is the fuse (No. 14) blown out?***
YES : Replace fuse (No. 14). If replaced fuse (No. 14) has blown out easily, repair short circuit in harness between fuse (No. 14) and TCM.
NO : Repair open circuit in harness between fuse (No. 14) and TCM, and poor contact in coupling connector.

7B3 : CHECK IGNITION POWER SUPPLY CIRCUIT.

1) Turn ignition switch to ON (engine OFF).
2) Measure ignition power supply voltage between TCM connector terminal.

Connector & terminal
(B54) No. 6 (+) — (B55) No. 10 (−):

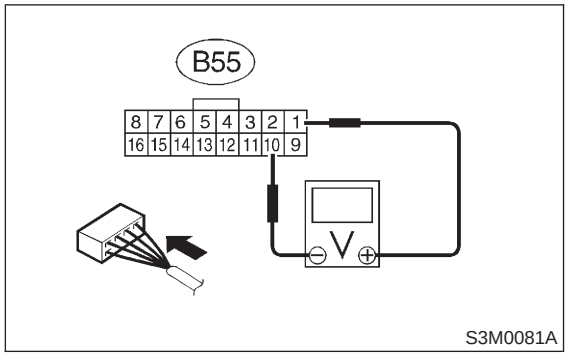


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **7B4**.
NO : Go to step **7B5**.

7B4 : CHECK IGNITION POWER SUPPLY CIRCUIT.

1) Turn ignition switch to ON (engine OFF).
2) Measure ignition power supply voltage between TCM connector terminal.

Connector & terminal
(B55) No. 1 (+) — No. 10 (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **7B6**.
NO : Go to step **7B5**.

7B5 : CHECK FUSE (NO. 16).

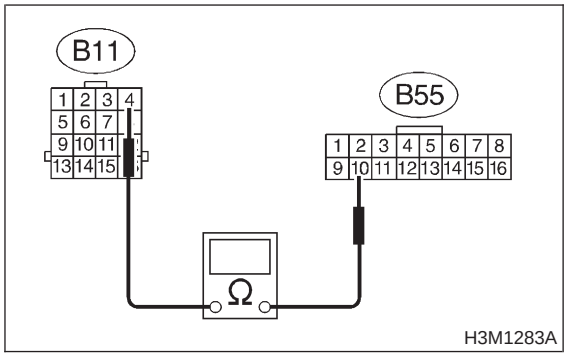
Remove fuse (No. 16).

CHECK : ***Is the fuse (No. 16) blown out?***
YES : Replace fuse (No. 16). If replaced fuse (No. 16) has blown out easily, repair short circuit in harness between fuse (No. 16) and TCM.
NO : Repair open circuit in harness between fuse (No. 16) and TCM, and poor contact in coupling connector.

7B6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Turn ignition switch to OFF.
2) Disconnect connector from TCM and transmission.
3) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 10 — (B11) No. 4:

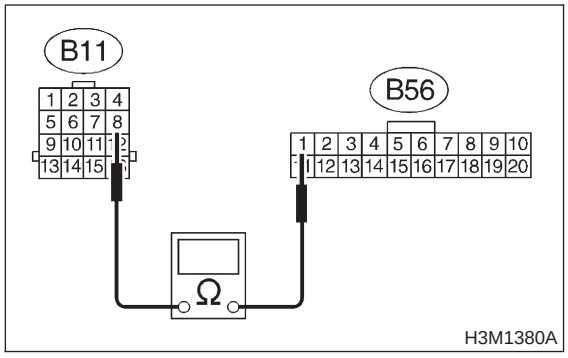


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7B7**.
NO : Repair open circuit in harness between TCM and transmission harness connector.

7B7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Turn ignition switch to OFF.
2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B56) No. 1 — (B11) No. 8:

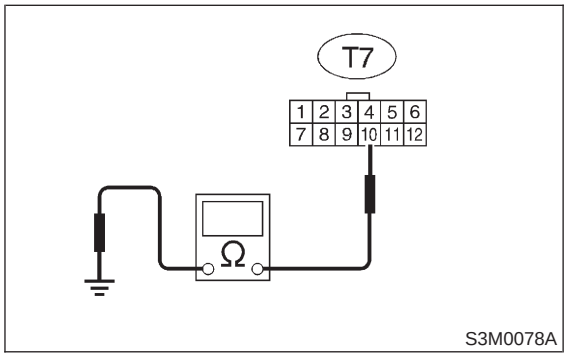


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7B8**.
NO : Repair open circuit in harness between TCM and transmission harness connector.

7B8 : CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.

1) Turn ignition switch to OFF.
2) Disconnect connector from inhibitor switch.
3) Measure resistance of harness between inhibitor switch side connector and chassis ground.

Connector & terminal
(T7) No. 10 — Chassis ground:

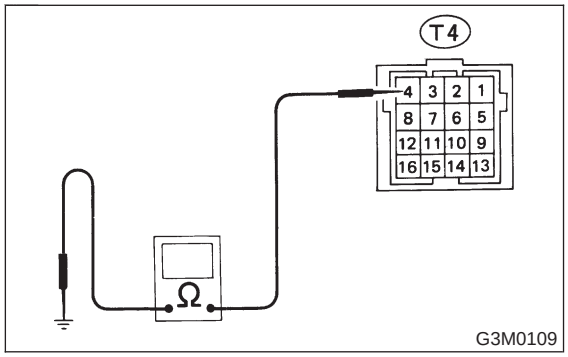


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7B9**.
NO : Repair open circuit in harness between chassis ground and inhibitor side connector, and poor contact in coupling connector.

7B9 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.

1) Drain automatic transmission fluid.
2) Remove oil pan.
3) Measure resistance of harness between transmission and transmission ground.

Connector & terminal
(T4) No. 4 — Transmission ground:

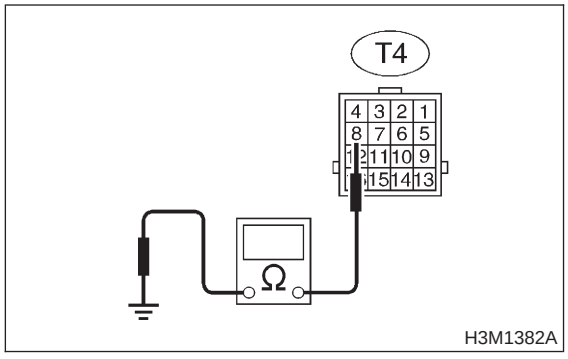


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7B9**.
NO : Repair open circuit in harness between transmission and transmission ground.

7B10 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.

Measure resistance of harness between transmission and transmission ground.

Connector & terminal
(T4) No. 8 — Transmission ground:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7B11**.
NO : Repair open circuit in harness between transmission and transmission ground.

7B11 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in control module power supply and ground line?***
YES : Repair poor contact and ground terminal.
NO : Replace TCM.

8. Diagnostic Chart with Trouble Code

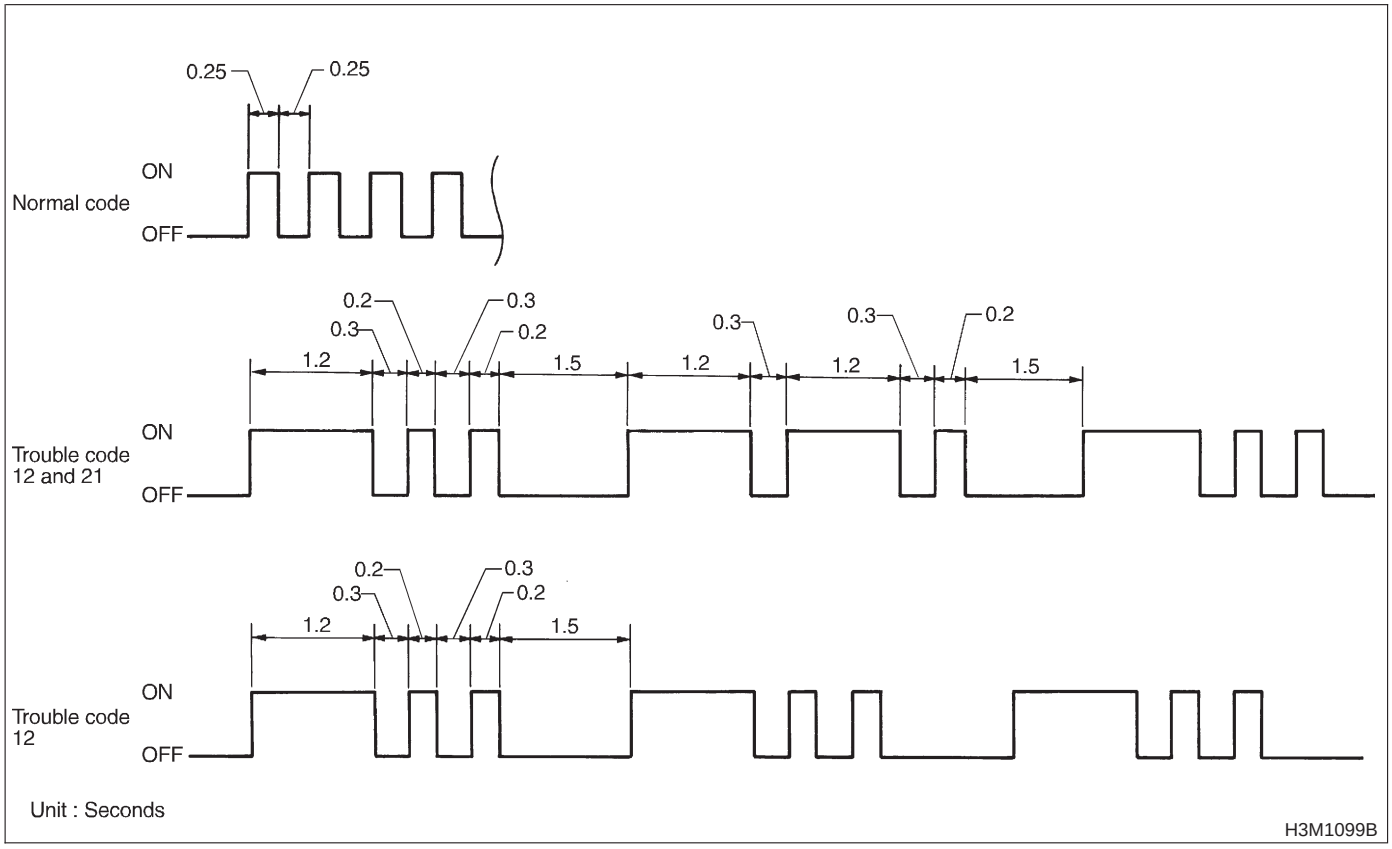
A: LIST OF TROUBLE CODE

1. TROUBLE CODE

Trouble code	Item	Content of diagnosis	Title index No.
11	Duty solenoid A	Detects open or shorted drive circuit, as well as valve seizure.	<Ref. to 3-2 [T8C0].>
12	Duty solenoid B	Detects open or shorted drive circuit, as well as valve seizure.	<Ref. to 3-2 [T8D0].>
13	Shift solenoid 3	Detects open or shorted drive circuit, as well as valve seizure.	<Ref. to 3-2 [T8E0].>
14	Shift solenoid 2	Detects open or shorted drive circuit, as well as valve seizure.	<Ref. to 3-2 [T8F0].>
15	Shift solenoid 1	Detects open or shorted drive circuit, as well as valve seizure.	<Ref. to 3-2 [T8G0].>
21	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8H0].>
22	Mass air flow signal	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8I0].>
23	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8J0].>
24	Duty solenoid C	Detects open or shorted drive circuit, as well as valve seizure.	<Ref. to 3-2 [T8K0].>
25	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8L0].>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8M0].>
32	Vehicle speed sensor 1	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8N0].>
33	Vehicle speed sensor 2	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8O0].>

2. HOW TO READ TROUBLE CODE OF INDICATOR LIGHT

The AT OIL TEMP indicator light flashes the code corresponding to the faulty part.
The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”.



B: CLEAR MEMORY

Current trouble codes shown on the display are cleared by turning the ignition switch OFF after conducting on-board diagnostics operation. Previous trouble codes, however, cannot be cleared since they are stored in the TCM memory which is operating on the back-up power supply. These trouble codes can be cleared by removing the specified fuse (located under the light or left lower position of the instrument panel).

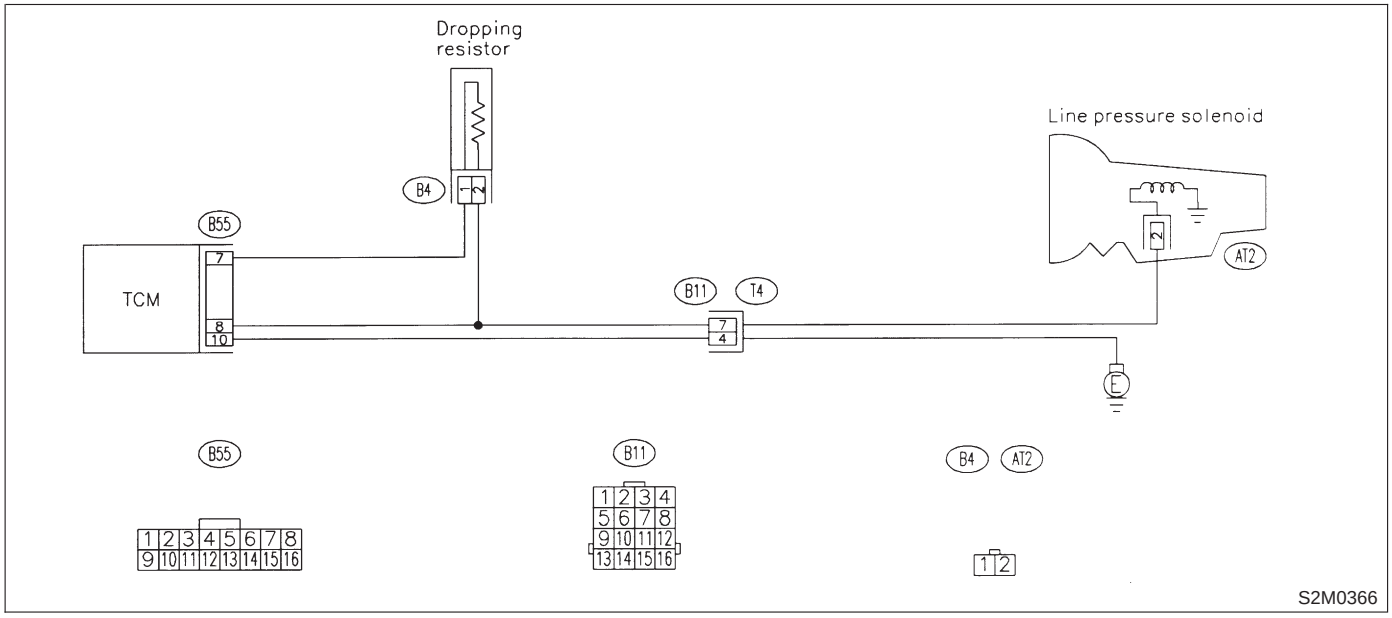
CLEAR MEMORY:

Removal of No. 14 fuse (for at least one minute)

- The No. 14 fuse is located in the line to the memory back-up power supply of the TCM. Removal of this fuse clears the previous trouble codes stored in the TCM memory.
- Be sure to remove the No. 14 fuse for at least the specified length of time. Otherwise, trouble codes may not be cleared.

C: TROUBLE CODE 11 — DUTY SOLENOID A —

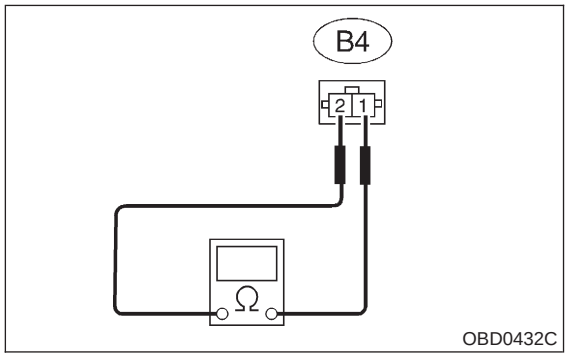
DIAGNOSIS:
Output signal circuit of duty solenoid A or resistor is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



8C1 : CHECK RESISTOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from dropping resistor.
3) Measure resistance between dropping resistor terminal.

Terminals
(B4) No. 1 — No. 2:

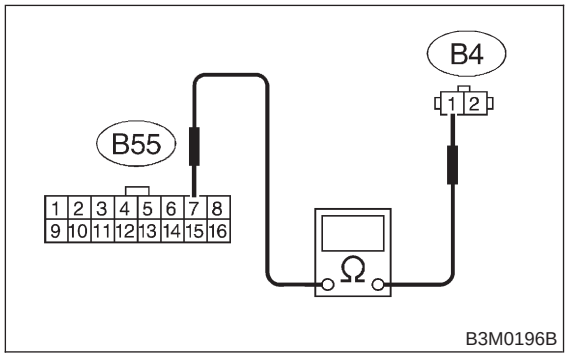


CHECK : ***Is the resistance between 9 and 15 Ω?***
YES : Go to step **8C2**.
NO : Replace dropping resistor.

8C2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM connector and dropping resistor connector.

Connector & terminal
(B55) No. 7 — (B4) No. 1:

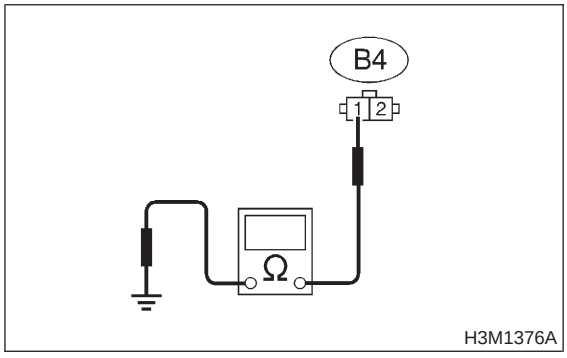


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8C3**.
NO : Repair open circuit in harness between TCM and dropping resistor connector.

8C3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal
(B4) No. 1 — Chassis ground:

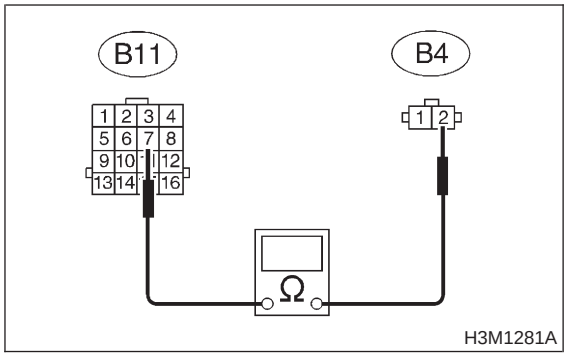


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8C4**.
NO : Repair short circuit in harness between TCM and dropping resistor connector.

8C4 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

1) Remove air intake chamber.
2) Disconnect connector from transmission.
3) Measure resistance of harness between transmission and dropping resistor connector.

Connector & terminal
(B4) No. 2 — (B11) No. 7:

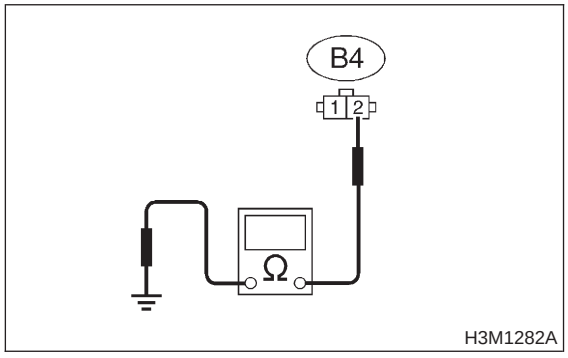


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8C5**.
NO : Repair open circuit in harness between dropping resistor and transmission connector.

8C5 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal
(B4) No. 2 — Chassis ground:

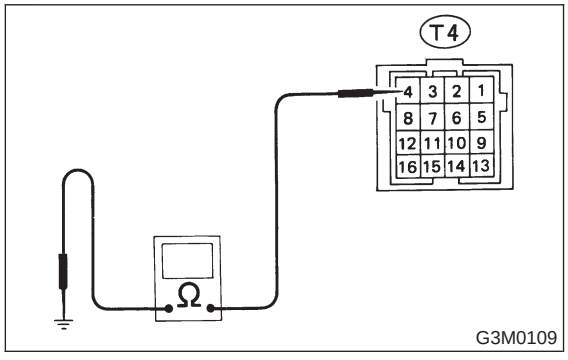


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8C6**.
NO : Repair short circuit in harness between dropping resistor and transmission connector.

8C6 : CHECK DUTY SOLENOID A GROUND LINE.

Measure resistance between transmission connector and transmission ground.

Connector & terminal
(T4) No. 4 — Transmission ground:

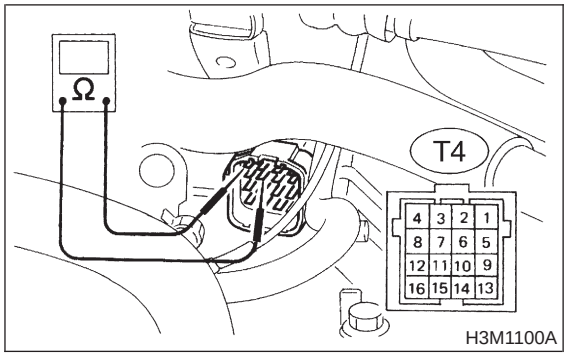


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8C7**.
NO : Repair open circuit in transmission harness.

8C7 : CHECK DUTY SOLENOID A.

Measure resistance between transmission connector receptacle's terminals.

Terminal
(T4) No. 7 — No. 4:

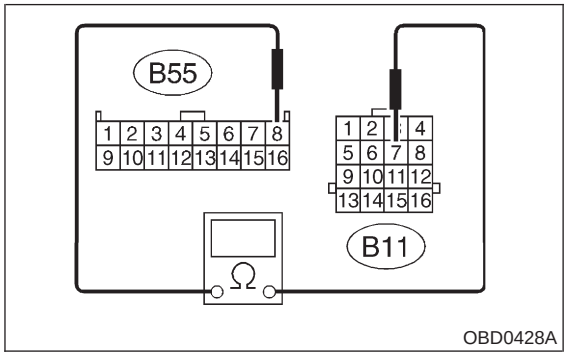


CHECK : ***Is the resistance between 1.5 and 4.5 Ω?***
YES : Go to step **8C8**.
NO : Go to step **8C20**.

8C8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 8 — (B11) No. 7:

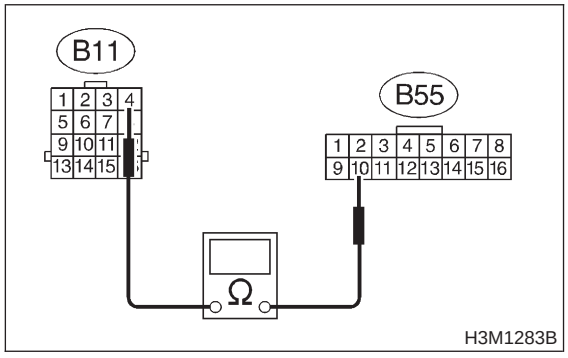


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8C9**.
NO : Repair open circuit in harness between TCM and transmission connector.

8C9 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 10 — (B11) No. 4:

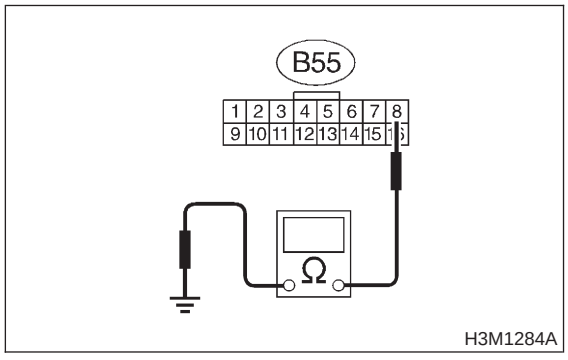


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8C10**.
NO : Repair open circuit in harness between TCM and transmission connector.

8C10 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 8 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8C11**.
NO : Repair short circuit in harness between TCM and transmission connector.

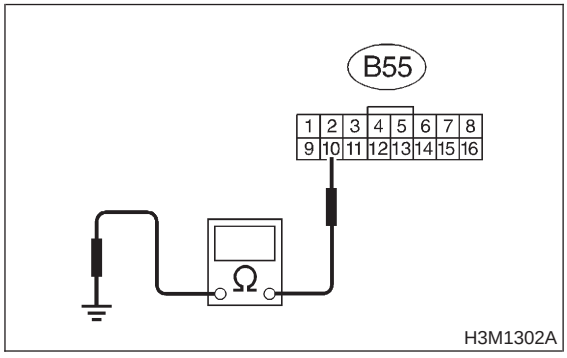
8C11 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8C17**.
NO : Go to step **8C12**.

8C12 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 10 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8C13**.
NO : Repair short circuit harness between TCM and transmission connector.

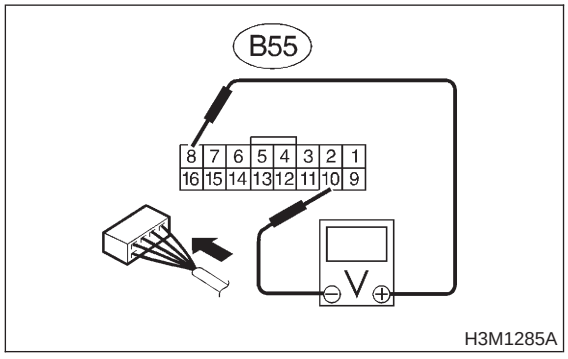
8C13 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Connect connectors to TCM, transmission and dropping resistor.
2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

3) Turn ignition switch to ON (engine OFF).
4) Move selector lever to "N".
5) Measure voltage between TCM connector terminal.

Connector & terminal
(B55) No. 8 (+) — No. 10 (−):

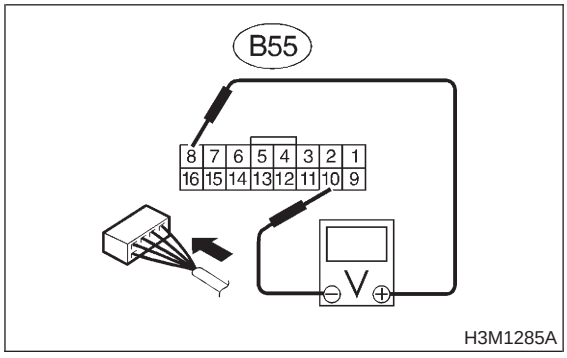


CHECK : ***Is the voltage between 1.5 and 4.0 V with throttle fully closed?***
YES : Go to step **8C14**.
NO : Go to step **8C19**.

8C14 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal
(B55) No. 8 (+) — No. 10 (−):

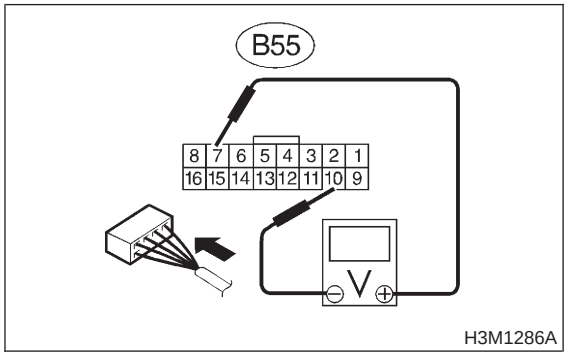


CHECK : ***Is the voltage less than 1 V with throttle fully open?***
YES : Go to step **8C15**.
NO : Go to step **8C19**.

8C15 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal
(B55) No. 7 (+) — No. 10 (−):

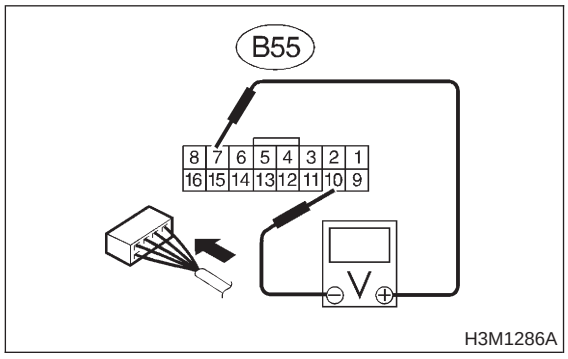


CHECK : ***Is the voltage more than 8.5 V with throttle fully closed?***
YES : Go to step **8C16**.
NO : Go to step **8C19**.

8C16 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal
(B55) No. 7 (+) — No. 10 (−):



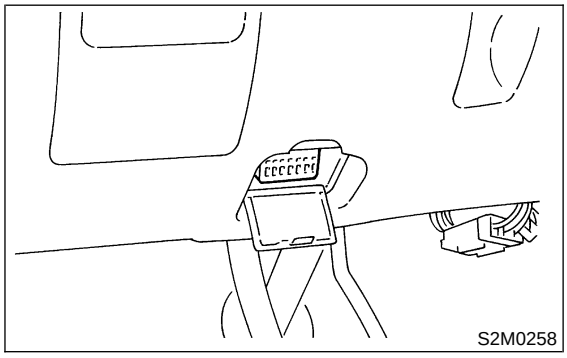
CHECK : ***Is the voltage less than 1 V with throttle fully open?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.

NO : Go to step **8C19**.

8C17 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

1) Connect connectors to TCM and transmission.
2) Connect Subaru Select Monitor to data link connector.



3) Start the engine, and turn Subaru Select Monitor switch to ON.
4) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

5) Stop the engine and turn ignition switch to ON (engine OFF).
6) Move selector lever to “N”.
7) Read data of duty solenoid A using Subaru Select Monitor.
● Line pressure duty is indicated in “%”.
8) Throttle is fully closed.

CHECK : ***Is the value 100%?***

YES : Go to step **8C18**.

NO : Go to step **8C19**.

8C18 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

1) Turn ignition switch to ON (Engine OFF).
2) Throttle is fully open.

CHECK : ***Is the value between 10 and 20%?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.

NO : Go to step **8C19**.

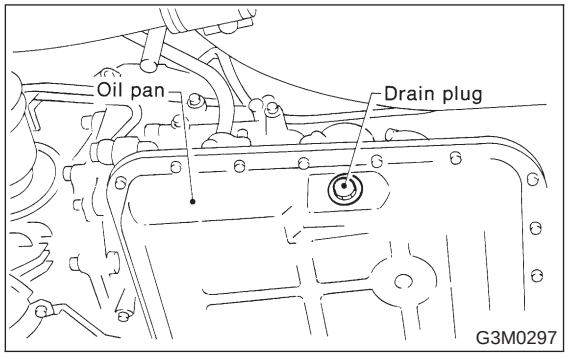
8C19 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in duty solenoid A circuit?***
YES : Repair poor contact.
NO : Replace TCM.

8C20 : CHECK DUTY SOLENOID A (IN TRANSMISSION).

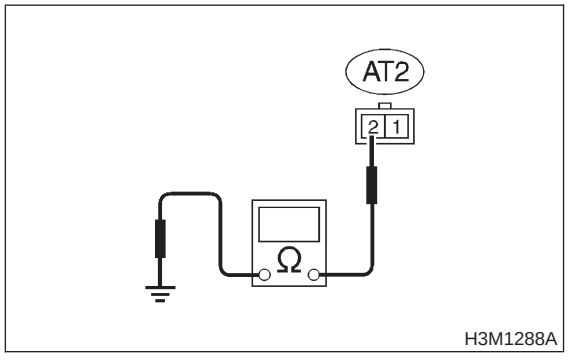
1) Remove transmission connector from bracket.
2) Drain automatic transmission fluid.

CAUTION:
Do not drain the automatic transmission fluid until it cools down.



3) Remove oil pan, and disconnect connector from duty solenoid A.
4) Measure resistance between duty solenoid A connector and transmission ground.

Connector & terminal
(AT2) No. 2 — Transmission ground:

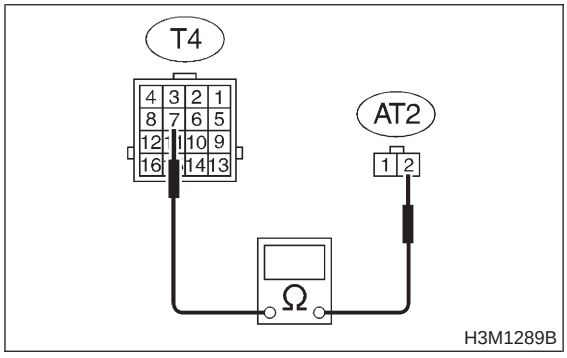


CHECK : ***Is the resistance between 1.5 and 4.5 Ω?***
YES : Go to step **8C21**.
NO : Replace duty solenoid A.

8C21 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DUTY SOLENOID A.

Measure resistance of harness between duty solenoid A and transmission connector.

Connector & terminal
(T4) No. 7 — (AT2) No. 2:

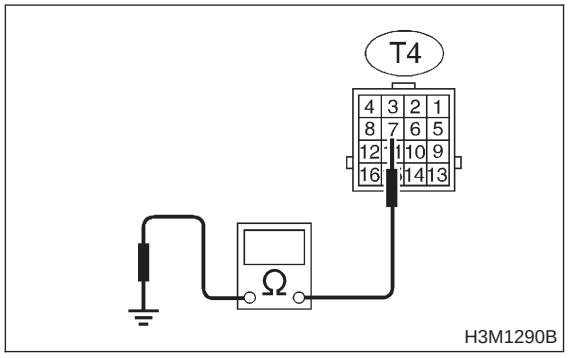


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8C22**.
NO : Repair open circuit in harness between duty solenoid A and transmission connector.

8C22 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DUTY SOLENOID A.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 7 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***

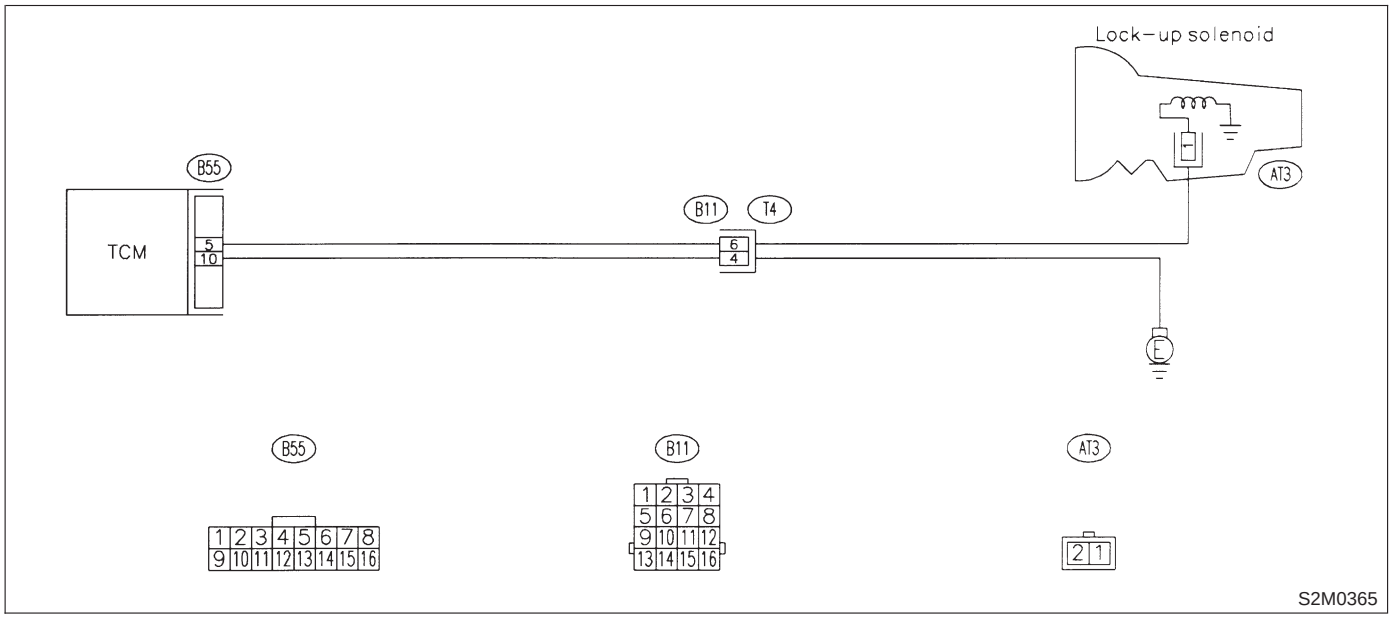
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in duty solenoid A and transmission connector.

NO : Repair short circuit in harness between duty solenoid A and transmission connector.

MEMO:

D: TROUBLE CODE 12 — DUTY SOLENOID B —

DIAGNOSIS:
Output signal circuit of duty solenoid B is open or shorted.
TROUBLE SYMPTOM:
No “lock-up” (after engine warm-up).
WIRING DIAGRAM:



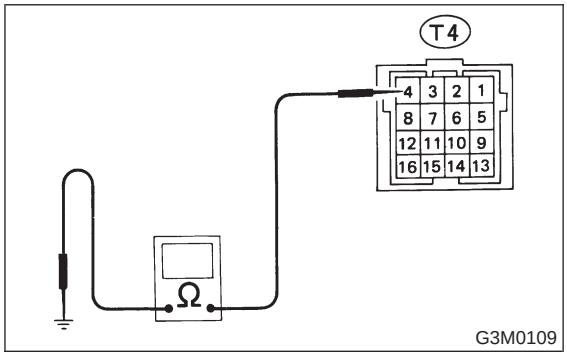
8D1 : CHECK TROUBLE CODE.

CHECK : ***Do multiple trouble codes appear in the on-board diagnostics test mode?***
YES : Go to another trouble code.
NO : Go to step **8D2**.

8D2 : CHECK DUTY SOLENOID B GROUND LINE.

1) Turn ignition switch to OFF.
2) Remove air intake chamber.
3) Disconnect connector from transmission.
4) Measure resistance between transmission connector receptacle’s terminals.

Connector & terminal
(T4) No. 4 — Chassis ground:

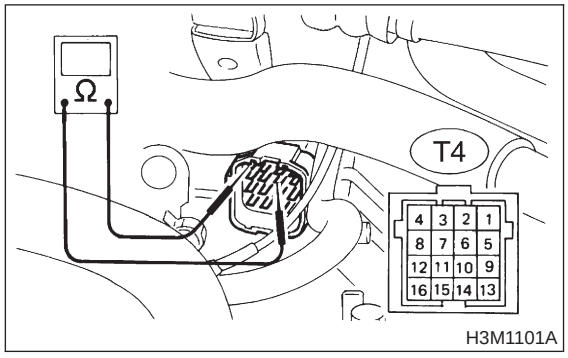


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D3**.
NO : Repair open circuit in transmission harness.

8D3 : CHECK DUTY SOLENOID B.

Measure resistance between transmission connector receptacle's terminals.

Connector & terminal
(T4) No. 6 — No. 4:

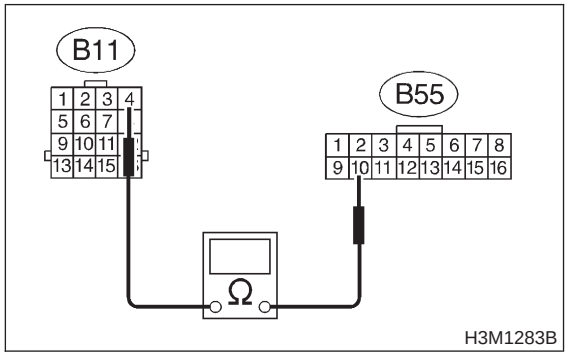


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D4**.
NO : Go to step **8D14**.

8D4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 10 — (B11) No. 4:

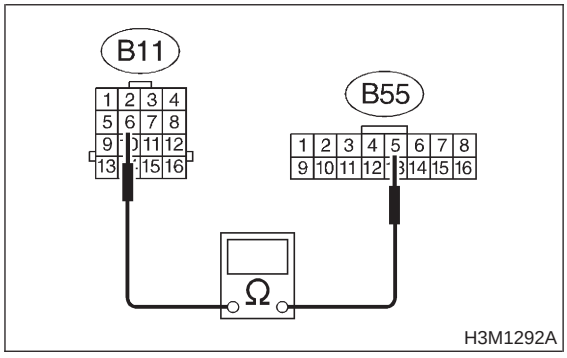


CHECK : ***Is the resistance than 1 Ω?***
YES : Go to step **8D5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8D5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and transmission.

Connector & terminal
(B55) No. 5 — (B11) No. 6:

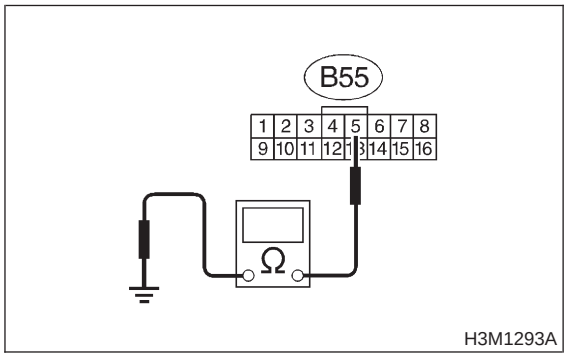


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D6**.
NO : Repair open circuit in harness between TCM and transmission connector.

8D6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and chassis ground.

Connector & terminal
(B55) No. 5 — Chassis ground:

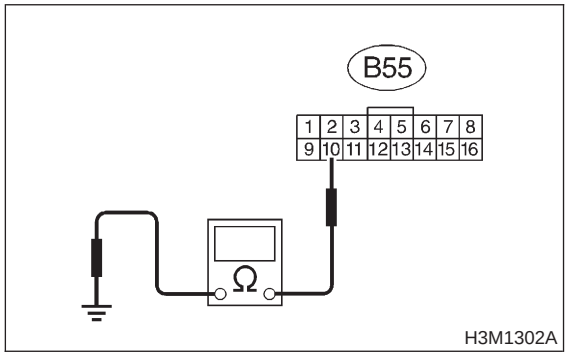


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8D7**.
NO : Repair short circuit in harness between TCM and transmission connector.

8D7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and chassis ground.

Connector & terminal
(B55) No. 10 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8D8**.
NO : Repair short circuit in harness between TCM and transmission connector.

8D8 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8D11**.
NO : Go to step **8D9**.

8D9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Lift-up the vehicle and place safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

4) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

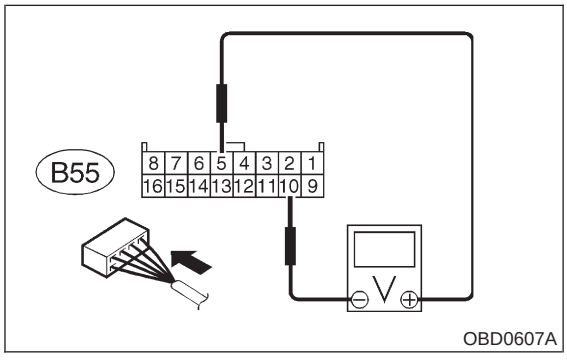
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

5) Move selector lever to “D” and slowly increase vehicle speed to 75 km/h (47 m/h). Wheels will lock-up.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

6) Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 5 (+) — No. 10 (−):

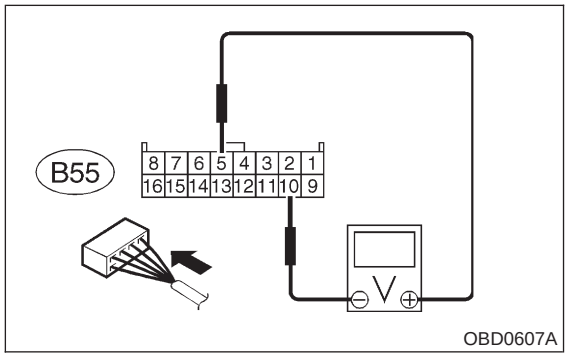


CHECK : ***Is the voltage more than 8.5 V?***
YES : Go to step **8D10**.
NO : Go to step **8D13**.

8D10 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Return the engine to idling speed and move selector lever to “N”.
2) Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 5 (+) — No. 10 (−):



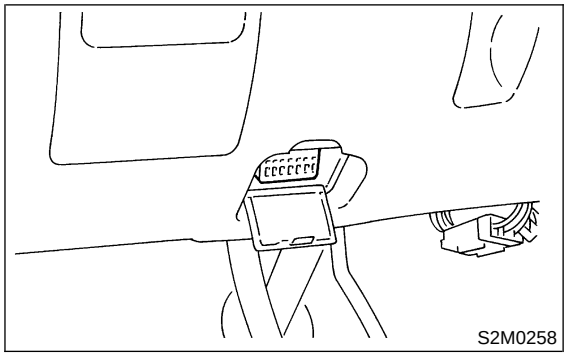
CHECK : ***Is the voltage less than 0.5 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
NO : Go to step **8D13**.

8D11 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Lift-up the vehicle and place safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

4) Connect Subaru Select Monitor to data link connector.



5) Start the engine, and turn Subaru Select Monitor switch to ON.
6) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

7) Read data of duty solenoid B using Subaru Select Monitor.
● Lock-up duty is indicated in “%”.
8) Move selector lever to “D” and slowly increase vehicle speed to 75 km/h (47 m/h). Wheels will lock-up.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Is the value 95%?***
YES : Go to step **8D12**.
NO : Go to step **8D13**.

8D12 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

Return the engine to idling speed and move selector lever to “N”.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Is the value 5%?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
NO : Go to step **8D13**.

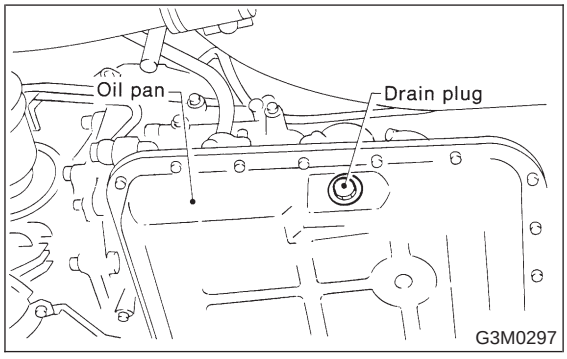
8D13 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in duty solenoid B circuit?***
YES : Repair poor contact.
NO : Replace TCM.

8D14 : CHECK DUTY SOLENOID B (IN TRANSMISSION).

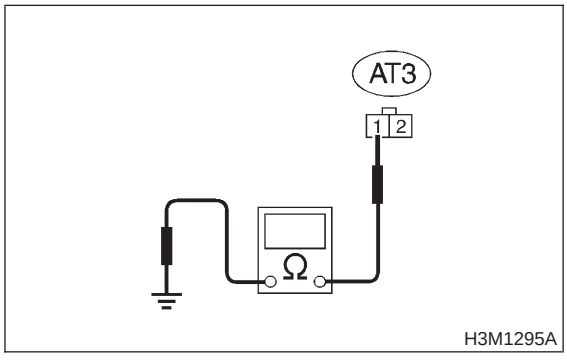
1) Remove transmission connector from bracket.
2) Drain automatic transmission fluid.

CAUTION:
Do not drain the automatic transmission fluid until it cools down.



3) Remove oil pan, and disconnect connector from duty solenoid B.
4) Measure resistance between duty solenoid B connector and transmission ground.

Connector & terminal
(AT3) No. 1 — Transmission ground:

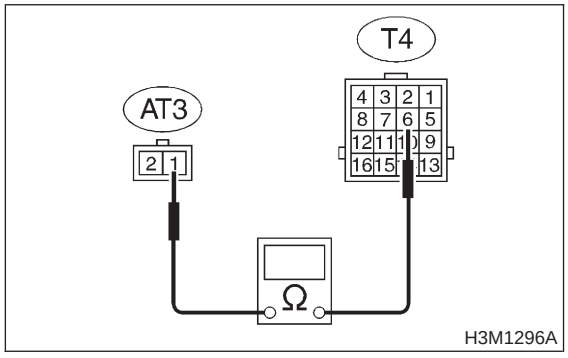


CHECK : ***Is the resistance between 9 and 17 Ω?***
YES : Go to step **8D15**.
NO : Replace duty solenoid B.

8D15 : CHECK HARNESS CONNECTOR BETWEEN DUTY SOLENOID B AND TRANSMISSION.

Measure resistance of harness between duty solenoid B and transmission connector.

Connector & terminal
(T4) No. 6 — (AT3) No. 1:

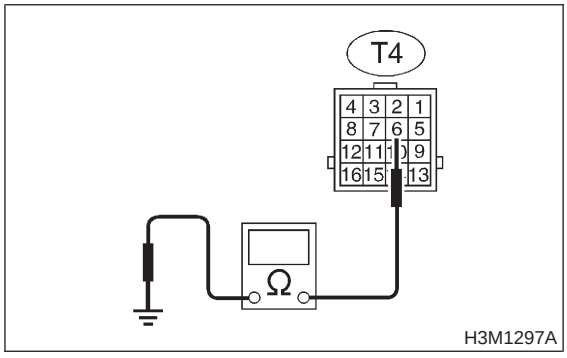


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D16**.
NO : Repair open circuit in harness between TCM and transmission connector.

8D16 : CHECK HARNESS CONNECTOR BETWEEN DUTY SOLENOID B AND TRANSMISSION.

Measure resistance of harness between transmission connector and transmission ground.

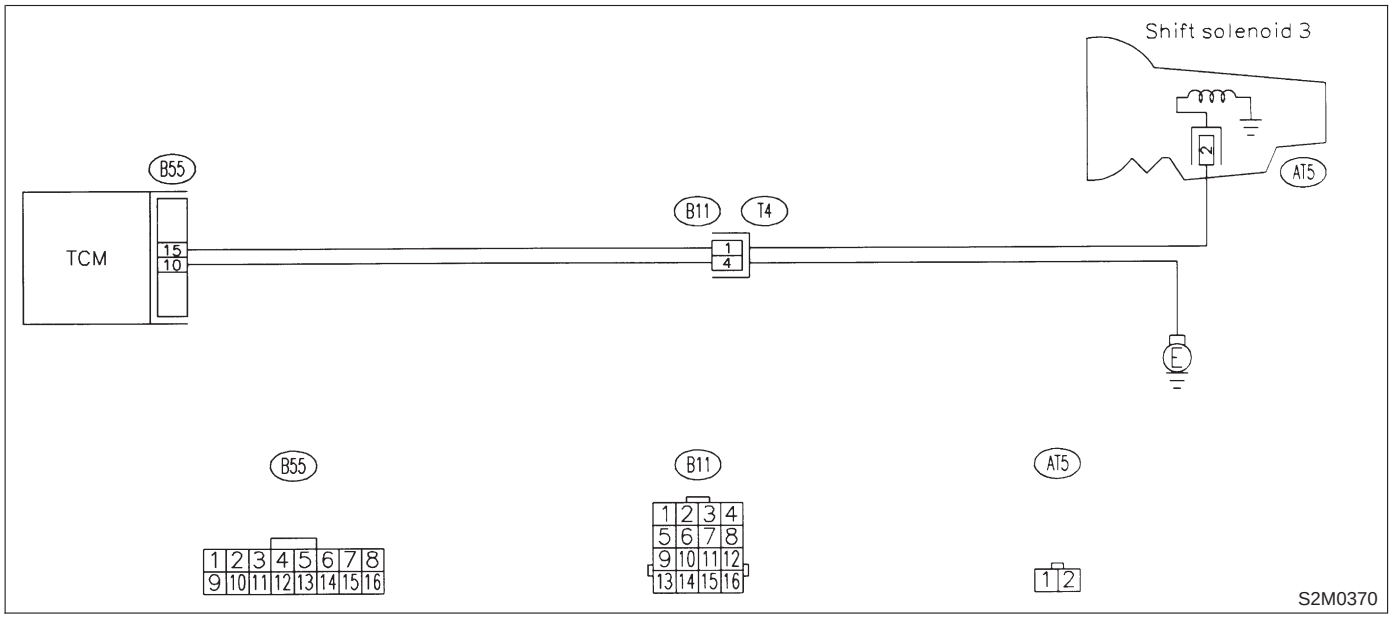
Connector & terminal
(T4) No. 6 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in duty solenoid B and transmission.
NO : Repair short circuit in harness between TCM and transmission connector.

E: TROUBLE CODE 13 — SHIFT SOLENOID 3 —

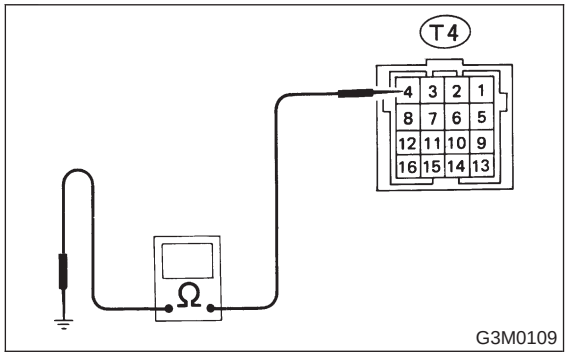
DIAGNOSIS:
Output signal circuit of shift solenoid 3 is open or shorted.
TROUBLE SYMPTOM:
Ineffective engine brake with shift lever in “3”.
WIRING DIAGRAM:



8E1 : CHECK SHIFT SOLENOID 3 GROUND LINE.

1) Turn ignition switch to OFF.
2) Remove air intake chamber.
3) Disconnect connector from transmission.
4) Measure resistance between transmission connector and transmission ground.

Connector & terminal
(T4) No. 4 — Chassis ground:

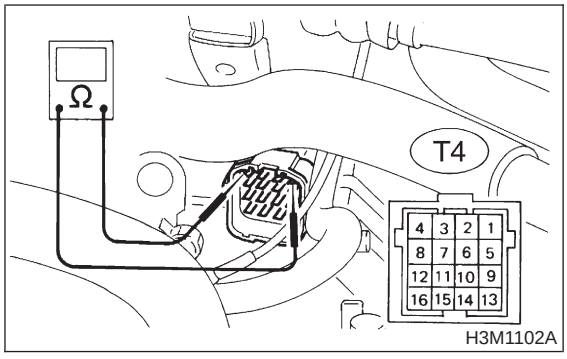


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E2**.
NO : Repair open circuit in transmission harness.

8E2 : CHECK SHIFT SOLENOID 3.

Measure resistance between transmission connector terminals.

Connector & terminal
(T4) No. 1 — No. 4:

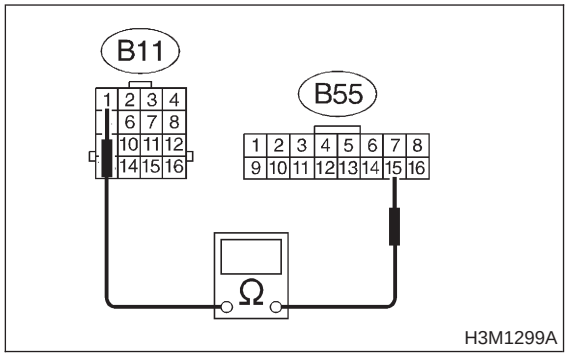


CHECK : ***Is the resistance between 20 and 32 Ω?***
YES : Go to step **8E3**.
NO : Go to step **8E10**.

8E3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 15 — (B11) No. 1:

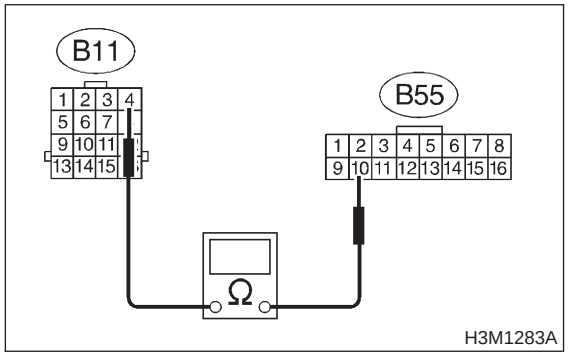


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8E4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 10 — (B11) No. 4:

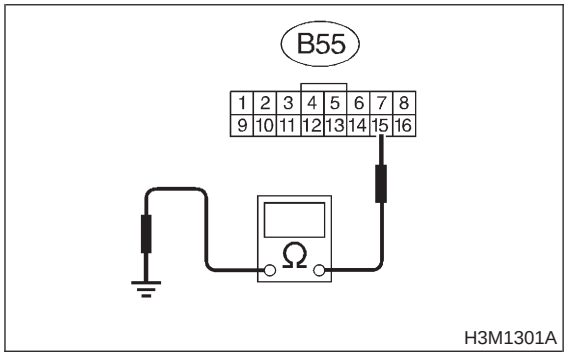


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8E5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 15 — Chassis ground:

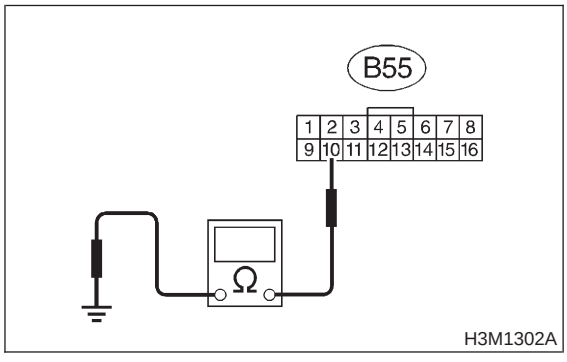


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8E6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8E6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 10 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8E7**.
NO : Repair short circuit in harness between TCM and transmission connector.

8E7 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Lift-up or raise the vehicle and support with safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

4) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

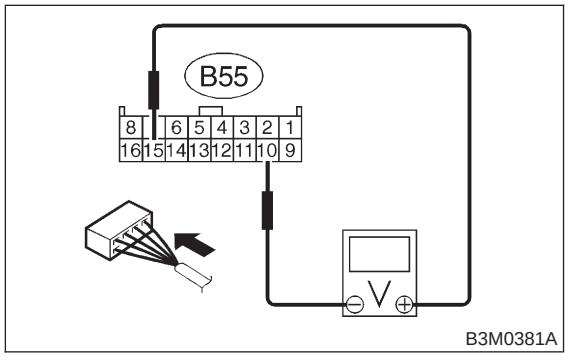
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

5) Move selector lever to “2”, and slowly increase vehicle speed to 35 km/h (22 m/h).

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

6) Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 15 (+) — No. 10 (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8E8**.
NO : Go to step **8E9**.

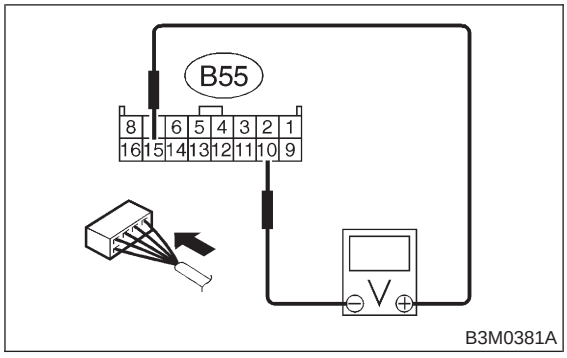
8E8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Move selector lever to “D”, and slowly increase vehicle speed to 65 km/h (41 m/h).

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

2) Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 15 (+) — No. 10 (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
NO : Go to step **8E9**.

8E9 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in shift solenoid 3 circuit?***
YES : Repair poor contact.
NO : Replace TCM.

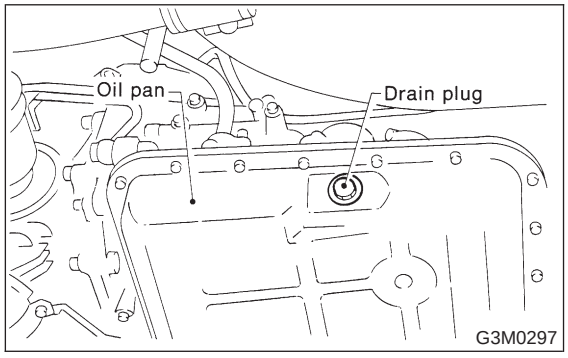
8E10 : CHECK SHIFT SOLENOID 3 (IN TRANSMISSION).

1) Remove transmission connector from bracket.
2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

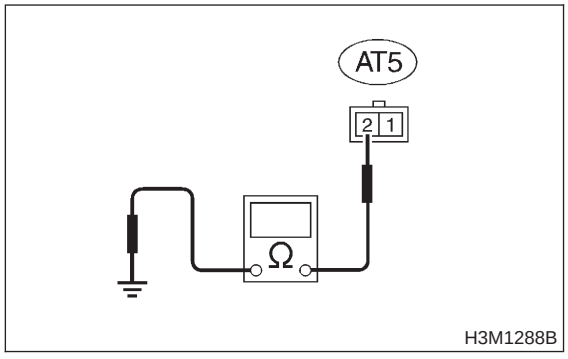
3) Drain automatic transmission fluid.

CAUTION:
Do not drain the automatic transmission fluid until it cools down.



4) Remove oil pan, and disconnect connector from shift solenoid 3.
5) Measure resistance between shift solenoid 3 connector and transmission ground.

Connector & terminal
(AT5) No. 2 — Transmission ground:

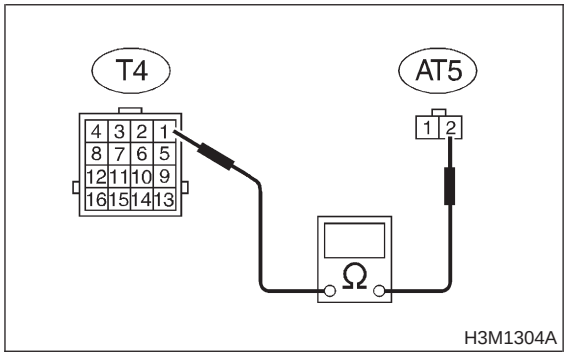


CHECK : ***Is the resistance between 20 and 32 Ω?***
YES : Go to step **8E11**.
NO : Replace shift solenoid assembly.

8E11 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 3 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 3 and transmission connector.

Connector & terminal
(AT5) No. 2 — (T4) No. 1:

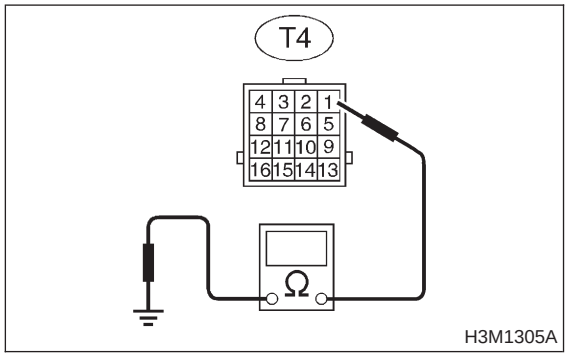


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E12**.
NO : Repair open circuit in harness between shift solenoid 3 and transmission connector.

8E12 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 3 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 3 connector and transmission ground.

Connector & terminal
(T4) No. 1 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***

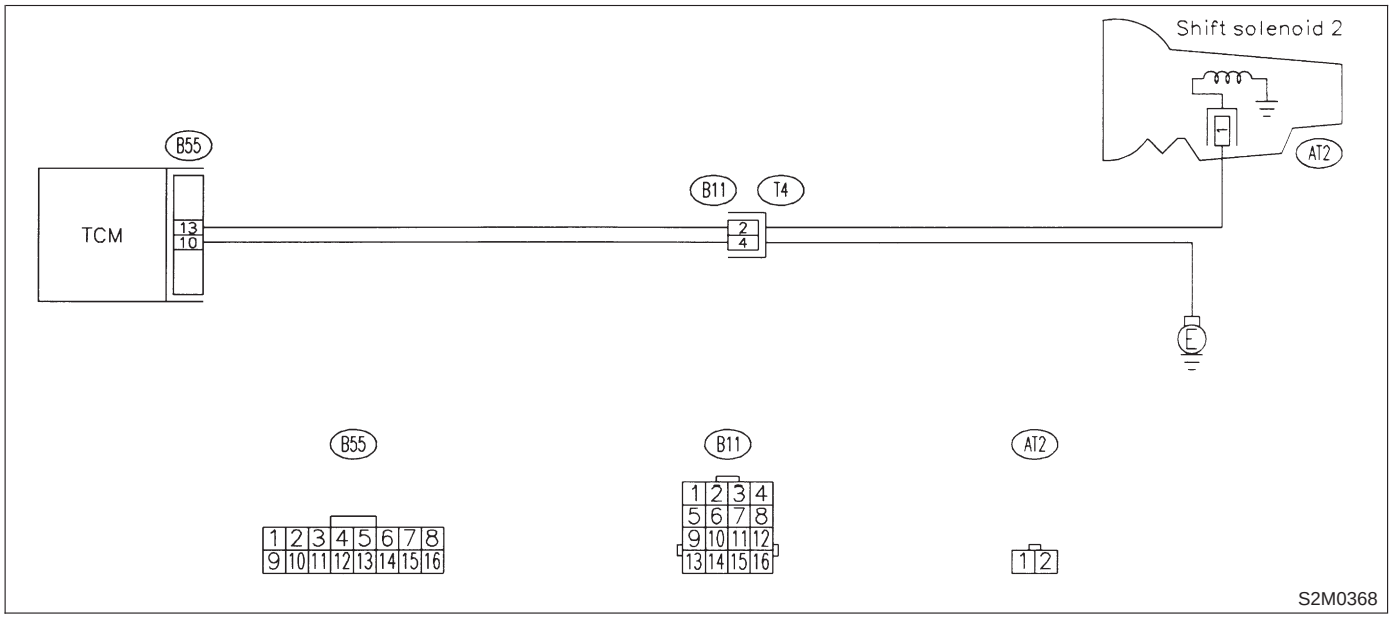
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 3 and transmission.

NO : Repair short circuit harness between TCM and transmission connector.

MEMO:

F: TROUBLE CODE 14 — SHIFT SOLENOID 2 —

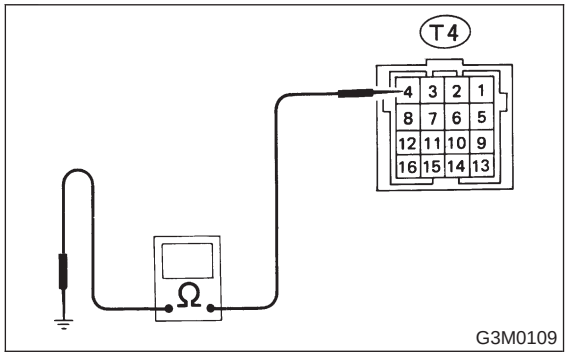
DIAGNOSIS:
Output signal circuit of shift solenoid 2 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



8F1 : CHECK SHIFT SOLENOID 2 GROUND LINE.

1) Turn ignition switch to OFF.
2) Remove air intake chamber.
3) Disconnect connector from transmission.
4) Measure resistance between transmission connector and transmission ground.

Connector & terminal
(T4) No. 4 — Chassis ground:

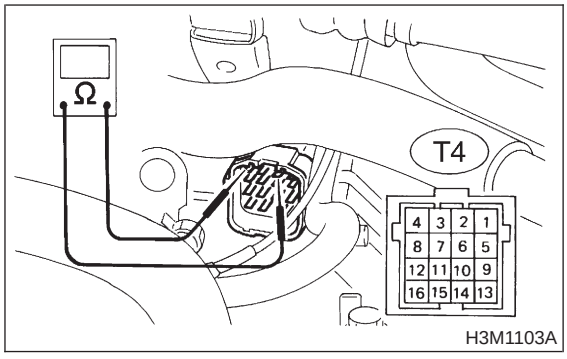


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8F2**.
NO : Repair open circuit in transmission harness.

8F2 : CHECK SHIFT SOLENOID 2.

Measure resistance between transmission connector terminals.

Connector & terminal
(T4) No. 2 — No. 4:

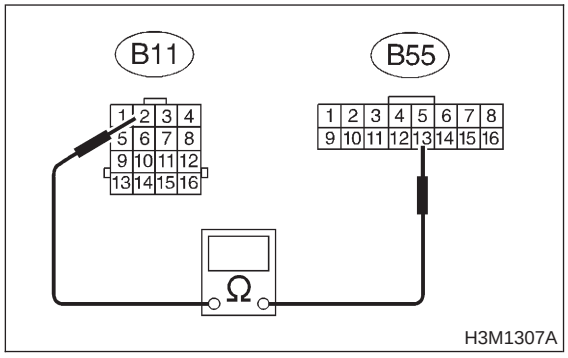


CHECK : ***Is the resistance between 20 and 32 Ω?***
YES : Go to step **8F3**.
NO : Go to step **8F9**.

8F3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and shift solenoid 2 connector.

Connector & terminal
(B55) No. 13 — (B11) No. 2:

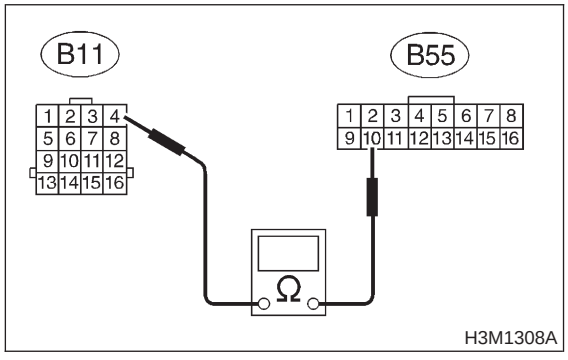


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8F4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8F4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and shift solenoid 2 connector.

Connector & terminal
(B55) No. 10 — (B11) No. 4:

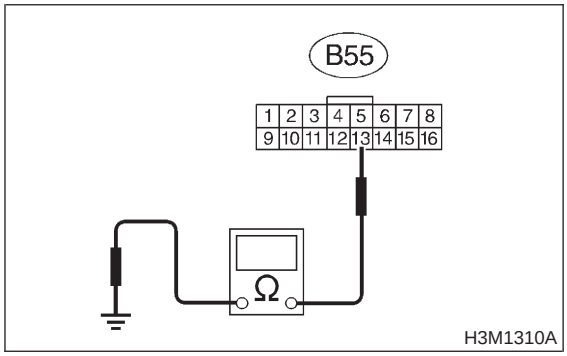


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8F5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8F5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 13 — Chassis ground:

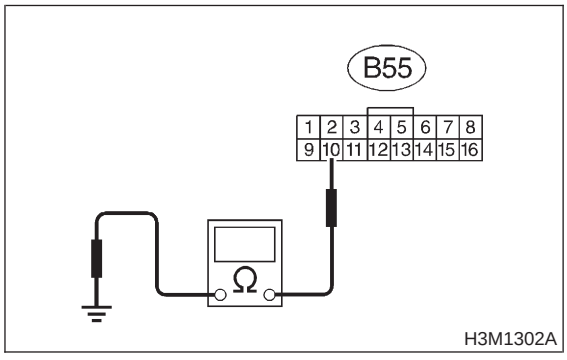


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8F6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8F6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 10 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8F7**.
NO : Repair short circuit in harness between TCM and transmission connector.

8F7 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Lift-up or raise the vehicle and support with safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

4) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F).

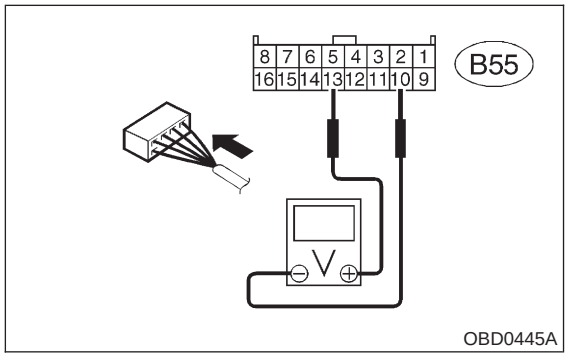
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

5) Move selector lever to "D", and slowly increase vehicle speed to 50 km/h (31 m/h).

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

6) Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 13 (+) — No. 10 (−):



CHECK : ***Is the voltage 9 V → 1 V?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
NO : Go to step **8F8**.

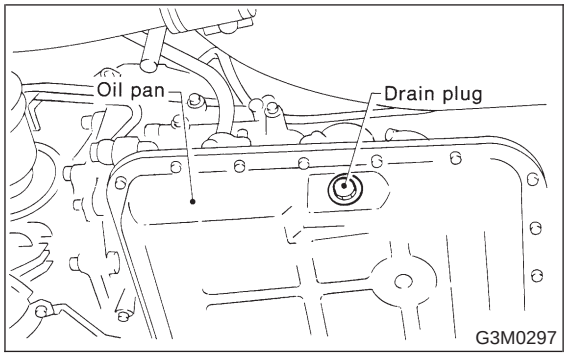
8F8 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in shift solenoid 2 circuit?***
YES : Repair poor contact.
NO : Replace TCM.

8F9 : CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).

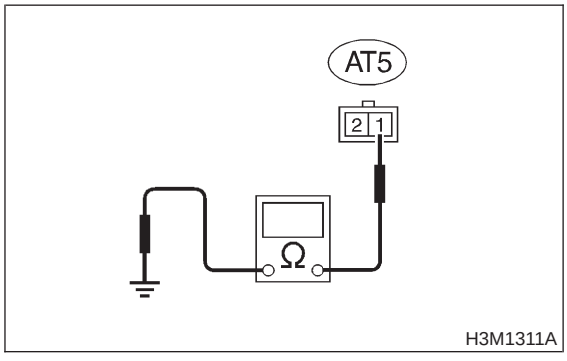
1) Remove transmission connector from bracket.
2) Drain automatic transmission fluid.

CAUTION:
Do not drain the automatic transmission fluid until it cools down.



3) Remove oil pan, and disconnect connector from shift solenoid 2.
4) Measure resistance between shift solenoid 2 connector and transmission ground.

Connector & terminal
(AT2) No. 1 — Transmission ground:

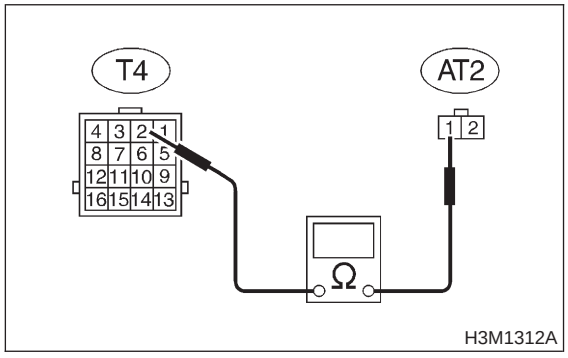


CHECK : ***Is the resistance between 20 and 32 Ω?***
YES : Go to step **8F10**.
NO : Replace shift solenoid assembly.

8F10 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 2 and transmission connector.

Connector & terminal
(AT2) No. 1 — (T4) No. 2:

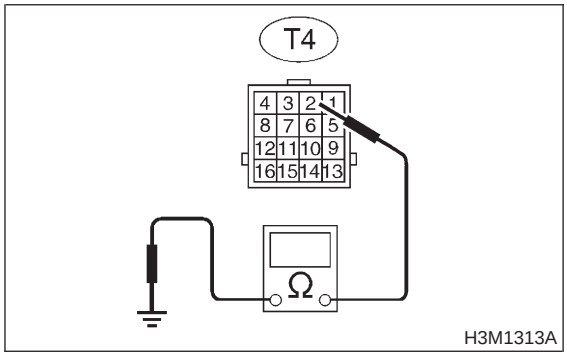


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8F11**.
NO : Repair open circuit in harness between shift solenoid 2 and transmission connector.

8F11 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 2 connector and transmission ground.

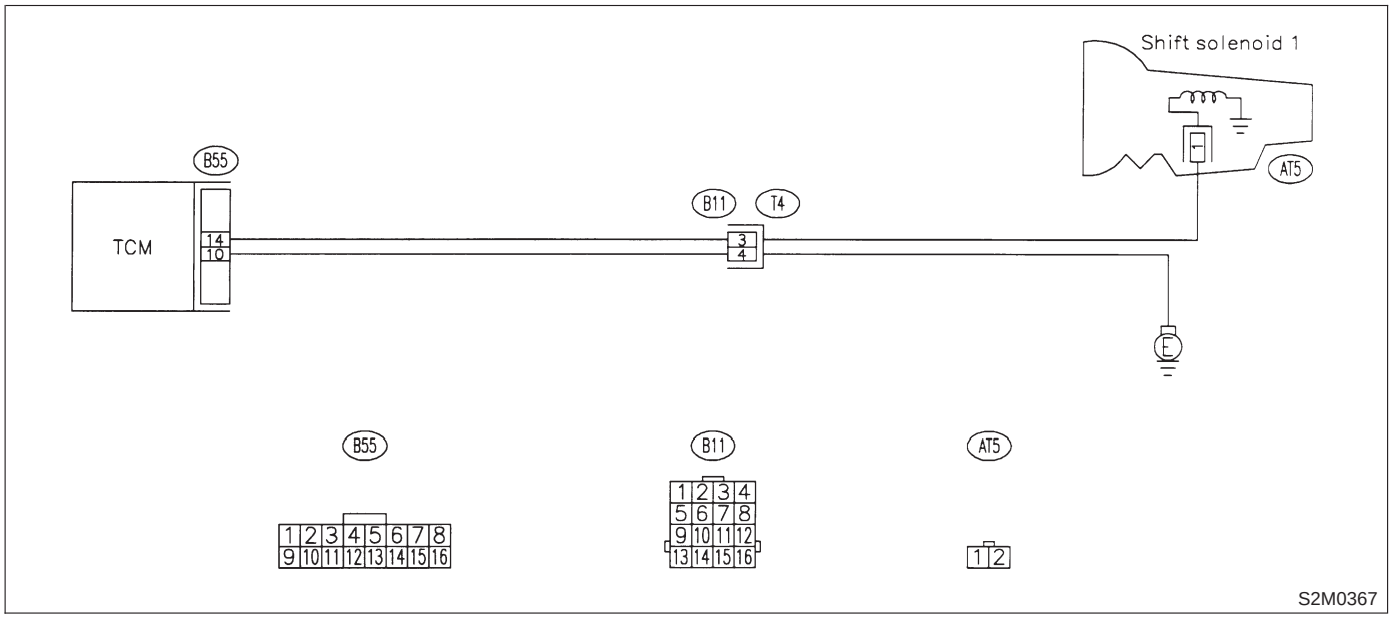
Connector & terminal
(T4) No. 2 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
NO : Repair short circuit harness between TCM and transmission connector.

G: TROUBLE CODE 15 — SHIFT SOLENOID 1 —

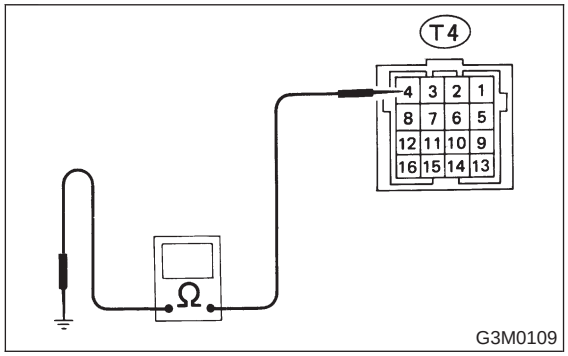
DIAGNOSIS:
Output signal circuit of shift solenoid 1 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



8G1 : CHECK SHIFT SOLENOID 1 GROUND LINE.

1) Turn ignition switch to OFF.
2) Remove air intake chamber.
3) Disconnect connector from transmission.
4) Measure resistance between transmission connector and transmission ground.

Connector & terminal
(T4) No. 4 — Chassis ground:

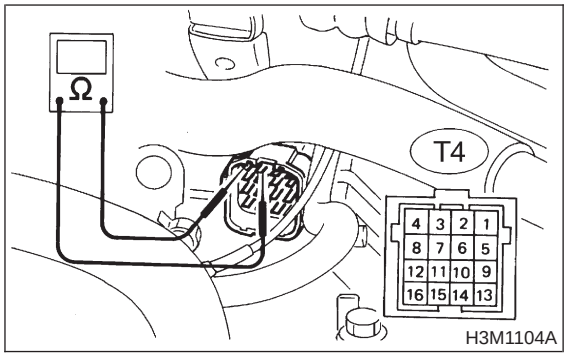


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8G2**.
NO : Repair open circuit in transmission harness.

8G2 : CHECK SHIFT SOLENOID 1.

Measure resistance between transmission connector terminals.

Connector & terminal
(T4) No. 3 — No. 4:

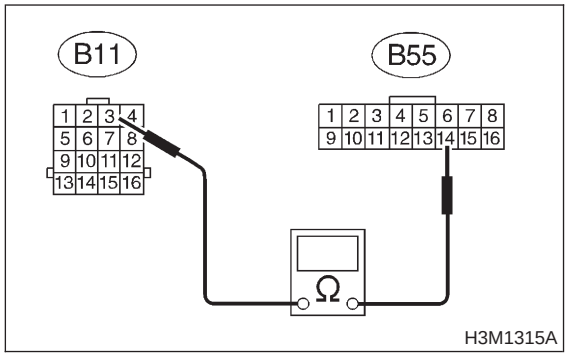


CHECK : ***Is the resistance between 20 and 32 Ω?***
YES : Go to step **8G3**.
NO : Go to step **8G9**.

8G3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and shift solenoid 1 connector.

Connector & terminal
(B55) No. 14 — (B11) No. 3:

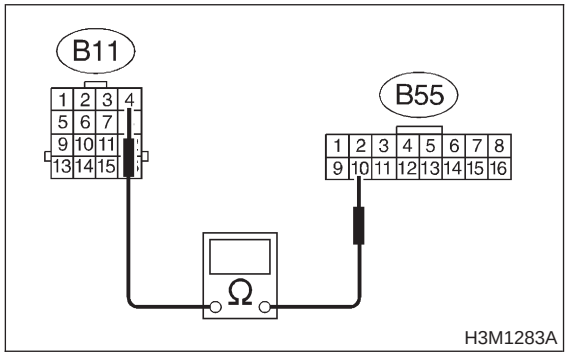


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8G4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8G4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and shift solenoid 1 connector.

Connector & terminal
(B55) No. 10 — (B11) No. 4:

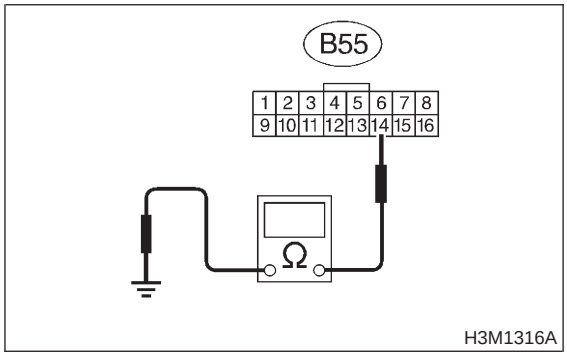


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8G5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8G5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 14 — Chassis ground:

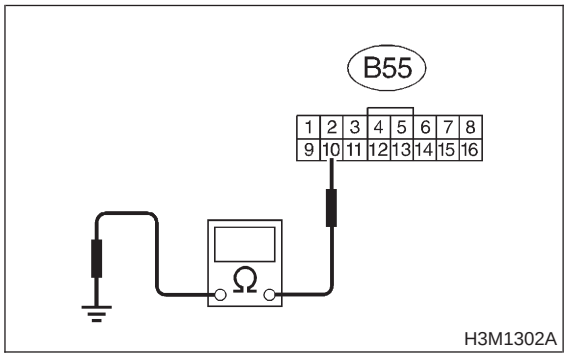


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8G6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8G6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness TCM connector and transmission ground.

Connector & terminal
(B55) No. 10 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8G7**.
NO : Repair short circuit in harness between TCM and transmission connector.

8G7 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Lift-up or raise the vehicle and support with safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

4) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

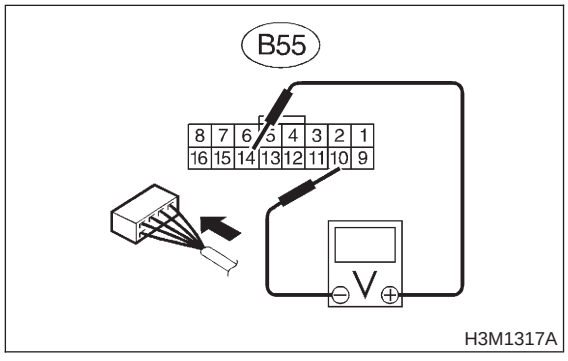
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

5) Move selector lever to "D", and slowly increase vehicle speed to 50 km/h (31 m/h).

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

6) Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 14 (+) — No. 10 (−):



CHECK : ***Is the voltage 1 V → 9 V?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.
NO : Go to step **8G8**.

8G8 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in shift solenoid 1 circuit?***
YES : Repair poor contact.
NO : Replace TCM.

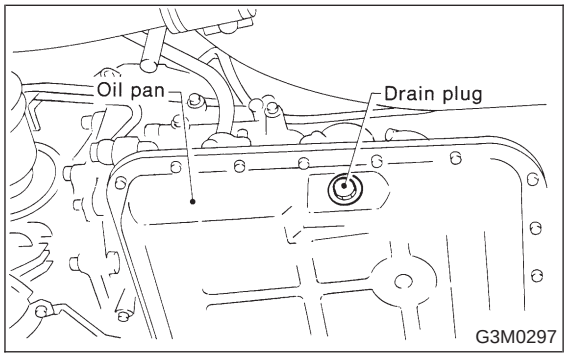
8G9 : CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).

1) Remove transmission connector from bracket.
2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

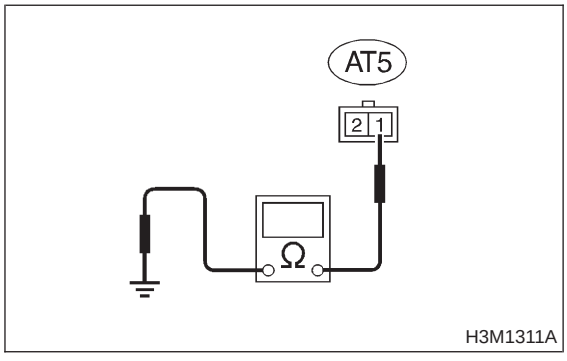
3) Drain automatic transmission fluid.

CAUTION:
Do not drain the automatic transmission fluid until it cools down.



4) Remove oil pan, and disconnect connector from shift solenoid 1.
5) Measure resistance between shift solenoid 1 connector and transmission ground.

Connector & terminal
(AT5) No. 1 — Transmission ground:

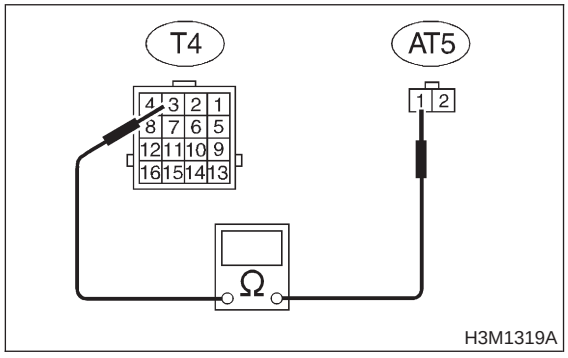


CHECK : ***Is the resistance between 20 and 32 Ω?***
YES : Go to step **8G10**.
NO : Replace shift solenoid assembly.

8G10 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 1 and transmission connector.

Connector & terminal
(AT5) No. 1 — (T4) No. 3:

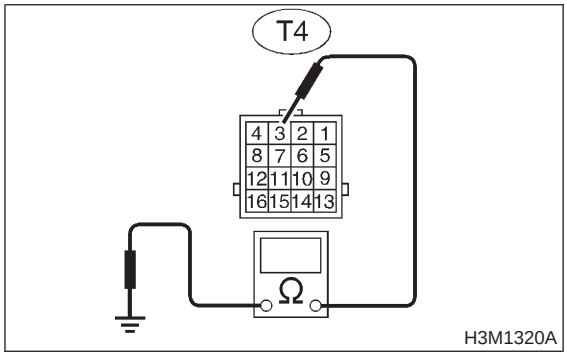


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8G11**.
NO : Repair open circuit in harness between TCM and transmission connector.

8G11 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 1 connector and transmission ground.

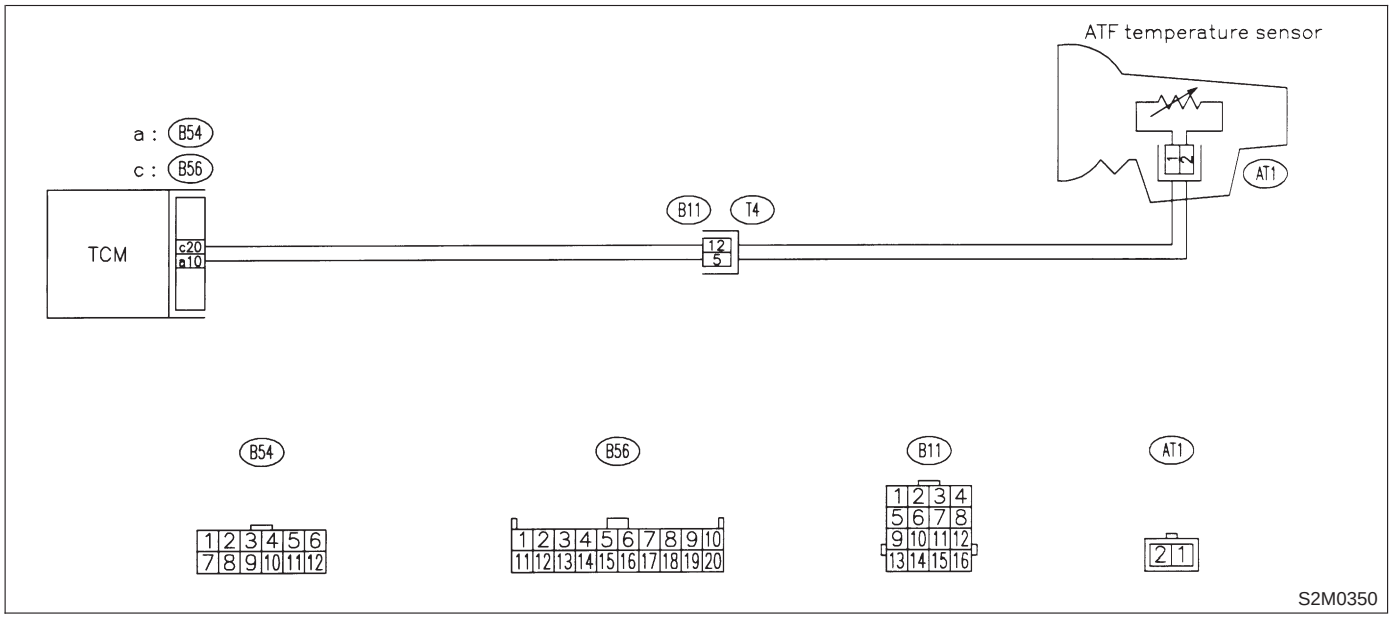
Connector & terminal
(T4) No. 3 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 1 and transmission.
NO : Repair short circuit harness between TCM and transmission connector.

H: TROUBLE CODE 21 — ATF TEMPERATURE SENSOR —

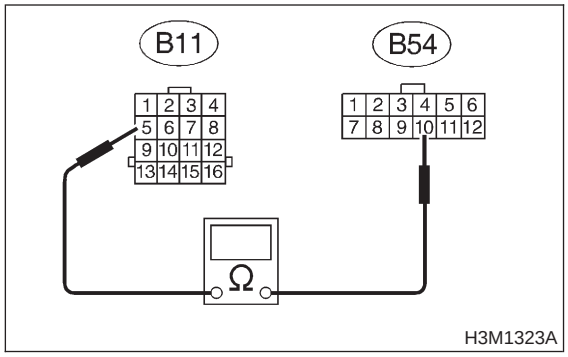
DIAGNOSIS:
Input signal circuit of TCM to ATF temperature sensor is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



8H1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

1) Turn ignition switch to OFF.
2) Remove air intake chamber.
3) Disconnect connector from transmission and TCM.
4) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B54) No. 10 — (B11) No. 5:

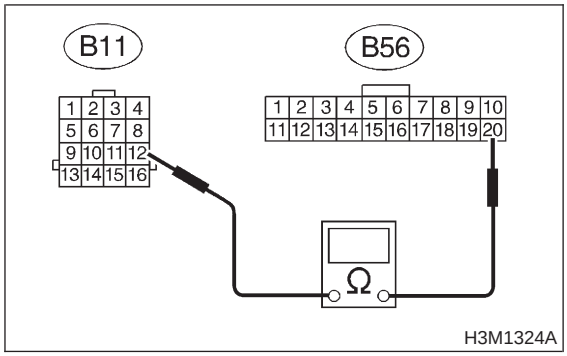


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8H2**.
NO : Repair open circuit in harness between TCM and transmission connector.

8H2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B56) No. 20 — (B11) No. 12:

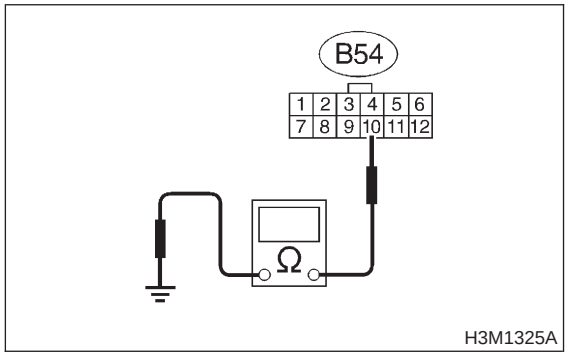


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8H3**.
NO : Repair open circuit in harness between TCM and transmission connector.

8H3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B54) No. 10 — Chassis ground:

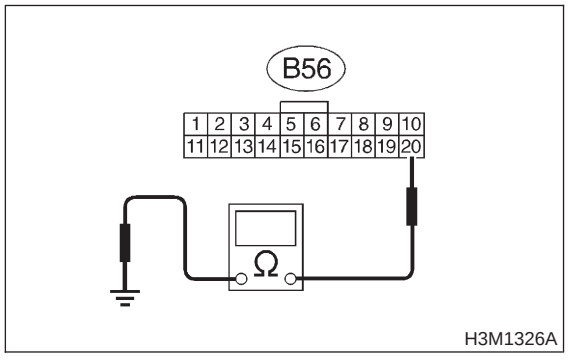


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8H4**.
NO : Repair short circuit in harness between TCM and transmission connector.

8H4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B56) No. 20 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8H5**.
NO : Repair short circuit in harness between TCM and transmission connector.

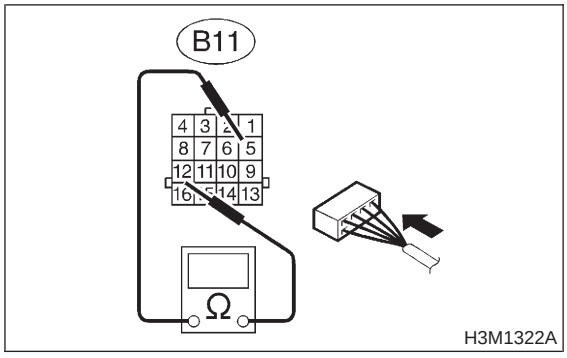
8H5 : CHECK ATF TEMPERATURE SENSOR.

1) Turn ignition switch to OFF.
2) Connect connectors to transmission and TCM.
3) Turn ignition switch to ON and start engine.
4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

5) Measure resistance between transmission connector terminals.

Connector & terminal
(B11) No. 12 — No. 5:

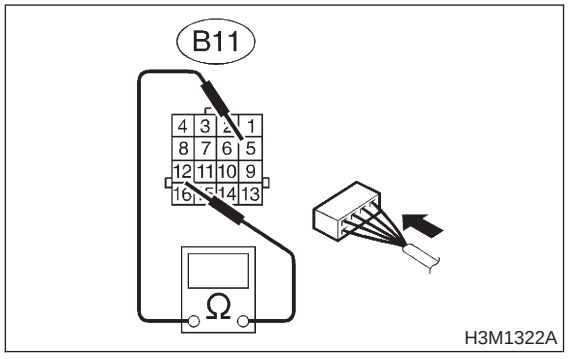


CHECK : ***Is the resistance between 272 and 374 Ω?***
YES : Go to step **8H6**.
NO : Go to step **8H13**.

8H6 : CHECK ATF TEMPERATURE SENSOR.

1) Turn ignition switch to ON (engine OFF).
2) Measure resistance between transmission connector terminals.

Connector & terminal
(B11) No. 12 — No. 5:



CHECK : ***Does the resistance value increase while the ATF temperature decreases?***
YES : Go to step **8H7**.
NO : Go to step **8H13**.

8H7 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8H10**.
NO : Go to step **8H8**.

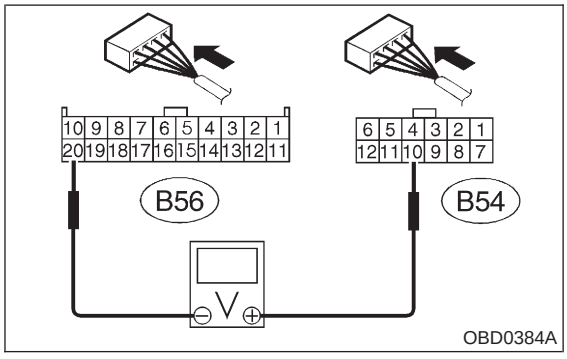
8H8 : CHECK INPUT SIGNAL FOR TCM.

1) Warm-up the transmission until ATF temperature is about 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

2) Measure voltage between TCM connector terminal.

Connector & terminal
(B54) No. 10 (+) — (B56) No. 20 (−):

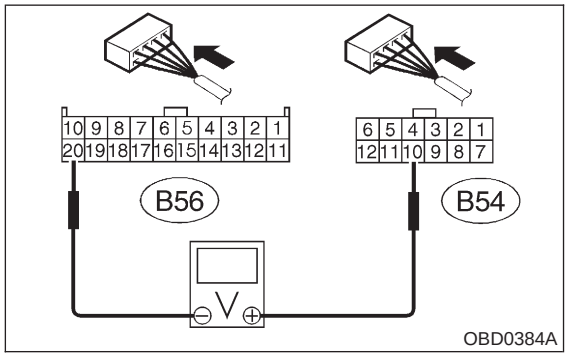


CHECK : ***Is the voltage between 2.9 and 4.0 V?***
YES : Go to step **8H9**.
NO : Go to step **8H12**.

8H9 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to ON (engine OFF).
2) Measure voltage between TCM connector terminal.

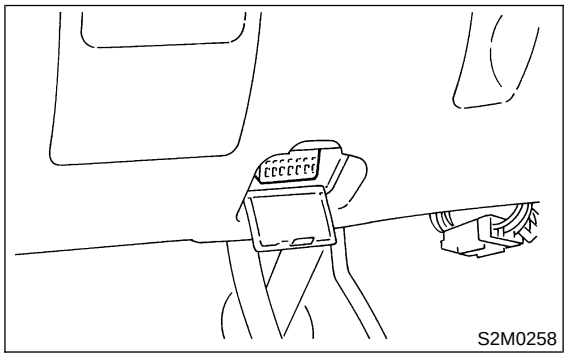
Connector & terminal
(B54) No. 10 (+) — (B56) No. 20 (−):



CHECK : ***Is the voltage between 1.0 and 1.4 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
NO : Go to step **8H12**.

8H10 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

1) Turn ignition switch to OFF.
2) Connect connectors to TCM and transmission.
3) Connect Subaru Select Monitor to data link connector.



4) Start the engine, and turn Subaru Select Monitor switch to ON.
5) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

6) Read data of ATF temperature using Subaru Select Monitor.
- ATF temperature is indicated in “°F” or “°C”.

CHECK : ***Is the ATF temperature between 70 and 110°C (158 and 230°F).***
YES : Go to step **8H11**.
NO : Go to step **8H12**.

8H11 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

Turn ignition switch to ON (engine OFF).

CHECK : ***Does the ATF temperature gradually decrease?***
YES : Even if “AT OIL TEMP” light up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.
NO : Go to step **8H12**.

8H12 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in ATF temperature sensor circuit?***
YES : Repair poor contact.
NO : Replace TCM.

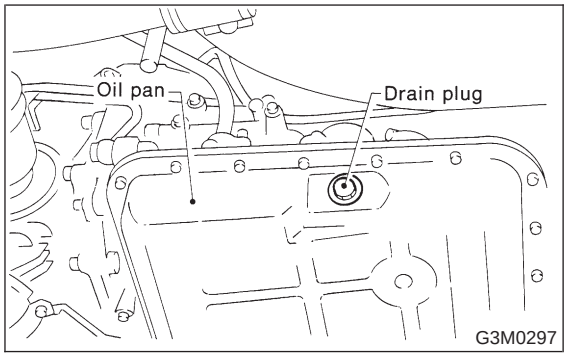
8H13 : CHECK ATF TEMPERATURE SENSOR (IN TRANSMISSION).

1) Turn ignition switch to OFF.
2) Disconnect connector from transmission.
3) Remove transmission connector from bracket.
4) Lift-up the vehicle and place safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

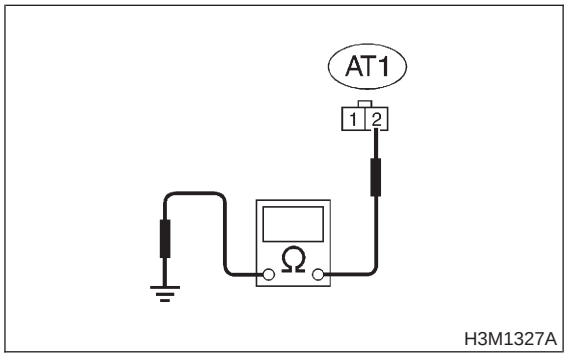
5) Drain automatic transmission fluid.

CAUTION:
Do not drain the automatic transmission fluid until it cools down.



6) Remove oil pan, and disconnect connector from ATF temperature sensor connector.
7) Measure resistance between ATF temperature sensor connector and transmission ground.

Connector & terminal
(AT1) No. 2 — Transmission ground:

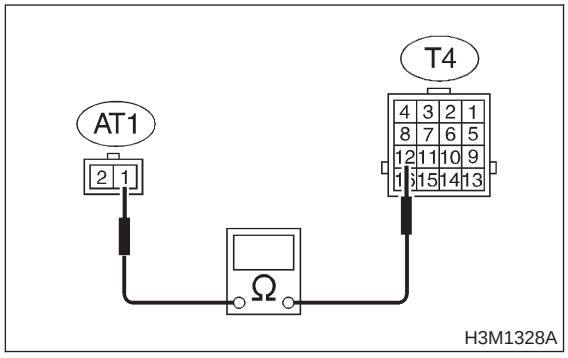


CHECK : ***Is the resistance between 1.5 and 4.5 Ω?***
YES : Go to step **8H14**.
NO : Replace ATF temperature sensor.

8H14 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

1) Disconnect connector from transmission.
2) Measure resistance of harness between ATF temperature sensor and transmission connector.

Connector & terminal
(T4) No. 12 — (AT1) No. 1:

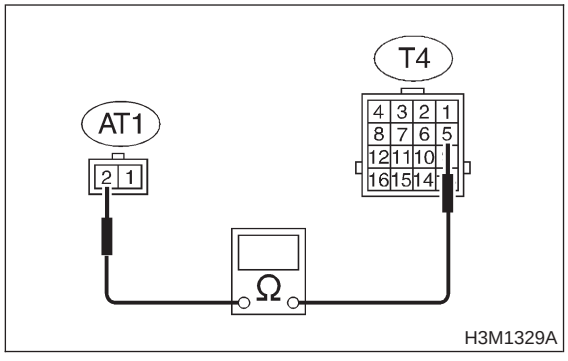


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8H15**.
NO : Repair open circuit in harness between ATF temperature sensor and transmission connector.

8H15 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between ATF temperature sensor and transmission connector.

Connector & terminal
(T4) No. 5 — (AT1) No. 2:

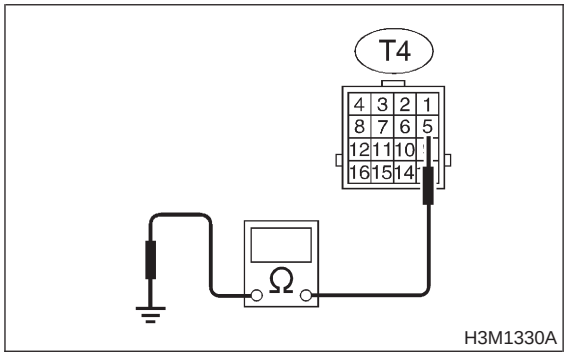


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8H16**.
NO : Repair open circuit in harness between ATF temperature sensor and transmission connector.

8H16 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 5 — Transmission ground:

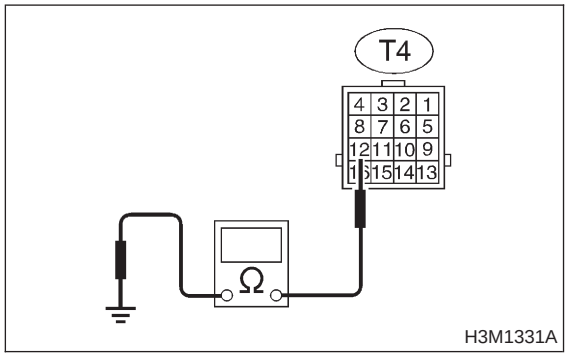


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8H17**.
NO : Repair short circuit in harness between ATF temperature sensor and transmission connector.

8H17 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 12 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***

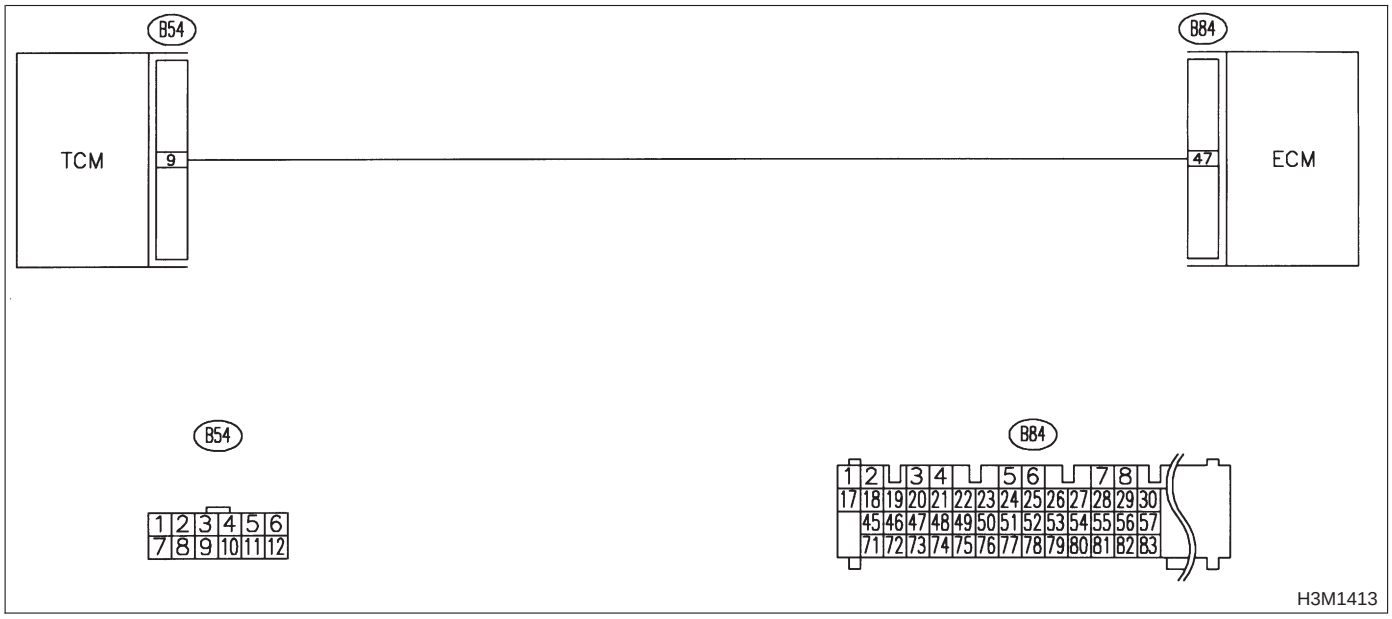
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the ATF temperature sensor and transmission connector.

NO : Repair short circuit in harness between ATF temperature sensor and transmission connector.

MEMO:

I: TROUBLE CODE 22 — MASS AIR FLOW SIGNAL —

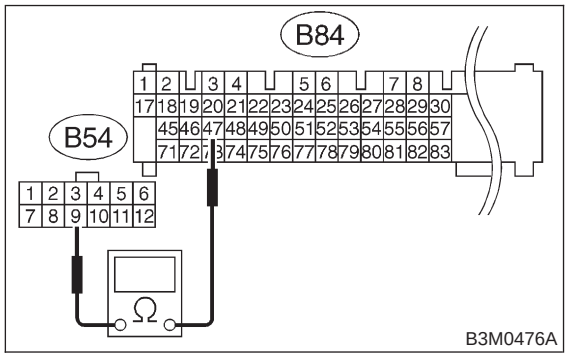
DIAGNOSIS:
Input signal circuit of TCM from ECM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



8I1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and ECM.
3) Measure resistance of harness between TCM and ECM connector.

Connector & terminal
(B54) No. 9 — (B84) No. 47:

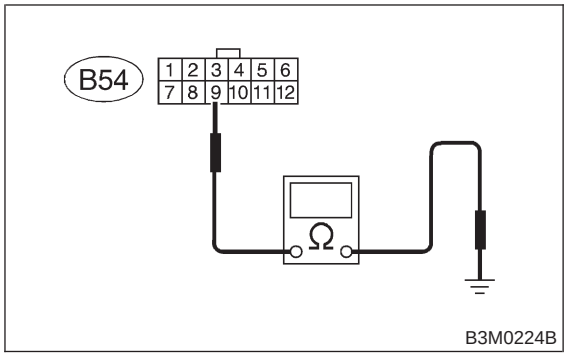


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8I2**.
NO : Repair open circuit in harness between TCM and ECM connector.

8I2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B54) No. 9 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8I3**.
NO : Repair short circuit in harness between TCM and ECM connector.

8I3 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8I5**.
NO : Go to step **8I4**.

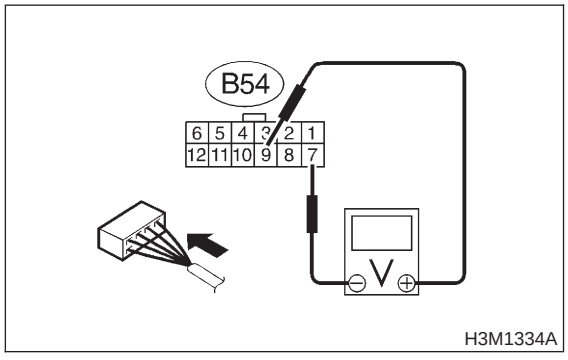
8I4 : CHECK INPUT SIGNAL FOR TCM.

1) Connect connectors to TCM and ECM.
2) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

3) Engine idling.
4) Measure voltage between TCM connectors.

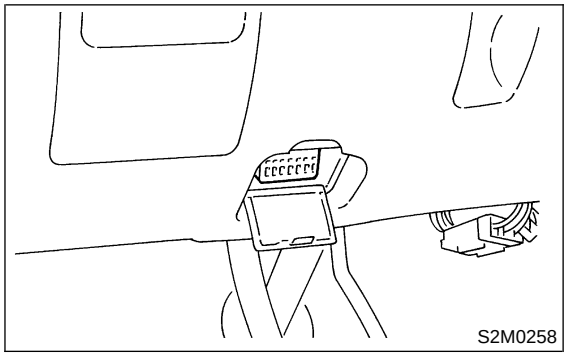
Connector & terminal
(B54) No. 9 (+) — No. 7 (−):



CHECK : ***Is the voltage between 0.5 and 1.2 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8I6**.

8I5 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

1) Connect connectors to TCM and ECM.
2) Turn ignition switch to OFF.
3) Connect Subaru Select Monitor to data link connector.



4) Start the engine, and turn Subaru Select monitor switch to ON.
5) Warm-up the engine until engine coolant temperature is above 80°C (176°F).
6) Engine idling.
7) Read data of mass air flow signal using Subaru Select Monitor.
● Display shows mass air flow signal value sent from ECM.

CHECK : ***Is the value between 0.5 and 1.2 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8I6**.

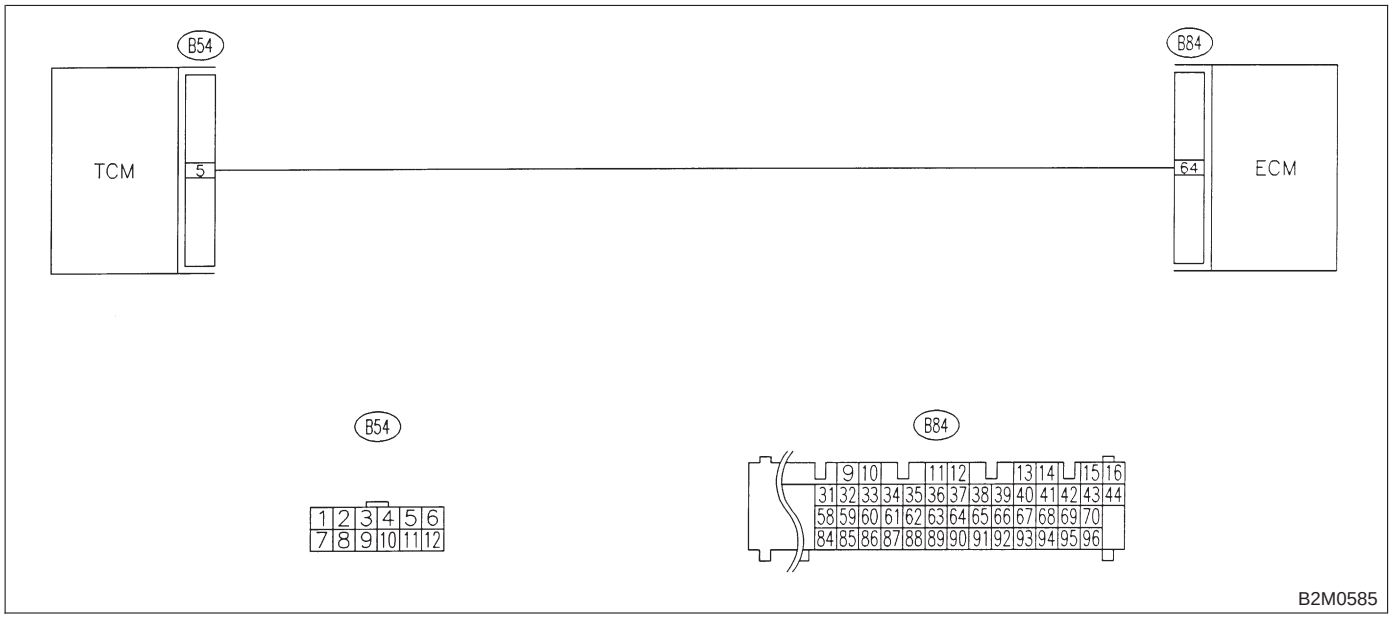
8I6 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in mass air flow signal circuit?***
YES : Repair poor contact.
NO : Replace TCM.

J: TROUBLE CODE 23 — ENGINE SPEED SIGNAL —

DIAGNOSIS:
Engine speed input signal circuit is open or shorted.
TROUBLE SYMPTOM:
- No lock-up (after engine warm-up).
- AT OIL TEMP indicator remains on when vehicle speed is “0”.

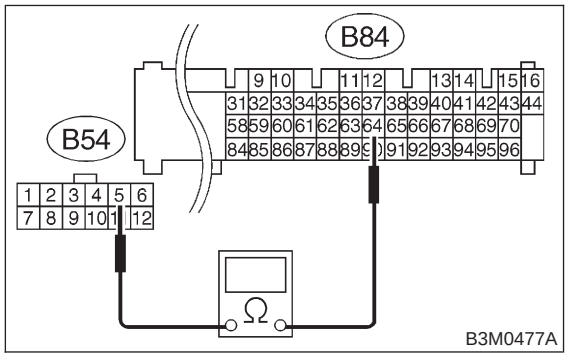
WIRING DIAGRAM:



8J1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and ECM.
3) Measure resistance of harness between TCM and ECM connector.

Connector & terminal
(B54) No. 5 — (B84) No. 64:

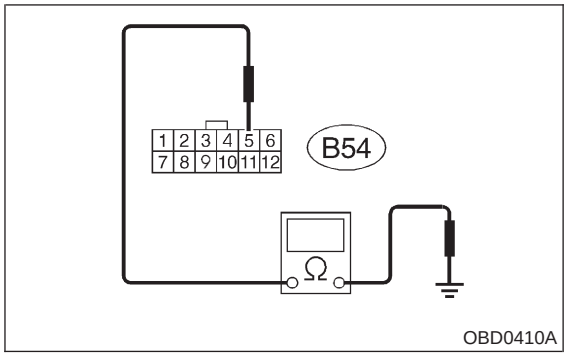


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8J2**.
NO : Repair open circuit in harness between TCM and ECM connector.

8J2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B54) No. 5 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8J3**.
NO : Repair short circuit in harness between TCM and ECM connector.

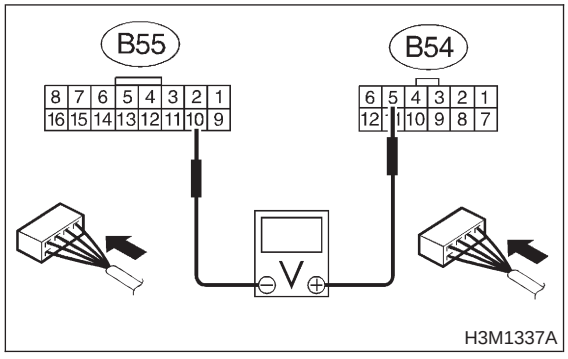
8J3 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8J5**.
NO : Go to step **8J4**.

8J4 : CHECK INPUT SIGNAL FOR TCM.

1) Connect connectors to TCM and ECM.
2) Turn ignition switch to ON (engine OFF).
3) Measure voltage between TCM connectors.

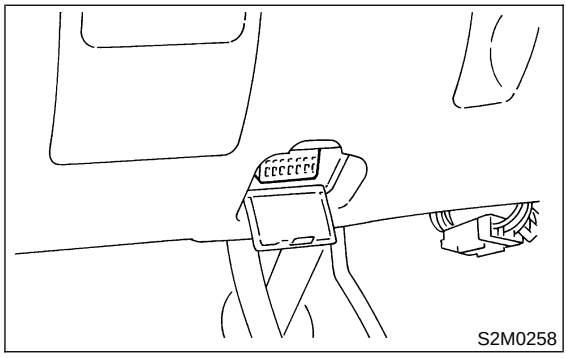
Connector & terminal
(B54) No. 5 (+) — (B55) No. 10 (−):



CHECK : ***Is the voltage more than 10.5 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8J6**.

8J5 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

1) Connect connectors to TCM and ECM.
2) Connect Subaru Select Monitor to data link connector.



3) Start the engine, and turn Subaru Select Monitor switch to ON.
4) Warm-up the engine until engine coolant temperature is above 80°C (176°F).
5) Engine idling.
6) Read data of engine speed using Subaru Select Monitor.
● Display shows engine speed signal value sent from ECM.

CHECK : ***Is the revolution value the same as the tachometer reading shown on the combination meter?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8J6**.

8J6 : CHECK POOR CONTACT.

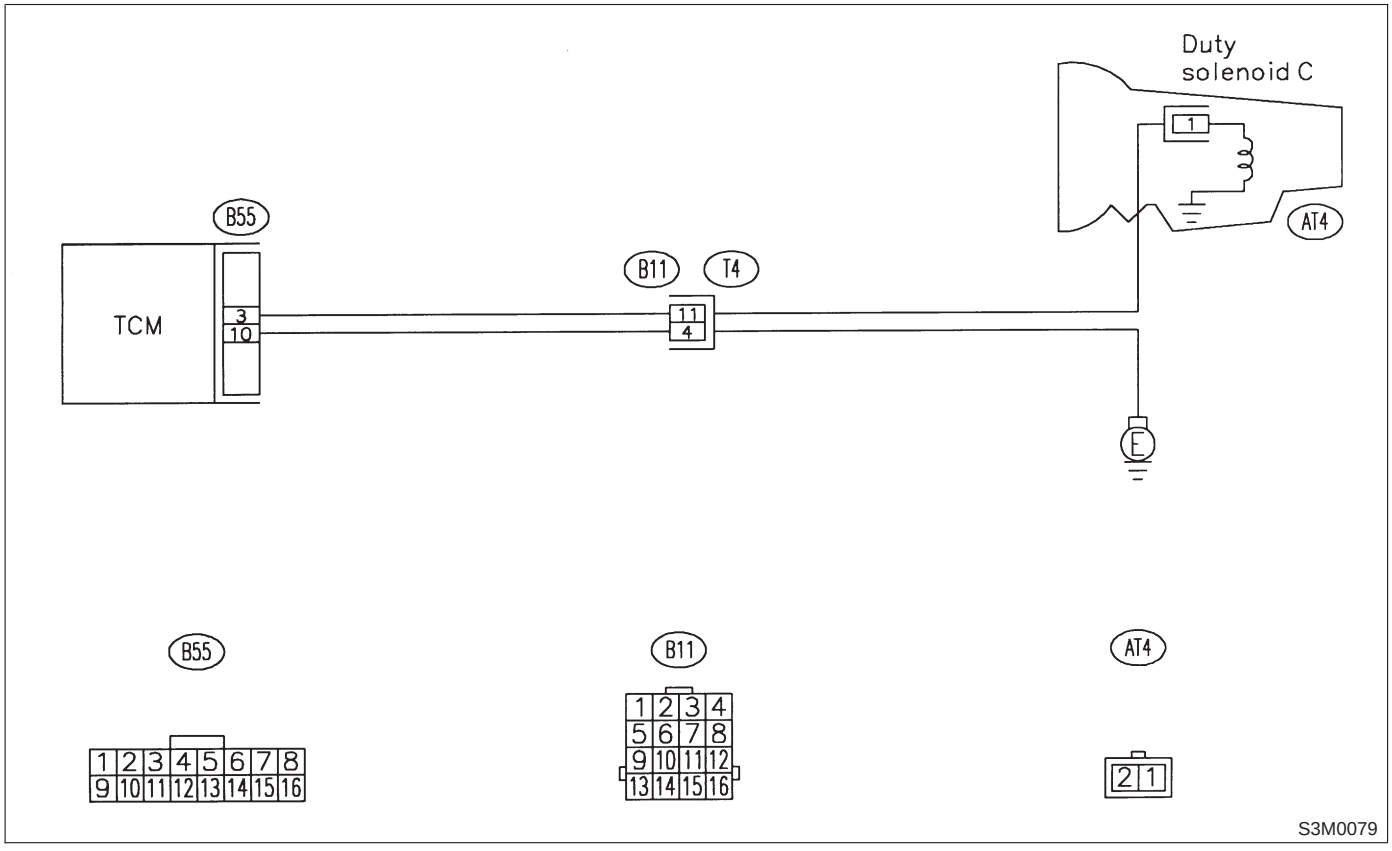
CHECK : ***Is there poor contact in engine speed signal circuit?***
YES : Repair poor contact.
NO : Go to step **8J7**.

8J7 : CONFIRM TROUBLE CODE 23.

CHECK : ***Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?***
YES : Replace TCM.
NO : Replace ECM.

K: TROUBLE CODE 24 — DUTY SOLENOID C —

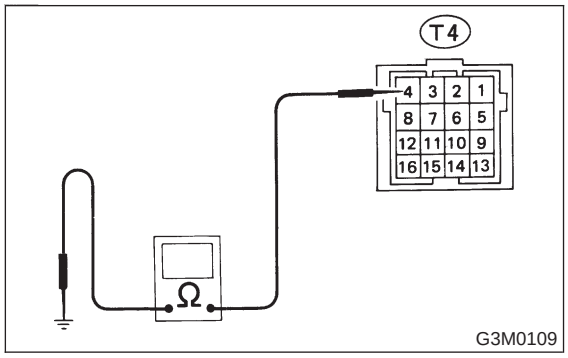
DIAGNOSIS:
Output signal circuit of duty solenoid C is open or shorted.
TROUBLE SYMPTOM:
Excessive “braking” in tight corners.
WIRING DIAGRAM:



8K1 : CHECK DUTY SOLENOID C GROUND LINE.

1) Turn ignition switch to OFF.
2) Remove air intake chamber.
3) Disconnect connector from transmission.
4) Measure resistance between transmission connector and transmission ground.

Connector & terminal
(T4) No. 4 — Chassis ground:

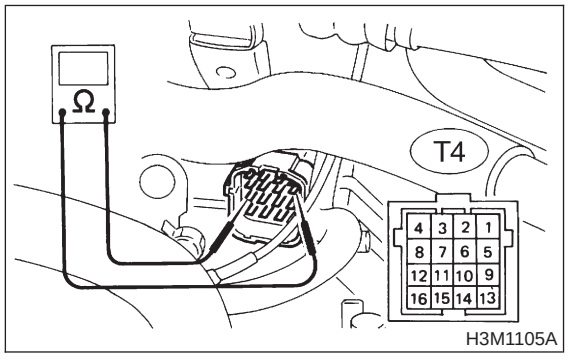


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8K2**.
NO : Repair open circuit in transmission harness.

8K2 : CHECK DUTY SOLENOID C.

Measure resistance between transmission connector and transmission terminals.

Connector & terminal
(T4) No. 11 — No. 4:

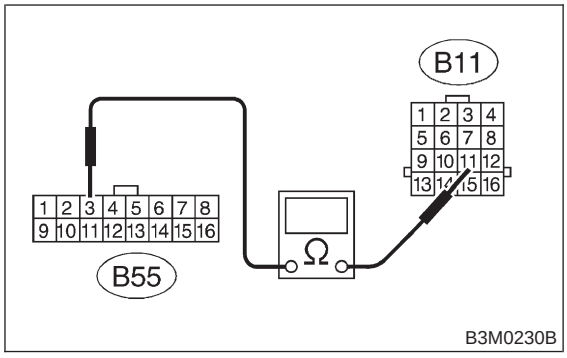


CHECK : ***Is the resistance between 9 and 17 Ω?***
YES : Go to step **8K3**.
NO : Go to step **8K13**.

8K3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 3 — (B11) No. 11:

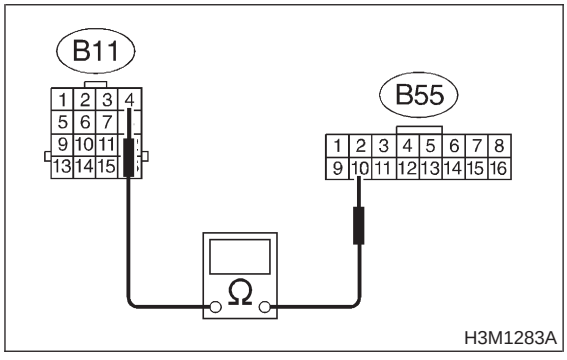


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8K4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8K4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and transmission connector.

Connector & terminal
(B55) No. 10 — (B11) No. 4:

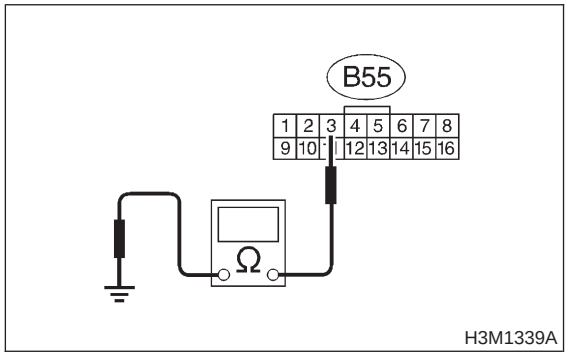


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8K5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8K5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and chassis ground.

Connector & terminal
(B55) No. 3 — Chassis ground:

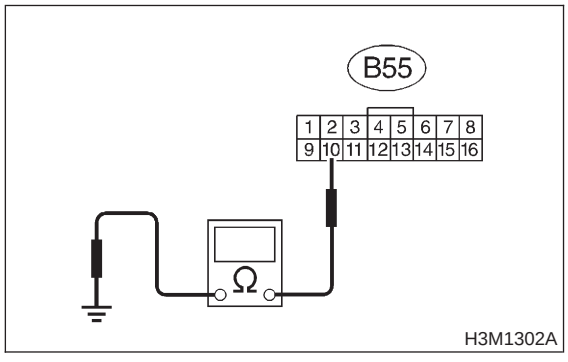


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8K6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8K6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and chassis ground.

Connector & terminal
(B55) No. 10 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8K7**.
NO : Repair short circuit in harness between TCM and transmission connector.

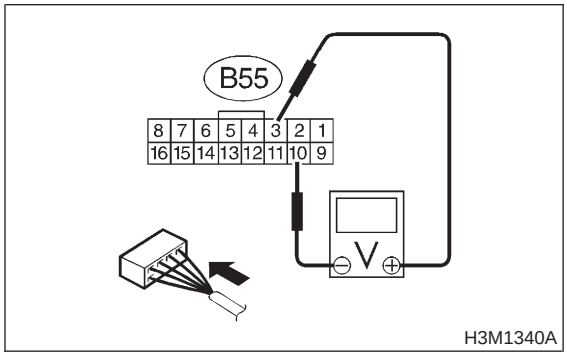
8K7 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8K10**.
NO : Go to step **8K8**.

8K8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Turn ignition switch to ON (engine OFF).
4) Throttle is fully closed.
5) Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 3 (+) — No. 10 (−):

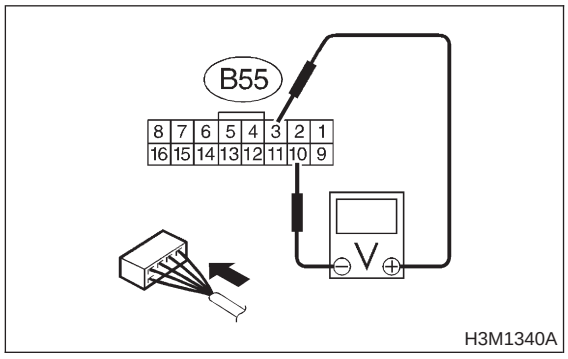


CHECK : ***Is the voltage less than 1 V in "P" range?***
YES : Go to step **8K9**.
NO : Go to step **8K12**.

8K9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 3 (+) — No. 10 (−):



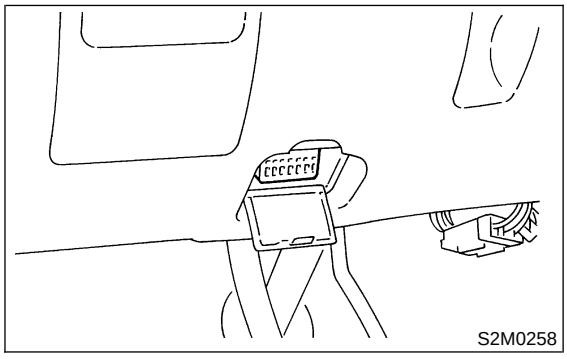
CHECK : ***Is the voltage between 5 and 7 V in "D" range?***

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the duty solenoid C and TCM connector.

NO : Go to step **8K12**.

8K10 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Connect Subaru Select Monitor to data link connector.



4) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.
5) Move selector lever to "D" with throttle fully open (vehicle speed 0 km/h or 0 m/h).
6) Read data of duty solenoid C using Subaru Select Monitor.
- Duty solenoid C is indicated in "%".

CHECK : ***Is the value between 5 and 10%?***
YES : Go to step **8K11**.
NO : Go to step **8K12**.

8K11 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

1) Set FWD mode.
2) Throttle fully closed.

CHECK : ***Is the value 95%?***

YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the duty solenoid C and TCM connector.

NO : Go to step **8K12**.

8K12 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in duty solenoid C circuit?***

YES : Repair poor contact.

NO : Replace TCM.

8K13 : CHECK DUTY SOLENOID C (IN TRANSMISSION).

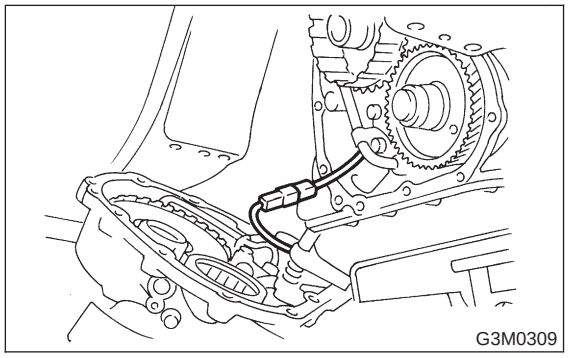
1) Lift-up the vehicle and place safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

2) Drain automatic transmission fluid.

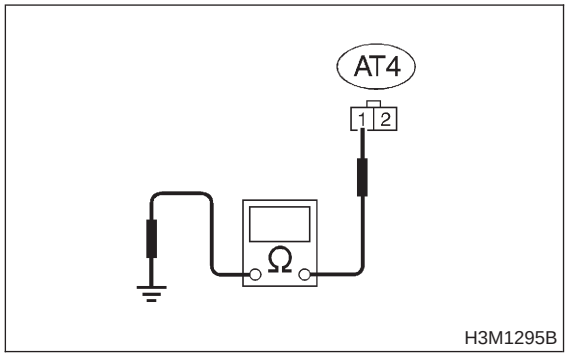
CAUTION:
Do not drain the automatic transmission fluid until it cools down.

3) Remove extension case, and disconnect connector from duty solenoid C.
<Ref. to 3-2 [W6A0].>



4) Measure resistance between duty solenoid C connector and transmission ground.

Connector & terminal
(AT4) No. 1 — Transmission ground:

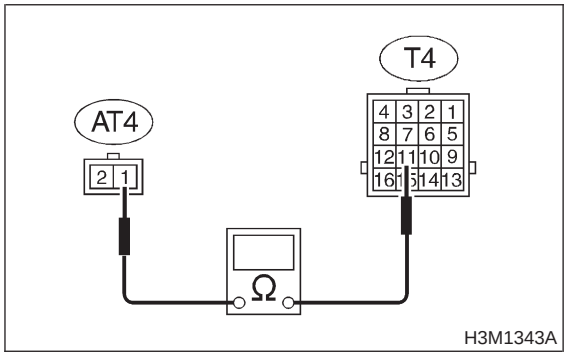


CHECK : ***Is the resistance between 9 and 17 Ω?***
YES : Go to step **8K14**.
NO : Replace duty solenoid C.

8K14 : CHECK HARNESS CONNECTOR BETWEEN DUTY SOLENOID C AND TRANSMISSION.

Measure resistance of harness between duty solenoid C and transmission connector.

Connector & terminal
(T4) No. 11 — (AT4) No. 1:

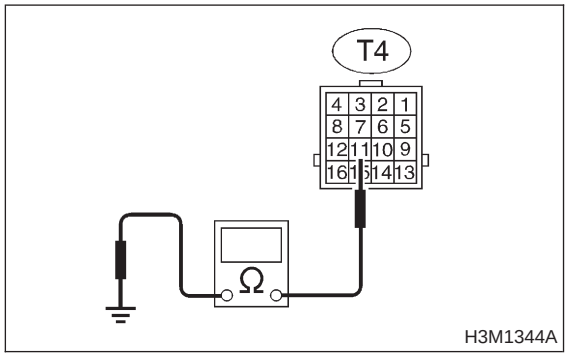


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8K15**.
NO : Repair open circuit in harness between duty solenoid C and transmission connector.

8K15 : CHECK HARNESS CONNECTOR BETWEEN DUTY SOLENOID C AND TRANSMISSION.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 11 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the duty solenoid C and transmission connector.

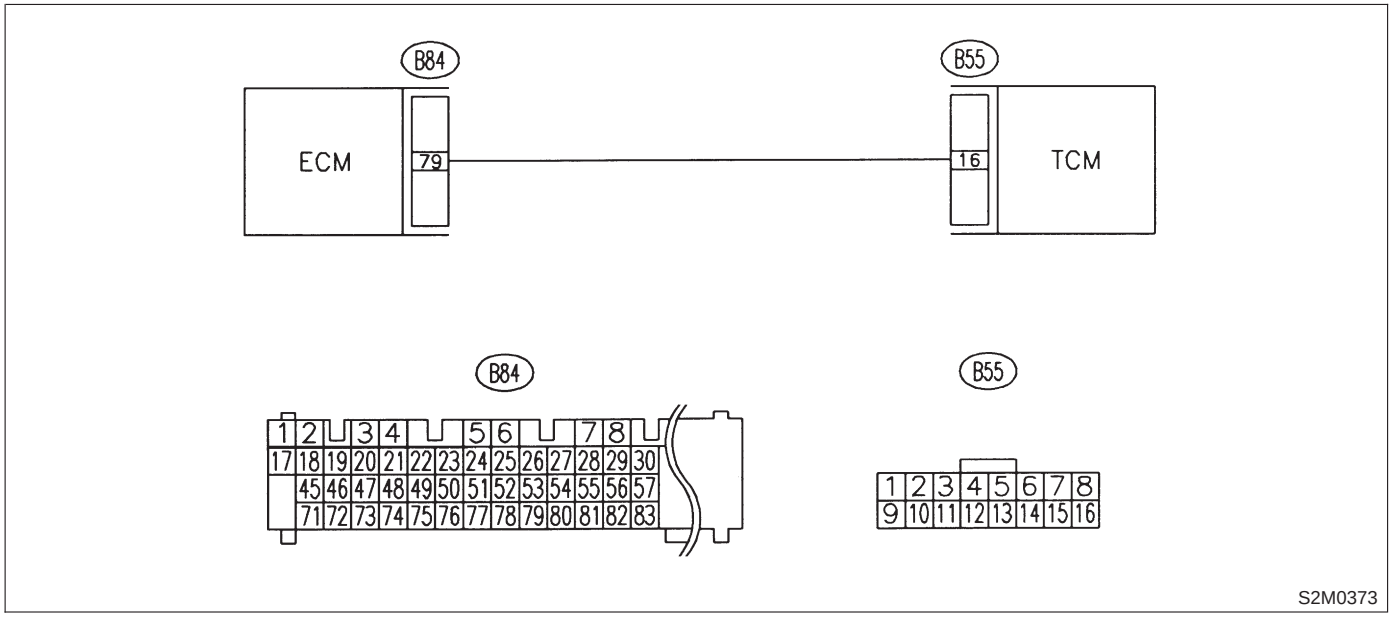
NO : Repair short circuit in harness between duty solenoid C and transmission connector.

L: TROUBLE CODE 25 — TORQUE CONTROL SIGNAL —

DIAGNOSIS:
- Torque control signal is not emitted from TCM.
- The signal circuit is open or shorted.

TROUBLE SYMPTOM:
Excessive shift shock.

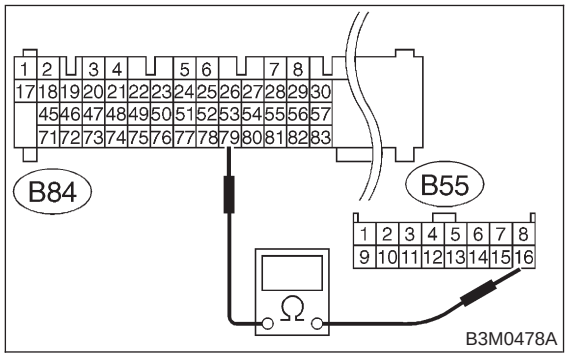
WIRING DIAGRAM:



8L1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and ECM.
3) Measure resistance of harness between TCM and ECM connector.

Connector & terminal
(B55) No. 16 — (B84) No. 79:

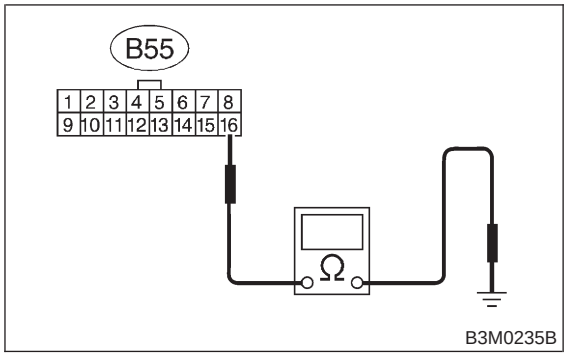


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8L2**.
NO : Repair open circuit in harness between TCM and ECM connector.

8L2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B55) No. 16 — Chassis ground:

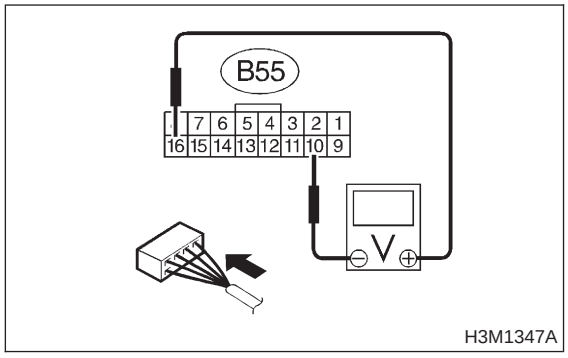


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8L3**.
NO : Repair short circuit in harness between TCM and ECM connector.

8L3 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Connect connectors to TCM and ECM.
2) Turn ignition switch to ON (engine OFF).
3) Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 16 (+) — No. 10 (−):



CHECK : ***Is the voltage between 4 and 6 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8L4**.

8L4 : CHECK POOR CONTACT.

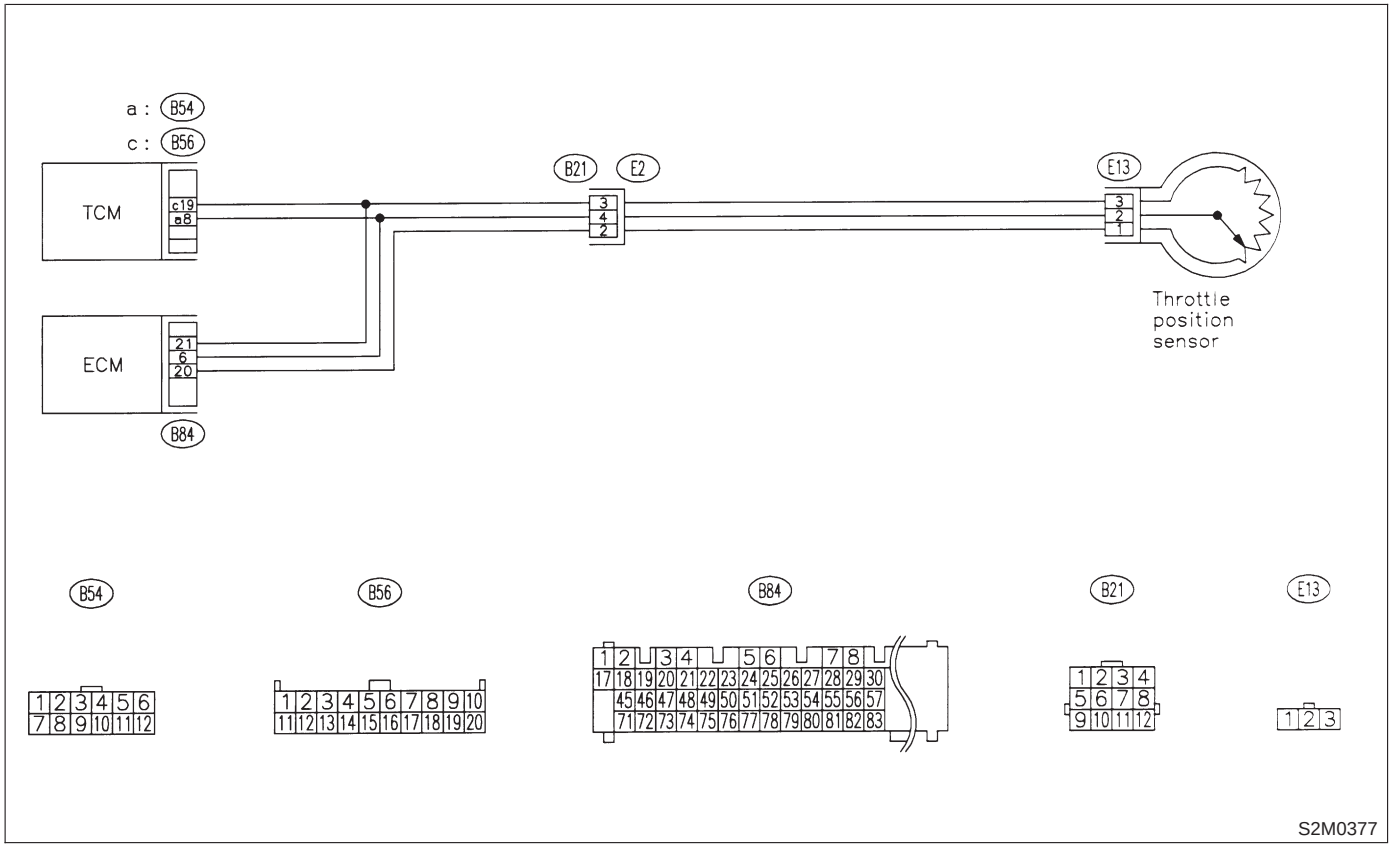
CHECK : ***Is there poor contact in torque control signal circuit?***
YES : Repair poor contact.
NO : Go to step **8L5**.

8L5 : CONFIRM TROUBLE CODE 25.

CHECK : ***Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?***
YES : Replace TCM.
NO : Replace ECM.

M: TROUBLE CODE 31 — THROTTLE POSITION SENSOR —

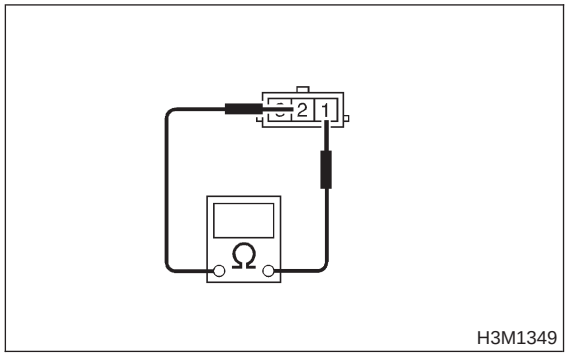
DIAGNOSIS:
Input signal circuit of throttle position sensor is open or shorted.
TROUBLE SYMPTOM:
Shift point too high or too low; engine brake not effected in “3” range: excessive shift shock; excessive tight corner “braking”.
WIRING DIAGRAM:



8M1 : CHECK THROTTLE POSITION SENSOR.

1) Turn ignition switch to OFF.
2) Remove air intake chamber.
3) Disconnect connector from throttle position sensor.
4) Measure resistance between throttle position sensor connector receptacle's terminals.

Terminals
No. 1 — No. 2:

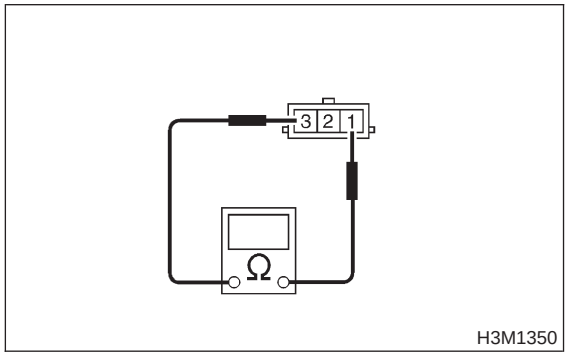


CHECK : ***Is the resistance between 0.3 and 0.7 kΩ?***
YES : Go to step **8M2**.
NO : Replace throttle position sensor.

8M2 : CHECK THROTTLE POSITION SENSOR.

Measure resistance between throttle position sensor connector receptacle's terminals.

Terminals
No. 1 — No. 3:

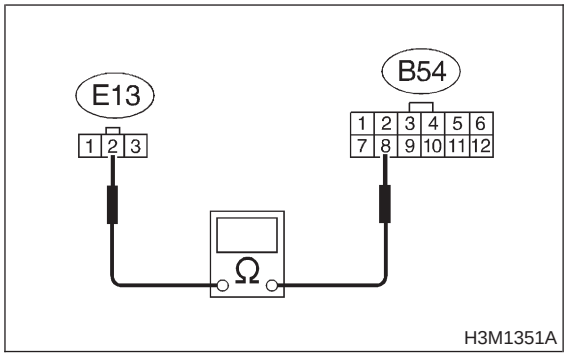


CHECK : ***Is the resistance between 3.5 and 6.5 kΩ?***
YES : Go to step **8M3**.
NO : Replace throttle position sensor.

8M3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and throttle position sensor connector.

Connector & terminal
(B54) No. 8 — (E13) No. 2:

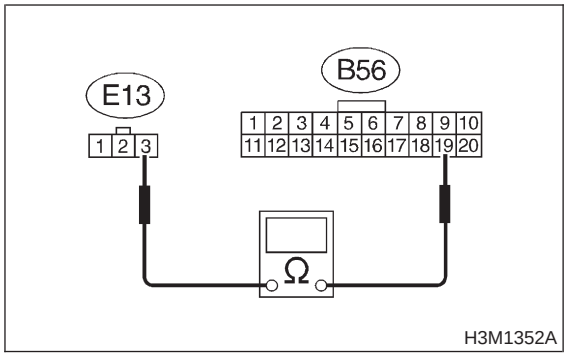


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8M4**.
NO : Repair open circuit in harness between TCM and throttle position sensor connector.

8M4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM and throttle position sensor connector.

Connector & terminal
(B56) No. 19 — (E13) No. 3:

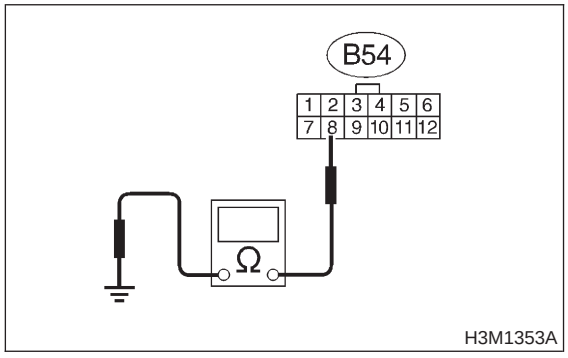


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8M5**.
NO : Repair open circuit in harness between TCM and throttle position sensor connector.

8M5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B54) No. 8 — Chassis ground:

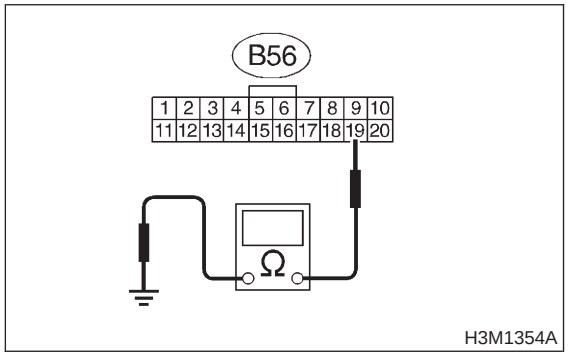


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8M6**.
NO : Repair short circuit in harness between TCM and throttle position sensor connector.

8M6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B56) No. 19 — Chassis ground:

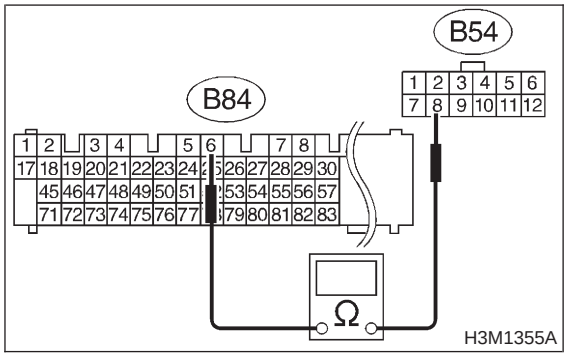


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8M7**.
NO : Repair short circuit in harness between TCM and throttle position sensor connector.

8M7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

1) Disconnect connector from ECM.
2) Measure resistance of harness between TCM and ECM connector.

Connector & terminal
(B54) No. 8 — (B84) No. 6:

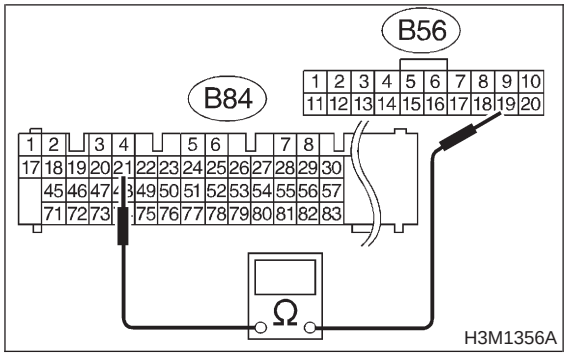


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8M8**.
NO : Repair open circuit in harness between TCM and ECM connector.

8M8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM and ECM connector.

Connector & terminal
(B56) No. 19 — (B84) No. 21:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8M9**.
NO : Repair open circuit in harness between TCM and ECM connector.

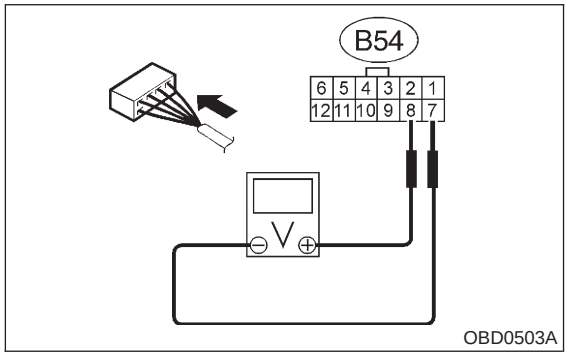
8M9 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8M12**.
NO : Go to step **8M10**.

8M10 : CHECK INPUT SIGNAL FOR TCM.

1) Connect connectors to TCM, throttle position sensor and ECM.
2) Install air intake chamber.
3) Turn ignition switch to ON (engine OFF).
4) Measure voltage between TCM connector terminals.

Connector & terminal
(B54) No. 8 (+) — No. 7 (−):

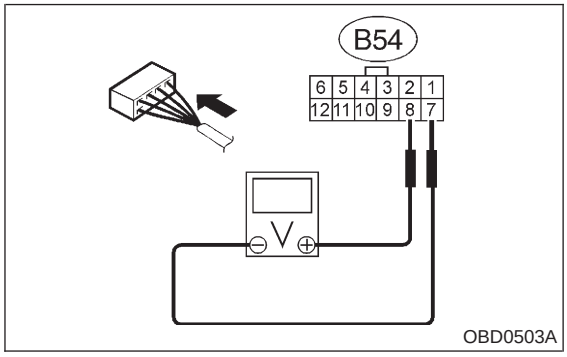


CHECK : ***Is the voltage between 0.3 and 0.7 V in throttle fully closed?***
YES : Go to step **8M11**.
NO : Go to step **8M16**.

8M11 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM connector terminals.

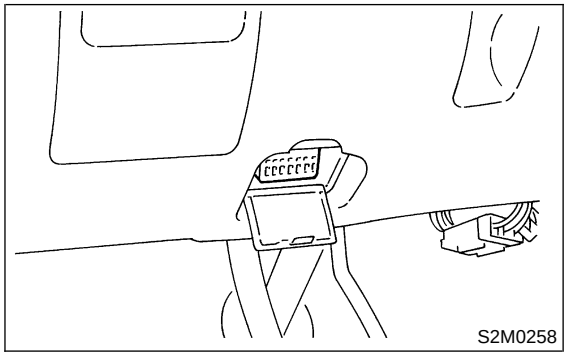
Connector & terminal
(B54) No. 8 (+) — No. 7 (−):



CHECK : ***Is the voltage between 4.3 and 4.9 V with throttle fully open?***
YES : Go to step **8M14**.
NO : Go to step **8M16**.

8M12 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

1) Connect connectors to TCM, throttle position sensor and ECM.
2) Install air intake chamber.
3) Connect Subaru Select Monitor to data link connector.



4) Turn ignition switch to ON (engine OFF).
5) Turn Subaru Select Monitor switch to ON.
6) Throttle fully closed.
7) Read data of throttle position sensor using Subaru Select Monitor.
● Throttle position sensor input signal is indicated.

CHECK : ***Is the value voltage between 0.3 and 0.7 V?***
YES : Go to step **8M13**.
NO : Go to step **8M16**.

8M13 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

Throttle fully open.

NOTE:
Must be changed correspondingly with accelerator pedal operation (from “released” to “depressed” position).

CHECK : ***Is the value voltage between 4.3 and 4.9 V ?***

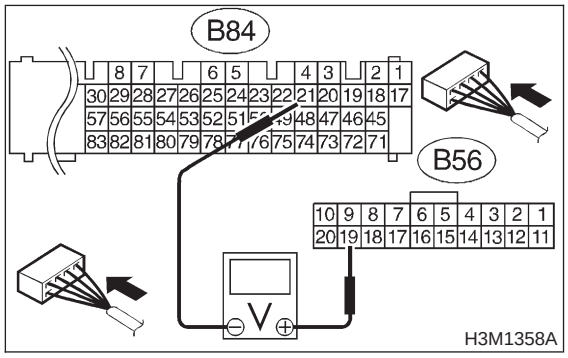
YES : Go to step **8M14**.

NO : Go to step **8M16**.

8M14 : CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY).

Measure voltage between TCM connector terminals.

Connector & terminal
(B56) No. 19 (+) — (B84) No. 21 (−):



CHECK : ***Is the voltage between 5.02 and 5.22 V?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.

NO : Go to step **8M16**.

8M15 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY).

Read data of throttle position sensor power supply using Subaru Select Monitor.
● Throttle position sensor power supply voltage is indicated.

CHECK : ***Is the value voltage between 5.02 and 5.22 V?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.

NO : Go to step **8M16**.

8M16 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in throttle position sensor circuit?***

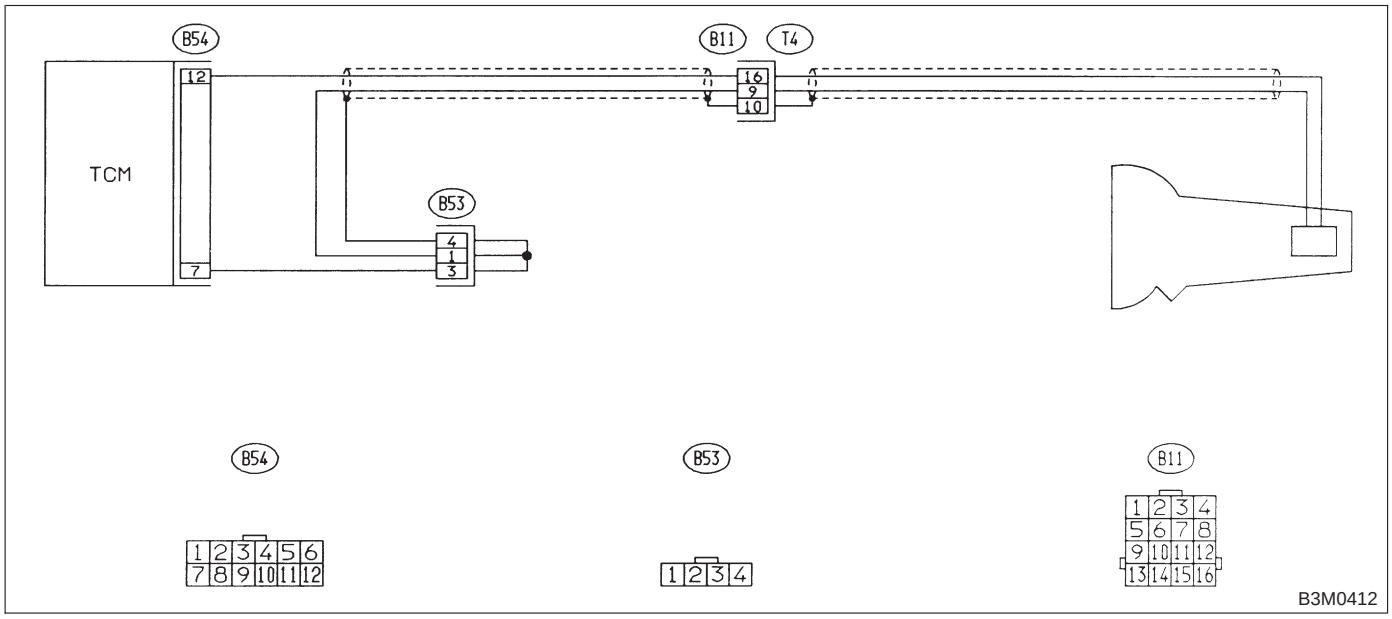
YES : Repair poor contact.

NO : Replace TCM.

MEMO:

N: TROUBLE CODE 32 — VEHICLE SPEED SENSOR 1 —

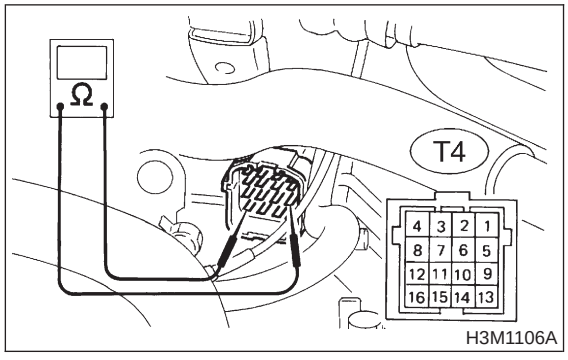
DIAGNOSIS:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
No lock-up or excessive tight corner “braking”.
WIRING DIAGRAM:



8N1 : CHECK VEHICLE SPEED SENSOR 1.

1) Turn ignition switch to OFF.
2) Remove air intake chamber.
3) Disconnect connector from transmission.
4) Measure resistance between transmission connector receptacle’s terminals.

Connector & terminal
(T4) No. 16 — No. 9:

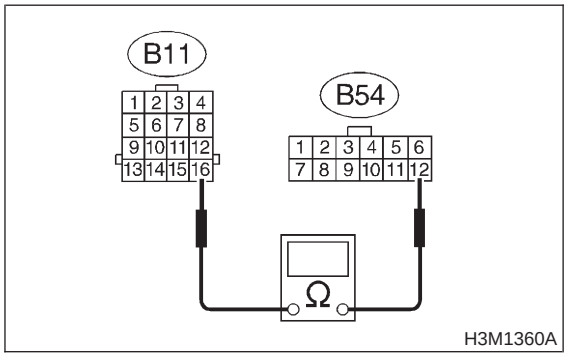


CHECK : ***Is the resistance between 450 and 720 Ω?***
YES : Go to step **8N2**.
NO : Replace vehicle speed sensor 1.

8N2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B54) No. 12 — (B11) No. 16:

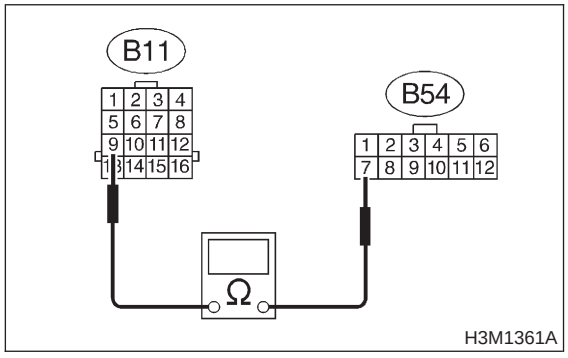


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8N3**.
NO : Repair open circuit in harness between TCM and transmission connector.

8N3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B54) No. 7 — (B11) No. 9:

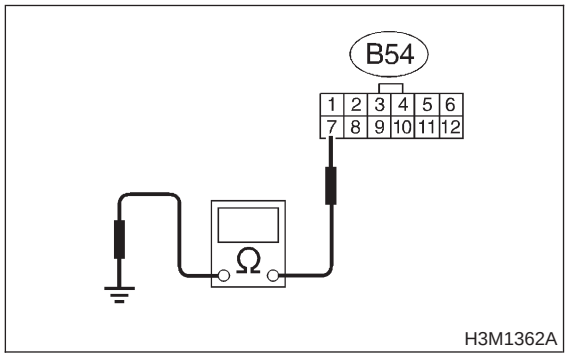


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8N4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8N4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B54) No. 7 — Chassis ground:

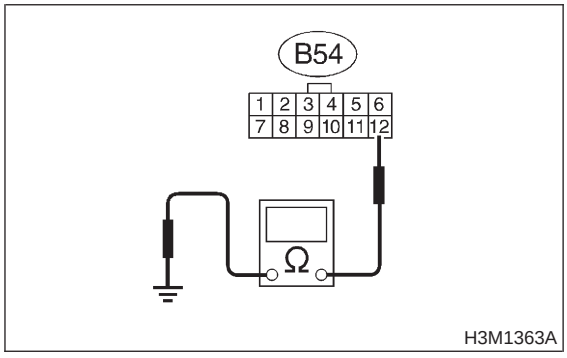


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8N5**.
NO : Repair short circuit in harness between TCM and transmission connector.

8N5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B54) No. 12 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8N6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8N6 : PREPARE OSCILLOSCOPE.

CHECK : ***Do you have oscilloscope?***
YES : Go to step **8N10**.
NO : Go to step **8N7**.

8N7 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8N9**.
NO : Go to step **8N8**.

8N8 : CHECK INPUT SIGNAL FOR TCM.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Lift-up or raise the vehicle and place safety stands.

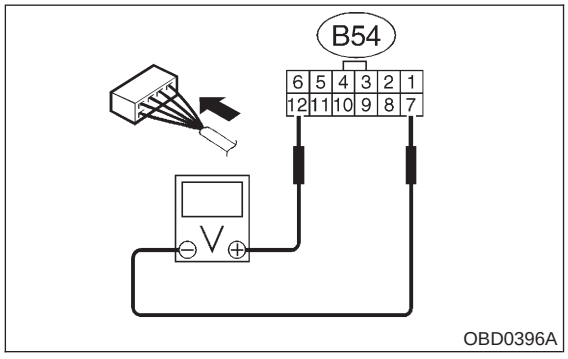
CAUTION:
On AWD models, raise all wheels off floor.

4) Start the engine and set vehicle in 20 km/h (12 m/h) condition.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

5) Measure voltage between TCM connector terminals.

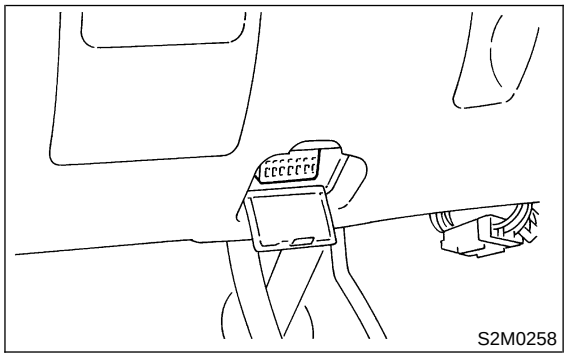
Connector & terminal
(B54) No. 12 (+) — No. 7 (−):



CHECK : ***Is the voltage more than AC 1 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.
NO : Go to step **8N11**.

8N9 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Connect Subaru Select Monitor to data link connector.



4) Lift-up or raise the vehicle and place safety stands.

CAUTION:
On AWD models, raise all wheels off floor.

5) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.
6) Start the engine.
7) Read data of vehicle speed using Subaru Select Monitor.
● Compare speedometer with Subaru Select Monitor indications.
● Vehicle speed is indicated in “km/h” or “MPH”.
8) Slowly increase vehicle speed to 60 km/h or 37 MPH.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

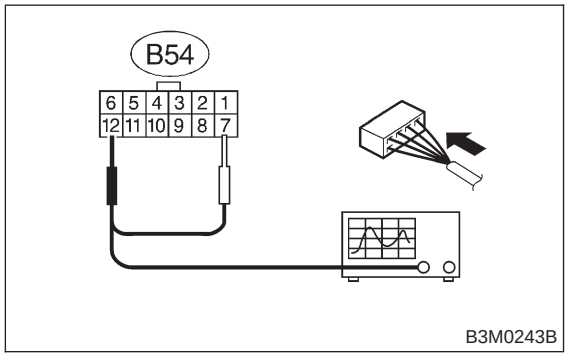
CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.
NO : Go to step **8N11**.

8N10 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

1) Connect connectors to TCM and transmission.
2) Install air intake chamber.
3) Lift-up or raise the vehicle and place safety stands.

CAUTION:
On AWD models, raise all wheels off floor.

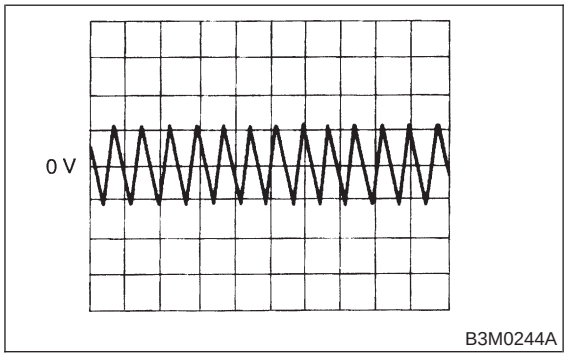
4) Set oscilloscope to TCM connector terminals.
Position prove; (B54) No. 12
Earth lead; (B54) No. 7



5) Start the engine and set vehicle in 20 km/h (12 m/h) condition.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

6) Measure signal voltage indicated on oscilloscope.



CHECK : ***Is the signal voltage more than AC 1 V?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

NO : Go to step **8N11**.

8N11 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in vehicle speed sensor 1 circuit?***

YES : Repair poor contact.

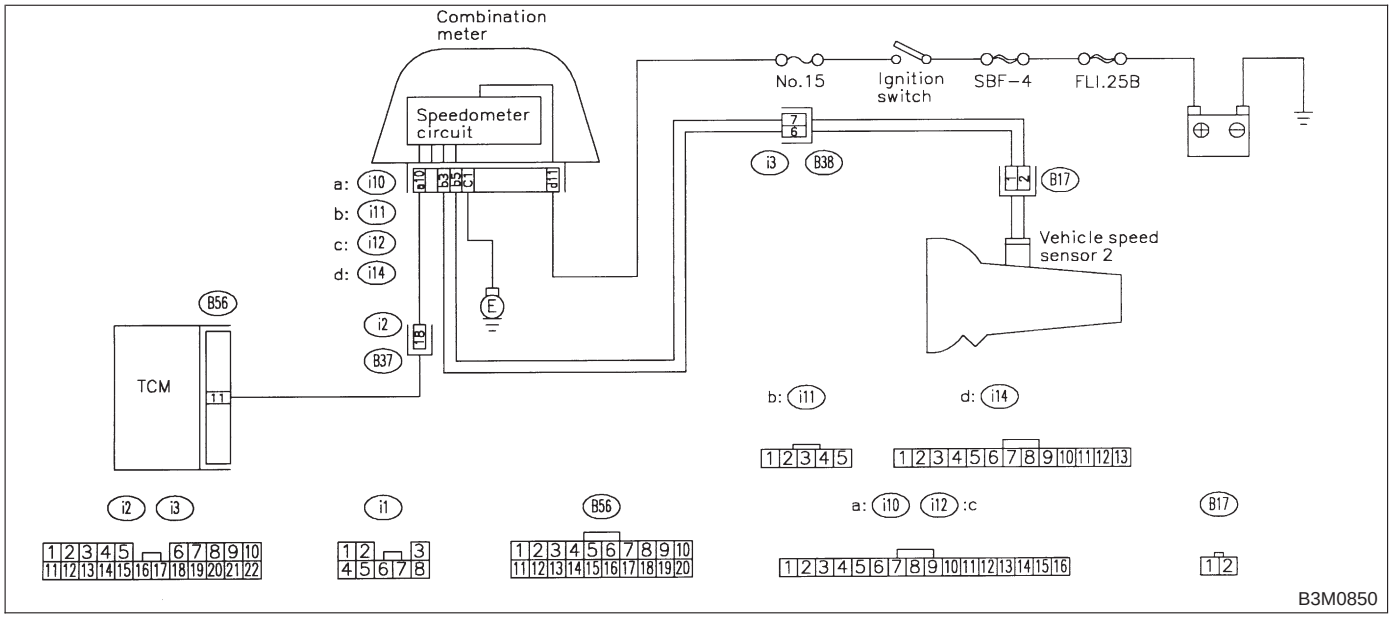
NO : Replace TCM.

O: TROUBLE CODE 33 — VEHICLE SPEED SENSOR 2 —

DIAGNOSIS:
- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and vehicle speed sensor is in short or open.

TROUBLE SYMPTOM:
- Erroneous idling.
- Engine stalls.
- Poor driving performance.

WIRING DIAGRAM:

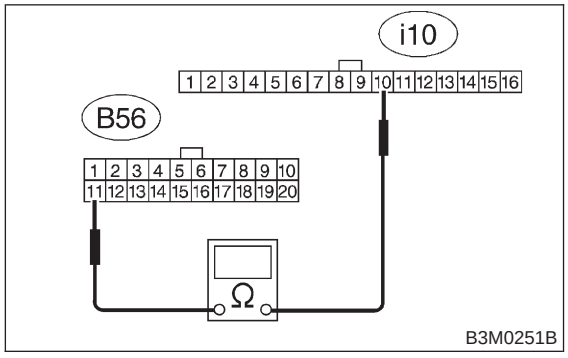


8O1 : CHECK OPERATION OF SPEEDOMETER.	
CHECK	: ***Does speedometer operate normally?***
YES	: Go to step **8O2**.
NO	: Check speedometer. <Ref. to 6-2b [T300].>

8O2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Disconnect connectors from TCM and combination meter.
4) Measure resistance of harness between TCM and combination meter connector.

Connector & terminal
(B56) No. 11 — (i10) No. 10:

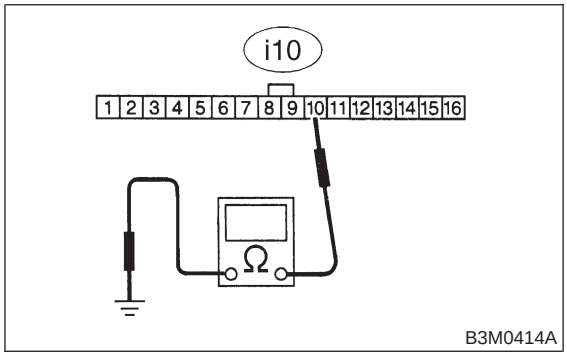


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8O3**.
NO : Repair open circuit in harness between TCM and combination meter connector, and poor contact in coupling connector.

8O3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

Measure resistance of harness between combination meter and chassis ground.

Connector & terminal
(i10) No. 10 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8O4**.
NO : Repair short circuit in harness between TCM and combination meter connector.

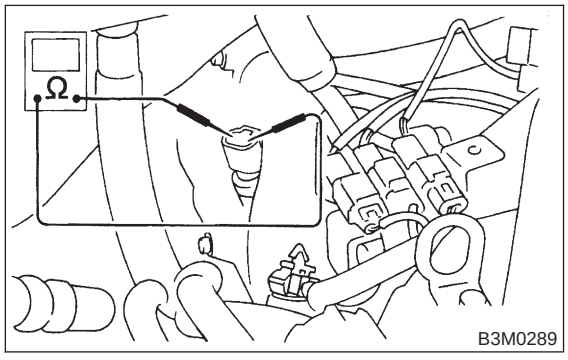
8O4 : CHECK VEHICLE SPEED SENSOR 2.

1) Install combination meter.
2) Connect connector to TCM.
3) Lift-up the vehicle and place safety stand.

CAUTION:
On AWD models, raise all wheels off floor.

4) Disconnect connector from vehicle speed sensor 2.
5) Measure resistance between terminals of vehicle speed sensor 2.

Terminals
No. 1 — No. 2:

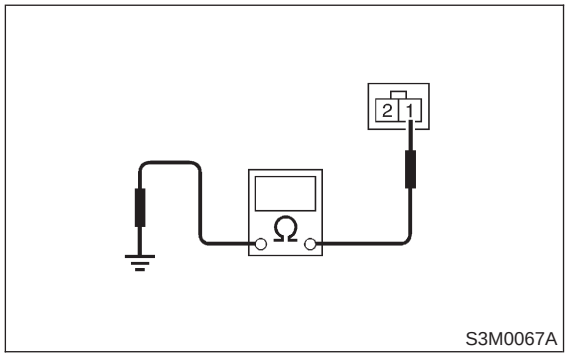


CHECK : ***Is the resistance between 350 and 450 Ω?***
YES : Go to step **8O5**.
NO : Replace vehicle speed sensor 2.

8O5 : CHECK VEHICLE SPEED SENSOR 2.

Measure resistance between terminals of vehicle speed sensor 2.

Terminals
No. 1 — Transmission ground:

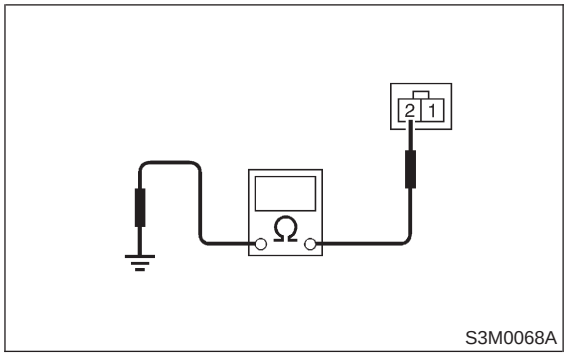


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8O6**.
NO : Replace vehicle speed sensor 2.

8O6 : CHECK VEHICLE SPEED SENSOR 2.

Measure resistance between terminals of vehicle speed sensor 2.

Terminals
No. 2 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8O7**.
NO : Replace vehicle speed sensor 2.

8O7 : PREPARE OSCILLOSCOPE.

CHECK : ***Do you have oscilloscope?***
YES : Go to step **8O9**.
NO : Go to step **8O8**.

8O8 : CHECK VEHICLE SPEED SENSOR 2.

1) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

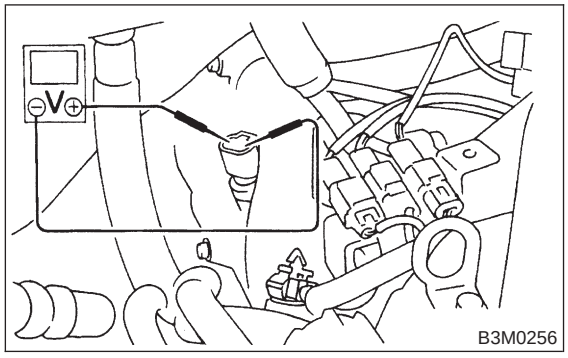
NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to 4-4 [T6D2].>

2) Measure output signal of vehicle speed sensor 2.

WARNING:
Be careful not to be caught up by the running wheels.

3) Measure voltage between terminals of vehicle speed sensor 2.

Terminals
No. 1 — No. 2:



CHECK : ***Is the voltage more than AC 2 V?***
YES : Go to step **8O10**.
NO : Replace vehicle speed sensor 2.

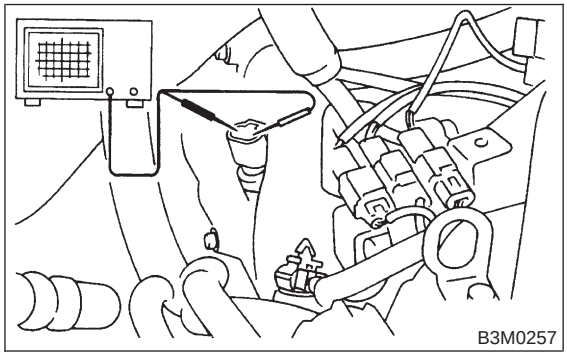
8O9 : CHECK VEHICLE SPEED SENSOR 2 USING OSCILLOSCOPE.

1) Install combination meter.
2) Connect connector to TCM.
3) Lift-up the vehicle and place safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

4) Set oscilloscope to vehicle speed sensor 2.

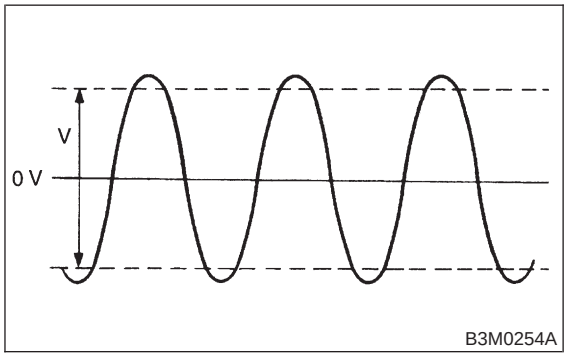
Terminals
No. 1 — No. 2:



5) Start the engine, and drive the wheels slowly.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to 4-4 [T6D2].>

6) Measure signal voltage indicated on oscilloscope.



CHECK : ***Is the voltage more than AC 2 V?***
YES : Go to step **8O13**.
NO : Replace vehicle speed sensor 2.

8O10 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8O12**.
NO : Go to step **8O11**.

8O11 : CHECK INPUT SIGNAL FOR TCM.

1) Connect connectors to TCM and combination meter.
2) Install combination meter.
3) Lift-up the vehicle and place safety stand.

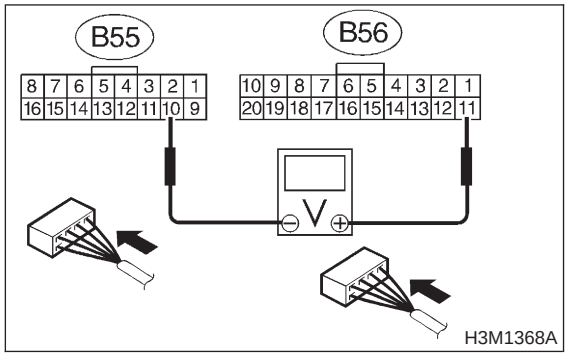
CAUTION:
On AWD models, raise all wheels off ground.

4) Start the engine, and set vehicle in 10 km/h (6 m/h).

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

5) Measure voltage between TCM connector terminals.

Connector & terminal
(B56) No. 11 (+) — (B55) No. 10 (−):



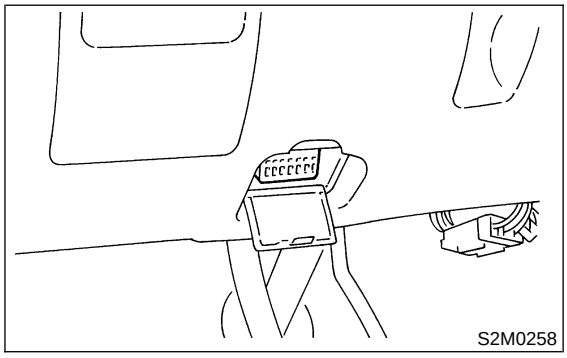
CHECK : ***Is the voltage less than 1 V ⇔ more than 9 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.
NO : Go to step **8O14**.

8O12 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

1) Connect connectors to TCM and combination meter.
2) Install combination meter.
3) Lift-up the vehicle and place safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

4) Connect Subaru Select Monitor to data link connector.



5) Turn ignition switch to ON and Subaru Select Monitor switch to ON.
6) Start the engine, and drive all wheels.
7) Read data of vehicle speed using Subaru Select Monitor.
● Compare speedometer with Subaru Select Monitor indications.
● Vehicle speed is indicated in “km/h” or “MPH”.
8) Slowly increase vehicle speed to 60 km/h or 37 MPH.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

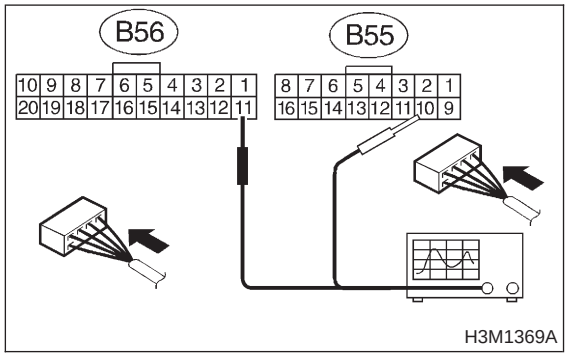
CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.
NO : Go to step **8O14**.

8O13 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

1) Connect connectors to TCM and combination meter.
2) Install combination meter.
3) Lift-up or raise the vehicle and place safety stands.

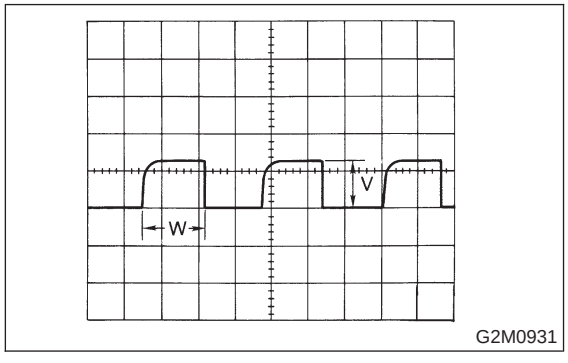
CAUTION:
On AWD models, raise all wheels off floor.

4) Set oscilloscope to TCM connector terminals.
Positive prove; (B56) No. 11
Earth lead; (B55) No. 10



5) Start the engine.
6) Shift on the gear position, and keep the vehicle speed at constant.
7) Measure signal voltage indicated on oscilloscope.

NOTE:
● If vehicle speed increases, the width of amplitude (W) decreases.
● The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>



CHECK : ***Is the voltage more than AC 2 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.
NO : Go to step **8O14**.

8O14 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in vehicle speed sensor 2 circuit?***
YES : Repair poor contact.
NO : Replace TCM.

9. Diagnostic Chart with Select Monitor

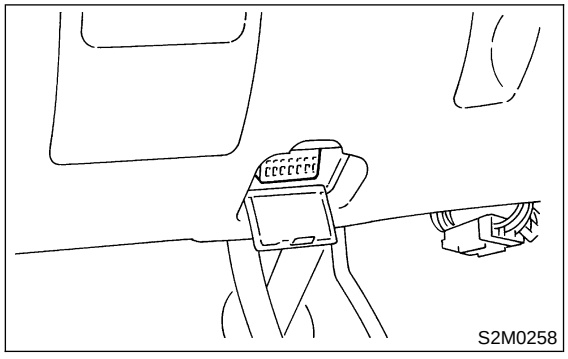
A: BASIC DIAGNOSTIC CHART

If no trouble codes appear in the on-board diagnostics operation (although problems have occurred or are occurring), measure performance characteristics of sensors, actuators, etc., in the Subaru Select Monitor and compare with the "basic data" to determine the cause of problems.
1) Trouble occurs.
2) No trouble codes appear in on-board diagnostics operation.
3) Measure each item using Subaru Select Monitor.
4) Compare measured values with basic data.
5) Determine item which is outside basic data specifications.
6) Check sensor and actuator affected.

B: BATTERY VOLTAGE

9B1 : CHECK BATTERY VOLTAGE.

1) Turn ignition switch to OFF.
2) Connect Subaru Select Monitor to data link connector.



3) Start the engine, and engine idling after warm-up.
4) Turn Subaru Select Monitor switch to ON.
5) Read data of battery voltage using Subaru Select Monitor.
● Battery voltage applied to TCM.

CHECK : ***Is voltage between 10 and 16 V?***
YES : Go to step VEHICLE SPEED SENSOR 1. <Ref. to 3-2 [T9C0].>
NO : Check battery voltage and specification of electrolyte, regulating voltage under no loads and generator (as a single unit).

C: CHECK VEHICLE SPEED SENSOR 1.

9C1 : CHECK VEHICLE SPEED SENSOR 1.

1) Lift-up the vehicle and place safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

2) Read data of vehicle speed #1 using Subaru Select Monitor.
● Compare speedometer with Subaru Select Monitor indications.
● Vehicle speed is indicated in "MPH" or "km/h".

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***
YES : Go to step VEHICLE SPEED SENSOR 2. <Ref. to 3-2 [T9D0].>
NO : Check vehicle speed sensor 1 circuit. <Ref. to 3-2 [T8N0].>

D: CHECK VEHICLE SPEED SENSOR 2.

9D1 : CHECK VEHICLE SPEED SENSOR 2.

Read data of vehicle speed #2 using Subaru Select Monitor.
● Compare speedometer with Subaru Select Monitor indications.
● Vehicle speed is indicated in "MPH" or "km/h".

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***
YES : Go to step ENGINE SPEED SIGNAL. <Ref. to 3-2 [T9E0].>
NO : Check vehicle speed sensor 2 circuit. <Ref. to 3-2 [T8O0].>

E: CHECK ENGINE SPEED SIGNAL.

9E1 : CHECK ENGINE SPEED SIGNAL.

1) Turn A/C switch to OFF (with A/C models).
2) Warm-up the engine until engine coolant temperature is above 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

3) Read data of engine speed using Subaru Select Monitor.
- Engine speed is indicated in “rpm”.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Does the tachometer revolution increase as the Subaru Select Monitor revolution data increases?***
YES : Go to step ATF TEMPERATURE SENSOR. <Ref. to 3-2 [T9F0].>
NO : Check engine speed signal circuit. <Ref. to 3-2 [T8J0].>

F: CHECK ATF TEMPERATURE SENSOR.

9F1 : CHECK AT OIL TEMP WARNING LIGHT.

CHECK : ***Does the AT OIL TEMP warning light remain on 2 seconds after the engine has been started?***
YES : Go to step **9F2**.
NO : Check ATF temperature sensor and combination meter circuit. <Ref. to 3-2 [T8H0].>

9F2 : CHECK ATF TEMPERATURE SENSOR.

1) Read data of ATF temperature using Subaru Select Monitor.
- ATF temperature is indicated in “°F” or “°C”.

2) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

3) Turn ignition switch to ON (engine OFF).

CHECK : ***Does the ATF temperature change from 176°F (80°C)?***
YES : Go to step THROTTLE POSITION SENSOR. <Ref. to 3-2 [T9G0].>
NO : Check ATF temperature sensor circuit. <Ref. to 3-2 [T8H0].>

G: CHECK THROTTLE POSITION SENSOR.

9G1 : CHECK INPUT SIGNAL FOR TCM.

Read data of throttle position sensor using Subaru Select Monitor.
- Throttle position sensor input signal is indicated.

CHECK : ***Is voltage between 0.3 and 0.7 V when the accelerator pedal is completely released?***
YES : Go to step **9G2**.
NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8M0].>

9G2 : CHECK INPUT SIGNAL FOR TCM.

CHECK : ***Is voltage between 4.4 and 4.8 V when the accelerator pedal is completely depressed?***
YES : Go to step **9G3**.
NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8M0].>

9G3 : CHECK INPUT SIGNAL FOR TCM.

CHECK : ***Does voltage decrease smoothly when the accelerator pedal is fully depressed and then fully released?***

YES : Go to step GEAR POSITION. <Ref. to 3-2 [T9H0].>

NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8M0].>

H: CHECK GEAR POSITION.

9H1 : CHECK GEAR POSITION.

1) Lift-up the vehicle and place safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

2) Start the engine.
3) Move select lever to “D”, and drive vehicle.
4) Read data of gear position using Subaru Select Monitor.
- Gear position is indicated.

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Does the transmission gear correspond to the gear which is shown on display?***

YES : Go to step LINE PRESSURE DUTY. <Ref. to 3-2 [T9I0].>

NO : Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to 3-2 [T8F0].> and <Ref. to 3-2 [T8G0].>

I: CHECK LINE PRESSURE DUTY.

9I1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

2) Stop the engine and turn ignition switch to ON (engine OFF).
3) Move selector lever to “N”.
4) Read data of line pressure duty ratio using Subaru Select Monitor.
- Line pressure duty is indicated in “%”.

CHECK : ***Does the Subaru Select Monitor indicate 100% when the accelerator pedal is completely released?***

YES : Go to step **9I2**.

NO : Go to step **9I4**.

9I2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : ***Does the Subaru Select Monitor indicate between 10 and 20% when the accelerator pedal is completely depressed?***

YES : Go to step **9I3**.

NO : Go to step **9I4**.

9I3 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : ***Does the Subaru Select Monitor change smoothly when the accelerator pedal is fully depressed and then fully released?***

YES : Go to step LOCK-UP DUTY. <Ref. to 3-2 [T9J0].>

NO : Go to step **9I4**.

9I4 : CHECK THROTTLE POSITION SENSOR.

NOTE:
For the diagnostics procedure on throttle position sensor circuit, <Ref. to 3-2 [T9G0].>.

CHECK : ***Is there any trouble in throttle position sensor circuit?***
YES : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8M0].>.
NO : Go to step **9I5**.

9I5 : CHECK ENGINE SPEED SIGNAL.

NOTE:
For the diagnostics procedure on engine speed signal circuit, <Ref. to 3-2 [T9E0].>.

CHECK : ***Is there any trouble in engine speed signal circuit?***
YES : Repair or replace engine speed signal circuit, <Ref. to 3-2 [T8J0].>.
NO : Go to step **9I6**.

9I6 : CHECK ATF TEMPERATURE SENSOR.

NOTE:
For the diagnostics procedure on ATF temperature sensor circuit, <Ref. to 3-2 [T9F0].>.

CHECK : ***Is there any trouble in ATF temperature sensor circuit?***
YES : Repair or replace ATF temperature sensor circuit, <Ref. to 3-2 [T8H0].>.
NO : Go to step **9I7**.

9I7 : CHECK INHIBITOR SWITCH.

1) Turn ignition switch and Subaru Select Monitor to ON.
2) Read data of range switch using Subaru Select Monitor.
- Range switch is indicated in ON ⇔ OFF.

CHECK : ***When each range is selected, does LED of the range switch on Subaru Select Monitor light up?***
YES : Go to step LOCK-UP DUTY. <Ref. to 3-2 [T9J0].>
NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

J: CHECK LOCK-UP DUTY.

9J1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Read data of lock-up duty ratio using Subaru Select Monitor.
- Lock-up duty ratio is indicated in “%”.

CHECK : ***Does the Subaru Select Monitor indicate 5%?***
YES : Go to step **9J2**.
NO : Go to step **9J3**.

9J2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Move selector lever to “D” and slowly increase vehicle speed to 75 km/h (47 m/h).

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Does the Subaru Select Monitor indicate 95%?***
YES : Go to step TRANSFER DUTY RATIO. <Ref. to 3-2 [T9K0].>
NO : Go to step **9J3**.

9J3 : CHECK THROTTLE POSITION SENSOR.

NOTE:
For the diagnostics procedure on throttle position sensor circuit, <Ref. to 3-2 [T9G0].>.

CHECK : ***Is there any trouble in throttle position sensor circuit?***
YES : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8M0].>.
NO : Go to step **9J4**.

9J4 : CHECK VEHICLE SPEED SENSOR 1.

NOTE:
For the diagnostics procedure on vehicle speed sensor 1 circuit, <Ref. to 3-2 [T9C0].>.

CHECK : ***Is there any trouble in vehicle speed sensor 1 circuit?***
YES : Repair or replace vehicle speed sensor 1 circuit, <Ref. to 3-2 [T8N0].>.
NO : Go to step **9J5**.

9J5 : CHECK VEHICLE SPEED SENSOR 2.

NOTE:
For the diagnostics procedure on vehicle speed sensor 2 circuit, <Ref. to 3-2 [T9D0].>.

CHECK : ***Is there any trouble in vehicle speed sensor 2 circuit?***
YES : Repair or replace vehicle speed sensor 2 circuit, <Ref. to 3-2 [T8O0].>.
NO : Go to step **9J6**.

9J6 : CHECK ENGINE SPEED SIGNAL.

NOTE:
For the diagnostics procedure on engine speed signal circuit, <Ref. to 3-2 [T9E0].>.

CHECK : ***Is there any trouble in engine speed signal circuit?***
YES : Repair or replace engine speed signal circuit, <Ref. to 3-2 [T8J0].>.
NO : Go to step **9J7**.

9J7 : CHECK INHIBITOR SWITCH.

Read data of range switch using Subaru Select Monitor.
- Range switch is indicated in ON ⇔ OFF.

CHECK : ***When each range is selected, does LED of the range switch on Subaru Select Monitor light up?***
YES : Go to step TRANSFER DUTY. <Ref. to 3-2 [T9K0].>
NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

K: CHECK TRANSFER DUTY.

9K1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Turn ignition switch to ON (engine OFF).
2) Move selector lever to “D”.
3) Read data of transfer duty ratio using Subaru Select Monitor.
- Transfer duty ratio is indicated in “%”.

CHECK : ***Does the duty ratio change in response to the depress-release motion of the accelerator pedal?***
YES : Go to step **9K2**.
NO : Go to step **9K3**.

9K2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Turn ignition switch to OFF.
2) Set FWD mode.
3) Turn ignition switch to ON (engine OFF).

CHECK : ***Does the Subaru Select Monitor indicate 95%?***
YES : Go to step THROTTLE POSITION SENSOR POWER SUPPLY. <Ref. to 3-2 [T9L0].>
NO : Go to step **9K3**.

9K3 : CHECK THROTTLE POSITION SENSOR.

NOTE:
For the diagnostics procedure on throttle position sensor circuit, <Ref to 3-2 [T9G0].>.

CHECK : ***Is there any trouble in throttle position sensor circuit?***
YES : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8M0].>.
NO : Go to step **9K4**.

9K4 : CHECK VEHICLE SPEED SENSOR 1.

NOTE:
For the diagnostics procedure on vehicle speed sensor 1 circuit, <Ref. to 3-2 [T9C0].>.

CHECK : ***Is there any trouble in vehicle speed sensor 1 circuit?***
YES : Repair or replace vehicle speed sensor 1 circuit, <Ref to 3-2 [T8N0].>.
NO : Go to step **9K5**.

9K5 : CHECK VEHICLE SPEED SENSOR 2 CIRCUIT.

NOTE:
For the diagnostics procedure on vehicle speed sensor 2 circuit, <Ref. to 3-2 [T9D0].>.

CHECK : ***Is there any trouble in vehicle speed sensor 2 circuit?***
YES : Repair or replace vehicle speed sensor 2 circuit, <Ref. to 3-2 [T8O0].>.
NO : Go to step **9K6**.

9K6 : CHECK ATF TEMPERATURE SENSOR.

NOTE:
For the diagnostics procedure on ATF temperature sensor circuit, <Ref. to 3-2 [T9F0].>.

CHECK : ***Is there any trouble in ATF temperature sensor circuit?***
YES : Repair or replace ATF temperature sensor circuit, <Ref. to 3-2 [T8H0].>.
NO : Go to step **9K7**.

9K7 : CHECK INHIBITOR SWITCH.

Read data of range switch using Subaru Select Monitor.
● Range switch is indicated in ON ⇔ OFF.

CHECK : ***When each range is selected, does LED of range switch on Subaru Select Monitor light up?***
YES : Go to step **9K8**.
NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

9K8 : CHECK ABS SIGNAL.

1) Start the engine, and turn Subaru Select Monitor switch to ON.
2) Read data of ABS signal using Subaru Select Monitor.
● ABS switch is indicated in ON ⇔ OFF.

CHECK : ***Does the LED of ABS switch light up?***
YES : Check ABS signal circuit. <Ref. to 4-4 [T10A0].>, <Ref. to 4-4 [T10V0].>
NO : Go to step THROTTLE POSITION SENSOR POWER SUPPLY. <Ref. to 3-2 [T9L0].>

L: CHECK THROTTLE POSITION SENSOR POWER SUPPLY.

9L1 : CHECK THROTTLE POSITION POWER SUPPLY.

Read data of throttle position sensor power supply using Subaru Select Monitor.
● Throttle position sensor power supply voltage is indicated.

CHECK : ***Is the value fixed between 5.02 and 5.22 V?***
YES : Go to step MASS AIR FLOW SIGNAL. <Ref. to 3-2 [T9M0].>
NO : Check throttle position sensor power supply circuit. <Ref. to 3-2 [T8M0].>

M: CHECK MASS AIR FLOW SIGNAL.

9M1 : CHECK INPUT SIGNAL FOR TCM.

1) Start the engine.
2) Warm-up the engine until engine coolant temperature is above 80°C (176°F).

NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

3) Engine idling after warm-up.
4) Move selector lever to “N”.
5) Read data of mass air flow signal using Subaru Select Monitor.
● Display shows mass air flow signal value sent from ECM.

CHECK : ***Does voltage change in response to the depress-release motion of the accelerator pedal?***
YES : Go to step **9M2**.
NO : Check mass air flow signal circuit. <Ref. to 3-2 [T8I0].>

9M2 : CHECK ECM.

CHECK : ***Has trouble been eliminated after ECM replacement?***
YES : Replace ECM.
NO : Go to step **9M3**.

9M3 : CHECK TCM.

NOTE:
Install former ECM.

CHECK : ***Has trouble been eliminated after TCM replacement?***

YES : Replace TCM.

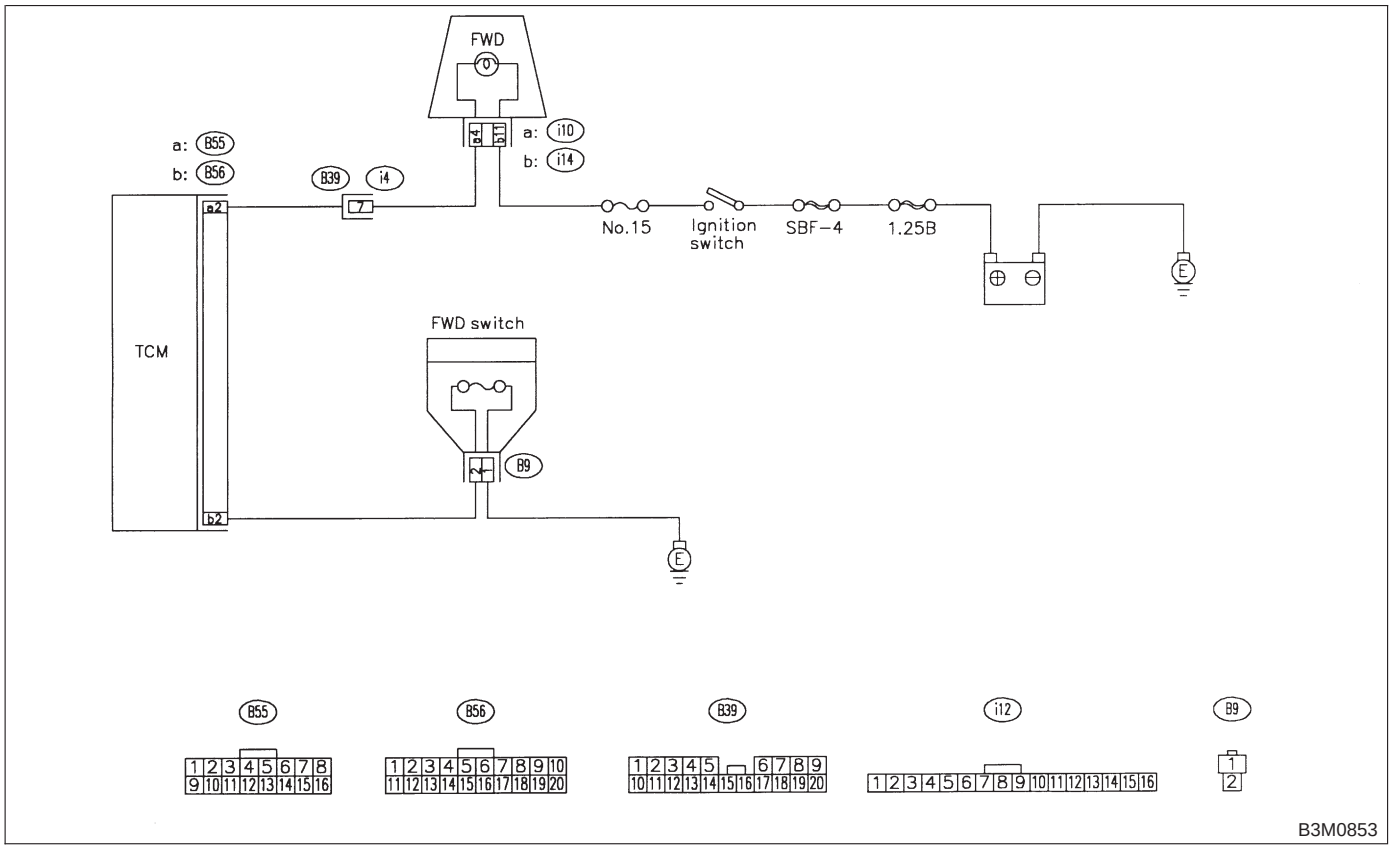
NO : Go to step FWD SWITCH. <Ref. to 3-2 [T9N0].>

MEMO:

N: CHECK FWD SWITCH.

DIAGNOSIS:
- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or short.

WIRING DIAGRAM:



9N1 : CHECK FWD SWITCH.

CHECK : ***When fuse is inserted to FWD switch, does LED light up?***

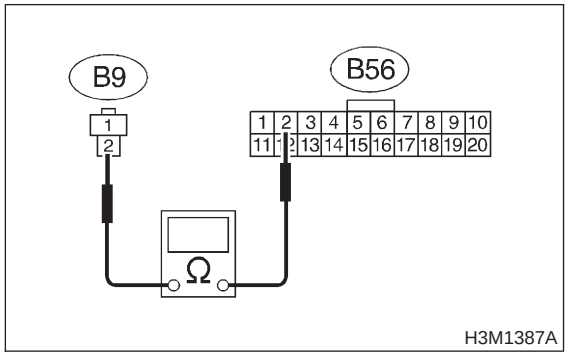
YES : Go to step KICK-DOWN SWITCH. <Ref. to 3-2 [T9O0].>

NO : Go to step **9N2**.

9N2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connector from TCM and FWD switch.
3) Measure resistance of harness between TCM and FWD switch connector.

Connector & terminal
(B56) No. 2 — (B9) No. 2:

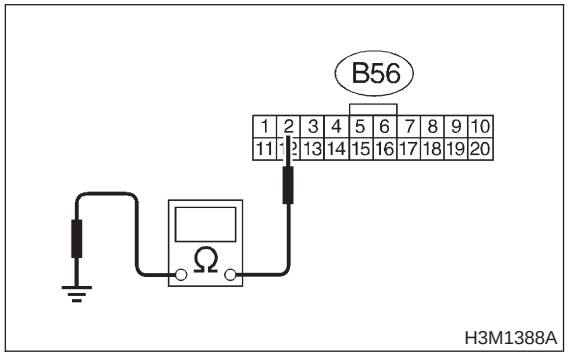


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9N3**.
NO : Repair open circuit in harness between TCM and FWD switch connector.

9N3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.

Measure resistance of harness connector between TCM and body to make sure that circuit does not short.

Connector & terminal
(B56) No. 2 — Chassis ground:

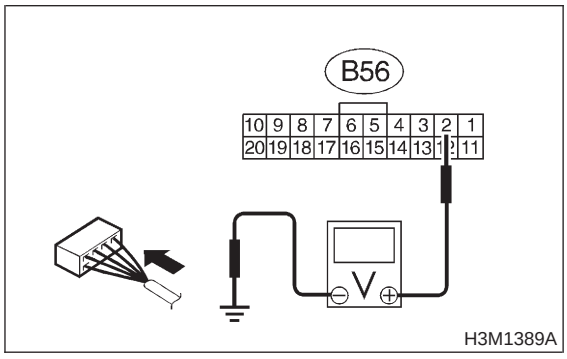


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9N4**.
NO : Repair short circuit in harness connector between TCM and chassis ground.

9N4 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and FWD switch.
3) Turn ignition switch to ON.
4) Measure signal voltage for TCM while installing the fuse to FWD switch connector.

Connector & terminal
(B56) No. 2 (+) — Chassis ground (−):

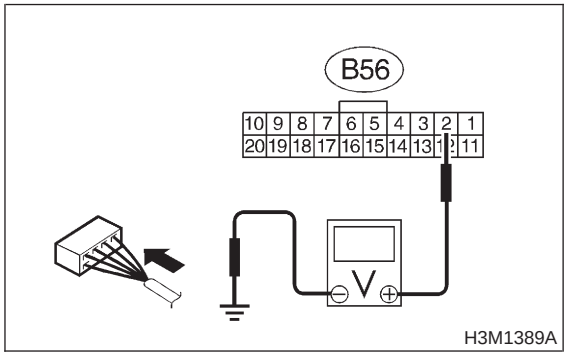


CHECK : ***Is the voltage less than 1 V in FWD switch while installing?***
YES : Go to step **9N5**.
NO : Go to step **9N10**.

9N5 : CHECK INPUT SIGNAL FOR TCM.

Measure signal voltage for TCM while removing the fuse from FWD switch connector.

Connector & terminal
(B56) No. 2 (+) — Chassis ground (−):

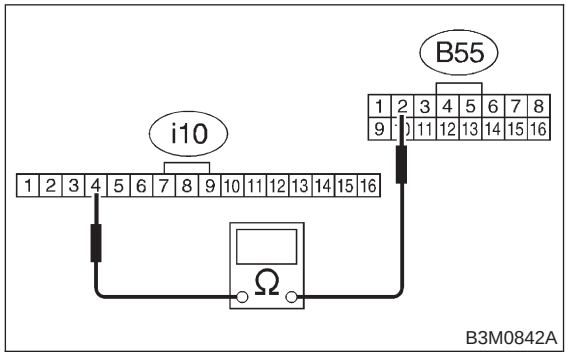


CHECK : ***Is the voltage more than 10 V in FWD switch while removing?***
YES : Go to step **9N6**.
NO : Replace TCM.

9N6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Disconnect connector from TCM and combination meter.
4) Measure resistance of harness between TCM and diagnosis connector.

Connector & terminal
(B55) No. 2 — (i10) No. 4:

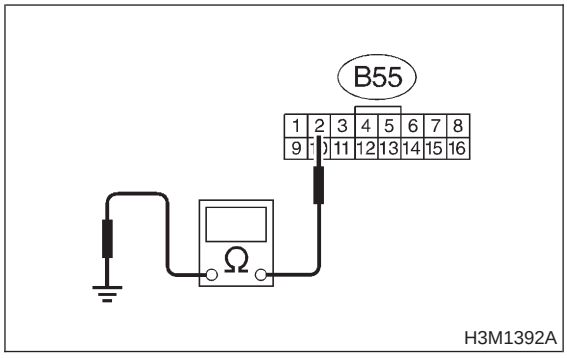


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9N7**.
NO : Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.

9N7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short.

Connector & terminal
(B55) No. 2 — Chassis ground:

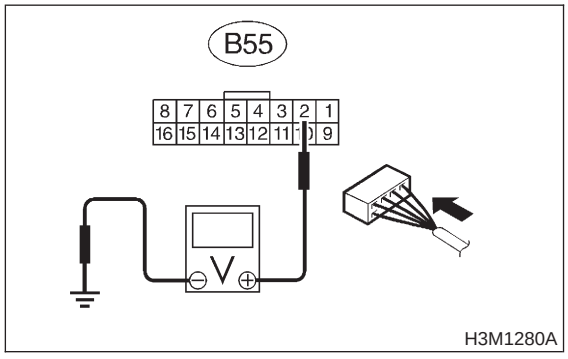


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9N8**.
NO : Repair short circuit in harness between TCM and combination meter connector.

9N8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and combination meter.
3) Install combination meter.
4) Turn ignition switch to ON.
5) Measure signal voltage for TCM while installing and removing the fuse to FWD switch connector.

Connector & terminal
(B55) No. 2 — Chassis ground:

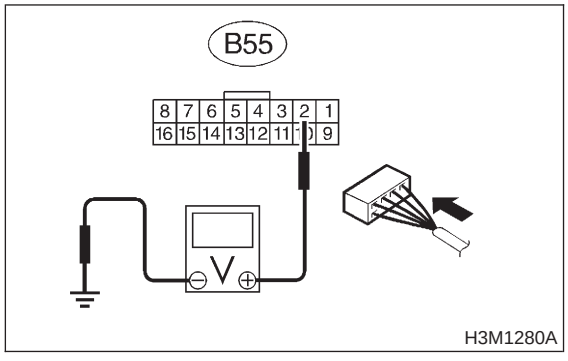


CHECK : ***Is the voltage less than 1 V in FWD switch while installing?***
YES : Go to step **9N9**.
NO : Go to step **9N10**.

9N9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure signal voltage for TCM while removing the fuse from FWD switch connector.

Connector & terminal
(B55) No. 2 — Chassis ground:



CHECK : ***Is the voltage more than 10 V in FWD switch while removing?***
YES : Go to step **9N10**.
NO : Replace TCM.

9N10 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in FWD switch circuit?***
YES : Repair poor contact.
NO : Replace TCM.

O: CHECK KICK-DOWN SWITCH.

9O1 : CHECK KICK-DOWN SWITCH.

CHECK : ***Does the LED of kick-down switch light up?***
YES : Replace TCM.
NO : Go to step BREAK SWITCH. <Ref. to 3-2 [T9P0].>

P: CHECK BRAKE SWITCH.

9P1 : CHECK BRAKE SWITCH.

CHECK : ***When the brake pedal is depressed, does LED light up?***
YES : Go to step ABS SWITCH. <Ref. to 3-2 [T9Q0].>
NO : Check brake switch circuit. LHD; <Ref. to 2-7 [T10BK0].>, RHD; <Ref. to 2-7 [T11BJ0].>

Q: CHECK ABS SWITCH.

9Q1 : CHECK ABS SWITCH.

CHECK : ***Does the LED of ABS switch light up?***
YES : Check ABS switch circuit. <Ref. to 4-4 [T10A0].>, <Ref. to 4-4 [T10V0].>
NO : Go to step CRUISE CONTROL SWITCH. <Ref. to 3-2 [T9R0].>

R: CHECK CRUISE CONTROL SWITCH.

9R1 : CHECK CRUISE CONTROL SWITCH.

CHECK : ***When cruise control is set, does LED light up?***
YES : Go to step POWER MODE SWITCH. <Ref. to 3-2 [T9S0].>
NO : Check cruise control. <Ref. to 6-2a [T600].>

S: CHECK POWER MODE SWITCH.

9S1 : CHECK POWER MODE SWITCH.

CHECK : ***Does the LED of power mode switch light up?***

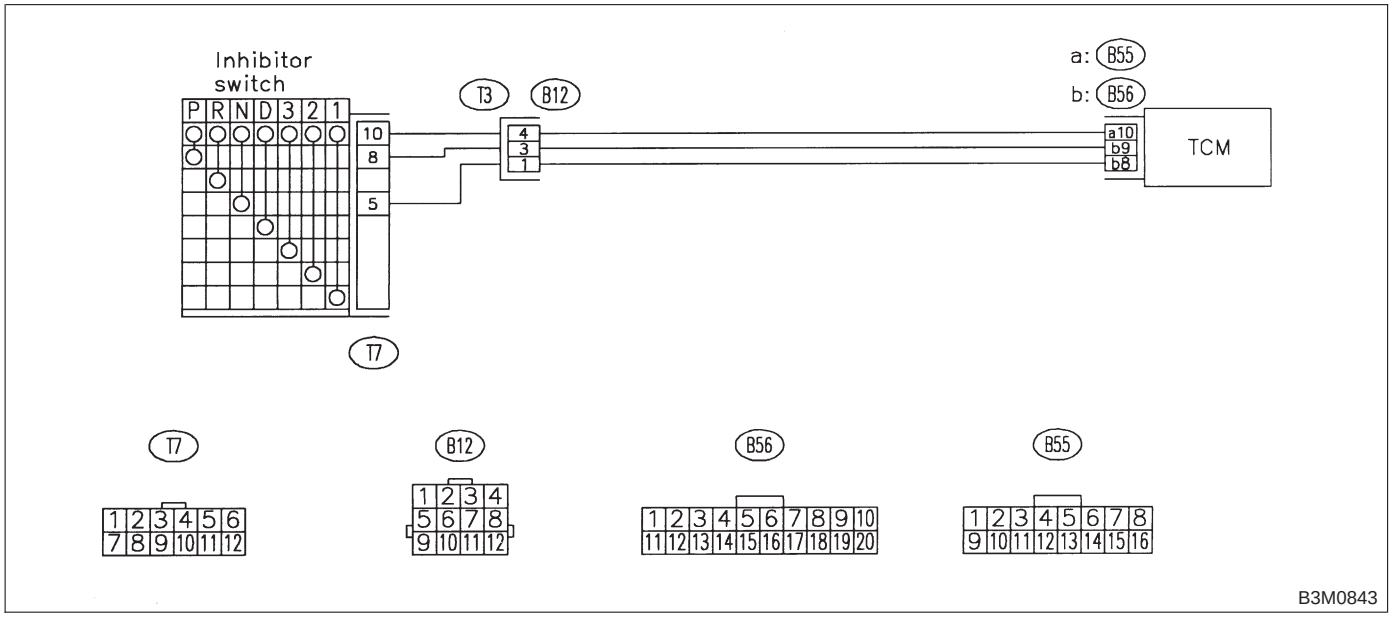
YES : Replace TCM.

NO : Go to step N/P RANGE SWITCH. <Ref. to 3-2 [T9T0].>

MEMO:

T: CHECK “N/P” RANGE SWITCH.

DIAGNOSIS:
Input signal circuit of “P” or “N” range is open or shorted.
WIRING DIAGRAM:



9T1 : CHECK “P” RANGE SWITCH.

CHECK : ***When “P” range is selected, does LED light up?***
YES : Go to step **9T2**.
NO : Go to step **9T3**.

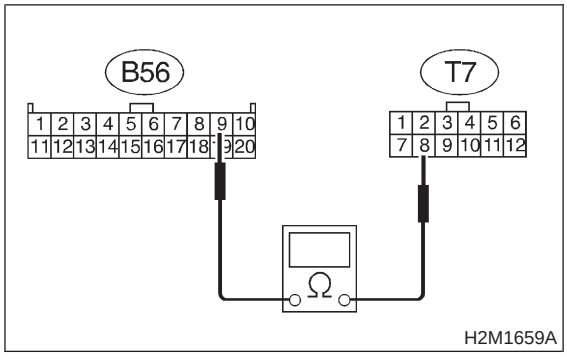
9T2 : CHECK “N” RANGE SWITCH.

CHECK : ***When the “N” range is selected, does LED light up?***
YES : Go to step “R” RANGE SWITCH. <Ref. to 3-2 [T9U0].>
NO : Go to step **9T4**.

9T3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and inhibitor switch.
3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B56) No. 9 — (T7) No. 8:

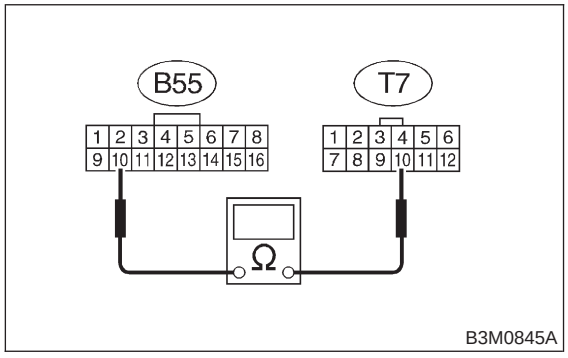


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T4**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 10 — (T7) No. 10:

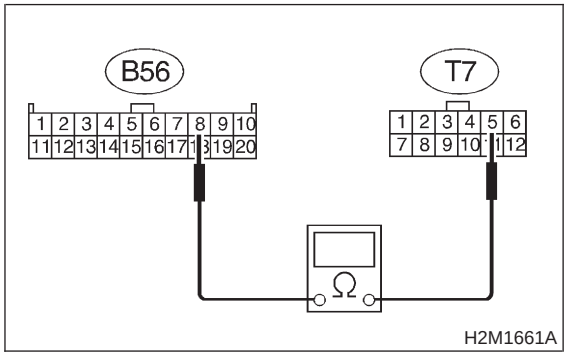


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T7**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and inhibitor switch.
3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B56) No. 8 — (T7) No. 5:

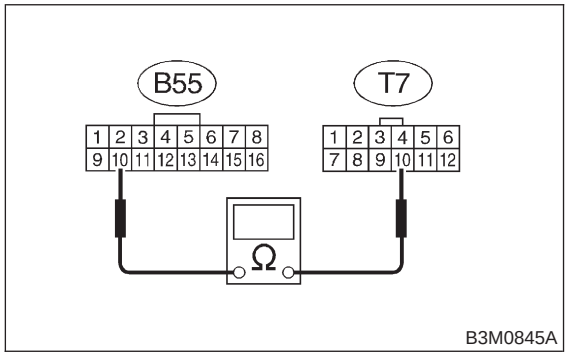


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T6**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 10 — (T7) No. 10:

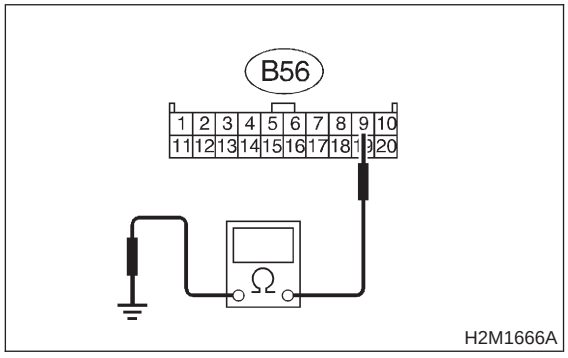


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T8**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B56) No. 9 — Chassis ground:

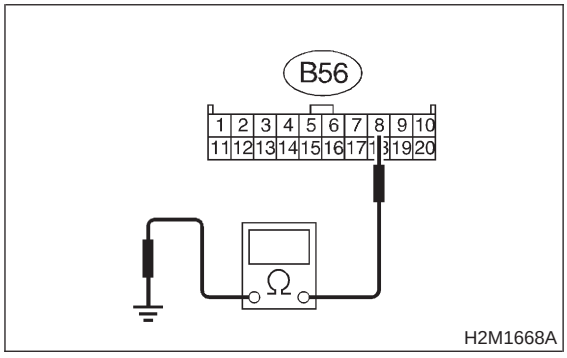


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9T9**.
NO : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9T8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B56) No. 8 — Chassis ground:

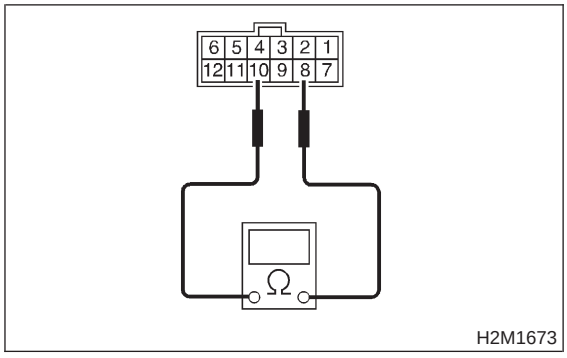


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9T11**.
NO : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9T9 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 8 — No. 10:

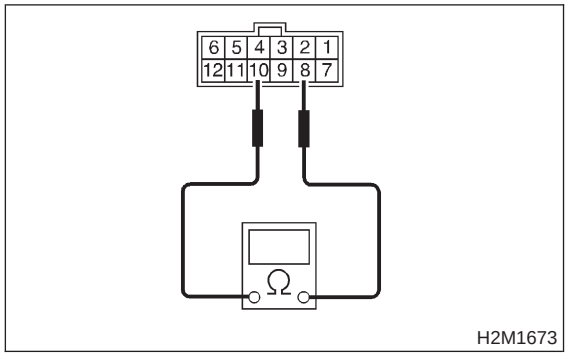


CHECK : ***Is the resistance less than 1 Ω in "P" range?***
YES : Go to step **9T10**.
NO : Go to step **9T18**.

9T10 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 8 — No. 10:

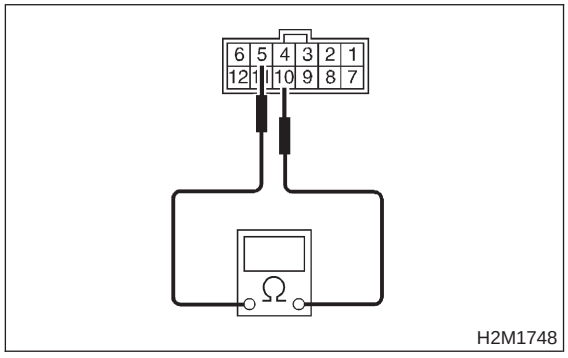


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Go to step **9T13**.
NO : Go to step **9T18**.

9T11 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 5 — No. 10:

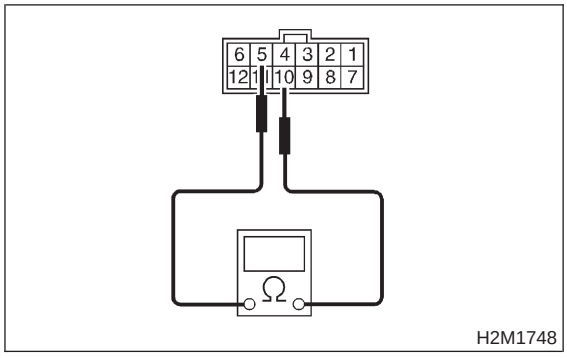


CHECK : ***Is the resistance less than 1 Ω in "N" range?***
YES : Go to step **9T12**.
NO : Go to step **9T18**.

9T12 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 5 — No. 10:

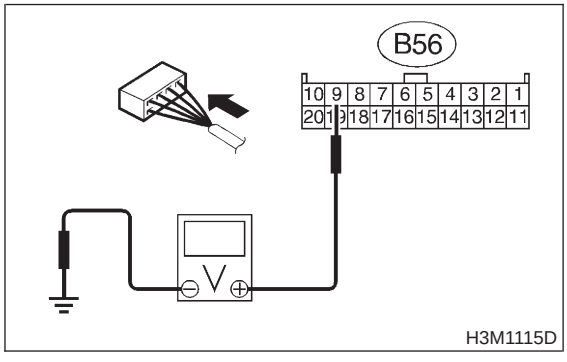


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Go to step **9T15**.
NO : Go to step **9T18**.

9T13 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and inhibitor switch.
3) Turn ignition switch to ON.
4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 9 — Chassis ground:

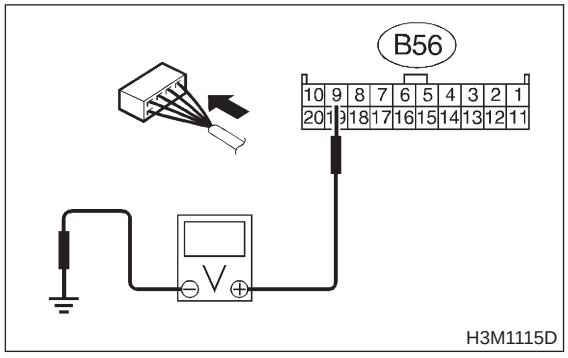


CHECK : ***Is the voltage less than 1 V in "P" range?***
YES : Go to step **9T14**.
NO : Go to step **9T17**.

9T14 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 9 — Chassis ground:

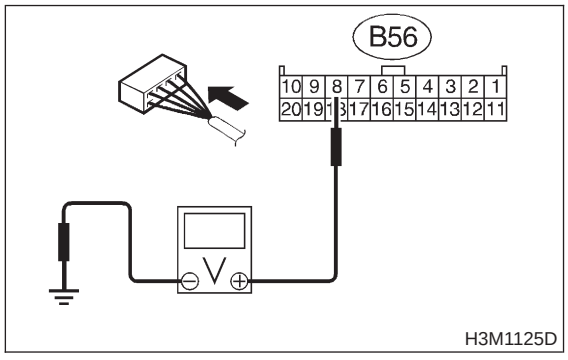


CHECK : ***Is the voltage more than 8 V in other ranges?***
YES : Go to step **9T17**.
NO : Go to step **9T18**.

9T15 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and inhibitor switch.
3) Turn ignition switch to ON.
4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 8 — Chassis ground:

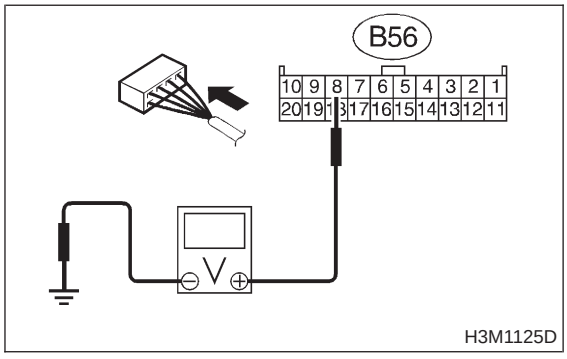


CHECK : ***Is the voltage less than 1 V in "N" range?***
YES : Go to step **9T16**.
NO : Go to step **9T17**.

9T16 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 8 — Chassis ground:



CHECK : ***Is the voltage more than 8 V in other ranges?***
YES : Go to step **9T17**.
NO : Go to step **9T18**.

9T17 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in "N/P" range switch circuit?***
YES : Repair poor contact.
NO : Replace TCM.

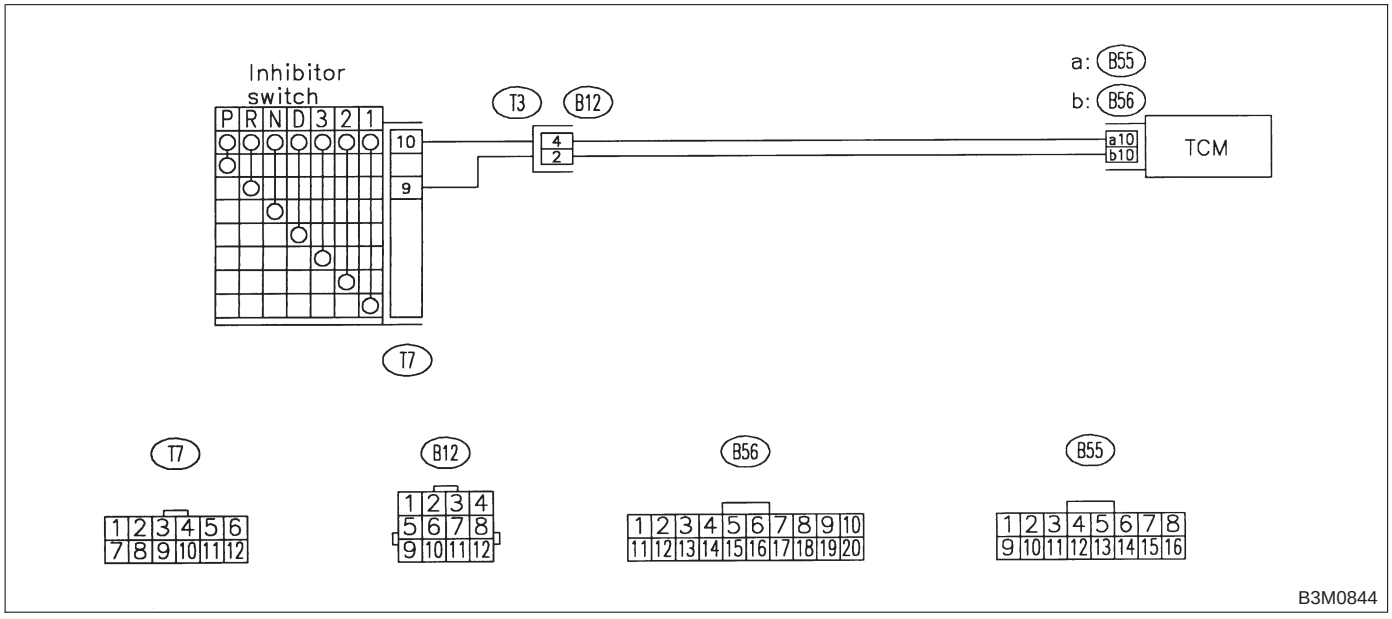
9T18 : CHECK SELECTOR CABLE.

CHECK : ***Is there faulty connection in the selector cable?***
YES : Repair connection of selector cable.
NO : Replace inhibitor switch.

MEMO:

U: CHECK “R” RANGE SWITCH.

DIAGNOSIS:
Input signal circuit of “R” range is open or shorted.
WIRING DIAGRAM:



9U1 : CHECK “R” RANGE SWITCH.

CHECK : ***When the “R” range is selected, does LED light up?***

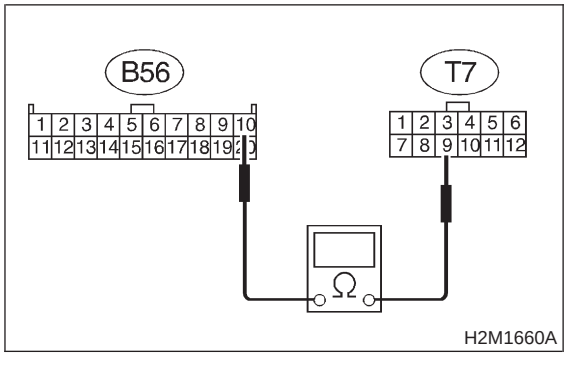
YES : Go to step “D” RANGE SWITCH. <Ref. to 3-2 [T9V0].>

NO : Go to step **9U2**.

9U2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and inhibitor switch.
3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B56) No. 10 — (T7) No. 9:



CHECK : ***Is the resistance less than 1 Ω?***

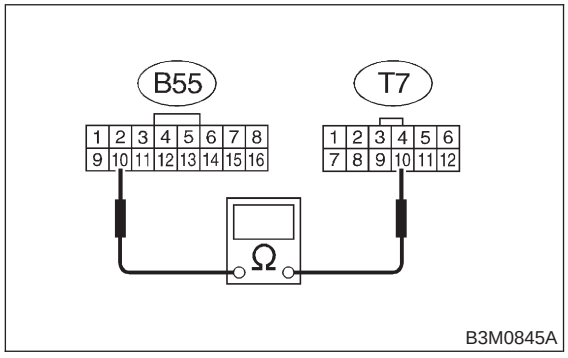
YES : Go to step **9U3**.

NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9U3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 10 — (T7) No. 10:

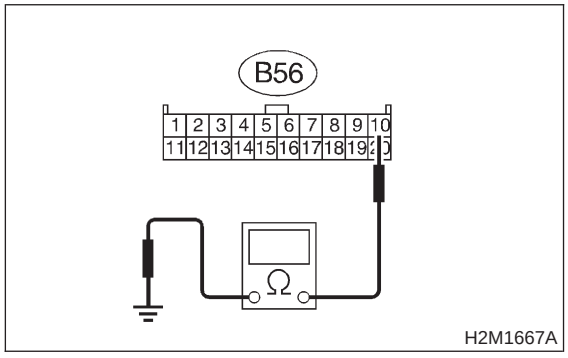


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9U4**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9U4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B56) No. 10 — Chassis ground:

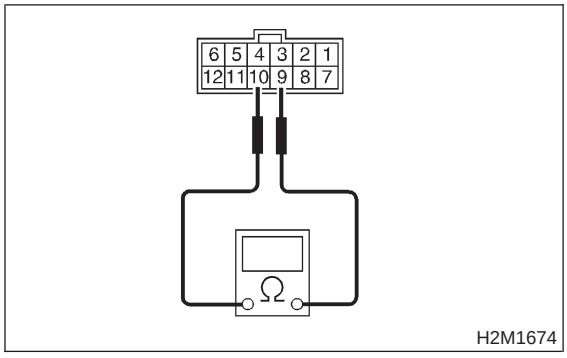


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9U5**.
NO : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9U5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 9 — No. 10:

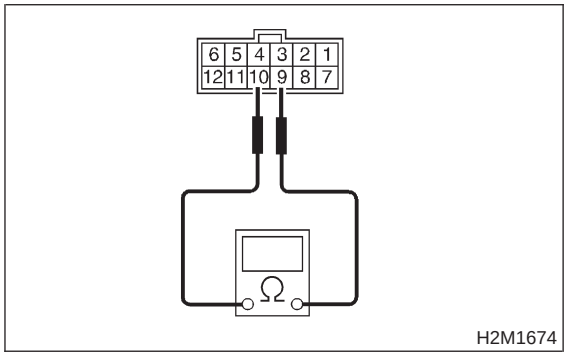


CHECK : ***Is the resistance less than 1 Ω in "R" range?***
YES : Go to step **9U6**.
NO : Go to step **9U10**.

9U6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 9 — No. 10:

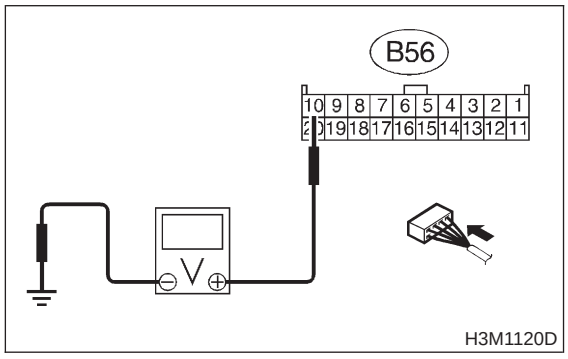


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Go to step **9U7**.
NO : Go to step **9U10**.

9U7 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and inhibitor switch.
3) Turn ignition switch to ON.
4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 10 — Chassis ground:

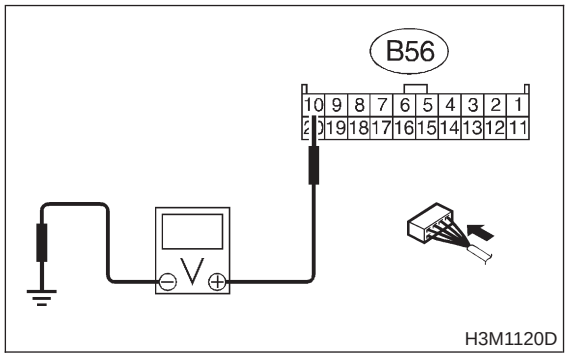


CHECK : ***Is the voltage less than 1 V in "R" range?***
YES : Go to step **9U8**.
NO : Go to step **9U9**.

9U8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B56) No. 10 — Chassis ground:



CHECK : ***Is the voltage more than 6 V in other ranges?***
YES : Go to step **9U9**.
NO : Go to step **9U10**.

9U9 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in "R" range switch circuit?***
YES : Repair poor contact.
NO : Replace TCM.

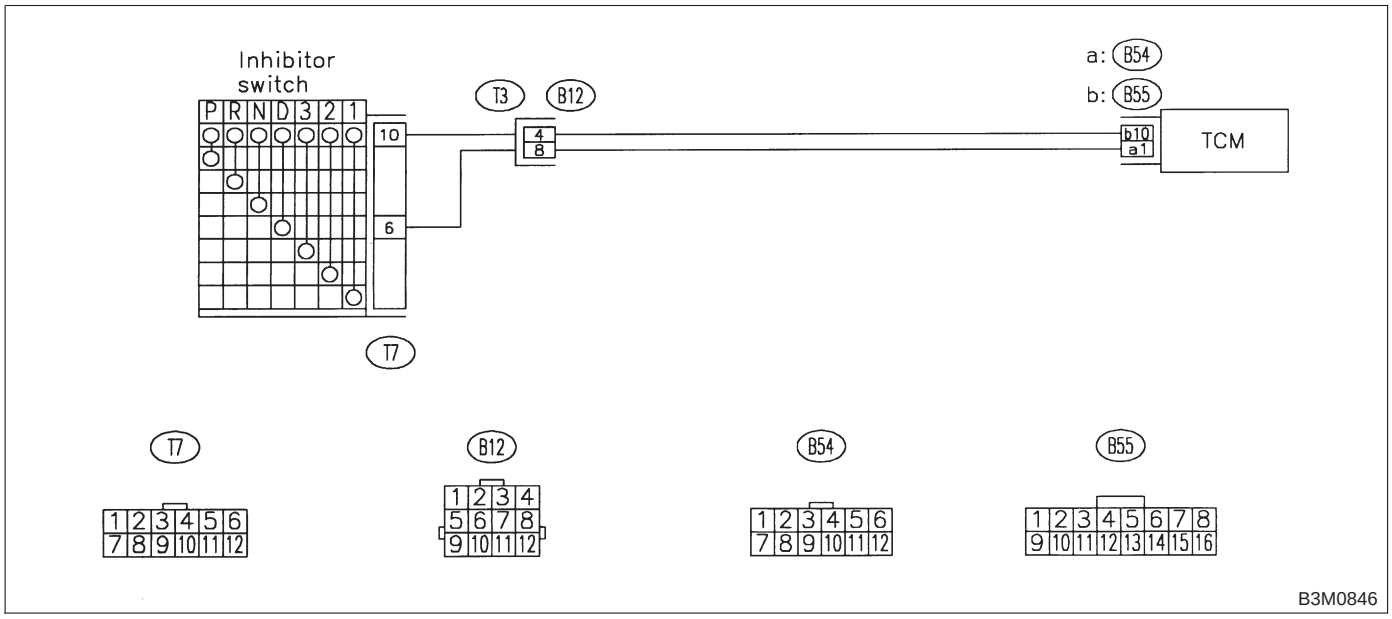
9U10 : CHECK SELECTOR CABLE.

CHECK : ***Is there faulty connection in the selector cable?***
YES : Repair connection of selector cable.
NO : Replace inhibitor switch.

MEMO:

V: CHECK “D” RANGE SWITCH.

DIAGNOSIS:
Input signal circuit of “D” range is open or shorted.
TROUBLE SYMPTOM:
Shift characteristics are erroneous.
WIRING DIAGRAM:



9V1 : CHECK “D” RANGE SWITCH.

CHECK : ***When the “D” range is selected, does LED light up?***

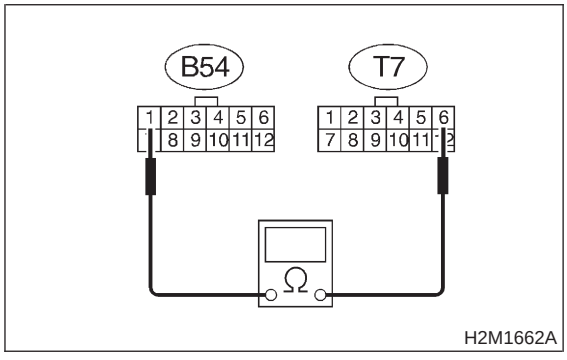
YES : Go to step “3” RANGE SWITCH. <Ref. to 3-2 [T9W0].>

NO : Go to step **9V2**.

9V2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and inhibitor switch.
3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B54) No. 1 — (T7) No. 6:



CHECK : ***Is the resistance less than 1 Ω?***

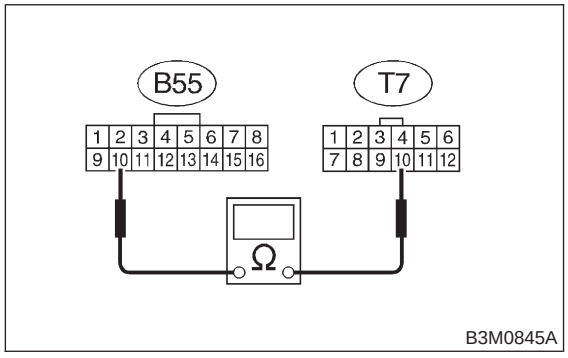
YES : Go to step **9V3**.

NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9V3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 10 — (T7) No. 10:

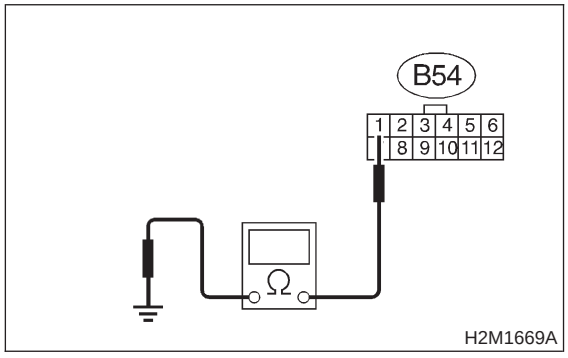


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9V4**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9V4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 1 — Chassis ground:

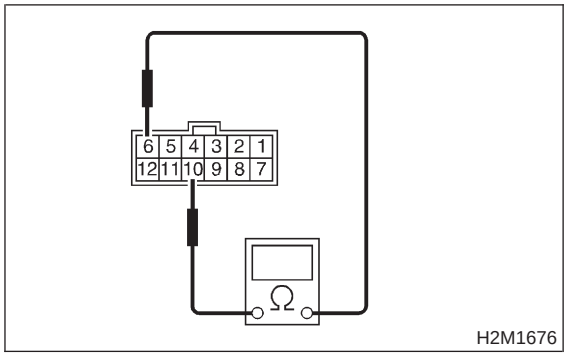


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9V5**.
NO : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9V5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 6 — No. 10:

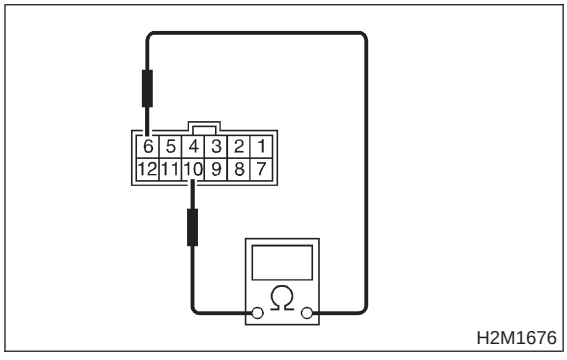


CHECK : ***Is the resistance less than 1 Ω in "D" range?***
YES : Go to step **9V6**.
NO : Go to step **9V10**.

9V6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 6 — No. 10:

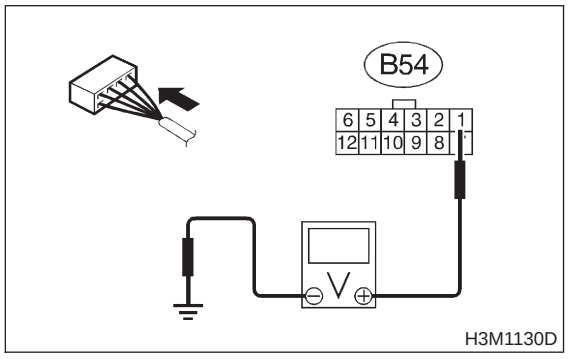


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Go to step **9V7**.
NO : Go to step **9V10**.

9V7 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and inhibitor switch.
3) Turn ignition switch to ON.
4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 1 — Chassis ground:

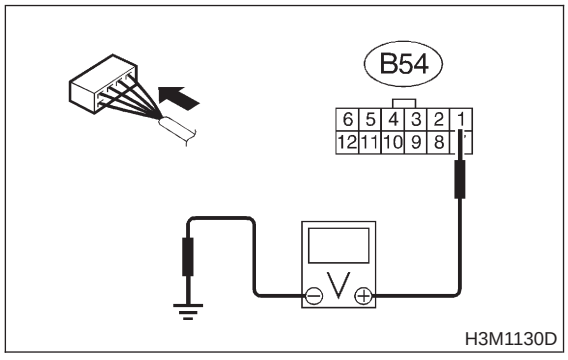


CHECK : ***Is the voltage less than 1 V in "D" range?***
YES : Go to step **9V8**.
NO : Go to step **9V9**.

9V8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 1 — Chassis ground:



CHECK : ***Is the voltage more than 6 V in other ranges?***
YES : Go to step **9V9**.
NO : Go to step **9V10**.

9V9 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in "D" range switch circuit?***
YES : Repair poor contact.
NO : Replace TCM.

9V10 : CHECK SELECTOR CABLE.

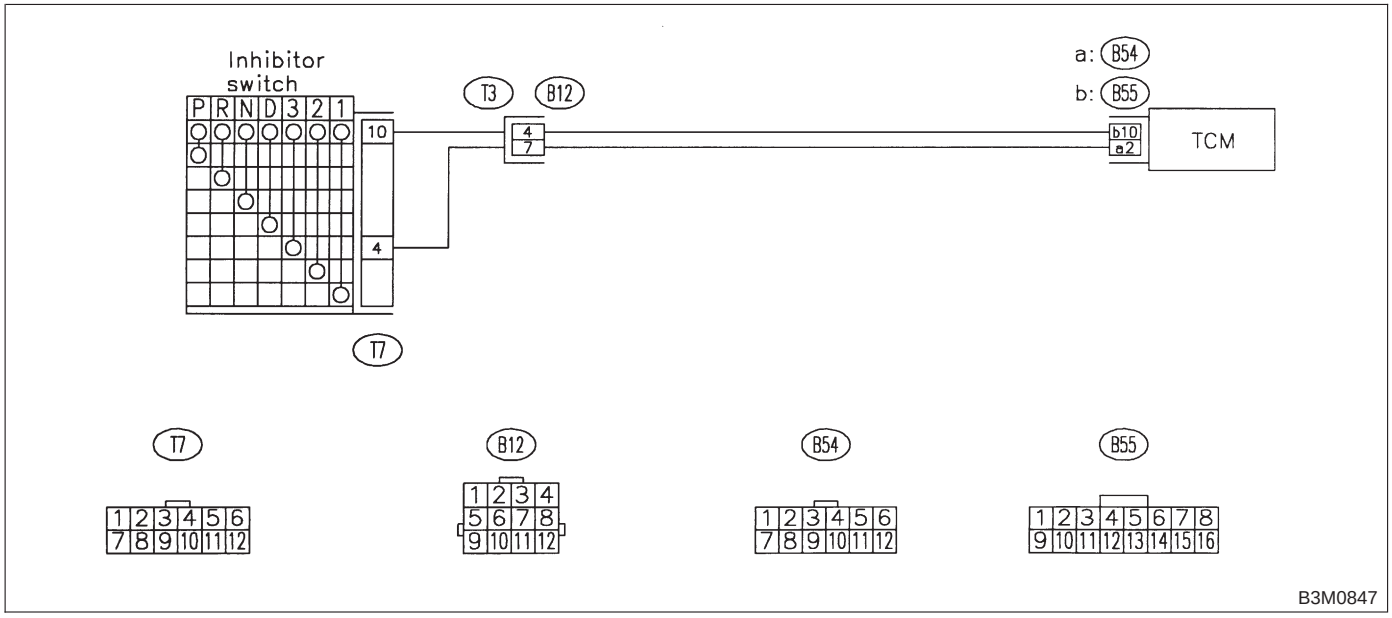
CHECK : ***Is there faulty connection in the selector cable?***
YES : Repair connection of selector cable.
NO : Replace inhibitor switch.

MEMO:

W: CHECK “3” RANGE SWITCH.

DIAGNOSIS:
Input signal circuit of “3” range is open or shorted.
TROUBLE SYMPTOM:
- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in “3” range.

WIRING DIAGRAM:



9W1 : CHECK “3” RANGE SWITCH.

CHECK : ***When the “3” range is selected, does LED light up?***

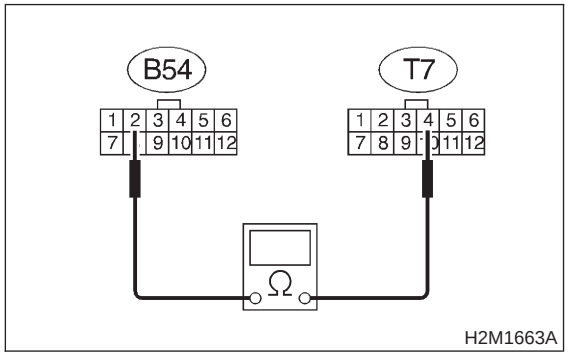
YES : Go to step “2” RANGE SWITCH. <Ref. to 3-2 [T9X0].>

NO : Go to step **9W2**.

9W2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connector from TCM and inhibitor switch.
3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B54) No. 2 — (T7) No. 4:

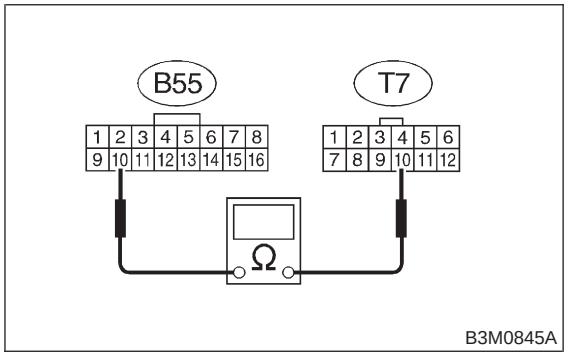


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9W3**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9W3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 10 — (T7) No. 10:

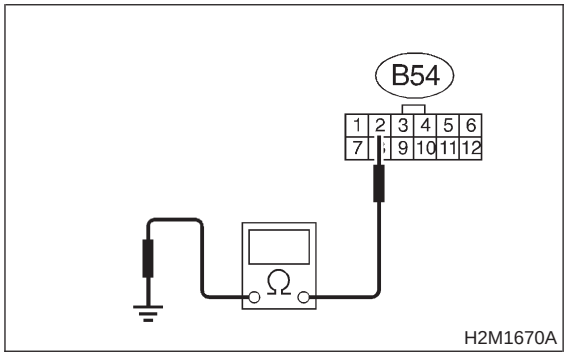


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9W4**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9W4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 2 — Chassis ground:

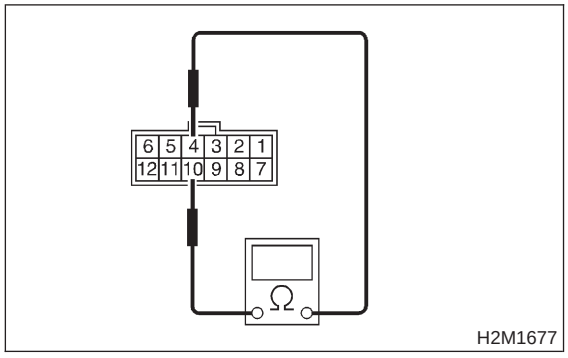


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9W5**.
NO : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9W5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 4 — No. 10:

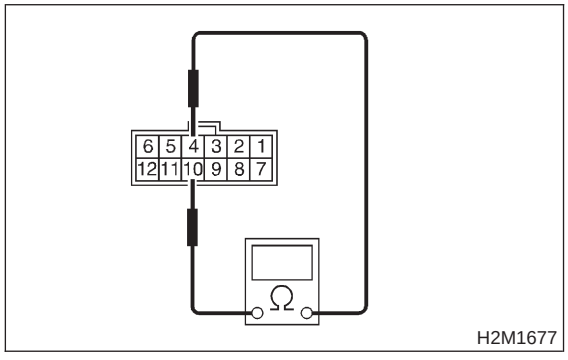


CHECK : ***Is the resistance less than 1 Ω in "3" range?***
YES : Go to step **9W6**.
NO : Go to step **9W7**.

9W6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 4 — No. 10:

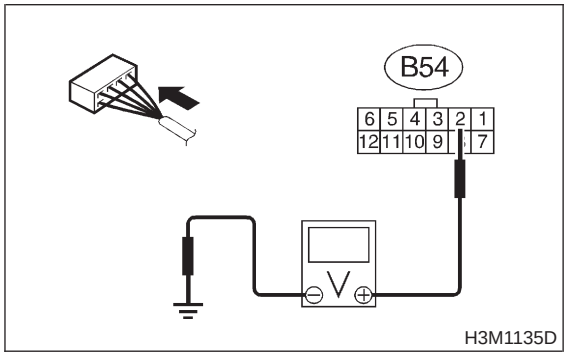


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Go to step **9W7**.
NO : Go to step **9W10**.

9W7 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and inhibitor switch.
3) Turn ignition switch to ON.
4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 2 — Chassis ground:

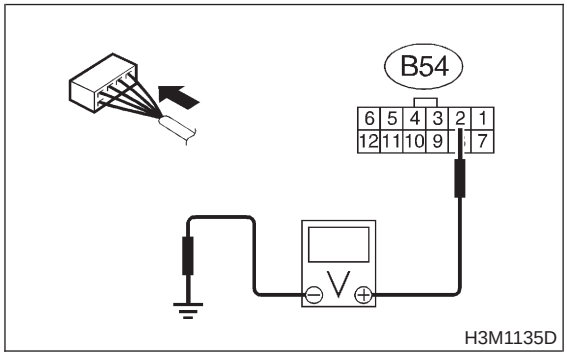


CHECK : ***Is the voltage less than 1 V in "3" range?***
YES : Go to step **9W8**.
NO : Go to step **9W9**.

9W8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 2 — Chassis ground:



CHECK : ***Is the voltage more than 6 V in other ranges?***
YES : Go to step **9W9**.
NO : Go to step **9W10**.

9W9 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in "3" range switch circuit?***
YES : Repair poor contact.
NO : Replace TCM.

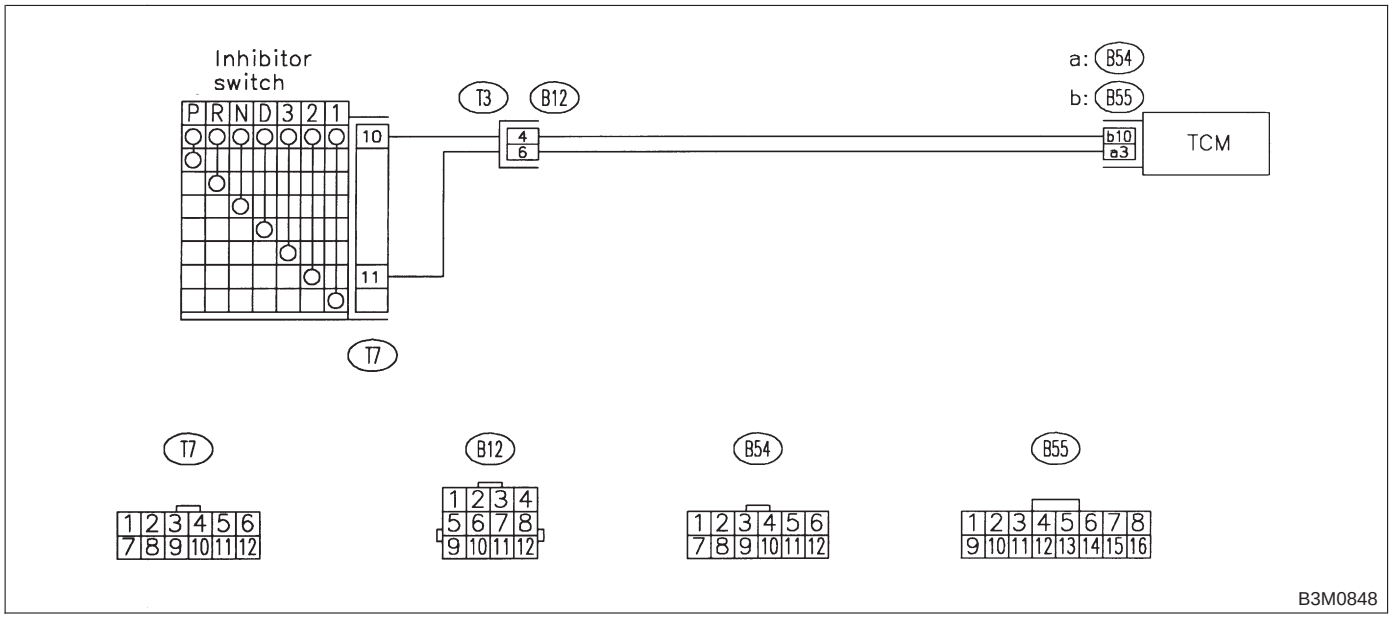
9W10 : CHECK SELECTOR CABLE.

CHECK : ***Is there faulty connection in the selector cable?***
YES : Repair connection of selector cable.
NO : Replace inhibitor switch.

X: CHECK “2” RANGE SWITCH.

DIAGNOSIS:
Input signal circuit of “2” range is open or shorted.
TROUBLE SYMPTOM:
- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in “2” range.

WIRING DIAGRAM:



9X1 : CHECK “2” RANGE SWITCH.

CHECK : ***When the “2” range is selected, does LED light up?***

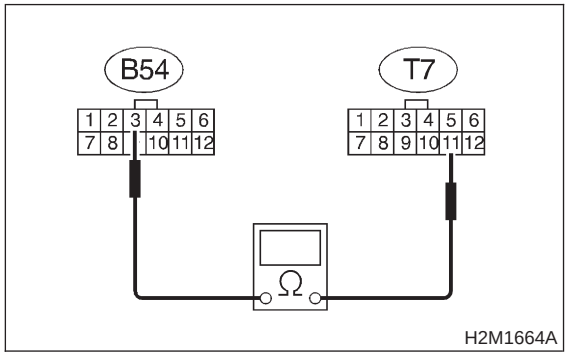
YES : Go to step “1” RANGE SWITCH. <Ref. to 3-2 [T9Y0].>

NO : Go to step **9X2**.

9X2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connector from TCM and inhibitor switch.
3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B54) No. 3 — (T7) No. 11:

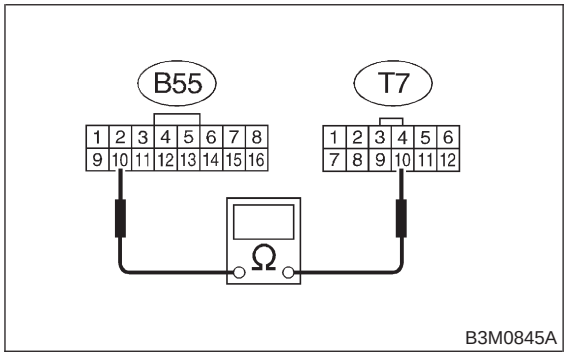


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9X3**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9X3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 10 — (T7) No. 10:

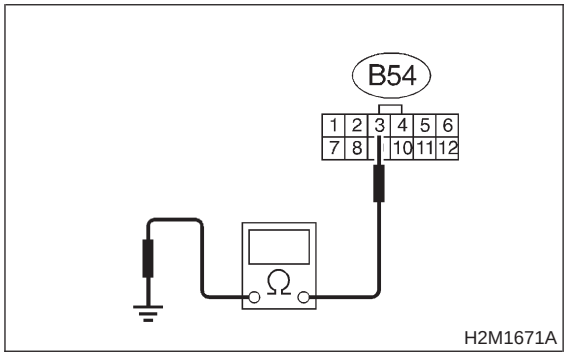


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9X4**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9X4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 3 — Chassis ground:

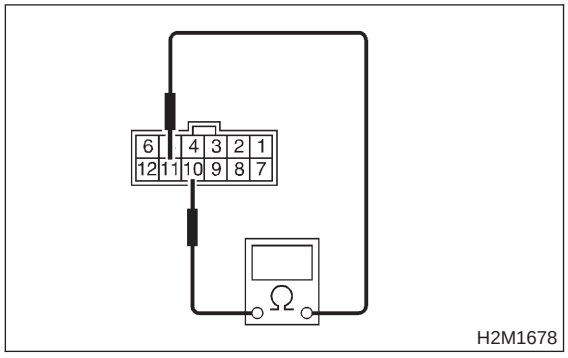


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9X5**.
NO : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9X5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 11 — No. 10:

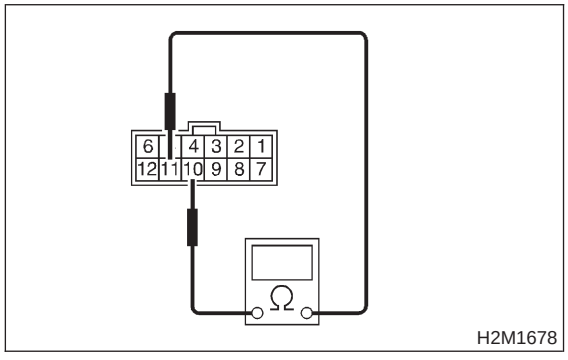


CHECK : ***Is the resistance less than 1 Ω in "2" range?***
YES : Go to step **9X6**.
NO : Go to step **9X10**.

9X6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 11 — No. 10:

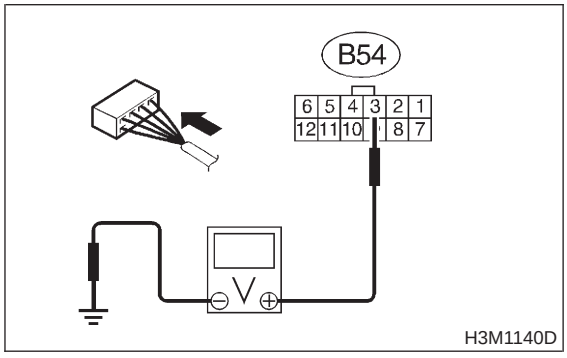


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Go to step **9X7**.
NO : Go to step **9X10**.

9X7 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and inhibitor switch.
3) Turn ignition switch to ON.
4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 3 — Chassis ground:

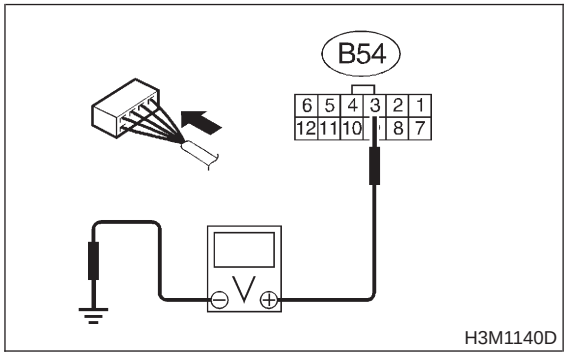


CHECK : ***Is the voltage less than 1 V in "2" range?***
YES : Go to step **9X8**.
NO : Go to step **9X9**.

9X8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 3 — Chassis ground:



CHECK : ***Is the voltage more than 6 V in other ranges?***
YES : Go to step **9X9**.
NO : Go to step **9X10**.

9X9 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in "2" range switch circuit?***
YES : Repair poor contact.
NO : Replace TCM.

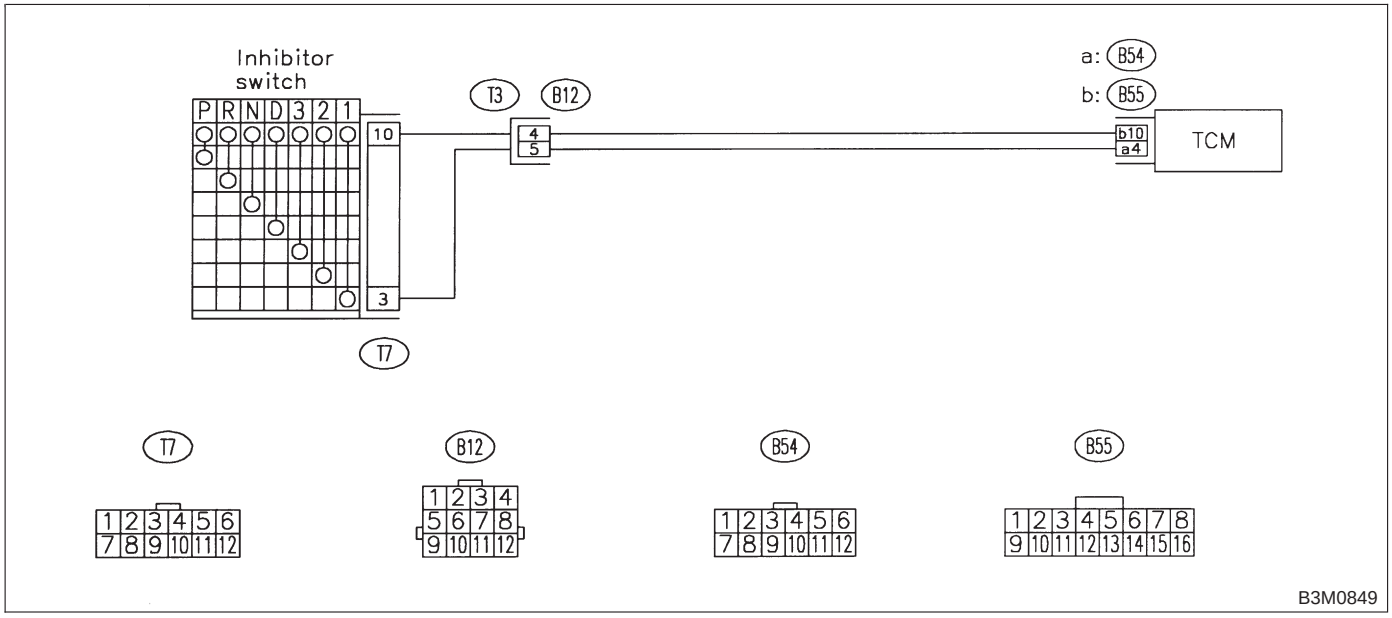
9X10 : CHECK SELECTOR CABLE.

CHECK : ***Is there faulty connection in the selector cable?***
YES : Repair connection of selector cable.
NO : Replace inhibitor switch.

Y: CHECK “1” RANGE SWITCH.

DIAGNOSIS:
Input signal circuit of “1” range is open or shorted.
TROUBLE SYMPTOM:
- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in “1” range.

WIRING DIAGRAM:



9Y1 : CHECK “1” RANGE SWITCH.

CHECK : ***When the “1” range is selected, does LED light up?***

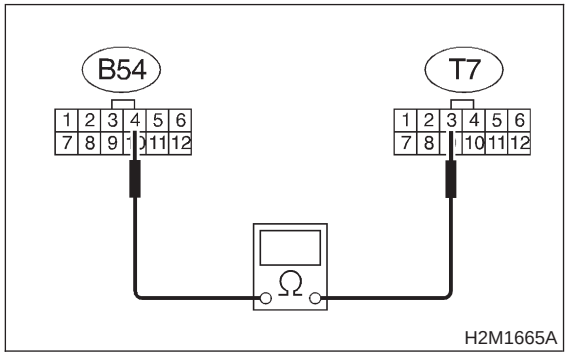
YES : Go to step HOLD SWITCH. <Ref. to 3-2 [T9Z0].>

NO : Go to step **9Y2**.

9Y2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connectors from TCM and inhibitor switch.
3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B54) No. 4 — (T7) No. 3:

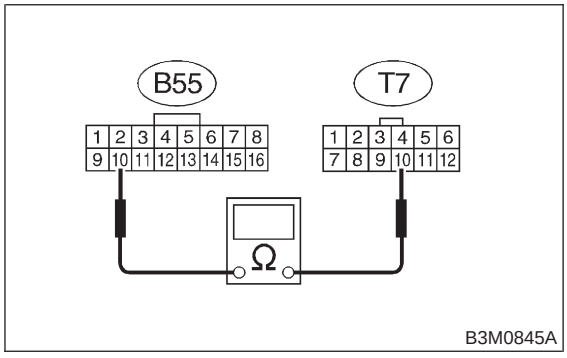


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9Y3**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9Y3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 10 — (T7) No. 10:

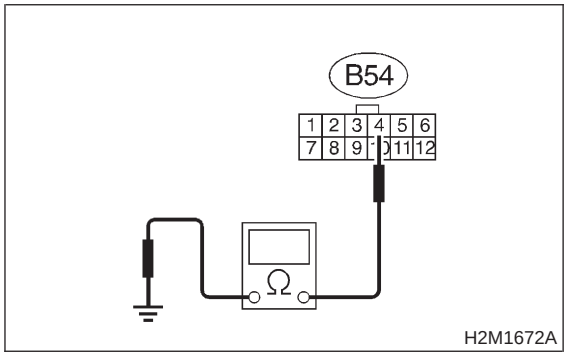


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9Y4**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9Y4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 4 — Chassis ground:

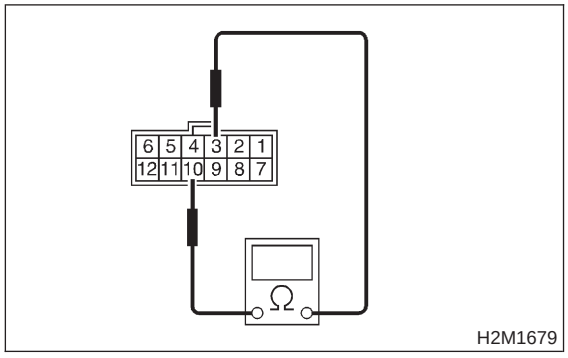


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9Y5**.
NO : Repair ground short circuit in harness between TCM and inhibitor switch connector.

9Y5 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 3 — No. 10:

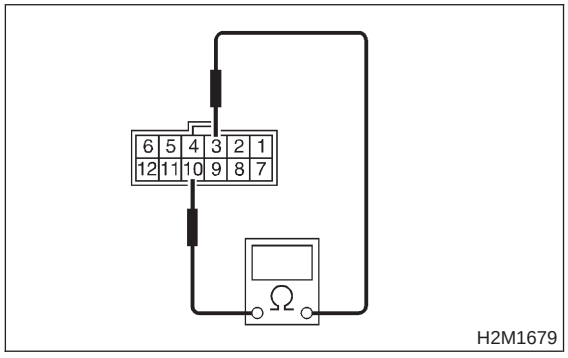


CHECK : ***Is the resistance less than 1 Ω in "1" range?***
YES : Go to step **9Y6**.
NO : Go to step **9Y10**.

9Y6 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
No. 3 — No. 10:

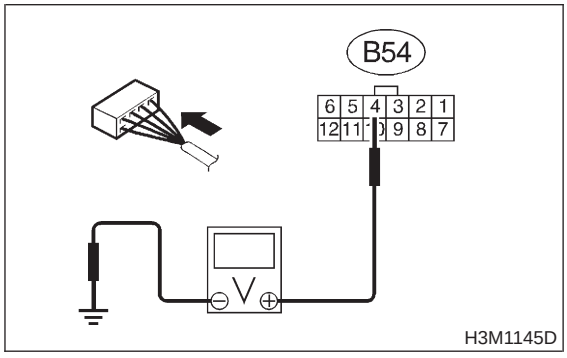


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Go to step **9Y7**.
NO : Go to step **9Y10**.

9Y7 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM and inhibitor switch.
3) Turn ignition switch to ON.
4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 4 — Chassis ground:

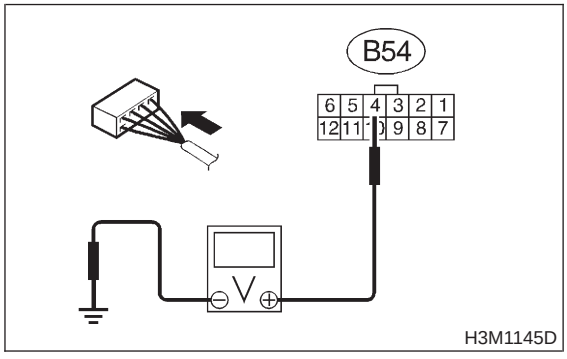


CHECK : ***Is the voltage less than 1 V in "1" range?***
YES : Go to step **9Y8**.
NO : Go to step **9Y9**.

9Y8 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 4 — Chassis ground:



CHECK : ***Is the voltage more than 6 V in other ranges?***
YES : Go to step **9Y9**.
NO : Go to step **9Y10**.

9Y9 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in "1" range switch circuit?***
YES : Repair poor contact.
NO : Replace TCM.

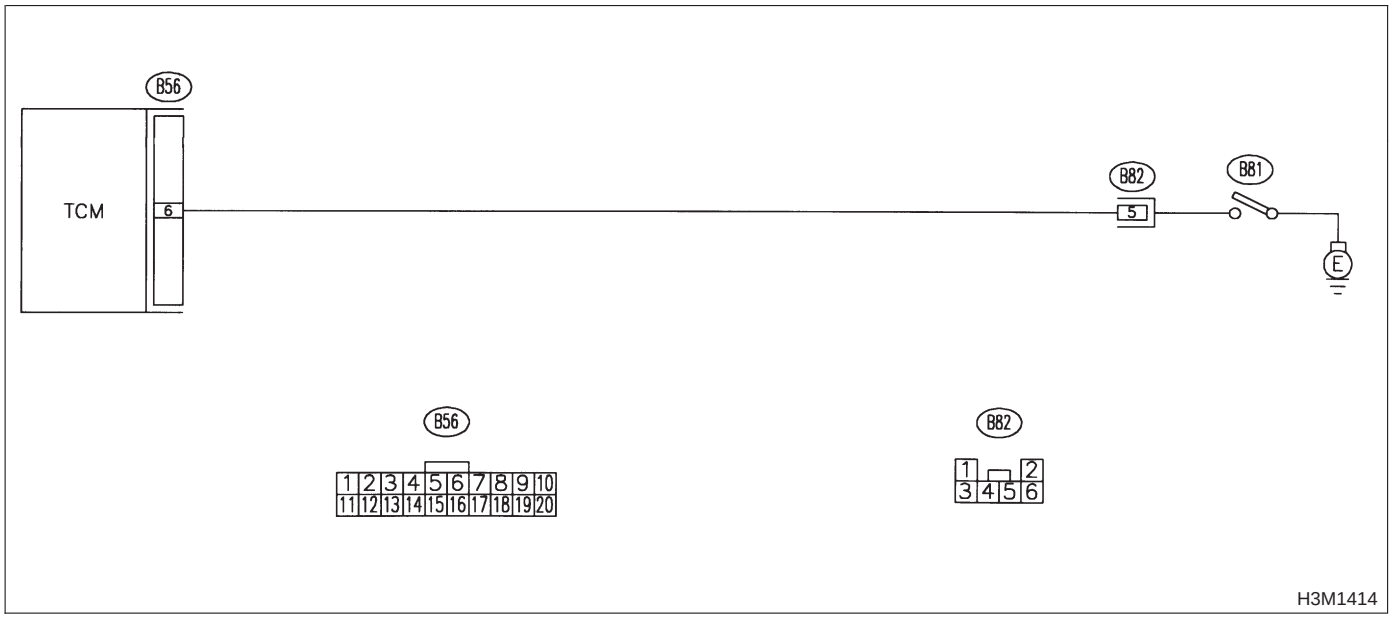
9Y10 : CHECK SELECTOR CABLE.

CHECK : ***Is there faulty connection in the selector cable?***
YES : Repair connection of selector cable.
NO : Replace inhibitor switch.

Z: CHECK HOLD SWITCH. (DIAGNOSIS SWITCH)

DIAGNOSIS:
- LED does not come on even if diagnosis switch is ON.
- Diagnosis switch circuit is open or short.

WIRING DIAGRAM:



9Z1 : CHECK DIAGNOSIS SWITCH.

CHECK : ***When the diagnosis switch is turned on, does the LED on the select monitor come on?***

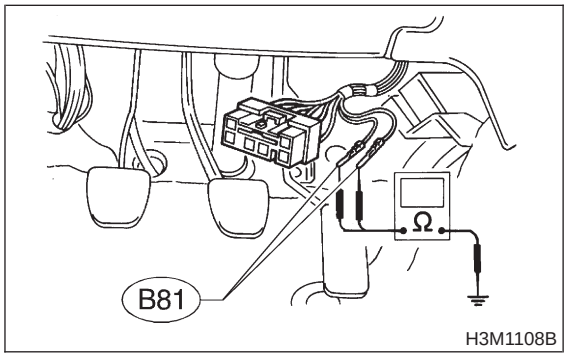
YES : Go to step SHIFT SOLENOID 1. <Ref. to 3-2 [T9AA0].>

NO : Go to step **9Z2**.

9Z2 : CHECK DIAGNOSIS SWITCH GROUND LINE.

1) Turn ignition switch to OFF.
2) Measure resistance of harness between diagnosis ground terminals and chassis ground.

Terminal
(B81) — Chassis ground:



CHECK : ***Is the resistance less than 1 Ω?***

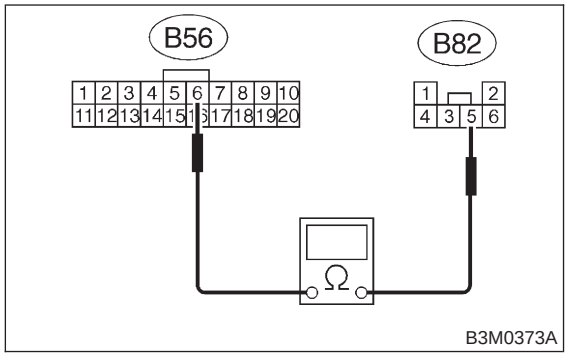
YES : Go to step **9Z3**.

NO : Repair open circuit in diagnosis ground terminals.

9Z3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DIAGNOSIS SWITCH.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and diagnosis connector.

Connector & terminal
(B56) No. 6 — (B82) No. 5:

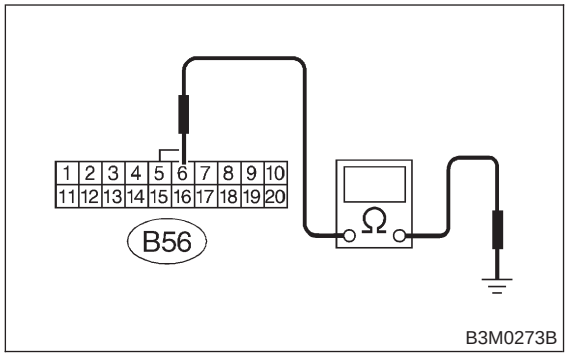


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9Z4**.
NO : Repair open circuit in harness between TCM and diagnosis connector.

9Z4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DIAGNOSIS SWITCH.

Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short.

Connector & terminal
(B56) No. 6 — Chassis ground:

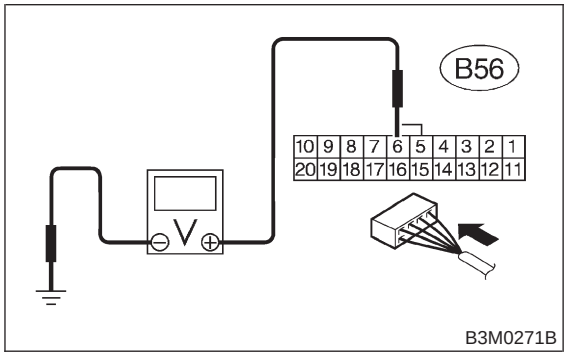


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9Z5**.
NO : Repair short circuit in harness connector between TCM and chassis ground.

9Z5 : CHECK INPUT SIGNAL FOR TCM.

1) Turn ignition switch to OFF.
2) Connect connector to TCM.
3) Turn ignition switch to ON.
4) Measure signal voltage for TCM while connecting the diagnosis terminal to diagnosis connector.

Connector & terminal
(B56) No. 6 — Chassis ground:

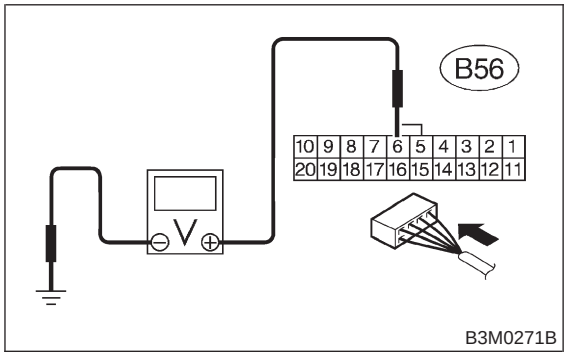


CHECK : ***Is the voltage less than 1 V in diagnosis connector connected?***
YES : Go to step **9Z6**.
NO : Go to step **9Z7**.

9Z6 : CHECK INPUT SIGNAL FOR TCM.

Measure signal voltage for TCM while disconnecting the diagnosis terminal from diagnosis connector.

Connector & terminal
(B56) No. 6 — Chassis ground:



CHECK : ***Is the voltage more than 6 V in diagnosis connector disconnected?***
YES : Go to step SHIFT SOLENOID 1. <Ref. to 3-2 [T9AA0].>
NO : Go to step **9Z7**.

9Z7 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in diagnosis switch circuit?***
YES : Repair poor contact.
NO : Replace TCM.

AA: CHECK SHIFT SOLENOID 1.

9AA1 :	CHECK SHIFT SOLENOID 1.

CHECK : ***Does the LED of shift solenoid 1 light up?***
YES : Go to step SHIFT SOLENOID 2. <Ref. to 3-2 [T9AB0].>
NO : Check shift solenoid 1 circuit. <Ref. to 3-2 [T8G0].>

AB: CHECK SHIFT SOLENOID 2.

9AB1 :	CHECK SHIFT SOLENOID 2.

CHECK : ***Does the LED of shift solenoid 2 light up?***
YES : Go to step OVERRUNNING SOLENOID. <Ref. to 3-2 [T9AC0].>
NO : Check shift solenoid 2 circuit. <Ref. to 3-2 [T8F0].>

AC: CHECK OVERRUNNING SOLENOID.

9AC1 :	CHECK OVERRUNNING SOLENOID.

CHECK : ***Does the LED of overrunning solenoid light up?***
YES : Check overrunning solenoid circuit. <Ref. to 3-2 [T8E0].>
NO : Go to step ATF TEMPERATURE WARNING LAMP. <Ref. to 3-2 [T9AD0].>

AD: CHECK ATF TEMPERATURE WARNING LAMP.

9AD1 :	CHECK ATF TEMPERATURE WARNING LAMP.

Turn ignition switch to ON (engine OFF).

CHECK : ***Does temperature warning lamp light up?***
YES : Go to step HOLD LAMP. <Ref. to 3-2 [T9AE0].>
NO : Check ATF temperature warning lamp circuit.

AE: CHECK HOLD LAMP.

9AE1 :	CHECK HOLD LAMP.

CHECK : ***Does the LED of hold lamp light up?***
YES : Replace TCM.
NO : Go to step FWD MODE LAMP. <Ref. to 3-2 [T9AF0].>

AF: CHECK FWD LAMP.

9AF1 :	CHECK FWD LAMP.

CHECK : ***Does the LED of FWD lamp light up?***
YES : Check FWD lamp circuit. <Ref. to 3-2 [T9N0].>
NO : Go to step TORQUE CONTROL SIGNAL. <Ref. to 3-2 [T9AG0].>

AG: CHECK TORQUE CONTROL SIGNAL.

9AG1 :	CHECK TORQUE CONTROL SIGNAL.

Turn ignition switch to ON (engine ON).

CHECK : ***Does the LED of torque control signal light up?***
YES : Check torque control signal circuit. <Ref. to 3-2 [T8L0].>
NO : Go to step General Diagnostic Table. <Ref. to 3-2 [T1000].>

MEMO:

10. General Diagnostic Table

Symptom	Problem parts
Starter does not rotate when select lever is in “P” or “N”; starter rotates when select lever is in “R”, “D”, “3” or “2”.	1) Inhibitor switch 2) Select cable 3) Select lever 4) Starter motor and harness
Abnormal noise when select lever is in “P” or “N”.	1) Strainer 2) Duty solenoid C 3) Oil pump 4) Drive plate 5) ATF level too high or too low
Hissing noise occurs during standing start.	1) Strainer 2) ATF level too high or too low
Noise occurs while driving in “D1”.	1) Final gear 2) Planetary gear 3) Reduction gear 4) Differential gear oil level too high or too low
Noise occurs while driving in “D2”.	
Noise occurs while driving in “D3”.	1) Final gear 2) Low & reverse brake 3) Reduction gear 4) Differential gear oil level too high or too low
Noise occurs while driving in “D4”.	1) Final gear 2) Low & reverse brake 3) Planetary gear 4) Reduction gear 5) Differential gear oil level too high or too low
Engine stalls while shifting from one range to another.	1) Control valve 2) Lock-up damper 3) Engine performance
Vehicle moves when select lever is in “N”.	1) Control module 2) Inhibitor switch 3) Forward clutch
Shock occurs when select lever is moved from “N” to “D”.	1) Control module 2) Accumulator (“N” to “D”) 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from “N” to “D”.	1) Control module 2) Control valve 3) Forward clutch 4) Duty solenoid A 5) Forward clutch seal ring 6) Front gasket transmission case
Shock occurs when select lever is moved from “N” to “R”.	1) Control module 2) Accumulator (4A) 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from “N” to “R”.	1) Control valve 2) Low & reverse clutch 3) Reverse clutch 4) Duty solenoid A 5) Forward clutch seal ring 6) Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	1) Parking brake mechanism 2) Planetary gear

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	1) Strainer 2) Duty solenoid A 3) Control valve 4) Drive pinion 5) Hypoid gear 6) Axle shaft 7) Differential gear 8) Oil pump 9) Input shaft 10) Output shaft 11) Planetary gear 12) Drive plate 13) ATF level too low 14) Front gasket transmission case
Vehicle does not start in “R” range only (engine revving up).	1) Select cable 2) Select lever 3) Control valve 4) Low & reverse clutch 5) Reverse clutch
Vehicle does not start in “R” range only (engine stalls).	1) Forward clutch 2) Band brake 3) Planetary gear 4) Parking brake mechanism
Vehicle does not start in “D”, “3” or “2” range only (engine revving up).	1) Forward clutch 2) One-way clutch (1-2)
Vehicle does not start in “D”, “3”, “2” or “1” range only (engine revving up).	1) Forward clutch
Vehicle does not start in “D”, “3”, “2” or “1” range only (engine stalls).	1) Reverse clutch
Vehicle starts in “R” range only (engine revving up).	1) Control valve
Acceleration during standing starts is poor (high stall rpm).	1) Control valve 2) Forward clutch 3) Reverse clutch 4) ATF level too low 5) Front gasket transmission case
Acceleration during standing starts is poor (low stall rpm).	1) Oil pump 2) Torque converter one-way clutch 3) Engine performance
Acceleration is poor when select lever is in “D”, “3” or “2” range (normal stall rpm).	1) Control module 2) Control valve 3) High clutch 4) Brake band 5) Planetary gear
Acceleration is poor when select lever is in “R” (normal stall rpm).	1) Control module 2) Overrunning clutch 3) High clutch 4) Brake band 5) Planetary gear
No shift occurs from 1st to 2nd gear.	1) Control module 2) Vehicle speed sensor 1 3) Vehicle speed sensor 2 4) Throttle position sensor 5) Shift solenoid 1 6) Shift solenoid 2 7) Control valve 8) Brake band

Symptom	Problem parts
No shift occurs from 2nd to 3rd gear.	1) Control module 2) Control valve 3) High clutch 4) One-way clutch (3-4)
No shift occurs from 3rd to 4th gear.	1) Control module 2) Accumulator (3R) 3) ATF temperature sensor 4) Control valve 5) Band brake
Engine brake is not effected when select lever is in “3” range.	1) Inhibitor switch 2) Control module 3) Throttle position sensor 4) Control valve 5) Shift solenoid 3
Engine brake is not effected when select lever is in “3” or “2” range.	1) Control valve 2) Overrunning clutch
Engine brake is not effected when select lever is in “1” range.	1) Control valve 2) Low & reverse brake clutch
Shift characteristics are erroneous.	1) Inhibitor switch 2) Control module 3) Vehicle speed sensor 1 4) Vehicle speed sensor 2 5) Throttle position sensor 6) Control valve
No lock-up occurs.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Control valve 5) Lock-up facing 6) Engine speed signal
Parking brake is not effected.	1) Select cable 2) Select lever 3) Parking mechanism
Shift lever cannot be moved or is hard to move from “P” range.	
ATF spurts out.	1) ATF level too high
Differential oil spurts out.	1) Differential gear oil too high
Differential oil level changes excessively.	1) Seal pipe 2) Double oil seal
Odor is produced from ATF supply pipe.	1) Transfer clutch 2) Forward clutch 3) Overrunning clutch 4) High clutch 5) Band brake 6) Low & reverse clutch 7) Reverse clutch 8) Lock-up facing 9) ATF deterioration
Shock occurs from 1st to 2nd gear.	1) Control module 2) Throttle position sensor 3) Accumulator (2A) 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) Band brake 8) ATF deterioration 9) Engine performance 10) Dropping resistor

Symptom	Problem parts
Slippage occurs from 1st to 2nd gear.	1) Control module 2) Throttle position sensor 3) Accumulator (2A) 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) Band brake
Shock occurs from 2nd to 3rd gear.	1) Control module 2) Throttle position sensor 3) Accumulator (3R) 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) High clutch 8) Band brake 9) ATF deterioration 10) Engine performance 11) Dropping resistor
Slippage occurs from 2nd to 3rd gear.	1) Control module 2) Throttle position sensor 3) Accumulator (3R) 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) High clutch 8) Band brake
Shock occurs from 3rd to 4th gear.	1) Control module 2) Throttle position sensor 3) Accumulator 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) Overrunning clutch 8) Band brake 9) ATF deterioration 10) Engine performance
Slippage occurs from 3rd to 4th gear.	1) Control module 2) Throttle position sensor 3) Accumulator 4) ATF temperature sensor 5) Duty solenoid A 6) Control valve 7) Band brake
Shock occurs when select lever is moved from “3” to “2” range.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Duty solenoid A 5) Control valve 6) Overrunning clutch 7) Band brake 8) ATF deterioration
Shock occurs when select lever is moved from “D” to “1” range.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Duty solenoid A 5) Control valve 6) ATF deterioration 7) Low & reverse brake

Symptom	Problem parts
Shock occurs when select lever is moved from “2” to “1” range.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Duty solenoid A 5) Control valve 6) Low & reverse clutch 7) ATF deterioration
Shock occurs when accelerator pedal is released at medium speeds.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Duty solenoid A 5) Control valve 6) Lock-up damper 7) Engine performance
Vibration occurs during straight-forward operation.	1) Control module 2) Duty solenoid B 3) Lock-up facing 4) Lock-up damper
Vibration occurs during turns (tight corner “braking” phenomenon).	1) Control module 2) Vehicle speed sensor 1 3) Vehicle speed sensor 2 4) Throttle position sensor 5) ATF temperature sensor 6) Transfer clutch 7) Transfer valve 8) Duty solenoid C 9) ATF deterioration
Front wheel slippage occurs during standing starts.	1) Control module 2) Vehicle speed sensor 2 3) FWD switch 4) Throttle position sensor 5) ATF temperature sensor 6) Control valve 7) Transfer clutch 8) Transfer valve 9) Transfer pipe 10) Duty solenoid C 11) Transfer clutch hub
Vehicle is not set in FWD mode.	1) Control module 2) FWD switch 3) Transfer clutch 4) Transfer valve 5) Duty solenoid C
Select lever is hard to move.	1) Select cable 2) Select lever 3) Detent spring 4) Manual plate
Select lever is too high to move (unreasonable resistance).	1) Detent spring 2) Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	1) Select cable 2) Select lever 3) Detent spring 4) Manual plate

MEMO:

BRAKES 4-4

1. Supplemental Restraint System “Airbag”

Airbag system wiring harness is routed near the ABS sensor, ABS control module and hydraulic control unit.

CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
● Be careful not to damage Airbag system wiring harness when servicing the ABS sensor, ABS control module and hydraulic control unit.

2. Pre-inspection

Before performing diagnostics, check the following items which might affect ABS problems:

A: MECHANICAL INSPECTION

1. POWER SUPPLY

1) Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V, or more

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. BRAKE FLUID

1) Check brake fluid level.
2) Check brake fluid leakage.

3. BRAKE DRAG

Check brake drag. <Ref. to 4-4 [K100].>

4. BRAKE PAD AND ROTOR

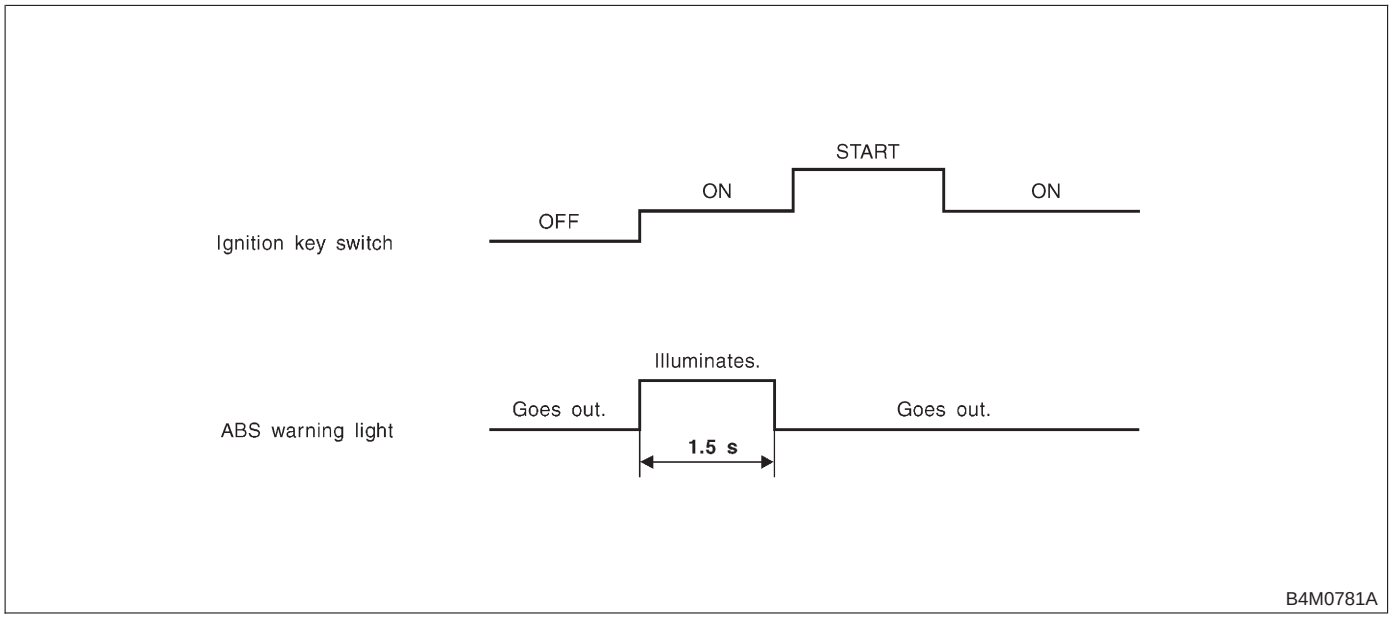
Check brake pad and rotor. <Ref. to 4-4 [K100].>

5. TIRE SPECIFICATIONS, TIRE WEAR AND AIR PRESSURE

Check tire specifications, tire wear and air pressure. <Ref. to 4-2 [S100].>, <Ref. to 4-2 [S200].>

B: ELECTRICAL INSPECTION

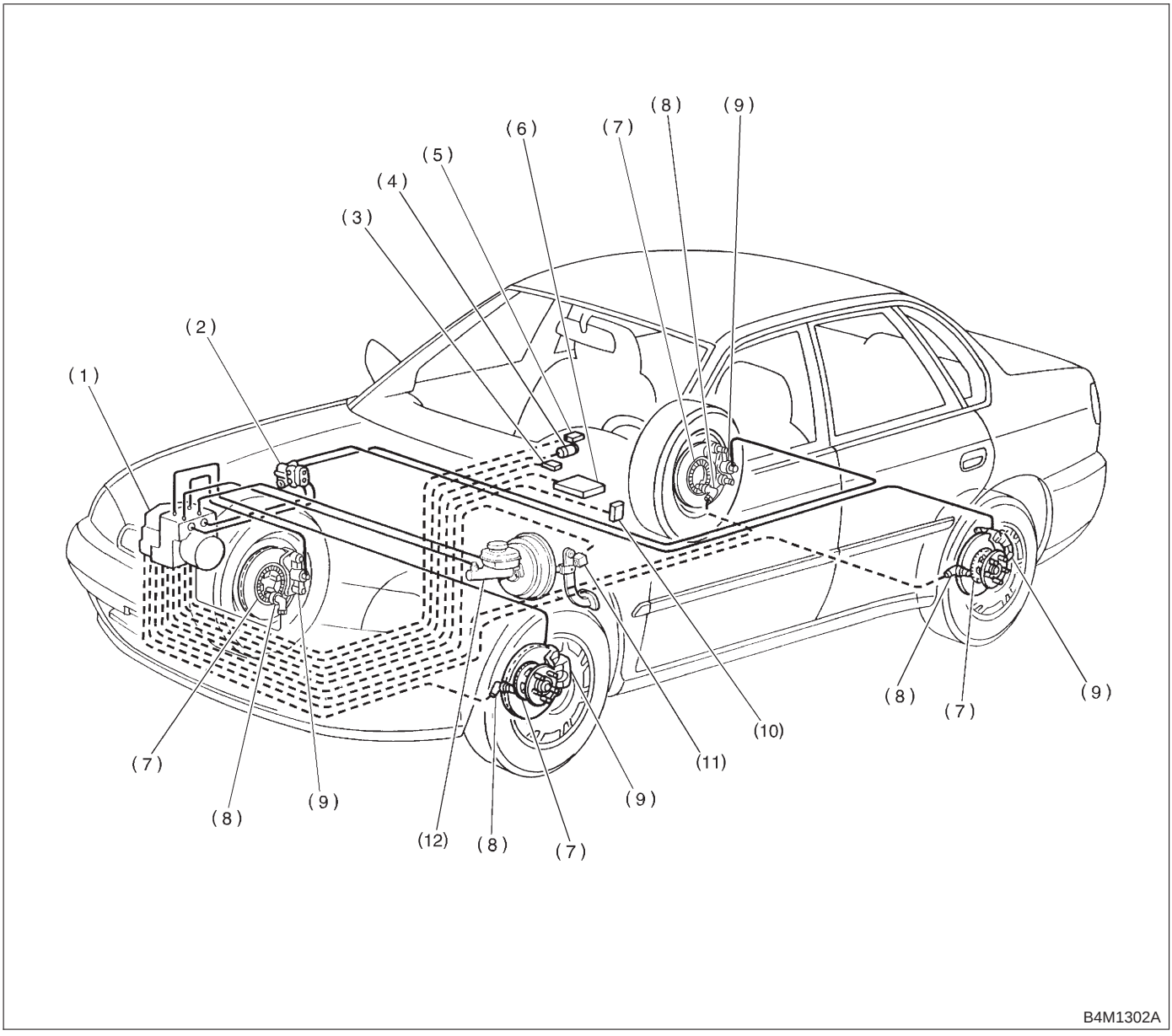
1. WARNING LIGHT ILLUMINATION PATTERN



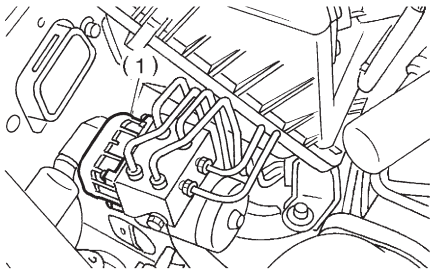
1) When the ABS warning light does not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
2) When the ABS warning light remains constantly OFF, repair the ABS warning light circuit or diagnosis circuit. <Ref. to 4-4 [T7A0].>

NOTE:
Even though the ABS warning light does not go out 1.5 seconds after it illuminates, the ABS system operates normally when the warning light goes out while driving at approximately 12 km/h (7 MPH). However, the Anti-lock brakes do not work while the ABS warning light is illuminated.

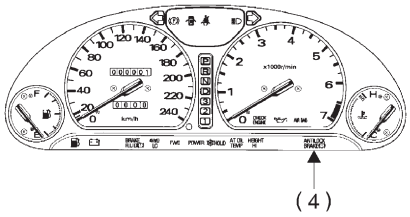
3. Electrical Components Location



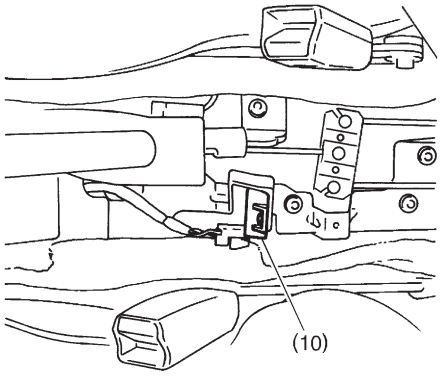
(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) Proportioning valve
(3) Diagnosis connector
(4) ABS warning light
(5) Data link connector (for Subaru select monitor)
(6) Transmission control module (only AT vehicle)
(7) Tone wheel
(8) ABS sensor
(9) Wheel cylinder
(10) G sensor (only AWD vehicle)
(11) Brake switch
(12) Master cylinder



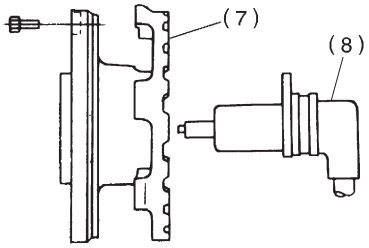
B4M1226C



B4M0230E



B4M0786D



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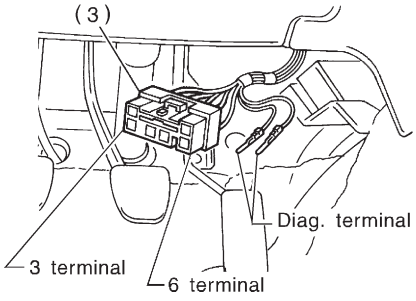
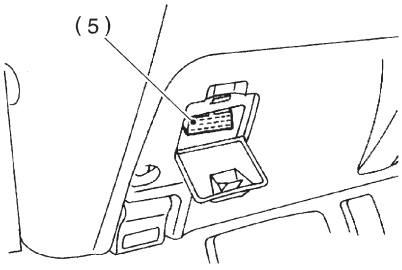
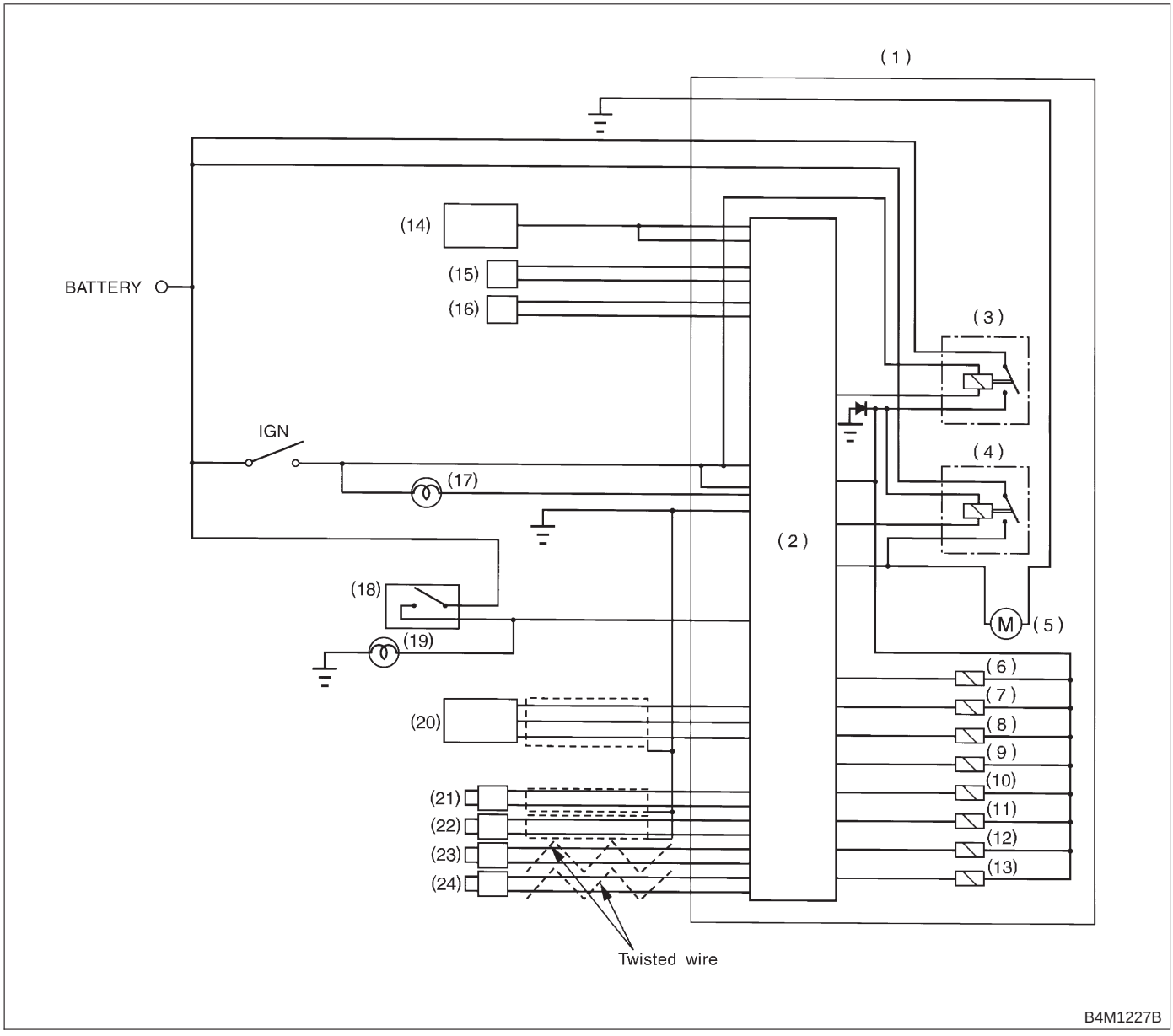


B4M0231F



B4M1303A

4. Schematic

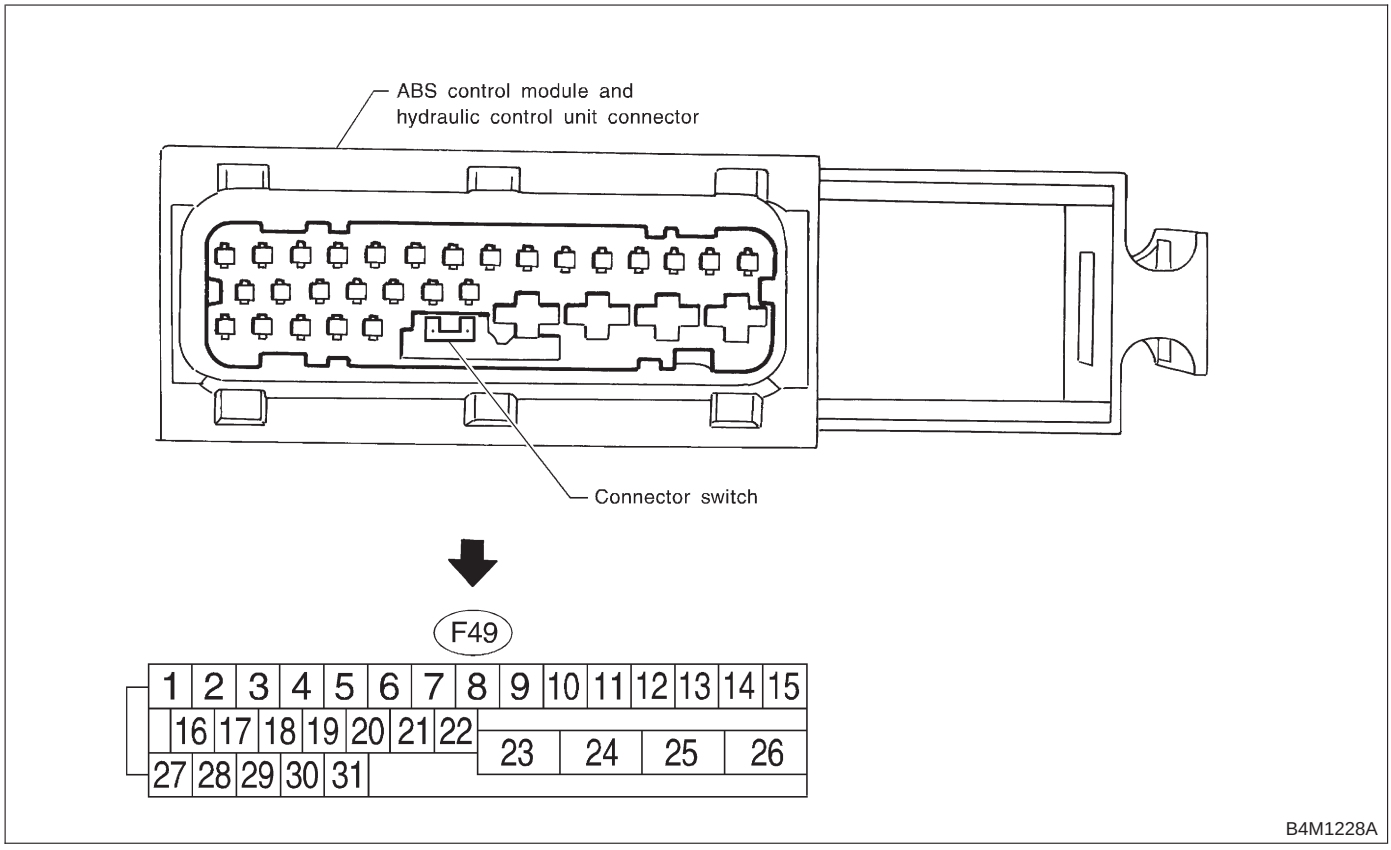


(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) ABS control module area
(3) Valve relay
(4) Motor relay
(5) Motor
(6) Front left inlet solenoid valve
(7) Front left outlet solenoid valve
(8) Front right inlet solenoid valve
(9) Front right outlet solenoid valve
(10) Rear left inlet solenoid valve
(11) Rear left outlet solenoid valve
(12) Rear right inlet solenoid valve
(13) Rear right outlet solenoid valve
(14) Transmission control module (only AT model)
(15) Diagnosis connector
(16) Data link connector
(17) ABS warning light
(18) Stop light switch
(19) Stop light
(20) G sensor (only AWD model)
(21) Front left ABS sensor
(22) Front right ABS sensor
(23) Rear left ABS sensor
(24) Rear right ABS sensor

MEMO:

5. Control Module I/O Signal

A: I/O SIGNAL VOLTAGE

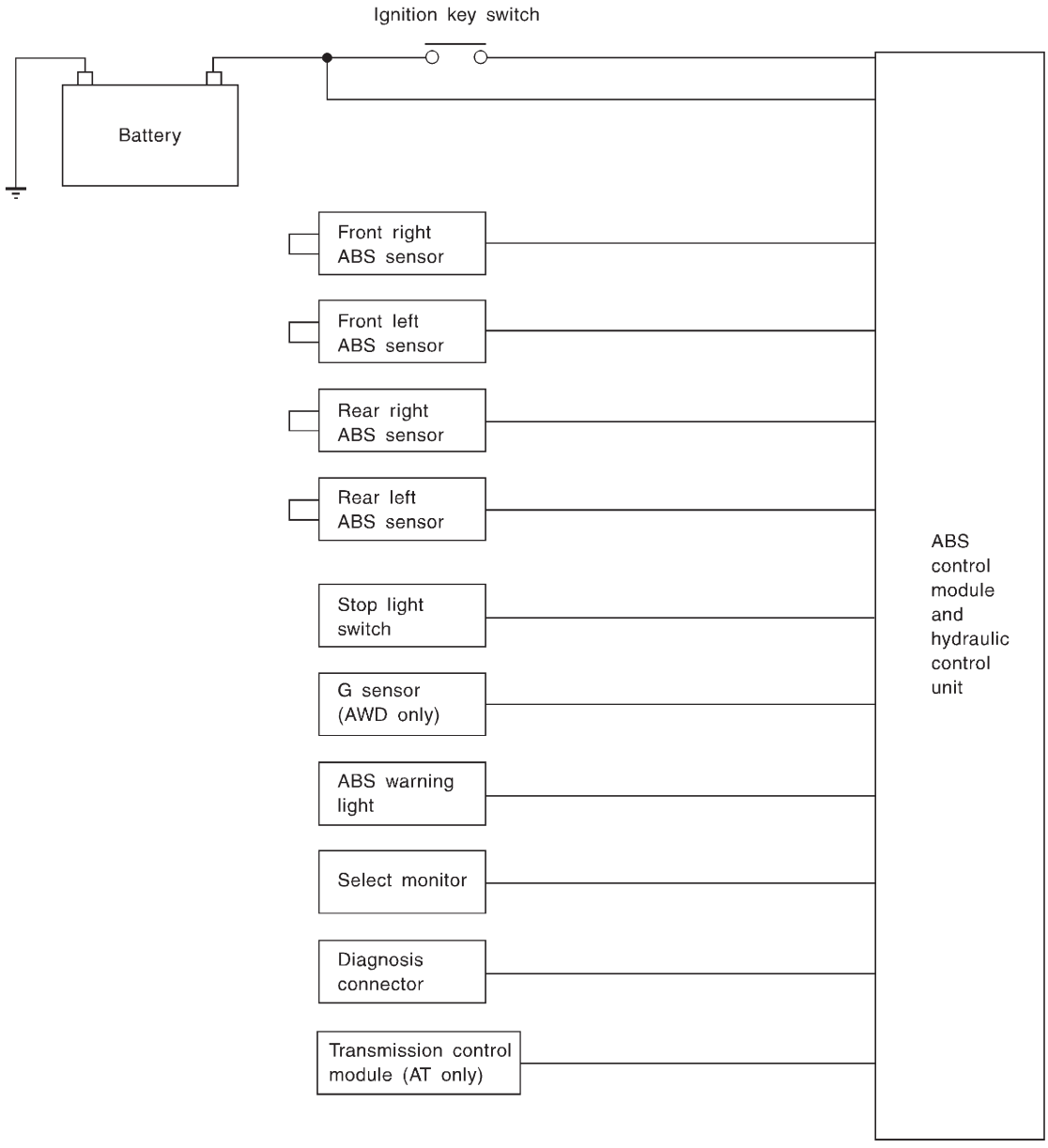


NOTE:
- The terminal numbers in the ABS control module and hydraulic control unit connector are as shown in the figure.
- When the connector is removed from the ABSCM&H/U, the connector switch closes the circuit between terminal No. 21 and No. 23. The ABS warning light illuminates.

Contents		Terminal No. (+) — (−)	Input/Output signal Measured value and measuring conditions
ABS sensor*2 (Wheel speed sensor)	Front left wheel	9 — 10	0.12 — 1 V (When it is 20 Hz.)
	Front right wheel	11 — 12	
	Rear left wheel	7 — 8	
	Rear right wheel	14 — 15	
Valve relay power supply		24 — 23	10 — 15 V when ignition switch is ON.
Motor relay power supply		25 — 23	10 — 15 V when ignition switch is ON.
G sensor*2 (AWD model only)	power supply	30 — 28	4.75 — 5.25 V
	ground	28	—
	output	6 — 28	2.3±0.2 V when vehicle is in horizontal position.
Stop light switch*1		2 — 23	Less than 1.5 V when the stop light is OFF and, 10 — 15 V when the stop light is ON.
ABS warning light*2		21 — 23	Less than 1.5 V during 1.5 seconds when ignition switch is ON, and 10 — 15 V after 1.5 seconds.
AT ABS signal*2 (AT model only)		31 — 23	Less than 1.5 V when the ABS control does not operate still and more than 5.5 V when ABS operates.
ABS operation signal monitor*2		3 — 23	Less than 1.5 V when the ABS control does not operate still and more than 5.5 V when ABS operates.
Select monitor*2	Data is received.	20 — 23	Less than 1.5 V when no data is received.
	Data is sent.	5 — 23	4.75 — 5.25 V when no data is sent.
ABS diagnosis connector*2	Terminal No. 3	29 — 23	10 — 15 V when ignition switch is ON.
	Terminal No. 6	4 — 23	10 — 15 V when ignition switch is ON.
Power supply*1		1 — 23	10 — 15 V when ignition switch is ON.
Grounding line		23	—
Grounding line		26	—

*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.
*2: Measure the I/O signal voltage at connector (F2) or (F1).

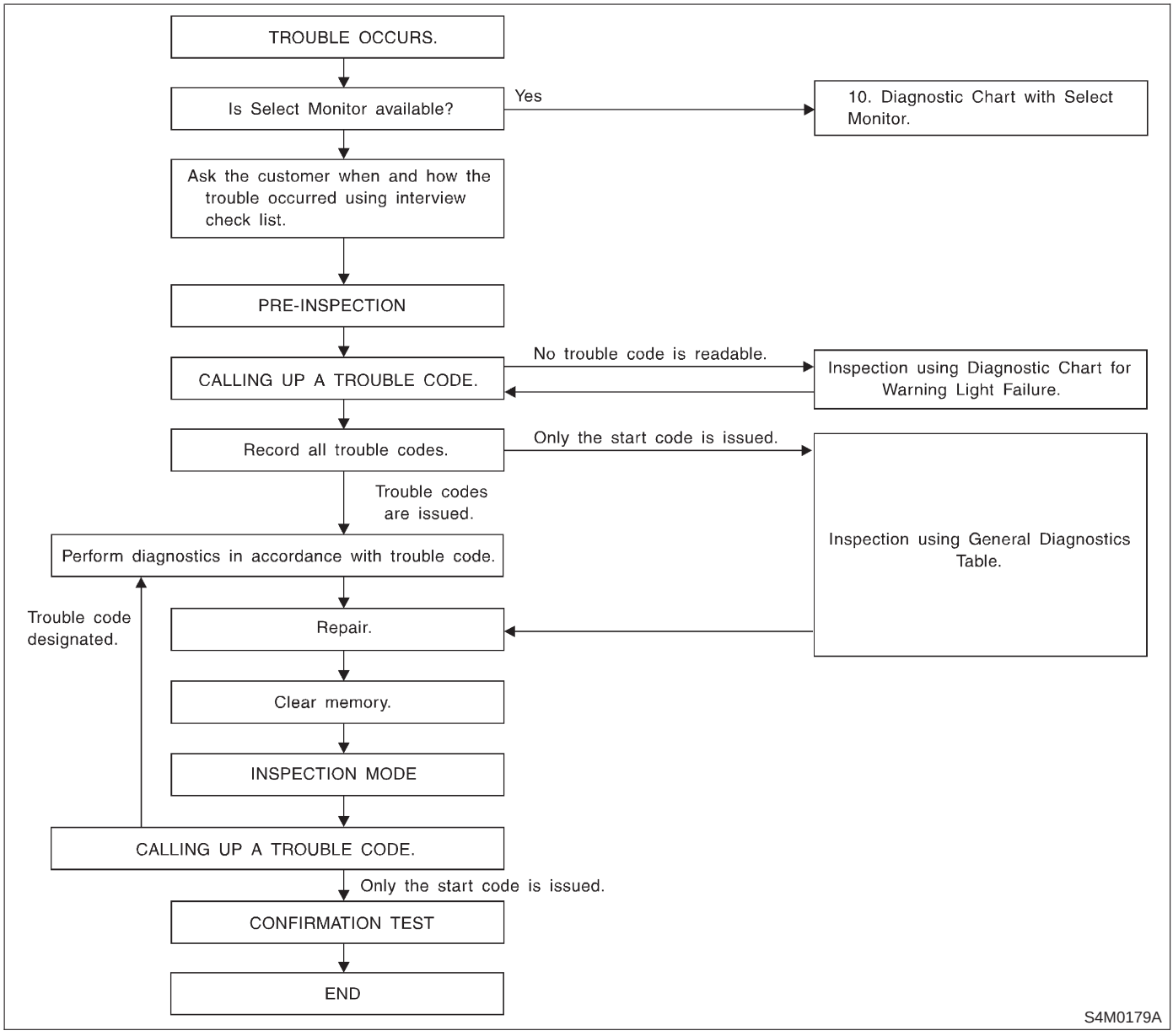
B: I/O SIGNAL DIAGRAM



B4M1229A

6. Diagnostics Chart for On-board Diagnosis System

A: BASIC DIAGNOSTICS PROCEDURE



CAUTION:
Remove foreign matter (dust, water, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:
- To check harness for broken wires or short circuits, shake it while holding it or the connector.
- When ABS warning light illuminates, read and record trouble code indicated by ABS warning light.

B: CHECK LIST FOR INTERVIEW

Check The Following Items About The Vehicle's State.

1. THE STATE OF THE ABS WARNING LIGHT

ABS warning light comes on.	☐ Always ☐ Sometimes ☐ Only once ☐ Does not come on ● When / how long does it come on?:		
Ignition key position	☐ LOCK ☐ ACC ☐ ON (before starting engine) ☐ START ☐ On after starting (Engine is running) ☐ On after starting (Engine is stop)		
Timing	☐ Immediately after ignition is ON. ☐ Immediately after ignition starts.		
	☐ When advancing	km/h to	km/h
		MPH to	MPH
	☐ While traveling at a constant speed	km/h	MPH
	☐ When decelerating	km/h to	km/h
		MPH to	MPH
	☐When turning to right	Steering angle :	deg
		Steering time :	sec
	☐ When turning to left	Steering angle :	deg
		Steering time :	sec
	☐ When moving other electrical parts		
	● Parts name : ● Operating condition :		

2. SYMPTOMS

ABS operating condition	☐ Performs no work.		
	☐ Operates only when abruptly applying brakes.	Vehicle speed :	km/h
			MPH
	● How to step on brake pedal :		
	a) Operating time :		sec
	b) Operating noise : ☐ Produce / ☐ Does not produce		
	● What kind of noise?	☐ Knock ☐ Gong gong ☐ Bong ☐ Buzz ☐ Gong gong buzz ☐ Others :	
	c) Reaction force of brake pedal		
		☐ Stick ☐ Press down once with a clunk ☐ Press and released ☐ Others :	

Behavior of vehicle	a) Directional stability cannot be obtained or steering arm refuses to work when applying brakes : ☐ Yes / ☐ No	
	● When :	☐ Vehicle turns to right ☐ Vehicle turns to left ☐ Spins ☐ Others :
	b) Directional stability cannot be obtained or steering arm refuses to work when accelerating : ☐ Yes / ☐ No	
	● When :	☐ Vehicle turns to right ☐ Vehicle turns to left ☐ Spins ☐ Others :
	c) Brakes are out of order : ☐ Yes / ☐ No	
	● What :	☐ Braking distance is long ☐ Brakes lock or drag ☐ Pedal stroke is long ☐ Pedal sticks ☐ Others :
	d) Poor acceleration : ☐ Yes / ☐ No	
	● What :	☐ Fails to accelerate ☐ Engine stalls ☐ Others :
	e) Occurrence of vibration : ☐ Yes / ☐ No	
	● Where ● What kind :	
	f) Occurrence of abnormal noise : ☐ Yes / ☐ No	
	● Where ● What kind :	
	g) Occurrence of other phenomena : ☐ Yes / ☐ No	
	● What kind :	

3. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others :
	b) Ambient temperature	°F (°C)
	c) Road	☐ Urban area ☐ Suburbs ☐ Highway ☐ General road ☐ Ascending slope ☐ Descending slope ☐ Paved road ☐ Gravel road ☐ Muddy road ☐ Sandy place ☐ Others :
	d) Road surface	☐ Dry ☐ Wet ☐ New-fallen snow ☐ Compressed snow ☐ Frozen slope ☐ Others :

Condition	a) Brakes	Deceleration :	g
		☐ Continuous / ☐ Intermittent	
	b) Accelerator	Acceleration :	g
		☐ Continuous / ☐ Intermittent	
	c) Vehicle speed	km/h	MPH
		☐ Advancing ☐ Accelerating ☐ Reducing speed ☐ Low speed ☐ Turning ☐ Others :	
	d) Tire inflation pressure	Front RH tire :	kPa
		Front LH tire :	kPa
		Rear RH tire :	kPa
		Rear LH tire :	kPa
	e) Degree of wear	Front RH tire :	
		Front LH tire :	
		Rear RH tire :	
		Rear LH tire :	
	f) Genuine parts are used. : ☐Yes / ☐No		
	g) Chain is passed around tires. : ☐Yes / ☐No		
	h) T tire is used. : ☐Yes / ☐No		
	i) Condition of suspension alignment :		
	j) Loading state :		
	k) Repair parts are used. : ☐Yes / ☐No		
	● What :		
	l) Others :		

C: INSPECTION MODE

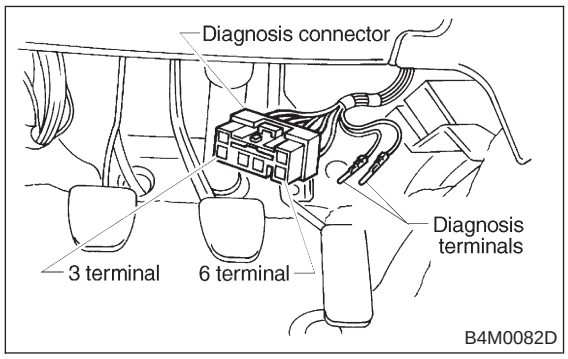
Reproduce the condition under which the problem has occurred as much as possible.
Drive the vehicle at a speed more than 40 km/h (25 MPH) for at least one minute.

D: TROUBLE CODES

When on-board diagnosis of the ABS control module detects a problem, the information (up to a maximum of three) will be stored in the EEP ROM as a trouble code. When there are more than three, the most recent three will be stored. (Stored codes will stay in memory until they are cleared.)

1. CALLING UP A TROUBLE CODE

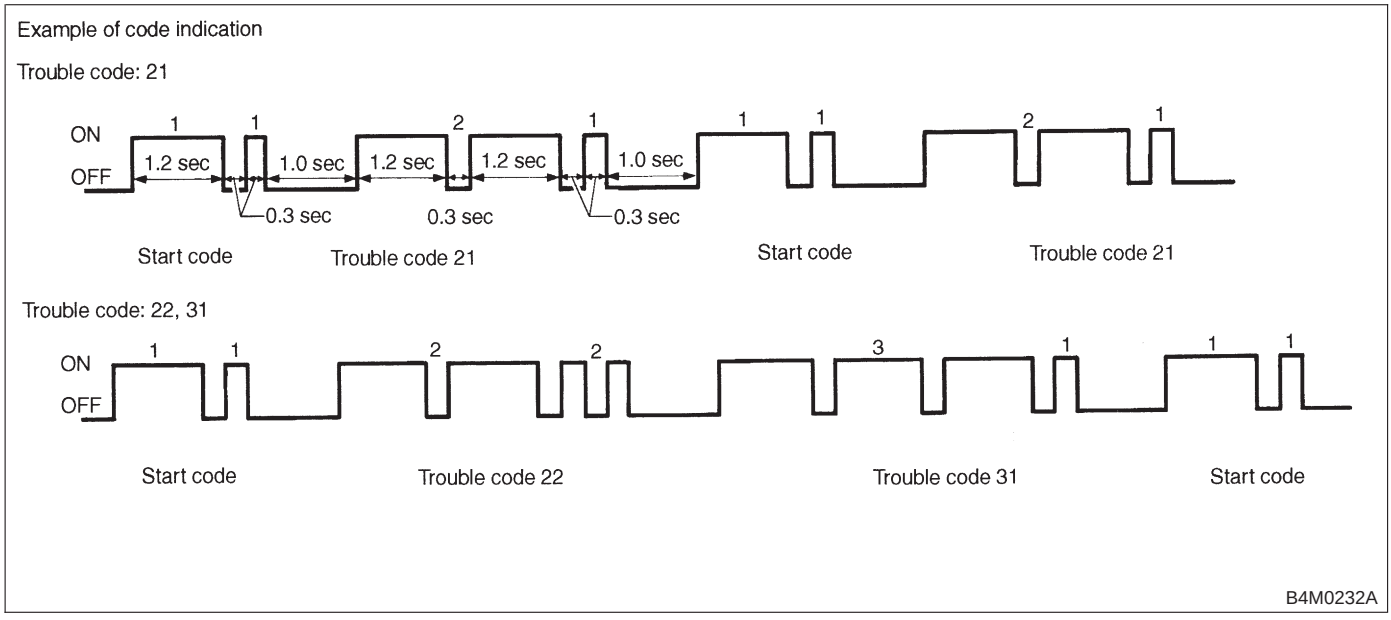
1) Take out diagnosis connector from side of driver's seat heater unit.



2) Turn ignition switch OFF.
3) Connect diagnosis connector terminal 6 to diagnosis terminal.
4) Turn ignition switch ON.
5) ABS warning light is set in the diagnostic mode and blinks to identify trouble code.

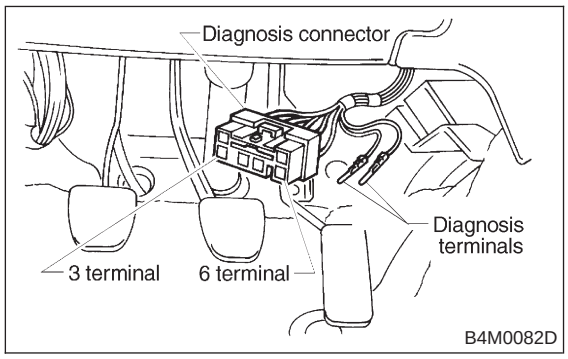
6) After the start code (11) is shown, the trouble codes will be shown in order of the last information first. These repeat for a maximum of 5 minutes.

NOTE:
When there are no trouble codes in memory, only the start code (11) is shown.

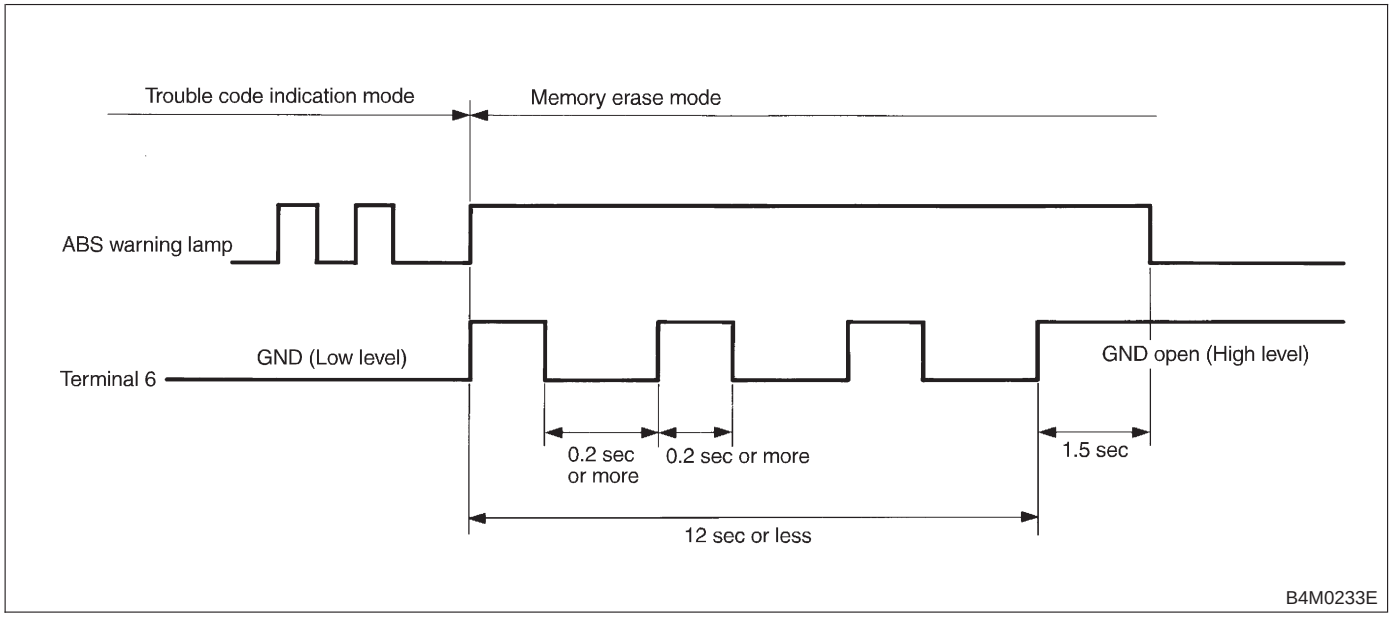


2. CLEARING MEMORY

1) After calling up a trouble code, disconnect diagnosis connector terminal 6 from diagnosis terminal.



2) Repeat 3 times within approx. 12 seconds; connecting and disconnecting terminal 6 and diagnosis terminal for at least 0.2 seconds each time.



NOTE:
After diagnostics is completed, make sure to clear memory. Make sure only start code (11) is shown after memory is cleared.

MEMO:

7. Diagnostics Chart for ABS Warning Light Circuit and Diagnosis Circuit Failure

A: ABS WARNING LIGHT DOES NOT COME ON.

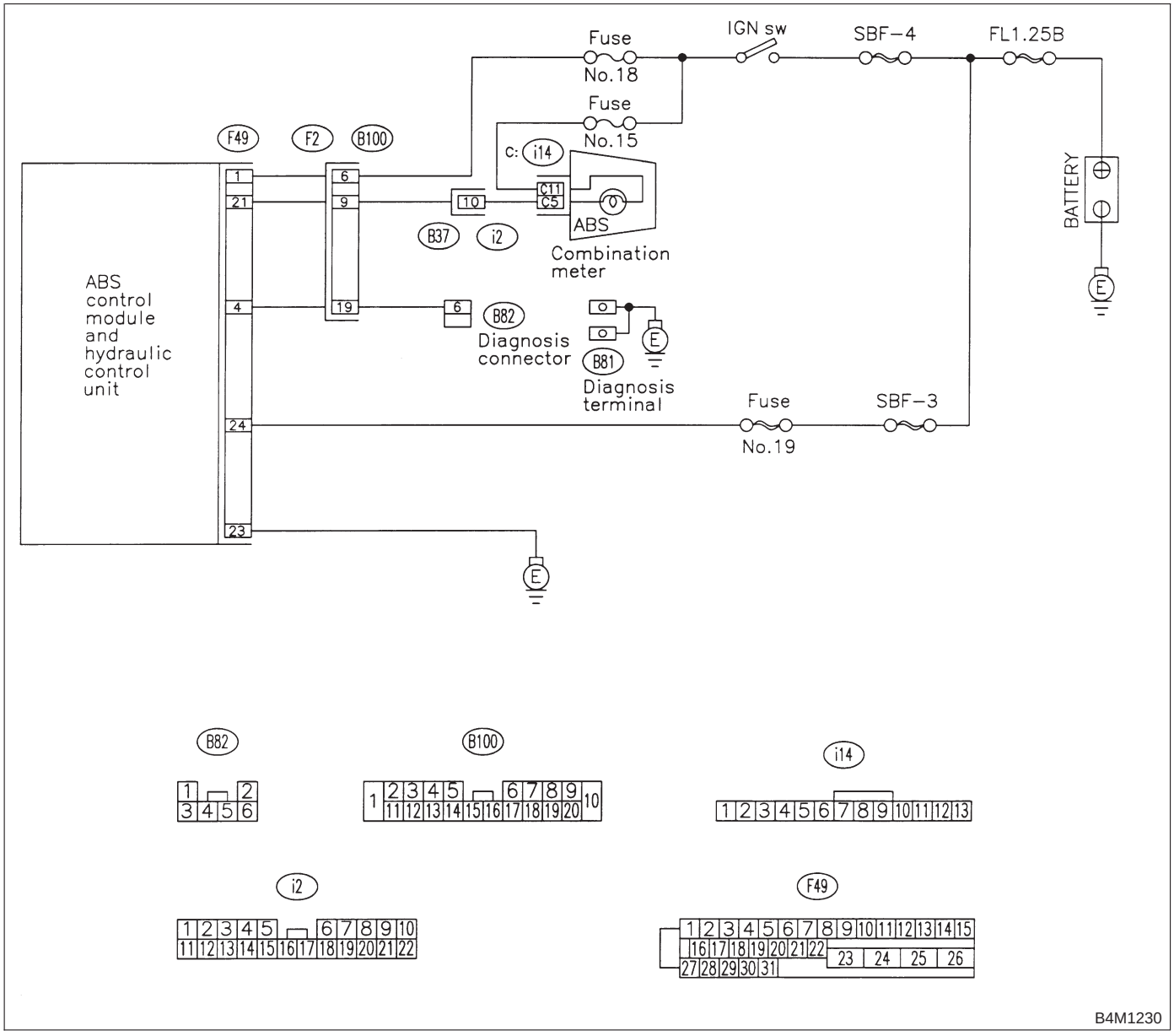
DIAGNOSIS:

- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:

- When ignition switch is turned ON (engine OFF), ABS warning light does not come on.

WIRING DIAGRAM:



7A1 : CHECK IF OTHER WARNING LIGHTS TURN ON.

Turn ignition switch to ON (engine OFF).

CHECK : ***Do other warning lights turn on?***
YES : Go to step **7A2**.
NO : Repair combination meter.

7A2 : CHECK ABS WARNING LIGHT BULB.

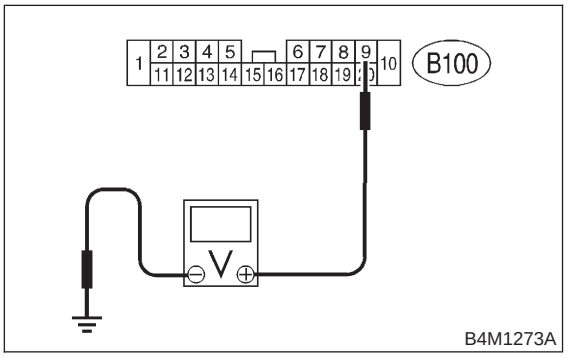
1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Remove ABS warning light bulb from combination meter.

CHECK : ***Is ABS warning light bulb OK?***
YES : Go to step **7A3**.
NO : Replace ABS warning light bulb.

7A3 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

1) Disconnect connector (B100) from connector (F2).
2) Measure voltage between connector (B100) and chassis ground.

Connector & terminal
(B100) No. 9 (+) — Chassis ground (−):

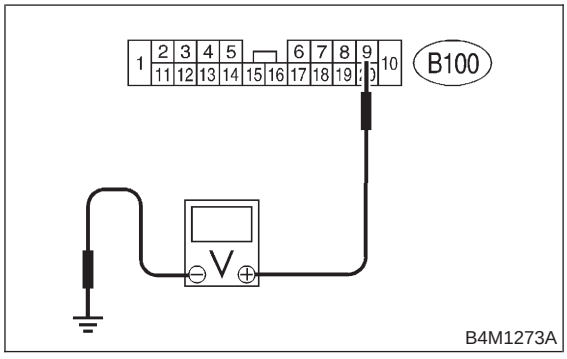


CHECK : ***Is the voltage less than 3 V?***
YES : Go to step **7A4**.
NO : Repair warning light harness.

7A4 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

1) Turn ignition switch to ON.
2) Measure voltage between connector (B100) and chassis ground.

Connector & terminal
(B100) No. 9 (+) — Chassis ground (−):

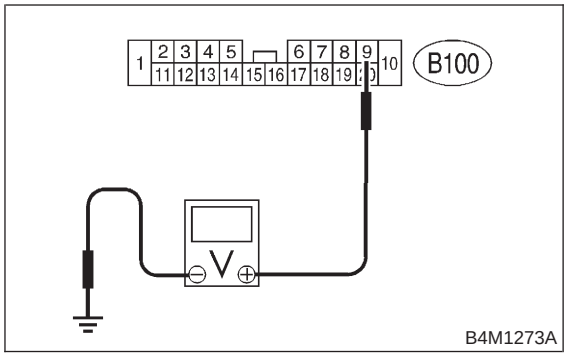


CHECK : ***Is voltage less than 3 V?***
YES : Go to step **7A5**.
NO : Repair warning light harness.

7A5 : CHECK WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Install ABS warning light bulb from combination meter.
3) Install combination meter.
4) Turn ignition switch to ON.
5) Measure voltage between connector (B100) and chassis ground.

Connector & terminal
(B100) No. 9 (+) — Chassis ground (−):

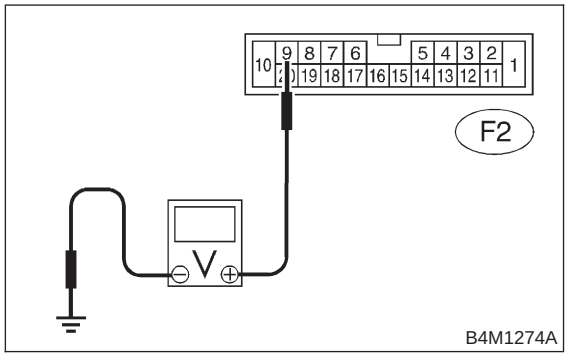


CHECK : ***Is voltage between 10 V and 15 V?***
YES : Go to step **7A6**.
NO : Repair wiring harness.

7A6 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

1) Turn ignition switch to OFF.
2) Measure voltage between connector (F2) and chassis ground.

Connector & terminal
(F2) No. 9 (+) — Chassis ground (−):

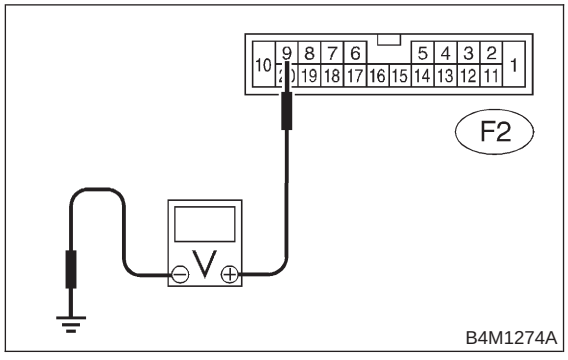


CHECK : ***Is the voltage less than 3 V?***
YES : Go to step **7A7**.
NO : Repair wiring harness.

7A7 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

1) Turn ignition switch to ON.
2) Measure voltage between connector (F2) and chassis ground.

Connector & terminal
(F2) No. 9 (+) — Chassis ground (−):

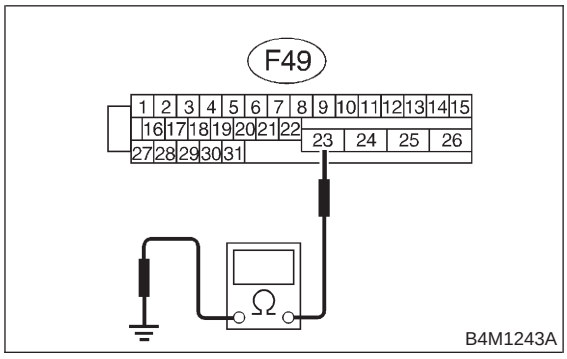


CHECK : ***Is voltage less than 3 V?***
YES : Go to step **7A8**.
NO : Repair wiring harness.

7A8 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal
(F49) No. 23 — GND:

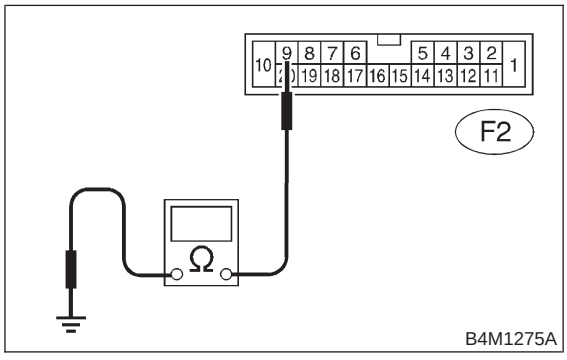


CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **7A9**.
NO : Repair ABSCM&H/U ground harness.

7A9 : CHECK WIRING HARNESS.

Measure resistance between connector (F2) and chassis ground.

Connector & terminal
(F2) No. 9 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **7A10**.
NO : Repair harness/connector.

7A10 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connectors between combination meter and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***

YES : Repair connector.

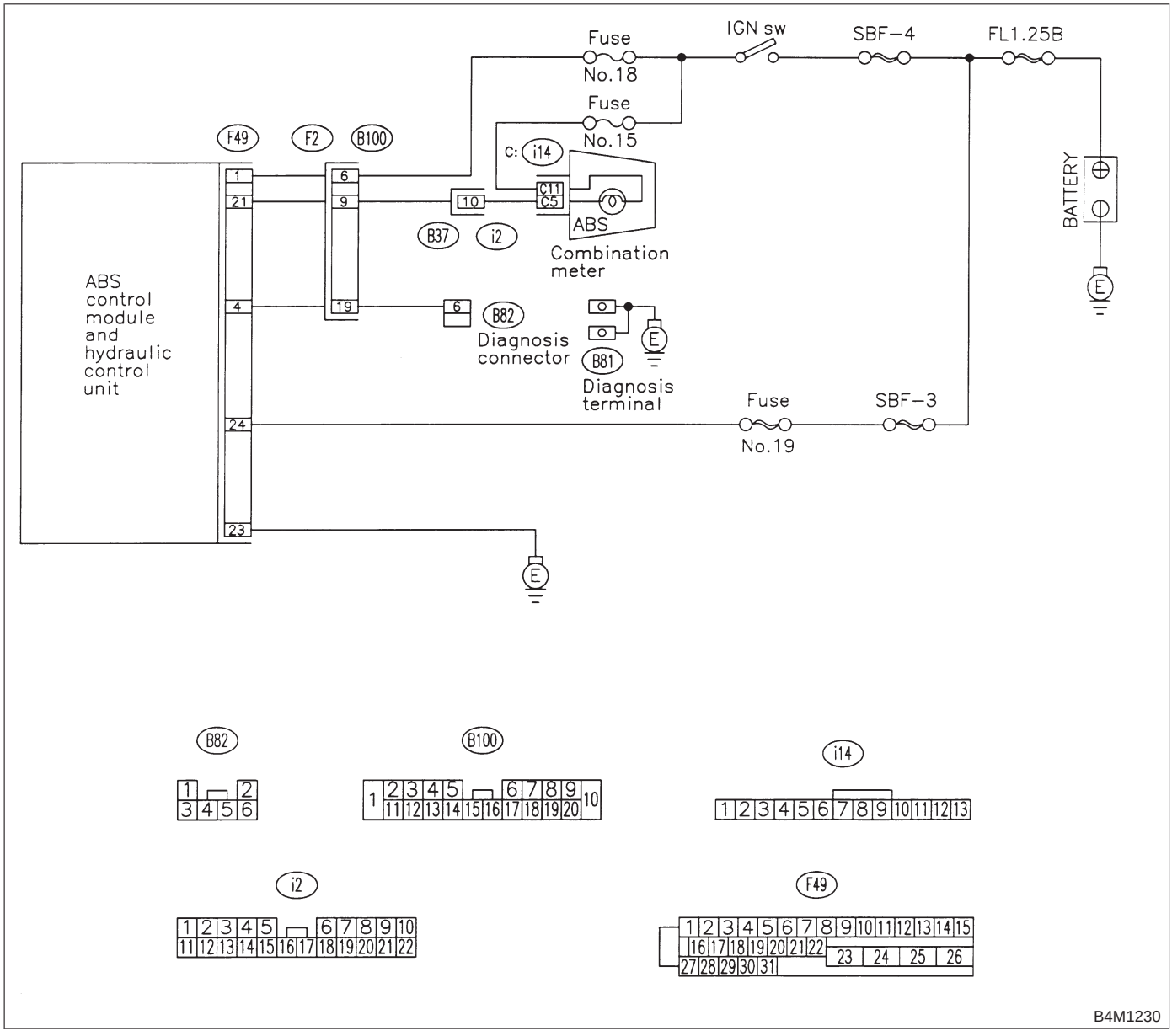
NO : Replace ABSCM&H/U.

B: ABS WARNING LIGHT DOES NOT GO OFF.

DIAGNOSIS:
- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:
- When starting the engine and while ABS warning light is kept ON.

WIRING DIAGRAM:



7B1 : CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.

Turn ignition switch to OFF.

CHECK : ***Is ABSCM&H/U connector inserted into ABSCM until the clamp locks onto it?***

YES : Go to step **7B2**.

NO : Insert ABSCM&H/U connector into ABSCM&H/U until the clamp locks onto it.

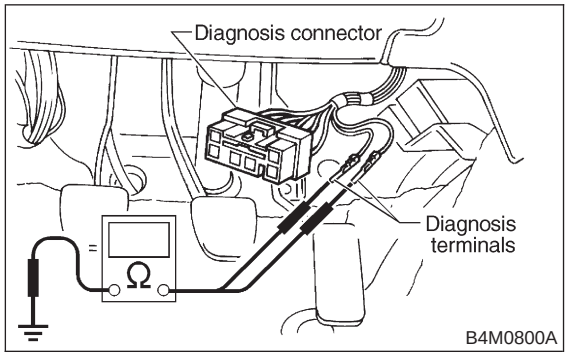
7B2 : CHECK DIAGNOSIS TERMINAL.

Measure resistance between diagnosis terminals (B81) and chassis ground.

Terminals

Diagnosis terminal (A) — Chassis ground:

Diagnosis terminal (B) — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***

YES : Go to step **7B3**.

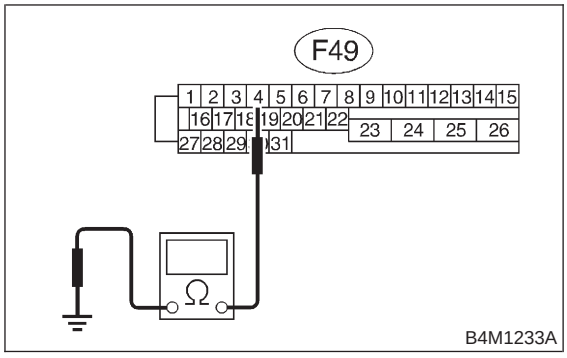
NO : Repair diagnosis terminal harness.

7B3 : CHECK DIAGNOSIS LINE.

1) Turn ignition switch to OFF.
2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 6.
3) Disconnect connector from ABSCM&H/U.
4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 4 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***

YES : Go to step **7B4**.

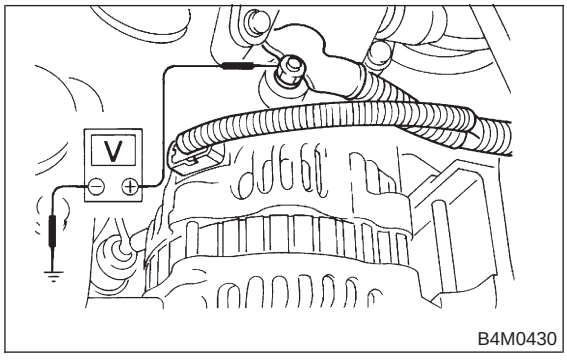
NO : Repair harness connector between ABSCM&H/U and diagnosis connector.

7B4 : CHECK GENERATOR.

1) Start the engine.
2) Idle the engine.
3) Measure voltage between generator and chassis ground.

Terminal

Generator B terminal (+) — Chassis ground (−):



CHECK : ***Is the voltage between 10 and 15 V?***

YES : Go to step **7B5**.

NO : Repair generator.

7B5 : CHECK BATTERY TERMINAL.

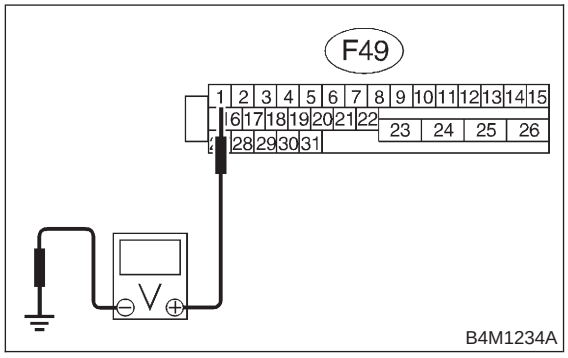
Turn ignition switch to OFF.

CHECK : ***Is there poor contact at battery terminal?***
YES : Repair battery terminal.
NO : Go to step **7B6**.

7B6 : CHECK POWER SUPPLY OF ABSCM.

1) Disconnect connector from ABSCM&H/U.
2) Start engine.
3) Idle the engine.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage between 10 and 15 V?***
YES : Go to step **7B7**.
NO : Repair ABSCM&H/U power supply circuit.

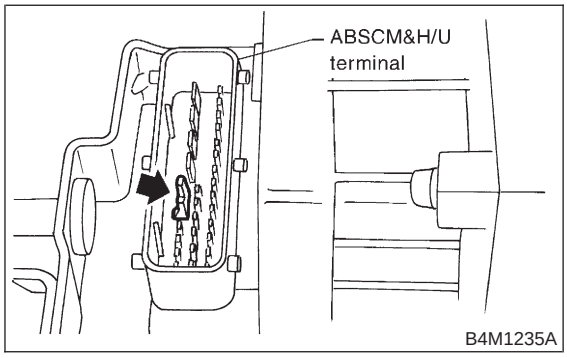
7B7 : CHECK WIRING HARNESS.

1) Disconnect connector (F2) from connector (B100).
2) Turn ignition switch to ON.

CHECK : ***Does the ABS warning light remain off?***
YES : Go to step **7B8**.
NO : Repair front wiring harness.

7B8 : CHECK PROJECTION AT ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Check for broken projection at the ABSCM&H/U terminal.

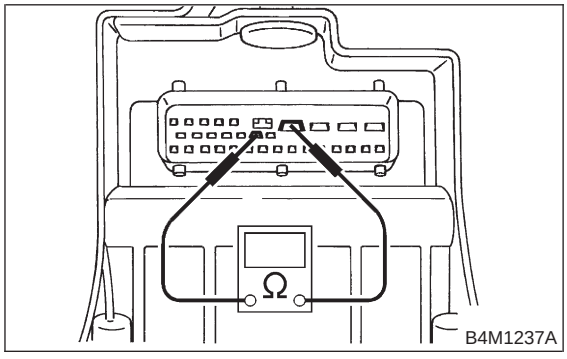


CHECK : ***Are the projection broken?***
YES : Go to step **7B9**.
NO : Replace ABSCM&H/U.

7B9 : CHECK ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminal
No. 21 — No. 23:

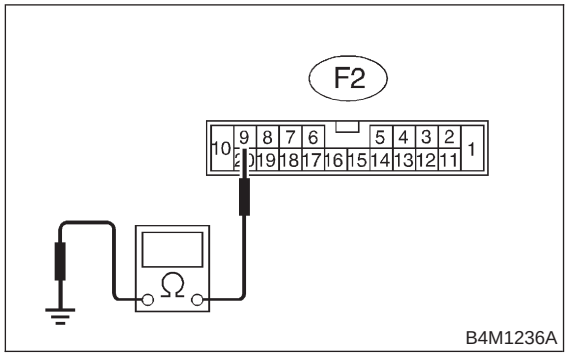


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **7B10**.
NO : Replace ABSCM&H/U.

7B10 : CHECK WIRING HARNESS.

Measure resistance between connector (F2) and chassis ground.

Connector & terminal
(F2) No. 9 — Chassis ground:

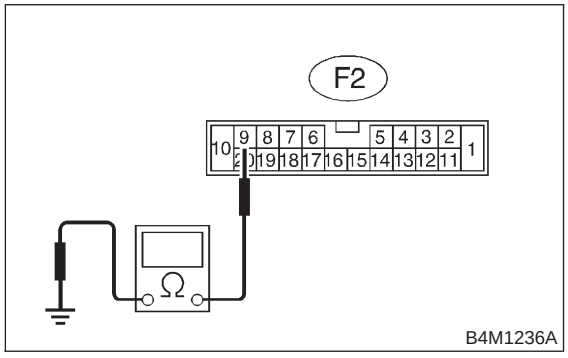


CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **7B11**.
NO : Repair harness.

7B11 : CHECK WIRING HARNESS.

1) Connect connector to ABSCM&H/U.
2) Measure resistance between connector (F2) and chassis ground.

Connector & terminal
(F2) No. 9 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **7B12**.
NO : Repair harness.

7B12 : CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.

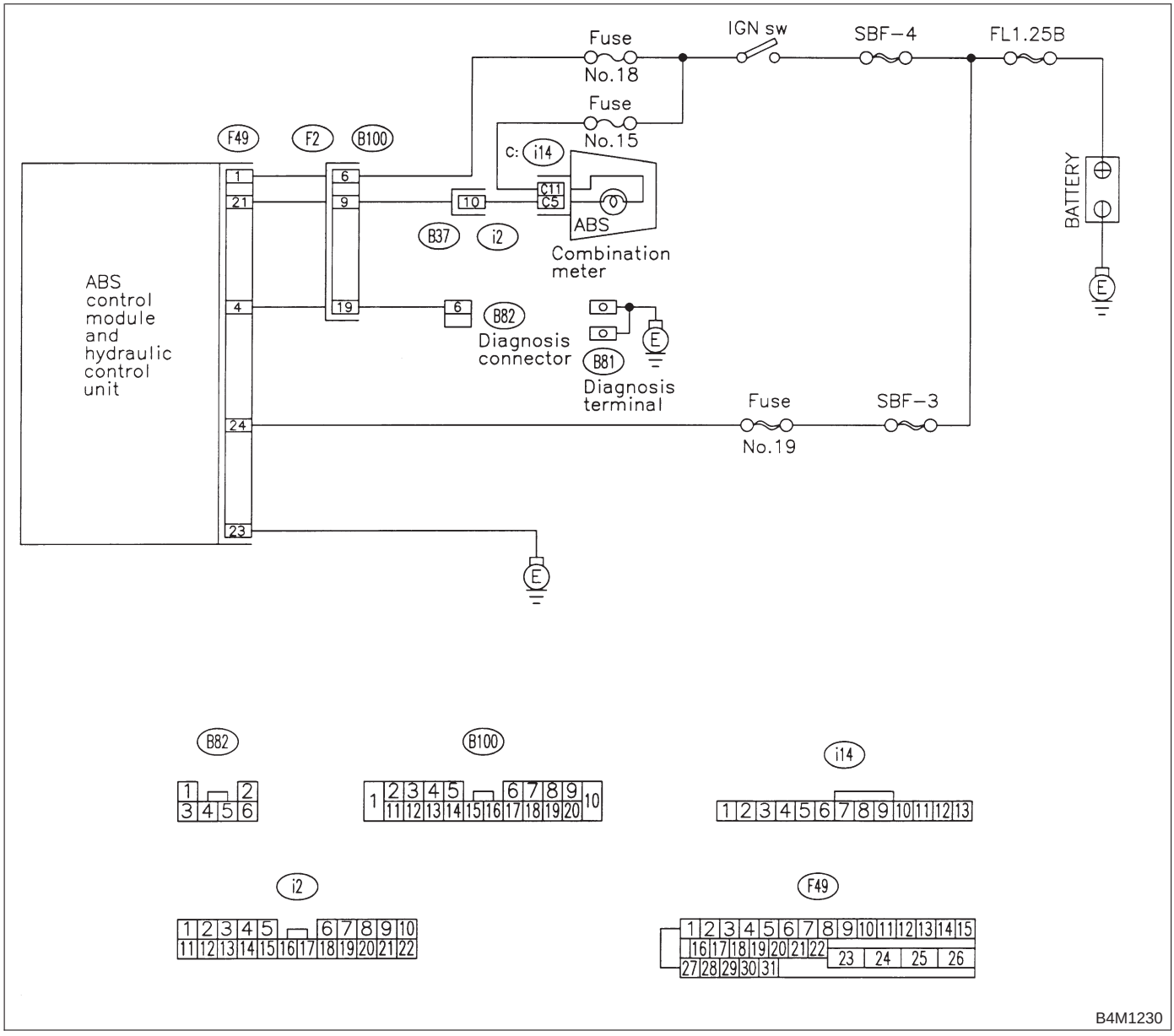
CHECK : ***Is there poor contact in ABSCM&H/U connector? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Replace ABSCM&H/U.

C: TROUBLE CODE DOES NOT APPEAR.

DIAGNOSIS:
- Diagnosis circuit is open.

TROUBLE SYMPTOM:
- The ABS warning light turns on or off normally but the start code cannot be read out in the diagnostic mode.

WIRING DIAGRAM:



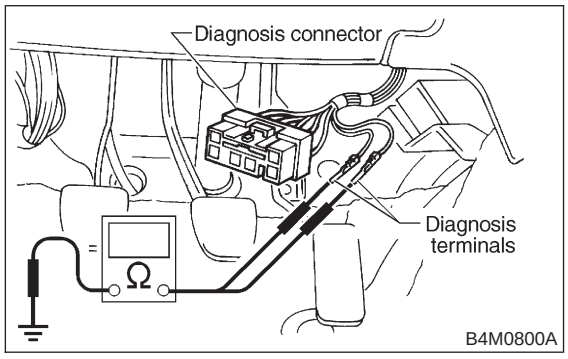
7C1 : CHECK DIAGNOSIS TERMINAL.

Measure resistance between diagnosis terminals (B81) and chassis ground.

Terminals

Diagnosis terminal (A) — Chassis ground:

Diagnosis terminal (B) — Chassis ground:



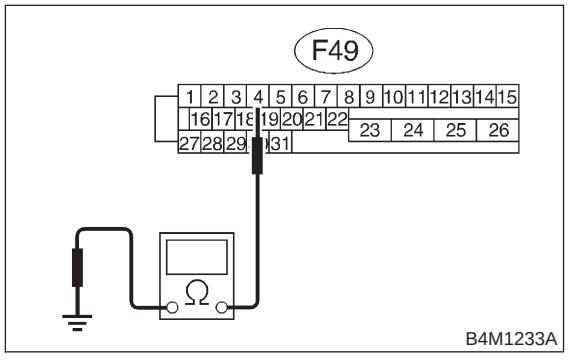
CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **7C2**.
NO : Repair diagnosis terminal harness.

7C2 : CHECK DIAGNOSIS LINE.

1) Turn ignition switch to OFF.
2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 6.
3) Disconnect connector from ABSCM&H/U.
4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 4 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **7C3**.
NO : Repair harness connector between ABSCM&H/U and diagnosis connector.

7C3 : CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.

CHECK : ***Is there poor contact in ABSCM&H/U connector? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Replace ABSCM&H/U.

MEMO:

8. Diagnostics Chart with Trouble Code by ABS Warning Light

A: LIST OF TROUBLE CODE

Trouble code	Contents of diagnosis		Index No.
11	Start code ● Trouble code is shown after start code. ● Only start code is shown in normal condition.		—
21	Abnormal ABS sensor (Open circuit or input voltage too high)	Front right ABS sensor	<Ref. to 4-4 [T8B0].>
23		Front left ABS sensor	<Ref. to 4-4 [T8C0].>
25		Rear right ABS sensor	<Ref. to 4-4 [T8D0].>
27		Rear left ABS sensor	<Ref. to 4-4 [T8E0].>
22	Abnormal ABS sensor (Abnormal ABS sensor signal)	Front right ABS sensor	<Ref. to 4-4 [T8F0].>
24		Front left ABS sensor	<Ref. to 4-4 [T8G0].>
26		Rear right ABS sensor	<Ref. to 4-4 [T8H0].>
28		Rear left ABS sensor	<Ref. to 4-4 [T8I0].>
29		Any one of four	<Ref. to 4-4 [T8J0].>
31	Abnormal solenoid valve circuit(s) in ABS control module and hydraulic unit	Front right inlet valve	<Ref. to 4-4 [T8K0].>
32		Front right outlet valve	<Ref. to 4-4 [T8O0].>
33		Front left inlet valve	<Ref. to 4-4 [T8L0].>
34		Front left outlet valve	<Ref. to 4-4 [T8P0].>
35		Rear right inlet valve	<Ref. to 4-4 [T8M0].>
36		Rear right outlet valve	<Ref. to 4-4 [T8Q0].>
37		Rear left inlet valve	<Ref. to 4-4 [T8N0].>
38		Rear left outlet valve	<Ref. to 4-4 [T8R0].>
41	Abnormal ABS control module		<Ref. to 4-4 [T8S0].>
42	Source voltage is abnormal.		<Ref. to 4-4 [T8T0].>
44	A combination of AT control abnormal		<Ref. to 4-4 [T8U0].>
51	Abnormal valve relay		<Ref. to 4-4 [T8V0].>
52	Abnormal motor and/or motor relay		<Ref. to 4-4 [T8W0].>
54	Abnormal stop light switch		<Ref. to 4-4 [T8X0].>
56	Abnormal G sensor output voltage		<Ref. to 4-4 [T8Y0].>

B: TROUBLE CODE 21 (FRONT RH)

C: TROUBLE CODE 23 (FRONT LH)

D: TROUBLE CODE 25 (REAR RH)

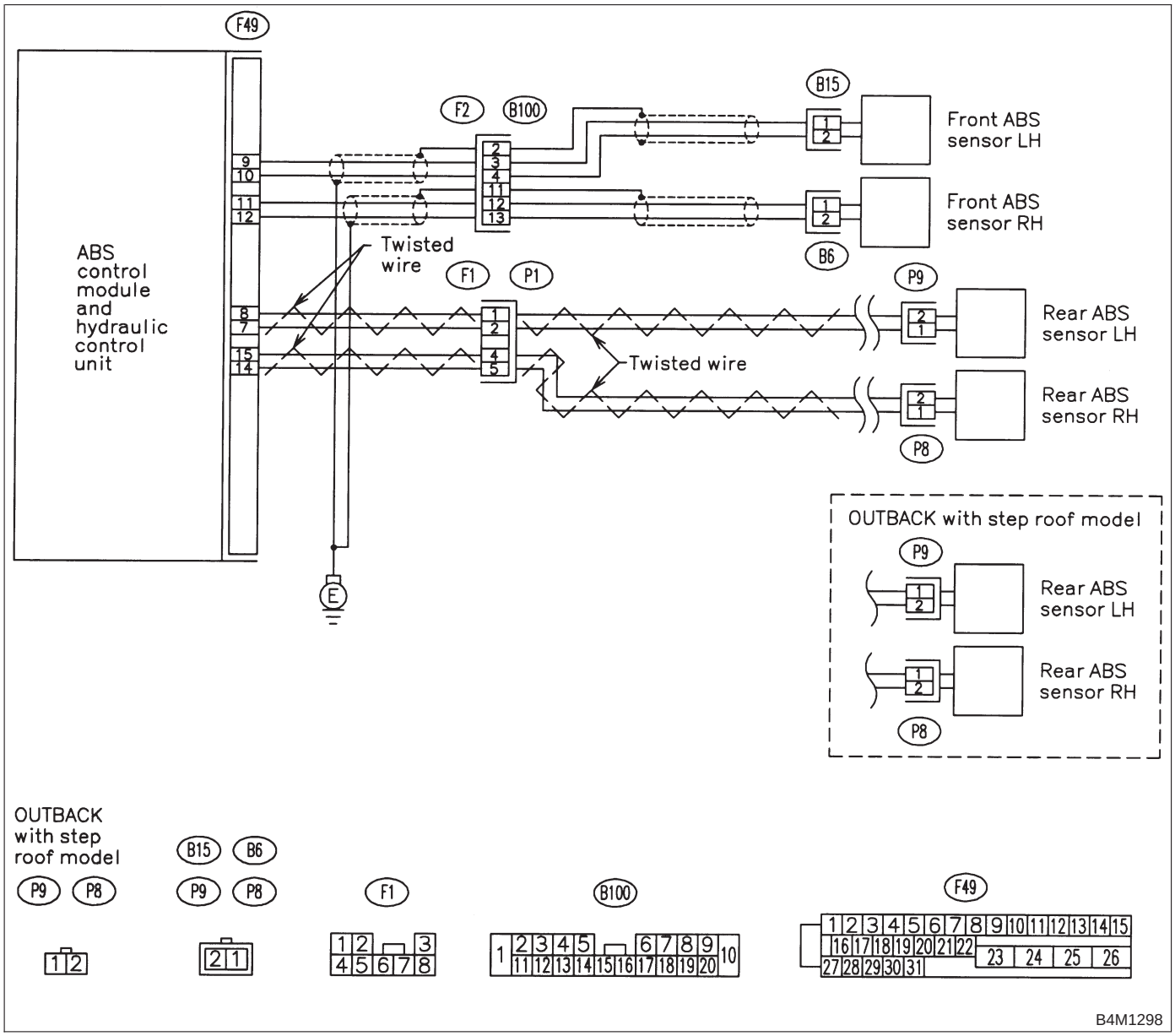
E: TROUBLE CODE 27 (REAR LH)

— ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) —

DIAGNOSIS:
- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



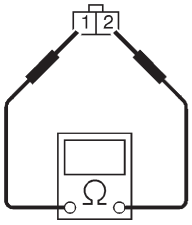
8E1 : CHECK ABS SENSOR.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABS sensor.
3) Measure resistance of ABS sensor connector terminals.

Terminal

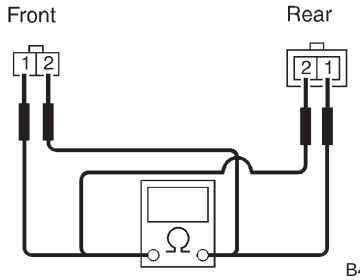
Front RH No. 1 — No. 2:
Front LH No. 1 — No. 2:
Rear RH No. 1 — No. 2:
Rear LH No. 1 — No. 2:

Except OUTBACK model



B4M0806E

OUTBACK model



B4M1036C

CHECK : ***Is the resistance between 0.8 and 1.2 kΩ?***
YES : Go to step **8E2**.
NO : Replace ABS sensor.

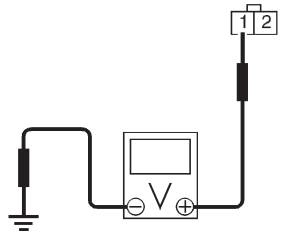
8E2 : CHECK BATTERY SHORT OF ABS SENSOR.

1) Disconnect connector from ABSCM&H/U.
2) Measure voltage between ABS sensor and chassis ground.

Terminal

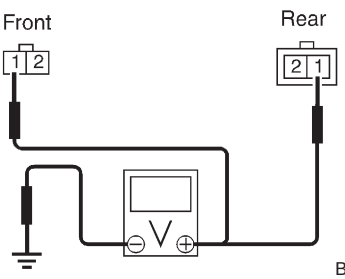
Front RH No. 1 (+) — Chassis ground (−):
Front LH No. 1 (+) — Chassis ground (−):
Rear RH No. 1 (+) — Chassis ground (−):
Rear LH No. 1 (+) — Chassis ground (−):

Except OUTBACK model



B4M0807E

OUTBACK model



B4M1037C

CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8E3**.
NO : Replace ABS sensor.

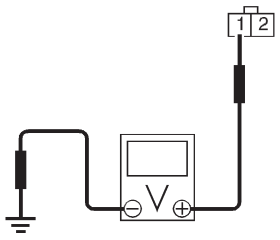
8E3 : CHECK BATTERY SHORT OF ABS SENSOR.

1) Turn ignition switch to ON.
2) Measure voltage between ABS sensor and chassis ground.

Terminal

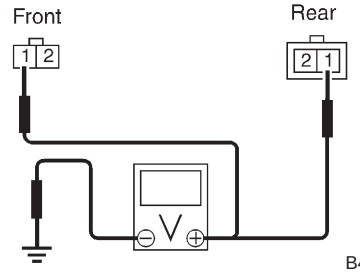
Front RH No. 1 (+) — Chassis ground (−):
Front LH No. 1 (+) — Chassis ground (−):
Rear RH No. 1 (+) — Chassis ground (−):
Rear LH No. 1 (+) — Chassis ground (−):

Except OUTBACK model



B4M0807E

OUTBACK model



B4M1037C

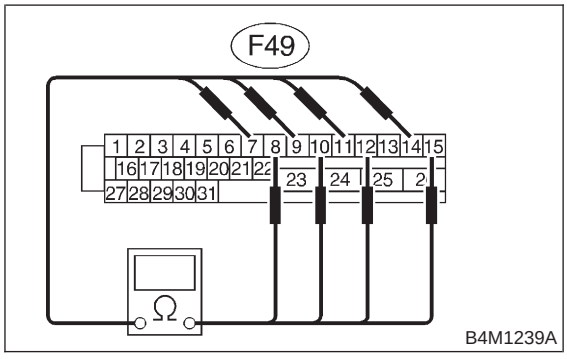
CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8E4**.
NO : Replace ABS sensor.

8E4 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

1) Turn ignition switch to OFF.
2) Connect connector to ABS sensor.
3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal

Trouble code 21 / (F49) No. 11 — No. 12:
Trouble code 23 / (F49) No. 9 — No. 10:
Trouble code 25 / (F49) No. 14 — No. 15:
Trouble code 27 / (F49) No. 7 — No. 8:



B4M1239A

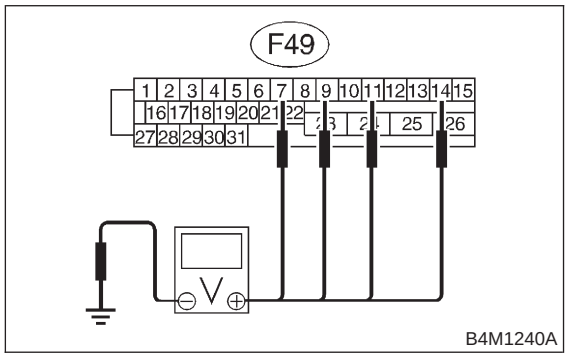
CHECK : ***Is the resistance between 0.8 and 1.2 kΩ?***
YES : Go to step **8E5**.
NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

8E5 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) — Chassis ground (−):
Trouble code 23 / (F49) No. 9 (+) — Chassis ground (−):
Trouble code 25 / (F49) No. 14 (+) — Chassis ground (−):
Trouble code 27 / (F49) No. 7 (+) — Chassis ground (−):



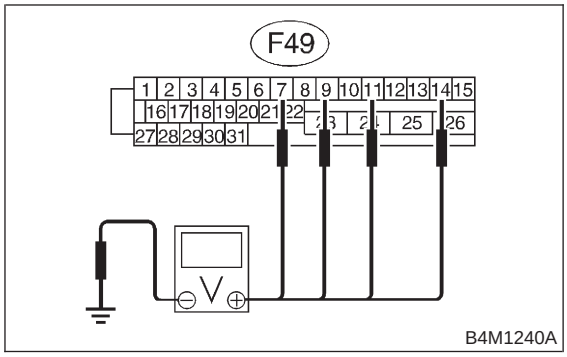
CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8E6**.
NO : Repair harness between ABSCM&H/U and ABS sensor.

8E6 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to ON.
2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) — Chassis ground (−):
Trouble code 23 / (F49) No. 9 (+) — Chassis ground (−):
Trouble code 25 / (F49) No. 14 (+) — Chassis ground (−):
Trouble code 27 / (F49) No. 7 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8E7**.
NO : Repair harness between ABSCM&H/U and ABS sensor.

8E7 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CHECK : ***Are the ABS sensor installation bolts tightened securely?***
YES : Go to step **8E8**.
NO : Tighten ABS sensor installation bolts securely.

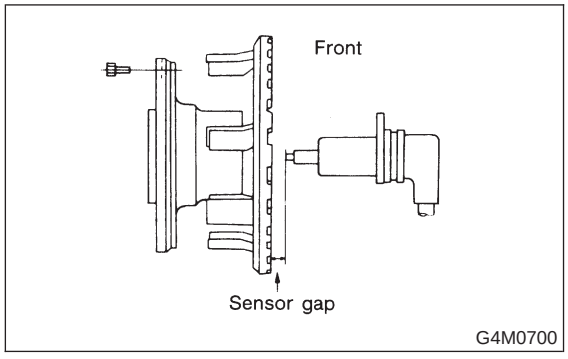
8E8 : CHECK INSTALLATION OF TONE WHEEL.

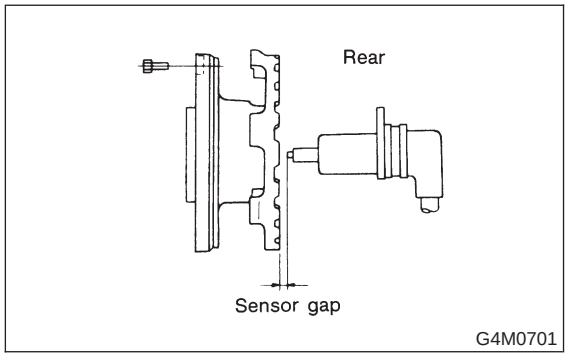
Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9±2.2 ft-lb)

CHECK : ***Are the tone wheel installation bolts tightened securely?***
YES : Go to step **8E9**.
NO : Tighten tone wheel installation bolts securely.

8E9 : CHECK ABS SENSOR GAP.

Measure tone wheel-to-pole piece gap over entire perimeter of the wheel.





	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : ***Is the gap within the specifications?***
YES : Go to step **8E10**.
NO : Adjust the gap.

NOTE:
Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

8E10 : CHECK HUB RUNOUT.

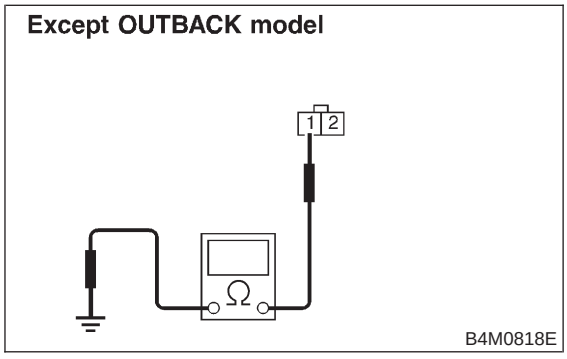
Measure hub runout.

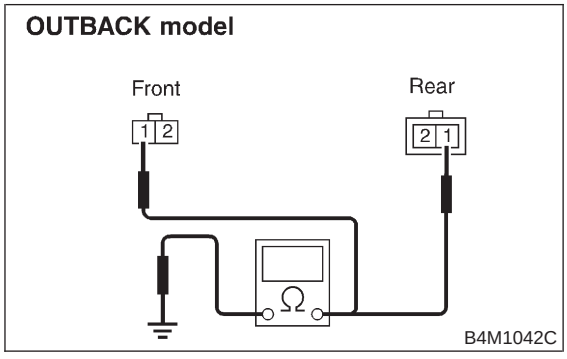
CHECK : ***Is the runout less than 0.05 mm (0.0020 in)?***
YES : Go to step **8E11**.
NO : Repair hub.

8E11 : CHECK GROUND SHORT OF ABS SENSOR.

1) Turn ignition switch to ON.
2) Measure resistance between ABS sensor and chassis ground.

Terminal
Front RH No. 1 — Chassis ground:
Front LH No. 1 — Chassis ground:
Rear RH No. 1 — Chassis ground:
Rear LH No. 1 — Chassis ground:



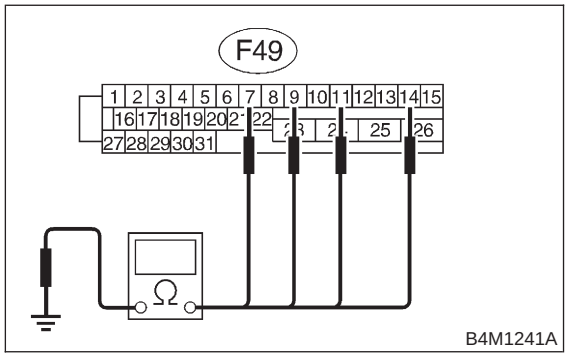


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8E12**.
NO : Replace ABS sensor and ABSCM&H/U.

8E12 : CHECK GROUND SHORT OF HARNESS.

1) Turn ignition switch to OFF.
2) Connect connector to ABS sensor.
3) Measure resistance between ABSCM&H/U connector terminal and chassis ground.

Connector & terminal
Trouble code 21 / (F49) No. 11 — Chassis ground:
Trouble code 23 / (F49) No. 9 — Chassis ground:
Trouble code 25 / (F49) No. 14 — Chassis ground:
Trouble code 27 / (F49) No. 7 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8E13**.
NO : Repair harness between ABSCM&H/U and ABS sensor.
Replace ABSCM&H/U.

8E13 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8E14**.

8E14 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8E15**.

8E15 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

NOTE:
Check harness and connectors between ABSCM&H/U and ABS sensor.

F: TROUBLE CODE 22 (FRONT RH)

G: TROUBLE CODE 24 (FRONT LH)

H: TROUBLE CODE 26 (REAR RH)

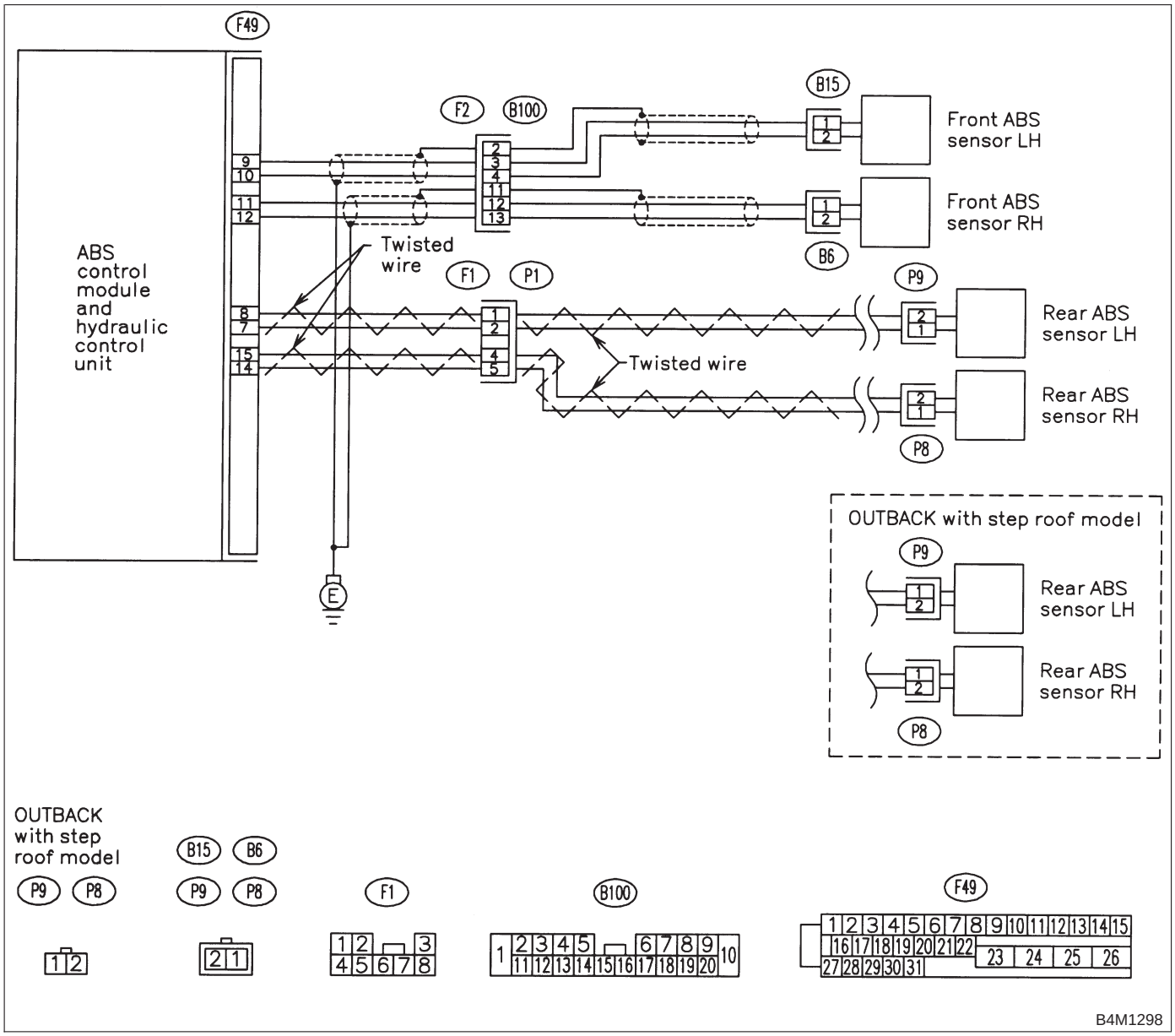
I: TROUBLE CODE 28 (REAR LH)

— ABNORMAL ABS SENSOR (ABNORMAL ABS SENSOR SIGNAL) —

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



8I1 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CHECK : ***Are the ABS sensor installation bolts tightened securely?***
YES : Go to step **8I2**.
NO : Tighten ABS sensor installation bolts securely.

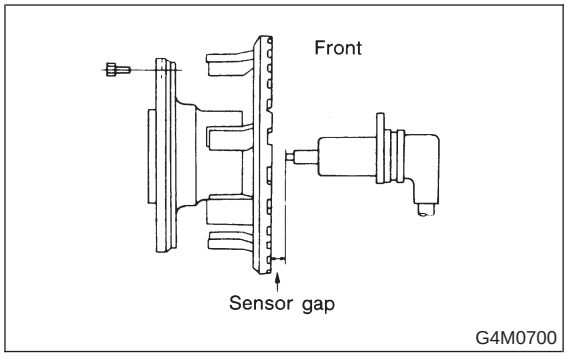
8I2 : CHECK INSTALLATION OF TONE WHEEL.

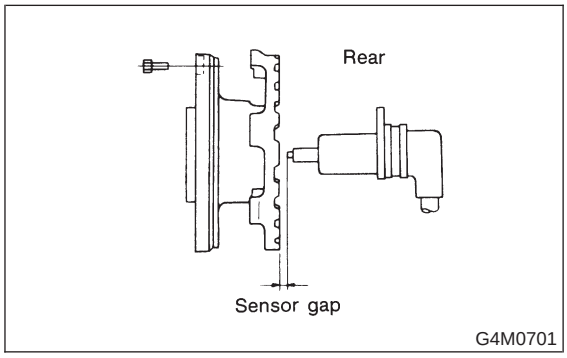
Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9±2.2 ft-lb)

CHECK : ***Are the tone wheel installation bolts tightened securely?***
YES : Go to step **8I3**.
NO : Tighten tone wheel installation bolts securely.

8I3 : CHECK ABS SENSOR GAP.

Measure tone wheel to pole piece gap over entire perimeter of the wheel.





	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : ***Is the gap within the specifications?***
YES : Go to step **8I4**.
NO : Adjust the gap.

NOTE:
Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

8I4 : CHECK OSCILLOSCOPE.

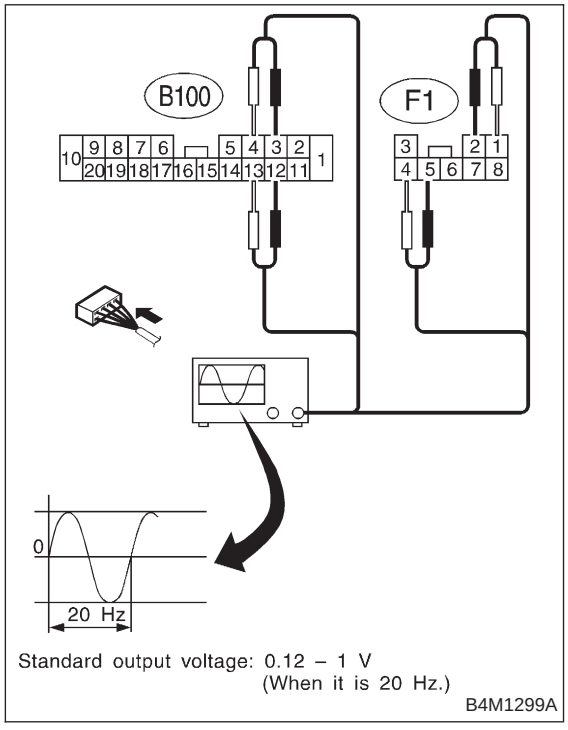
CHECK : ***Is an oscilloscope available?***
YES : Go to step **8I5**.
NO : Go to step **8I6**.

8I5 : CHECK ABS SENSOR SIGNAL.

1) Raise all four wheels of ground.
2) Turn ignition switch OFF.
3) Connect the oscilloscope to the connector (B100) or connector (F1).
4) Turn ignition switch ON.
5) Rotate wheels and measure voltage at specified frequency.

NOTE:
When this inspection is completed, the ABS control module sometimes stores the trouble code 29.

Connector & terminal
Trouble code 22 / (B100) No. 12 (+) — No. 13 (−):
Trouble code 24 / (B100) No. 3 (+) — No. 4 (−):
Trouble code 26 / (F1) No. 5 (+) — No. 4 (−):
Trouble code 28 / (F1) No. 2 (+) — No. 1 (−):
Specified voltage: 0.12 — 1 V (When it is 20 Hz.)



CHECK : ***Is oscilloscope pattern smooth, as shown in figure?***
YES : Go to step **8I9**.
NO : Go to step **8I6**.

8I6 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor or drum from hub in accordance with trouble code.

CHECK : ***Is the ABS sensor pole piece or the tone wheel contaminated by dirt or other foreign matter?***
YES : Thoroughly remove dirt or other foreign matter.
NO : Go to step **8I7**.

8I7 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : ***Are there broken or damaged in the ABS sensor pole piece or the tone wheel?***
YES : Replace ABS sensor or tone wheel.
NO : Go to step **8I8**.

8I8 : CHECK HUB RUNOUT.

Measure hub runout.

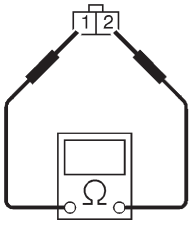
CHECK : ***Is the runout less than 0.05 mm (0.0020 in)?***
YES : Go to step **8I9**.
NO : Repair hub.

8I9 : CHECK RESISTANCE OF ABS SENSOR.

1) Turn ignition switch OFF.
2) Disconnect connector from ABS sensor.
3) Measure resistance between ABS sensor connector terminals.

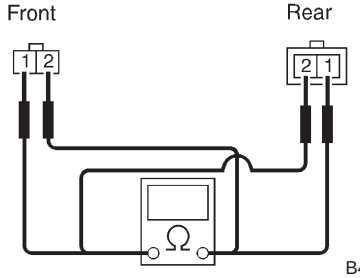
Terminal
Front RH No. 1 — No. 2:
Front LH No. 1 — No. 2:
Rear RH No. 1 — No. 2:
Rear LH No. 1 — No. 2:

Except OUTBACK model



B4M0806E

OUTBACK model



B4M1036C

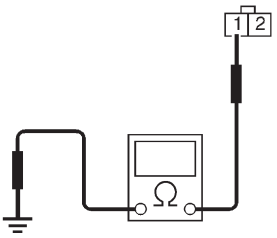
CHECK : ***Is the resistance between 0.8 and 1.2 kΩ?***
YES : Go to step **8I10**.
NO : Replace ABS sensor.

8I10 : CHECK GROUND SHORT OF ABS SENSOR.

Measure resistance between ABS sensor and chassis ground.

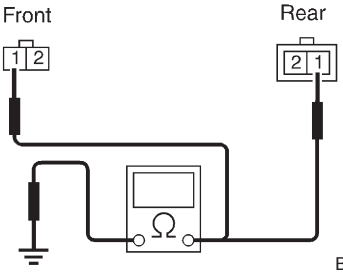
Terminal
Front RH No. 1 — Chassis ground:
Front LH No. 1 — Chassis ground:
Rear RH No. 1 — Chassis ground:
Rear LH No. 1 — Chassis ground:

Except OUTBACK model



B4M0818E

OUTBACK model



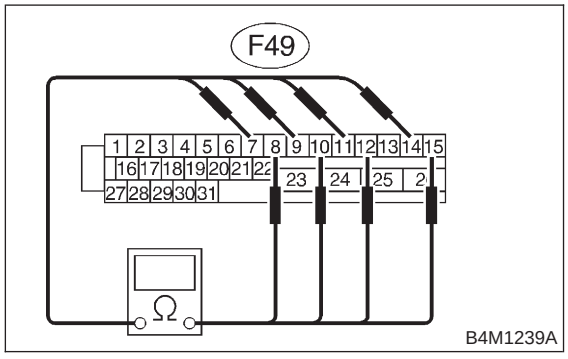
B4M1042C

CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8I11**.
NO : Replace ABS sensor.

8I11 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

1) Connect connector to ABS sensor.
2) Disconnect connector from ABSCM&H/U.
3) Measure resistance at ABSCM&H/U connector terminals.

Connector & terminal
Trouble code 22 / (F49) No. 11 — No. 12:
Trouble code 24 / (F49) No. 9 — No. 10:
Trouble code 26 / (F49) No. 14 — No. 15:
Trouble code 28 / (F49) No. 7 — No. 8:

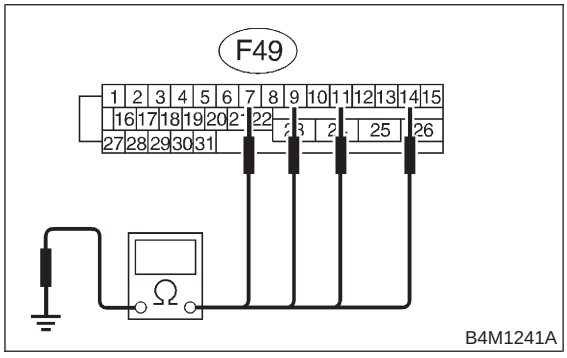


CHECK : ***Is the resistance between 0.8 and 1.2 kΩ?***
YES : Go to step **8I12**.
NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

8I12 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
Trouble code 22 / (F49) No. 11 — Chassis ground:
Trouble code 24 / (F49) No. 9 — Chassis ground:
Trouble code 26 / (F49) No. 14 — Chassis ground:
Trouble code 28 / (F49) No. 7 — Chassis ground:

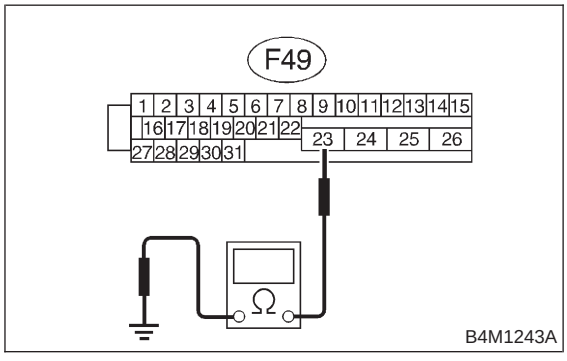


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8I13**.
NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

8I13 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal
(F49) No. 23 — GND:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **8I14**.
NO : Repair ABSCM&H/U ground harness.

8I14 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8I15**.

8I15 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Is the car telephone or the wireless transmitter properly installed?***
YES : Go to step **8I16**.
NO : Properly install the car telephone or the wireless transmitter.

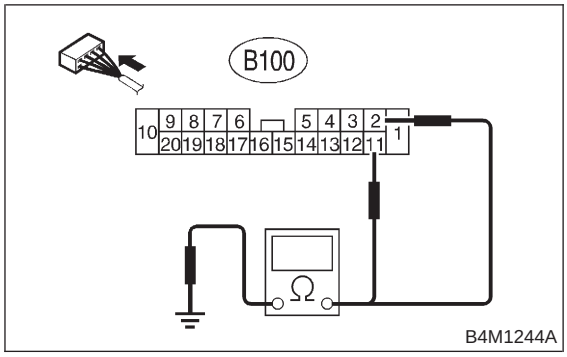
8I16 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Are noise sources (such as an antenna) installed near the sensor harness?***
YES : Install the noise sources apart from the sensor harness.
NO : Go to step **8I17**.

8I17 : CHECK SHIELD CIRCUIT.

1) Connect all connectors.
2) Measure resistance between shield connector and chassis ground.

Connector & terminal
Trouble code 22 / (B100) No. 11 — Chassis ground:
Trouble code 24 / (B100) No. 2 — Chassis ground:
***Trouble code 26 / Go to step* 8I18.**
***Trouble code 28 / Go to step* 8I18.**



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **8I18**.
NO : Repair shield harness.

8I18 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8I19**.

8I19 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary noise interference.

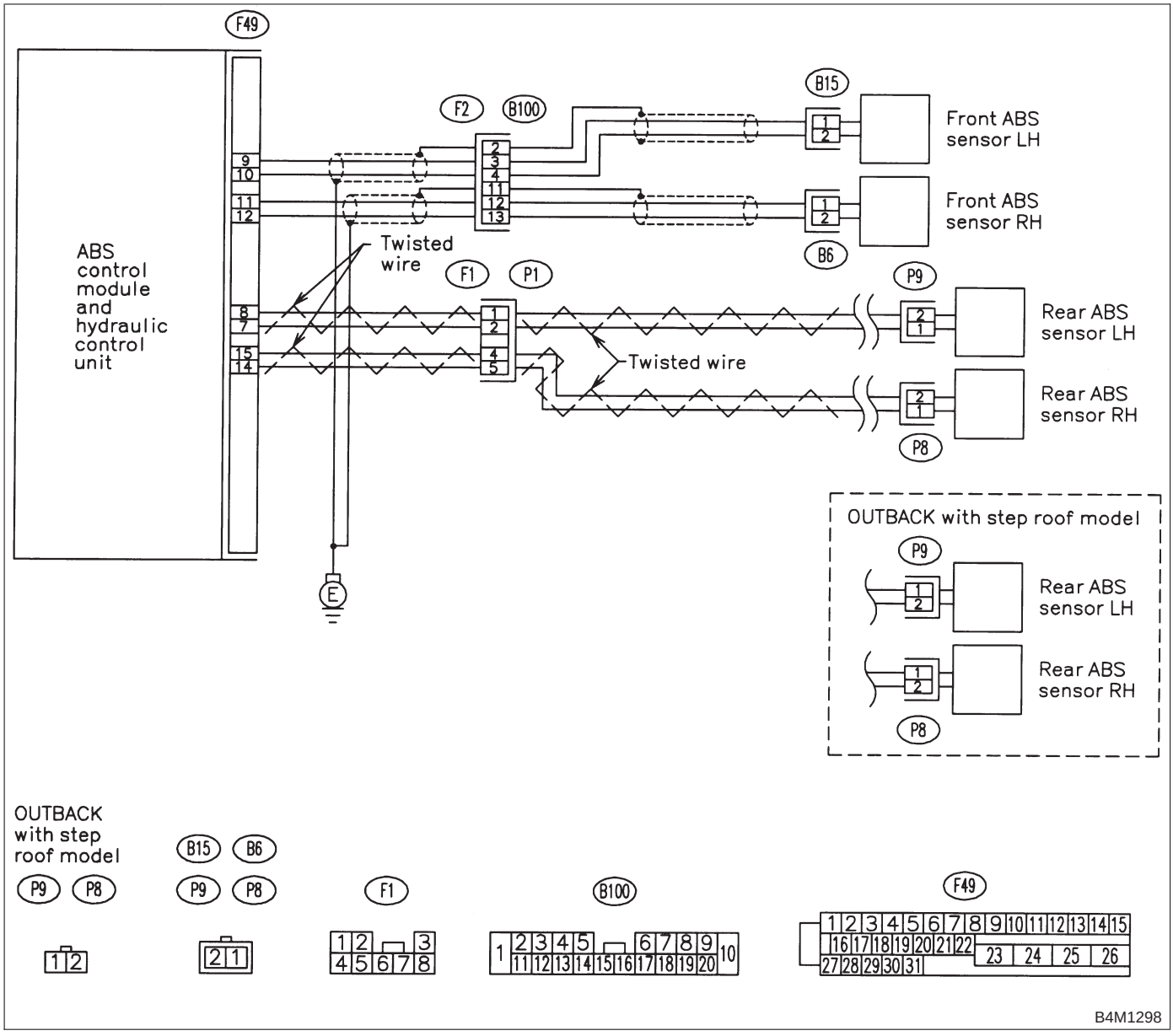
J: TROUBLE CODE 29

— ABNORMAL ABS SENSOR SIGNAL (ANY ONE OF FOUR) —

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



8J1 : CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.

CHECK : ***Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when tire is not in contact with road surface.***

YES : The ABS is normal. Erase the trouble code.

NOTE:
When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this trouble code may sometimes occur.

NO : Go to step **8J2**.

8J2 : CHECK TIRE SPECIFICATIONS.

CHECK : ***Are the tire specifications correct?***

YES : Go to step **8J3**.

NO : Replace tire.

8J3 : CHECK WEAR OF TIRE.

CHECK : ***Is the tire worn excessively?***

YES : Replace tire.

NO : Go to step **8J4**.

8J4 : CHECK TIRE PRESSURE.

CHECK : ***Is the tire pressure correct?***

YES : Go to step **8J5**.

NO : Adjust tire pressure.

8J5 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CHECK : ***Are the ABS sensor installation bolts tightened securely?***

YES : Go to step **8J6**.

NO : Tighten ABS sensor installation bolts securely.

8J6 : CHECK INSTALLATION OF TONE WHEEL.

Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9±2.2 ft-lb)

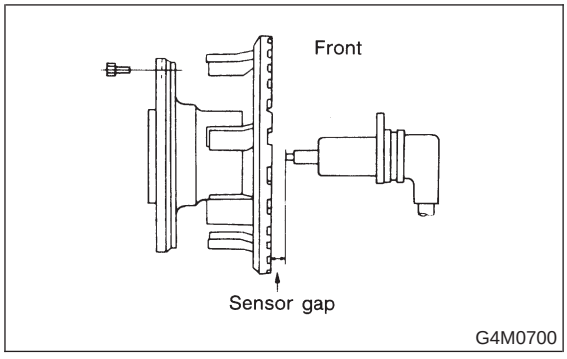
CHECK : ***Are the tone wheel installation bolts tightened securely?***

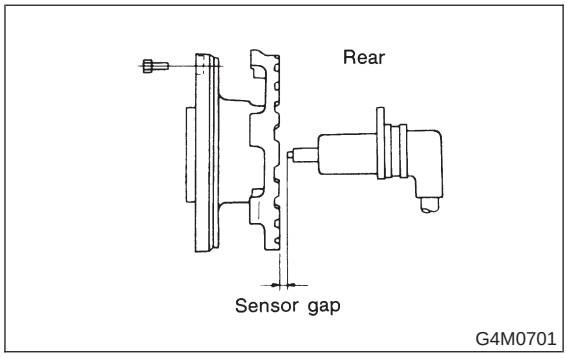
YES : Go to step **8J7**.

NO : Tighten tone wheel installation bolts securely.

8J7 : CHECK ABS SENSOR GAP.

Measure tone wheel to pole piece gap over entire perimeter of the wheel.





	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : ***Is the gap within the specifications?***

YES : Go to step **8J8**.

NO : Adjust the gap.

NOTE:
Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

8J8 : CHECK OSCILLOSCOPE.

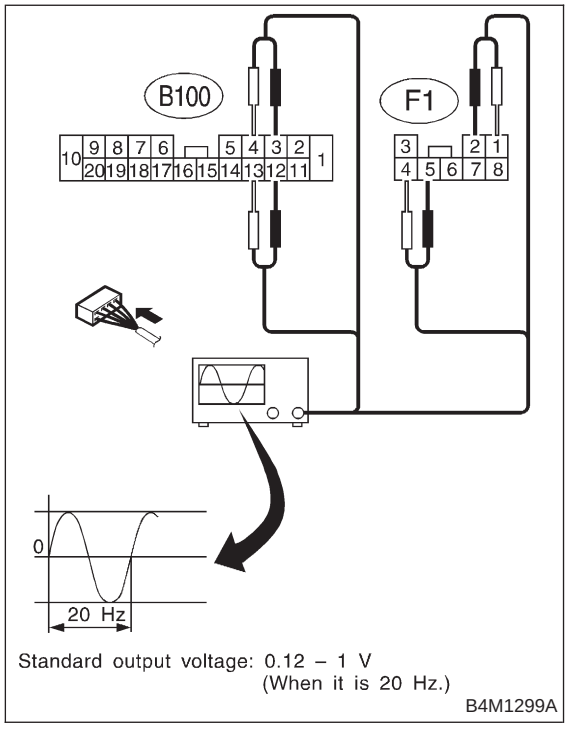
CHECK : ***Is an oscilloscope available?***
YES : Go to step **8J9**.
NO : Go to step **8J10**.

8J9 : CHECK ABS SENSOR SIGNAL.

1) Raise all four wheels of ground.
2) Turn ignition switch OFF.
3) Connect the oscilloscope to the connector (B100) or connector (F1).
4) Turn ignition switch ON.
5) Rotate wheels and measure voltage at specified frequency.

NOTE:
When this inspection is completed, the ABS control module sometimes stores the trouble code 29.

Connector & terminal
(B100) No. 12 (+) — No. 13 (−) (Front RH):
(B100) No. 3 (+) — No. 4 (−) (Front LH):
(F1) No. 5 (+) — No. 4 (−) (Rear RH):
(F1) No. 2 (+) — No. 1 (−) (Rear LH):
Specified voltage: 0.12 — 1 V (When it is 20 Hz.)



CHECK : ***Is oscilloscope pattern smooth, as shown in figure?***
YES : Go to step **8J13**.
NO : Go to step **8J10**.

8J10 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor from hub.

CHECK : ***Is the ABS sensor pole piece or the tone wheel contaminated by dirt or other foreign matter?***
YES : Thoroughly remove dirt or other foreign matter.
NO : Go to step **8J11**.

8J11 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : ***Are there broken or damaged teeth in the ABS sensor pole piece or the tone wheel?***
YES : Replace ABS sensor or tone wheel.
NO : Go to step **8J12**.

8J12 : CHECK HUB RUNOUT.

Measure hub runout.

CHECK : ***Is the runout less than 0.05 mm (0.0020 in)?***
YES : Go to step **8J13**.
NO : Repair hub.

8J13 : CHECK ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Connect all connectors.
3) Erase the memory.
4) Perform inspection mode.
5) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8J14**.

8J14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

MEMO:

K: TROUBLE CODE 31 (FRONT RH)

L: TROUBLE CODE 33 (FRONT LH)

M: TROUBLE CODE 35 (REAR RH)

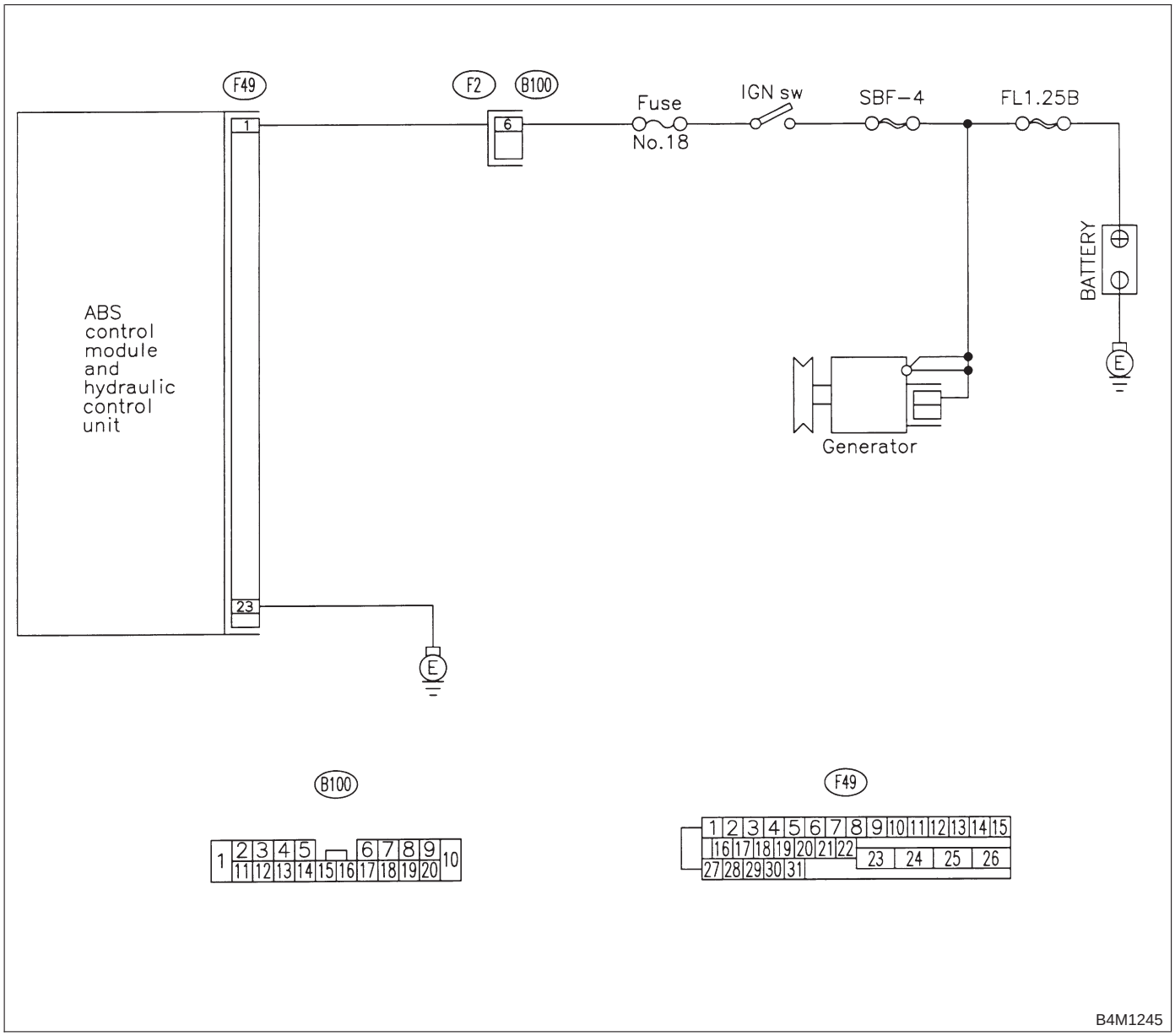
N: TROUBLE CODE 37 (REAR LH)

— ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U —

DIAGNOSIS:
- Faulty harness/connector
- Faulty inlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:

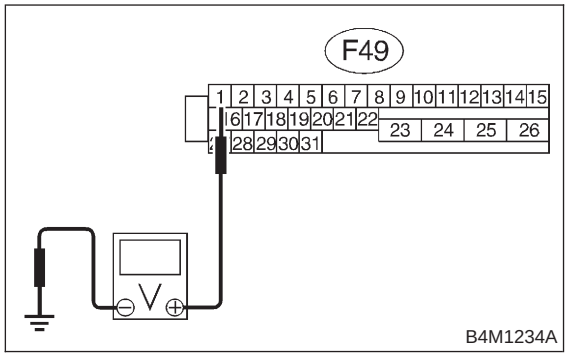


B4M1245

8N1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Disconnect connector from ABSCM&H/U.
2) Run the engine at idle.
3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

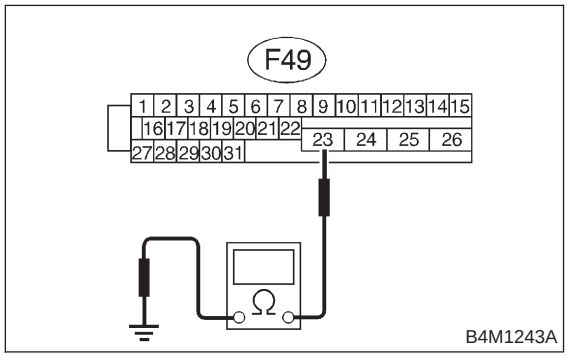


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **8N2**.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8N2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **8N3**.
NO : Repair ABSCM&H/U ground harness.

8N3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8N4**.

8N4 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8N5**.

8N5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

O: TROUBLE CODE 32 (FRONT RH)

P: TROUBLE CODE 34 (FRONT LH)

Q: TROUBLE CODE 36 (REAR RH)

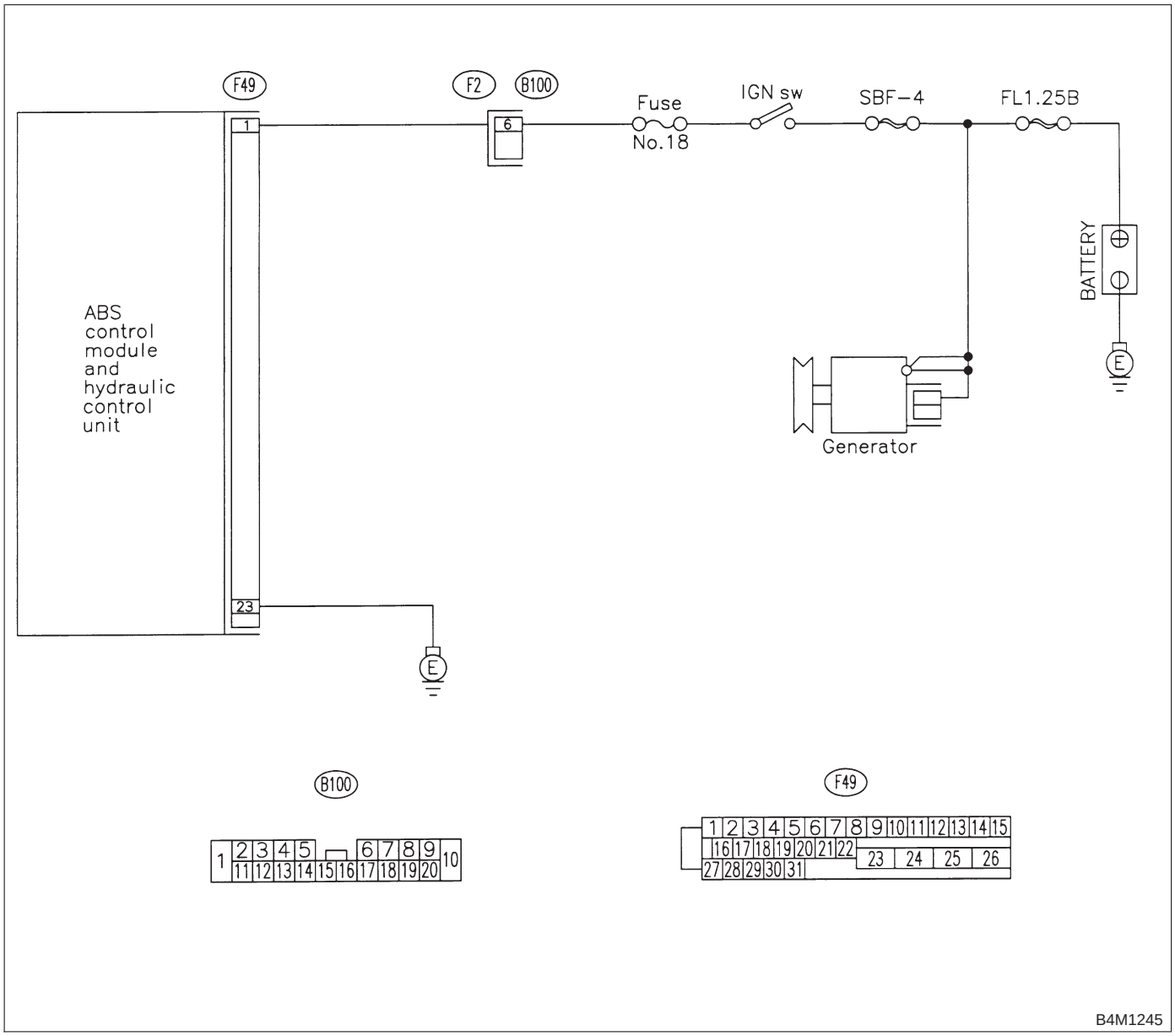
R: TROUBLE CODE 38 (REAR LH)

— ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U —

DIAGNOSIS:
- Faulty harness/connector
- Faulty outlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

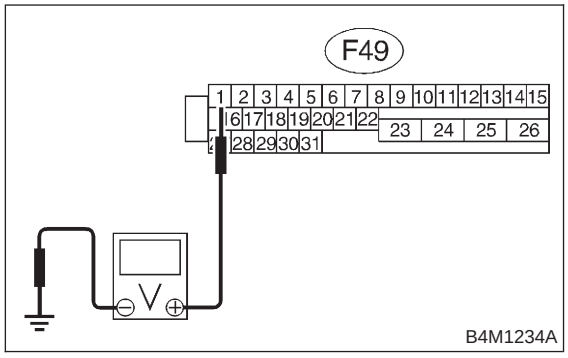
WIRING DIAGRAM:



8R1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Disconnect connector from ABSCM&H/U.
2) Run the engine at idle.
3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

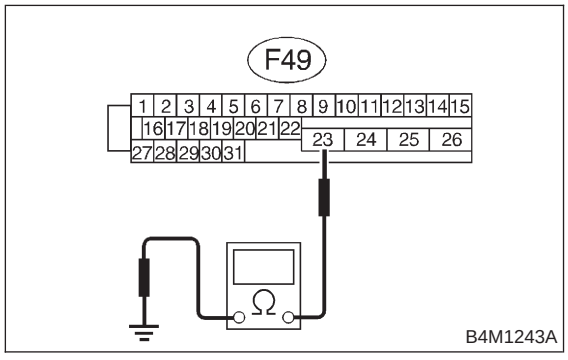


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **8R2**.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8R2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **8R3**.
NO : Repair ABSCM&H/U ground harness.

8R3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8R4**.

8R4 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8R5**.

8R5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

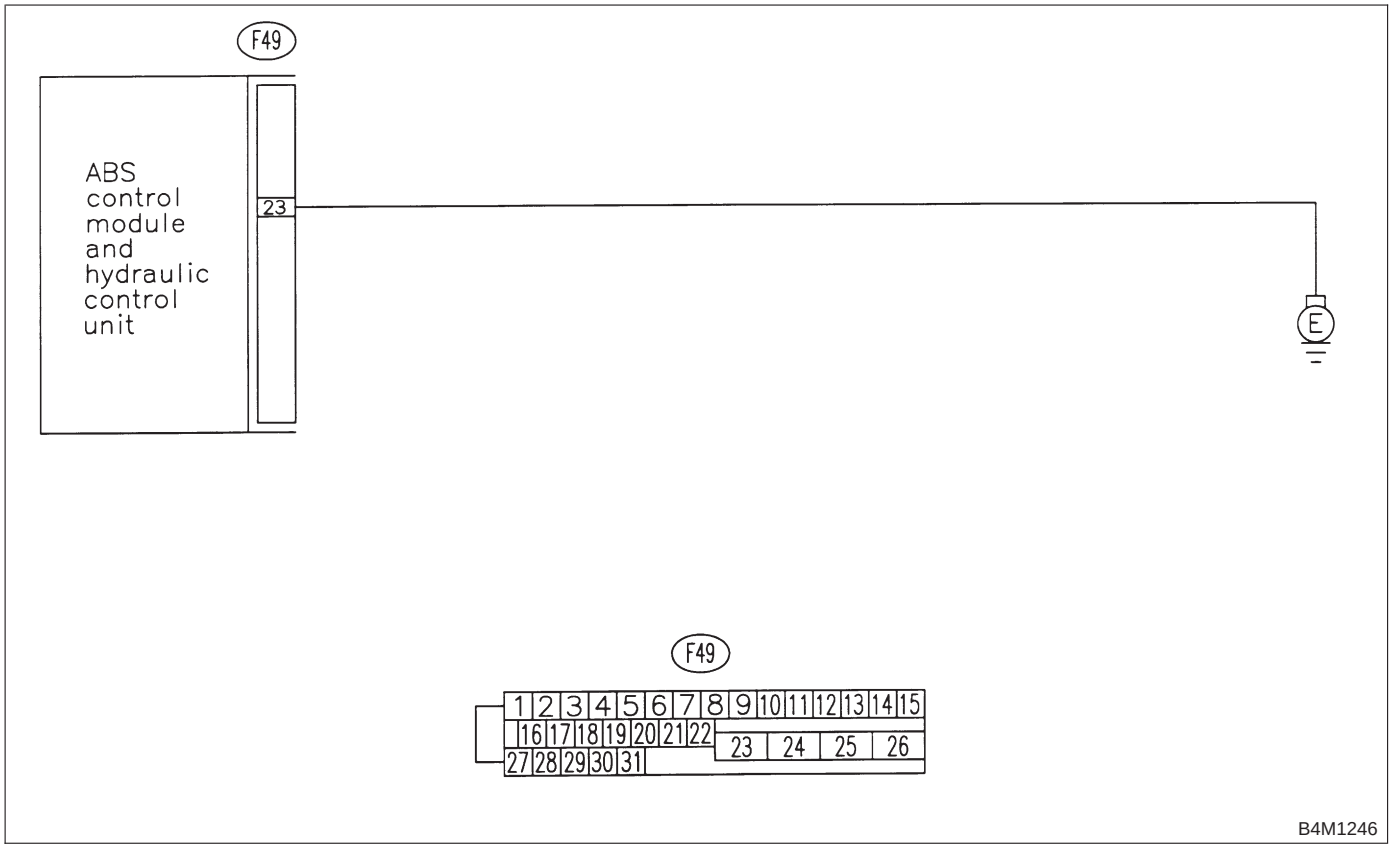
S: TROUBLE CODE 41

— ABNORMAL ABS CONTROL MODULE —

DIAGNOSIS:
- Faulty ABSCM&H/U.

TROUBLE SYMPTOM:
- ABS does not operate.

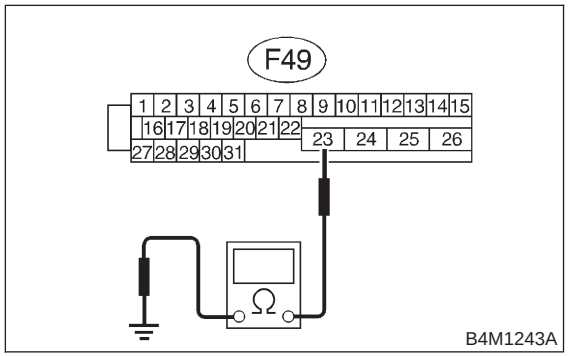
WIRING DIAGRAM:



8S1 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **8S2**.
NO : Repair ABSCM&H/U ground harness.

8S2 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8S3**.

8S3 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Is the car telephone or the wireless transmitter properly installed?***
YES : Go to step **8S4**.
NO : Properly install the car telephone or the wireless transmitter.

8S4 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Are noise sources (such as an antenna) installed near the sensor harness?***
YES : Install the noise sources apart from the sensor harness.
NO : Go to step **8S5**.

8S5 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8S6**.

8S6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

T: TROUBLE CODE 42

— SOURCE VOLTAGE IS ABNORMAL. —

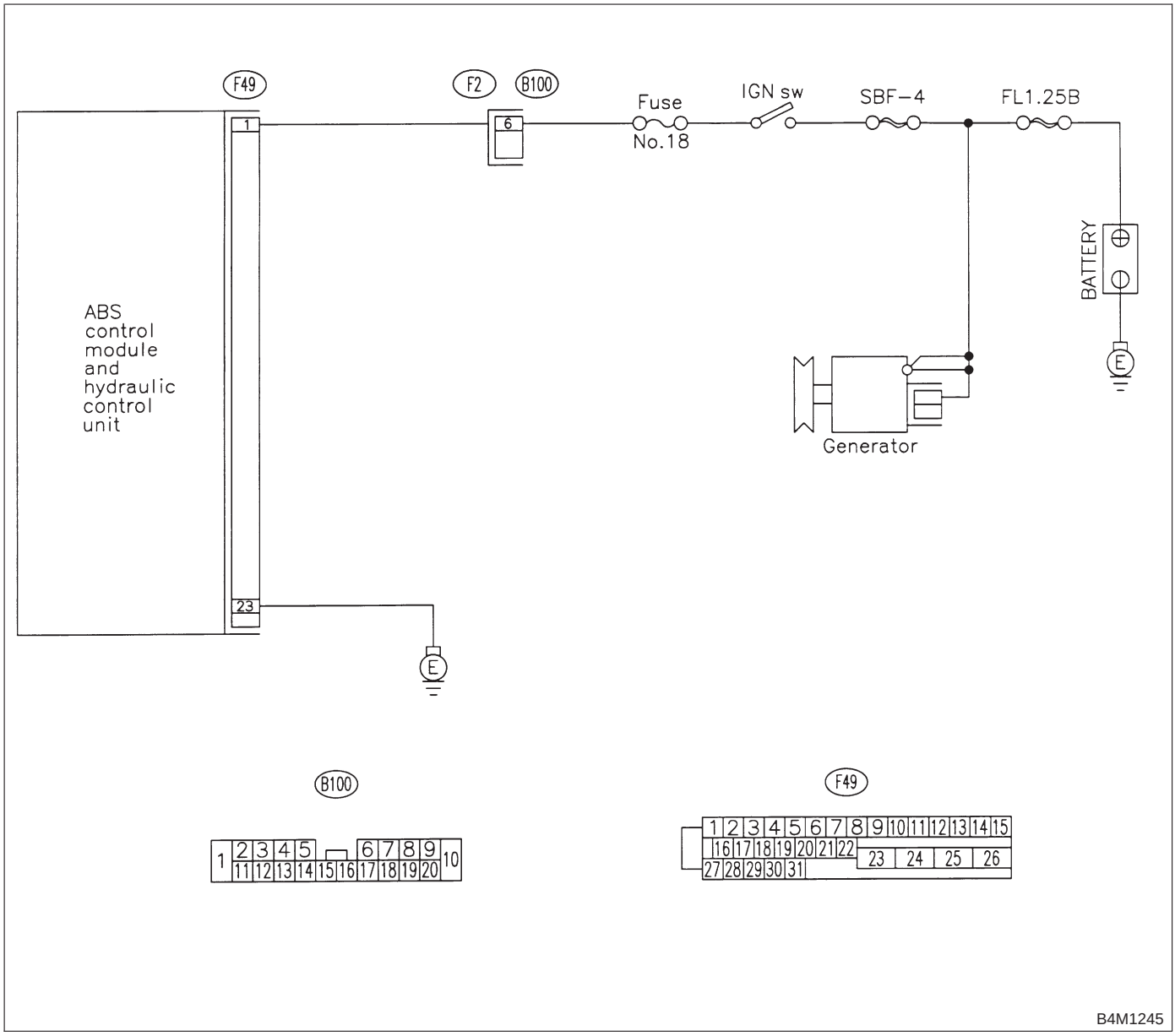
DIAGNOSIS:

- Power source voltage of the ABSCM&H/U is low or high.

TROUBLE SYMPTOM:

- ABS does not operate.

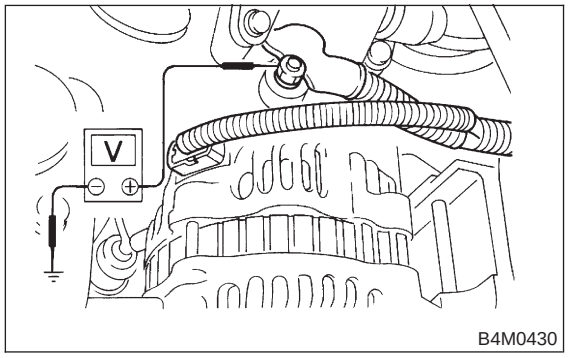
WIRING DIAGRAM:



8T1 : CHECK GENERATOR.

1) Start engine.
2) Idling after warm-up.
3) Measure voltage between generator B terminal and chassis ground.

Terminal
Generator B terminal — Chassis ground:



CHECK : ***Is the voltage between 10 V and 17 V?***
YES : Go to step **8T2**.
NO : Repair generator.

8T2 : CHECK BATTERY TERMINAL.

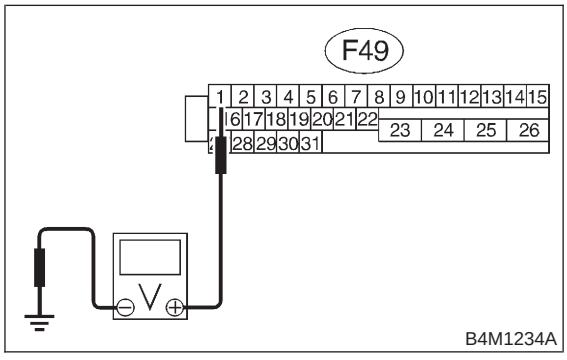
Turn ignition switch to OFF.

CHECK : ***Are the positive and negative battery terminals tightly clamped?***
YES : Go to step **8T3**.
NO : Tighten the clamp of terminal.

8T3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Disconnect connector from ABSCM&H/U.
2) Run the engine at idle.
3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

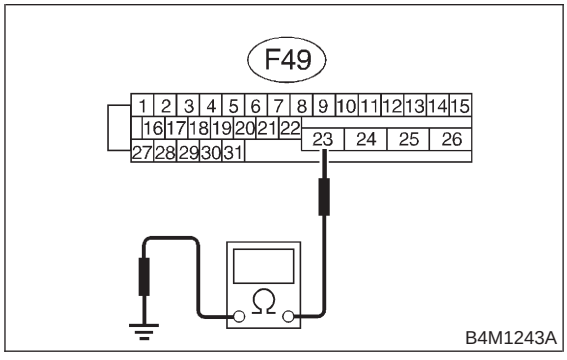


CHECK : ***Is the voltage between 10 V and 17 V?***
YES : Go to step **8T4**.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8T4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **8T5**.
NO : Repair ABSCM&H/U ground harness.

8T5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***

YES : Repair connector.

NO : Go to step **8T6**.

8T6 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **8T7**.

8T7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

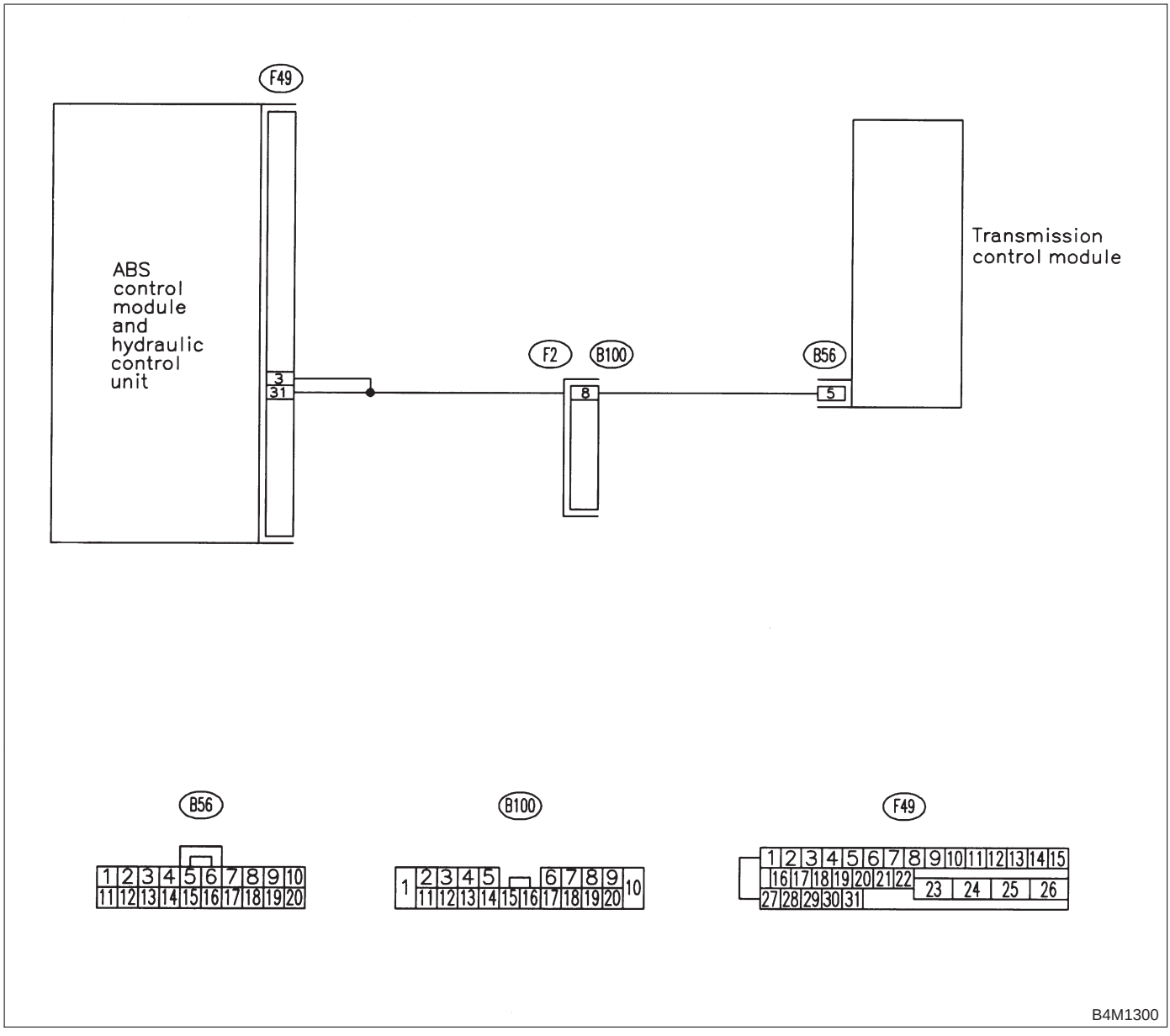
U: TROUBLE CODE 44

— A COMBINATION OF AT CONTROL ABNORMAL —

DIAGNOSIS:
- Combination of AT control faults

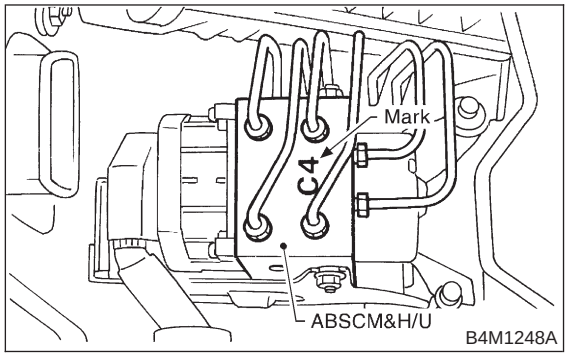
TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



8U1 : CHECK SPECIFICATIONS OF THE ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



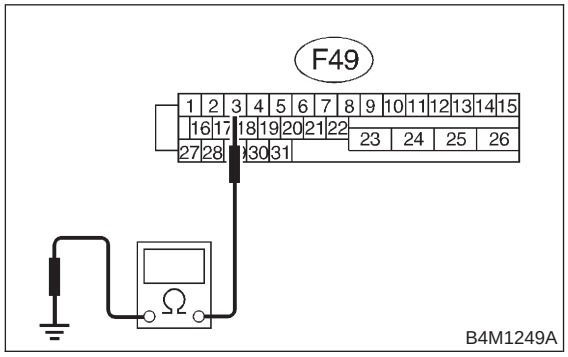
Mark	Model
C1	FWD AT
C3	AWD AT
C4	AWD MT

CHECK : ***Is an ABSCM&H/U for AT model installed on a MT model?***
YES : Replace ABSCM&H/U.
NO : Go to step **8U2**.

8U2 : CHECK GROUND SHORT OF HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect two connectors from TCM.
3) Disconnect connector from ABSCM&H/U.
4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 — Chassis ground:

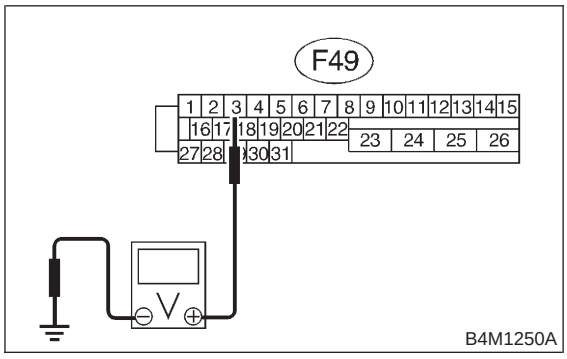


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8U3**.
NO : Repair harness between TCM and ABSCM&H/U.

8U3 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 (+) — Chassis ground (−):

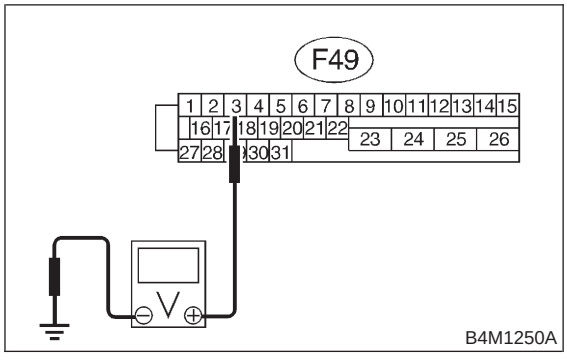


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8U4**.
NO : Repair harness between TCM and ABSCM&H/U.

8U4 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to ON.
2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 (+) — Chassis ground (−):

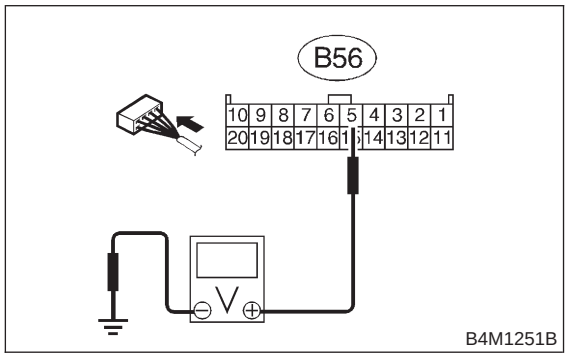


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8U5**.
NO : Repair harness between TCM and ABSCM&H/U.

8U5 : CHECK TCM.

1) Turn ignition switch to OFF.
2) Connect all connectors to TCM.
3) Turn ignition switch to ON.
4) Measure voltage between TCM connector terminal and chassis ground.

Connector & terminal
(B56) No. 5 (+) — Chassis ground (−):



CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **8U7**.
NO : Go to step **8U6**.

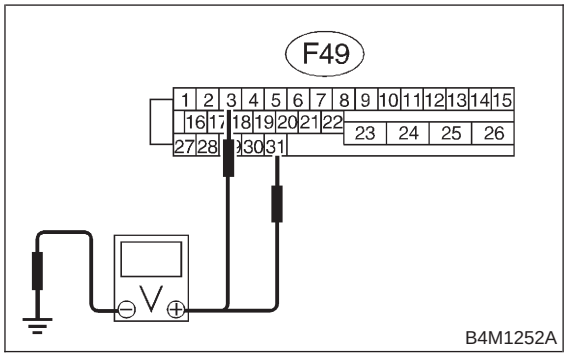
8U6 : CHECK AT.

CHECK : ***Is the AT functioning normally?***
YES : Replace TCM.
NO : Repair AT.

8U7 : CHECK OPEN CIRCUIT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 (+) — Chassis ground (−):
(F49) No. 31 (+) — Chassis ground (−):



CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **8U8**.
NO : Repair harness/connector between TCM and ABSCM&H/U.

8U8 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between TCM and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8U9**.

8U9 : CHECK ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Connect all connectors.
3) Erase the memory.
4) Perform inspection mode.
5) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8U10**.

8U10 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

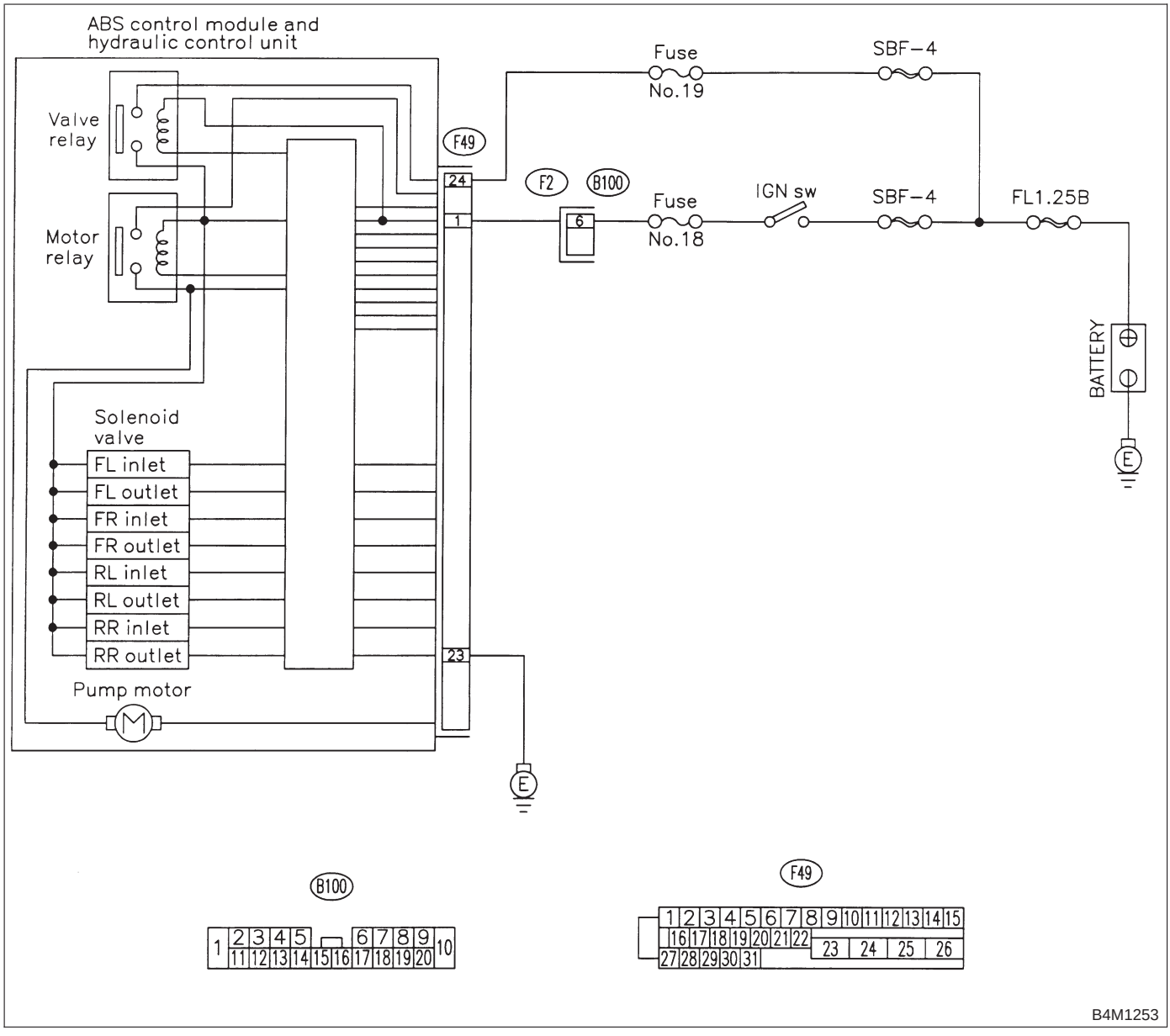
V: TROUBLE CODE 51

— ABNORMAL VALVE RELAY —

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

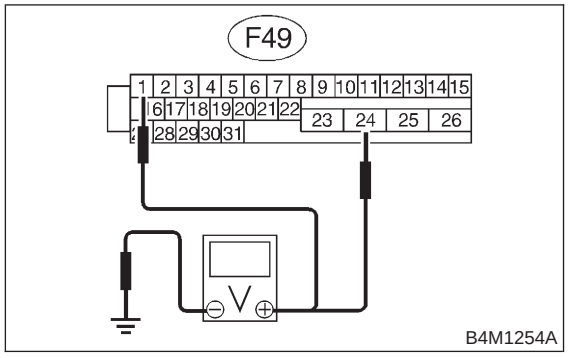
WIRING DIAGRAM:



8V1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Run the engine at idle.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):
(F49) No. 24 (+) — Chassis ground (−):

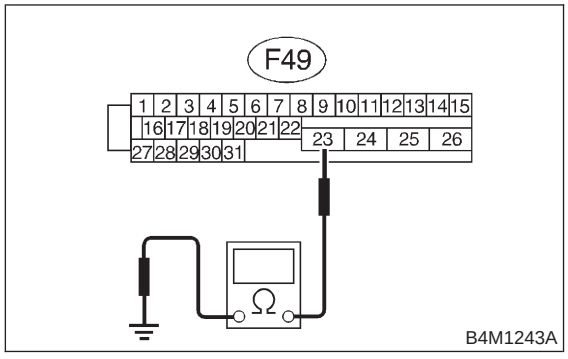


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **8V2**.
NO : Repair harness connector between battery and ABSCM&H/U.

8V2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:

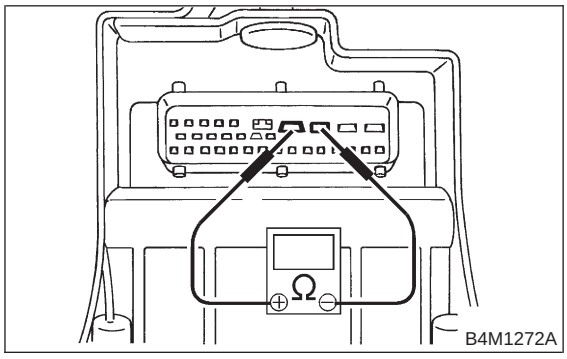


CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **8V3**.
NO : Repair ABSCM&H/U ground harness.

8V3 : CHECK VALVE RELAY IN ABSCM&H/U.

Measure resistance between ABSCM&H/U and terminals.

Terminals
No. 23 (+) — No. 24 (−):



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8V4**.
NO : Replace ABSCM&H/U.

8V4 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8V5**.

8V5 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8V6**.

8V6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

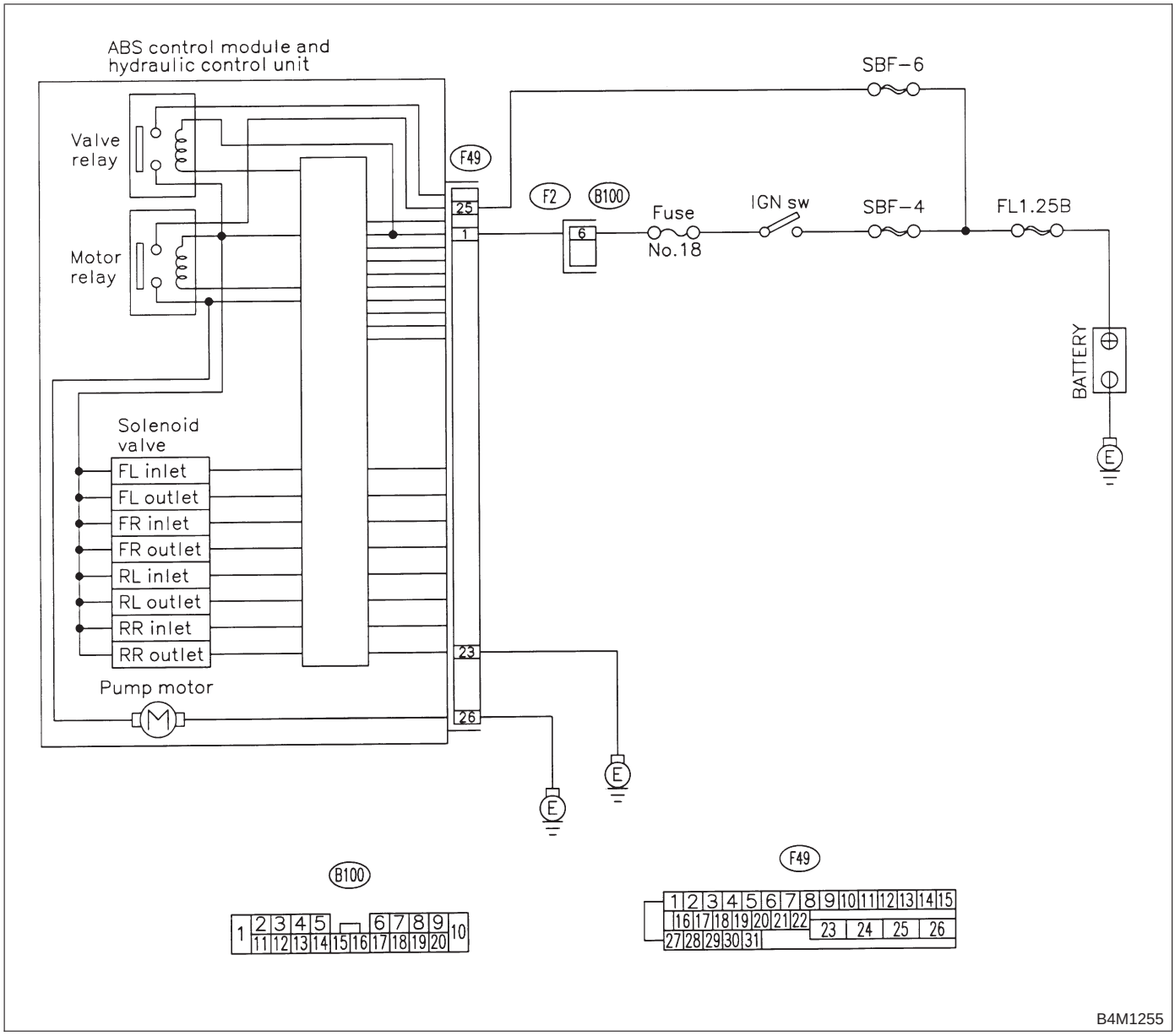
W: TROUBLE CODE 52

— ABNORMAL MOTOR AND/OR MOTOR RELAY —

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

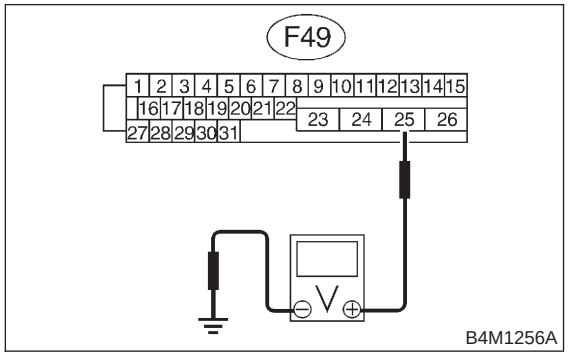
WIRING DIAGRAM:



8W1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Turn ignition switch to ON.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 25 (+) — Chassis ground (−):

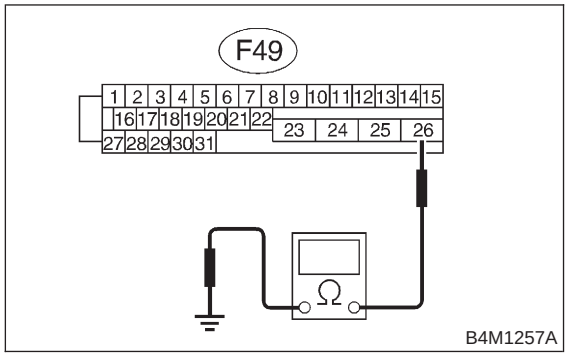


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **8W2**.
NO : Repair harness/connector between battery and ABSCM&H/U and check fuse SBF-6.

8W2 : CHECK GROUND CIRCUIT OF MOTOR.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 26 — Chassis ground:

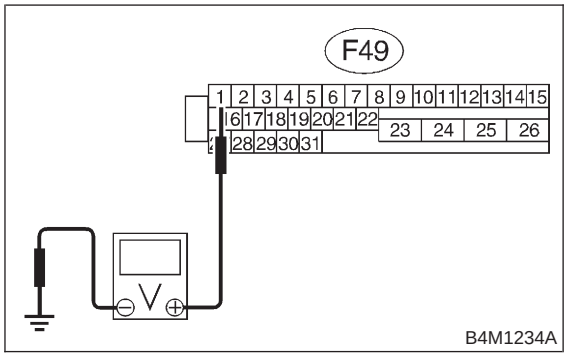


CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **8W3**.
NO : Repair ABSCM&H/U ground harness.

8W3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Run the engine at idle.
2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

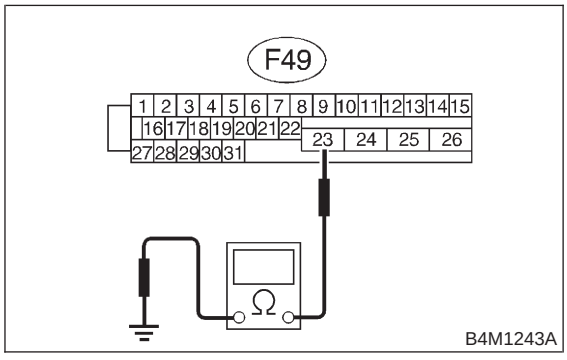


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **8W4**.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8W4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **8W5**.
NO : Repair ABSCM&H/U ground harness.

8W5 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W15D0].>

NOTE:
Use the diagnosis connector to operate the sequence control.

CHECK : ***Can motor revolution noise (buzz) be heard when carrying out the sequence control?***
YES : Go to step **8W6**.
NO : Replace ABSCM&H/U.

8W6 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connector between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8W7**.

8W7 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8W8**.

8W8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

MEMO:

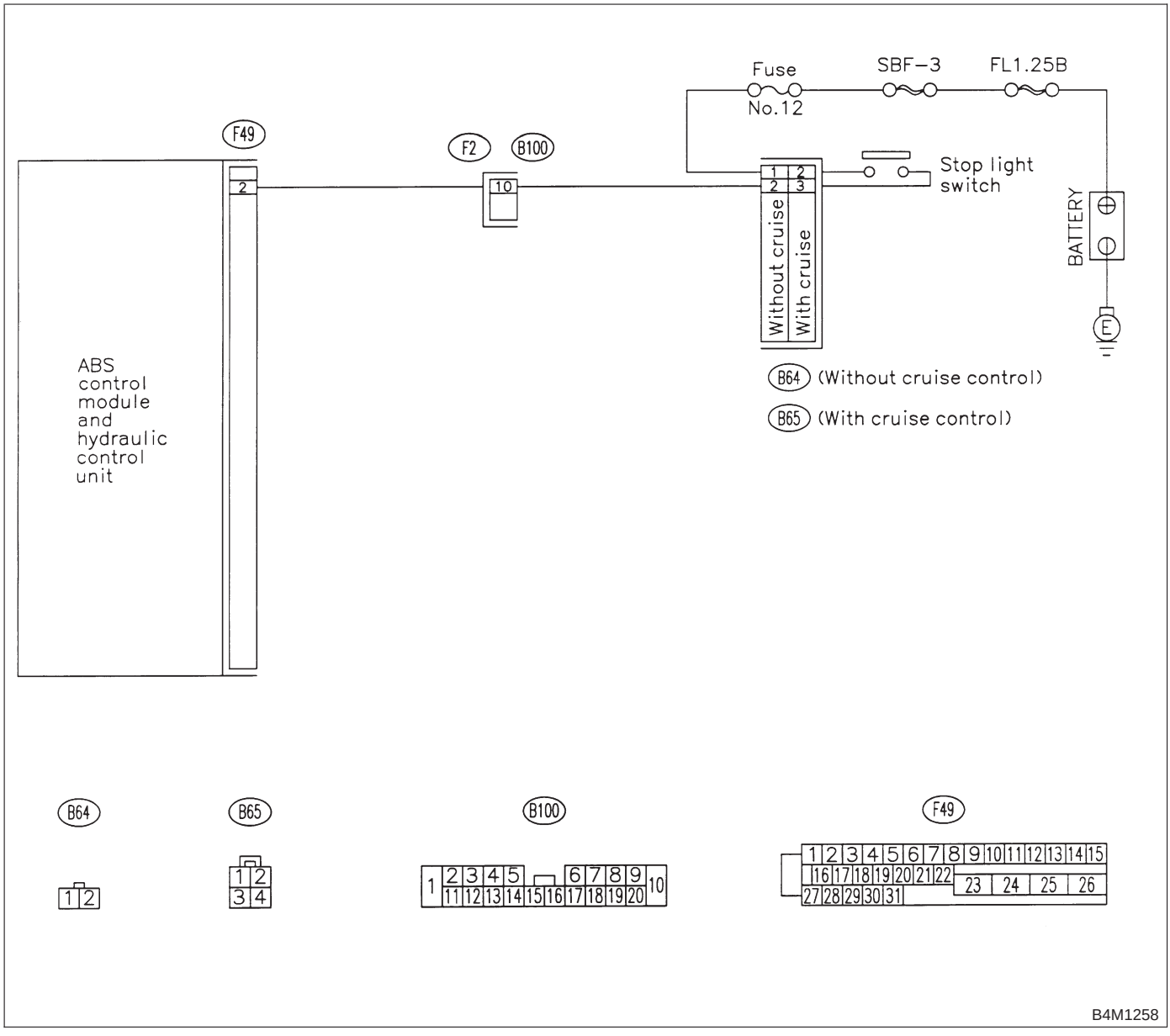
X: TROUBLE CODE 54

— ABNORMAL STOP LIGHT SWITCH —

DIAGNOSIS:
- Faulty stop light switch

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



8X1 : CHECK STOP LIGHTS COME ON.

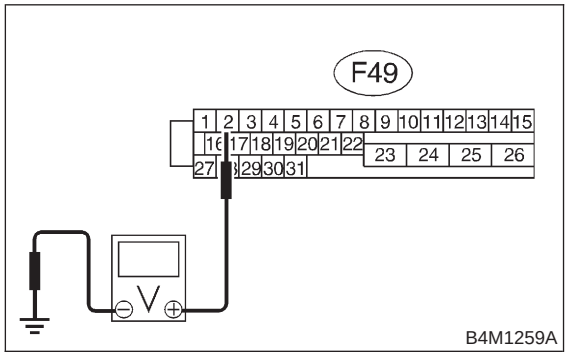
Depress the brake pedal.

CHECK : ***Do stop lights come on?***
YES : Go to step **8X2**.
NO : Repair stop lights circuit.

8X2 : CHECK OPEN CIRCUIT IN HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Depress brake pedal.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 2 (+) — Chassis ground (−):



CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **8X3**.
NO : Repair harness between stop light switch and ABSCM&H/U.

8X3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connector between stop light switch and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8X4**.

8X4 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8X5**.

8X5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

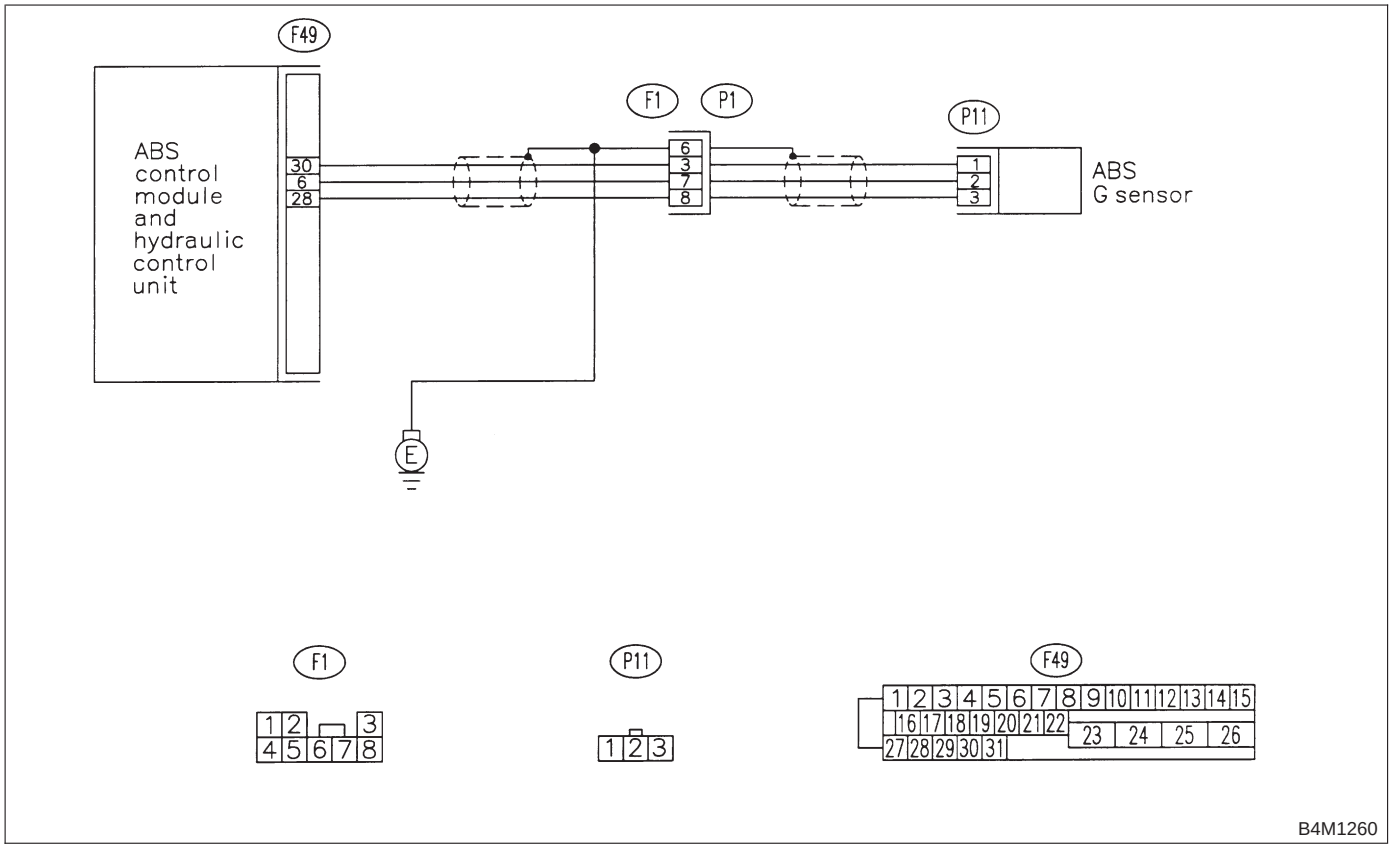
Y: TROUBLE CODE 56

— ABNORMAL G SENSOR OUTPUT VOLTAGE —

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



8Y1 : CHECK ALL FOUR WHEELS FOR FREE TURNING.

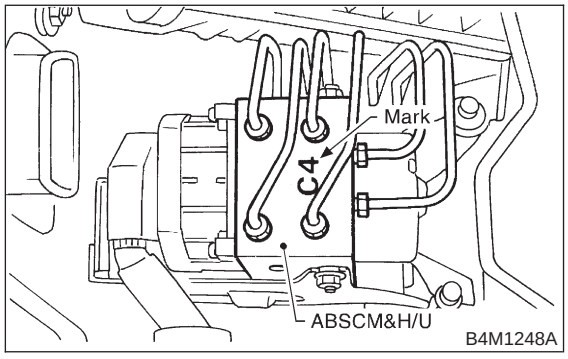
CHECK : ***Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?***

YES : The ABS is normal. Erase the trouble code.

NO : Go to step **8Y2**.

8Y2 : CHECK SPECIFICATIONS OF ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



Mark	Model
C1	FWD AT
C3	AWD AT
C4	AWD MT

CHECK : ***Is an ABSCM for AWD model installed on a FWD model?***

YES : Replace ABSCM&H/U.

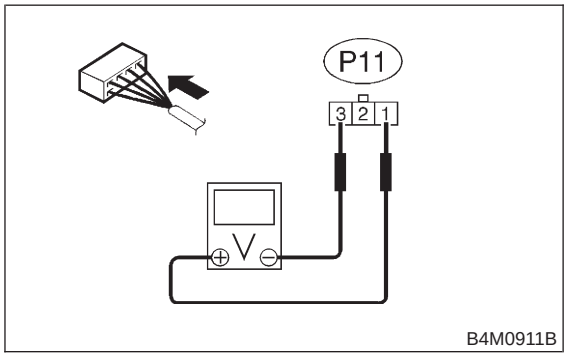
CAUTION:
Be sure to turn ignition switch to OFF when removing ABSCM&H/U.

NO : Go to step **8Y3**.

8Y3 : CHECK INPUT VOLTAGE OF G SENSOR.

1) Turn ignition switch to OFF.
2) Remove console box.
3) Disconnect G sensor from body. (Do not disconnect connector.)
4) Turn ignition switch to ON.
5) Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 1 (+) — No. 3 (−):



CHECK : ***Is the voltage between 4.75 and 5.25 V?***

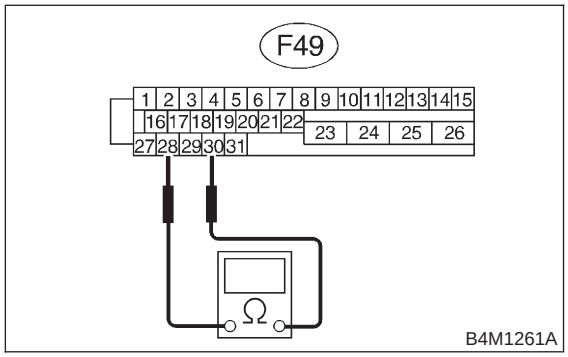
YES : Go to step **8Y4**.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

8Y4 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 30 — No. 28:

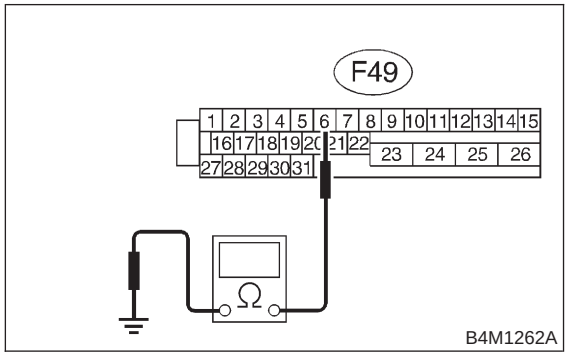


CHECK : ***Is the resistance between 4.3 and 4.9 kΩ?***
YES : Go to step **8Y5**.
NO : Repair harness/connector between G sensor and ABSCM&H/U.

8Y5 : CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.

1) Disconnect connector from G sensor.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 — Chassis ground:

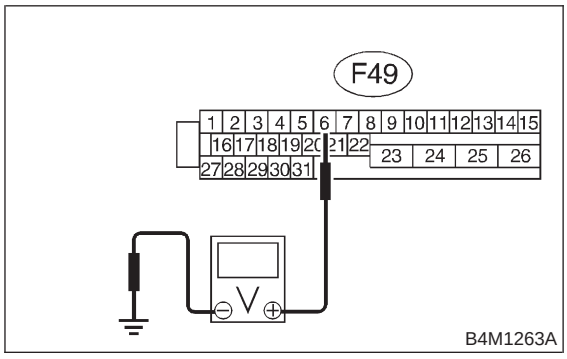


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8Y6**.
NO : Repair harness between G sensor and ABSCM&H/U.

8Y6 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (−):

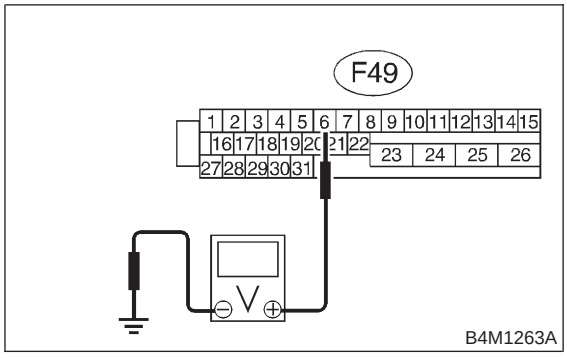


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8Y7**.
NO : Repair harness between G sensor and ABSCM&H/U.

8Y7 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to ON.
2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (−):

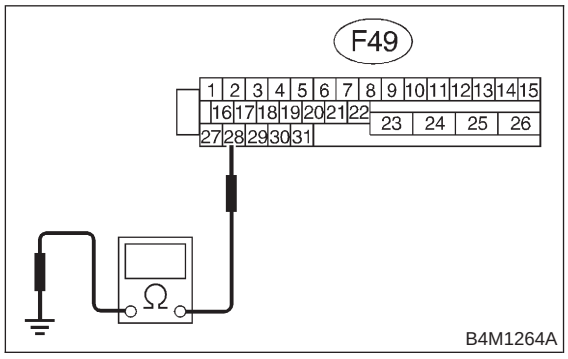


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8Y8**.
NO : Repair harness between G sensor and ABSCM&H/U.

8Y8 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 28 — Chassis ground:

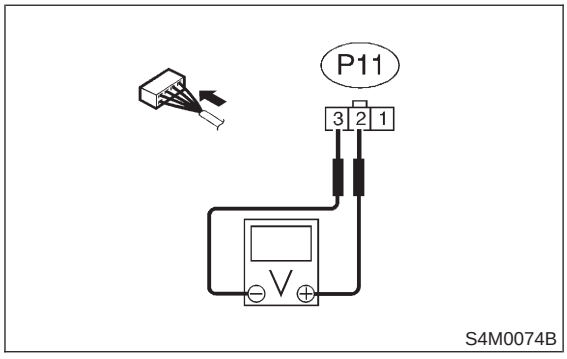


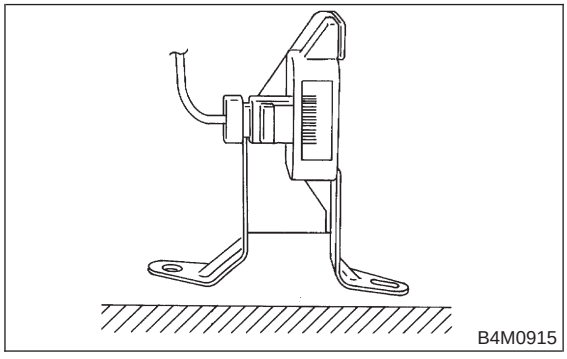
CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8Y9**.
NO : Repair harness between G sensor and ABSCM&H/U.
Replace ABSCM&H/U.

8Y9 : CHECK G SENSOR.

1) Turn ignition switch to OFF.
2) Remove G sensor from vehicle.
3) Connect connector to G sensor.
4) Connect connector to ABSCM&H/U.
5) Turn ignition switch to ON.
6) Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−):



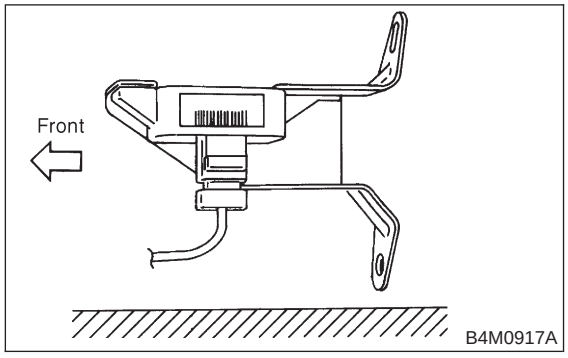


CHECK : ***Is the voltage between 2.1 and 2.4 V when G sensor is horizontal?***
YES : Go to step **8Y10**.
NO : Replace G sensor.

8Y10 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−):

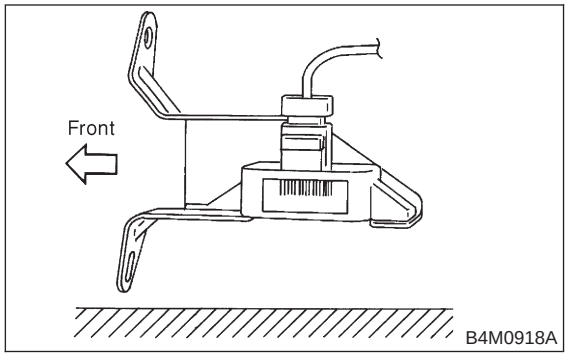


CHECK : ***Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?***
YES : Go to step **8Y11**.
NO : Replace G sensor.

8Y11 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−):



CHECK : ***Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?***
YES : Go to step **8Y12**.
NO : Replace G sensor.

8Y12 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **8Y13**.

8Y13 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **8Y14**.

8Y14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

9. Select Monitor Function Mode

Applicable cartridge of select monitor: No. 24082AA010

NOTE:
For basic handling of the select monitor, refer to its Operation Manual.

A: LIST OF FUNCTION MODE

1. ANALOG DATA ARE DISPLAYED.

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by the Front Right ABS sensor is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by the Front Left ABS sensor is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by the Rear Right ABS sensor is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by the Rear Left ABS sensor is displayed in km/h or mile/h.
Stop light switch	Stop light switch monitor voltage is displayed.
G sensor output voltage	Refers to vehicle acceleration detecting by the analog G sensor. It appears on the select monitor display in volts.

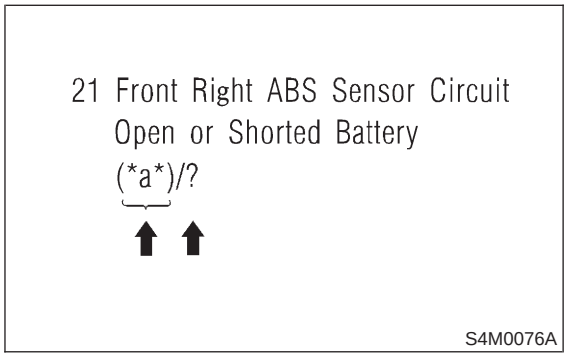
2. ON/OFF DATA ARE DISPLAYED.

Display screen	Contents to be monitored
Stop light switch	Stop light switch signal
Valve relay signal	Valve relay signal
Motor relay signal	Motor relay signal
ABS signal to TCM	ABS operation signal from ABS control module to TCM
ABS warning light	ABS warning light
Valve relay monitor	Valve relay operation monitor signal
Motor relay monitor	Motor relay operation monitor signal
CCM signal	ABS operation signal from ABS control module to TCM

3. TROUBLE CODES ARE DISPLAYED.

A maximum of 3 trouble codes are displayed in order of occurrence.

● If a particular trouble code is not properly stored in memory (due to a drop in ABSCM&H/U power supply, etc.) when a problem occurs, the trouble code, followed by a question mark “?”, appears on the select monitor display. This shows it may be an unreliable reading.



● *a* refers to the troubles in order of occurrence (Latest, Old, Older and Reference).

Display screen	Contents to be monitored
Latest	The most recent trouble code appears on the select monitor display.
Old	The second most recent trouble code appears on the select monitor display.
Older	The third most recent trouble code appears on the select monitor display.
Reference	A specified period of time proceeding trouble code appears on the select monitor display.

4. CLEAR MEMORY

Display screen	Contents to be monitored
Clear memory?	Function of clearing trouble code and freeze frame data.

5. ABS SEQUENCE CONTROL

Display screen	Contents to be monitored	Index No.
ABS sequence control	Perform ABS sequence control by operating valve and pump motor sequentially.	<Ref. to 4-4 [W15D0].>

6. FREEZE FRAME DATA

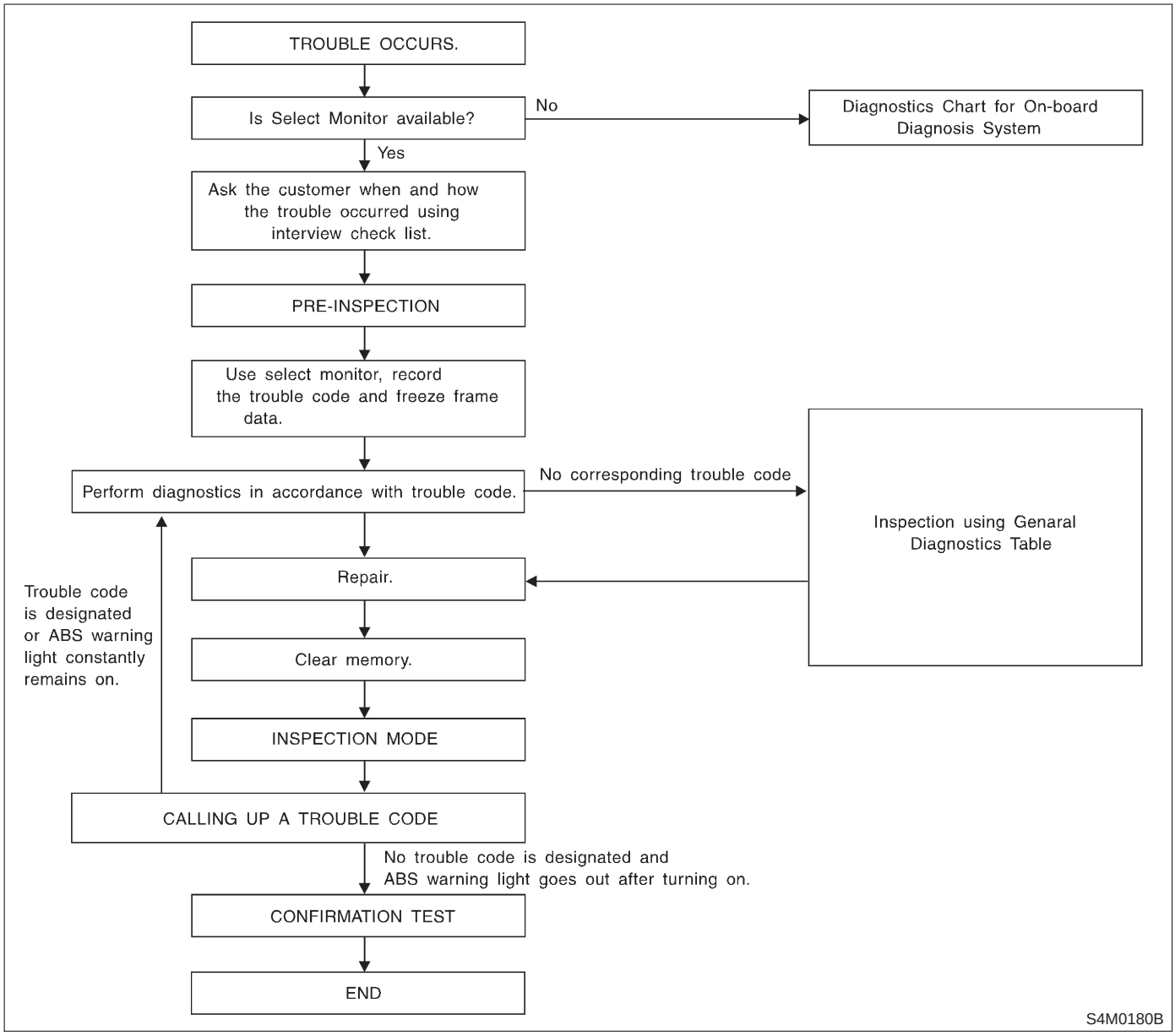
NOTE:
● Data stored at the time of trouble occurrence is shown on display.
● Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
● If freeze frame data is not properly stored in memory (due to a drop in ABSCM power supply, etc.), a trouble code, preceded by a question mark “?”, appears on the select monitor display. This shows it may be an unreliable reading.

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by the Front Right ABS sensor is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by the Front Left ABS sensor is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by the Rear Right ABS sensor is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by the Rear Left ABS sensor is displayed in km/h or mile/h.
ABSCM power voltage	Power (in volts) supplied to ABSCM&H/U appears on the select monitor display.
G sensor output voltage	Refers to vehicle acceleration detected by the analog G sensor. It appears on the select monitor display in volts.
Motor relay monitor	Motor relay operation monitor signal
Stop light switch	Stop light switch signal
ABS signal to TCM	ABS operation signal from ABS control module to TCM
ABS-AT control	ABS operation signal from ABS control module to TCM
ABS operation signal	ABS operation signal

MEMO:

10. Diagnostics Chart with Select Monitor

A: BASIC DIAGNOSTIC CHART



CAUTION:
Remove foreign matter (dust, water, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:
- To check harness for broken wires or short circuits, shake it while holding it or the connector.
- Check list for interview, <Ref. to 4-4 [T6B0].>

B: LIST OF DIAGNOSTIC TROUBLE CODE

Code	Display screen	Contents of diagnosis	Index No.
—	Communication for initializing impossible	Select monitor communication failure	<Ref. to 4-4 [T10C0].>
—	No trouble code	Although no trouble code appears on the select monitor display, the ABS warning light remains on.	<Ref. to 4-4 [T10D0].>
21	Open or short circuit in front right ABS sensor circuit	Open or short circuit in front right ABS sensor circuit	<Ref. to 4-4 [T10E0].>
22	Front right ABS sensor abnormal signal	Front right ABS sensor abnormal signal	<Ref. to 4-4 [T10I0].>
23	Open or short circuit in front left ABS sensor circuit	Open or short circuit in front left ABS sensor circuit	<Ref. to 4-4 [T10F0].>
24	Front left ABS sensor abnormal signal	Front left ABS sensor abnormal signal	<Ref. to 4-4 [T10J0].>
25	Open or short circuit in rear right ABS sensor circuit	Open or short circuit in rear right ABS sensor circuit	<Ref. to 4-4 [T10G0].>
26	Rear right ABS sensor abnormal signal	Rear right ABS sensor abnormal signal	<Ref. to 4-4 [T10K0].>
27	Open or short circuit in rear left ABS sensor circuit	Open or short circuit in rear left ABS sensor circuit	<Ref. to 4-4 [T10H0].>
28	Rear left ABS sensor abnormal signal	Rear left ABS sensor abnormal signal	<Ref. to 4-4 [T10L0].>
29	Abnormal ABS sensor signal on any one of four sensor	Abnormal ABS sensor signal on any one of four	<Ref. to 4-4 [T10M0].>
31	Front right inlet valve malfunction	Front right inlet valve malfunction	<Ref. to 4-4 [T10N0].>
32	Front right outlet valve malfunction	Front right outlet valve malfunction	<Ref. to 4-4 [T10R0].>
33	Front left inlet valve malfunction	Front left inlet valve malfunction	<Ref. to 4-4 [T10O0].>
34	Front left outlet valve malfunction	Front left outlet valve malfunction	<Ref. to 4-4 [T10S0].>
35	Rear right inlet valve malfunction	Rear right inlet valve malfunction	<Ref. to 4-4 [T10P0].>
36	Rear right outlet valve malfunction	Rear right outlet valve malfunction	<Ref. to 4-4 [T10T0].>
37	Rear left inlet valve malfunction	Rear left inlet valve malfunction	<Ref. to 4-4 [T10Q0].>
38	Rear left outlet valve malfunction	Rear left outlet valve malfunction	<Ref. to 4-4 [T10U0].>
41	ABS control module malfunction	ABS control module and hydraulic control unit malfunction	<Ref. to 4-4 [T10V0].>
42	Power supply voltage too low	Power supply voltage too low	<Ref. to 4-4 [T10W0].>
42	Power supply voltage too high	Power supply voltage too high	<Ref. to 4-4 [T10X0].>
44	ABS-AT control (Non Controlled)	ABS-AT control (Non Controlled)	<Ref. to 4-4 [T10Y0].>
44	ABS-AT control (Controlled)	ABS-AT control (Controlled)	<Ref. to 4-4 [T10Z0].>
51	Valve relay malfunction	Valve relay malfunction	<Ref. to 4-4 [T10AA0].>
51	Valve relay ON failure	Valve relay ON failure	<Ref. to 4-4 [T10AB0].>
52	Open circuit in motor relay circuit	Open circuit in motor relay circuit	<Ref. to 4-4 [T10AC0].>
52	Motor relay ON failure	Motor relay ON failure	<Ref. to 4-4 [T10AD0].>
52	Motor malfunction	Motor malfunction	<Ref. to 4-4 [T10AE0].>
54	Stop light switch signal circuit malfunction	Stop light switch signal circuit malfunction	<Ref. to 4-4 [T10AF0].>
56	Open or short circuit in G sensor circuit	Open or short circuit in G sensor circuit	<Ref. to 4-4 [T10AG0].>
56	Battery short in G sensor circuit	Battery short in G sensor circuit	<Ref. to 4-4 [T10AH0].>
56	Abnormal G sensor high μ output	Abnormal G sensor high μ output	<Ref. to 4-4 [T10AI0].>
56	Detection of G sensor stick	Detection of G sensor stick	<Ref. to 4-4 [T10AJ0].>

NOTE:
High μ means high friction coefficient against road surface.

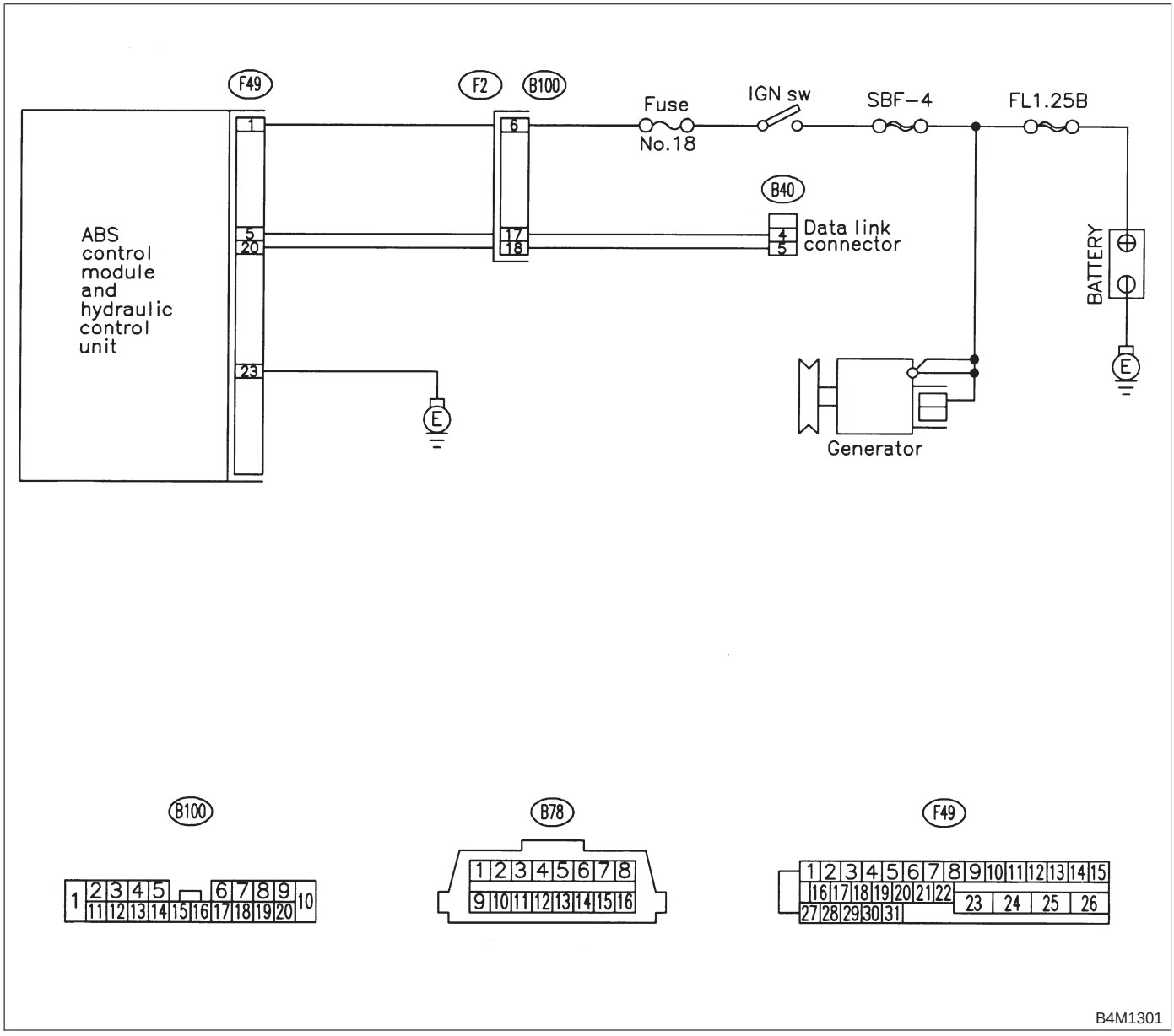
C: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

— SELECT MONITOR COMMUNICATION FAILURE —

DIAGNOSIS:
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS warning light remains on.

WIRING DIAGRAM:



B4M1301

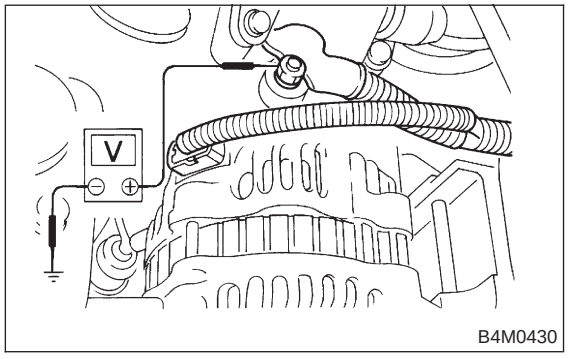
10C1 : CHECK IGNITION SWITCH.

CHECK : ***Is ignition switch ON?***
YES : Go to step **10C2**.
NO : Turn ignition switch ON, and select ABS/TCS mode using the select monitor.

10C2 : CHECK GENERATOR.

1) Start the engine.
2) Idle the engine.
3) Measure voltage between generator and chassis ground.

Terminal
Generator B terminal (+) — Chassis ground (−):



CHECK : ***Is the voltage between 10 and 15 V?***
YES : Go to step **10C3**.
NO : Repair generator.

10C3 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact at battery terminal?***
YES : Repair battery terminal.
NO : Go to step **10C4**.

10C4 : CHECK COMMUNICATION OF SELECT MONITOR.

Using the select monitor, check whether communication to other system (such as engine, AT, etc.) can be executed normally.

CHECK : ***Are the name and year of the system displayed on the select monitor?***
YES : Go to step **10C5**.
NO : Repair select monitor communication cable and connector.

10C5 : CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.

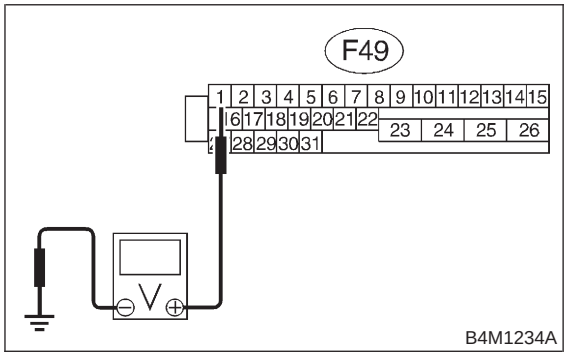
Turn ignition switch to OFF.

CHECK : ***Is ABSCM&H/U connector inserted into ABSCM&H/U until the clamp locks onto it?***
YES : Go to step **10C6**.
NO : Insert ABSCM&H/U connector into ABSCM&H/U until the clamp locks onto it.

10C6 : CHECK POWER SUPPLY OF ABSCM&H/U.

1) Disconnect connector from ABSCM&H/U.
2) Start engine.
3) Idle the engine.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

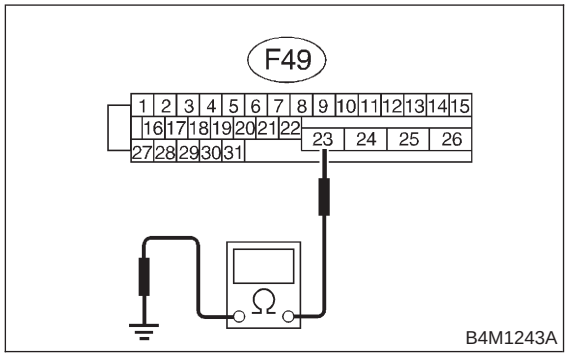


CHECK : ***Is the voltage between 10 and 15 V?***
YES : Go to step **10C7**.
NO : Repair ABSCM&H/U power supply circuit.

10C7 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:

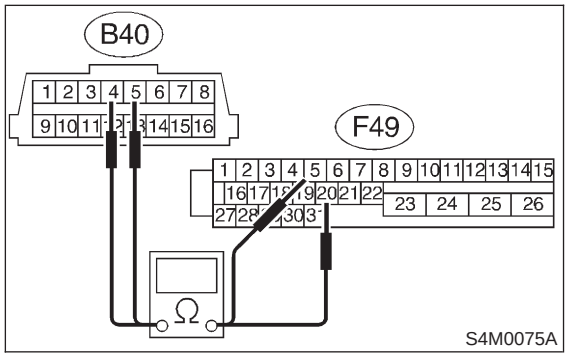


CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Repair harness/connector between ABSCM&H/U and select monitor.
NO : Go to step **10C8**.

10C8 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND DATA LINK CONNECTOR.

1) Turn ignition switch OFF.
2) Measure resistance between ABSCM&H/U connector and data link connector.

Connector & terminal
(F49) No. 20 — (B40) No. 5:
(F49) No. 5 — (B40) No. 4:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Repair harness and connector between ABSCM&H/U and data link connector.
NO : Go to step **10C9**.

10C9 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between ABSCM&H/U and data link connector? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Replace ABSCM&H/U.

MEMO:

D: NO TROUBLE CODE

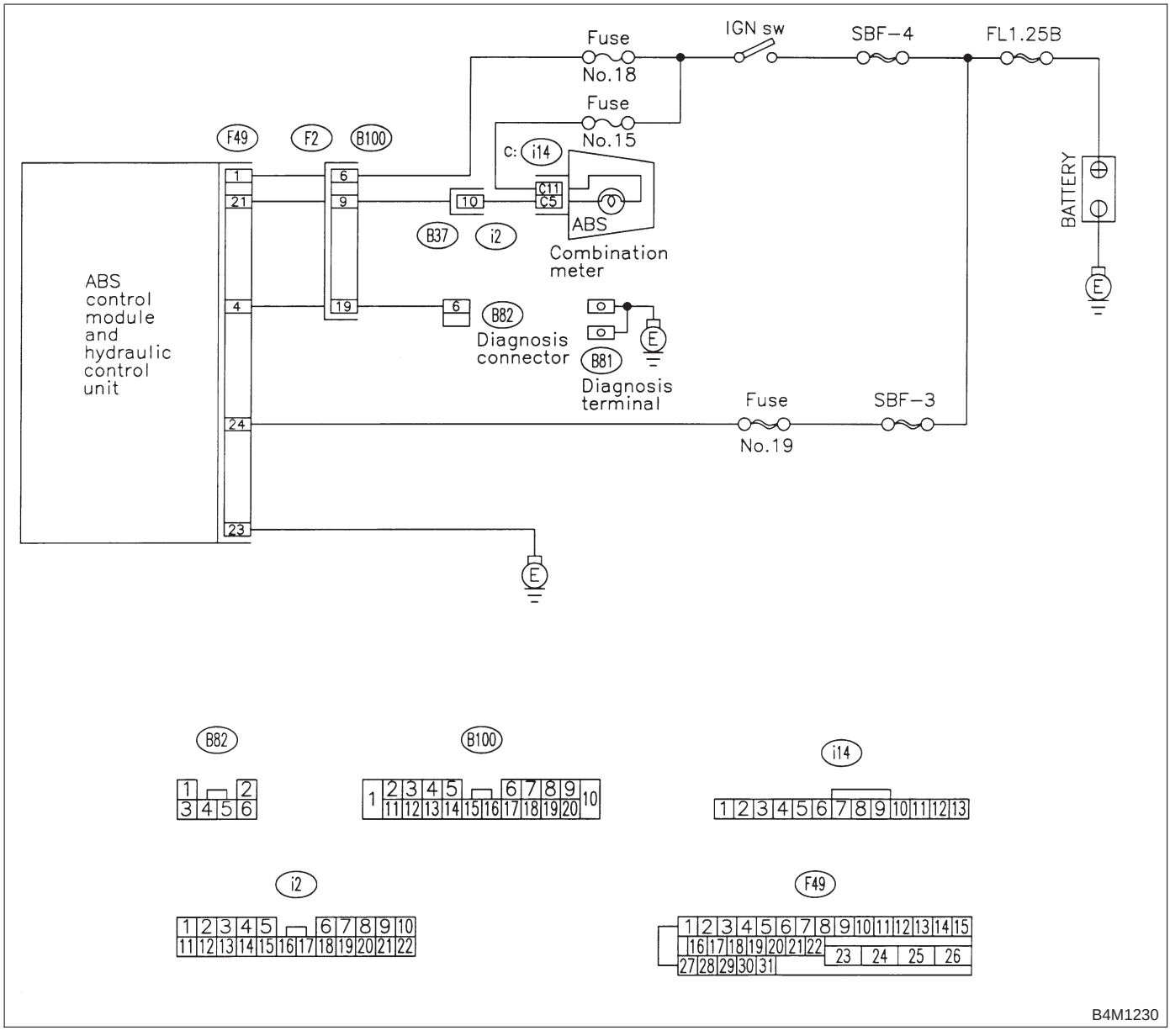
— ALTHOUGH NO TROUBLE CODE APPEARS ON THE SELECT MONITOR DISPLAY, THE ABS WARNING LIGHT REMAINS ON. —

DIAGNOSIS:
- ABS warning light circuit is shorted.

TROUBLE SYMPTOM:
- ABS warning light remains on.
- NO TROUBLE CODE displayed on the select monitor.

NOTE:
When the ABS warning light is OFF and “NO TROUBLE CODE” is displayed on the select monitor, the system is in normal condition.

WIRING DIAGRAM:



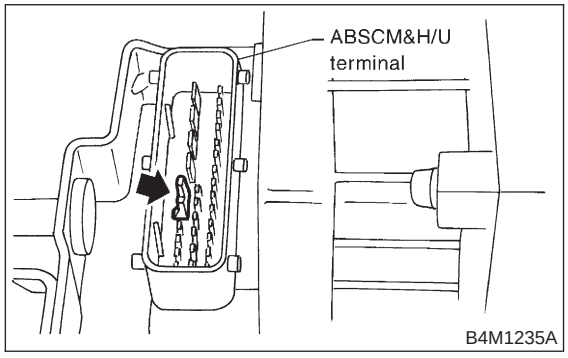
10D1 : CHECK WIRING HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector (F2) from connector (B100).
3) Turn ignition switch to ON.

CHECK : ***Does the ABS warning light remain off?***
YES : Go to step **10D2**.
NO : Repair front wiring harness.

10D2 : CHECK PROJECTION AT ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Check for broken projection at the ABSCM&H/U terminal.

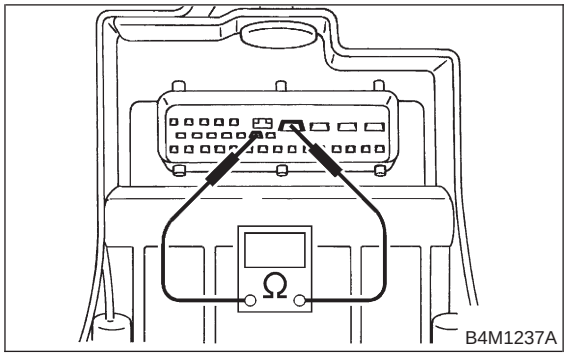


CHECK : ***Are the projection broken?***
YES : Go to step **10D3**.
NO : Replace ABSCM&H/U.

10D3 : CHECK ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminals
No. 21 — No. 23:

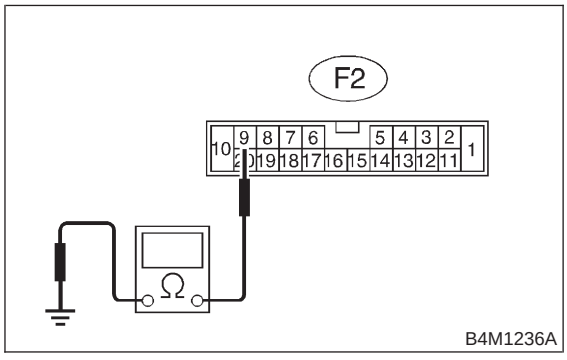


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10D4**.
NO : Replace valve relay.

10D4 : CHECK WIRING HARNESS.

Measure resistance between connector (F2) and chassis ground.

Connector & terminal
(F2) No. 9 — Chassis ground:

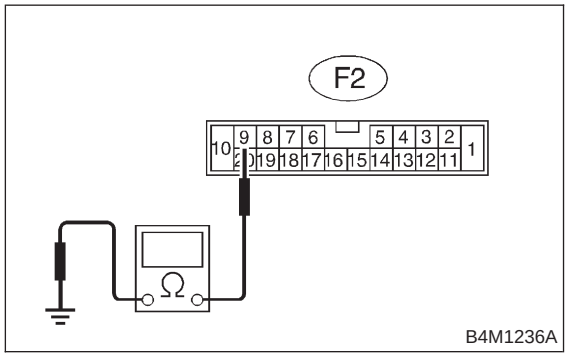


CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10D5**.
NO : Repair harness.

10D5 : CHECK WIRING HARNESS.

1) Connect connector to ABSCM&H/U.
2) Measure resistance between connector (F2) and chassis ground.

Connector & terminal
(F2) No. 9 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10D6**.
NO : Repair harness.

10D6 : CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.

CHECK : ***Is there poor contact in ABSCM&H/U connector? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Replace ABSCM&H/U.

MEMO:

E: TROUBLE CODE 21 OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT

F: TROUBLE CODE 23 OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT

G: TROUBLE CODE 25 OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT

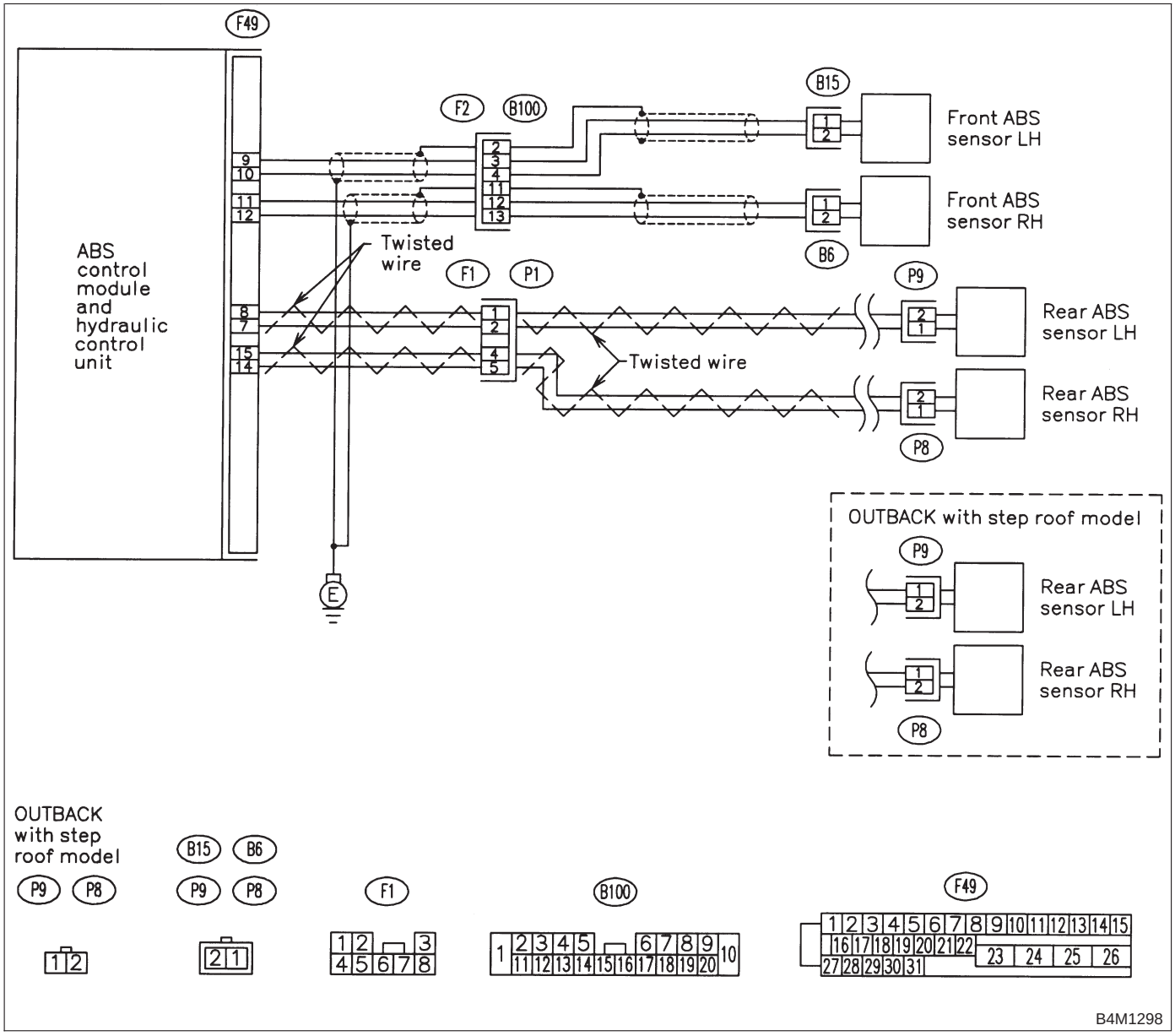
H: TROUBLE CODE 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT

— ABNORMAL ABS SENSOR (OPEN OR SHORT CIRCUIT IN ABS SENSOR CIRCUIT) —

DIAGNOSIS:
- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



10H1 : CHECK OUTPUT OF ABS SENSOR USING SELECT MONITOR.

1) Select “Current data display & Save” on the select monitor.
2) Read the ABS sensor output corresponding to the faulty system in the select monitor data display mode.

CHECK : ***Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?***
YES : Go to step **10H2**.
NO : Go to step **10H9**.

10H2 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CHECK : ***Are the ABS sensor installation bolts tightened securely?***
YES : Go to step **10H3**.
NO : Tighten ABS sensor installation bolts securely.

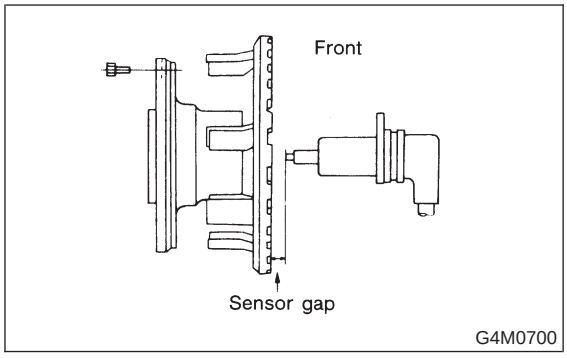
10H3 : CHECK INSTALLATION OF TONE WHEEL.

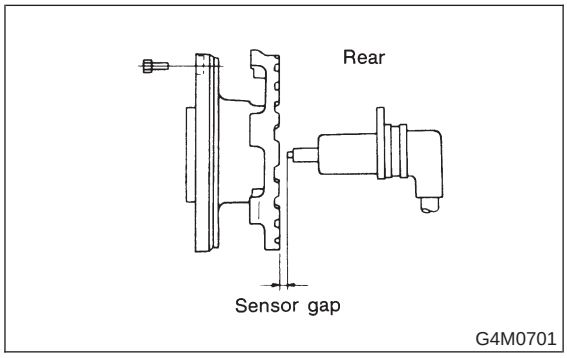
Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9±2.2 ft-lb)

CHECK : ***Are the tone wheel installation bolts tightened securely?***
YES : Go to step **10H4**.
NO : Tighten tone wheel installation bolts securely.

10H4 : CHECK ABS SENSOR GAP.

Measure tone wheel-to-pole piece gap over entire perimeter of the wheel.





	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : ***Is the gap within the specifications?***
YES : Go to step **10H5**.
NO : Adjust the gap.

NOTE:
Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10H5 : CHECK HUB RUNOUT.

Measure hub runout.

CHECK : ***Is the runout less than 0.05 mm (0.0020 in)?***
YES : Go to step **10H6**.
NO : Repair hub.

10H6 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>***

YES : Repair connector.

NO : Go to step **10H7**.

10H7 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **10H8**.

10H8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

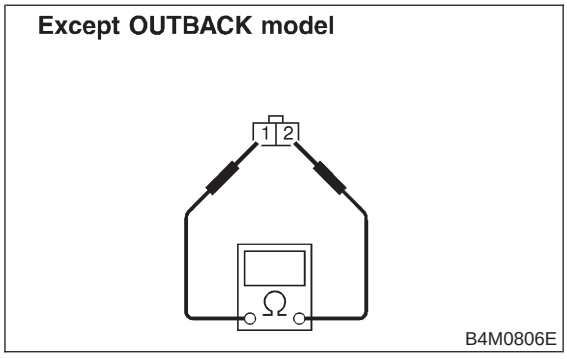
NOTE:
Check harness and connectors between ABSCM&H/U and ABS sensor.

10H9 : CHECK ABS SENSOR.

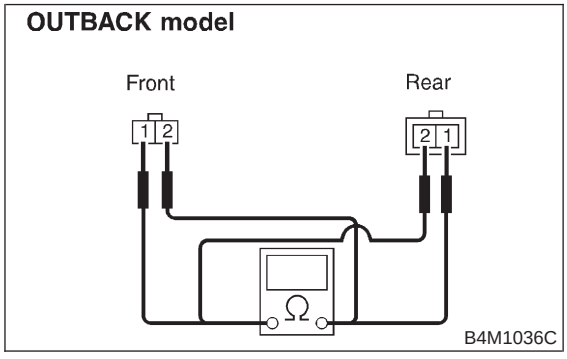
1) Turn ignition switch to OFF.
2) Disconnect connector from ABS sensor.
3) Measure resistance of ABS sensor connector terminals.

Terminal
Front RH No. 1 — No. 2:
Front LH No. 1 — No. 2:
Rear RH No. 1 — No. 2:
Rear LH No. 1 — No. 2:

Except OUTBACK model



OUTBACK model



CHECK : ***Is the resistance between 0.8 and 1.2 kΩ?***

YES : Go to step **10H10**.

NO : Replace ABS sensor.

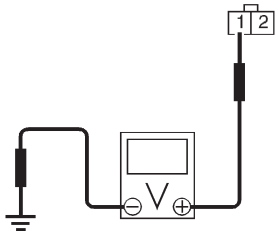
10H10 : CHECK BATTERY SHORT OF ABS SENSOR.

1) Disconnect connector from ABSCM&H/U.
2) Measure voltage between ABS sensor and chassis ground.

Terminal

Front RH No. 1 (+) — Chassis ground (−):
Front LH No. 1 (+) — Chassis ground (−):
Rear RH No. 1 (+) — Chassis ground (−):
Rear LH No. 1 (+) — Chassis ground (−):

Except OUTBACK model



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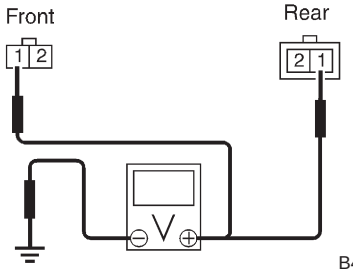
OUTBACK model



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CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10H11**.
NO : Replace ABS sensor.

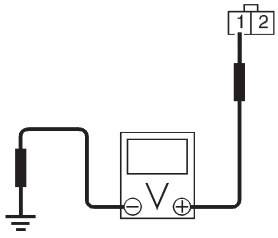
10H11 : CHECK BATTERY SHORT OF ABS SENSOR.

1) Turn ignition switch to ON.
2) Measure voltage between ABS sensor and chassis ground.

Terminal

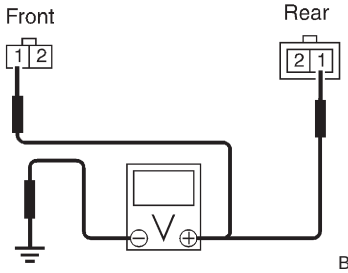
Front RH No. 1 (+) — Chassis ground (−):
Front LH No. 1 (+) — Chassis ground (−):
Rear RH No. 1 (+) — Chassis ground (−):
Rear LH No. 1 (+) — Chassis ground (−):

Except OUTBACK model



B4M0807E

OUTBACK model



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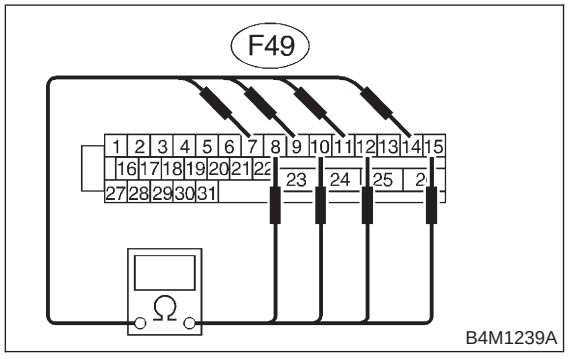
CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10H12**.
NO : Replace ABS sensor.

10H12 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

1) Turn ignition switch to OFF.
2) Connect connector to ABS sensor.
3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal

Trouble code 21 / (F49) No. 11 — No. 12:
Trouble code 23 / (F49) No. 9 — No. 10:
Trouble code 25 / (F49) No. 14 — No. 15:
Trouble code 27 / (F49) No. 7 — No. 8:



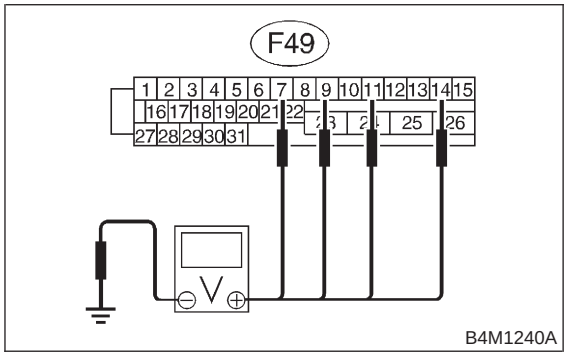
CHECK : ***Is the resistance between 0.8 and 1.2 kΩ?***
YES : Go to step **10H13**.
NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

10H13 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) — Chassis ground (−):
Trouble code 23 / (F49) No. 9 (+) — Chassis ground (−):
Trouble code 25 / (F49) No. 14 (+) — Chassis ground (−):
Trouble code 27 / (F49) No. 7 (+) — Chassis ground (−):

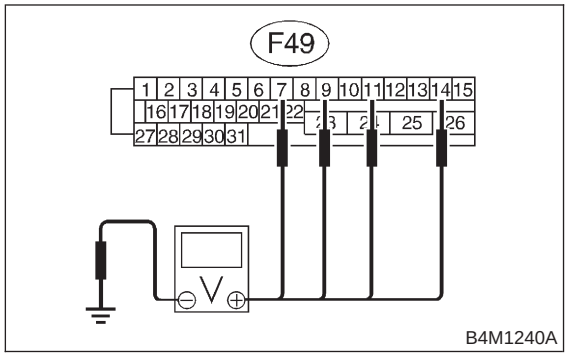


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10H14**.
NO : Repair harness between ABSCM&H/U and ABS sensor.

10H14 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to ON.
2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
Trouble code 21 / (F49) No. 11 (+) — Chassis ground (−):
Trouble code 23 / (F49) No. 9 (+) — Chassis ground (−):
Trouble code 25 / (F49) No. 14 (+) — Chassis ground (−):
Trouble code 27 / (F49) No. 7 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10H15**.
NO : Repair harness between ABSCM&H/U and ABS sensor.

10H15 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CHECK : ***Are the ABS sensor installation bolts tightened securely?***
YES : Go to step **10H16**.
NO : Tighten ABS sensor installation bolts securely.

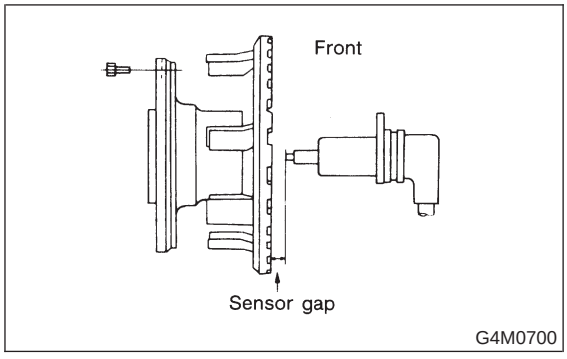
10H16 : CHECK INSTALLATION OF TONE WHEEL.

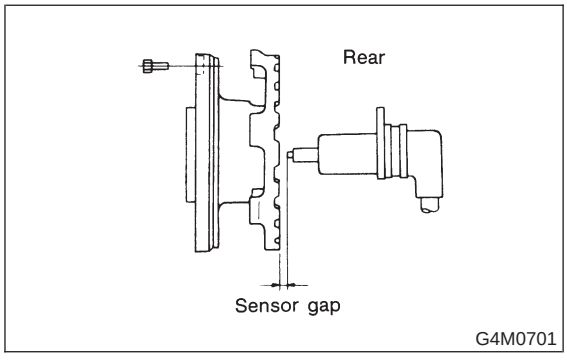
Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9±2.2 ft-lb)

CHECK : ***Are the tone wheel installation bolts tightened securely?***
YES : Go to step **10H17**.
NO : Tighten tone wheel installation bolts securely.

10H17 : CHECK ABS SENSOR GAP.

Measure tone wheel-to-pole piece gap over entire perimeter of the wheel.





	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : ***Is the gap within the specifications?***
YES : Go to step **10H18**.
NO : Adjust the gap.

NOTE:
Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10H18 : CHECK HUB RUNOUT.

Measure hub runout.

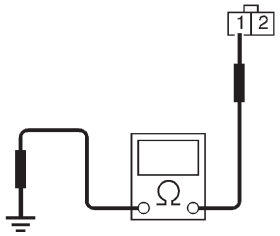
CHECK : ***Is the runout less than 0.05 mm (0.0020 in)?***
YES : Go to step **10H19**.
NO : Repair hub.

10H19 : CHECK GROUND SHORT OF ABS SENSOR.

1) Turn ignition switch to ON.
2) Measure resistance between ABS sensor and chassis ground.

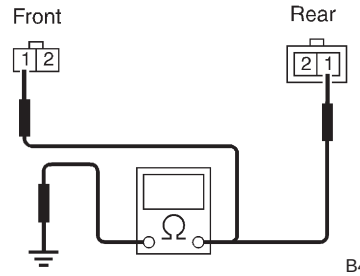
Terminal
Front RH No. 1 — Chassis ground:
Front LH No. 1 — Chassis ground:
Rear RH No. 1 — Chassis ground:
Rear LH No. 1 — Chassis ground:

Except OUTBACK model



B4M0818E

OUTBACK model



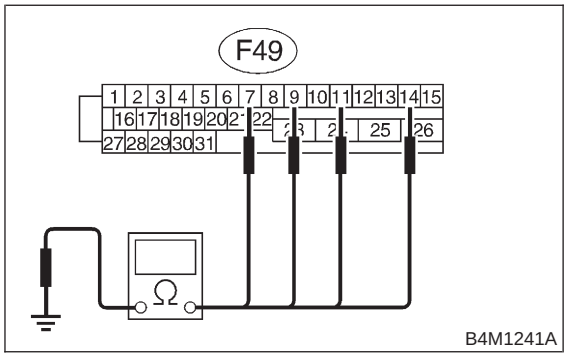
B4M1042C

CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10H20**.
NO : Replace ABS sensor and ABSCM&H/U.

10H20 : CHECK GROUND SHORT OF HARNESS.

1) Turn ignition switch to OFF.
2) Connect connector to ABS sensor.
3) Measure resistance between ABSCM&H/U connector terminal and chassis ground.

Connector & terminal
Trouble code 21 / (F49) No. 11 — Chassis ground:
Trouble code 23 / (F49) No. 9 — Chassis ground:
Trouble code 25 / (F49) No. 14 — Chassis ground:
Trouble code 27 / (F49) No. 7 — Chassis ground:



B4M1241A

CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10H21**.
NO : Repair harness between ABSCM&H/U and ABS sensor.
And replace ABSCM&H/U.

10H21 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10H22**.

10H22 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **10H23**.

10H23 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

NOTE:
Check harness and connectors between ABSCM&H/U and ABS sensor.

MEMO:

I: TROUBLE CODE 22 FRONT RIGHT ABS SENSOR ABNORMAL SIGNAL

J: TROUBLE CODE 24 FRONT LEFT ABS SENSOR ABNORMAL SIGNAL

K: TROUBLE CODE 26 REAR RIGHT ABS SENSOR ABNORMAL SIGNAL

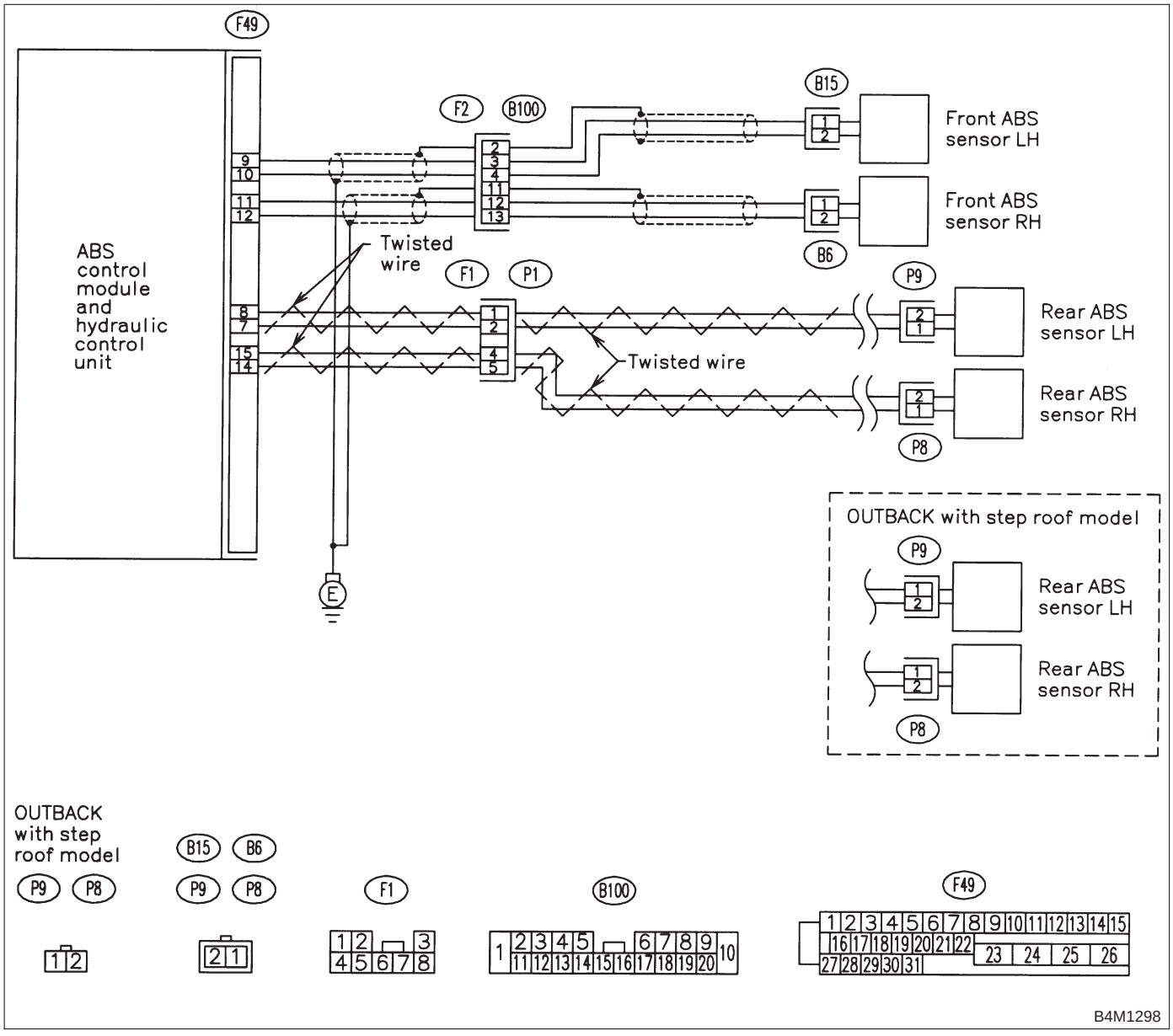
L: TROUBLE CODE 28 REAR LEFT ABS SENSOR ABNORMAL SIGNAL

— ABNORMAL ABS SENSOR (ABS SENSOR ABNORMAL SIGNAL) —

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



10L1 : CHECK OUTPUT OF ABS SENSOR USING SELECT MONITOR.

1) Select “Current data display & Save” on the select monitor.
2) Read the ABS sensor output corresponding to the faulty system in the select monitor data display mode.

CHECK : ***Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?***
YES : Go to step **10L2**.
NO : Go to step **10L8**.

10L2 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connectors between ABSCM&H/U and ABS sensor?***
YES : Repair connector.
NO : Go to step **10L3**.

10L3 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Is the car telephone or the wireless transmitter properly installed?***
YES : Go to step **10L4**.
NO : Properly install the car telephone or the wireless transmitter.

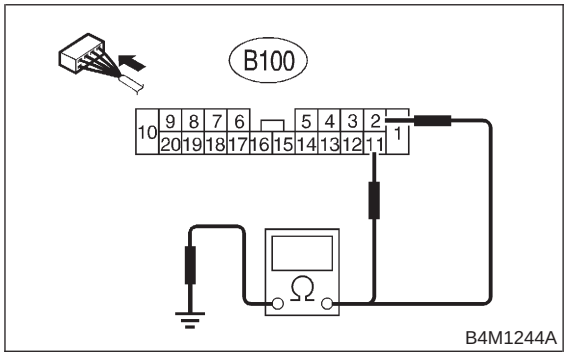
10L4 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Are noise sources (such as an antenna) installed near the sensor harness?***
YES : Install the noise sources apart from the sensor harness.
NO : Go to step **10L5**.

10L5 : CHECK SHIELD CIRCUIT.

1) Turn ignition switch to OFF.
2) Connect all connectors.
3) Measure resistance between shield connector and chassis ground.

Connector & terminal
Trouble code 22 / (B100) No. 11 — Chassis ground:
Trouble code 24 / (B100) No. 2 — Chassis ground:
***Trouble code 26 / Go to step* 10L6.**
***Trouble code 28 / Go to step* 10L6.**



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10L6**.
NO : Repair shield harness.

10L6 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10L7**.

10L7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary noise interference.

10L8 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CHECK : ***Are the ABS sensor installation bolts tightened securely?***
YES : Go to step **10L9**.
NO : Tighten ABS sensor installation bolts securely.

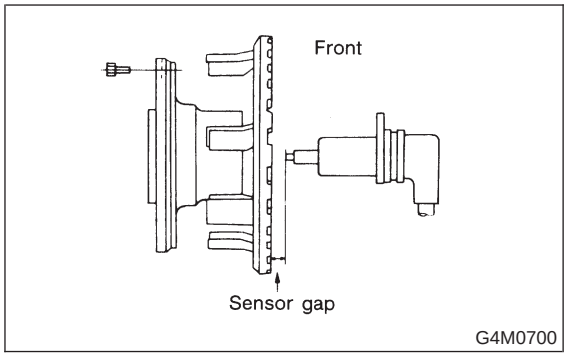
10L9 : CHECK INSTALLATION OF TONE WHEEL.

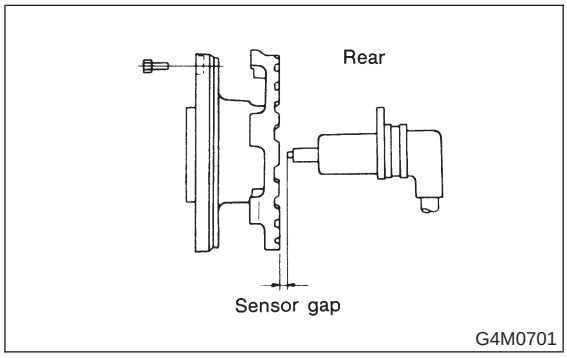
Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9±2.2 ft-lb)

CHECK : ***Are the tone wheel installation bolts tightened securely?***
YES : Go to step **10L10**.
NO : Tighten tone wheel installation bolts securely.

10L10 : CHECK ABS SENSOR GAP.

Measure tone wheel to pole piece gap over entire perimeter of the wheel.





	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : ***Is the gap within the specifications?***
YES : Go to step **10L11**.
NO : Adjust the gap.

NOTE:
Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10L11 : CHECK OSCILLOSCOPE.

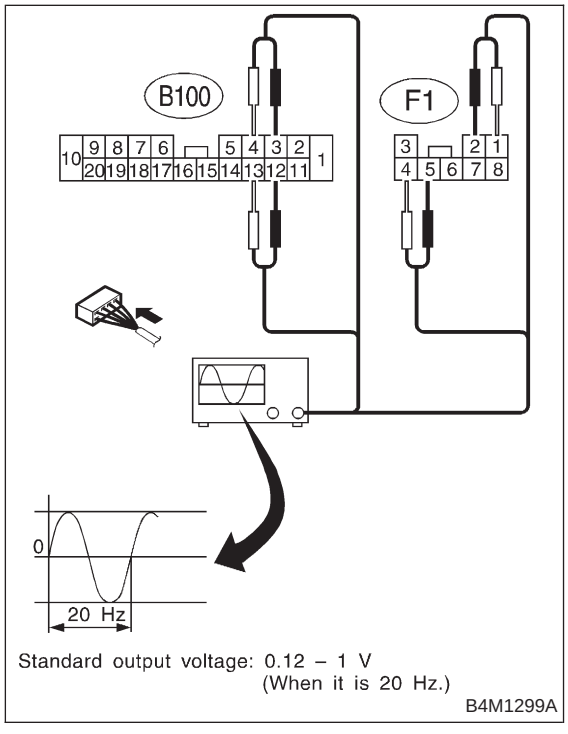
CHECK : ***Is an oscilloscope available?***
YES : Go to step **10L12**.
NO : Go to step **10L13**.

10L12 : CHECK ABS SENSOR SIGNAL.

1) Raise all four wheels of ground.
2) Turn ignition switch OFF.
3) Connect the oscilloscope to the connector (F1) or connector (B100) in accordance with trouble code.
4) Turn ignition switch ON.
5) Rotate wheels and measure voltage at specified frequency.

NOTE:
When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29.

Connector & terminal
Trouble code 22 / (B100) No. 12 (+) — No. 13 (−):
Trouble code 24 / (B100) No. 3 (+) — No. 4 (−):
Trouble code 26 / (F1) No. 5 (+) — No. 4 (−):
Trouble code 28 / (F1) No. 2 (+) — No. 1 (−):
Specified voltage: 0.12 — 1 V (When it is 20 Hz.)



Standard output voltage: 0.12 – 1 V
(When it is 20 Hz.)
B4M1299A

CHECK : ***Is oscilloscope pattern smooth, as shown in figure?***
YES : Go to step **10L16**.
NO : Go to step **10L13**.

10L13 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor or drum from hub in accordance with trouble code.

CHECK : ***Is the ABS sensor pole piece or the tone wheel contaminated by dirt or other foreign matter?***
YES : Thoroughly remove dirt or other foreign matter.
NO : Go to step **10L14**.

10L14 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : ***Are there broken or damaged in the ABS sensor pole piece or the tone wheel?***
YES : Replace ABS sensor or tone wheel.
NO : Go to step **10L15**.

10L15 : CHECK HUB RUNOUT.

Measure hub runout.

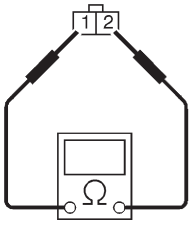
CHECK : ***Is the runout less than 0.05 mm (0.0020 in)?***
YES : Go to step **10L16**.
NO : Repair hub.

10L16 : CHECK RESISTANCE OF ABS SENSOR.

1) Turn ignition switch OFF.
2) Disconnect connector from ABS sensor.
3) Measure resistance between ABS sensor connector terminals.

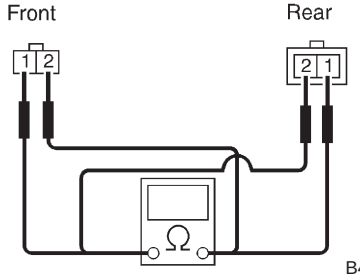
Terminal
Front RH No. 1 — No. 2:
Front LH No. 1 — No. 2:
Rear RH No. 1 — No. 2:
Rear LH No. 1 — No. 2:

Except OUTBACK model



B4M0806E

OUTBACK model



B4M1036C

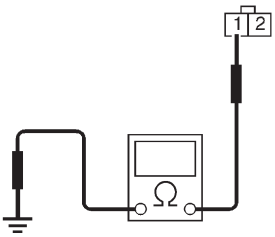
CHECK : ***Is the resistance between 0.8 and 1.2 kΩ?***
YES : Go to step **10L17**.
NO : Replace ABS sensor.

10L17 : CHECK GROUND SHORT OF ABS SENSOR.

Measure resistance between ABS sensor and chassis ground.

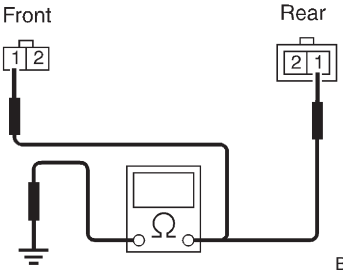
Terminal
Front RH No. 1 — Chassis ground:
Front LH No. 1 — Chassis ground:
Rear RH No. 1 — Chassis ground:
Rear LH No. 1 — Chassis ground:

Except OUTBACK model



B4M0818E

OUTBACK model



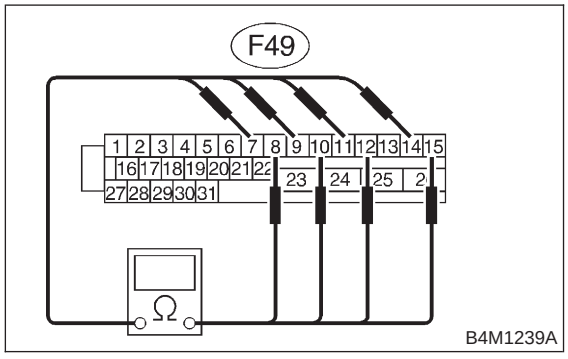
B4M1042C

CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10L18**.
NO : Replace ABS sensor.

10L18 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

1) Connect connector to ABS sensor.
2) Disconnect connector from ABSCM&H/U.
3) Measure resistance at ABSCM&H/U connector terminals.

Connector & terminal
Trouble code 22 / (F49) No. 11 — No. 12:
Trouble code 24 / (F49) No. 9 — No. 10:
Trouble code 26 / (F49) No. 14 — No. 15:
Trouble code 28 / (F49) No. 7 — No. 8:

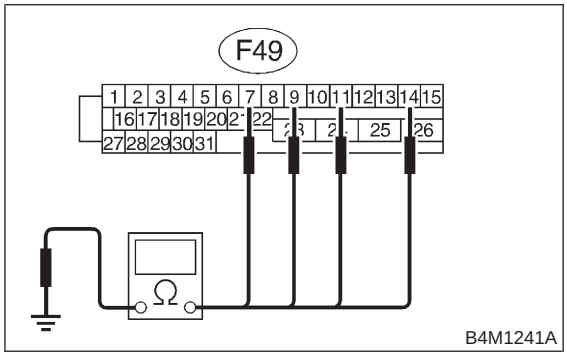


CHECK : ***Is the resistance between 0.8 and 1.2 kΩ?***
YES : Go to step **10L19**.
NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

10L19 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
Trouble code 22 / (F49) No. 11 — Chassis ground:
Trouble code 24 / (F49) No. 9 — Chassis ground:
Trouble code 26 / (F49) No. 14 — Chassis ground:
Trouble code 28 / (F49) No. 7 — Chassis ground:

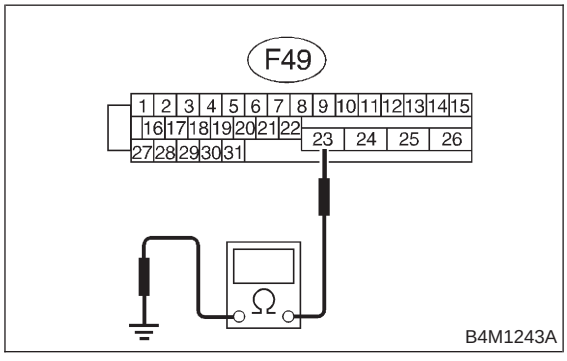


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10L20**.
NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

10L20 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal
(F49) No. 23 — GND:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10L21**.
NO : Repair ABSCM&H/U ground harness.

10L21 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10L22**.

10L22 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Is the car telephone or the wireless transmitter properly installed?***
YES : Go to step **10L23**.
NO : Properly install the car telephone or the wireless transmitter.

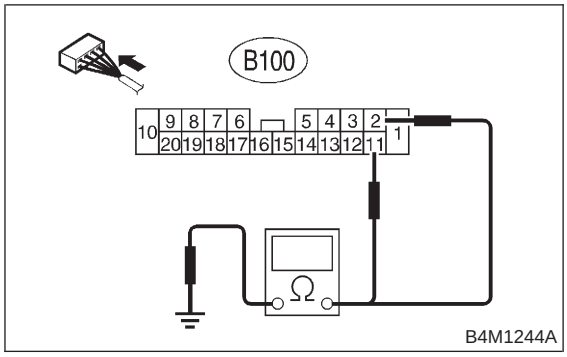
10L23 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Are noise sources (such as an antenna) installed near the sensor harness?***
YES : Install the noise sources apart from the sensor harness.
NO : Go to step **10L24**.

10L24 : CHECK SHIELD CIRCUIT.

1) Connect all connectors.
2) Measure resistance between shield connector and chassis ground.

Connector & terminal
Trouble code 22 / (B100) No. 11 — Chassis ground:
Trouble code 24 / (B100) No. 2 — Chassis ground:
***Trouble code 26 / Go to step* 10L25.**
***Trouble code 28 / Go to step* 10L25.**



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10L25**.
NO : Repair shield harness.

10L25 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10L26**.

10L26 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary noise interference.

MEMO:

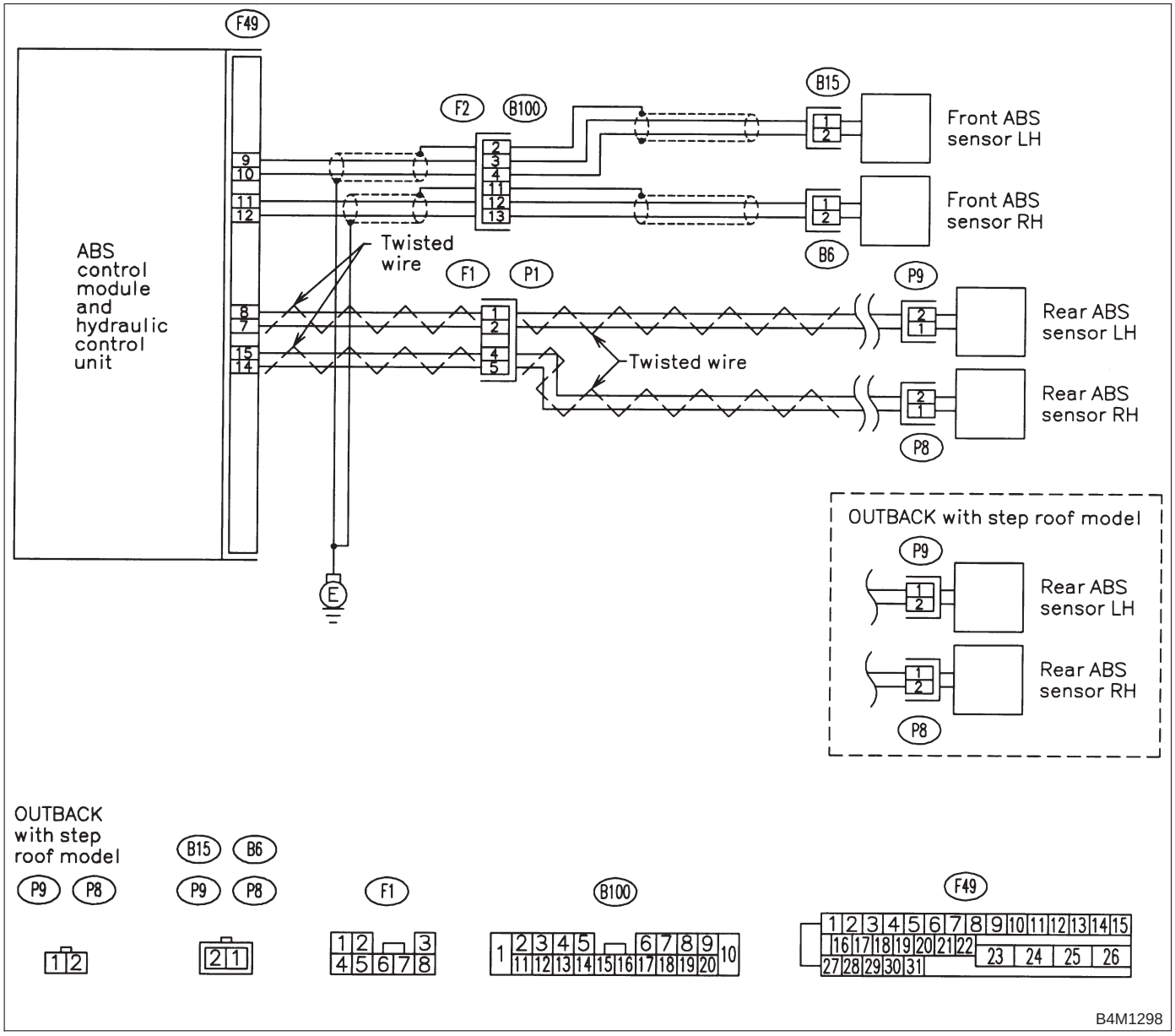
M: TROUBLE CODE 29 ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR

— ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR —

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



10M1 : CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.

CHECK : ***Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when tire is not in contact with road surface.***

YES : The ABS is normal. Erase the trouble code.

NOTE:
When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this trouble code may sometimes occur.

NO : Go to step **10M2**.

10M2 : CHECK TIRE SPECIFICATIONS.

Turn ignition switch to OFF.

CHECK : ***Are the tire specifications correct?***

YES : Go to step **10M3**.

NO : Replace tire.

10M3 : CHECK WEAR OF TIRE.

CHECK : ***Is the tire worn excessively?***

YES : Replace tire.

NO : Go to step **10M4**.

10M4 : CHECK TIRE PRESSURE.

CHECK : ***Is the tire pressure correct?***

YES : Go to step **10M5**.

NO : Adjust tire pressure.

10M5 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CHECK : ***Are the ABS sensor installation bolts tightened securely?***

YES : Go to step **10M6**.

NO : Tighten ABS sensor installation bolts securely.

10M6 : CHECK INSTALLATION OF TONE WHEEL.

Tightening torque:
13±3 N·m (1.3±0.3 kg-m, 9±2.2 ft-lb)

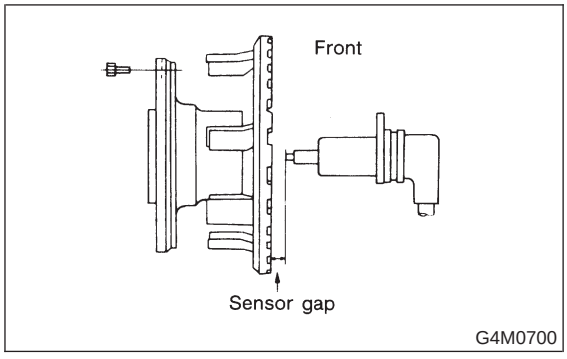
CHECK : ***Are the tone wheel installation bolts tightened securely?***

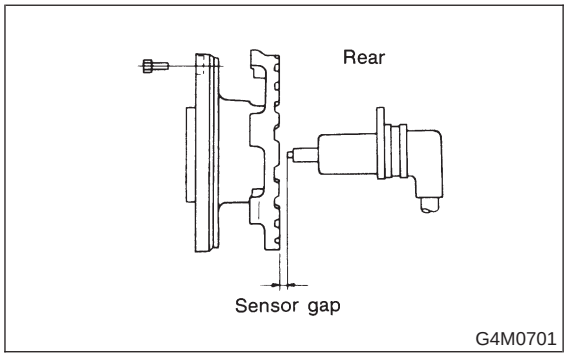
YES : Go to step **10M7**.

NO : Tighten tone wheel installation bolts securely.

10M7 : CHECK ABS SENSOR GAP.

Measure tone wheel to pole piece gap over entire perimeter of the wheel.





	Front wheel	Rear wheel
Specifications	0.9 — 1.4 mm (0.035 — 0.055 in)	0.7 — 1.2 mm (0.028 — 0.047 in)

CHECK : ***Is the gap within the specifications?***

YES : Go to step **10M8**.

NO : Adjust the gap.

NOTE:
Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10M8 : CHECK OSCILLOSCOPE.

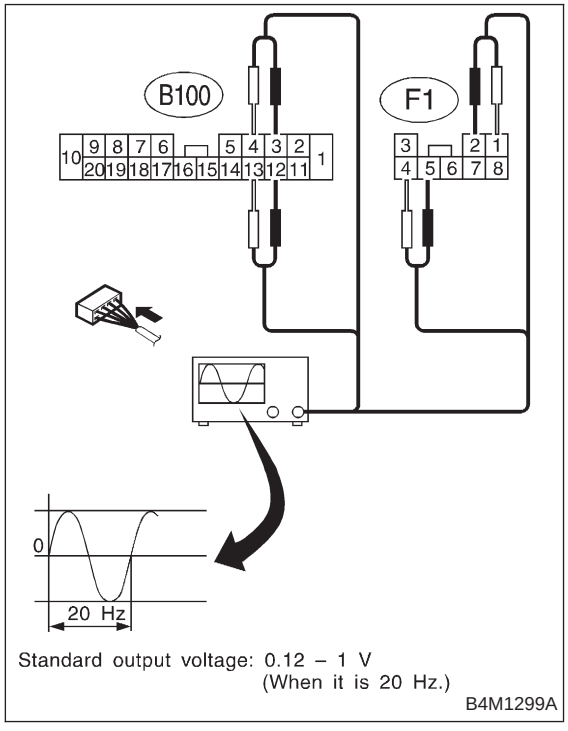
CHECK : ***Is an oscilloscope available?***
YES : Go to step **10M9**.
NO : Go to step **10M10**.

10M9 : CHECK ABS SENSOR SIGNAL.

1) Raise all four wheels of ground.
2) Turn ignition switch OFF.
3) Connect the oscilloscope to the connector (B100) or connector (F1).
4) Turn ignition switch ON.
5) Rotate wheels and measure voltage at specified frequency.

NOTE:
When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29.

Connector & terminal
(B100) No. 12 (+) — No. 13 (−) (Front RH):
(B100) No. 3 (+) — No. 4 (−) (Front LH):
(B100) No. 5 (+) — No. 4 (−) (Rear RH):
(B100) No. 2 (+) — No. 1 (−) (Rear LH):
Specified voltage: 0.12 — 1 V (When it is 20 Hz.)



Standard output voltage: 0.12 – 1 V
(When it is 20 Hz.)
B4M1299A

CHECK : ***Is oscilloscope pattern smooth, as shown in figure?***
YES : Go to step **10M13**.
NO : Go to step **10M10**.

10M10 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor from hub.

CHECK : ***Is the ABS sensor pole piece or the tone wheel contaminated by dirt or other foreign matter?***
YES : Thoroughly remove dirt or other foreign matter.
NO : Go to step **10M11**.

10M11 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : ***Are there broken or damaged teeth in the ABS sensor pole piece or the tone wheel?***
YES : Replace ABS sensor or tone wheel.
NO : Go to step **10M12**.

10M12 : CHECK HUB RUNOUT.

Measure hub runout.

CHECK : ***Is the runout less than 0.05 mm (0.0020 in)?***
YES : Go to step **10M13**.
NO : Repair hub.

10M13 : CHECK ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Connect all connectors.
3) Erase the memory.
4) Perform inspection mode.
5) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10M14**.

10M14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

MEMO:

N: TROUBLE CODE 31 FRONT RIGHT INLET VALVE MALFUNCTION

O: TROUBLE CODE 33 FRONT LEFT INLET VALVE MALFUNCTION

P: TROUBLE CODE 35 REAR RIGHT INLET VALVE MALFUNCTION

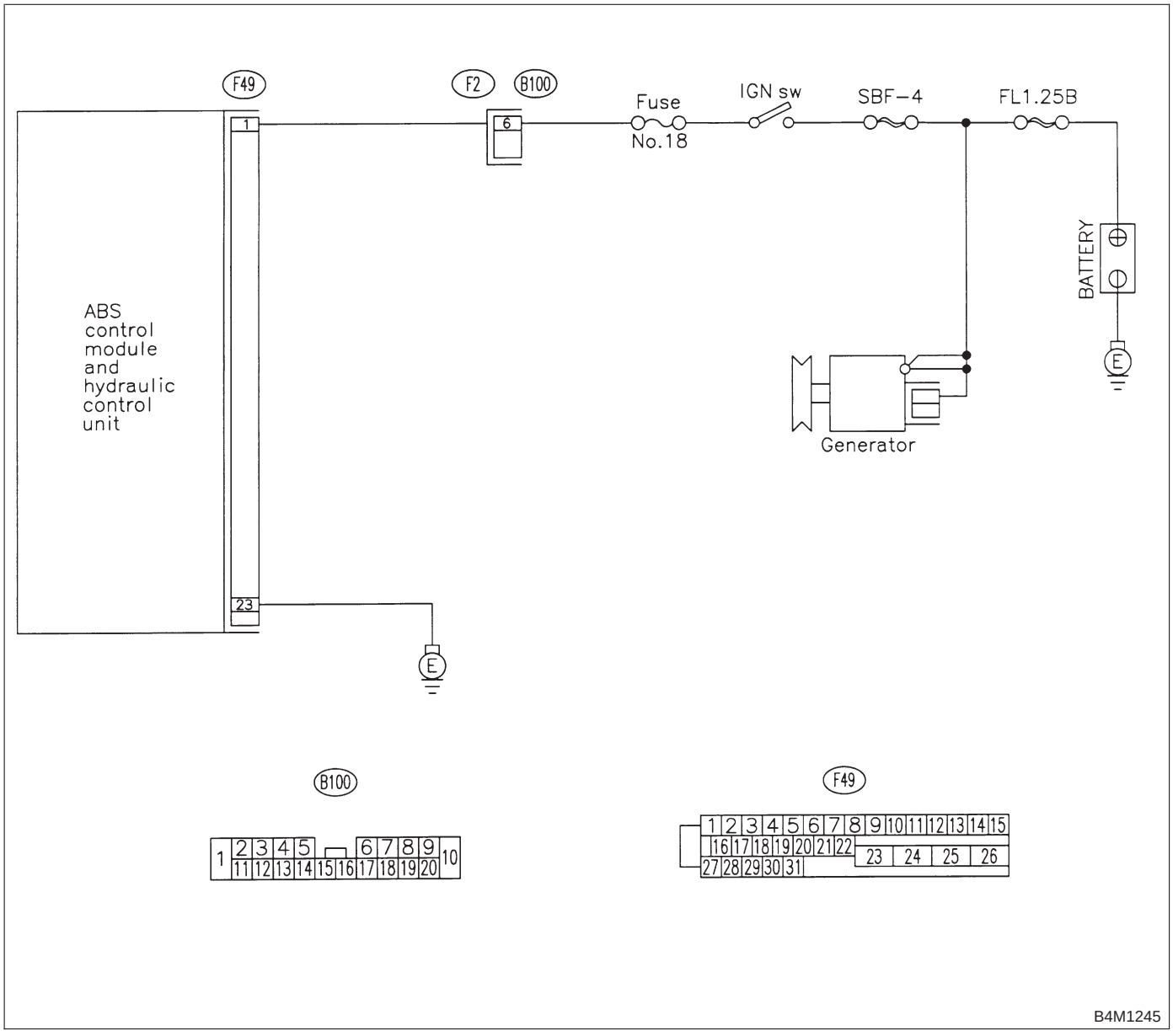
Q: TROUBLE CODE 37 REAR LEFT INLET VALVE MALFUNCTION

— INLET SOLENOID VALVE MALFUNCTION —

DIAGNOSIS:
- Faulty harness/connector
- Faulty inlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.

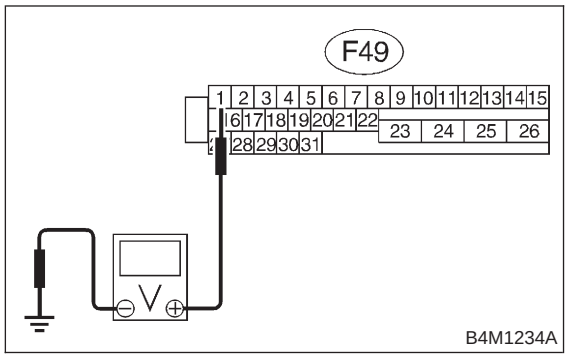
WIRING DIAGRAM:



10Q1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Run the engine at idle.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

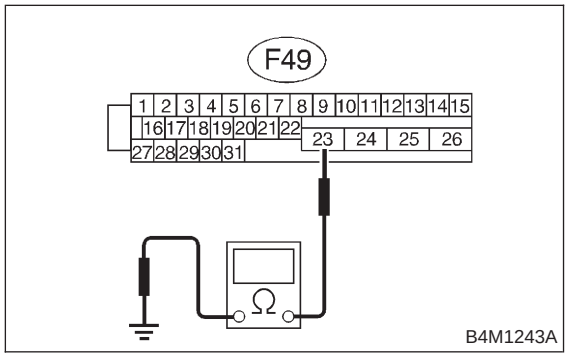


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **10Q2**.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10Q2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10Q3**.
NO : Repair ABSCM&H/U ground harness.

10Q3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10Q4**.

10Q4 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10Q5**.

10Q5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

R: TROUBLE CODE 32 FRONT RIGHT OUTLET VALVE MALFUNCTION

S: TROUBLE CODE 34 FRONT LEFT OUTLET VALVE MALFUNCTION

T: TROUBLE CODE 36 REAR RIGHT OUTLET VALVE MALFUNCTION

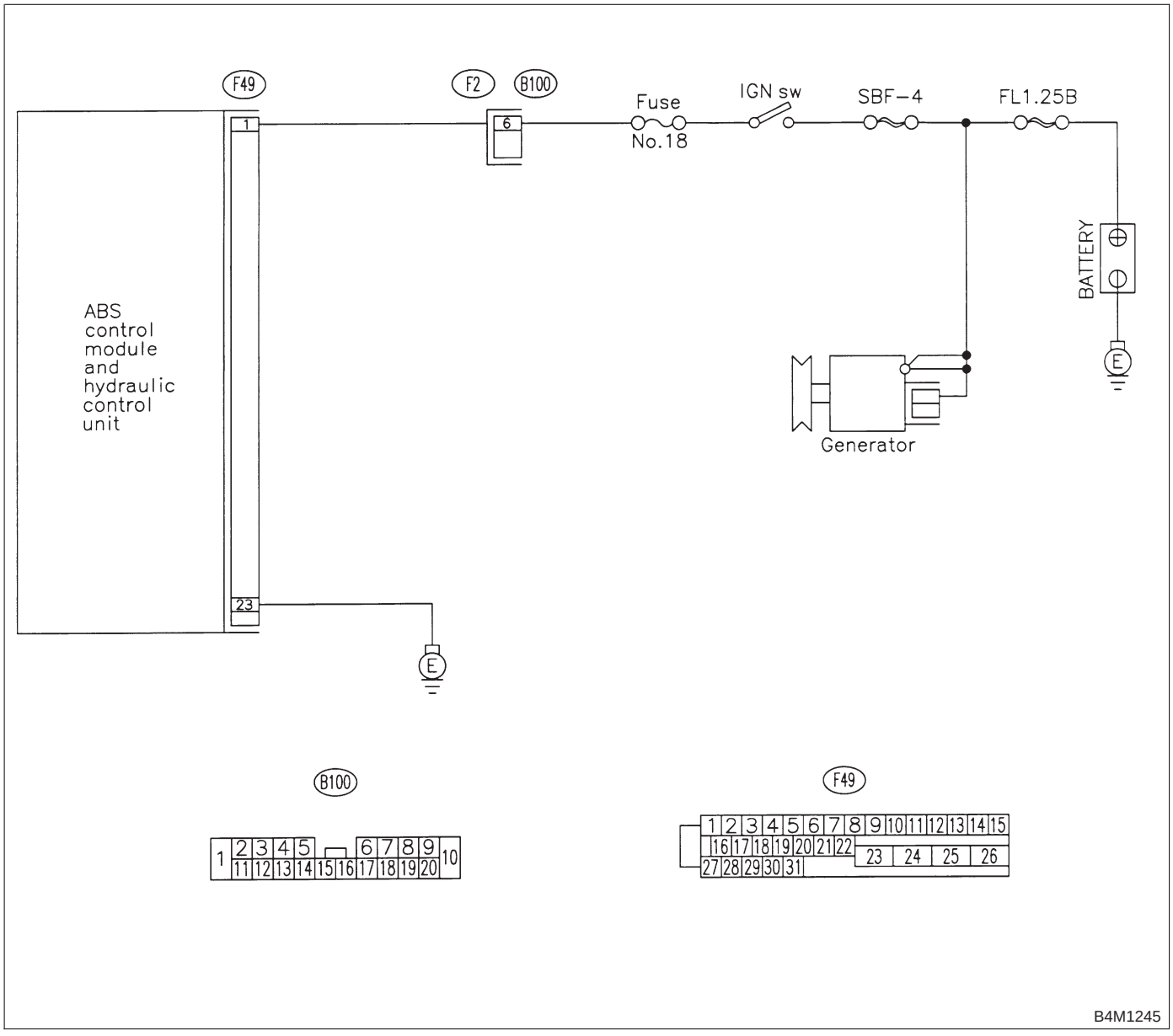
U: TROUBLE CODE 38 REAR LEFT OUTLET VALVE MALFUNCTION

— OUTLET SOLENOID VALVE MALFUNCTION —

DIAGNOSIS:
- Faulty harness/connector
- Faulty outlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.

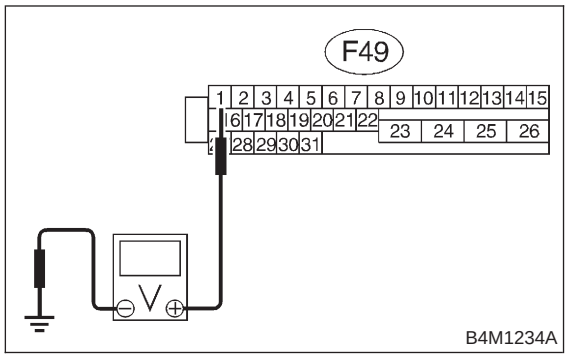
WIRING DIAGRAM:



10U1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Run the engine at idle.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

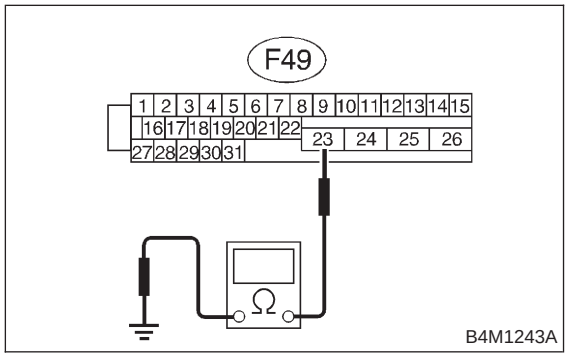


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **10U2**.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10U2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10U3**.
NO : Repair ABSCM&H/U ground harness.

10U3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10U4**.

10U4 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10U5**.

10U5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

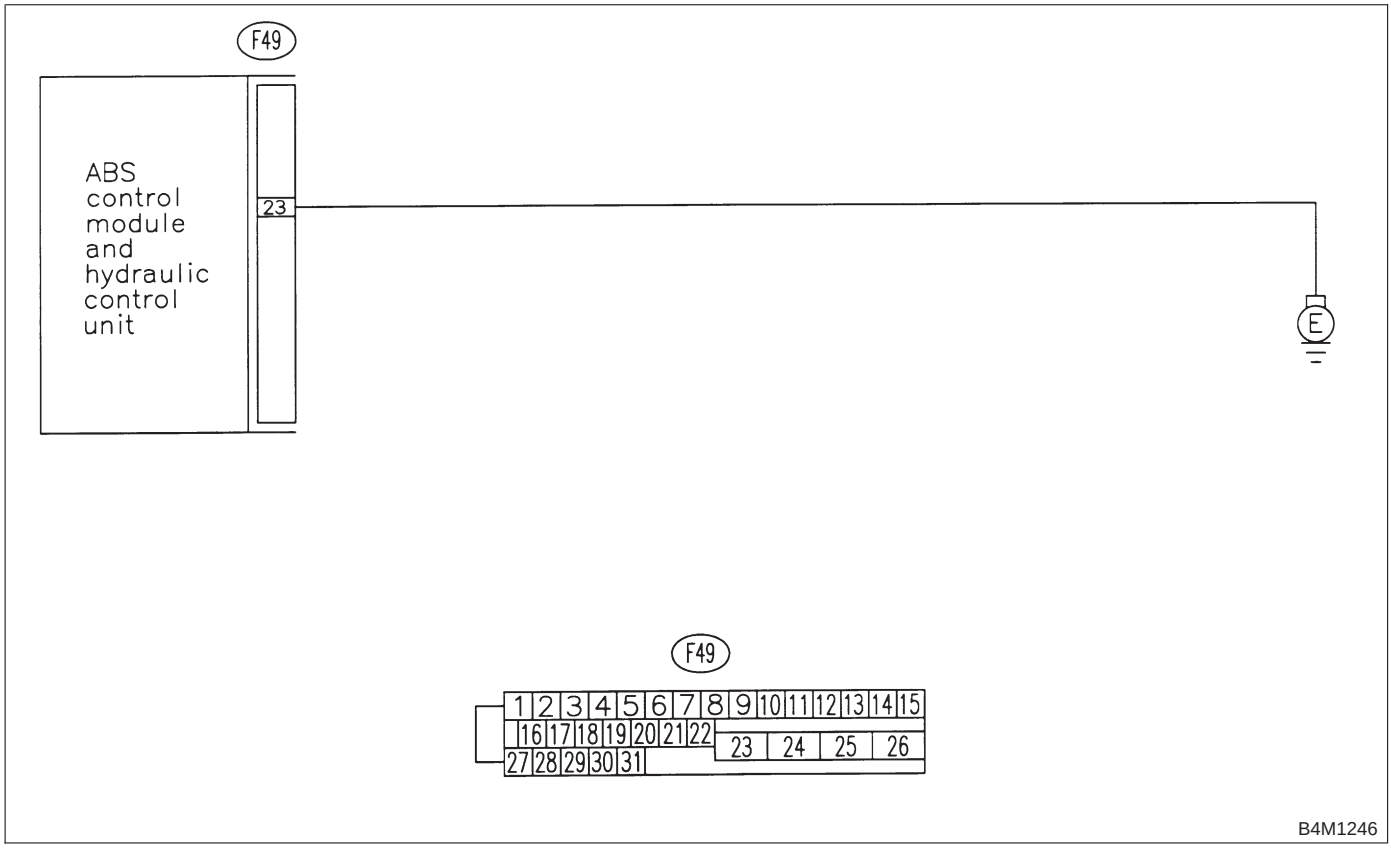
V: TROUBLE CODE 41 ABS CONTROL MODULE MALFUNCTION

— ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT MALFUNCTION—

DIAGNOSIS:
- Faulty ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

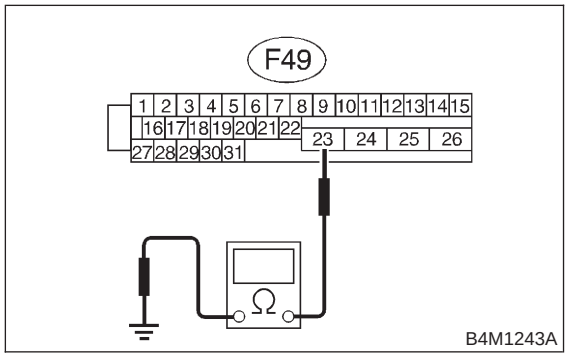
WIRING DIAGRAM:



10V1 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10V2**.
NO : Repair ABSCM&H/U ground harness.

10V2 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10V3**.

10V3 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Is the car telephone or the wireless transmitter properly installed?***
YES : Go to step **10V4**.
NO : Properly install the car telephone or the wireless transmitter.

10V4 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : ***Are noise sources (such as an antenna) installed near the sensor harness?***
YES : Install the noise sources apart from the sensor harness.
NO : Go to step **10V5**.

10V5 : CHECK ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Connect all connectors.
3) Erase the memory.
4) Perform inspection mode.
5) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10V6**.

10V6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

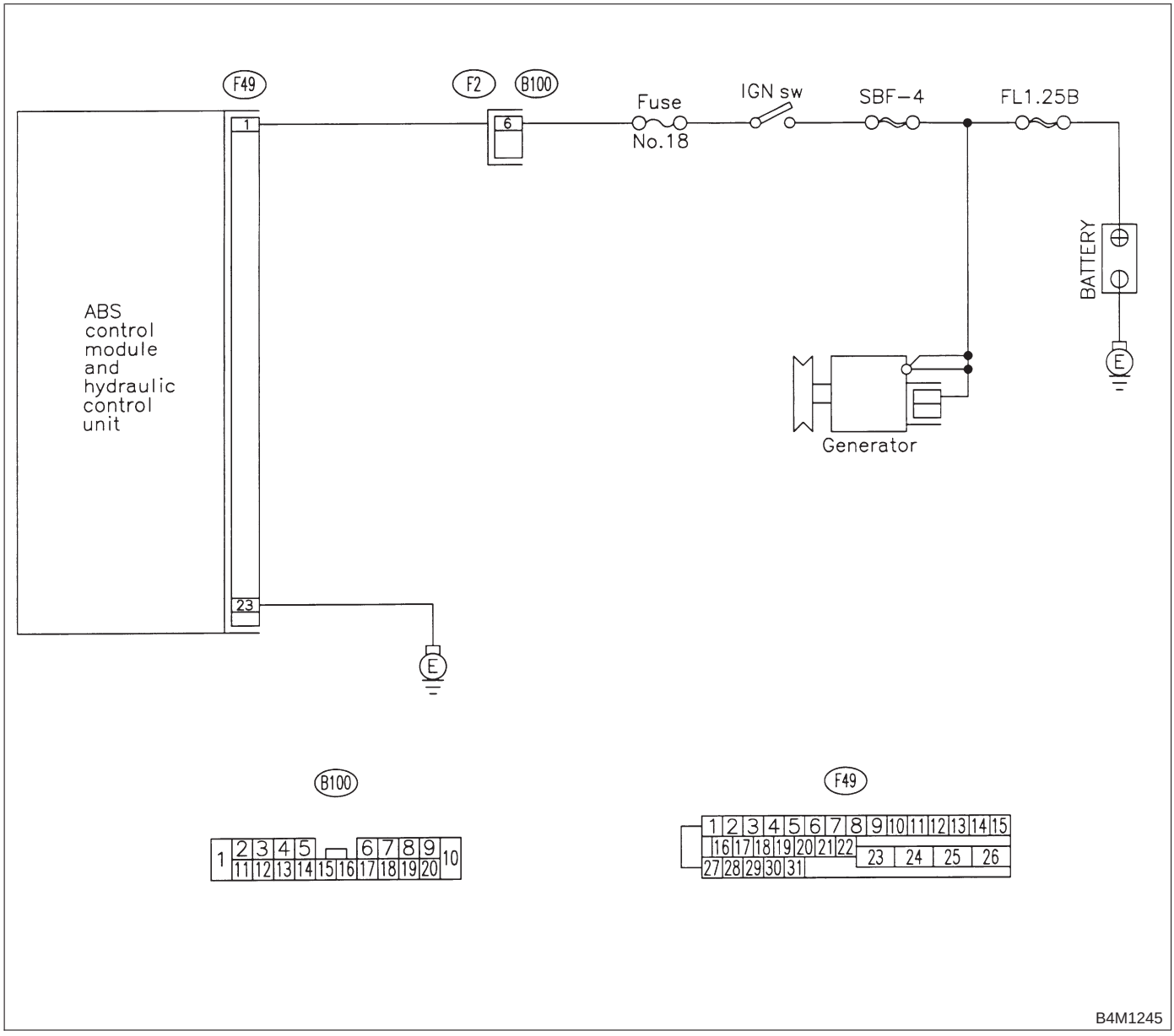
W: TROUBLE CODE 42 POWER SUPPLY VOLTAGE TOO LOW

— POWER SUPPLY VOLTAGE TOO LOW —

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is low.

TROUBLE SYMPTOM:
- ABS does not operate.

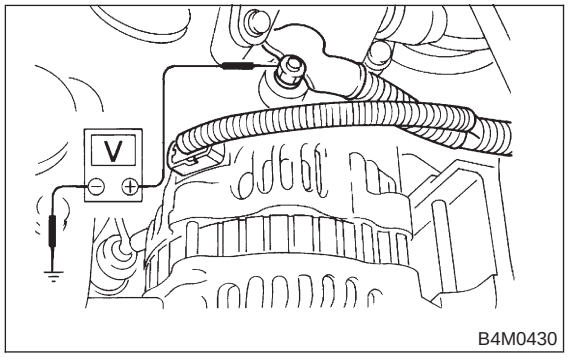
WIRING DIAGRAM:



10W1 : CHECK GENERATOR.

1) Start engine.
2) Idling after warm-up.
3) Measure voltage between generator B terminal and chassis ground.

Terminal
Generator B terminal — Chassis ground:



CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **10W2**.
NO : Repair generator.

10W2 : CHECK BATTERY TERMINAL.

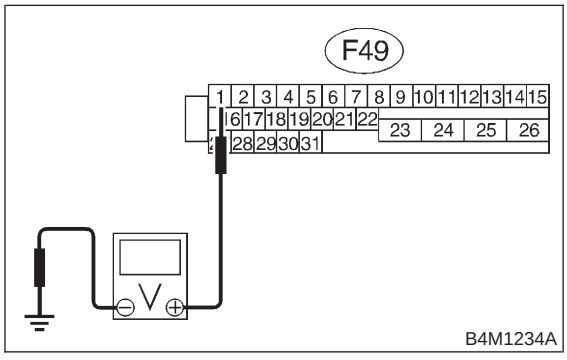
Turn ignition switch to OFF.

CHECK : ***Are the positive and negative battery terminals tightly clamped?***
YES : Go to step **10W3**.
NO : Tighten the clamp of terminal.

10W3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Disconnect connector from ABSCM&H/U.
2) Run the engine at idle.
3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

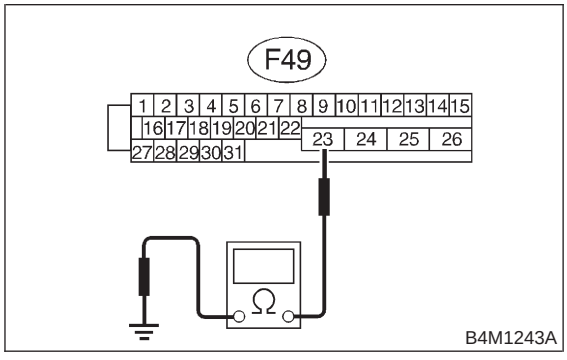


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **10W4**.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10W4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10W5**.
NO : Repair ABSCM&H/U ground harness.

10W5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***

YES : Repair connector.

NO : Go to step **10W6**.

10W6 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **10W7**.

10W7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

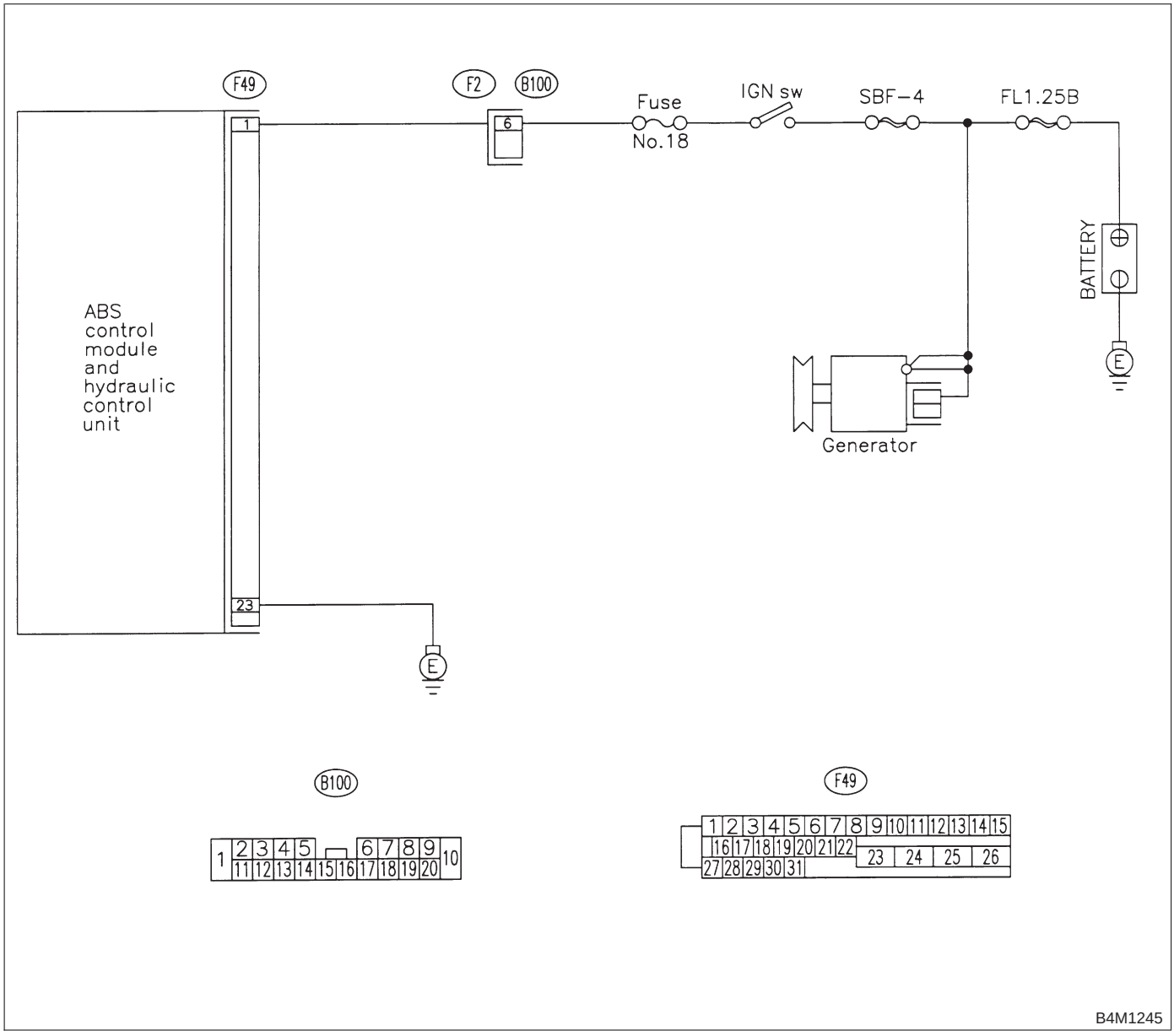
X: TROUBLE CODE 42 POWER SUPPLY VOLTAGE TOO HIGH

— POWER SUPPLY VOLTAGE TOO HIGH —

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is high.

TROUBLE SYMPTOM:
- ABS does not operate.

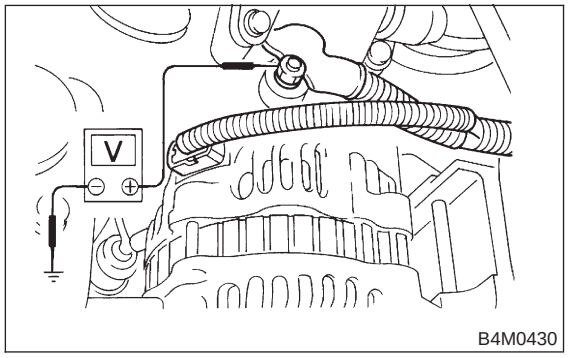
WIRING DIAGRAM:



10X1 : CHECK GENERATOR.

1) Start engine.
2) Idling after warm-up.
3) Measure voltage between generator B terminal and chassis ground.

Terminal
Generator B terminal — Chassis ground:



CHECK : ***Is the voltage between 10 V and 17 V?***
YES : Go to step **10X2**.
NO : Repair generator.

10X2 : CHECK BATTERY TERMINAL.

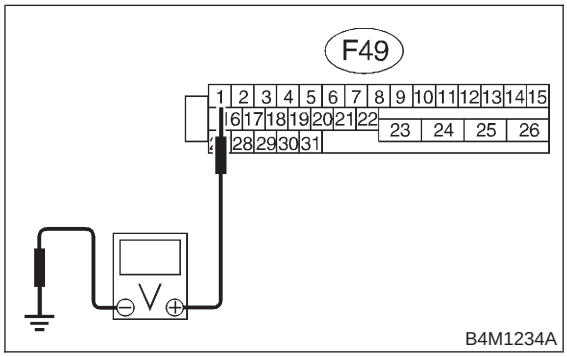
Turn ignition switch to OFF.

CHECK : ***Are the positive and negative battery terminals tightly clamped?***
YES : Go to step **10X3**.
NO : Tighten the clamp of terminal.

10X3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Disconnect connector from ABSCM&H/U.
2) Run the engine at idle.
3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

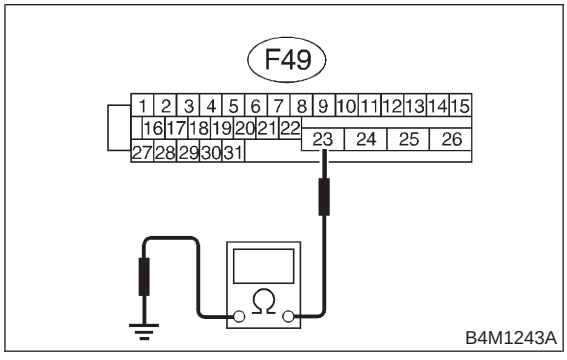


CHECK : ***Is the voltage between 10 V and 17 V?***
YES : Go to step **10X4**.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10X4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10X5**.
NO : Repair ABSCM&H/U ground harness.

10X5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***

YES : Repair connector.

NO : Go to step **10X6**.

10X6 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **10X7**.

10X7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

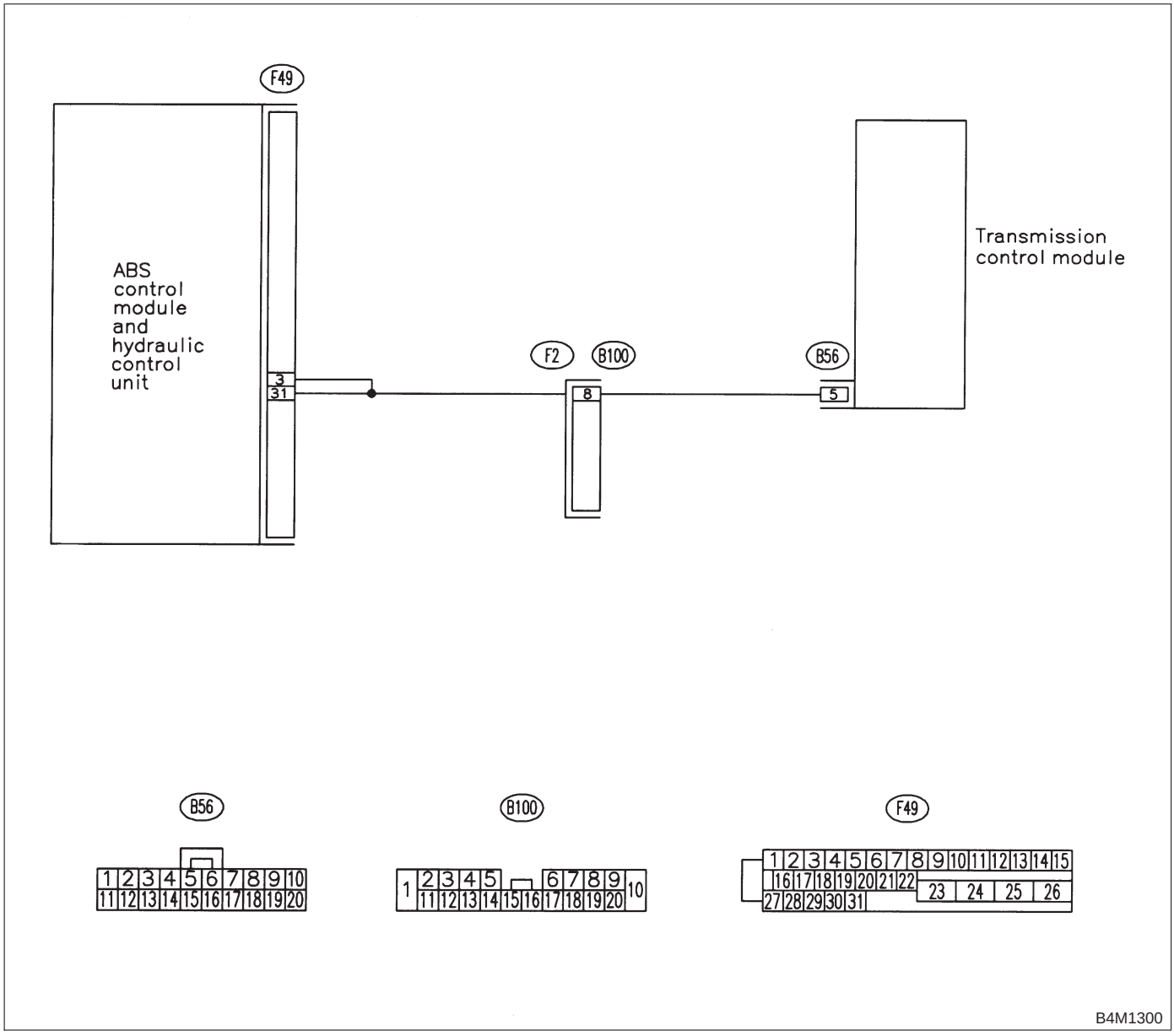
Y: TROUBLE CODE 44 ABS-AT CONTROL (NON CONTROLLED)

— ABS-AT CONTROL (NON CONTROLLED) —

DIAGNOSIS:
- Combination of AT control faults

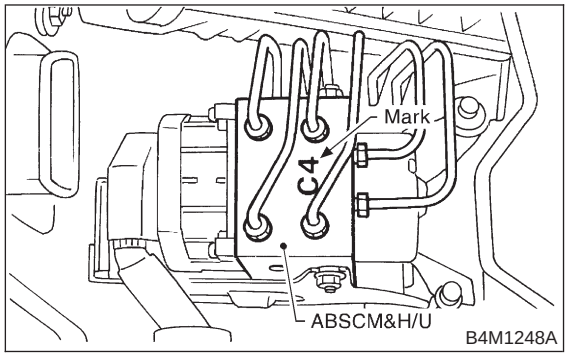
TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



10Y1 : CHECK SPECIFICATIONS OF THE ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



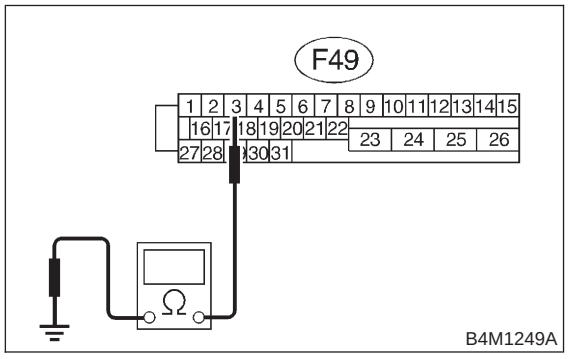
Mark	Model
C1	FWD AT
C3	AWD AT
C4	AWD MT

CHECK : ***Is an ABSCM&H/U for AT model installed on a MT model?***
YES : Replace ABSCM&H/U.
NO : Go to step **10Y2**.

10Y2 : CHECK GROUND SHORT OF HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect two connectors from TCM.
3) Disconnect connector from ABSCM&H/U.
4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 — Chassis ground:

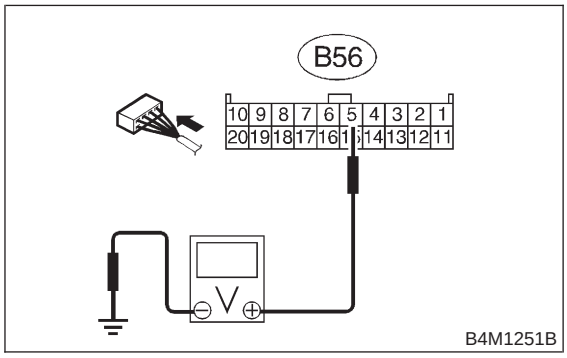


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10Y3**.
NO : Repair harness between TCM and ABSCM&H/U.

10Y3 : CHECK TCM.

1) Connect all connectors to TCM.
2) Turn ignition switch to ON.
3) Measure voltage between TCM connector terminal and chassis ground.

Connector & terminal
(B56) No. 5 (+) — Chassis ground (−):



CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **10Y5**.
NO : Go to step **10Y4**.

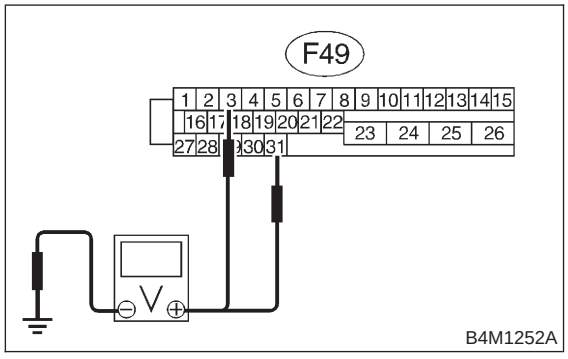
10Y4 : CHECK AT.

CHECK : ***Is the AT functioning normally?***
YES : Replace TCM.
NO : Repair AT.

10Y5 : CHECK OPEN CIRCUIT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 (+) — Chassis ground (−):
(F49) No. 31 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **10Y6**.
NO : Repair harness/connector between AT control module and ABSCM&H/U.

10Y6 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between AT control module and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10Y7**.

10Y7 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10Y8**.

10Y8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

MEMO:

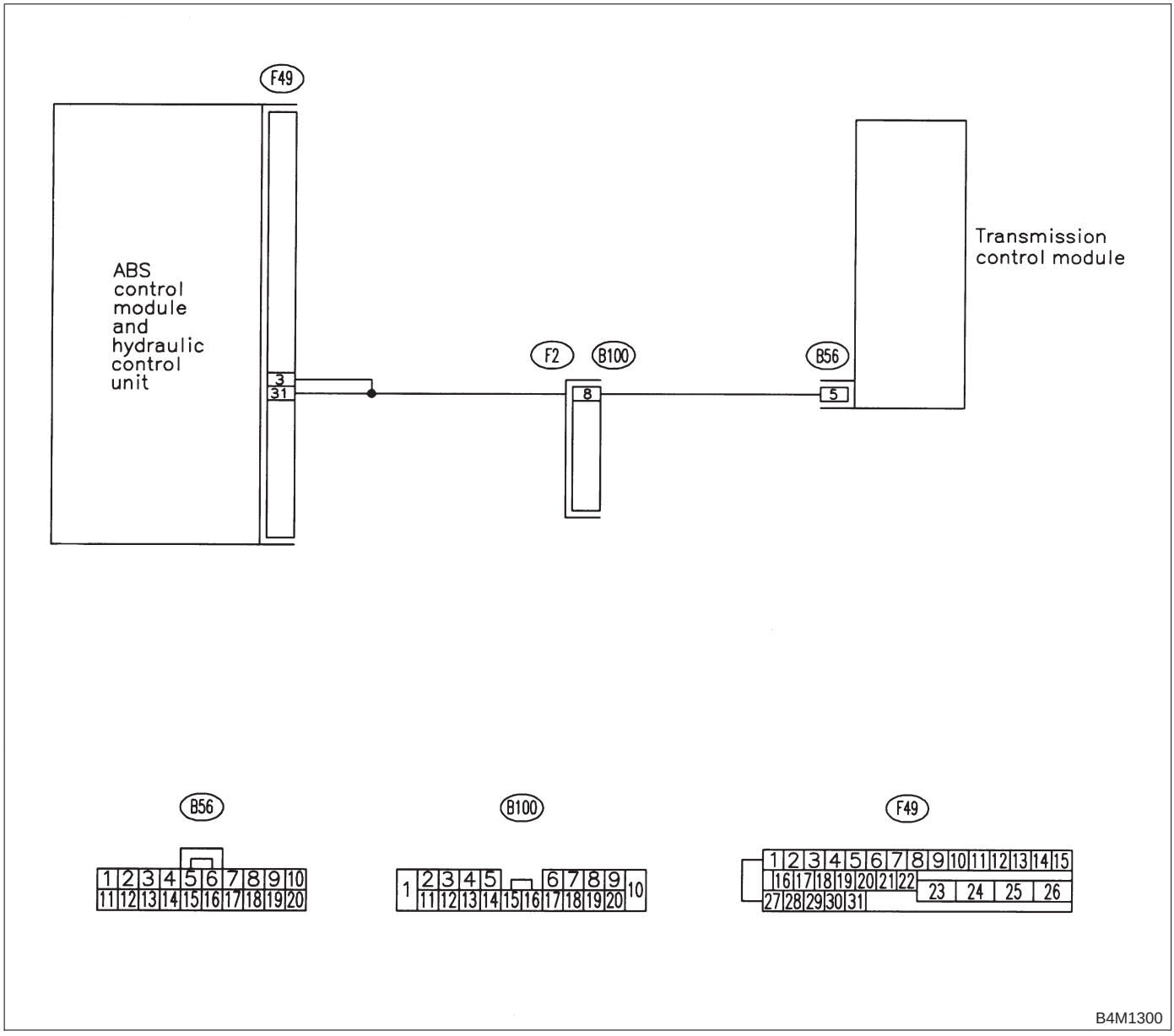
Z: TROUBLE CODE 44 ABS-AT CONTROL (CONTROLLED)

— ABS-AT CONTROL (CONTROLLED) —

DIAGNOSIS:
- Combination of AT control faults

TROUBLE SYMPTOM:
- ABS does not operate.

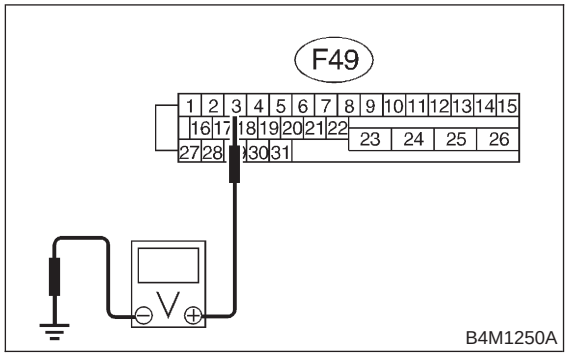
WIRING DIAGRAM:



10Z1 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect two connectors from AT control module.
3) Disconnect connector from ABSCM&H/U.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 (+) — Chassis ground (−):

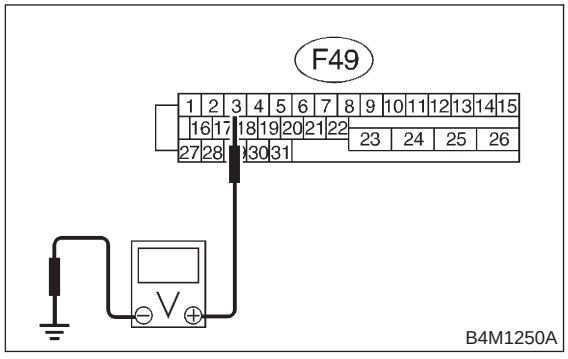


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10Z2**.
NO : Repair harness between AT control module and ABSCM&H/U.

10Z2 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to ON.
2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 (+) — Chassis ground (−):

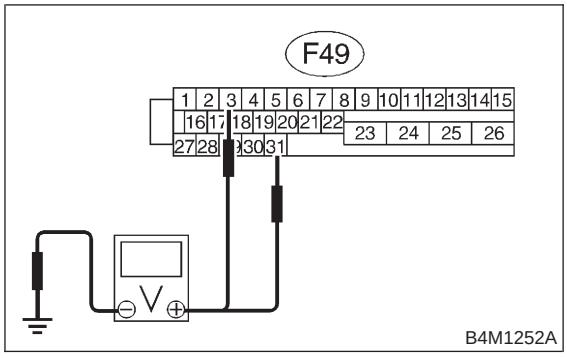


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10Z3**.
NO : Repair harness between AT control module and ABSCM&H/U.

10Z3 : CHECK OPEN CIRCUIT OF HARNESS.

1) Turn ignition switch to OFF.
2) Connect all connectors to TCM.
3) Turn ignition switch to ON.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 3 (+) — Chassis ground (−):
(F49) No. 31 (+) — Chassis ground (−):



CHECK : ***Is the voltage between 10 V and 13 V?***
YES : Go to step **10Z4**.
NO : Repair harness/connector between TCM and ABSCM&H/U.

10Z4 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connectors between AT control module and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10Z5**.

10Z5 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10Z6**.

10Z6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

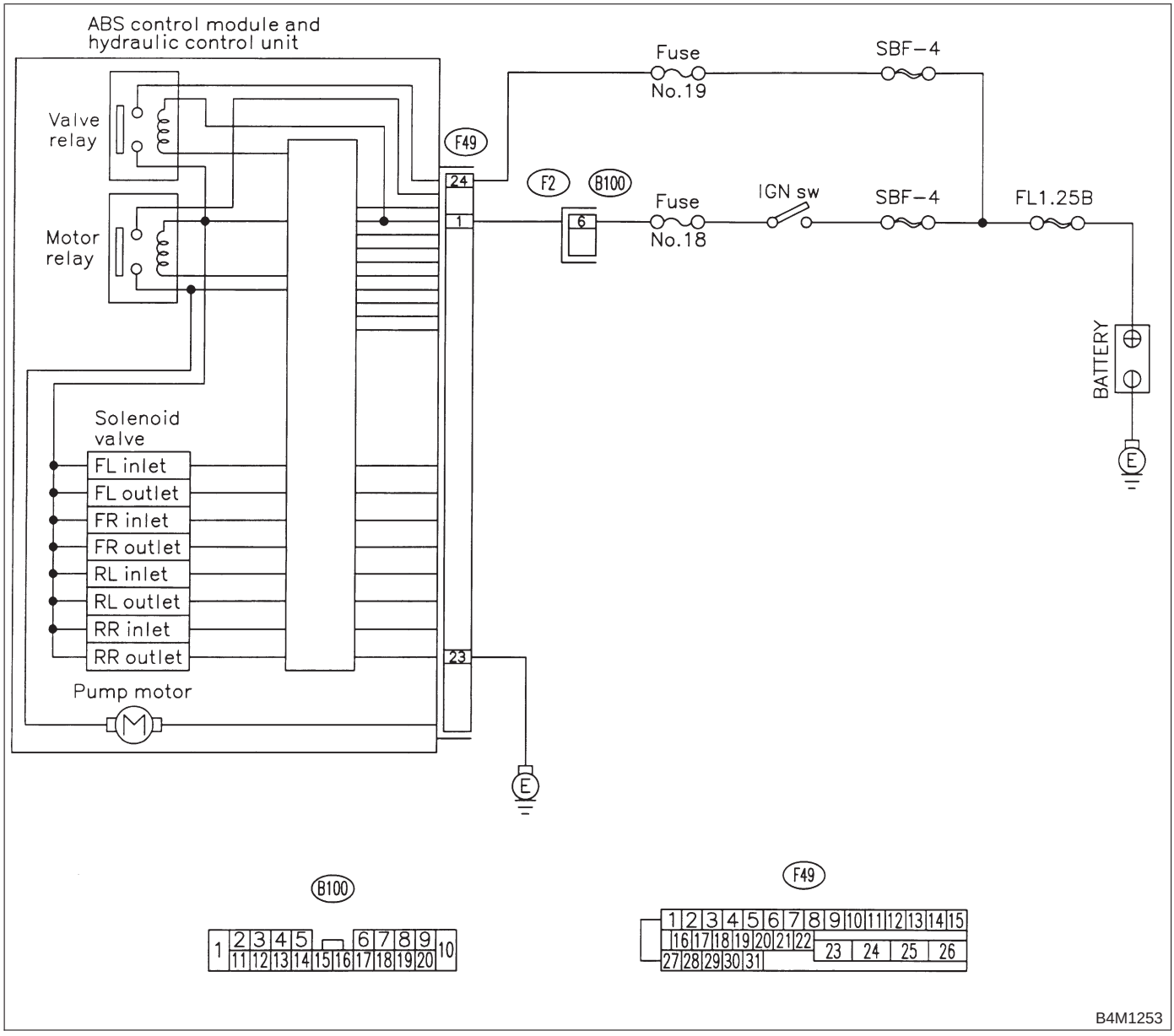
AA: TROUBLE CODE 51 VALVE RELAY MALFUNCTION

— VALVE RELAY MALFUNCTION —

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

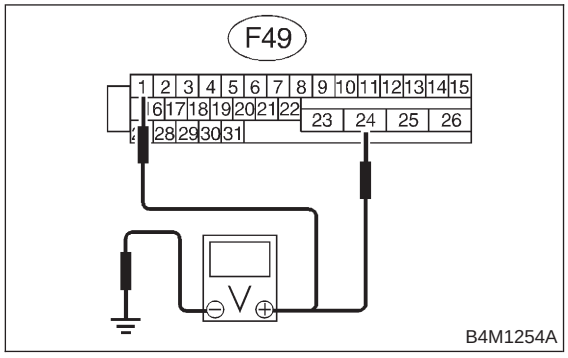
WIRING DIAGRAM:



10AA1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Run the engine at idle.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):
(F49) No. 24 (+) — Chassis ground (−):

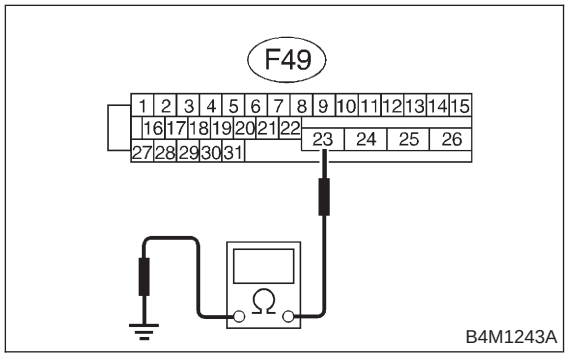


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **10AA2**.
NO : Repair harness connector between battery and ABSCM&H/U.

10AA2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10AA3**.
NO : Repair ABSCM&H/U ground harness.

10AA3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10AA4**.

10AA4 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AA5**.

10AA5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

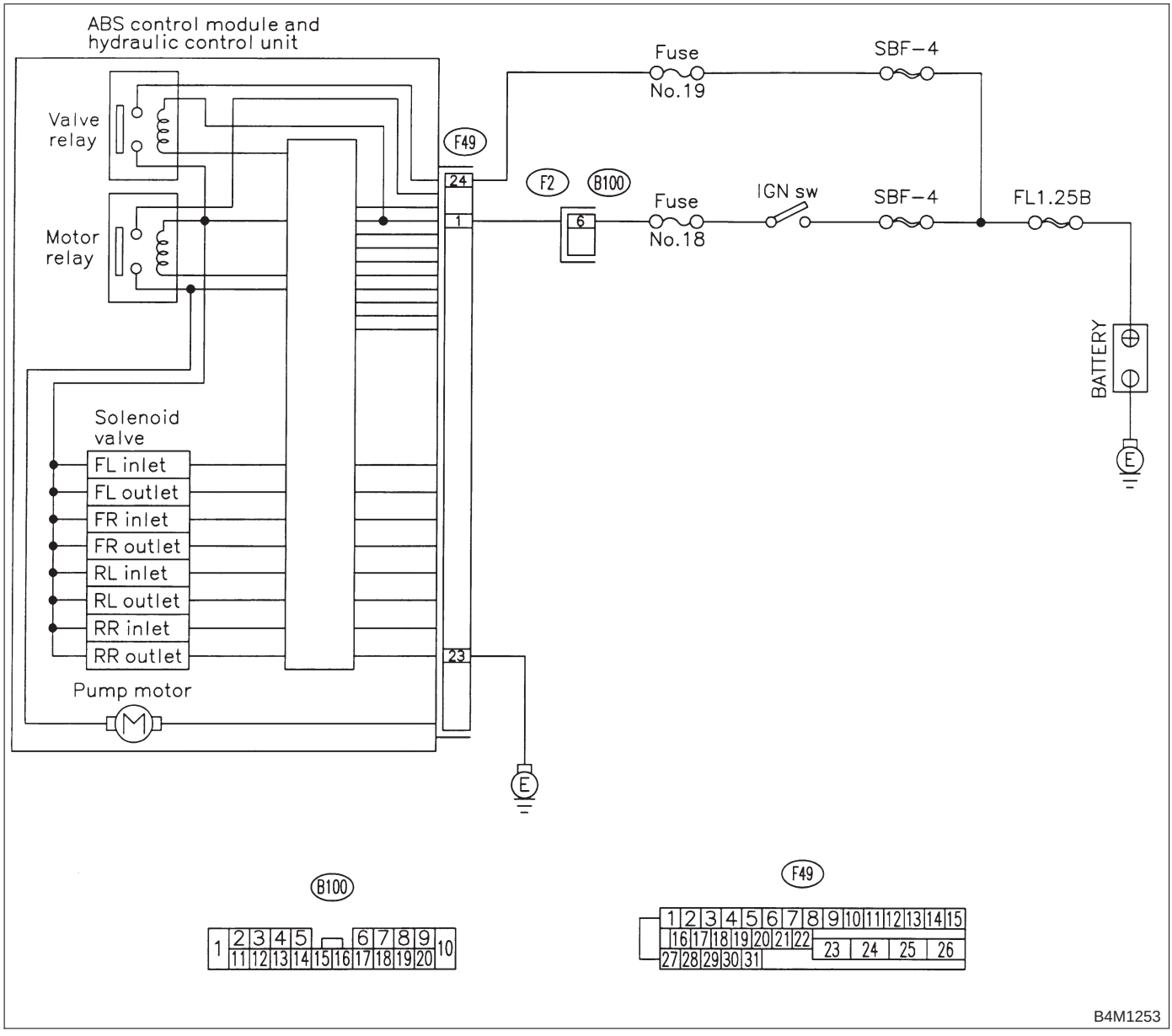
AB: TROUBLE CODE 51 VALVE RELAY ON FAILURE

— VALVE RELAY ON FAILURE —

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

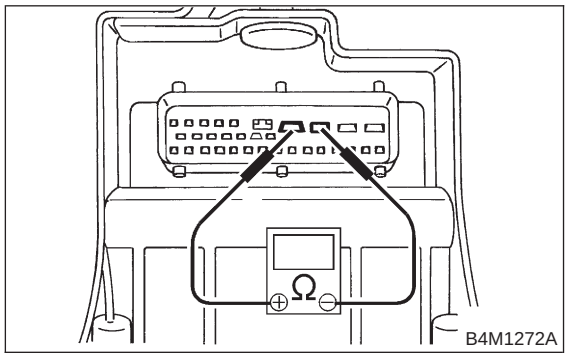
WIRING DIAGRAM:



10AB1 : CHECK VALVE RELAY IN ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminals
No. 23 (+) — No. 24 (−):



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10AB2**.
NO : Replace ABSCM&H/U.

10AB2 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10AB3**.

10AB3 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AB4**.

10AB4 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

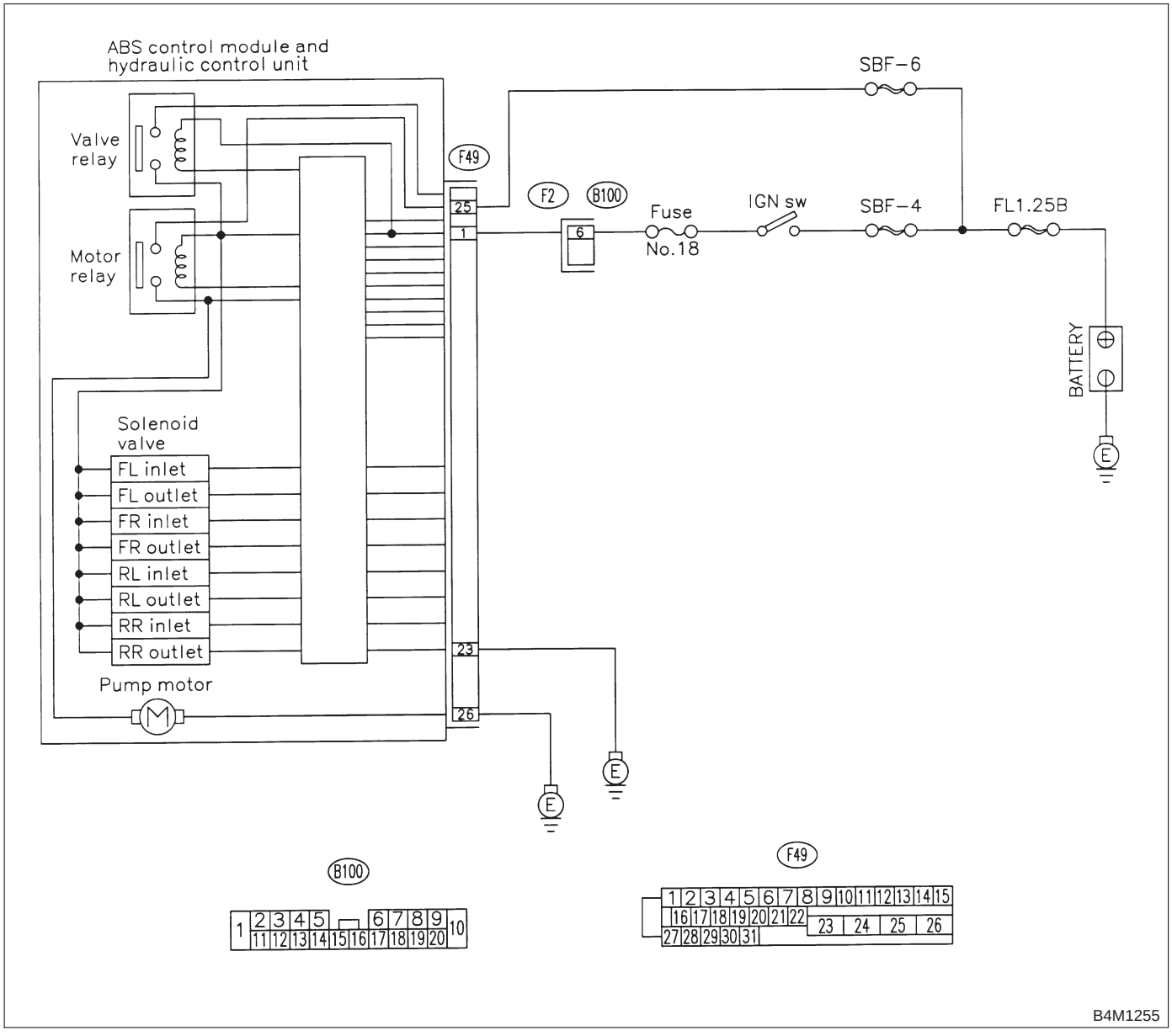
AC: TROUBLE CODE 52 OPEN CIRCUIT IN MOTOR RELAY CIRCUIT

— OPEN CIRCUIT IN MOTOR RELAY CIRCUIT —

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

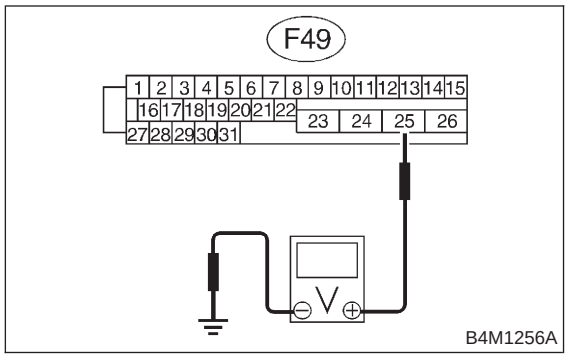
WIRING DIAGRAM:



10AC1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Turn ignition switch to ON.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 25 (+) — Chassis ground (−):

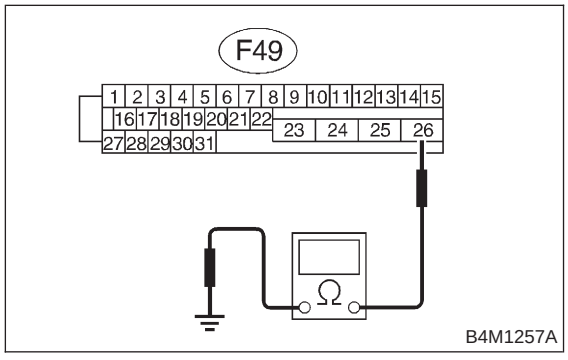


CHECK : ***Is the voltage between 10 V and 13 V?***
YES : Go to step **10AC2**.
NO : Repair harness/connector between battery and ABSCM&H/U and check fuse SBF6.

10AC2 : CHECK GROUND CIRCUIT OF MOTOR.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 26 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10AC3**.
NO : Repair ABSCM&H/U ground harness.

10AC3 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W15D0].>

NOTE:
Use the diagnosis connector to operate the sequence control.

CHECK : ***Can motor revolution noise (buzz) be heard when carrying out the check sequence?***
YES : Go to step **10AC4**.
NO : Replace ABSCM&H/U.

10AC4 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connector between hydraclic unit, relay box and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10AC5**.

10AC5 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AC6**.

10AC6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

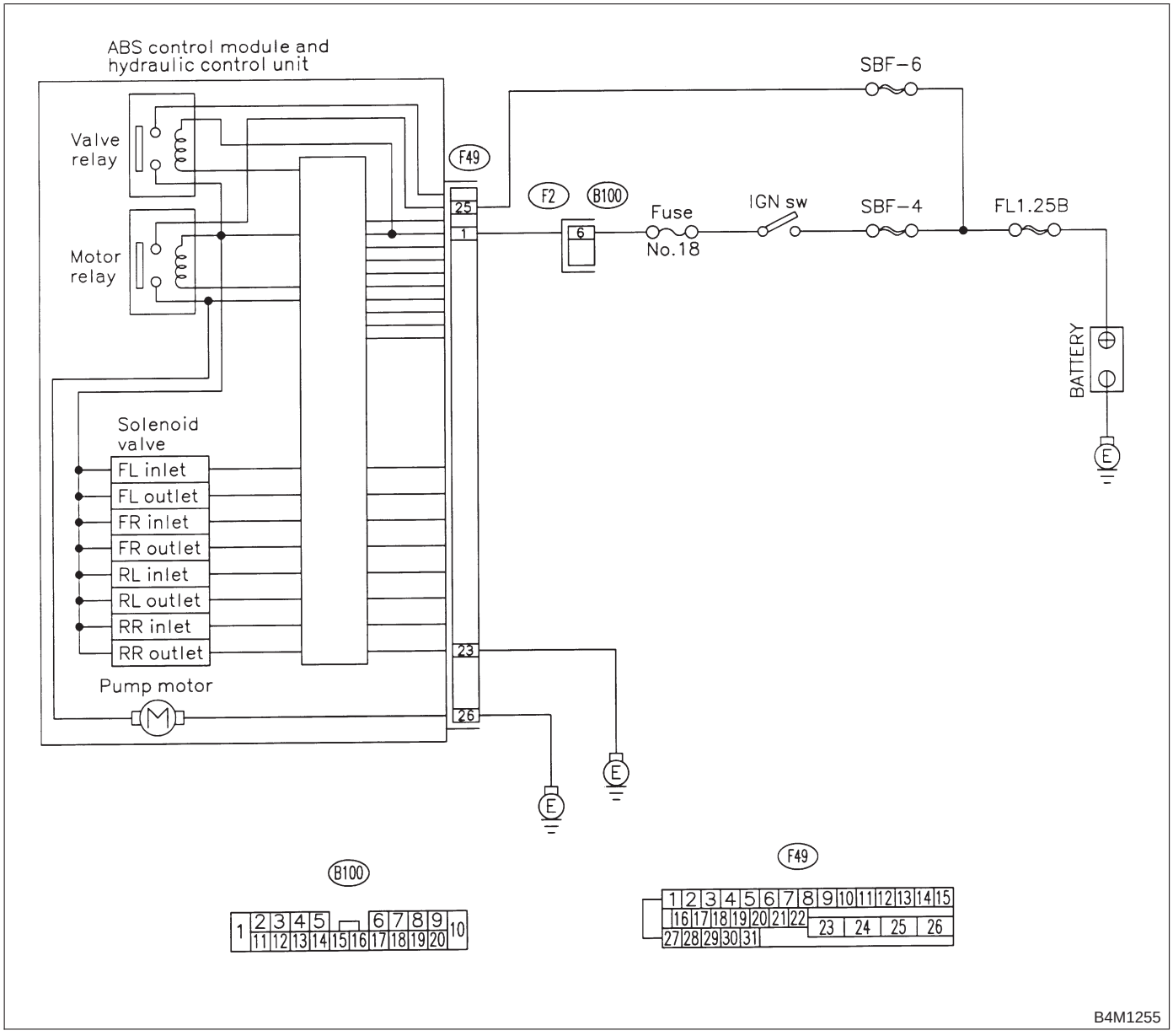
AD: TROUBLE CODE 52 MOTOR RELAY ON FAILURE

— MOTOR RELAY ON FAILURE —

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

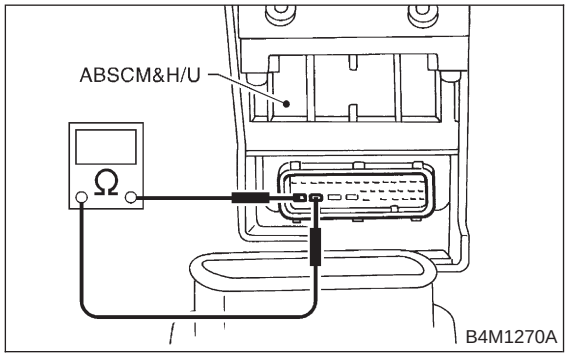
WIRING DIAGRAM:



10AD1 : CHECK MOTOR RELAY IN ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminals
No. 25 — No. 26:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10AD2**.
NO : Replace ABSCM&H/U.

10AD2 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W15D0].>

NOTE:
Use the diagnosis connector to operate the sequence control.

CHECK : ***Can motor revolution noise (buzz) be heard when carrying out the sequence control?***
YES : Go to step **10AD3**.
NO : Replace ABSCM&H/U.

10AD3 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connector between hydraulic unit, relay box and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10AD4**.

10AD4 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AD5**.

10AD5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

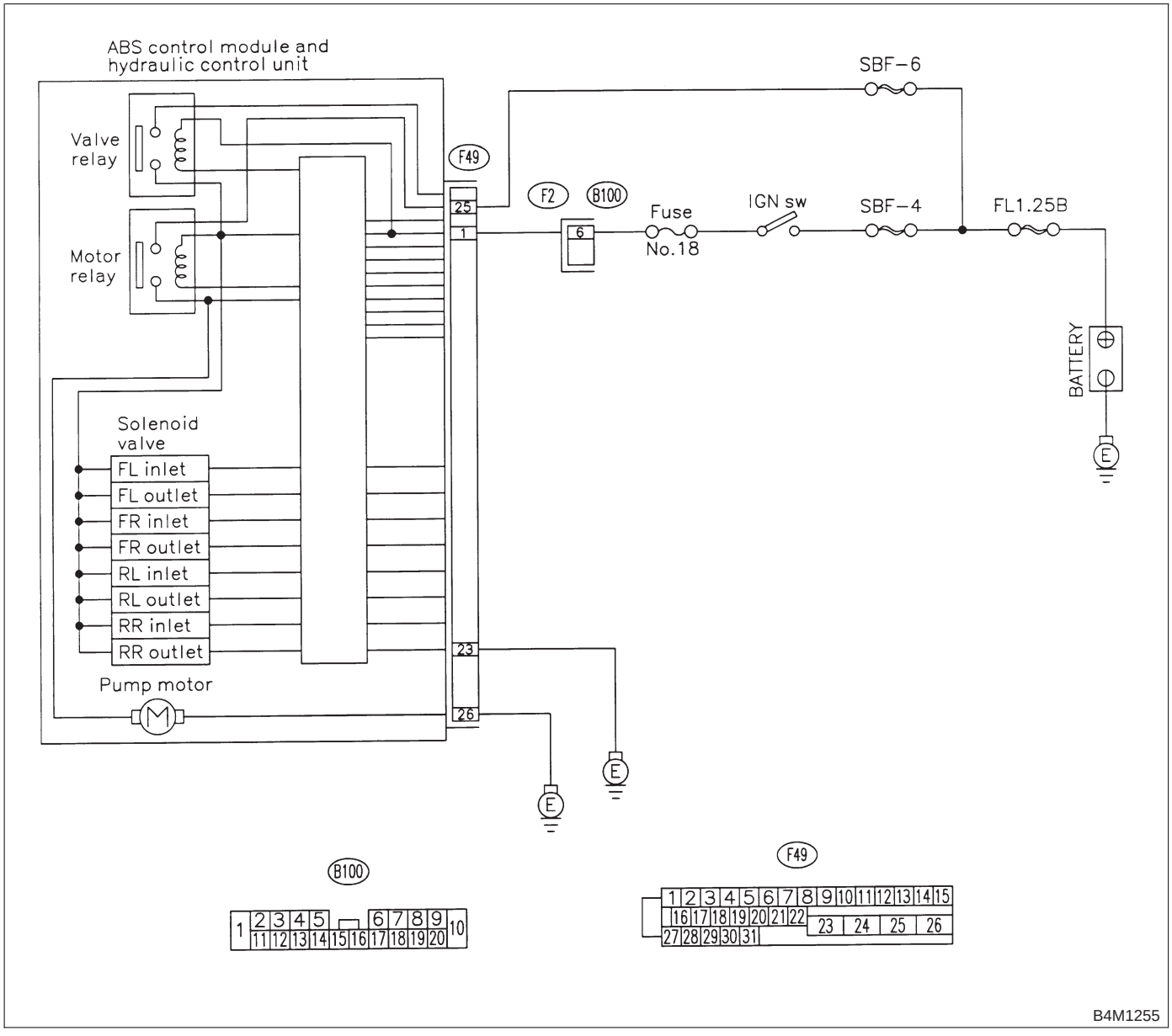
AE: TROUBLE CODE 52 MOTOR MALFUNCTION

— MOTOR MALFUNCTION —

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:

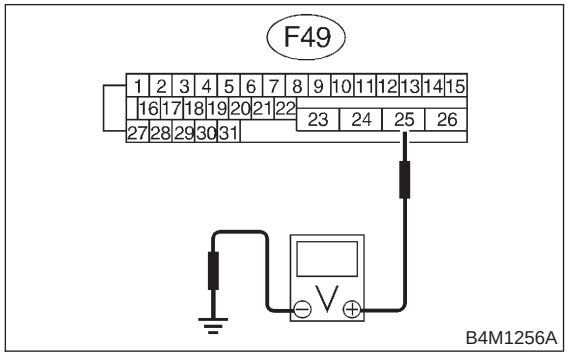


B4M1255

10AE1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Turn ignition switch to ON.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 25 (+) — Chassis ground (−):

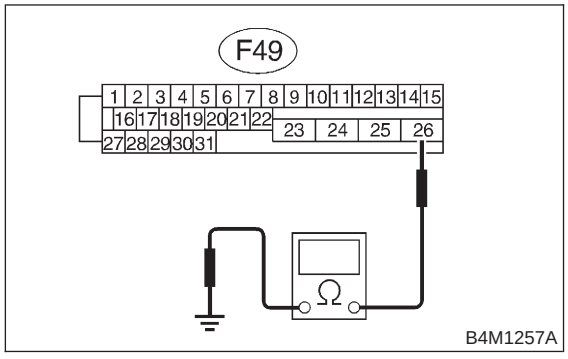


CHECK : ***Is the voltage between 10 V and 13 V?***
YES : Go to step **10AE2**.
NO : Repair harness/connector between battery and ABSCM&H/U and check fuse SBF6.

10AE2 : CHECK GROUND CIRCUIT OF MOTOR.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 26 — Chassis ground:

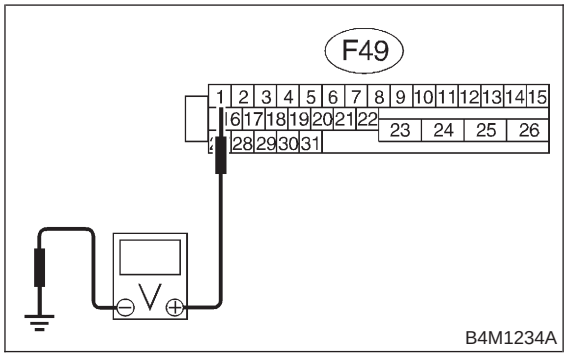


CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10AE3**.
NO : Repair ABSCM&H/U ground harness.

10AE3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

1) Run the engine at idle.
2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (−):

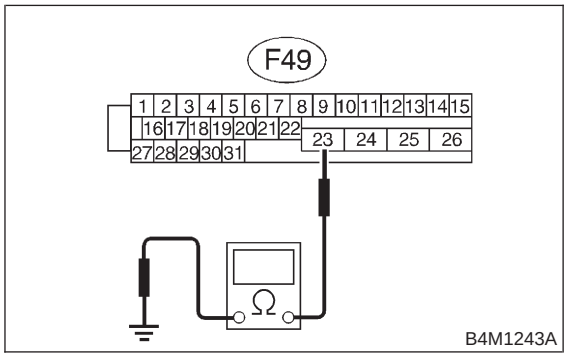


CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **10AE4**.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10AE4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:



CHECK : ***Is the resistance less than 0.5 Ω?***
YES : Go to step **10AE5**.
NO : Repair ABSCM&H/U ground harness.

10AE5 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W15D0].>

NOTE:
Use the diagnosis connector to operate the sequence control.

CHECK : ***Can motor revolution noise (buzz) be heard when carrying out the sequence control?***
YES : Go to step **10AE6**.
NO : Replace hydraulic unit.

10AE6 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connector between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10AE7**.

10AE7 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AE8**.

10AE8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

MEMO:

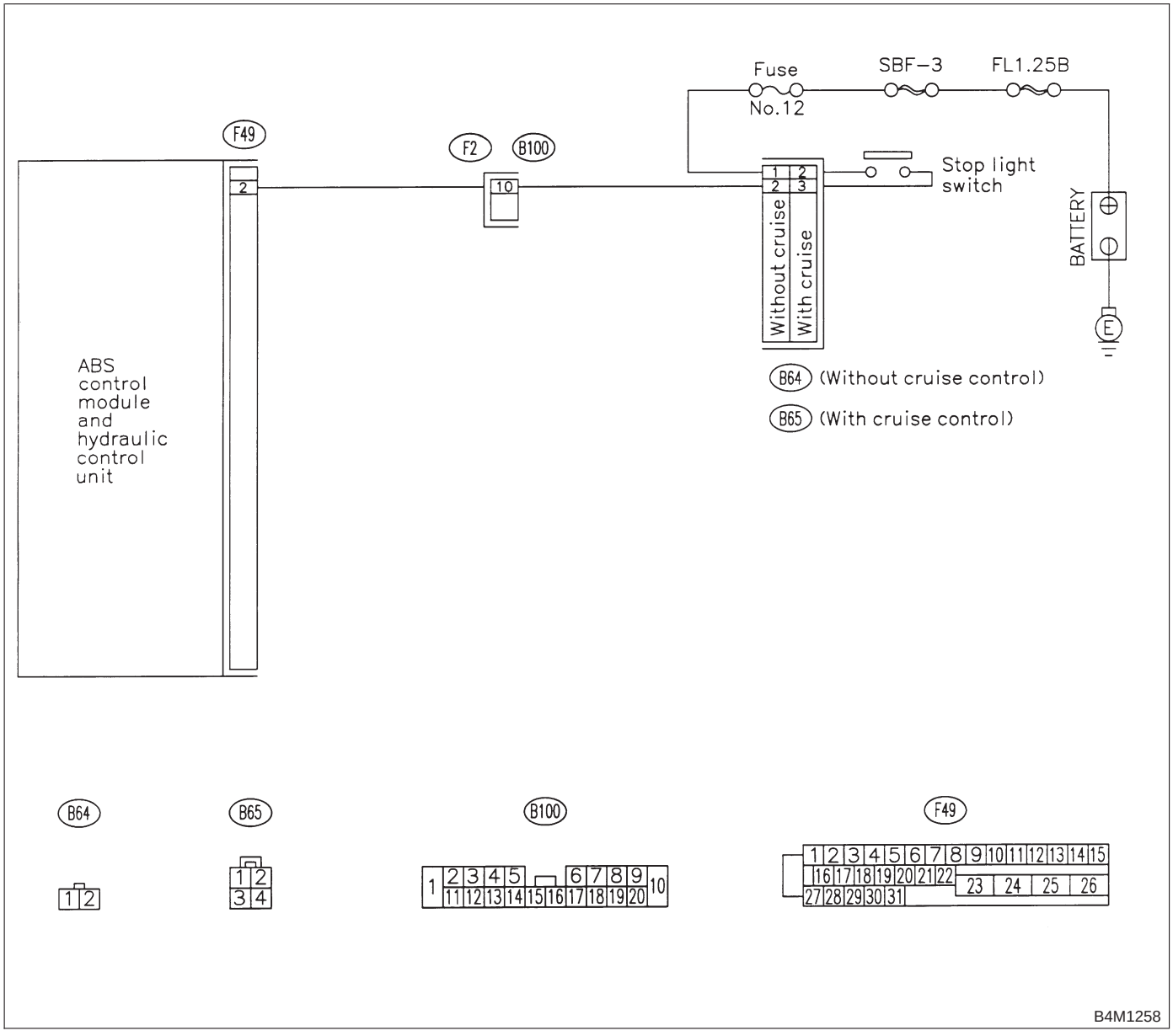
AF: TROUBLE CODE 54 STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION

— STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION —

DIAGNOSIS:
- Faulty stop light switch

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



10AF1 : CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.

1) Select “Current data display & Save” on the select monitor.
2) Release the brake pedal.
3) Read the stop light switch output in the select monitor data display.

CHECK : ***Is the reading indicated on monitor display less than 1.5 V?***
YES : Go to step **10AF2**.
NO : Go to step **10AF3**.

10AF2 : CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.

1) Depress the brake pedal.
2) Read the stop light switch output in the select monitor data display.

CHECK : ***Is the reading indicated on monitor display between 10 V and 15 V?***
YES : Go to step **10AF5**.
NO : Go to step **10AF3**.

10AF3 : CHECK IF STOP LIGHTS COME ON.

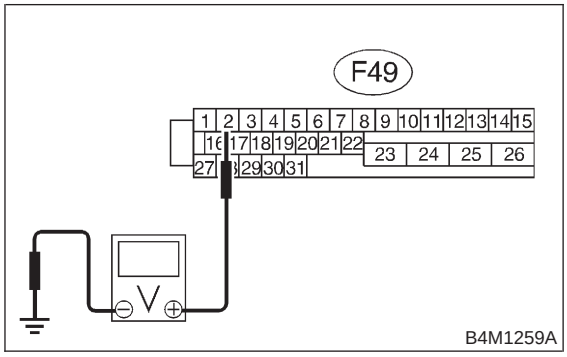
Depress the brake pedal.

CHECK : ***Do stop lights turn on?***
YES : Go to step **10AF4**.
NO : Repair stop lights circuit.

10AF4 : CHECK OPEN CIRCUIT IN HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Depress brake pedal.
4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 2 — Chassis ground:



CHECK : ***Is the voltage between 10 V and 15 V?***
YES : Go to step **10AF5**.
NO : Repair harness between stop light switch and ABSCM&H/U connector.

10AF5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connector between stop light switch and ABSCM&H/U? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10AF6**.

10AF6 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AF7**.

10AF7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

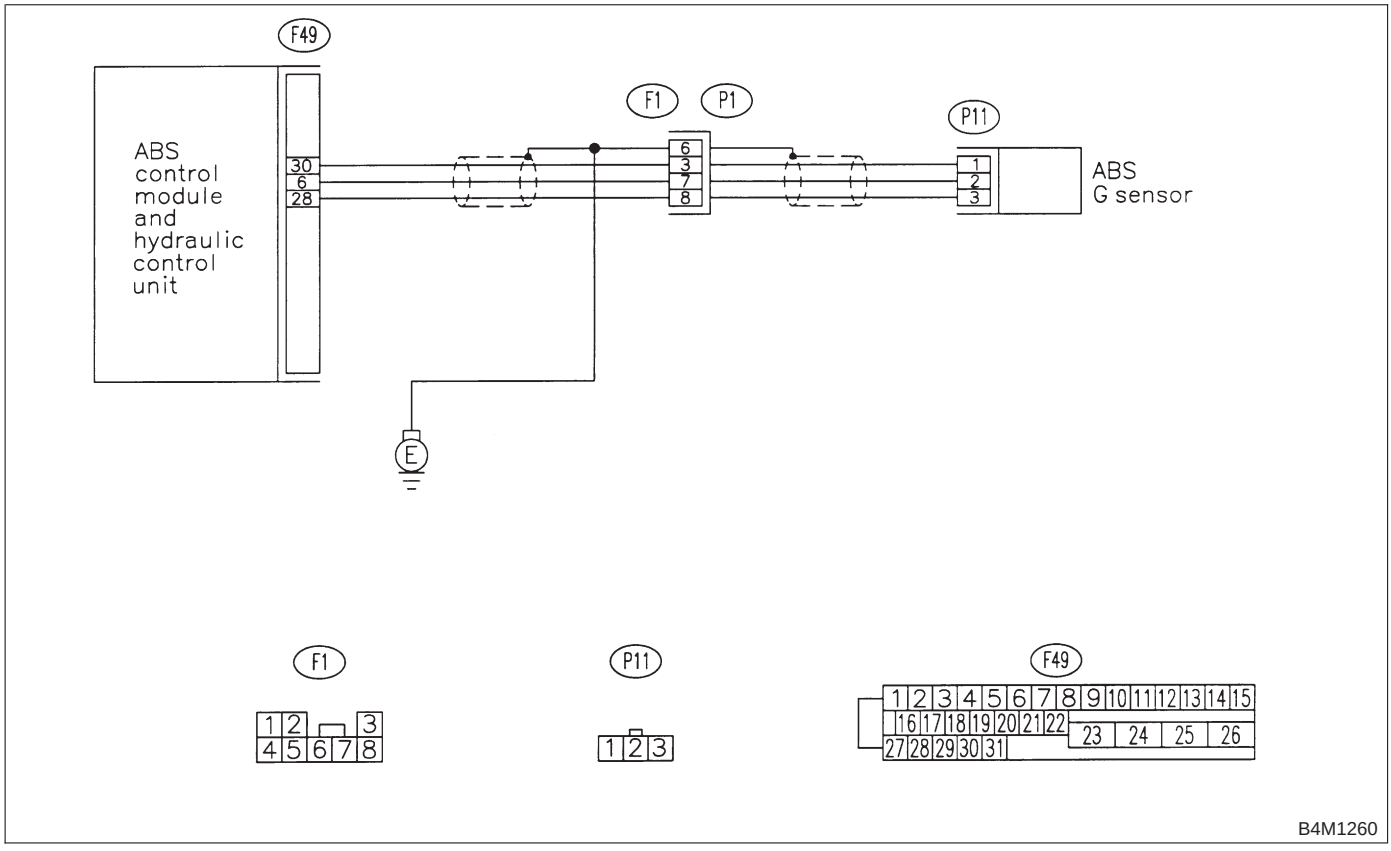
AG: TROUBLE CODE 56 OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT

— OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT —

DIAGNOSIS:
- Faulty G sensor output voltage

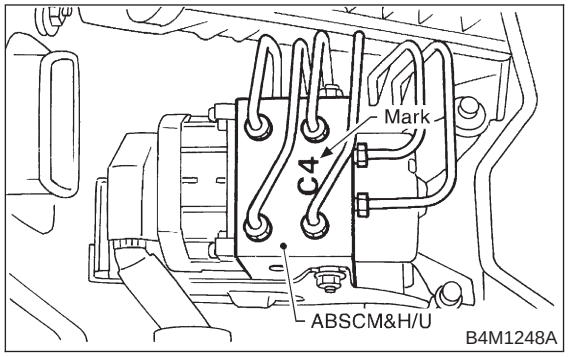
TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



10AG1 : CHECK SPECIFICATIONS OF ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



Mark	Model
C1	FWD AT
C3	AWD AT
C4	AWD MT

CHECK : ***Is an ABSCM for AWD model installed on a FWD model?***

YES : Replace ABSCM&H/U.

CAUTION:
Be sure to turn ignition switch to OFF when removing ABSCM&H/U.

NO : Go to step **10AG2**.

10AG2 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

1) Select “Current data display & Save” on the select monitor.
2) Read the G sensor output in select monitor data display.

CHECK : ***Is the G sensor output on the monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?***

YES : Go to step **10AG3**.

NO : Go to step **10AG6**.

10AG3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>***

YES : Repair connector.

NO : Go to step **10AG4**.

10AG4 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **10AG5**.

10AG5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

10AG6 : CHECK FREEZE FRAME DATA.

1) Select “Freeze frame data” on the select monitor.
2) Read front right wheel speed on the select monitor display.

CHECK : ***Is the front right wheel speed on monitor display 0 km?***

YES : Go to step **10AG7**.

NO : Go to step **10AG15**.

10AG7 : CHECK FREEZE FRAME DATA.

Read front left wheel speed on the select monitor display.

CHECK : ***Is the front left wheel speed on monitor display 0 km?***

YES : Go to step **10AG8**.

NO : Go to step **10AG15**.

10AG8 : CHECK FREEZE FRAME DATA.

Read rear right wheel speed on the select monitor display.

CHECK : ***Is the rear right wheel speed on monitor display 0 km?***

YES : Go to step **10AG9**.

NO : Go to step **10AG15**.

10AG9 : CHECK FREEZE FRAME DATA.

Read rear left wheel speed on the select monitor display.

CHECK : ***Is the rear left wheel speed on monitor display 0 km?***
YES : Go to step **10AG10**.
NO : Go to step **10AG15**.

10AG10 : CHECK FREEZE FRAME DATA.

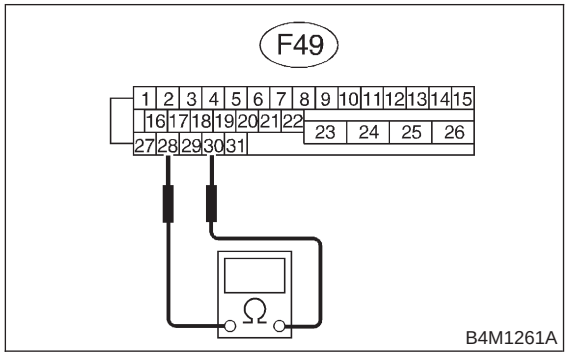
Read G sensor output on the select monitor display.

CHECK : ***Is the G sensor output on monitor display more than 3.65 V?***
YES : Go to step **10AG11**.
NO : Go to step **10AG15**.

10AG11 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 30 — No. 28:



CHECK : ***Is the resistance between 4.3 and 4.9 kΩ?***
YES : Go to step **10AG12**.
NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AG12 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : ***Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10AG13**.

10AG13 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AG14**.

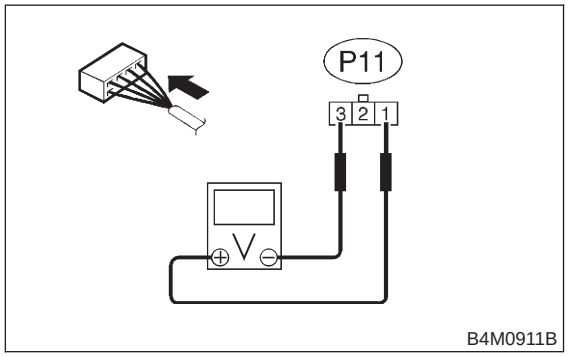
10AG14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

10AG15 : CHECK INPUT VOLTAGE OF G SENSOR.

1) Turn ignition switch to OFF.
2) Remove console box.
3) Disconnect G sensor from body. (Do not disconnect connector.)
4) Turn ignition switch to ON.
5) Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 1 (+) — No. 3 (−):

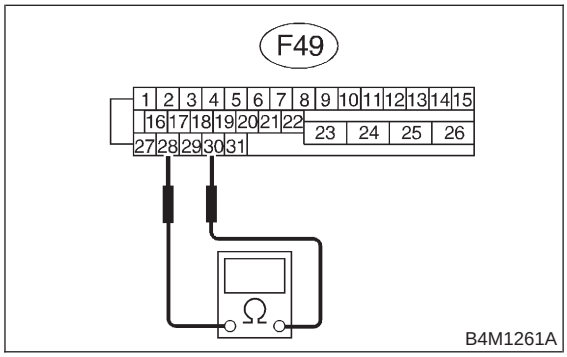


CHECK : ***Is the voltage between 4.75 and 5.25 V?***
YES : Go to step **10AG16**.
NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AG16 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 30 — No. 28:

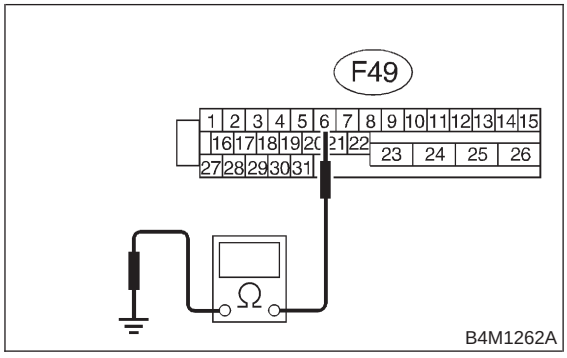


CHECK : ***Is the resistance between 4.3 and 4.9 kΩ?***
YES : Go to step **10AG17**.
NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AG17 : CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.

1) Disconnect connector from G sensor.
2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 — Chassis ground:

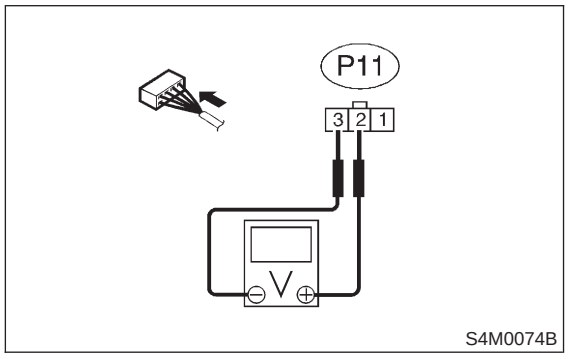


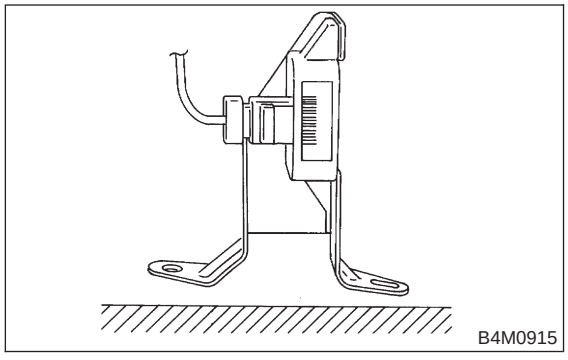
CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10AG18**.
NO : Repair harness between G sensor and ABSCM&H/U.

10AG18 : CHECK G SENSOR.

1) Connect connector to G sensor.
2) Connect connector to ABSCM&H/U.
3) Turn ignition switch to ON.
4) Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−):



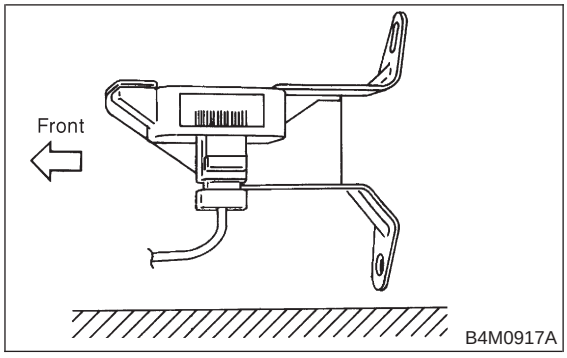


CHECK : ***Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?***
YES : Go to step **10AG19**.
NO : Replace G sensor.

10AG19 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−):

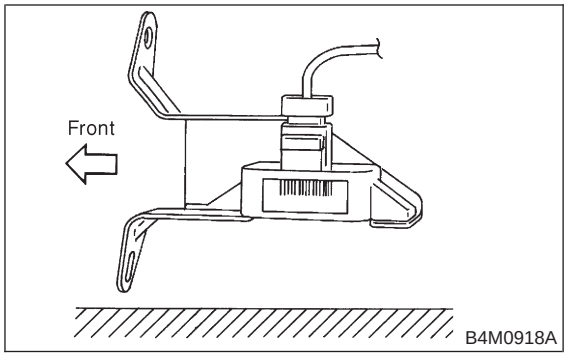


CHECK : ***Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?***
YES : Go to step **10AG20**.
NO : Replace G sensor.

10AG20 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−):



CHECK : ***Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?***
YES : Go to step **10AG21**.
NO : Replace G sensor.

10AG21 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>***

YES : Repair connector.

NO : Go to step **10AG22**.

10AG22 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **10AG23**.

10AG23 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

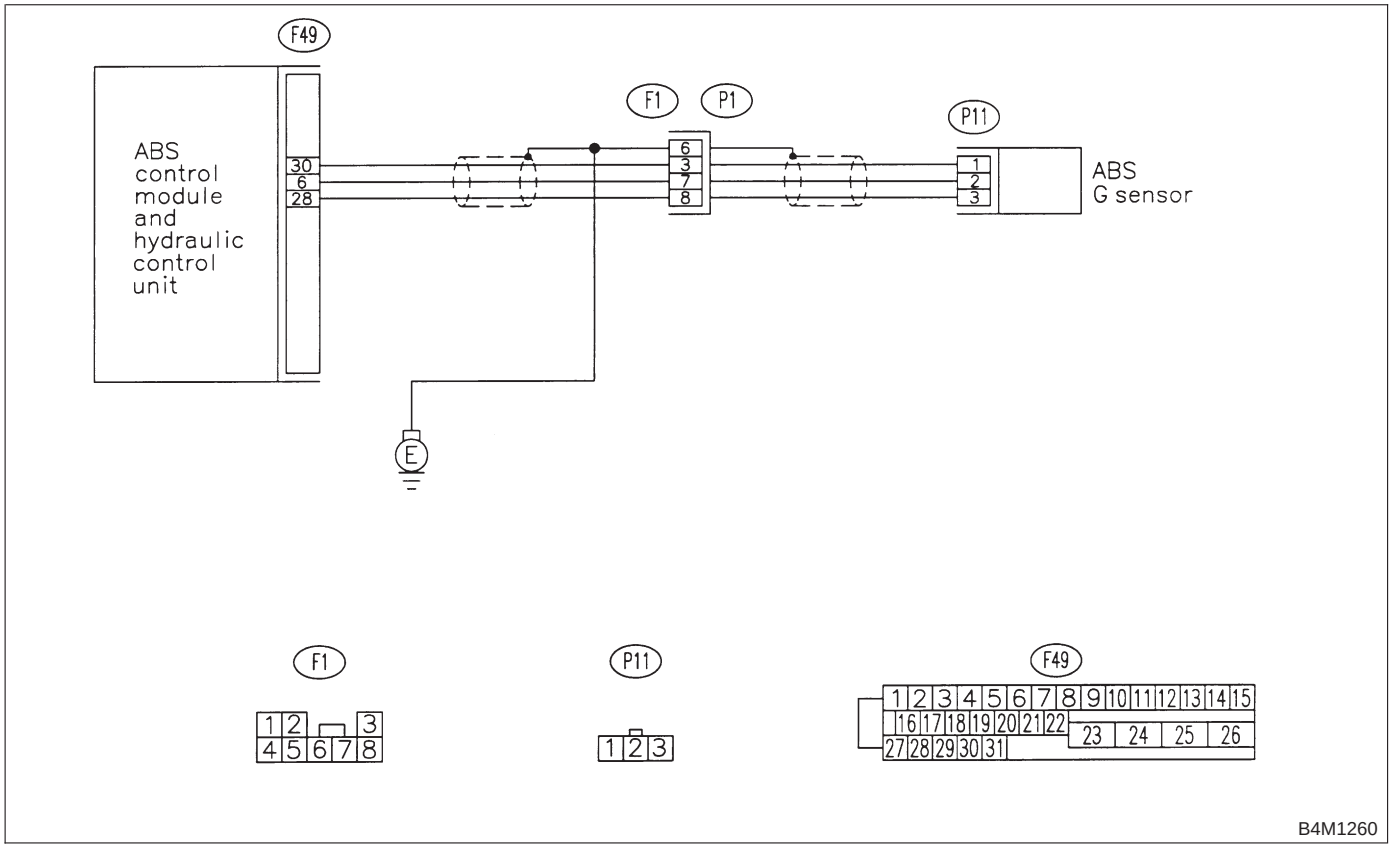
AH: TROUBLE CODE 56 BATTERY SHORT IN G SENSOR CIRCUIT

— BATTERY SHORT IN G SENSOR CIRCUIT —

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



10AH1 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

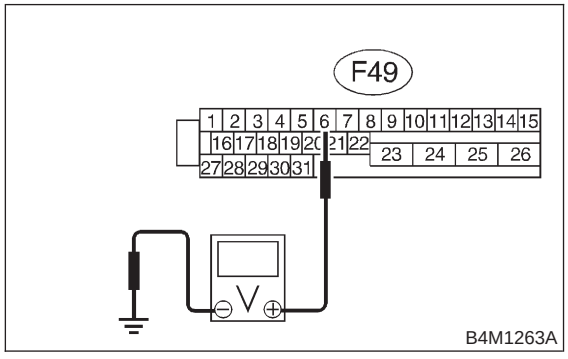
1) Select “Current data display & Save” on the select monitor.
2) Read G sensor output on the select monitor display.

CHECK : ***Is the G sensor output on monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AH2**.

10AH2 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to OFF.
2) Remove console box.
3) Disconnect connector from G sensor.
4) Disconnect connector from ABSCM&H/U.
5) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (−):

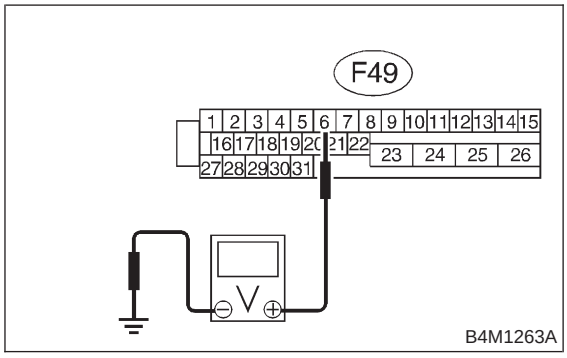


CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10AH3**.
NO : Repair harness between G sensor and ABSCM&H/U.

10AH3 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to ON.
2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **10AH4**.
NO : Repair harness between G sensor and ABSCM&H/U.

10AH4 : CHECK ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Connect all connectors.
3) Erase the memory.
4) Perform inspection mode.
5) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AH5**.

10AH5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

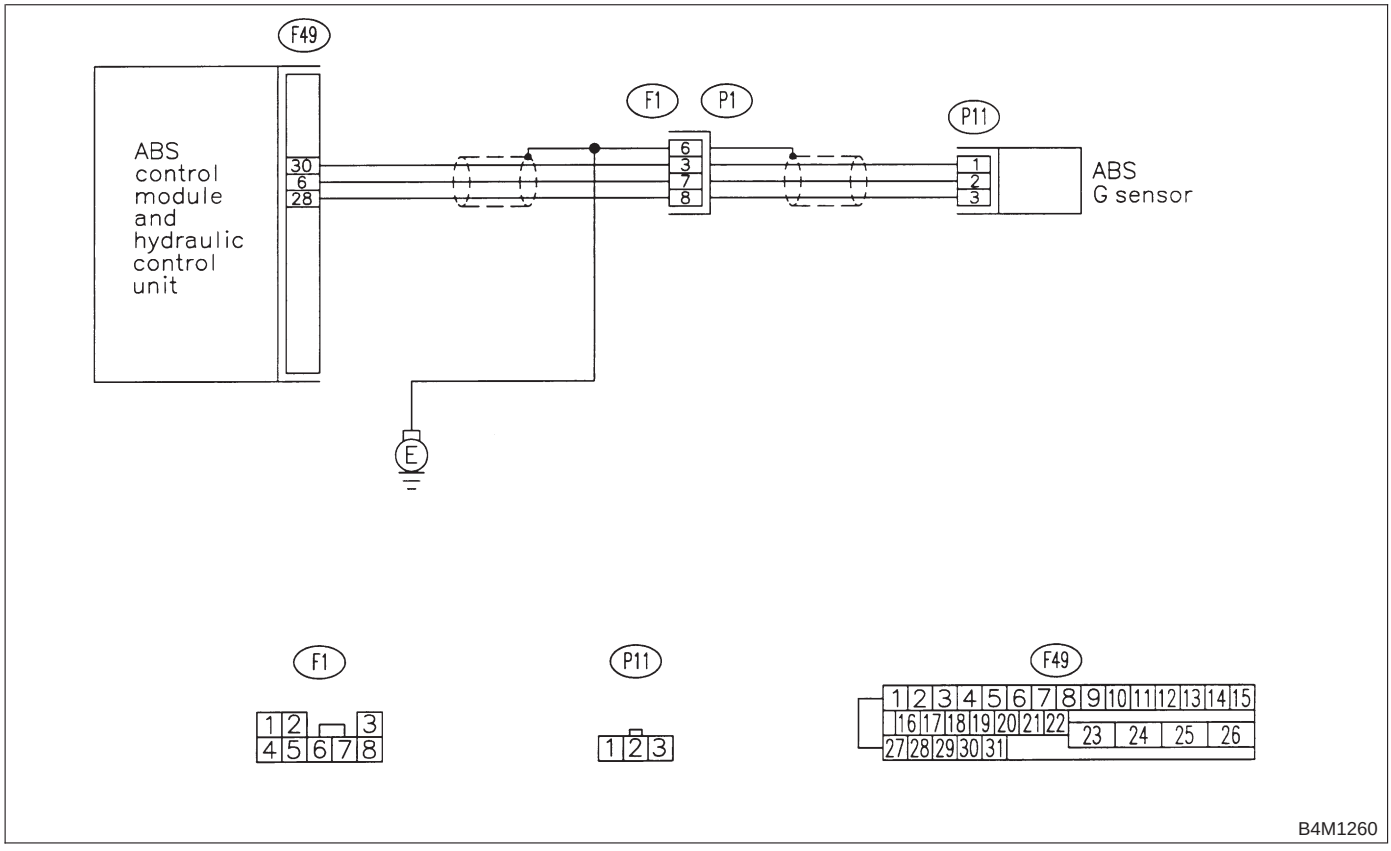
AI: TROUBLE CODE 56 ABNORMAL G SENSOR HIGH μ OUTPUT

— ABNORMAL G SENSOR HIGH μ OUTPUT —

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



10AI1 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

1) Select “Current data display & Save” on the select monitor.
2) Read G sensor output on the select monitor display.

CHECK : ***Is the G sensor output on monitor display 2.3±0.2 V when the G sensor is in horizontal position?***
YES : Go to step **10AI2**.
NO : Go to step **10AI6**.

10AI2 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10AI3**.

10AI3 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AI4**.

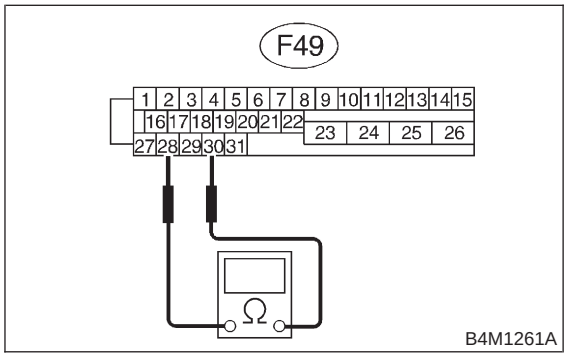
10AI4 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

10AI5 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 30 — No. 28:

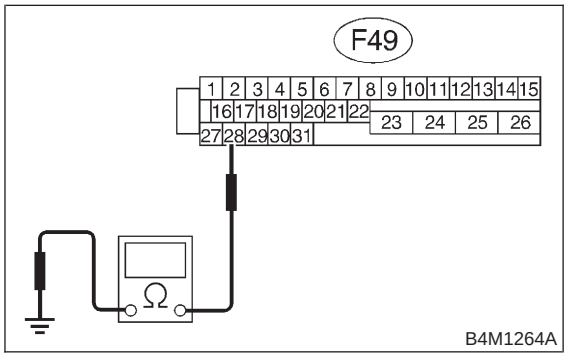


CHECK : ***Is the resistance between 4.3 and 4.9 kΩ?***
YES : Go to step **10AI6**.
NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AI6 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 28 — Chassis ground:

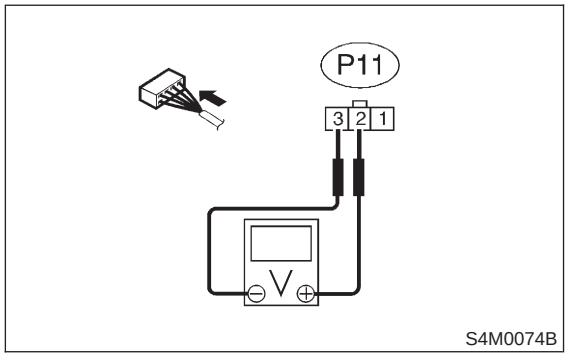


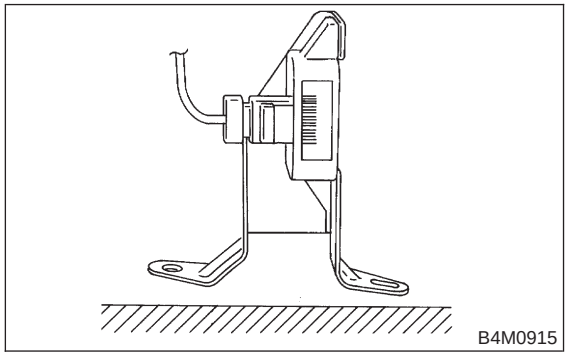
CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **10AI7**.
NO : Repair harness between G sensor and ABSCM&H/U.
Replace ABSCM&H/U.

10AI7 : CHECK G SENSOR.

1) Remove console box.
2) Remove G sensor from vehicle.
3) Connect connector to G sensor.
4) Connect connector to ABSCM&H/U.
5) Turn ignition switch to ON.
6) Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−):



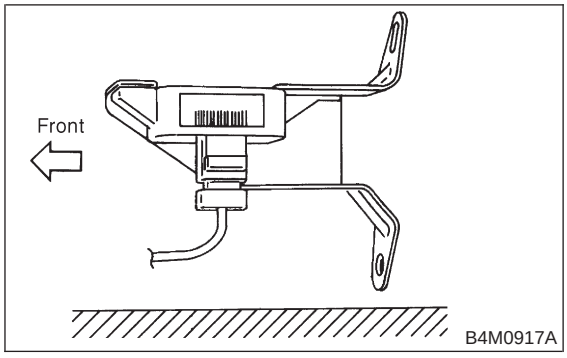


CHECK : ***Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?***
YES : Go to step **10AI8**.
NO : Replace G sensor.

10AI8 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−):

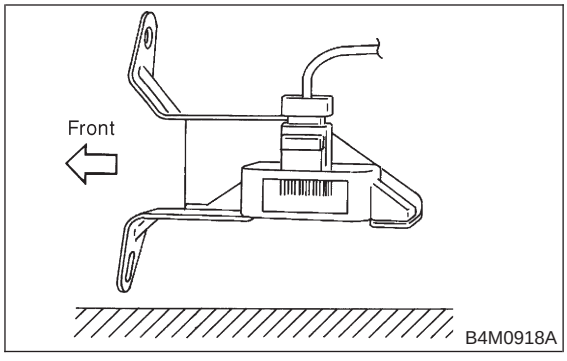


CHECK : ***Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?***
YES : Go to step **10AI9**.
NO : Replace G sensor.

10AI9 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 3 (−):



CHECK : ***Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?***
YES : Go to step **10AI10**.
NO : Replace G sensor.

10AI10 : CHECK ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Connect all connectors.
3) Erase the memory.
4) Perform inspection mode.
5) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***

YES : Replace ABSCM&H/U.

NO : Go to step **10AI11**.

10AI11 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

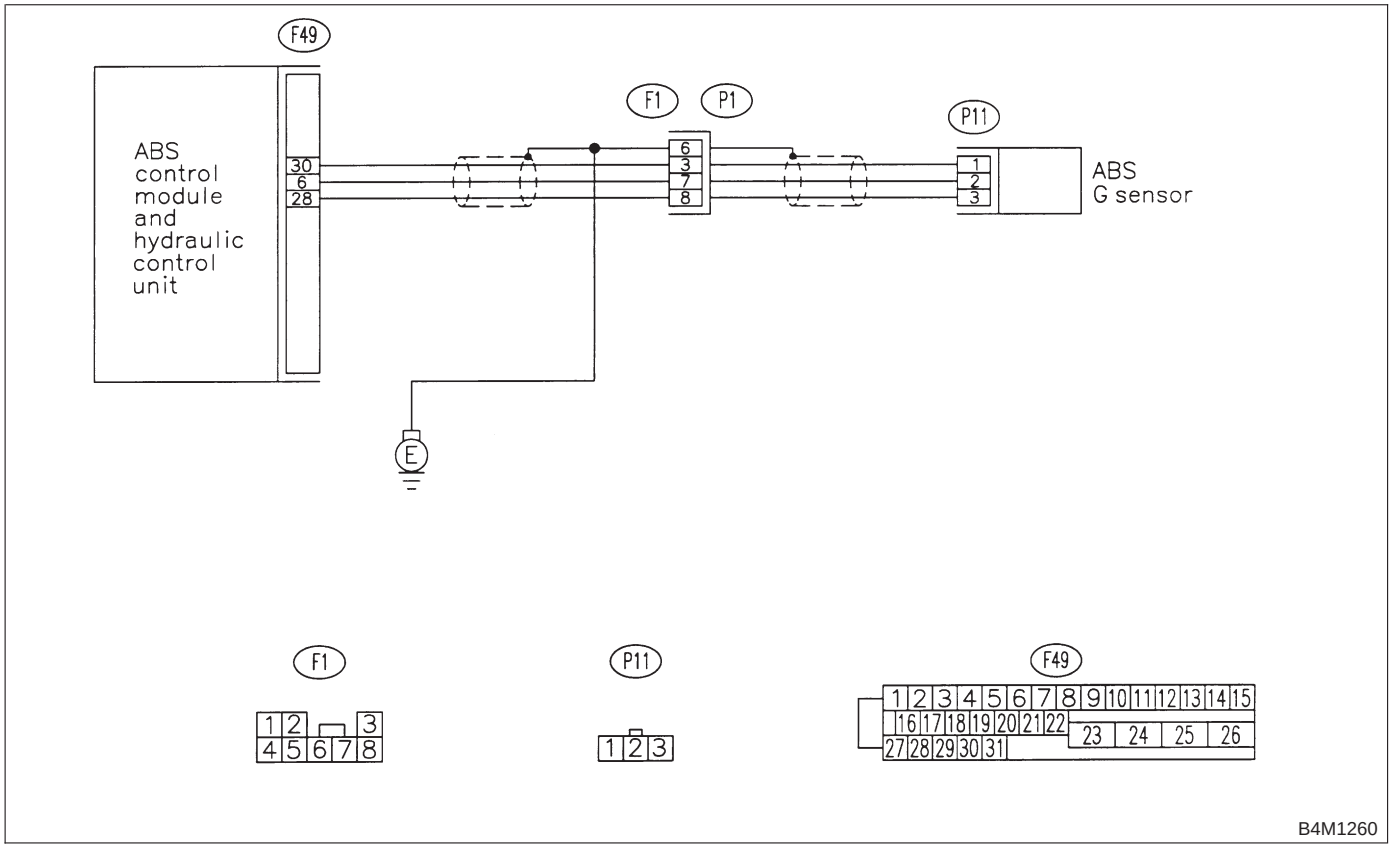
AJ: TROUBLE CODE 56 DETECTION OF G SENSOR STICK

— DETECTION OF G SENSOR STICK —

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



10AJ1 : CHECK ALL FOUR WHEELS FOR FREE TURNING.

CHECK : ***Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?***
YES : The ABS is normal. Erase the trouble code.
NO : Go to step **10AJ2**.

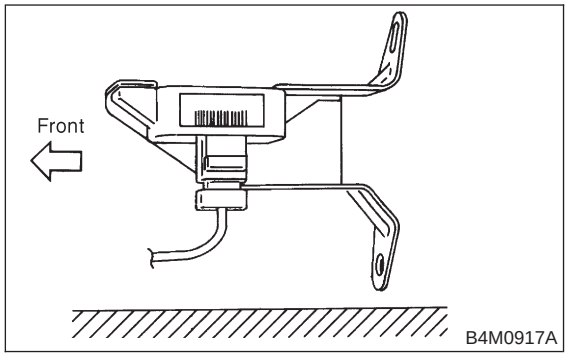
10AJ2 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

1) Select “Current data display & Save” on the select monitor.
2) Read the select monitor display.

CHECK : ***Is the G sensor output on the monitor display between 2.1 and 2.5 V when the vehicle is in horizontal position?***
YES : Go to step **10AJ3**.
NO : Go to step **10AJ8**.

10AJ3 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

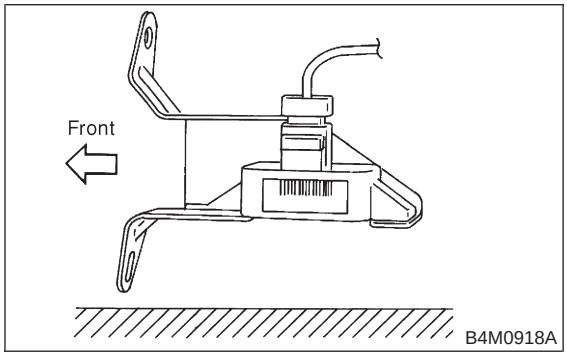
1) Turn ignition switch to OFF.
2) Remove console box.
3) Remove G sensor from vehicle. (Do not disconnect connector.)
4) Turn ignition switch to ON.
5) Select “Current data display & Save” on the select monitor.
6) Read the select monitor display.



CHECK : ***Is the G sensor output on the monitor display between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?***
YES : Go to step **10AJ4**.
NO : Replace G sensor.

10AJ4 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

Read the select monitor display.



CHECK : ***Is the G sensor output on the monitor display between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?***
YES : Go to step **10AJ5**.
NO : Replace G sensor.

10AJ5 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : ***Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [T3C1].>***
YES : Repair connector.
NO : Go to step **10AJ6**.

10AJ6 : CHECK ABSCM&H/U.

1) Connect all connectors.
2) Erase the memory.
3) Perform inspection mode.
4) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AJ7**.

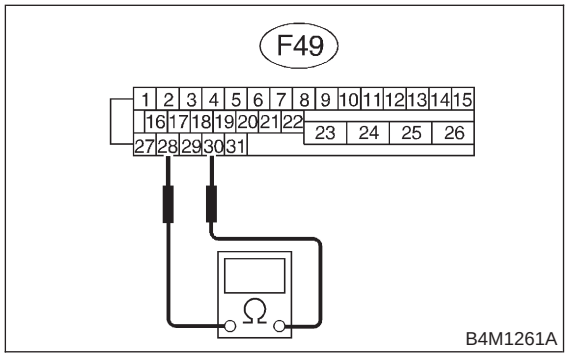
10AJ7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

10AJ8 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

1) Turn ignition switch to OFF.
2) Disconnect connector from ABSCM&H/U.
3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 30 — No. 28:

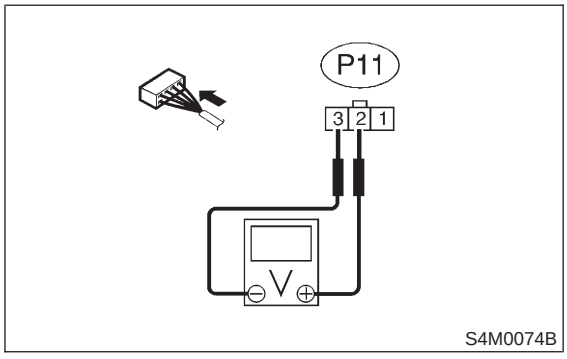


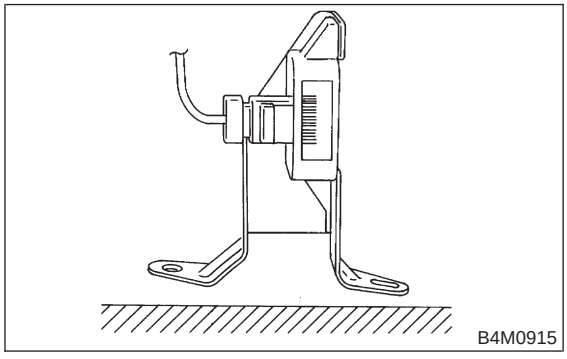
CHECK : ***Is the resistance between 4.3 and 4.9 kΩ?***
YES : Go to step **10AJ9**.
NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AJ9 : CHECK G SENSOR.

1) Remove console box.
2) Remove G sensor from vehicle.
3) Connect connector to G sensor.
4) Connect connector to ABSCM&H/U.
5) Turn ignition switch to ON.
6) Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 1 (−):



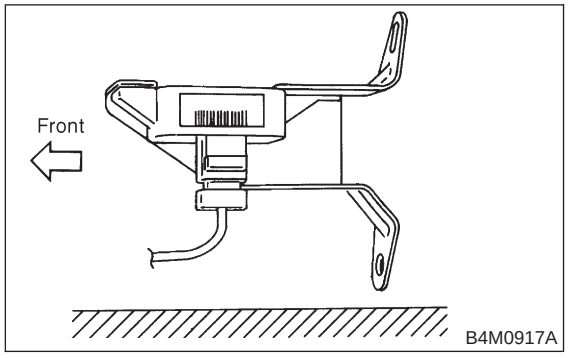


CHECK : ***Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?***
YES : Go to step **10AJ10**.
NO : Replace G sensor.

10AJ10 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 1 (−):

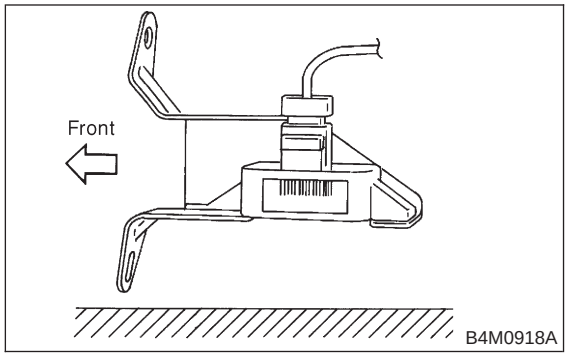


CHECK : ***Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?***
YES : Go to step **10AJ11**.
NO : Replace G sensor.

10AJ11 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(P11) No. 2 (+) — No. 1 (−):



CHECK : ***Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?***
YES : Go to step **10AJ12**.
NO : Replace G sensor.

10AJ12 : CHECK ABSCM&H/U.

1) Turn ignition switch to OFF.
2) Connect all connectors.
3) Erase the memory.
4) Perform inspection mode.
5) Read out the trouble code.

CHECK : ***Is the same trouble code as in the current diagnosis still being output?***
YES : Replace ABSCM&H/U.
NO : Go to step **10AJ13**.

10AJ13 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : ***Are other trouble codes being output?***
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

11. General Diagnostics Table

A: SYMPTOMS AND PROBABLE CAUSES

Symptom		Probable faulty units/parts
Vehicle instability during braking	Vehicle pulls to either side.	● ABSCM&H/U (solenoid valve) ● ABS sensor ● Brake (caliper & piston, pads) ● Wheel alignment ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections ● Road surface (uneven, camber)
	Vehicle spins.	● ABSCM&H/U (solenoid valve) ● ABS sensor ● Brake (pads) ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections
Poor braking	Long braking/stopping distance	● ABSCM&H/U (solenoid valve) ● Brake (pads) ● Air in brake line ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections
	Wheel locks.	● ABSCM&H/U (solenoid valve, motor) ● ABS sensor ● Incorrect wiring or piping connections
	Brake dragging	● ABSCM&H/U (solenoid valve) ● ABS sensor ● Master cylinder ● Brake (caliper & piston) ● Parking brake ● Axle & wheels ● Brake pedal play
	Long brake pedal stroke	● Air in brake line ● Brake pedal play
	Vehicle pitching	● Suspension play or fatigue (reduced damping) ● Incorrect wiring or piping connections ● Road surface (uneven)
	Unstable or uneven braking	● ABSCM&H/U (solenoid valve) ● ABS sensor ● Brake (caliper & piston, pads) ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections ● Road surface (uneven)
Vibration and/or noise (while driving on slippery roads)	Excessive pedal vibration	● Incorrect wiring or piping connections ● Road surface (uneven)
	Noise from ABSCM&H/U	● ABSCM&H/U (mount bushing) ● ABS sensor ● Brake piping
	Noise from front of vehicle	● ABSCM&H/U (mount bushing) ● ABS sensor ● Master cylinder ● Brake (caliper & piston, pads, rotor) ● Brake piping ● Brake booster & check valve ● Suspension play or fatigue
	Noise from rear of vehicle	● ABS sensor ● Brake (caliper & piston, pads, rotor) ● Parking brake ● Brake piping ● Suspension play or fatigue

B: CHECKING THE HYDRAULIC UNIT OPERATION

11B1 : PREPARING THE BRAKE TESTER.

CHECK : ***Is the brake tester available?***

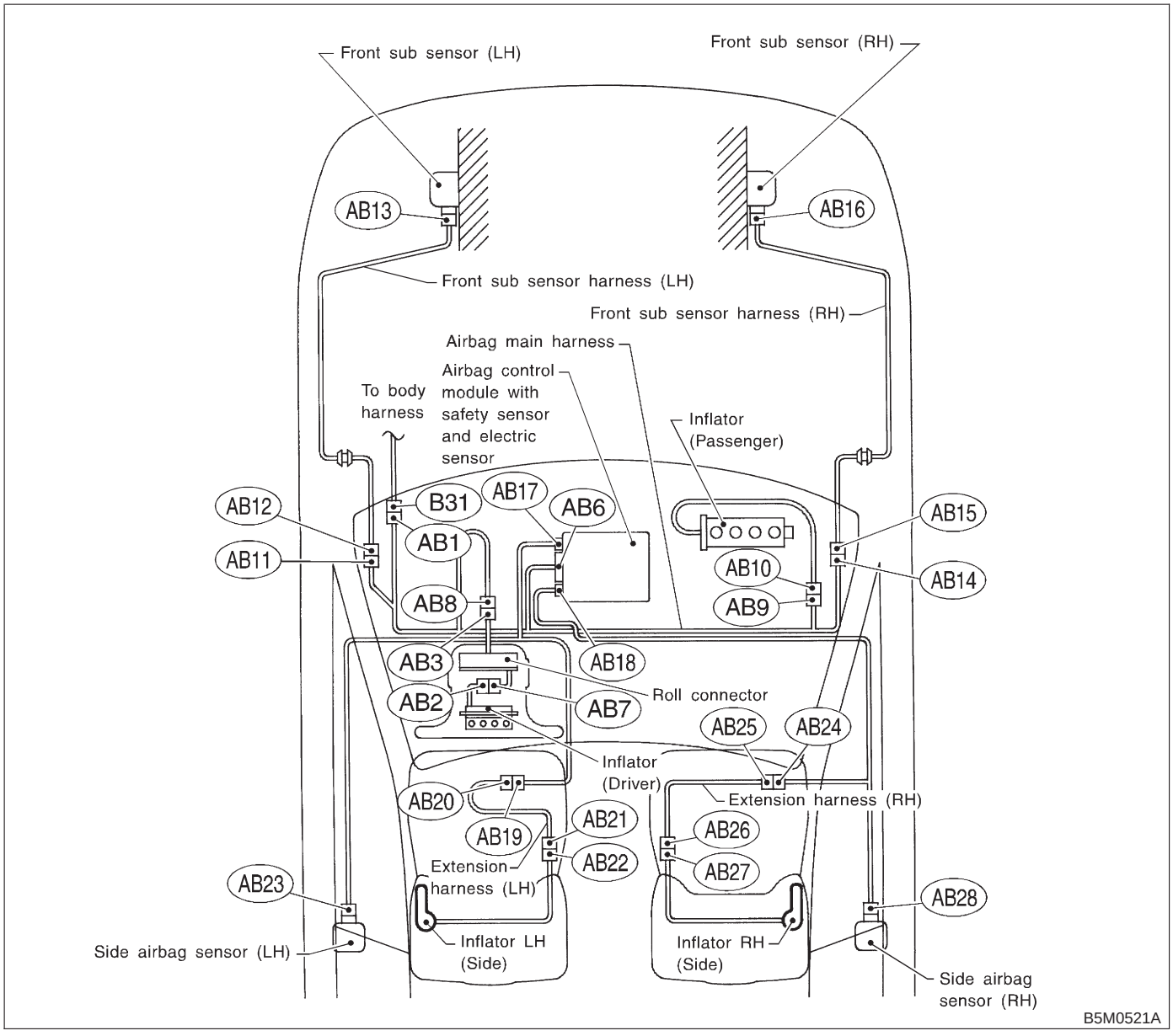
YES : CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER <Ref. to 4-4 [W15C2].>

NO : CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE <Ref. to 4-4 [W15C1].>

MEMO:

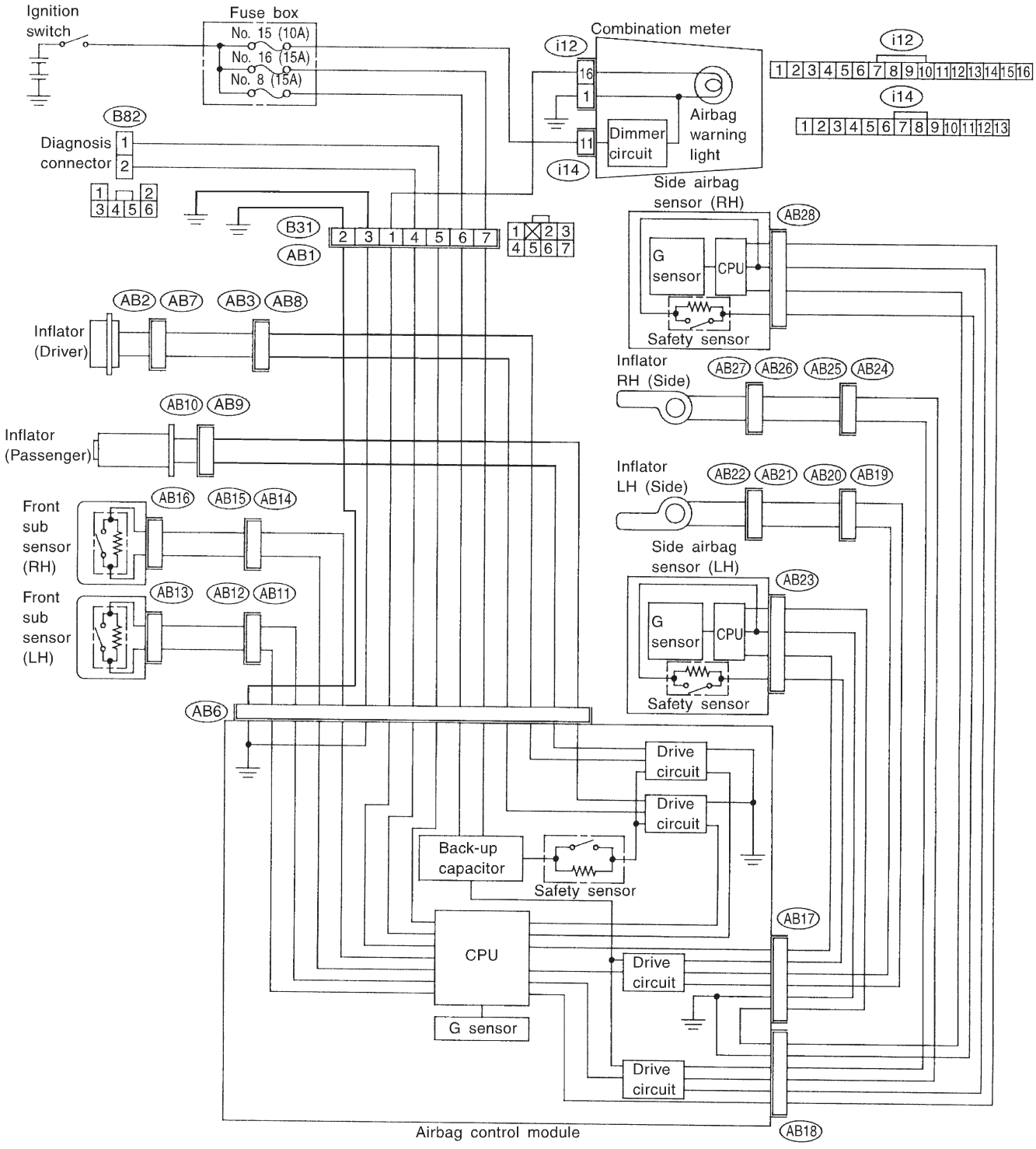
SUPPLEMENTAL RESTRAINT SYSTEM 5-5

1. Electrical Components Location



Connector No.	(AB1)	(AB2)	(AB3)	(AB6)	(AB7)	(AB8)	(AB9)	(AB10)	(AB11)
Pole	7	2	2	20	2	2	2	2	2
Color	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue
Male/Female	Male	Male	Male	Female	Female	Female	Female	Male	Female
Connector No.	(AB12)	(AB13)	(AB14)	(AB15)	(AB16)	(AB17)	(AB18)	(AB19)	(AB20)
Pole	2	2	2	2	2	12	12	2	2
Color	Blue	Yellow	Blue	Blue	Yellow	Yellow	Yellow	Yellow	Yellow
Male/Female	Male	Female	Female	Male	Female	Female	Female	Female	Male
Connector No.	(AB21)	(AB22)	(AB23)	(AB24)	(AB25)	(AB26)	(AB27)	(AB28)	
Pole	2	2	4	2	2	2	2	4	
Color	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
Male/Female	Female	Male	Female	Female	Male	Female	Male	Female	

2. Schematic



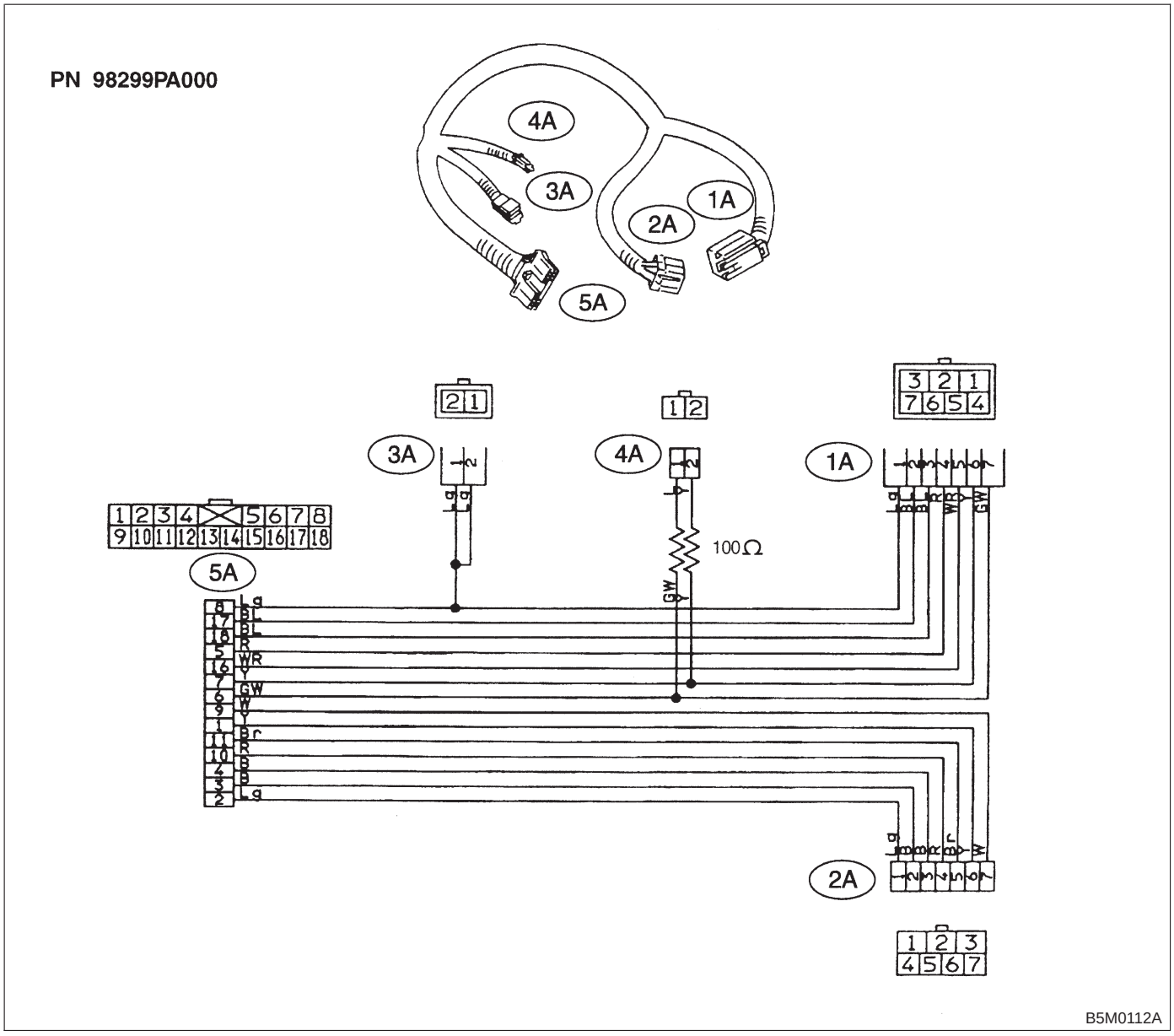
B5M0522A

3. Tools for Diagnostics

CAUTION:
Be sure to use specified test harness A, E, F, G and H when measuring voltage, resistance, etc. of AIRBAG system component parts.

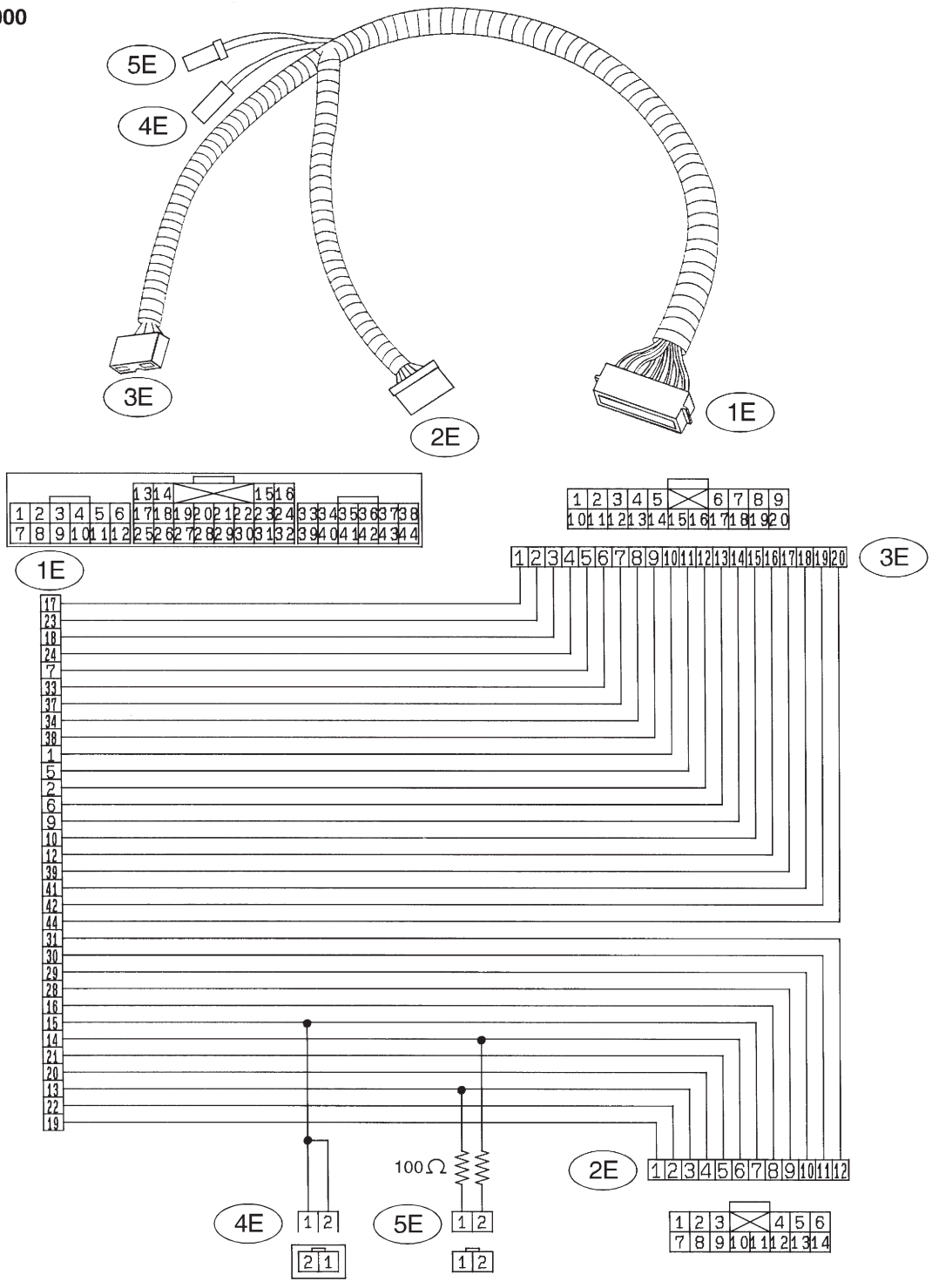
A: TEST HARNESS A

PN 98299PA000



B: TEST HARNESS E

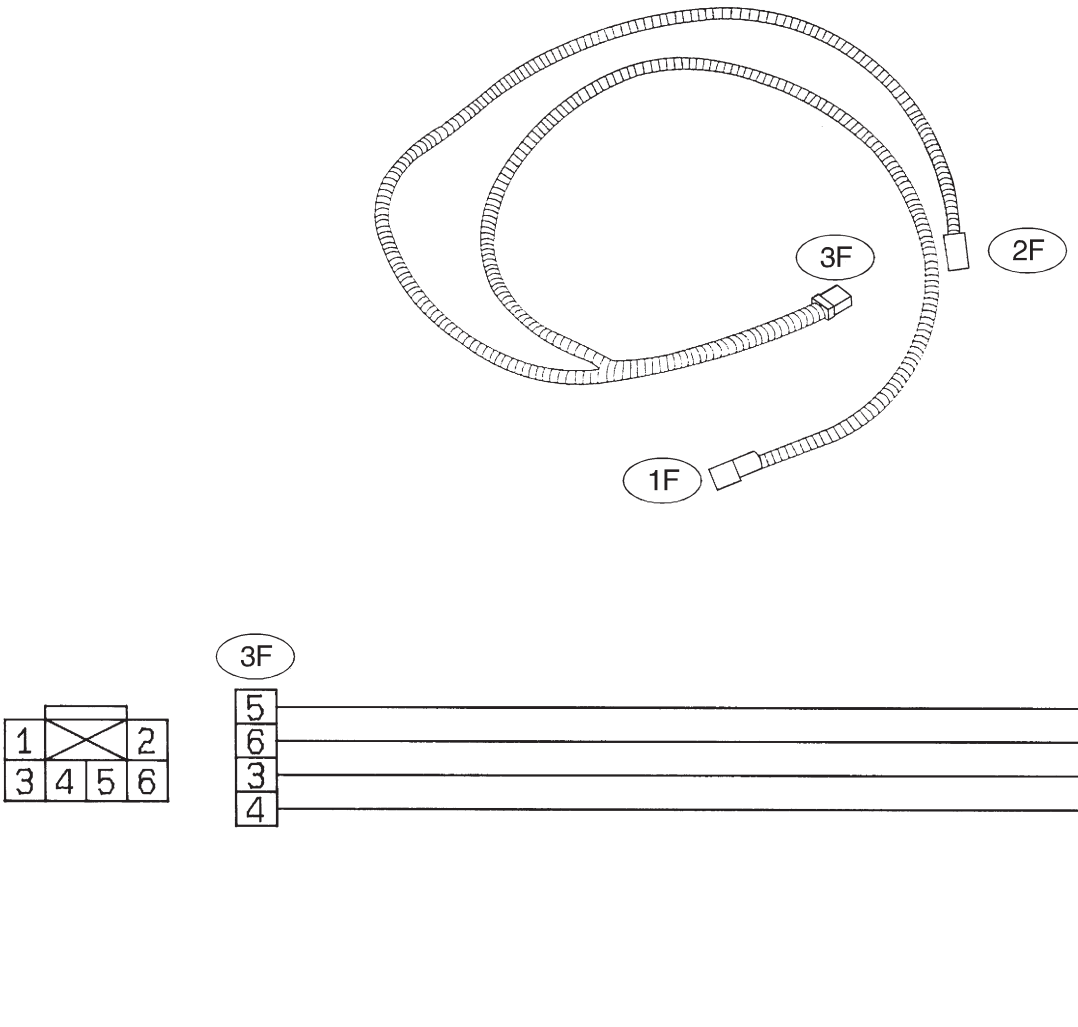
PN 98299FC000



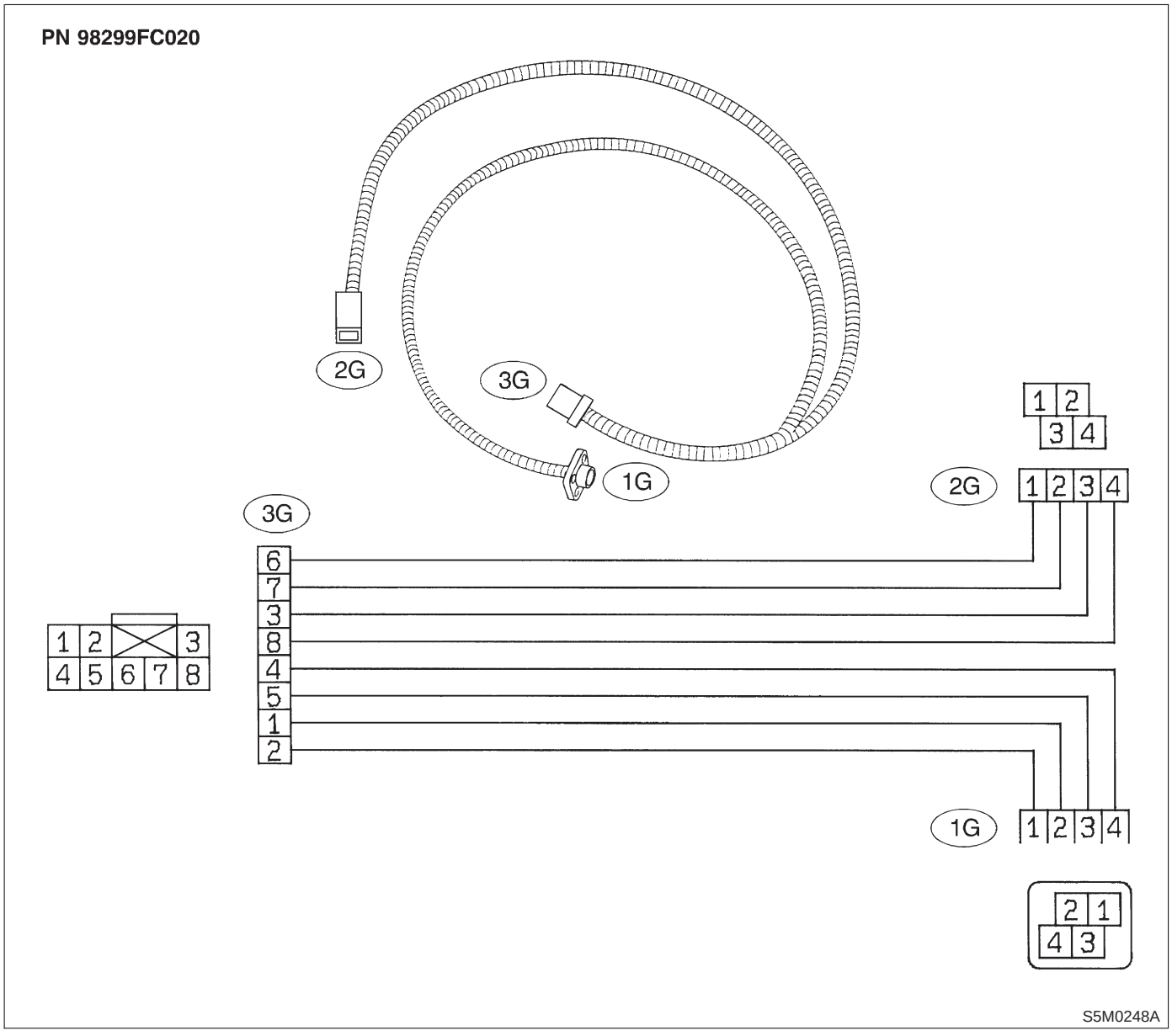
S5M0246A

C: TEST HARNESS F

PN 98299FC010

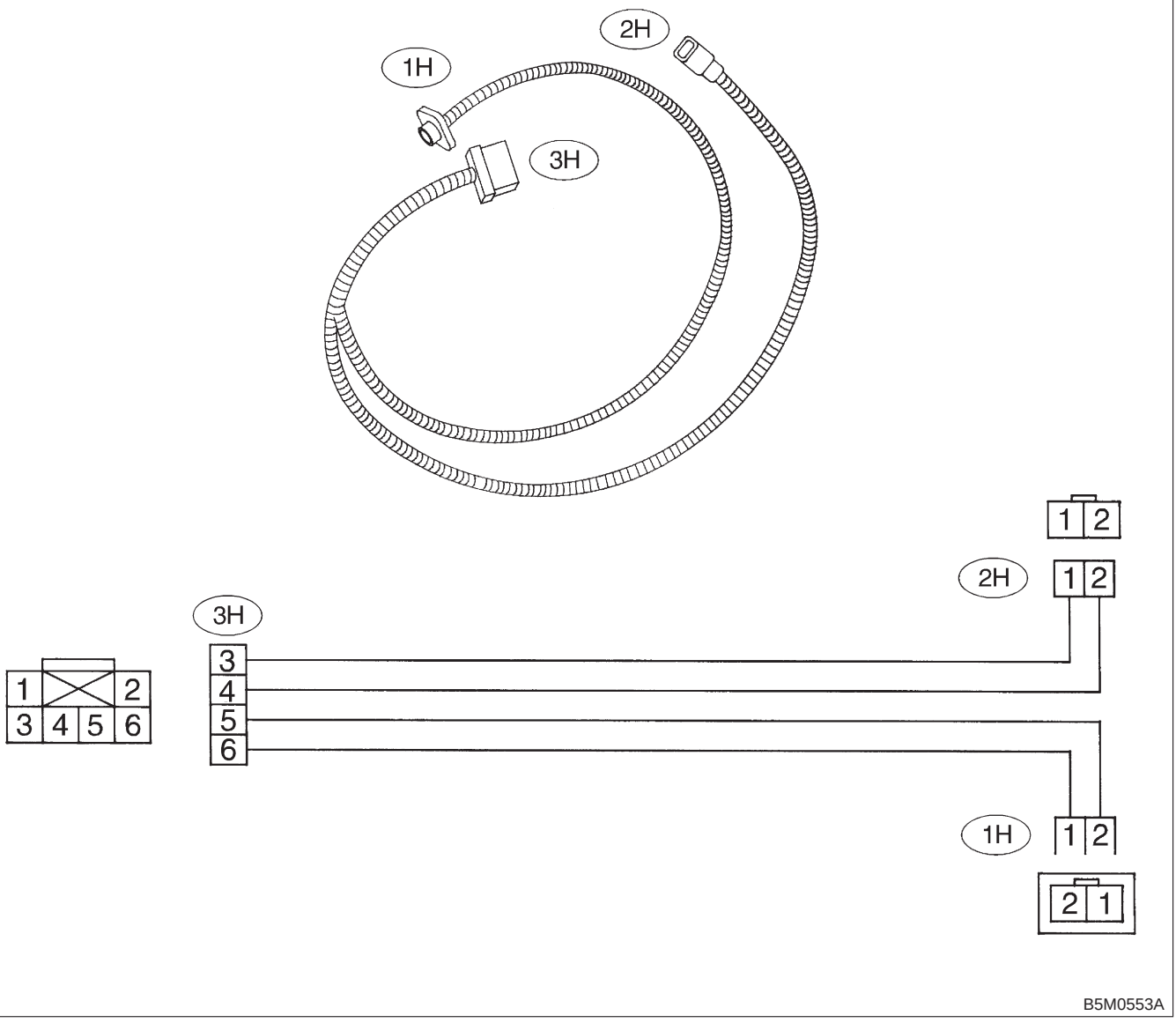


D: TEST HARNESS G



E: TEST HARNESS H

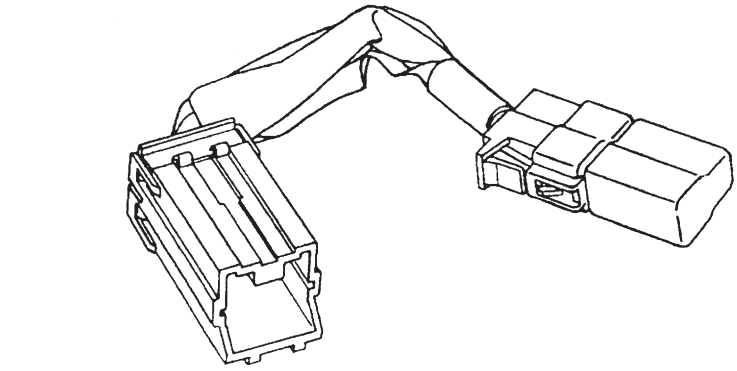
PN 98299FC030

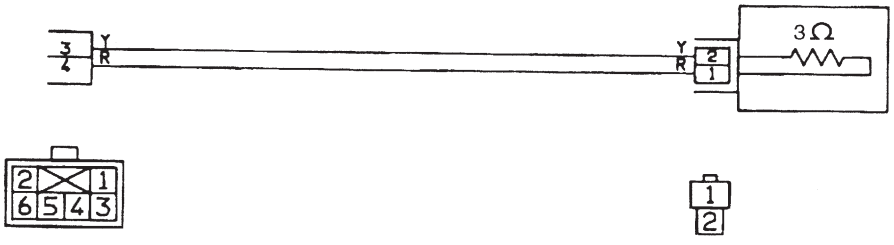


F: AIRBAG RESISTOR

The airbag resistor is used during diagnostics. The airbag resistor has the same resistance as the airbag module and thus provides safety when used instead of the airbag module. It also makes it possible to finish, diagnostics in less time.

PN 98299PA040





B5M0114A

4. Diagnostics Chart for On-board Diagnostic System

A: BASIC DIAGNOSTICS PROCEDURE

4A1 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Airbag warning light comes ON.
2) Turn ignition switch to ON (engine OFF).
3) Check airbag warning light illuminates.

CHECK : ***Does airbag warning light stay ON after about 7 seconds or remain OFF, or come back ON after 30 seconds?***

YES : Repair and replace. <Ref. to 5-5 [T4D0].>

NO : Go to step **4A2**.

4A2 : CHECK TROUBLE CODE INDICATES.

Perform ON-BOARD DIAGNOSTICS.
<Ref. to 5-5 [T4B0].>

CHECK : ***Does trouble code indicate? <Ref. to 5-5 [T5A0].>***

YES : Repair and replace. <Ref. to 5-5 [T5AA0].> Go to step **4A3**.

NO : Repair and replace. <Ref. to 5-5 [T5AB0].> Go to step **4A3**.

4A3 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Turn ignition switch to ON (engine OFF).
2) Check airbag warning light illuminates.

CHECK : ***Does airbag warning light stay ON after about 7 seconds or come back ON after 30 seconds?***

YES : Repair and replace. <Ref. to 5-5 [T4D0].>

NO : Go to step **4A4**.

4A4 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

Check airbag warning light illuminates.

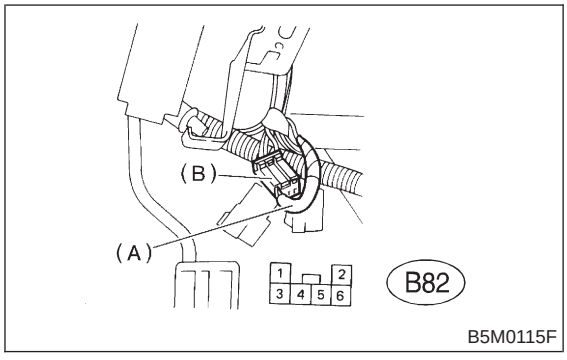
CHECK : ***Does airbag warning light come ON for about 7 seconds, then go out and stay out?***

YES : Perform clear memory. <Ref. to 5-5 [T4C0].>

NO : Go to step **4A1**.

B: ON-BOARD DIAGNOSTICS

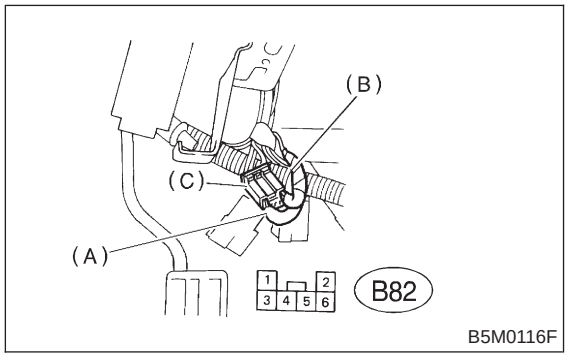
When the airbag system is in functioning condition, the airbag warning light will remain on for about 7 seconds and go out when the ignition switch is set to ON.
If there is any malfunction, the airbag warning light will either stay on or off continuously. In such cases, perform on-board diagnostic in accordance with the specified procedure to determine trouble codes.
1) Turn ignition switch ON (with engine OFF).
2) Connect DIAG. terminal (A) to No. 1 terminal of diagnosis connector (B) located below lower cover.



3) Check in accordance with the trouble code indicated by the AIRBAG warning light, and record the trouble codes.
4) Turn the ignition switch “OFF” and remove the DIAG. terminal from No.1 terminal of diagnosis connector.

C: CLEAR MEMORY

After eliminating problem as per trouble code, clear memory as follows:
1) Make sure ignition switch is ON (and engine off). Connect one DIAG. terminal “A” (A) on diagnosis connector (C) terminal No. 1.
While warning light is flashing, connect the other DIAG. terminal “B” (B) on terminal No. 2 for at least three seconds.



2) After memory is cleared, normal warning light flashing rate resumes. (Warning light flashes every 0.6 seconds ON-OFF operation.) Memory cannot be cleared if any problem exists.
3) After clear memory and then DIAG. terminals “A” and “B”, extract from diagnosis connector.

D: DIAGNOSTICS PROCEDURE

4D1 : CHECK TROUBLE CODE INDICATES.

1) Perform on-board diagnostic. <Ref. to 5-5 [T4B0].>
2) Check trouble code indicates.

CHECK : ***Are trouble codes 4, 12, 13, 22, 34, 41, 42, or 43 indicated? <Ref. to 5-5 [T5A2].>***
YES : Go to step **4D2**.
NO : Perform diagnostics and repair according to indicated trouble code. <Ref. to 5-5 [T5A0].> Go to step **4D10**.

4D2 : CHECK TROUBLE CODE INDICATES.

Check trouble code indicates.

CHECK : ***Are trouble codes 4, 22, 34, 42 indicated? <Ref. to 5-5 [T5A2].>***
YES : Go to step **4D3**.
NO : Go to step **4D7**.

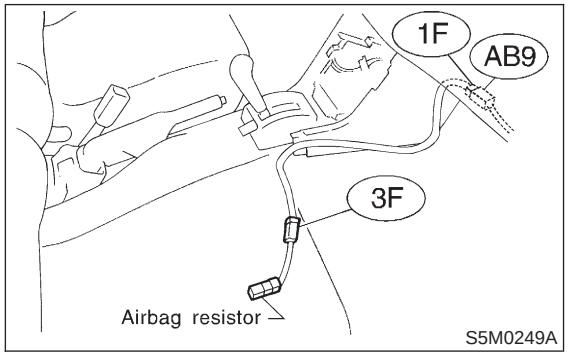
4D3 : CHECK TROUBLE CODE INDICATES.

Check trouble code indicates.

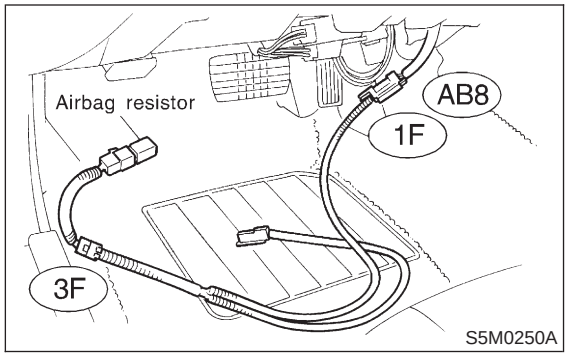
CHECK : ***Are trouble codes 12, 13, 41, 43 indicated? <Ref. to 5-5 [T5A2].>***
YES : Go to step **4D4**.
NO : Go to step **4D8**.

4D4 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Turn ignition switch to OFF. Disconnect battery ground cable, and wait 20 seconds.
2) Disconnect passenger's airbag module connector (AB9) to (AB10). <Ref. to 5-5 [W3A2].>
3) Connect test harness F connector (1F) to (AB9).
4) Connect airbag resistor to test harness F connector (3F).



5) Remove lower cover panel <Ref. to 5-4 [W1A0].> and connect test harness F connector (1F) to (AB8) with airbag resistor attached to test harness F connector (3F).



6) Connect battery ground cable and turn ignition switch to ON.
7) Check airbag warning light illuminates.

NOTE:
In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

CHECK : ***Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?***

YES : Go to step **4D5**.

NO : Perform diagnostics and repair according to indicated trouble code. <Ref. to 5-5 [T5A0].> Go to step **4D10**.

4D5 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Turn ignition switch to OFF. Disconnect battery ground cable, and wait 20 seconds.
2) Connect passenger's airbag module connector (AB9) to (AB10).
3) Connect battery ground cable and turn ignition switch to ON.
4) Check airbag warning light illuminates.

NOTE:
In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

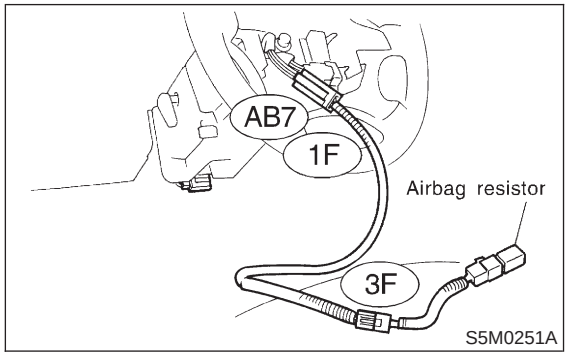
CHECK : ***Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?***

YES : Go to step **4D6**.

NO : Replace with a new passenger's airbag module. <Ref. to 5-5 [W3A2].> Go to step **4D5**.

4D6 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Turn ignition switch to “OFF”. Disconnect battery ground cable, and wait 20 seconds.
2) Connect connector (AB8) to (AB3).
3) Remove driver’s airbag module and connect test harness F connector (1F) to (AB7). <Ref. to 5-5 [W3A1].>
4) Connect airbag resistor to test harness F connector (3F).



5) Connect battery ground cable and turn ignition switch to ON.
6) Check airbag warning light illuminates.

NOTE:
In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

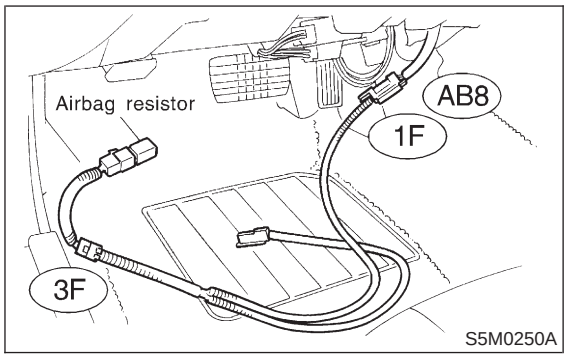
CHECK : ***Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?***

YES : Replace with a new driver’s airbag module. <Ref. to 5-5 [W3A1].> Go to step **4D10**.

NO : Replace with a new combination switch. <Ref. to 5-5 [W6A0].> and install driver’s airbag module. <Ref. to 5-5 [W3A1].> Go to step **4D9**.

4D7 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Turn ignition switch to OFF. Disconnect battery ground cable, and wait 20 seconds.
2) Remove lower cover panel and connect test harness F connector (1F) to (AB8) <Ref. to 5-4 [W1A0].> with airbag resistor attached to test harness F connector (3F).



3) Connect battery ground cable and turn ignition switch to ON.
4) Check airbag warning light illuminates.

NOTE:
In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

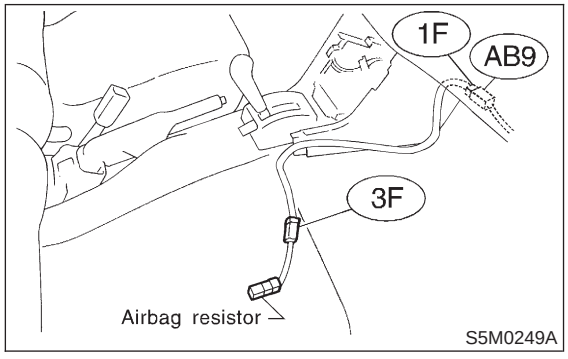
CHECK : ***Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?***

YES : Go to step **4D6**.

NO : Perform diagnostics and repair according to indicated trouble code. <Ref. to 5-5 [T5A0].> Go to step **4D10**.

4D8 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Turn ignition switch to OFF. Disconnect battery ground cable, and wait 20 seconds.
2) Disconnect passenger's airbag module connector (AB9) to (AB10). <Ref. to 5-5 [W3A2].>
3) Connect test harness F connector (1F) to (AB9).
4) Connect airbag resistor to test harness F connector (3F).



5) Connect battery ground cable and turn ignition switch to ON.
6) Check airbag warning light illuminates.

NOTE:
In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

CHECK : ***Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?***

YES : Replace with a new passenger's airbag module. <Ref. to 5-5 [W3A2].> Go to step **4D10**.

NO : Perform diagnostics and repair according to indicated trouble code. <Ref. to 5-5 [T5A0].> Go to step **4D10**.

4D9 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Connect battery ground cable and turn ignition switch to ON.
2) Check airbag warning light illuminates.

NOTE:
In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

CHECK : ***Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?***

YES : Perform clear memory. <Ref. to 5-5 [T4C0].>

NO : Replace with a new driver's airbag module. <Ref. to 5-5 [W3A1].> Go to step **4D10**.

4D10 : CHECK AIRBAG WARNING LIGHT ILLUMINATES.

1) Connect battery ground cable and turn ignition switch to ON.
2) Check airbag warning light illuminates.

NOTE:
In some cases the airbag warning light will go OFF after about 7 seconds but will turn ON again within 30 seconds. In this case continue diagnostics with the basic diagnostics procedures or trouble code procedures.

CHECK : ***Does airbag warning light go off after about 7 seconds and remain off for more than 30 seconds?***

YES : Perform clear memory. <Ref. to 5-5 [T4C0].>

NO : Go to step **4D1**.

5. Diagnostics Chart with Trouble Code

A: TROUBLE CODES

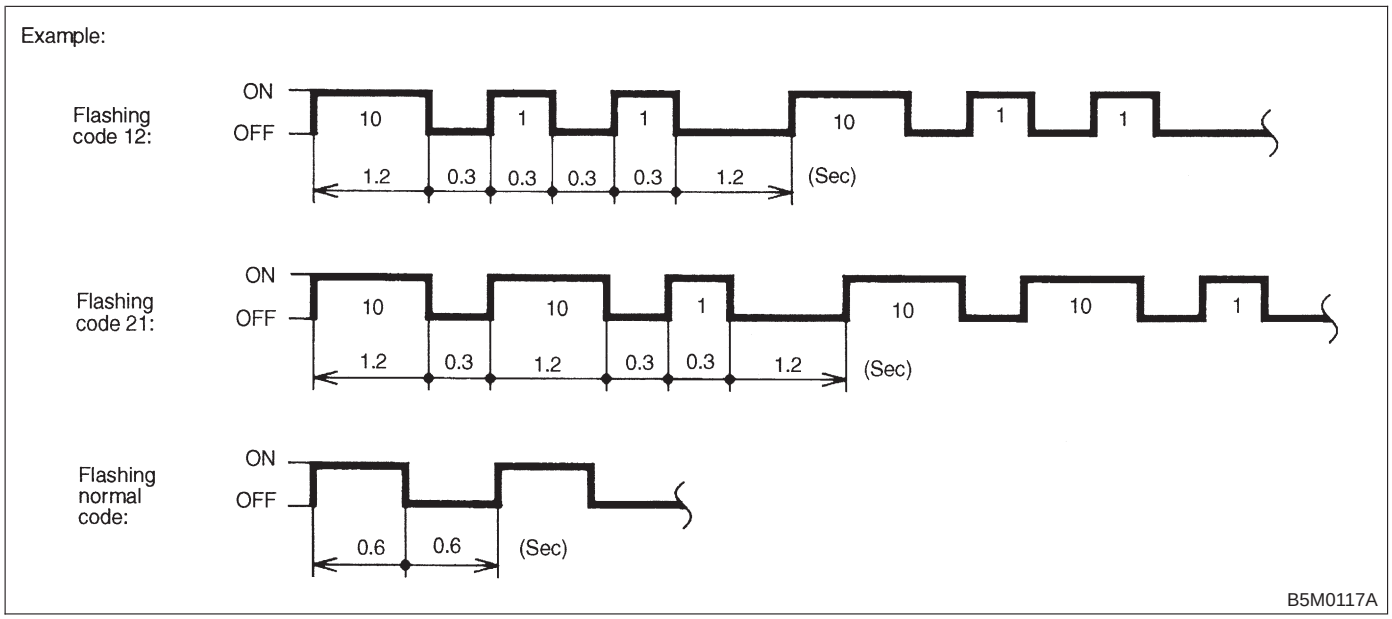
1. LIST OF TROUBLE CODES

Trouble code/ Contents of troubles	Memory function	Contents of diagnosis	Index No.
03	Provided.	● Front sub sensor harness is faulty. ● Front sub sensor is faulty.	<Ref. to 5-5 [T5B0].>
04	Provided.	● Airbag main harness circuit is shorted. ● Passenger's airbag module harness circuit is shorted. ● Airbag control module is faulty.	<Ref. to 5-5 [T5C0].>
08	Provided.	● Airbag control module is faulty. ● Airbag main harness is faulty.	<Ref. to 5-5 [T5D0].>
09	Provided.	● Airbag control module is faulty. ● Airbag main harness is faulty.	<Ref. to 5-5 [T5E0].>
11	Provided.	● Airbag control module is faulty. ● Airbag main harness circuit is open. ● Fuse No. 8 is blown. ● Body harness circuit is open.	<Ref. to 5-5 [T5F0].>
12	Provided.	● Airbag main harness circuit is open. ● Driver's airbag module harness circuit is open. ● Roll connector circuit is open. ● Airbag control module is faulty.	<Ref. to 5-5 [T5G0].>
13	Provided.	● Airbag main harness circuit is shorted. ● Driver's airbag module harness is shorted. ● Roll connector circuit is shorted. ● Airbag control module is faulty.	<Ref. to 5-5 [T5H0].>
14	Not provided.	(AB6), (AB17) and (AB18) are not connected properly to airbag control module.	<Ref. to 5-5 [T5I0].>
15	Provided.	● Side airbag sensor (RH) is faulty. ● Airbag main harness is faulty.	<Ref. to 5-5 [T5J0].>
16	Provided.	● Side airbag sensor (RH) is faulty. ● Side airbag sensor is different.	<Ref. to 5-5 [T5K0].>
21	Provided.	Airbag control module is faulty.	<Ref. to 5-5 [T5L0].>
22	Provided.	● Airbag main harness circuit is open. ● Passenger's airbag module harness circuit is open. ● Airbag control module is faulty.	<Ref. to 5-5 [T5M0].>
25	Provided.	● Side airbag sensor (LH) is faulty. ● Airbag main harness is faulty.	<Ref. to 5-5 [T5N0].>
26	Provided	● Side airbag sensor (LH) is faulty. ● Side airbag sensor is different.	<Ref. to 5-5 [T5O0].>
31	Not provided.	● Airbag control module is faulty. ● Airbag main harness circuit is open. ● Fuse No. 16 is blown. ● Body harness circuit is open.	<Ref. to 5-5 [T5P0].>
33	Provided.	Front airbag module is inflated.	<Ref. to 5-5 [T5Q0].>
34	Provided.	● Passenger's airbag main harness circuit is shorted to power supply. ● Passenger's airbag module harness is shorted to power supply. ● Airbag control module is faulty.	<Ref. to 5-5 [T5R0].>

Trouble code/ Contents of troubles	Memory function	Contents of diagnosis	Index No.
41	Provided.	● Driver's airbag main harness circuit is shorted to ground. ● Driver's airbag module harness circuit is shorted to ground. ● Roll connector circuit is shorted to ground. ● Airbag control module is faulty.	<Ref. to 5-5 [T5S0].>
42	Provided.	● Passenger's airbag main harness circuit is shorted to ground. ● Passenger's airbag module harness circuit is shorted to ground. ● Airbag control module is faulty.	<Ref. to 5-5 [T5T0].>
43	Provided.	● Driver's airbag main harness circuit is shorted to power supply. ● Driver's airbag module harness is shorted to power supply. ● Roll connector is shorted to power supply. ● Airbag control module is faulty.	<Ref. to 5-5 [T5U0].>
44	Provided.	Side airbag module is inflated.	<Ref. to 5-5 [T5V0].>
51	Provided.	● Airbag main harness is faulty. ● Side airbag module (RH) is faulty. ● Airbag control module is faulty.	<Ref. to 5-5 [T5W0].>
52	Provided.	● Airbag main harness is faulty. ● Side airbag module (LH) is faulty. ● Airbag control module is faulty.	<Ref. to 5-5 [T5X0].>
Airbag warning light remains on.	Not provided.	● Airbag warning light is faulty. ● Airbag control module to airbag warning light harness circuit is shorted or open. ● Grounding circuit is faulty. ● Airbag control module is faulty. ● (AB1) and (B31) are not connected properly. ● (AB6) is not connected properly to airbag control module.	<Ref. to 5-5 [T5Y0].>
Airbag warning light remains off.	Not provided.	● Fuse No. 15 is blown. ● Body harness circuit is open. ● Airbag warning light is faulty. ● Airbag main harness is faulty. ● Airbag control module is faulty.	<Ref. to 5-5 [T5Z0].>
Warning light indicates trouble code, then normal code. (Flashing trouble code.)	Provided.	Airbag system component parts are faulty.	<Ref. to 5-5 [T5AA0].>
Warning light indicates trouble code, then normal code. (Flashing normal code.)	Not provided.	● Airbag connector is faulty. ● Fuse No. 16 is blown. ● Airbag main harness is faulty. ● Airbag control module is faulty. ● Body harness is faulty.	<Ref. to 5-5 [T5AB0].>

2. HOW TO READ TROUBLE CODES

The AIRBAG warning light flashes a code corresponding to the faulty parts.
The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.3 sec on) indicates a “one”.



B: TROUBLE CODE 03

DIAGNOSIS:

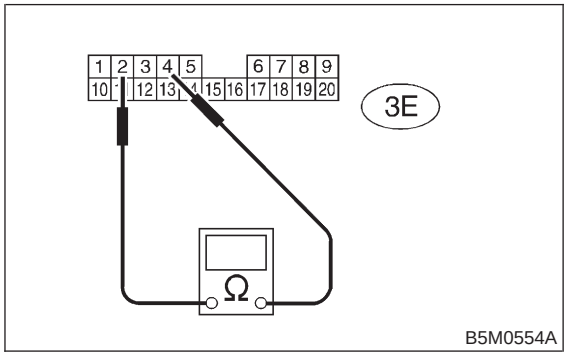
- Front sub sensor harness is faulty.
- Front sub sensor is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch “OFF”, disconnect battery ground terminal, and then wait at least 20 seconds.

5B1 : FRONT SUB SENSOR (RH) AND FRONT SUB SENSOR HARNESS (RH) INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness E connector (1E).
2) Measure resistance between test harness E connector (3E) terminal.

Connector & terminal
(3E) No. 2 — (3E) No. 4:

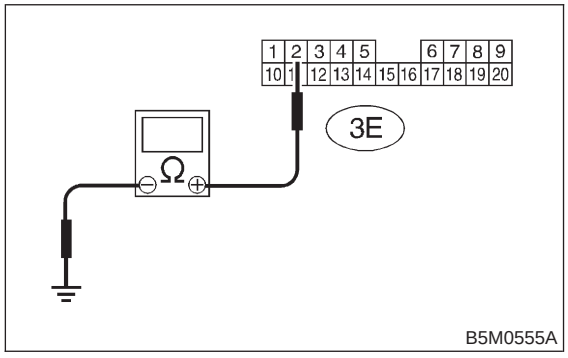


CHECK : ***Is the resistance between 750 Ω and 1 kΩ?***
YES : Go to step **5B2**.
NO : Go to step **5B2**.

5B2 : FRONT SUB SENSOR (RH) AND FRONT SUB SENSOR HARNESS (RH) INSPECTION

Measure resistance across test harness E connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 2 (+) — Chassis ground (−):

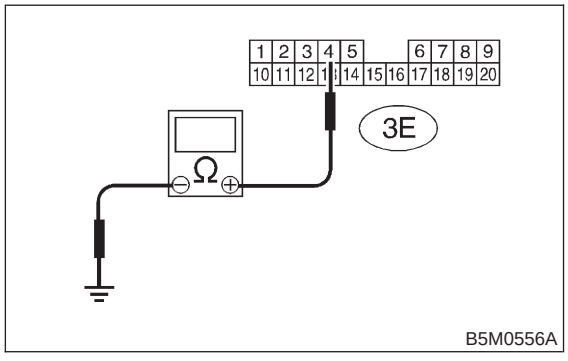


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B3**.
NO : Go to step **5B3**.

5B3 : FRONT SUB SENSOR (RH) AND FRONT SUB SENSOR HARNESS (RH) INSPECTION

Measure resistance across test harness E connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 4 (+) — Chassis ground (−):

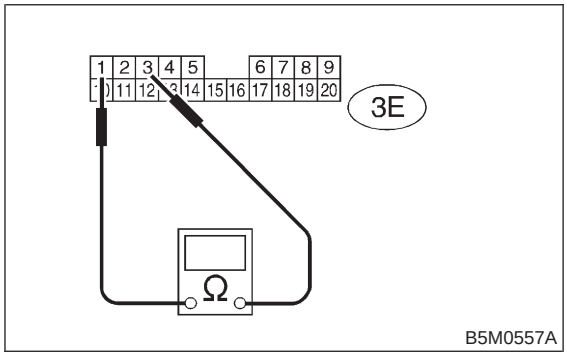


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B4**.
NO : Go to step **5B4**.

5B4 : FRONT SUB SENSOR (LH) AND FRONT SUB SENSOR HARNESS (LH) INSPECTION

Measure resistance between test harness E connector (3E) terminal.

Connector & terminal
(3E) No. 1 — (3E) No. 3:

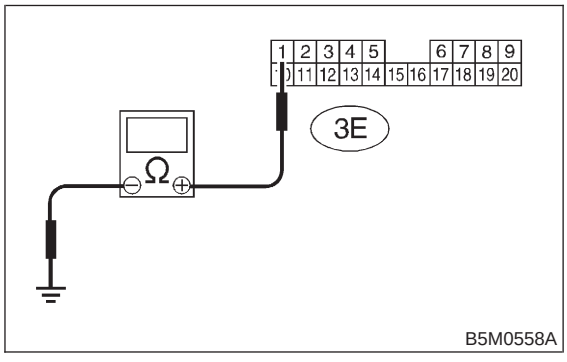


CHECK : ***Is the resistance between 750 Ω and 1 kΩ?***
YES : Go to step **5B5**.
NO : Go to step **5B5**.

5B5 : FRONT SUB SENSOR (LH) AND FRONT SUB SENSOR HARNESS (LH) INSPECTION

Measure resistance across test harness E connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 1 (+) — Chassis ground (−):

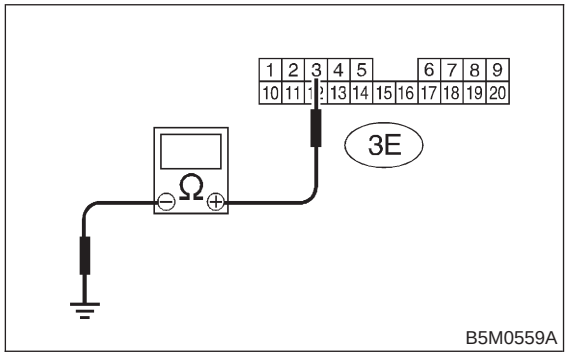


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B6**.
NO : Go to step **5B6**.

5B6 : FRONT SUB SENSOR (LH) AND FRONT SUB SENSOR HARNESS (LH) INSPECTION

Measure resistance across test harness E connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 3 (+) — Chassis ground (−):

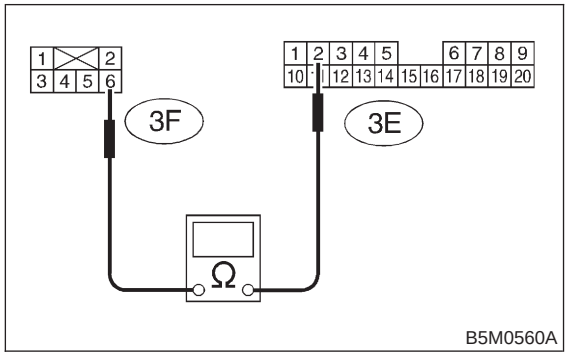


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Go to step **5B7**.

5B7 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB14) and (AB15), then connect test harness F connector (2F) and connector (AB14).
2) Measure resistance between test harness E connector (3E) terminal and test harness F connector (3F) terminal.

Connector & terminal
(3E) No. 2 — (3F) No. 6:

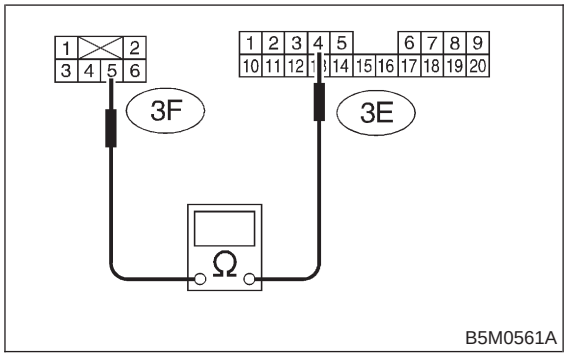


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5B8**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B8 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness E connector (3E) terminal and test harness F connector (3F) terminal.

Connector & terminal
(3E) No. 4 — (3F) No. 5:

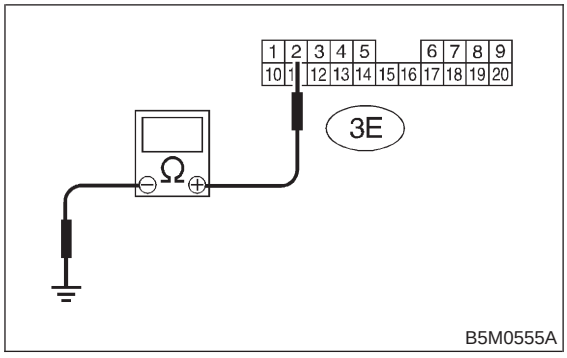


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5B9**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B9 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance across test harness E connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 2 (+) — Chassis ground (−):

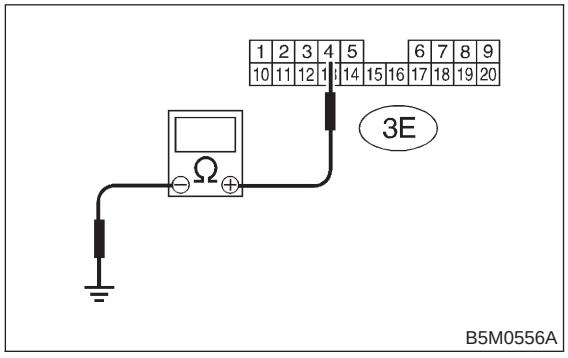


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B10**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B10 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance across test harness E connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 4 (+) — Chassis ground (−):

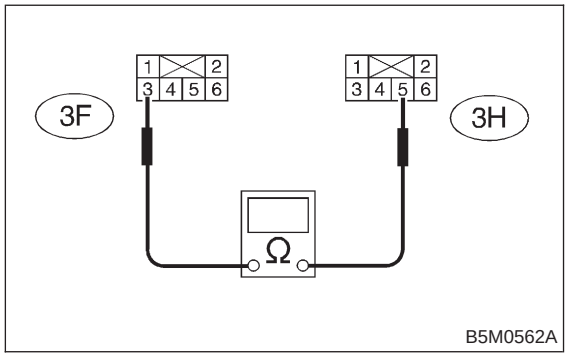


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B11**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B11 : FRONT SUB SENSOR HARNESS (RH) INSPECTION

1) Connect test harness F connector (1F) and connector (AB15).
2) Disconnect connector (AB16) from front sub sensor (RH) <Ref. to 5-5 [W7A0].> and then test harness H connector (1H) and connector (AB16).
3) Measure resistance between test harness F connector (3F) terminal and test harness H connector (3H) terminal.

Connector & terminal
(3F) No. 3 — (3H) No. 5:

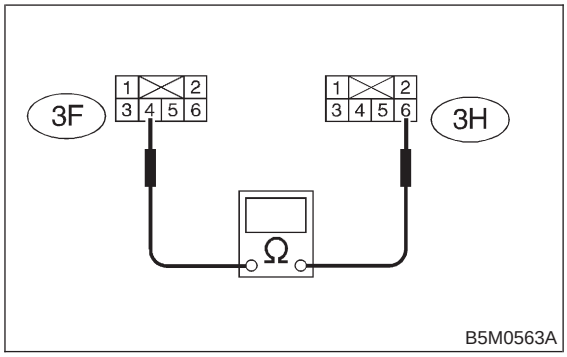


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5B12**.
NO : Replace front sub sensor harness (RH). <Ref. to 5-5 [W7A0].>

5B12 : FRONT SUB SENSOR HARNESS (RH) INSPECTION

Measure resistance between test harness F connector (3F) terminal and test harness H connector (3H) terminal.

Connector & terminal
(3F) No. 4 — (3H) No. 6:

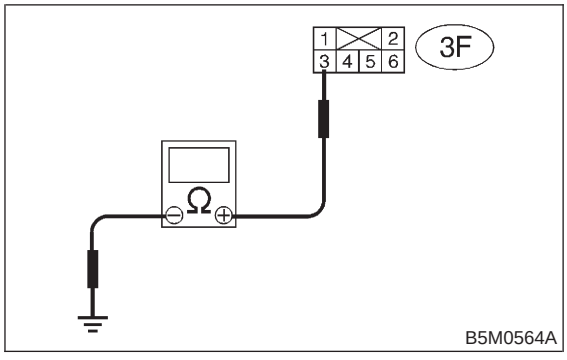


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5B13**.
NO : Replace front sub sensor harness (RH). <Ref. to 5-5 [W7A0].>

5B13 : FRONT SUB SENSOR HARNESS (RH) INSPECTION

Measure resistance across test harness F connector (3F) terminal and chassis ground.

Connector & terminal
(3F) No. 3 (+) — Chassis ground (−):

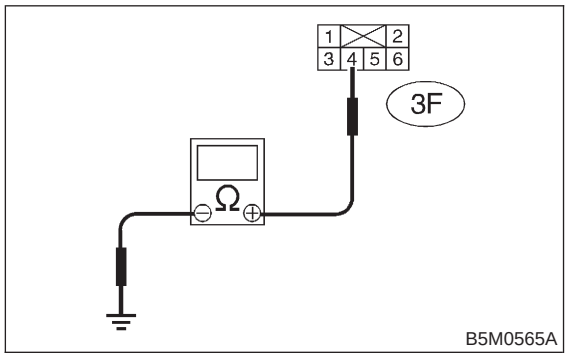


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B14**.
NO : Replace front sub sensor harness (RH). <Ref. to 5-5 [W7A0].>

5B14 : FRONT SUB SENSOR HARNESS (RH) INSPECTION

Measure resistance across test harness F connector (3F) terminal and chassis ground.

Connector & terminal
(3F) No. 4 (+) — Chassis ground (−):

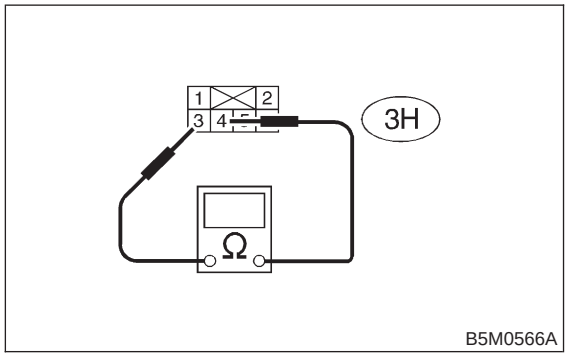


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B15**.
NO : Replace front sub sensor harness (RH). <Ref. to 5-5 [W7A0].>

5B15 : FRONT SUB SENSOR (RH) INSPECTION

1) Connect test harness H connector (2H) and front sub sensor (RH).
2) Measure resistance between test harness H connector (3H) terminal.

Connector & terminal
(3H) No. 3 — (3H) No. 4:

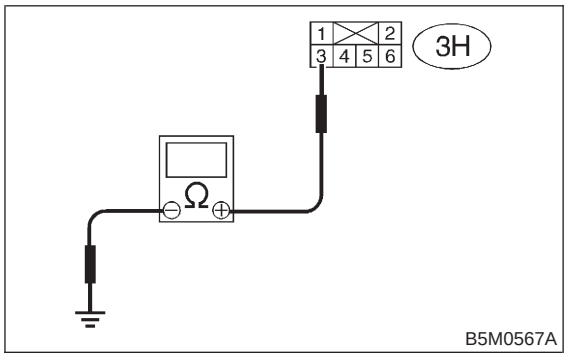


CHECK : ***Is the resistance between 750 Ω and 1 kΩ?***
YES : Go to step **5B16**.
NO : Replace front sub sensor (RH). <Ref. to 5-5 [W7A0].>

5B16 : FRONT SUB SENSOR (RH) INSPECTION

Measure resistance across test harness H connector (3H) terminal and chassis ground.

Connector & terminal
(3H) No. 3 (+) — Chassis ground (−):

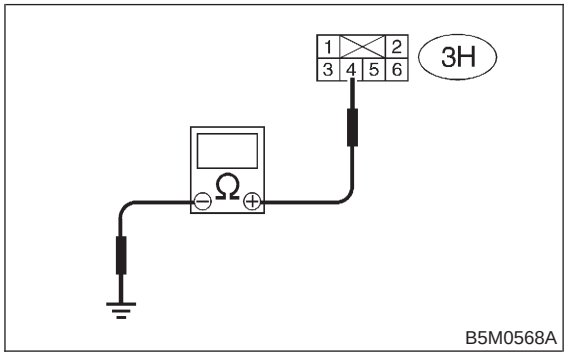


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B17**.
NO : Replace front sub sensor (RH). <Ref. to 5-5 [W7A0].>

5B17 : FRONT SUB SENSOR (RH) INSPECTION

Measure resistance across test harness H connector (3H) terminal and chassis ground.

Connector & terminal
(3H) No. 4 (+) — Chassis ground (−):

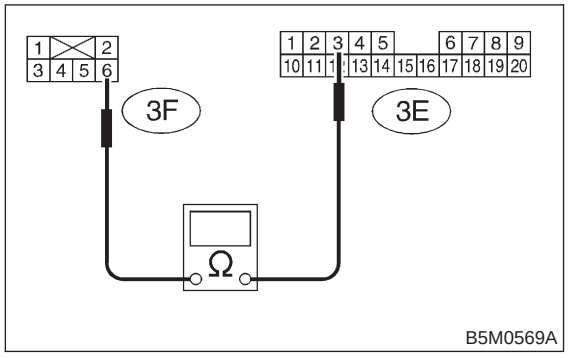


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B18**.
NO : Replace front sub sensor (RH). <Ref. to 5-5 [W7A0].>

5B18 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB11) and (AB12), then connect test harness F connector (2F) and connector (AB11).
2) Measure resistance between test harness E connector (3E) terminal and test harness F connector (3F) terminal.

Connector & terminal
(3E) No. 3 — (3F) No. 6:

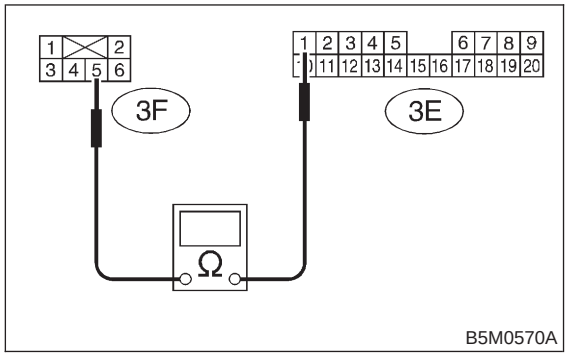


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5B19**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B19 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness E connector (3E) terminal and test harness F connector (3F) terminal.

Connector & terminal
(3E) No. 1 — (3F) No. 5:

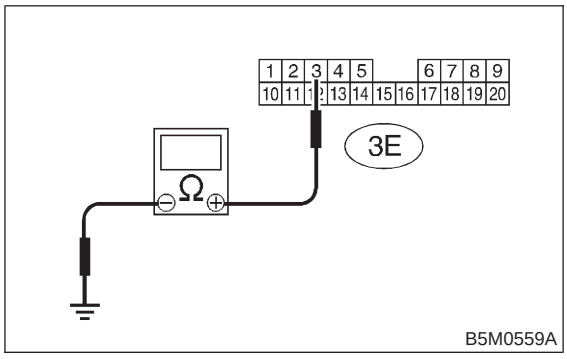


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5B20**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B20 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance across test harness E connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 3 (+) — Chassis ground (−):

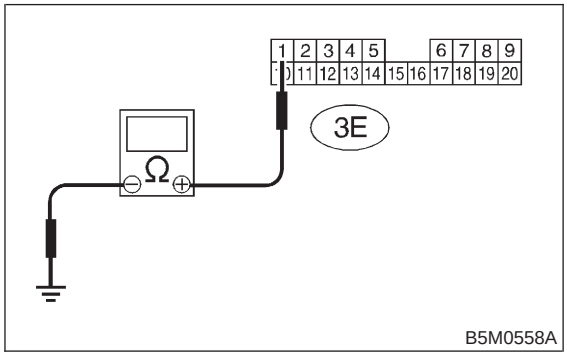


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B21**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B21 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance across test harness E connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 1 (+) — Chassis ground (−):

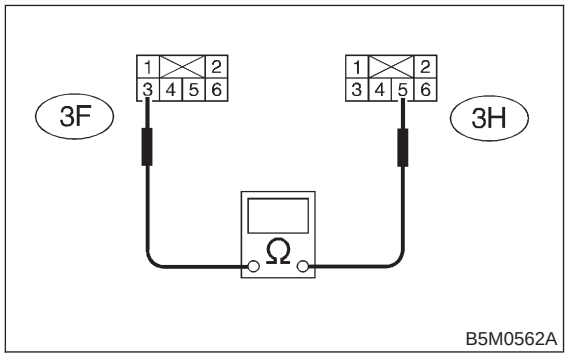


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B22**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5B22 : FRONT SUB SENSOR HARNESS (LH) INSPECTION

1) Connect test harness F connector (1F) and connector (AB12).
2) Disconnect connector (AB13) from front sub sensor (LH) <Ref. to 5-5 [W7A0].> and then test harness H connector (1H) and connector (AB13).
3) Measure resistance between test harness F connector (3F) terminal and test harness H connector (3H) terminal.

Connector & terminal
(3F) No. 3 — (3H) No. 5:

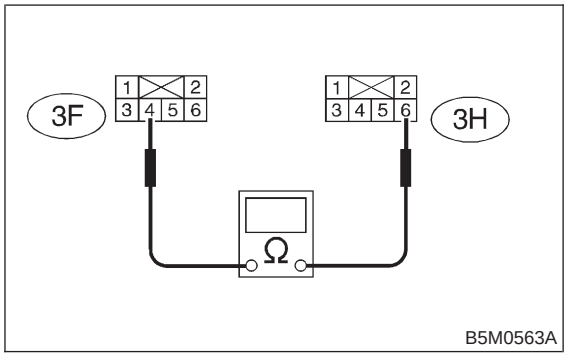


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5B23**.
NO : Replace front sub sensor harness (LH). <Ref. to 5-5 [W7A0].>

5B23 : FRONT SUB SENSOR HARNESS (LH) INSPECTION

Measure resistance between test harness F connector (3F) terminal and test harness H connector (3H) terminal.

Connector & terminal
(3F) No. 4 — (3H) No. 6:

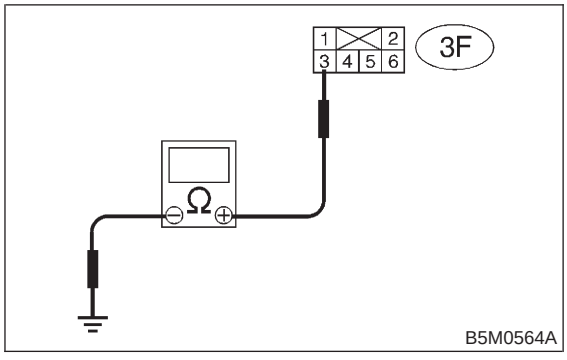


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5B24**.
NO : Replace front sub sensor harness (LH). <Ref. to 5-5 [W7A0].>

5B24 : FRONT SUB SENSOR HARNESS (LH) INSPECTION

Measure resistance across test harness F connector (3F) terminal and chassis ground.

Connector & terminal
(3F) No. 3 (+) — Chassis ground (−):

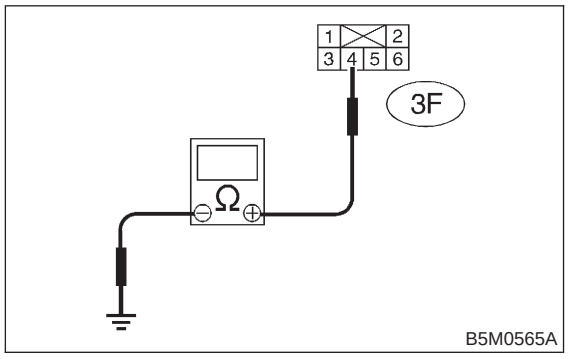


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B25**.
NO : Replace front sub sensor harness (LH). <Ref. to 5-5 [W7A0].>

5B25 : FRONT SUB SENSOR HARNESS (LH) INSPECTION

Measure resistance across test harness F connector (3F) terminal and chassis ground.

Connector & terminal
(3F) No. 4 (+) — Chassis ground (−):

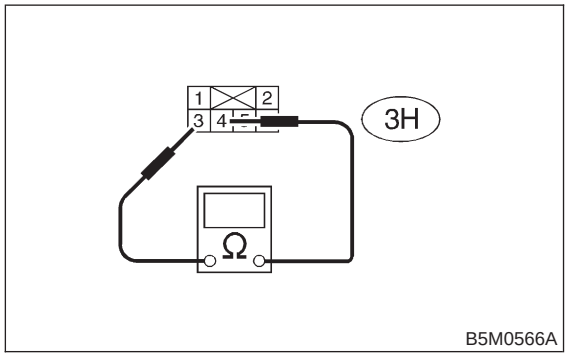


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B26**.
NO : Replace front sub sensor harness (LH). <Ref. to 5-5 [W7A0].>

5B26 : FRONT SUB SENSOR (LH) INSPECTION

1) Connect test harness H connector (2H) and front sub sensor (LH).
2) Measure resistance between test harness H connector (3H) terminal.

Connector & terminal
(3H) No. 3 — (3H) No. 4:

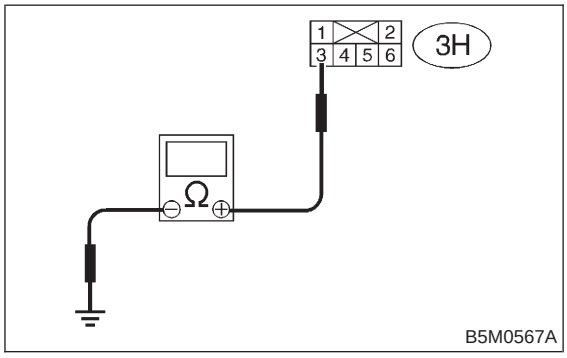


CHECK : ***Is the resistance between 750 Ω and 1 kΩ?***
YES : Go to step **5B27**.
NO : Replace front sub sensor (LH). <Ref. to 5-5 [W7A0].>

5B27 : FRONT SUB SENSOR (LH) INSPECTION

Measure resistance across test harness H connector (3H) terminal and chassis ground.

Connector & terminal
(3H) No. 3 (+) — Chassis ground (−):

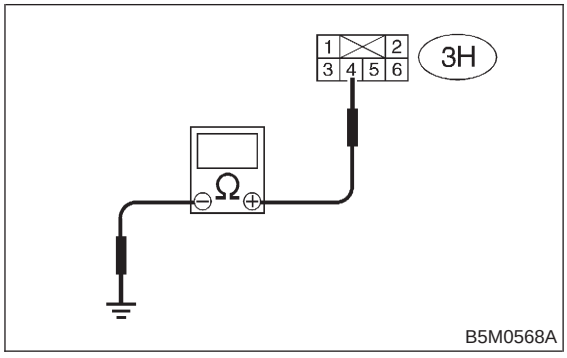


CHECK : ***Is the resistance more than 10 kΩ?***
YES : Go to step **5B28**.
NO : Replace front sub sensor (LH). <Ref. to 5-5 [W7A0].>

5B28 : FRONT SUB SENSOR (LH) INSPECTION

Measure resistance across test harness H connector (3H) terminal and chassis ground.

Connector & terminal
(3H) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the resistance more than 10 kΩ?***
YES : Perform clear memory. <Ref. to 5-5 [T4C0].>
NO : Replace front sub sensor (LH). <Ref. to 5-5 [W7A0].>

C: TROUBLE CODE 04

DIAGNOSIS:

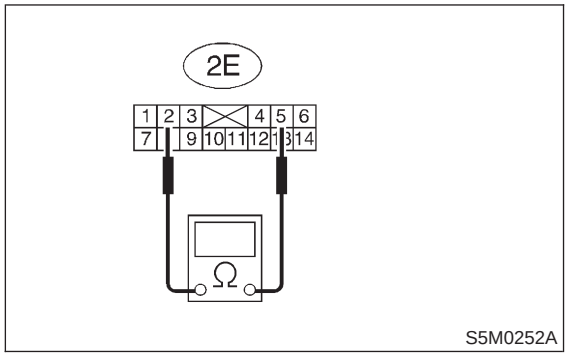
- Airbag main harness circuit is shorted.
- Passenger's airbag module harness circuit is shorted.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5C1 :	AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness E connector (1E).
2) Measure resistance between test harness E connector (2E) terminal.

Connector & terminal
(2E) No. 2 — (2E) No. 5:



CHECK : ***Is resistance more than 10 kΩ?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

D: TROUBLE CODE 08

DIAGNOSIS:

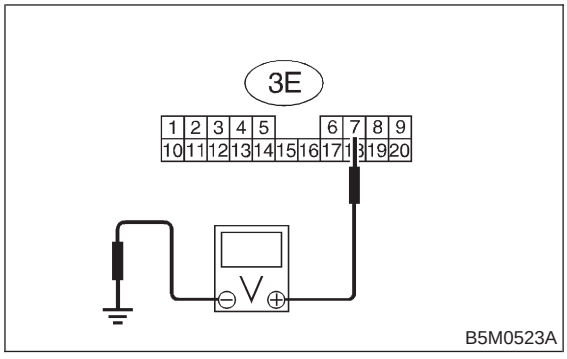
- Airbag control module is faulty.
- Airbag main harness is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5D1 :	AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB18) from airbag control module and connect it to test harness E connector (1E).
2) Connect battery ground cable and turn ignition switch ON. (engine off)
3) Measure voltage across connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 7 (+) — Chassis ground (–):

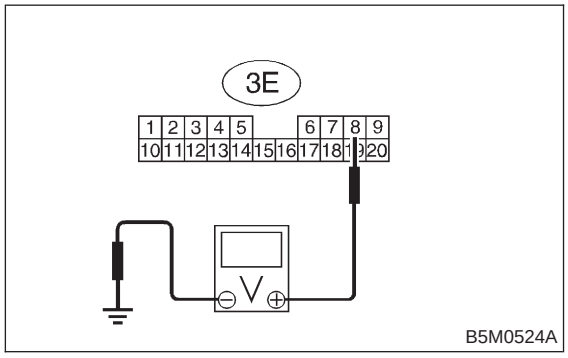


CHECK : ***Is the voltage less than 1 V?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Go to step **5D2**.

5D2 : AIRBAG MAIN HARNESS INSPECTION

Measure voltage across connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 8 (+) — Chassis ground (–):



CHECK : ***Is the voltage less than 1 V?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

E: TROUBLE CODE 09

DIAGNOSIS:

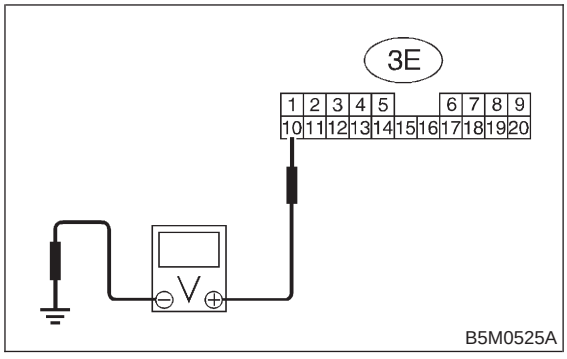
- Airbag control module is faulty.
- Airbag main harness is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5E1 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB17) from airbag control module and connect it to test harness E connector (1E).
2) Connect battery ground cable and turn ignition switch ON. (engine off)
3) Measure voltage across connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 10 (+) — Chassis ground (–):

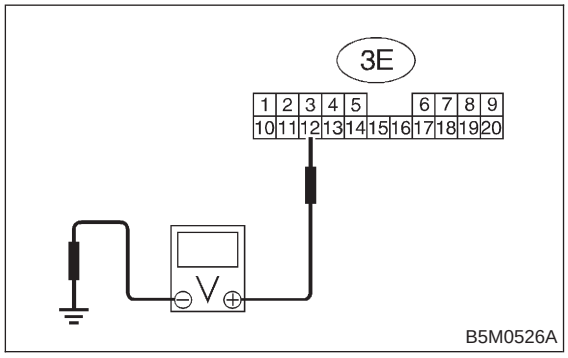


CHECK : ***Is the voltage less than 1 V?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Go to step **5E2**.

5E2 : AIRBAG MAIN HARNESS INSPECTION

Measure voltage across connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 12 (+) — Chassis ground (–):



CHECK : ***Is the voltage less than 1 V?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

F: TROUBLE CODE 11

DIAGNOSIS:

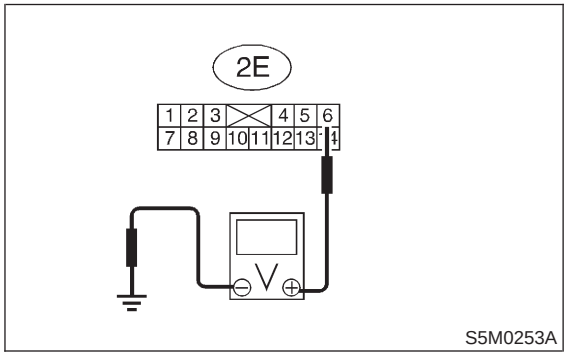
- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 8 is blown. (In joint box)
- Body harness circuit is open.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5F1 : AIRBAG CONTROL MODULE INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].> and connect it to test harness E connector (1E).
2) Connect battery ground cable and turn ignition switch "ON". (engine off)
3) Measure voltage across connector (2E) terminal and chassis ground.

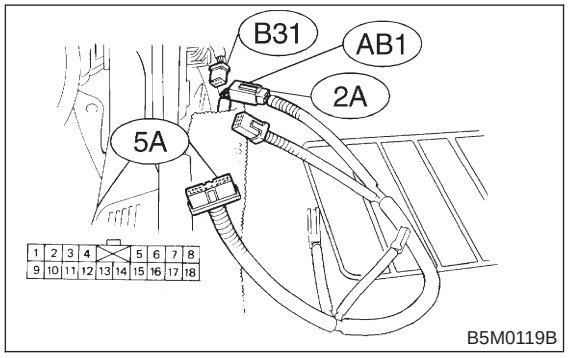
Connector & terminal
(2E) No. 6 (+) — Chassis ground (–):



CHECK : ***Is voltage more than 10 V?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Go to step **5F2**.

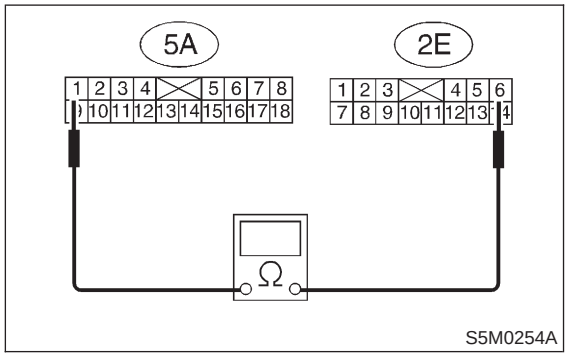
5F2 : AIRBAG MAIN HARNESS INSPECTION

1) Go to following procedure after performing diagnostics on airbag system as per diagnosis procedure under “5F1: AIRBAG CONTROL MODULE INSPECTION” <Ref. to 5-5 [T5F1].> previously outlined.
2) Turn ignition switch “OFF”, disconnect battery ground terminal and then wait at least 20 seconds.
3) Disconnect body harness connector (B31) from connector (AB1) at front lower pillar, and connect connector (AB1) to test harness A connector (2A).



4) Measure resistance between test harness A connector (5A) terminal and test harness E connector (2E) terminal.

Connector & terminal
(5A) No. 1 — (2E) No. 6:

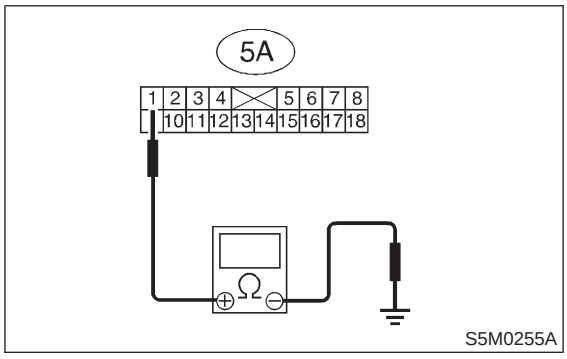


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **5F3**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5F3 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between (5A) connector terminal and chassis ground.

Connector & terminal
(5A) No. 1 (+) — Chassis ground (−):

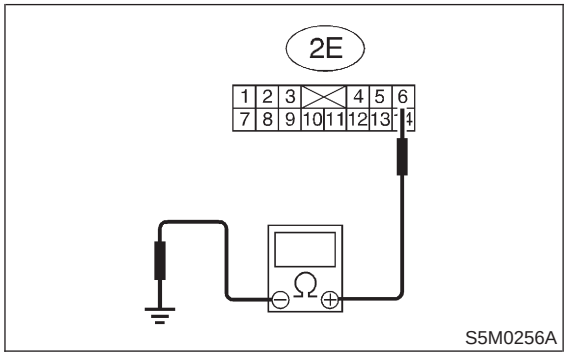


CHECK : ***Is resistance more than 10 kΩ?***
YES : Go to step **5F4**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5F4 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between (2E) connector terminal and chassis ground.

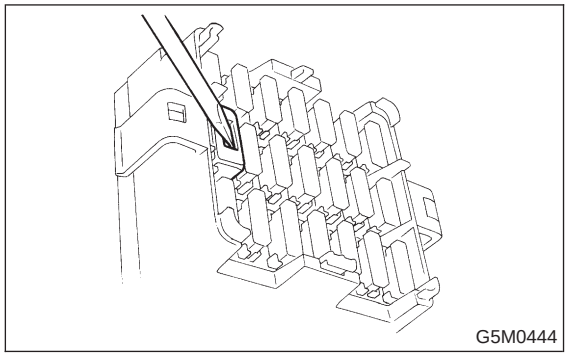
Connector & terminal
(2E) No. 6 (+) — Chassis ground (−):



CHECK : ***Is resistance more than 10 kΩ?***
YES : Go to step **5F5**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5F5 : FUSE NO. 8 (IN JOINT BOX) INSPECTION

1) Turn ignition switch “OFF”.
2) Remove and visually check fuse No. 8 (in joint box).



CHECK : ***Is fuse No. 8 blown?***
YES : Replace fuse No. 8 if fuse No. 8 blows again, repair body harness.
NO : Repair body harness.

G: TROUBLE CODE 12

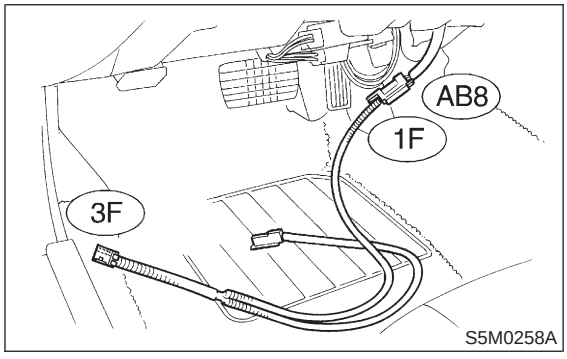
DIAGNOSIS:

- Airbag main harness circuit is open.
- Driver’s airbag module harness circuit is open.
- Roll connector circuit is open.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch “OFF”, disconnect battery ground cable and then wait at least 20 seconds.

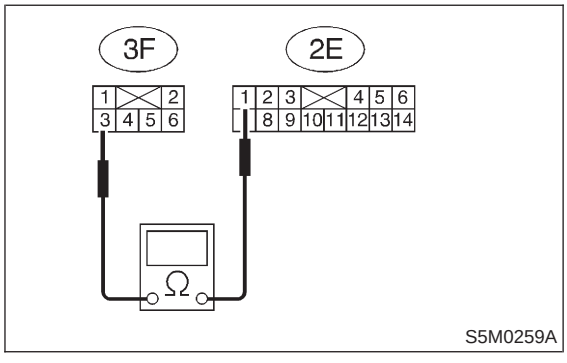
5G1 : AIRBAG MAIN HARNESS INSPECTION

1) Remove lower cover panel <Ref. to 5-4 [W1A0].>, and connect connector (AB8) below steering column to test harness F connector (1F).



2) Disconnect connector (AB6) <Ref. to 5-5 [W5A0].> from airbag control module, and connect it to test harness E connector (1E) terminal.
3) Measure resistance between test harness E connector (2E) and test harness F connector (3F) terminals.

Connector & terminal
(2E) No. 1 — (3F) No. 3:

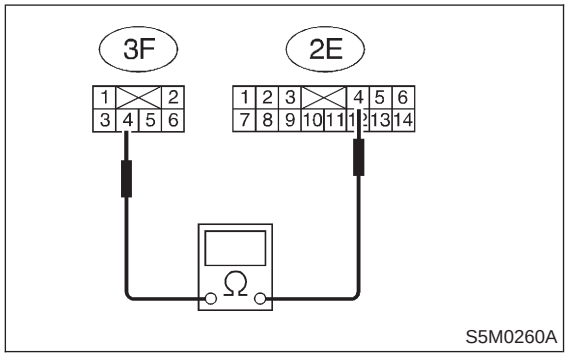


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **5G2**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5G2 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness E connector (2E) and test harness F connector (3F) terminals.

Connector & terminal
(2E) No. 4 — (3F) No. 4:



CHECK : ***Is resistance less than 10 Ω?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

H: TROUBLE CODE 13

DIAGNOSIS:

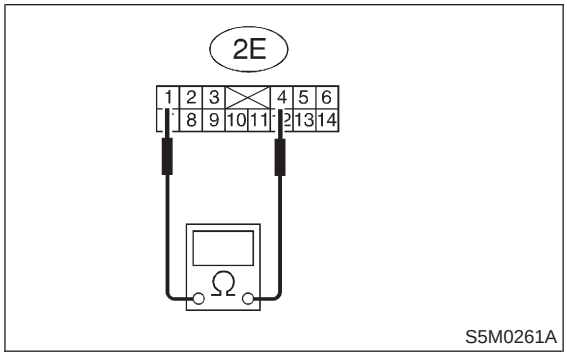
- Airbag main harness circuit is shorted.
- Driver's airbag module harness is shorted.
- Roll connector circuit is shorted.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5H1 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness E connector (1E).
2) Measure resistance between test harness E connector (2E) terminal.

Connector & terminal
(2E) No. 1 — (2E) No. 4:



CHECK : ***Is resistance more than 10 kΩ?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

I: TROUBLE CODE 14

DIAGNOSIS:

(AB6), (AB17) and (AB18) are not connected properly to airbag control module.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.

5I1 :	**CHECK POOR CONTACT IN CONNECTORS (AB6), (AB17) AND (AB18).**

Check connectors (AB6), (AB17) and (AB18) connected to airbag control module. <Ref. to 5-5 [W5A0].>

CHECK : ***Is there poor contact in connectors (AB6), (AB17) and (AB18)?***

YES : Repair poor contact in connectors (AB6), (AB17) and (AB18).

NO : Replace airbag control module. <Ref. to 5-5 [W5A0].>

J: TROUBLE CODE 15

DIAGNOSIS:

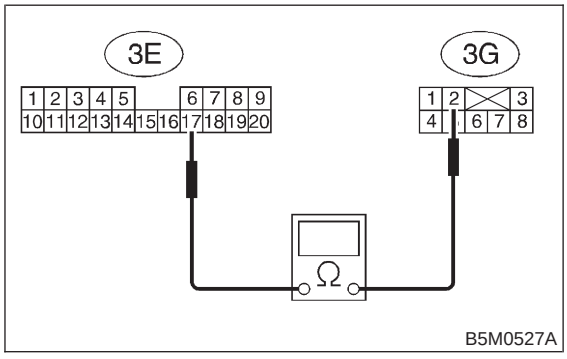
- Side airbag sensor (RH) is faulty.
- Airbag main harness is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5J1 :	**AIRBAG MAIN HARNESS INSPECTION**

1) Disconnect connector (AB18) from airbag control module and connect it to test harness E connector (1E).
2) Disconnect connector (AB28) from airbag control module and connect it to test harness G connector (1G).
3) Measure resistance between test harness E connector (3E) terminal and test harness G connector (3G) terminal.

Connector & terminal
(3E) No. 17 — (3G) No. 2:



CHECK : ***Is the resistance less than 10 Ω?***

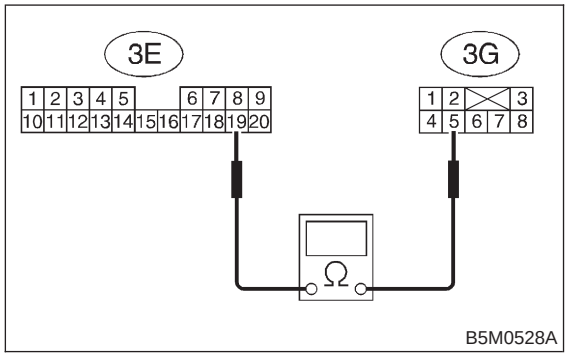
YES : Go to step **5J2**.

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5J2 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness E connector (3E) terminal and test harness G connector (3G) terminal.

Connector & terminal
(3E) No. 19 — (3G) No. 5:

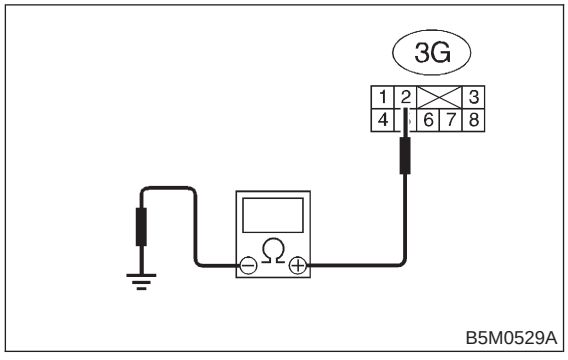


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5J3**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5J3 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3G) terminal and chassis ground.

Connector & terminal
(3G) No. 2 (+) — Chassis ground (–):

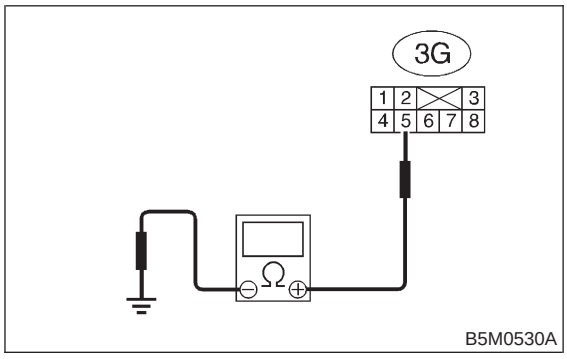


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5J4**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5J4 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3G) terminal and chassis ground.

Connector & terminal
(3G) No. 5 (+) — Chassis ground (–):

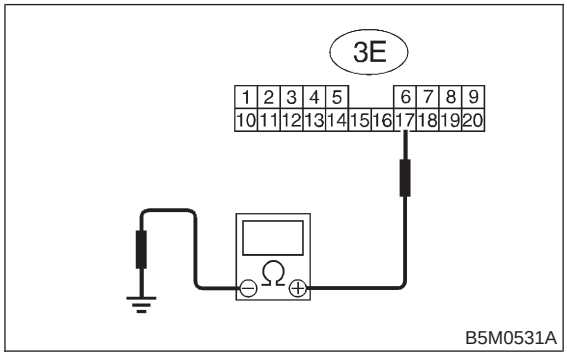


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5J5**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5J5 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 17 (+) — Chassis ground (–):

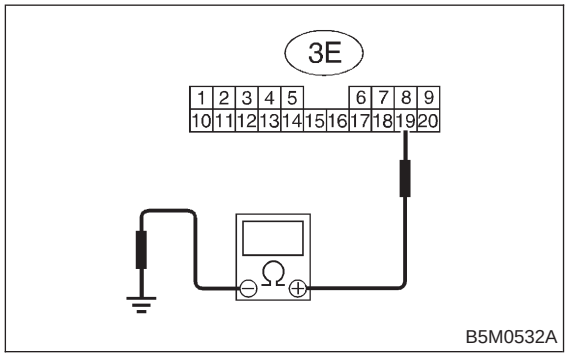


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5J6**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5J6 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 19 (+) — Chassis ground (–):



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Replace side airbag sensor. <Ref. to 5-5 [W8A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

K: TROUBLE CODE 16

DIAGNOSIS:
- Side airbag sensor (RH) is faulty.
- Side airbag sensor is different.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.

5K1 : CHECK IF TROUBLE CODE 16 IS INDICATED.

Confirm flashing trouble code according to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 5-5 [T4A0].>

CHECK : ***Is airbag warning light trouble code 16 indicated?***
YES : Replace side airbag sensor (RH). <Ref. to 5-5 [W8A0].>
NO : Perform clear memory. <Ref. to 5-5 [T4C0].>

L: TROUBLE CODE 21

DIAGNOSIS:

Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal, and then wait at least 20 seconds.

5L1 :	**CHECK IF TROUBLE CODE 21 IS INDICATED.**

Confirm flashing trouble code according to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 5-5 [T4A0].>

CHECK : ***Is airbag warning light trouble code 21 indicated?***

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

NO : Perform clear memory. <Ref. to 5-5 [T4C0].>

M: TROUBLE CODE 22

DIAGNOSIS:

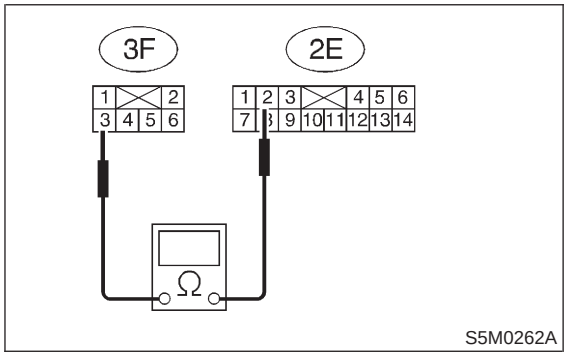
- Airbag main harness circuit is open.
- Passenger's airbag module harness circuit is open.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.

5M1 :	**AIRBAG MAIN HARNESS INSPECTION**

1) Remove front pillar lower trim (Passenger side). <Ref. to 5-3 [W5A1].>
2) Disconnect connector (AB9) and (AB10) <Ref. to 5-5 [W3A2].> and connect connector (AB9) to test harness F connector (1F).
3) Disconnect connector (AB6) <Ref. to 5-5 [W5A0].> from airbag control module, and connect it to test harness E connector (1E) terminal.
4) Measure resistance between test harness E connector (2E) and test harness F connector (3F) terminals.

Connector & terminal
(2E) No. 2 — (3F) No. 3:



CHECK : ***Is resistance less than 10 Ω?***

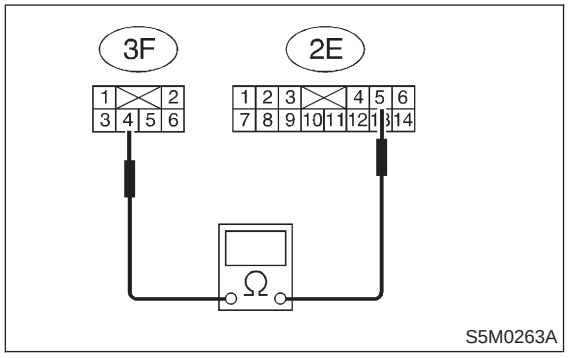
YES : Go to step **5M2**.

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5M2 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness E connector (2E) and test harness F connector (3F) terminals.

Connector & terminal
(2E) No. 5 — (3F) No. 4:



CHECK : ***Is resistance less than 10 Ω?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

N: TROUBLE CODE 25

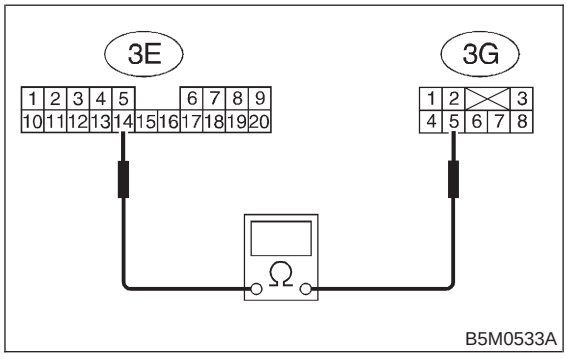
DIAGNOSIS:
- Side airbag sensor (LH) is faulty.
- Airbag main harness is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5N1 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB17) from airbag control module and connect it to test harness E connector (1E).
2) Disconnect connector (AB23) from airbag control module and connect it to test harness G connector (1G).
3) Measure resistance between test harness E connector (3E) terminal and test harness G connector (3G) terminal.

Connector & terminal
(3E) No. 14 — (3G) No. 5:

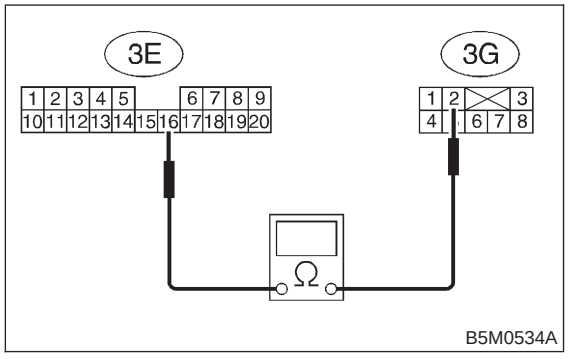


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5N2**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5N2 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness E connector (3E) terminal and test harness G connector (3G) terminal.

Connector & terminal
(3E) No. 16 — (3G) No. 2:

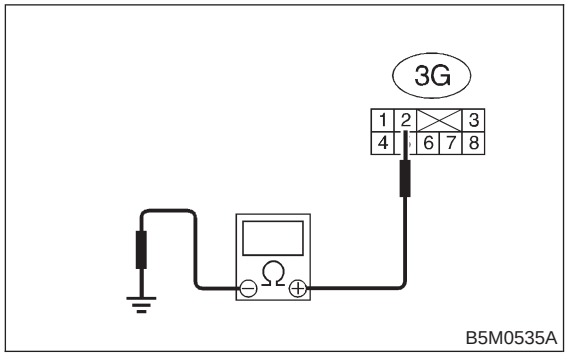


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **5N3**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5N3 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3G) terminal and chassis ground.

Connector & terminal
(3G) No. 2 (+) — Chassis ground (–):

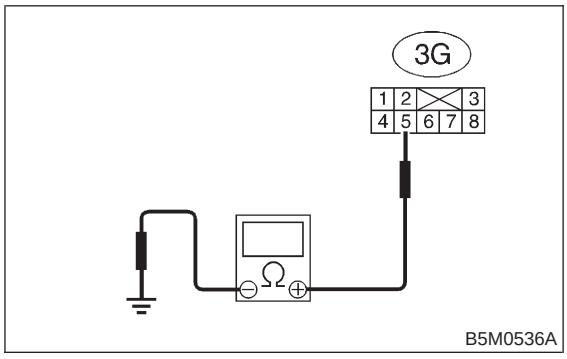


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5N4**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5N4 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3G) terminal and chassis ground.

Connector & terminal
(3G) No. 5 (+) — Chassis ground (–):

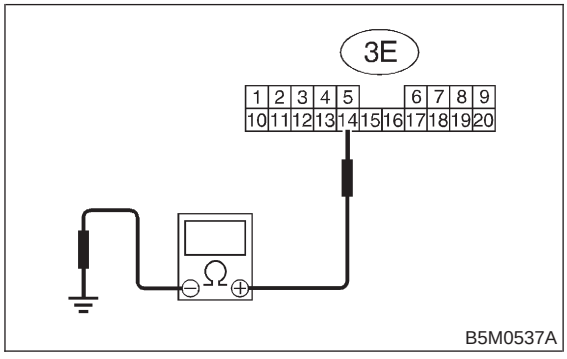


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5N5**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5N5 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 14 (+) — Chassis ground (–):

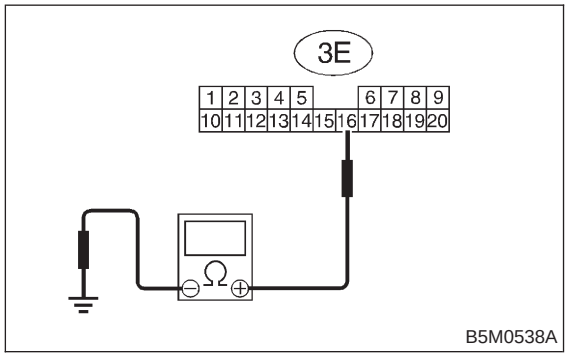


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5N6**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5N6 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 16 (+) — Chassis ground (–):



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Replace side airbag sensor (LH). <Ref. to 5-5 [W8A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

O: TROUBLE CODE 26

DIAGNOSIS:
- Side airbag sensor (LH) is faulty.
- Side airbag sensor is different.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.

5O1 : CHECK IF TROUBLE CODE 26 IS INDICATED.

Confirm flashing trouble code according to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 5-5 [T4A0].>

CHECK : ***Is airbag warning light trouble code 26 indicated?***
YES : Replace side airbag sensor (LH). <Ref. to 5-5 [W8A0].>
NO : Perform clear memory. <Ref. to 5-5 [T4C0].>

P: TROUBLE CODE 31

DIAGNOSIS:

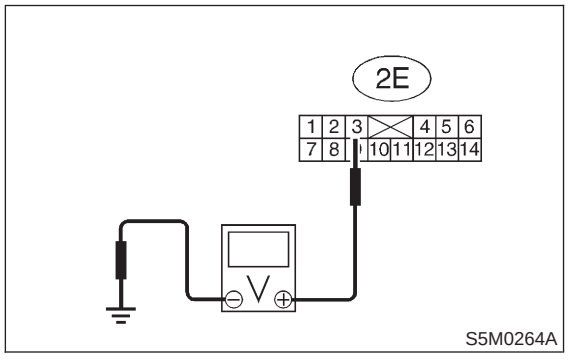
- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 16 is blown. (In joint box)
- Body harness circuit is open.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5P1 : AIRBAG CONTROL MODULE INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness E connector (1E).
2) Connect battery ground cable and turn ignition switch "ON" (engine off).
3) Measure voltage across connector (2E) terminal and chassis ground.

Connector & terminal
(2E) No. 3 (+) — Chassis ground (−):

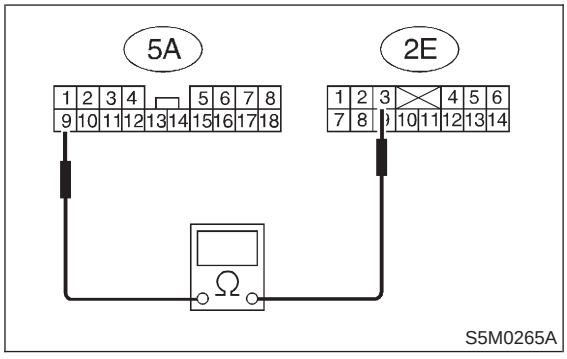


CHECK : ***Is voltage more than 10 V?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Go to step **5P2**.

5P2 : AIRBAG MAIN HARNESS INSPECTION

1) Go to following procedure after performing diagnostics on airbag system as per diagnosis procedure under "5P1 AIRBAG CONTROL MODULE INSPECTION" <Ref. to 5-5 [T5P1].> previously outlined.
2) Turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
3) Disconnect connector (AB1) from body harness connector (B31) at front lower pillar (driver side), and connect connector (AB1) to test harness A connector (2A).
4) Measure resistance between test harness A connector (5A) and test harness E connector (2E) terminals.

Connector & terminal
(5A) No. 9 — (2E) No. 3:

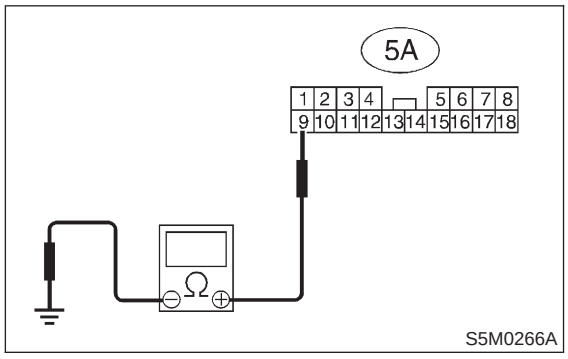


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **5P3**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5P3 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between each terminal of connectors (5A) and chassis ground.

Connector & terminal
(5A) No. 9 (+) — Chassis ground (−):

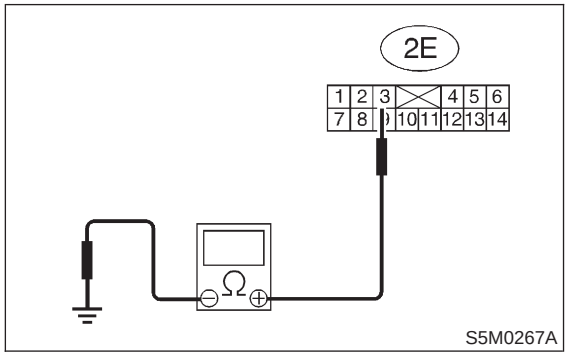


CHECK : ***Is resistance more than 10 kΩ?***
YES : Go to step **5P4**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5P4 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between each terminal of connectors (2E) and chassis ground.

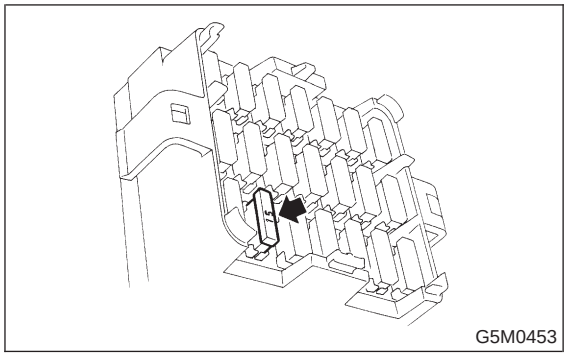
Connector & terminal
(2E) No. 3 (+) — Chassis ground (−):



CHECK : ***Is resistance more than 10 kΩ?***
YES : Go to step **5P5**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5P5 : FUSE NO. 16 (IN JOINT BOX) INSPECTION

Make sure ignition switch is turned “OFF”, then remove and visually check fuse No. 16 (in joint box).



CHECK : ***Is fuse No. 16 blown?***
YES : Replace fuse No. 16. If fuse No. 16 blows again, repair body harness.
NO : Repair body harness.

Q: TROUBLE CODE 33

DIAGNOSIS:

Front airbag module is inflated.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal, and then wait at least 20 seconds.

5Q1 :	**CHECK IF TROUBLE CODE 33 IS INDICATED.**

Confirm flashing trouble code according to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 5-5 [T4A0].>

CHECK : ***Is airbag warning light trouble code 33 indicated?***

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

NO : Perform clear memory. <Ref. to 5-5 [T4C0].>

R: TROUBLE CODE 34

DIAGNOSIS:

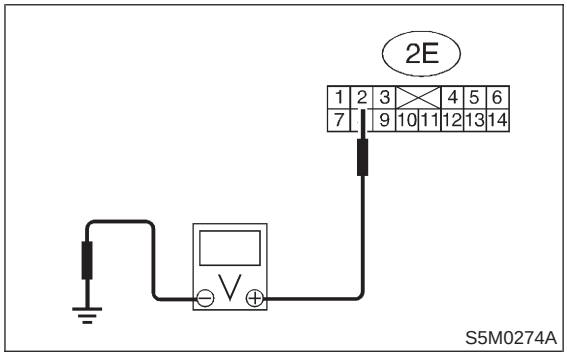
- Passenger's airbag main harness circuit is shorted to power supply.
- Passenger's airbag module harness is shorted to power supply.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5R1 :	**AIRBAG MAIN HARNESS INSPECTION**

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness E connector (1E).
2) Connect battery ground cable and turn ignition switch "ON" (engine off).
3) Measure voltage across each test harness E connector (2E) terminal and chassis ground.

Connector & terminal
(2E) No. 2 (+) — Chassis ground (−):



CHECK : ***Is voltage less than 1 V?***

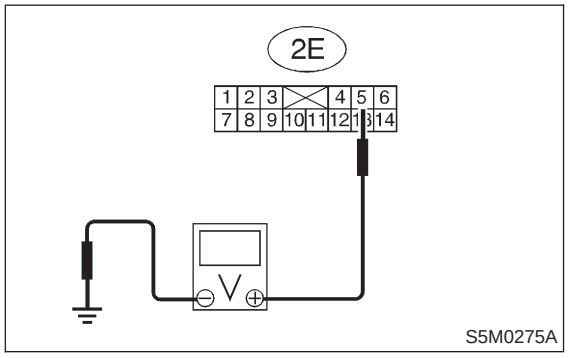
YES : Go to step **5R2**.

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5R2 : AIRBAG MAIN HARNESS INSPECTION

Measure voltage across each test harness E connector (2E) terminal and chassis ground.

Connector & terminal
(2E) No. 5 (+) — Chassis ground (−):



CHECK : ***Is voltage less than 1 V?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

S: TROUBLE CODE 41

DIAGNOSIS:

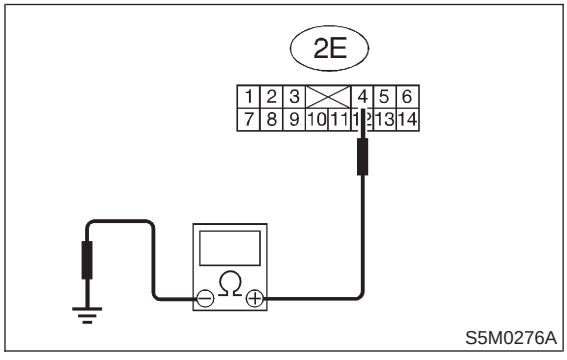
- Driver's airbag main harness circuit is shorted to ground.
- Driver's airbag module harness circuit is shorted to ground.
- Roll connector circuit is shorted to ground.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5S1 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness E connector (1E).
2) Measure resistance between test harness E connector (2E) terminals and chassis ground.

Connector & terminal
(2E) No. 4 (+) — Chassis ground (−):

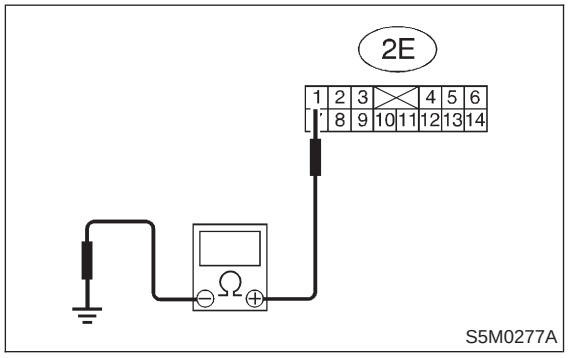


CHECK : ***Is resistance more than 200 Ω?***
YES : Go to step **5S2**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5S2 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness E connector (2E) terminals and chassis ground.

Connector & terminal
(2E) No. 1 (+) — Chassis ground (−):



CHECK : ***Is resistance more than 200 Ω?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

T: TROUBLE CODE 42

DIAGNOSIS:

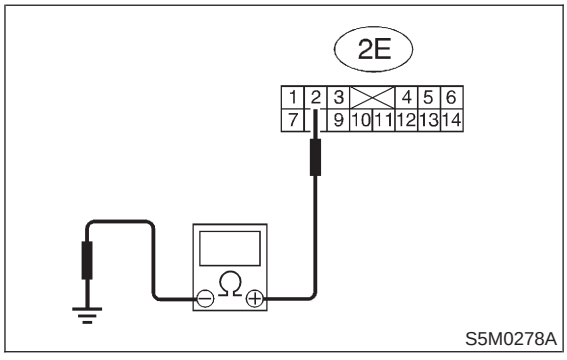
- Passenger's airbag main harness circuit is shorted to ground.
- Passenger's airbag module harness circuit is shorted to ground.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5T1 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness E connector (1E).
2) Measure resistance between test harness E connector (2E) terminals and chassis ground.

Connector & terminal
(2E) No. 2 (+) — Chassis ground (−):

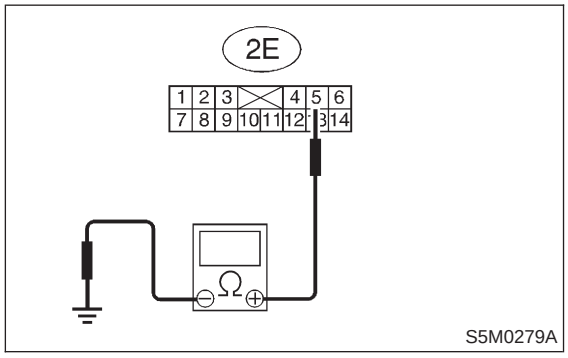


CHECK : ***Is resistance more than 200 Ω?***
YES : Go to step **5T2**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5T2 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between test harness E connector (2E) terminals and chassis ground.

Connector & terminal
(2E) No. 5 (+) — Chassis ground (−):



CHECK : ***Is resistance more than 200 Ω?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

U: TROUBLE CODE 43

DIAGNOSIS:

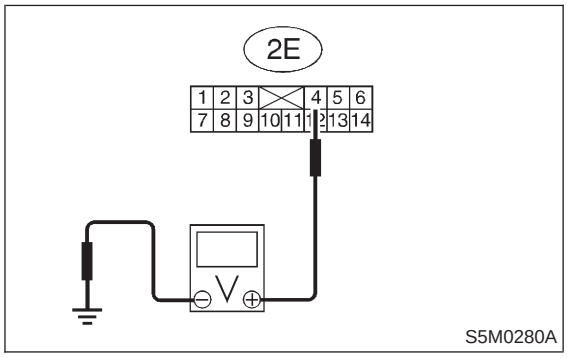
- Driver's airbag main harness circuit is shorted to power supply.
- Driver's airbag module harness is shorted to power supply.
- Roll connector is shorted to power supply.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5U1 : AIRBAG MAIN HARNESS INSPECTION

1) Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness E connector (1E).
2) Connect battery ground cable and turn ignition switch "ON" (engine off).
3) Measure voltage across each test harness E connector (2E) terminal and chassis ground.

Connector & terminal
(2E) No. 4 (+) — Chassis ground (−):

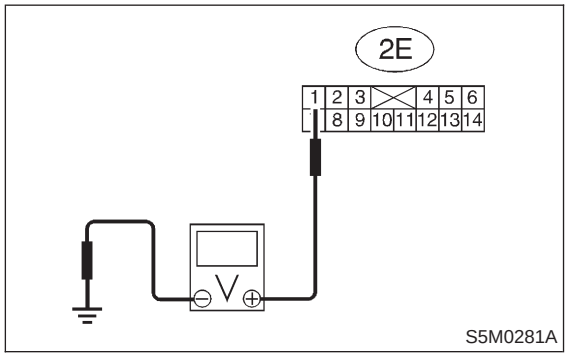


CHECK : ***Is voltage less than 1 V?***
YES : Go to step **5U2**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5U2 : AIRBAG MAIN HARNESS INSPECTION

Measure voltage across each test harness E connector (2E) terminal and chassis ground.

Connector & terminal
(2E) No. 1 (+) — Chassis ground (−):



CHECK : ***Is voltage less than 1 V?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

V: TROUBLE CODE 44

DIAGNOSIS:
Side airbag module is inflated.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.

5V1 : CHECK IF TROUBLE CODE 44 IS INDICATED.

Confirm flashing trouble code according to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 5-5 [T4A0].>

CHECK : ***Is airbag warning light trouble code 44 indicated?***
YES : Replace front seat with side airbag module (Operating side). <Ref. to 5-3 [W1A0].>
NO : Perform clear memory. <Ref. to 5-5 [T4C0].>

W: TROUBLE CODE 51

DIAGNOSIS:
- Airbag main harness is faulty.
- Side airbag module (RH) is faulty.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5W1 : SIDE AIRBAG MODULE INSPECTION

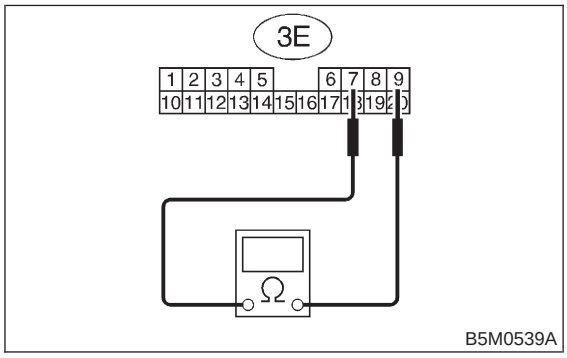
1) Disconnect connector (AB26) and (AB27), and then connect connector (AB26) and test harness F connector (1F).
2) Connect test harness F connector (2F) and airbag resistor <Ref. to 5-5 [T3C0].>.
3) Connect battery ground cable and then turn ignition switch ON.

CHECK : ***Does the airbag warning light come on?***
YES : Replace front seat with side airbag module (RH). <Ref. to 5-3 [W1A0].>
NO : Go to step **5W2**.

5W2 : AIRBAG MAIN HARNESS INSPECTION

1) Turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.
2) Disconnect test harness F and airbag resistor.
3) Disconnect connector (AB18) from airbag control module and connect it to test harness E connector (1E).
4) Measure resistance of test harness E connector (3E) terminal.

Connector & terminal
(3E) No. 7 — (3E) No. 9:

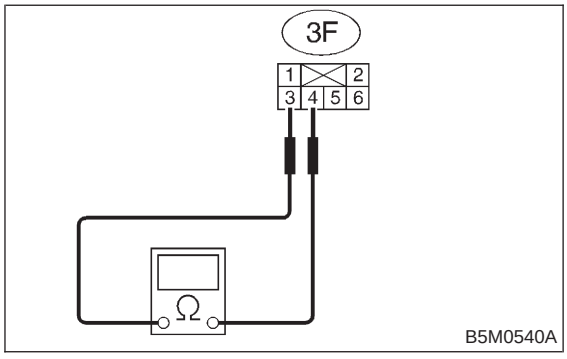


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5W3**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5W3 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance of test harness E connector (3F) terminal.

Connector & terminal
(3F) No. 3 — (3F) No. 4:

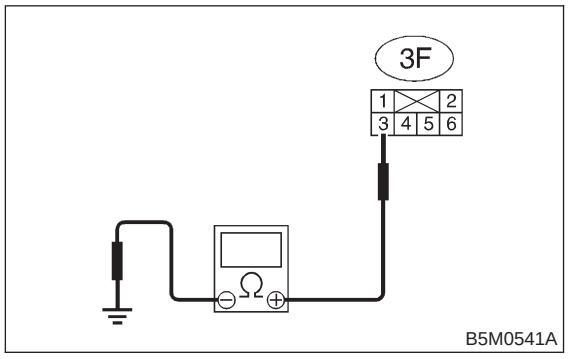


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5W4**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5W4 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3F) terminal and chassis ground.

Connector & terminal
(3F) No. 3 (+) — Chassis ground (–):

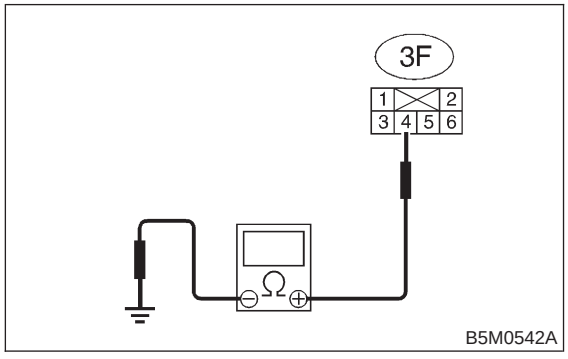


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5W5**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5W5 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3F) terminal and chassis ground.

Connector & terminal
(3F) No. 4 (+) — Chassis ground (–):

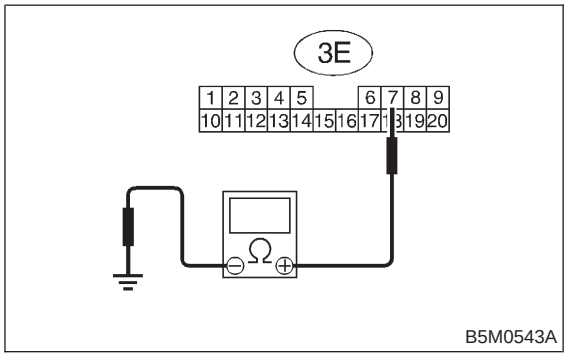


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5W6**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5W6 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 7 (+) — Chassis ground (–):

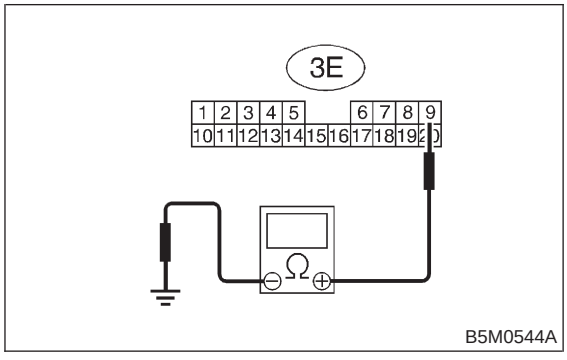


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5W7**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5W7 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 9 (+) — Chassis ground (–):



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

X: TROUBLE CODE 52

DIAGNOSIS:
- Airbag main harness is faulty.
- Side airbag module (LH) is faulty.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.
After 20 seconds elapse, remove instrument panel lower cover, and disconnect (AB3) and (AB8), (AB9) and (AB10).

5X1 : SIDE AIRBAG MODULE INSPECTION

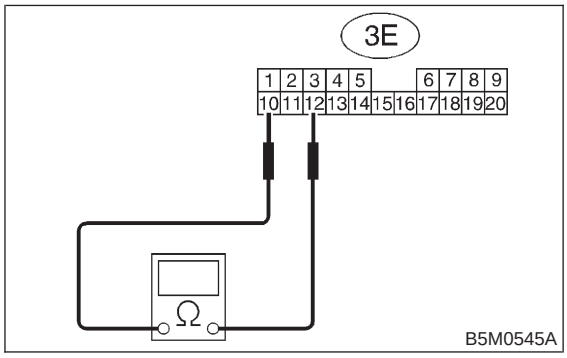
1) Disconnect connector (AB21) and (AB22), and then connect connector (AB21) and test harness F connector (1F).
2) Connect test harness F connector (2F) and airbag resistor. <Ref. to 5-5 [T3C0].>
3) Connect battery ground cable and then turn ignition switch ON.

CHECK : ***Does the airbag warning light come on?***
YES : Replace front seat with side airbag module (LH). <Ref. to 5-3 [W1A0].>
NO : Go to step **5X2**.

5X2 : AIRBAG MAIN HARNESS INSPECTION

1) Turn ignition switch OFF, disconnect battery ground cable and then wait at least 20 seconds.
2) Disconnect test harness F and airbag resistor.
3) Disconnect connector (AB17) from airbag control module and connect it to test harness E connector (1E).
4) Measure resistance of test harness E connector (3E) terminal.

Connector & terminal
(3E) No. 10 — (3E) No. 12:

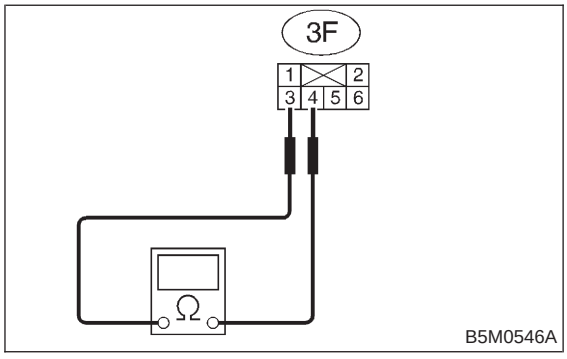


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5X3**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5X3 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance of test harness E connector (3F) terminal.

Connector & terminal
(3F) No. 3 — (3F) No. 4:

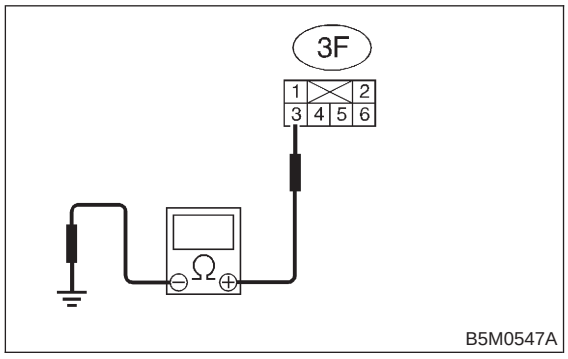


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5X4**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5X4 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3F) terminal and chassis ground.

Connector & terminal
(3F) No. 3 (+) — Chassis ground (–):

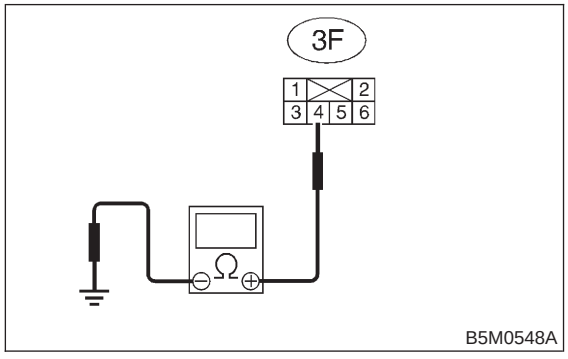


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5X5**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5X5 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3F) terminal and chassis ground.

Connector & terminal
(3F) No. 4 (+) — Chassis ground (–):

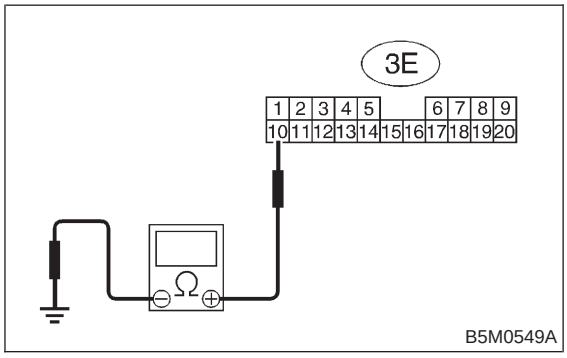


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5X6**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5X6 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 10 (+) — Chassis ground (–):

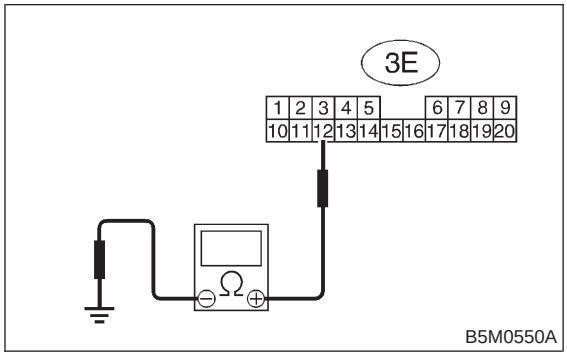


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **5X7**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5X7 : AIRBAG MAIN HARNESS INSPECTION

Measure resistance between connector (3E) terminal and chassis ground.

Connector & terminal
(3E) No. 12 (+) — Chassis ground (–):



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

Y: AIRBAG WARNING LIGHT REMAINS ON.

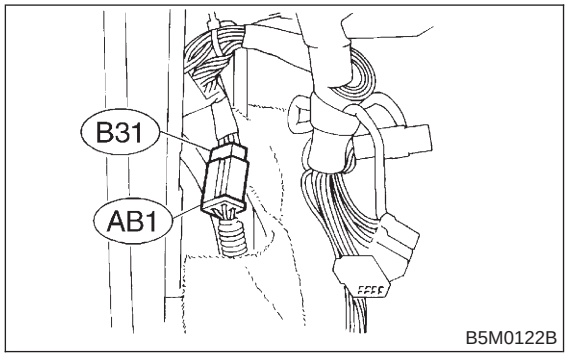
DIAGNOSIS:

- Airbag warning light is faulty.
- Airbag control module to airbag warning light harness circuit is shorted or open.
- Grounding circuit is faulty.
- Airbag control module is faulty.
- (AB1) and (B31) are not connected properly.
- (AB6) is not connected properly to airbag control module.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.

5Y1 : CHECK POOR CONTACT IN CONNECTORS (AB1) AND (B31).

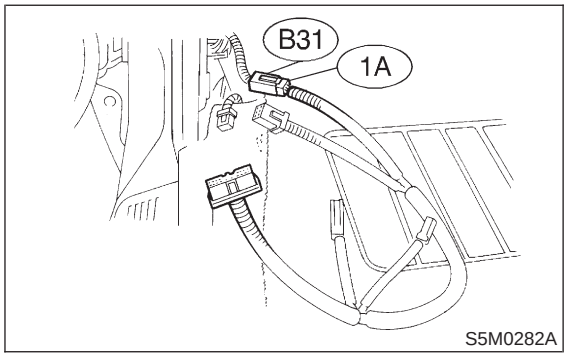
1) Remove front pillar lower trim (Driver side).
2) Check poor contact in connectors (AB1) and (B31).



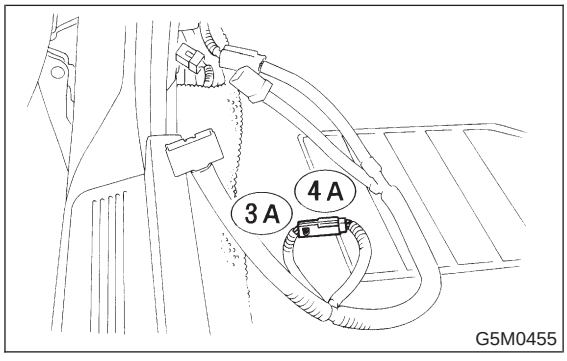
CHECK : ***Is there poor contact in double lock of connectors (AB1) and (B31)?***
YES : Repair poor contact in double lock of connectors (AB1) and (B31).
NO : Go to step **5Y2**.

5Y2 : INSPECTION OF AIRBAG WARNING LIGHT

1) Turn ignition switch "OFF" and connect body harness connector (B31) to test connector A connector (1A).



2) Connect battery ground cable and turn ignition switch "ON", (engine off) and connect connectors (3A) and (4A).

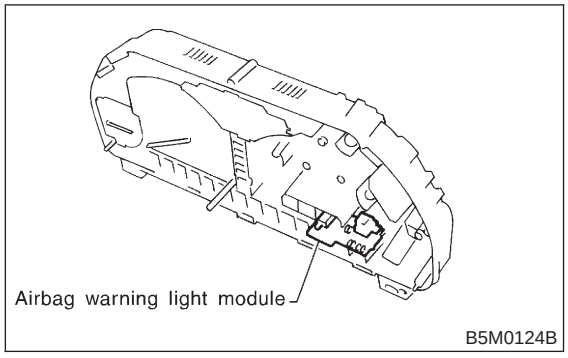


CHECK : ***Does the airbag warning light come off?***
YES : Go to step **5Y4**.
NO : Go to step **5Y3**.

5Y3 : INSPECTION OF BODY HARNESS

Check body harness.

NOTE:
After problem has been eliminated, disconnect connectors (3A) and (4A).



CHECK : ***Is there anything unusual to body harness?***
YES : Repair body harness.
NO : Replace airbag warning light module.

5Y4 : CHECK POOR CONTACT IN CONNECTOR (AB6).

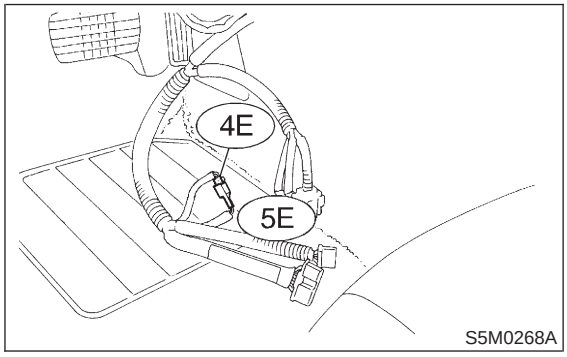
Check connector (AB6) connected to airbag control module. <Ref. to 5-5 [W5A0].>

CHECK : ***Is there poor contact in connector (AB6)?***
YES : Repair poor contact in connector (AB6).
NO : Go to step **5Y5**.

5Y5 : INSPECTION OF AIRBAG MAIN HARNESS

1) Turn ignition switch “OFF”, disconnect battery ground cable and then wait at least 20 seconds, and re-connect connectors (AB1) and (B31).
2) Remove instrument panel lower cover and disconnect (AB3) with (AB8), then disconnect connector (AB6) from airbag control module, <Ref. to 5-5 [W5A0].> and connect it to test harness E connector (1E).
3) Connect battery ground cable and turn ignition switch “ON”, (engine off) and connect connectors (4E) and (5E).

NOTE:
After problem has been eliminated, disconnect connectors (4E) and (5E).

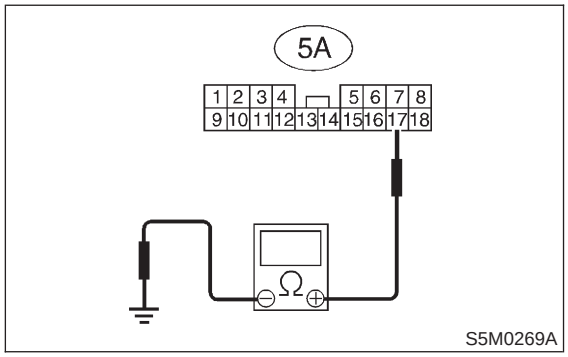


CHECK : ***Does the airbag warning light come on?***
YES : Go to step **5Y6**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5Y6 : GROUNDING CIRCUIT INSPECTION

1) Turn ignition switch “OFF”, disconnect battery ground cable and then wait at least 20 seconds.
2) Disconnect connector (AB1) from body harness connector (B31), and connect connector (B31) to test harness A connector (1A).
3) Measure resistance between connector (5A) terminal and chassis ground.

Connector & terminal
(5A) No. 17 (+) — Chassis ground (−):

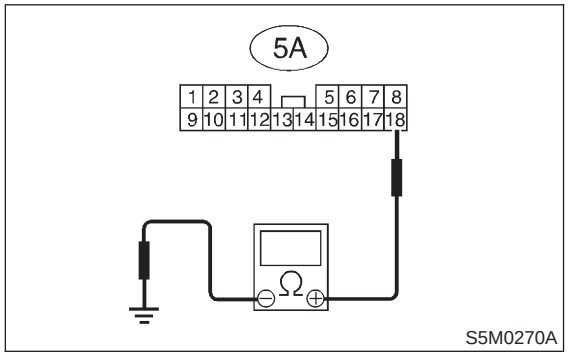


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **5Y7**.
NO : Repair body grounding circuit.

5Y7 : GROUNDING CIRCUIT INSPECTION

Measure resistance between connector (5A) terminal and chassis ground.

Connector & terminal
(5A) No. 18 (+) — Chassis ground (−):

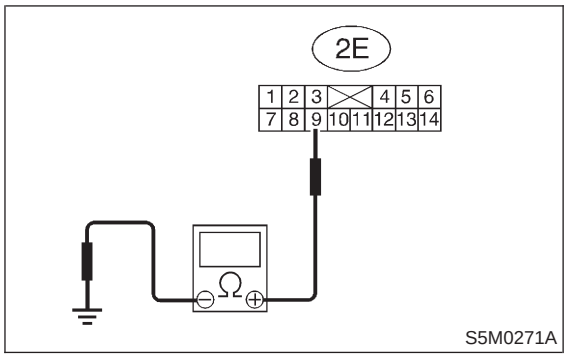


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **5Y8**.
NO : Repair body grounding circuit.

5Y8 : INSPECTION OF AIRBAG MAIN HARNESS

1) Connect connectors (AB1) and (B31). Disconnect connector (AB6) from airbag control module <Ref. to 5-5 [W5A0].>, and connect it to test harness E connector (1E).
2) Measure resistance between each test harness E connector (2E) terminal and chassis ground.

Connector & terminal
(2E) No. 9 (+) — Chassis ground (−):

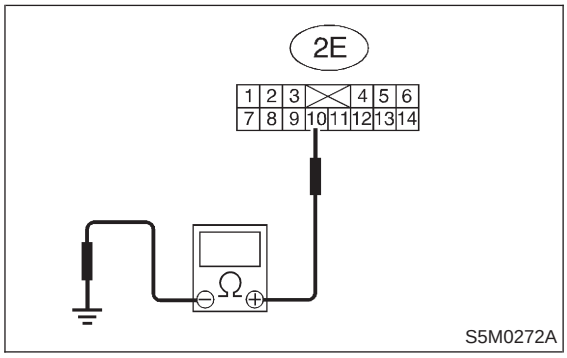


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **5Y9**.
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

5Y9 : INSPECTION OF AIRBAG MAIN HARNESS

Measure resistance between each test harness E connector (2E) terminal and chassis ground.

Connector & terminal
(2E) No. 10 (+) — Chassis ground (−):



CHECK : ***Is resistance less than 10 Ω?***
YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>
NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

Z: AIRBAG WARNING LIGHT REMAINS OFF.

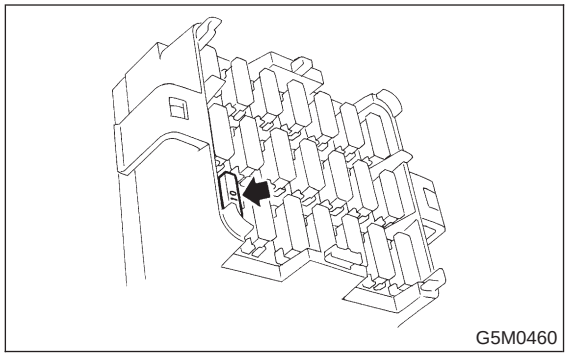
DIAGNOSIS:

- Fuse No. 15 is blown. (In joint box)
- Body harness circuit is open.
- Airbag warning light is faulty.
- Airbag main harness is faulty.
- Airbag control module is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground terminal, and then wait at least 20 seconds.

5Z1 : FUSE NO. 15 (IN JOINT BOX) INSPECTION

Remove and visually check fuse No. 15 (In joint box).


G5M0460

CHECK : ***Is fuse No. 15 blown?***
YES : Replace fuse No. 15. If fuse No. 15 blows again, Go to step **5Z2**.
NO : Go to step **5Z2**.

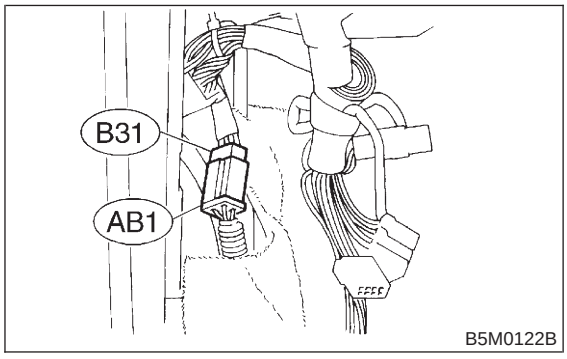
5Z2 : BODY HARNESS INSPECTION

Turn ignition switch "ON" (engine off) to make sure other warning lights (in combination meter) illuminate.

CHECK : ***Do all the warning lights (in combination meter) except airbag warning light come on?***
YES : Go to step **5Z3**.
NO : Repair body harness.

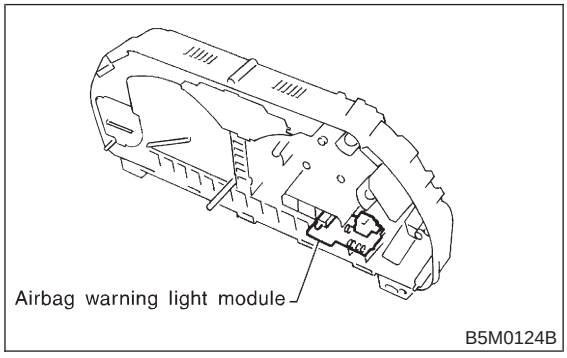
5Z3 : AIRBAG WARNING LIGHT MODULE (IN COMBINATION METER) INSPECTION

1) Turn ignition switch "OFF", disconnect battery ground cable and then wait at least 20 seconds.
2) Disconnect body harness connector (B31) from connector (AB1).



B5M0122B

3) Connect battery ground cable and turn ignition switch "ON" (engine off) to make sure airbag warning light illuminates.

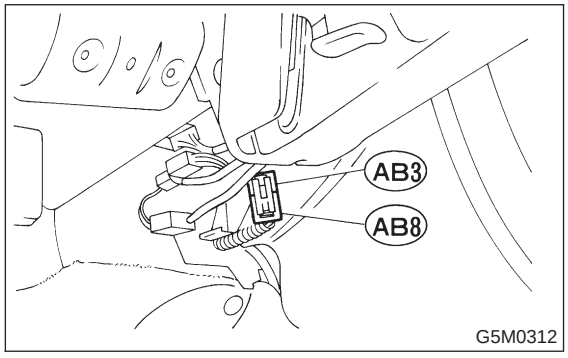


B5M0124B

CHECK : ***Does the airbag warning light come on?***
YES : Go to step **5Z4**.
NO : Replace airbag warning light module.

5Z4 : AIRBAG MAIN HARNESS INSPECTION

1) Turn ignition switch “OFF”, disconnect battery ground cable and then wait at least 20 seconds.
2) Connect body harness connector (B31) and connector (AB1).
3) Disconnect connectors (AB3) and (AB8) below steering column. <Ref. to 5-5 [M2F2].>



4) Disconnect connector (AB6) from airbag control module. <Ref. to 5-5 [W5A0].>
5) Connect battery ground cable and turn ignition switch “ON” to make sure airbag warning light illuminates.

CHECK : ***Does the airbag warning light come on?***

YES : Replace airbag control module. <Ref. to 5-5 [W5A0].>

NO : Replace airbag main harness. <Ref. to 5-5 [W4A0].>

AA: WARNING LIGHT INDICATES TROUBLE CODE, THEN NORMAL CODE. (FLASHING TROUBLE CODE.)

DIAGNOSIS:

Airbag system component parts are faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch “OFF”, disconnect battery ground cable, and then wait at least 20 seconds.

5AA1 : AIRBAG COMPONENT PARTS APPEARANCE INSPECTION

1) Conduct on-board diagnostic and call up trouble codes stored in memory. <Ref. to 5-5 [T4B0].>
2) Select trouble code required to check airbag component parts from those listed in table and reproduce symptom.

Trouble codes	Check parts	Index. No.
03	• Airbag main harness • Front sub sensor and front sub sensor harness (Both sides)	<Ref. to 5-5 [W400].> <Ref. to 5-5 [W700].>
04	• Airbag module (Passenger) • Airbag main harness • Airbag control module	<Ref. to 5-5 [W300].> <Ref. to 5-5 [W400].> <Ref. to 5-5 [W500].>
08	• Airbag control module • Side airbag module RH in front seat	<Ref. to 5-5 [W500].> <Ref. to 5-3 [W100].>
09	• Airbag control module • Side airbag module LH in front seat	<Ref. to 5-5 [W500].> <Ref. to 5-3 [W100].>
11	• Fuse No. 8 • Airbag main harness • Airbag control module • Body harness	<Ref. to 5-5 [T5F5].> <Ref. to 5-5 [W400].> <Ref. to 5-5 [W500].> <Ref. to 5-3 [W100].>
12	• Roll connector • Airbag module (Driver) • Airbag main harness • Airbag control module	<Ref. to 5-5 [W600].> <Ref. to 5-5 [W300].> <Ref. to 5-5 [W400].> <Ref. to 5-5 [W500].>
13	• Airbag module (Driver) • Roll connector • Airbag main harness • Airbag control module	<Ref. to 5-5 [W300].> <Ref. to 5-5 [W600].> <Ref. to 5-5 [W400].> <Ref. to 5-5 [W500].>
15	Side airbag sensor RH	<Ref. to 5-5 [W800].>
16	Side airbag sensor RH	<Ref. to 5-5 [W800].>
21	Airbag control module	<Ref. to 5-5 [W500].>
22	• Airbag module (Passenger) • Airbag main harness • Airbag control module	<Ref. to 5-5 [W300].> <Ref. to 5-5 [W400].> <Ref. to 5-5 [W500].>
25	Side airbag module LH in front seat	<Ref. to 5-3 [W100].>
26	Side airbag module LH in front seat	<Ref. to 5-3 [W100].>
33	Airbag control module	<Ref. to 5-5 [W500].>
34	• Airbag main harness • Airbag module (Passenger) • Airbag control module	<Ref. to 5-5 [W400].> <Ref. to 5-5 [W300].> <Ref. to 5-5 [W500].>
41	• Airbag module (Driver) • Roll connector • Airbag main harness • Airbag control module	<Ref. to 5-5 [W300].> <Ref. to 5-5 [W600].> <Ref. to 5-5 [W400].> <Ref. to 5-5 [W500].>
42	• Airbag module (Passenger) • Airbag main harness • Airbag control module	<Ref. to 5-5 [W300].> <Ref. to 5-5 [W400].> <Ref. to 5-5 [W500].>
43	• Airbag module (Driver) • Roll connector • Airbag main harness • Airbag control module	<Ref. to 5-5 [W300].> <Ref. to 5-5 [W600].> <Ref. to 5-5 [W400].> <Ref. to 5-5 [W500].>
44	Side airbag module in front seat	<Ref. to 5-3 [W100].>
51	Side airbag module RH in front seat	<Ref. to 5-3 [W100].>
52	Side airbag module LH in front seat	<Ref. to 5-3 [W100].>

3) Conduct appearance inspection on parts selected.

NOTE:
Also check connector terminals, wiring harness, case, etc. for damage.

CHECK : ***Is there anything unusual about the appearance of airbag component parts?***

YES : Replace faulty airbag component parts.

NO : Go to step **5AA2**.

5AA2 : AIRBAG COMPONENT PARTS VIBRATION INSPECTION

1) Gently shake check parts (to determine faults.).
2) To check airbag module or roll connector, turn and tilt steering wheel.

CAUTION:
Do not shake or vibrate airbag control module.

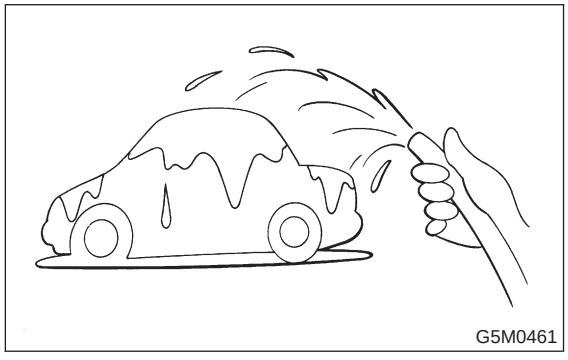
CHECK : ***Does the component malfunction again when shaking?***
YES : Replace faulty airbag component parts.
NO : Go to step **5AA3**.

5AA3 : SHOWERING INSPECTION TO BODY

Spray water on vehicle body.

CAUTION:
Do not directly spray water on airbag components.

NOTE:
Also check wiring harnesses as water may leak along them and get airbag component parts wet.



CHECK : ***Does water leak into the passenger compartment when showering vehicle?***
YES : Replace faulty airbag component parts.
NO : Perform clear memory. <Ref. to 5-5 [T4C0].>

AB: WARNING LIGHT INDICATES TROUBLE CODE, THEN NORMAL CODE. (FLASHING NORMAL CODE.)

DIAGNOSIS:

- Airbag connector is faulty.
- Fuse No. 16 is blown. (In joint box)
- Airbag main harness is faulty.
- Airbag control module is faulty.
- Body harness is faulty.

CAUTION:
Before performing diagnostics on airbag system, turn ignition switch "OFF", disconnect battery ground cable, and then wait at least 20 seconds.

5AB1 : AIRBAG CONNECTOR APPEARANCE INSPECTION

Conduct appearance inspection on airbag connectors (AB2) through (AB28). <Ref. to 5-5 [T100].>

NOTE:
Check terminals, case and wiring harnesses for damage.

CHECK : ***Is there anything unusual about the appearance of connectors (AB2) through (AB28)?***
YES : Replace faulty airbag component parts.
NO : Go to step **5AB2**.

5AB2 : AIRBAG CONNECTOR VIBRATION INSPECTION

Conduct vibration inspection on airbag connectors (AB2) through (AB28). <Ref. to 5-5 [T100].>

NOTE:
Gently shake each airbag connector.

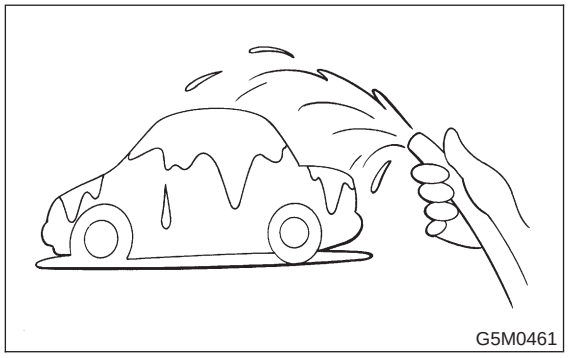
CHECK : ***Do the connectors (AB2) through (AB28) malfunction again when shaking?***
YES : Replace faulty airbag component parts.
NO : Go to step **5AB3**.

5AB3 : SHOWERING INSPECTION TO BODY

Spray water on vehicle body.

CAUTION:
Do not directly spray water on airbag components.

NOTE:
If leaks are noted, also check wiring harnesses as water may leak along them and wet airbag connectors.



CHECK : ***Does water leak into the passenger compartment when showering vehicle?***
YES : Replace faulty airbag component parts.
NO : Go to step **5AB4**.

5AB4 : FUSE NO. 16 (IN JOINT BOX), AIRBAG MAIN HARNESS, AIRBAG CONTROL MODULE, BODY HARNESS APPEARANCE INSPECTION

Conduct appearance inspection on fuse No. 16 <Ref. to 5-5 [T5P5].>, airbag main harness <Ref. to 5-5 [W4A0].>, airbag control module <Ref. to 5-5 [W5A0].> and body harness.

NOTE:
Also check connectors, terminals, wiring harness and case for damage.

CHECK : ***Is there anything unusual about the appearance of fuse No. 16, airbag main harness, airbag control module or body harness?***
YES : Replace faulty airbag component parts.
NO : Go to step **5AB5**.

5AB5 : FUSE NO. 16 (IN JOINT BOX), AIRBAG MAIN HARNESS, BODY HARNESS VIBRATION INSPECTION

Conduct vibration inspection on fuse No. 16, airbag main harness and body harness.

CAUTION:
Do not shake or vibrate airbag control module.

NOTE:
Gently shake each part.

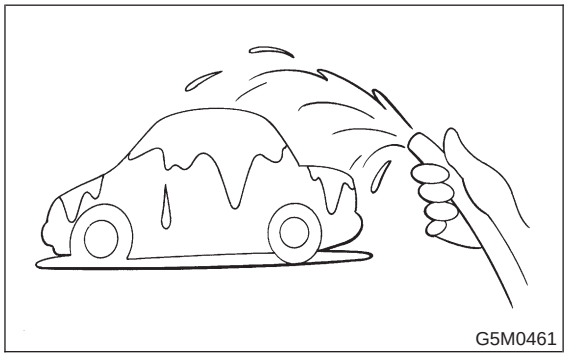
CHECK : ***Do fuse No. 16, airbag main harness or body harness malfunction again when shaking?***
YES : Replace faulty airbag component parts.
NO : Go to step **5AB6**.

5AB6 : SHOWERING INSPECTION TO BODY

Spray water on vehicle body.

CAUTION:
Do not directly spray water on each part.

NOTE:
If leaks are noted, check wiring harnesses as water may leak along them and get parts wet.



CHECK : ***Does water leak into the passenger compartment when showering vehicle?***
YES : Replace faulty airbag component parts.
NO : Go to step **5AB7**.

5AB7 : WARNING LIGHT ILLUMINATION CHECK

Turn ignition switch “ON” (engine off) and observe airbag warning light.

CHECK : ***Does the airbag warning light come on for about 7 seconds, then go out and stay out?***

YES : Perform clear memory. <Ref. to 5-5 [T4C0].>

NO : Go to “DIAGNOSTICS PROCEDURE”. <Ref. to 5-5 [T4D0].>

MEMO:

BODY ELECTRICAL SYSTEM (CRUISE CONTROL) 6-2a

1. Supplemental Restraint System “Airbag”

Airbag system wiring harness is routed near the cruise control module and cruise control command switch.

CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
● Be careful not to damage Airbag system wiring harness when servicing the cruise control module and cruise control command switch.

2. Pre-inspection

A: FUNCTION TESTS

Conduct road tests by selecting a smooth, flat road or use free rollers for road test simulation.

1. CRUISE CONTROL MAIN SWITCH

1) Turn ignition switch to ON.
2) Check that cruise control main switch indicator light comes on when main switch is pressed (ON).
3) Check that main switch indicator light goes out when main switch is pressed again (OFF).
4) Turn ignition switch to OFF with main switch ON (indicated by illumination). Turn ignition switch ON again to ensure that main switch indicator light remains OFF.

2. CRUISE CONTROL COMMAND SWITCH

1) Check that cruise control command switch is properly set in “SET/COAST”, “RESUME/ACCEL”, or “CANCEL” mode.
2) Also check that command switch returns to the original position when released.

3. CONSTANT SPEED TEST

1) Turn cruise control main switch to ON.
2) Drive the vehicle at a speed greater than 40 km/h (25 MPH).
3) Press command switch to set in “SET/COAST” mode.
4) Ensure that vehicle is maintained at the speed set when command switch was pressed.

4. ACCELERATION TEST

1) Set vehicle speed at a speed greater that 40 km/h (25 MPH).
2) Ensure that vehicle continues to accelerate while holding command switch in “RESUME/ ACCEL” mode, and that vehicle maintains that optional speed when command switch is released.

5. DECELERATION TEST

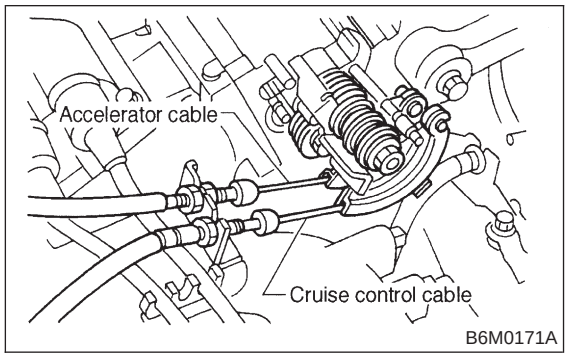
1) Set vehicle speed at an optional speed greater than 40 km/h (25 MPH).
2) Ensure that vehicle continues to decelerate while holding command switch in “SET/COAST” mode, and that it maintains that optional speed when command switch is released.

NOTE:
When vehicle speed reaches the lower speed limit of 30 km/h (19 MPH) during deceleration, cruise control will be released.

B: CRUISE CONTROL CABLE

2B1 : CHECK CRUISE CONTROL CABLE.

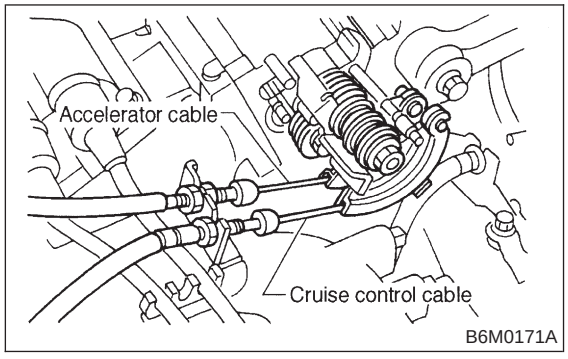
Check cruise control cable installation.



CHECK : ***Is the cruise control cable securely installed to the left of the accelerator cable?***
YES : Go to step **2B2**.
NO : Install cruise control cable securely. Go to step **2B2**.

2B2 : CHECK ACCELERATOR CABLE.

Check function of accelerator cable.



CHECK : ***Does the accelerator cable throttle cam move when the cruise control throttle is moved by hand?***
YES : Repair accelerator cable throttle cam. Go to step **2B3**.
NO : Go to step **2B3**.

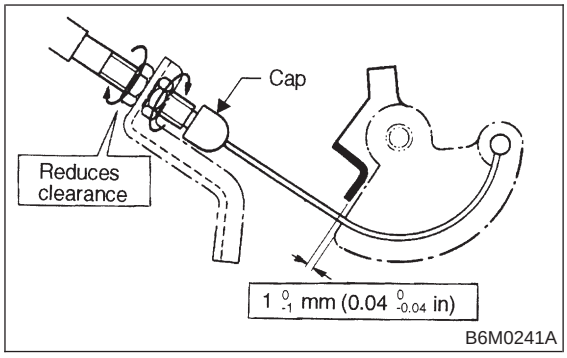
2B3 : CHECK THROTTLE CAM.

Check function of throttle cam.

CHECK : ***Does the throttle cam move smoothly?***
YES : Go to step **2B4**.
NO : Repair throttle cam. Go to step **2B4**.

2B4 : CHECK CABLE FREE PLAY.

Ensure that throttle cam-to-lever clearance is within specifications.



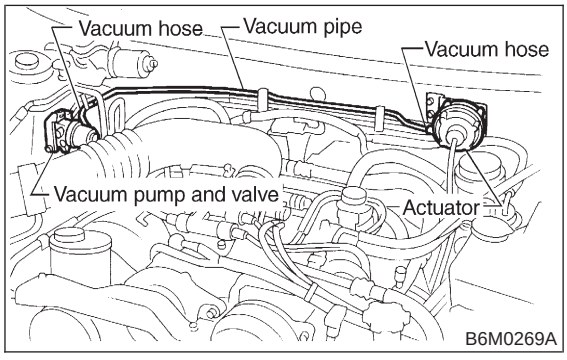
CHECK : ***Is throttle cam-to-lever clearance between 0 and 1 mm (0 and 0.04 in)?***
YES : Go to step **2C1**.
NO : Adjust cable end by adjusting nuts. Go to step **2C1**.

NOTE:
Ensure that cap is positioned in groove.

C: VACUUM HOSE AND PIPE

2C1 : CHECK VACUUM HOSE VISUALLY.

Check vacuum hose and pipe (which connect actuator and vacuum pump).

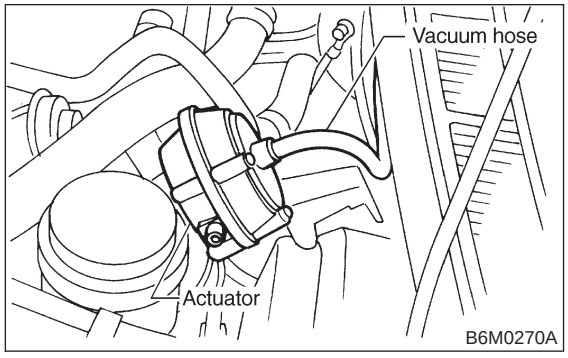


CHECK : ***Is there disconnection or cracks in vacuum hose?***
YES : Replace vacuum hose. Go to step **2D1**.
NO : Go to step **2D1**.

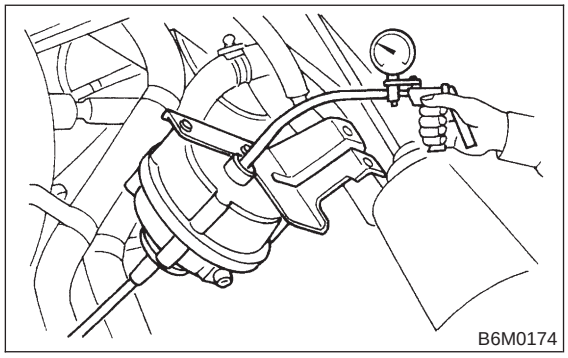
D: ACTUATOR

2D1 : CHECK FUNCTION OF ACTUATOR.

1) Disconnect vacuum hose from actuator.



2) Connect vacuum pump as shown in figure.



3) Make sure that cruise control cable moves smoothly and quickly when a vacuum pressure of 40.0 kPa (300 mmHg, 11.81 inHg) is applied to actuator.

CHECK : ***Does cruise control cable have a stroke of 35 mm (1.38 in)?***

YES : Go to step **2E1**.

NO : Replace actuator. Go to step **2E1**.

NOTE:

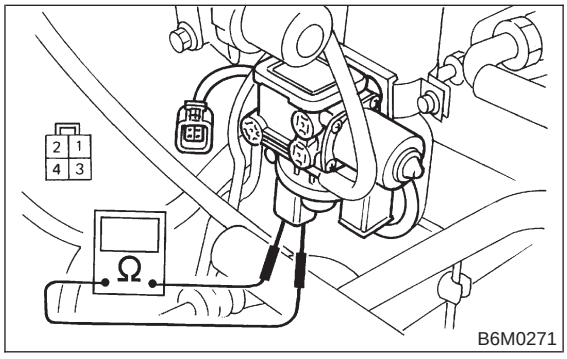
- When vacuum pressure is released from condition 3) above, make sure the cable returns to its original position smoothly and quickly.
- After inspection, disconnect vacuum pump and connect vacuum hose.

E: VACUUM PUMP AND VALVE

2E1 : MEASURE RESISTANCE OF VALVE.

1) Disconnect connector from vacuum pump and valve.
2) Measure resistance between terminals of vacuum pump and valve.

Terminals
No. 2 — No. 3:



CHECK : ***Is resistance less than 100 Ω?***

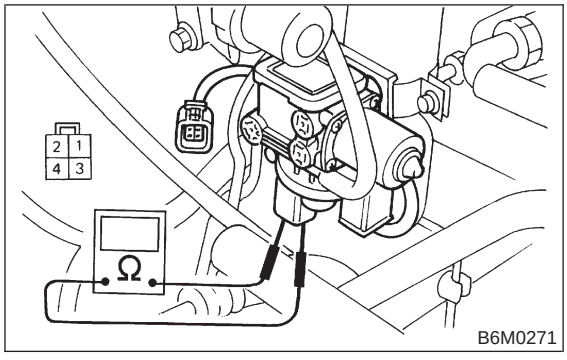
YES : Go to step **2E2**.

NO : Replace vacuum pump and valve.

2E2 : MEASURE RESISTANCE OF VALVE.

Measure resistance between terminals of vacuum pump and valve.

Terminals
No. 2 — No. 1:



CHECK : ***Is resistance less than 69 Ω?***

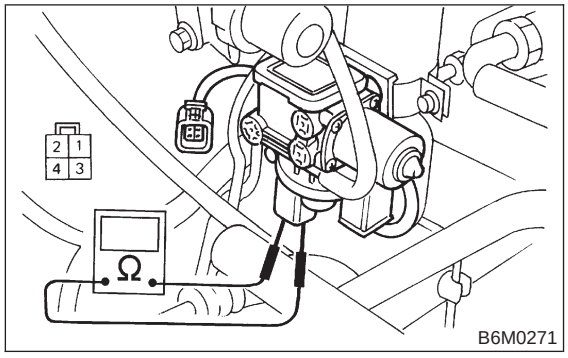
YES : Go to step **2E3**.

NO : Replace vacuum pump and valve.

2E3 : MEASURE RESISTANCE OF VALVE.

Measure resistance between terminals of vacuum pump and valve.

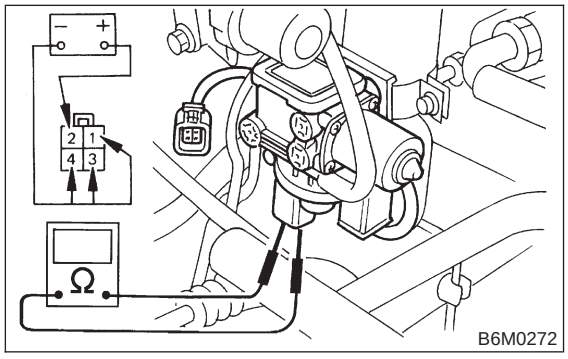
Terminals
No. 2 — No. 4:



CHECK : ***Is resistance less than 69 Ω?***
YES : Go to step **2E4**.
NO : Replace vacuum pump and valve.

2E4 : CHECK FOR LEAKAGE AND STICKING OF VALVES.

Make sure that cruise control cable moves smoothly when connecting + (positive) battery cable to terminal No. 2 and − (negative) battery cable to terminals No. 1, 3 and 4 of vacuum pump and valve connector.



CHECK : ***Does cruise control cable have a stroke of 35 mm (1.38 in) within 3 seconds?***
YES : Go to step **2E5**.
NO : Replace vacuum pump and valve. Go to step **2E5**.

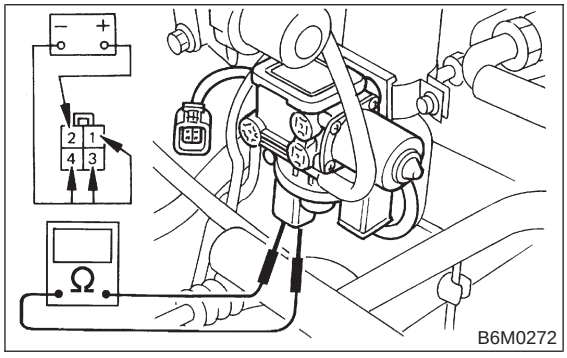
2E5 : CHECK FOR LEAKAGE AND STICKING OF VALVES.

When the battery cable is disconnected from former condition <Ref. to 6-2a [T2E4].>, make sure the cable returns to its original position smoothly.

CHECK : ***Does cruise control cable get back to its original position within 1.5 seconds?***
YES : Go to step **2E6**.
NO : Replace vacuum pump and valve. Go to step **2E6**.

2E6 : CHECK CABLE MOVEMENT.

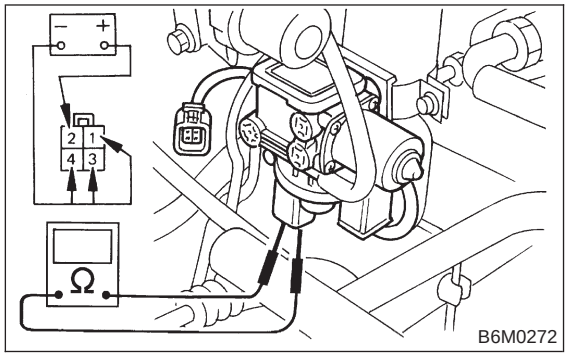
Connect + (positive) battery cable to terminal No. 2 and − (negative) battery cable to terminals No. 1, 3 and 4 of vacuum pump and valve connector.



CHECK : ***Does cruise control perform pull operation?***
YES : Go to step **2E7**.
NO : Replace vacuum pump and valve. Go to step **2E7**.

2E7 : CHECK CABLE MOVEMENT.

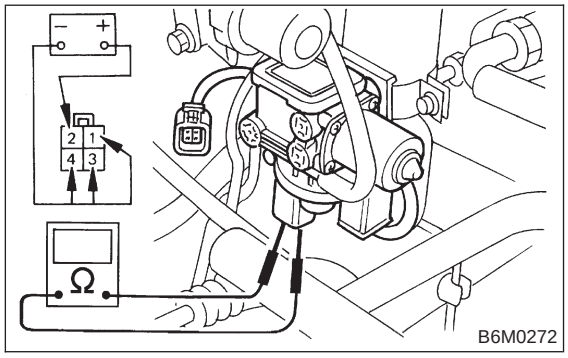
Connect + (positive) battery cable to terminal No. 2 and − (negative) battery cable to terminals No. 1 and 4 of vacuum pump and valve connector.



CHECK : ***Does cruise control perform hold operation?***
YES : Go to step **2E8**.
NO : Replace vacuum pump and valve. Go to step **2E8**.

2E8 : CHECK CABLE MOVEMENT.

Connect + (positive) battery cable to terminal No. 2 and − (negative) battery cable to terminal No. 4 of vacuum pump and valve connector.



CHECK : ***Does cruise control perform release operation?***
YES : Go to step **2F1**.
NO : Replace vacuum pump and valve. Go to step **2F1**.

F: POWER SUPPLY

2F1 : CHECK BATTERY.

Measure battery specific gravity of electrolyte.

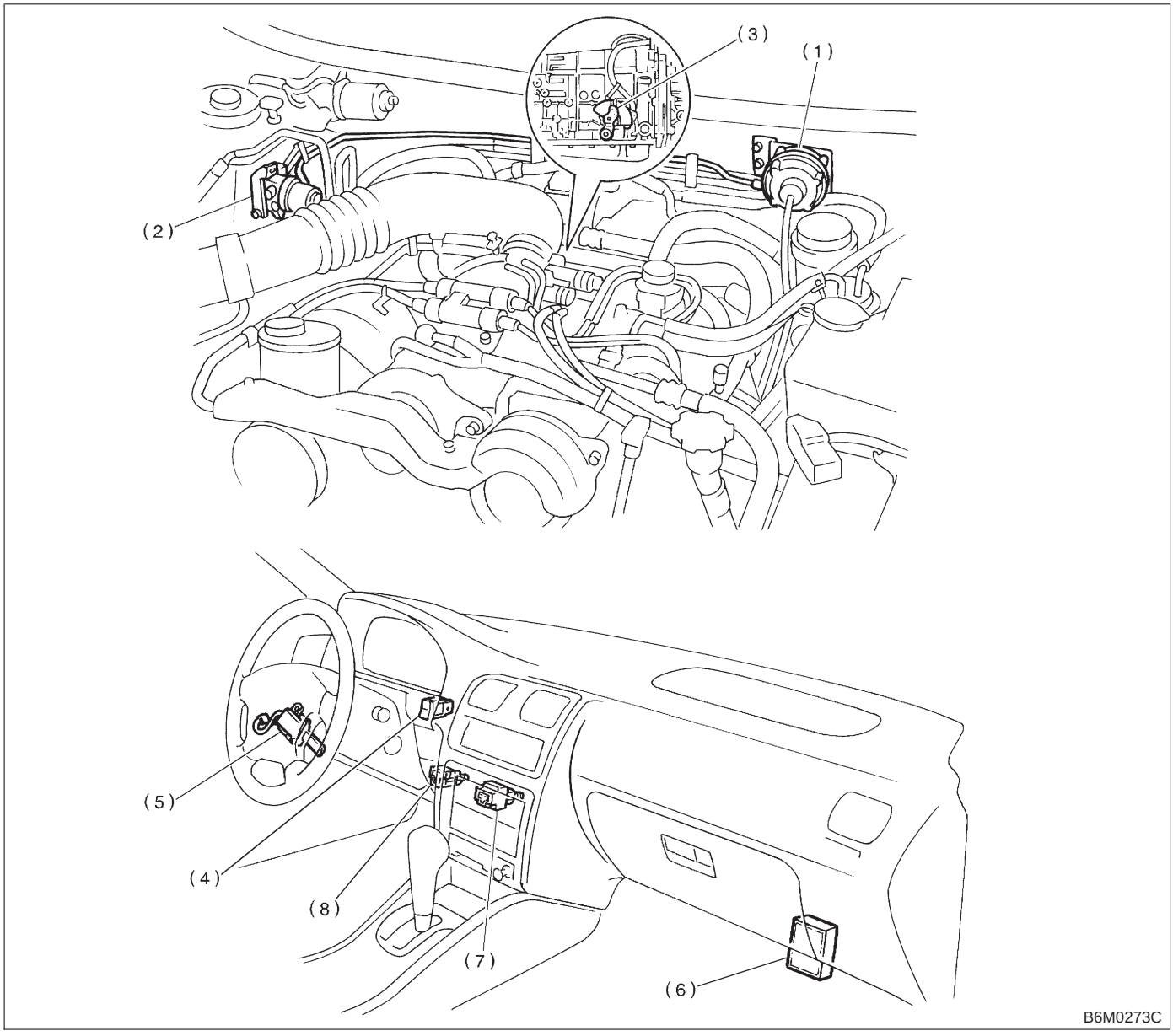
CHECK : ***Is battery specific gravity more than 1.260?***
YES : Go to step **2F2**.
NO : Charge or replace battery. Go to step **2F2**.

2F2 : CHECK FUSES, CONNECTORS AND HARNESSES.

Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

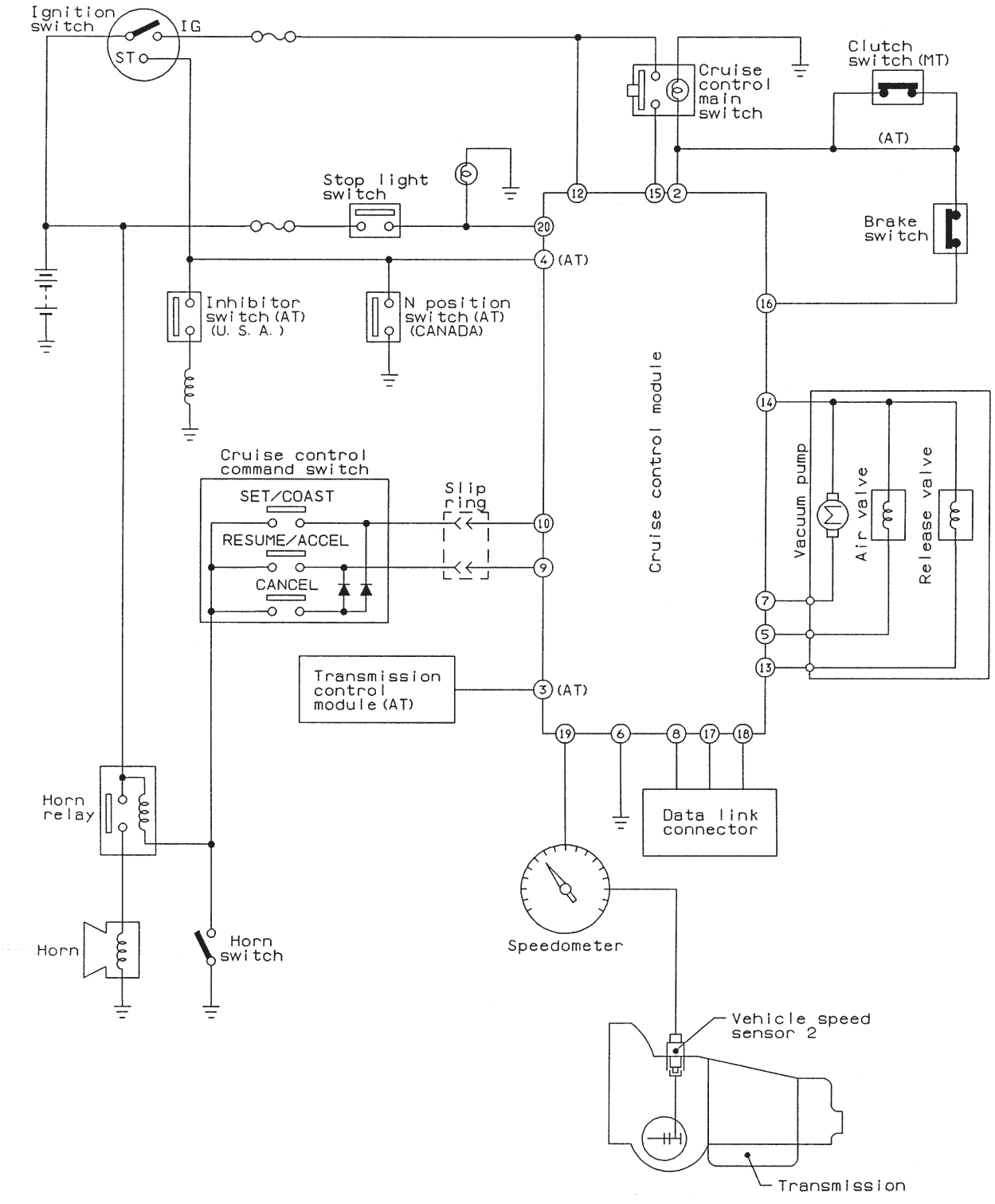
CHECK : ***Is there anything unusual about the appearance of main fuse, fuse, harness, connector and grounding?***
YES : Repair or replace faulty parts. End of pre-inspection.
NO : End of pre-inspection.

3. Electrical Components Location



(1) Actuator
(2) Vacuum pump and valve
(3) Inhibitor switch (AT)
(4) Cruise control main switch
(5) Cruise control command switch
(6) Cruise control module
(7) Stop and brake switch
(8) Clutch switch (MT)

4. Schematic



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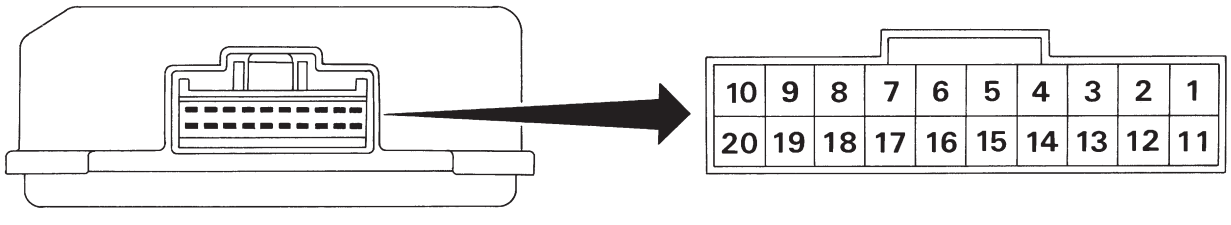
MEMO:

5. Control Module I/O Signal



G6M0015

Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Main power supply	2	● Battery voltage is present when main power is turned ON. ● “0” volt is present when main power is turned OFF.
Inhibitor switch (AT) (U.S.A.)/ N position switch (AT) (CANADA)	4	● Battery voltage is present when selector lever is other than “P” or “N” position (CANADA: “N” position only). ● “0” volt is present when selector lever is set to “P” or “N” position (CANADA: “N” position only).
Air valve	5	● ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating. ● “0” volt is present when vehicle is stopped.
Ground	6	—
Vacuum pump motor	7	● ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating. ● “0” volt is present when vehicle is stopped.
Data link connector	8	—
RESUME/ACCEL switch	9	● Battery voltage is present when command switch is turned to RESUME/ACCEL position. ● “0” volt is present when command switch is released.
SET/COAST switch	10	● Battery voltage is present when command switch is turned to SET/ COAST position. ● “0” volt is present when command switch is released.
Ignition switch	12	● Battery voltage is present when ignition switch is turned ON. ● “0” volt is present when ignition switch is turned OFF.
Release valve	13	● ON-and-OFF (“0”-and-battery voltage) operation is alternately repeated while cruise control is operating. ● “0” volt is present when vehicle is stopped.
Power supply to vacuum pump motor, air valve, and release valve	14	● Battery voltage is present while cruise control is operating. ● “0” volt is present when vehicle is stopped.
Cruise control main switch	15	● Battery voltage is present during pressing the cruise control main switch, and then battery voltage is present while switch is turned ON. ● “0” volt is present when switch is turned OFF.
Brake switch	16	Leave clutch pedal released (MT), while cruise control main switch is turned ON. Then check that; ● Battery voltage is present when brake pedal is released. ● “0” volt is present when brake pedal is depressed. Additionally only in MT vehicle, keep the cruise control main switch to ON and leave brake pedal released. Then check that; ● Battery voltage is present when clutch pedal is released. ● “0” volt is present when clutch pedal is depressed.
Data link connector	17	—
Data link connector	18	—

Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Vehicle speed sensor 2	19	Lift-up the vehicle until all four wheels are raised off ground, and then rotate any wheel manually. Approx. “5” and “0” volt pulse signals are alternately input to cruise control module.
Stop light switch	20	Turn ignition switch to OFF. Then check that; ● Battery voltage is present when brake pedal is depressed. ● “0” volt is present when brake pedal is released.
NOTE: Voltage at terminals 5, 7, 13 and 14 cannot be checked unless vehicle is driving by cruise control operation.		

6. Diagnostics Chart for On-board Diagnosis System

A: BASIC DIAGNOSTIC PROCEDURE

6A1 : CHECK CRUISE CONTROL MAIN SWITCH.

1) Trouble occurs.
2) Perform pre-inspection.
<Ref. to 6-2a [T200].>
3) Check cruise control main switch.

CHECK : ***Does cruise control main switch turn ON?***
YES : Go to step **6A2**.
NO : Go to “Diagnostics Chart for Power Line”. <Ref. to 6-2a [T700].>

6A2 : CHECK CRUISE SPEED IS SET.

CHECK : ***Does cruise speed properly set while driving at minimum of 40 km/h (25 MPH)?***
YES : Go to step **6A3**.
NO : Go to “Diagnostics Chart with Truoble Code”. <Ref. to 6-2a [T800].>

6A3 : CHECK CRUISE CONTROL IS RELEASED.

CHECK : ***Does cruise control properly release during operation?***
YES : Go to step **6A4**.
NO : Go to “Diagnostics Chart with Truoble Code”. <Ref. to 6-2a [T800].>

6A4 : CHECK CRUISE SPEED IS HELD WITHIN SET SPEED.

CHECK : ***Does cruise speed hold within set speed ±3 km/h (2 MPH)?***
YES : Go to step **6A5**.
NO : Go to pre-inspection of actuator, vacuum pump and valve. <Ref. to 6-2a [T2D0].> <Ref. to 6-2a [T2E0].>

6A5 : CHECK RESUME/ACCEL SWITCH.

CHECK : ***Does RESUME/ACCEL switch function properly?***
YES : Go to step **6A6**.
NO : Go to “Diagnostics Chart with Truoble Code”. <Ref. to 6-2a [T800].>

6A6 : CHECK SET/COAST SWITCH.

CHECK : ***Does SET/COAST switch function properly?***
YES : Go to step **6A7**.
NO : Go to “Diagnostics Chart with Truoble Code”. <Ref. to 6-2a [T800].>

6A7 : CHECK CANCEL SWITCH.

CHECK : ***Does CANCEL switch function properly?***
YES : Go to step **6A8**.
NO : Go to “Diagnostics Chart with Truoble Code”. <Ref. to 6-2a [T800].>

6A8 : CHECK CRUISE SPEED IS RELEASED.

CHECK : ***Does cruise speed release when brake pedal is depressed?***
YES : Go to step **6A9**.
NO : Go to “Diagnostics Chart with Truoble Code”. <Ref. to 6-2a [T800].>

6A9 : CHECK CRUISE SPEED IS RELEASED.

CHECK : ***Does cruise speed release when clutch pedal is depressed (MT) or when selector lever is set to N (AT)?***
YES : Cruise control system is in correct order.
NO : Go to “Diagnostics Chart with Truoble Code”. <Ref. to 6-2a [T800].>

B: ON-BOARD DIAGNOSIS WITH SELECT MONITOR

1. GENERAL

The on-board diagnosis function of the cruise control system uses an external select monitor.
The on-board diagnosis function operates in two categories, which are used depending on the type of problems;

NOTE:
Select monitor cartridge:
No. 24082AA010

1) Cruise cancel conditions diagnosis
(1) This category of diagnosis requires actual vehicle driving in order to determine the cause, (as when cruise speed is cancelled during driving although cruise cancel condition is not entered).
(2) Cruise control module memory stores the cancel condition (Code No.) which occurred during driving. When there are plural cancel conditions (Code No.), they are shown on the select monitor.

CAUTION:
● The cruise control memory stores not only the cruise "cancel" which occurred (although "cancel" operation is not entered by the driver), but also the "cancel" condition input by the driver.
● The content of memory is cleared when ignition switch or cruise main switch is turned OFF.

2) Real-time diagnosis
The real-time diagnosis function is used to determine whether or not the input signal system is in good order, according to signal emitted from switches, sensors, etc.
(1) Vehicle cannot be driven at cruise speed because problems occurs in the cruise control system or its associated circuits.
(2) Monitor the signal conditions from switches and sensors.

2. CRUISE CANCEL CONDITIONS DIAGNOSIS

1) Connect select monitor.
2) Start the engine and turn cruise control main switch to ON.
3) Set select monitor in "All System Diagnosis" mode.

NOTE:
The diagnostic trouble code is also shown in the "Each System Check" mode. This mode is called up on the "Cruise Control Diagnosis" screen by selecting the item "Cancel Code(s) Display".

4) Drive vehicle at least 40 km/h (25 MPH) with cruise speed set.
5) If cruise speed is canceled itself (without doing any cancel operations), a diagnostic trouble code will appear on select monitor display.

CAUTION:
● A diagnostic trouble code will also appear when cruise cancel is effected by driver. Do not confuse.
● Have a co-worker ride in vehicle to assist in diagnosis during driving.

NOTE:
Diagnostic trouble code will be cleared by turning ignition switch or cruise control main switch to OFF.

3. REAL-TIME DIAGNOSIS

1) Connect select monitor.
2) Turn ignition switch and cruise control main switch to ON.
3) Select the "Current Data Display & Save" mode on the select monitor "Cruise Control Diagnosis" screen.
4) Ensure that normal indication is displayed when controls are operated as indicated below:
● Depress/release the brake pedal. (Stop light switch and brake switch turn ON.)
● Turn ON the "SET/COAST" switch.
● Turn ON the "RESUME/ACCEL" switch.
● Depress/release the clutch pedal. (MT)
● Set the selector lever to N. (AT)

7. Diagnostics Chart for Power Line

A: BASIC DIAGNOSTICS PROCEDURE

7A1 : DRIVE AT CRUISE SPEED.

CHECK : ***Can cruise speed be set?***

YES : Go to “CHECK INDICATOR AND CIRCUIT IN CRUISE CONTROL MAIN SWITCH”. <Ref. to 6-2a [T7B0].>

NO : Go to “CHECK CRUISE CONTROL MAIN SWITCH”. <Ref. to 6-2a [T7C0].>

B: CHECK INDICATOR AND CIRCUIT IN CRUISE CONTROL MAIN SWITCH

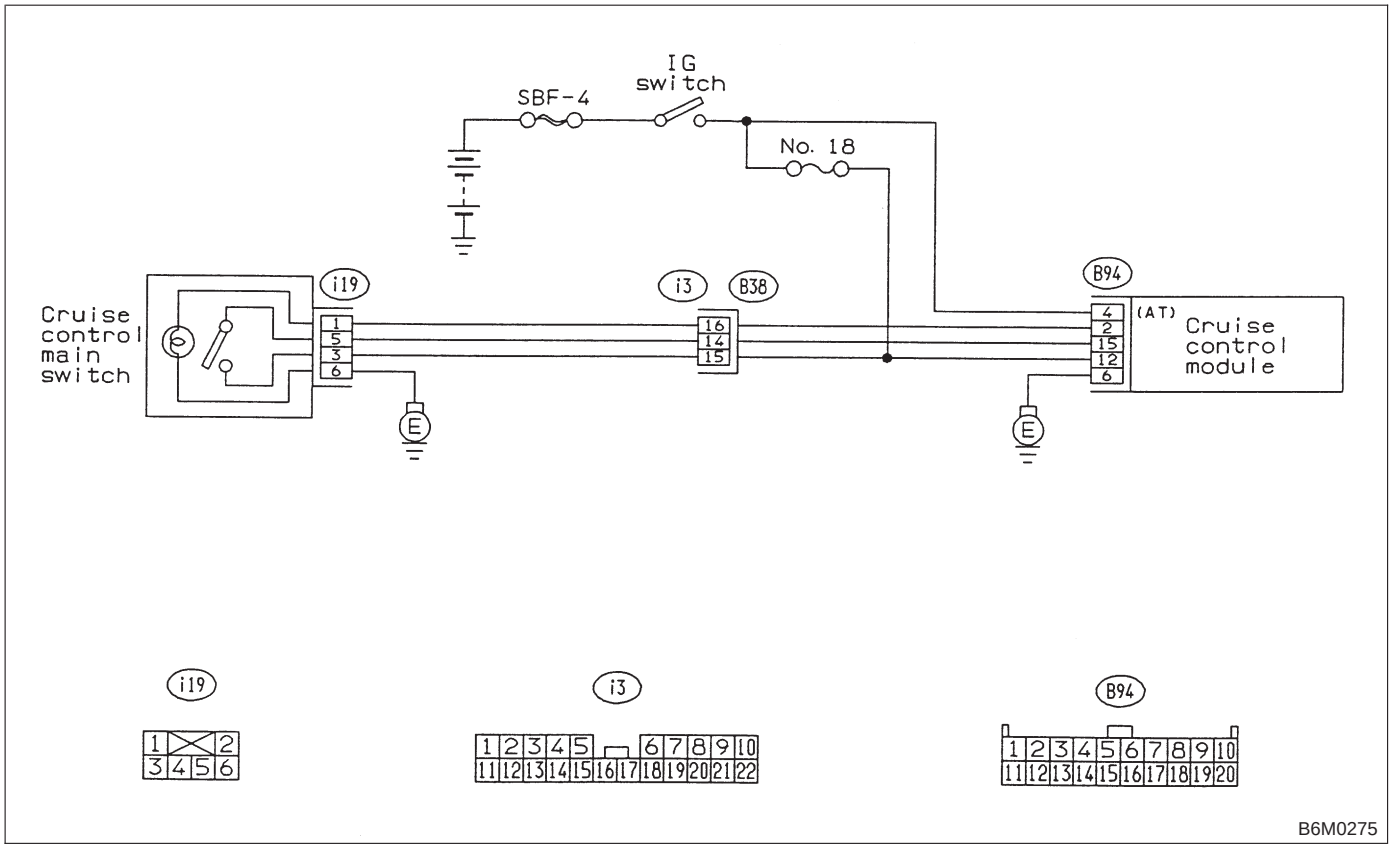
DIAGNOSIS:

- Bulb failure or open harness of the indicator circuit in the cruise control main switch.

TROUBLE SYMPTOM:

- Cruise control can be set, normally indicator does not come on. (When main switch is pressed.)

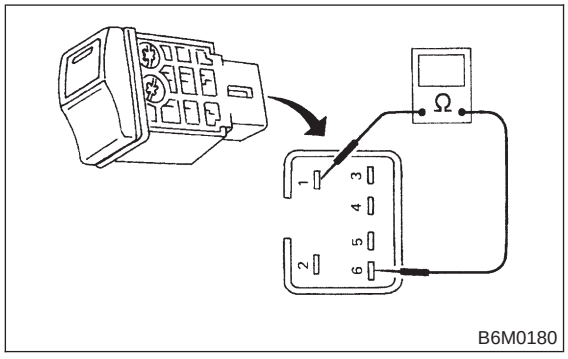
WIRING DIAGRAM:



7B1 : CHECK CRUISE CONTROL MAIN SWITCH.

1) Remove cruise control main switch.
2) Measure resistance between cruise control main switch terminals.

Terminals
No. 1 — No. 6:

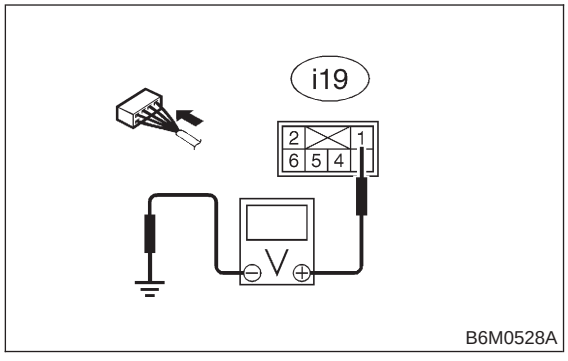


CHECK : ***Is resistance between 10 and 80 Ω?***
YES : Go to step **7B2**.
NO : Replace switch illumination bulb.

7B2 : CHECK CIRCUIT BETWEEN CRUISE CONTROL MODULE AND CRUISE CONTROL MAIN SWITCH INDICATOR LIGHT.

1) Turn the ignition switch to ON.
2) Turn cruise control main switch to ON.
3) Measure voltage between cruise control main switch connector and the chassis ground.

Connector & terminal
(i19) No. 1 (+) — Chassis ground (−):

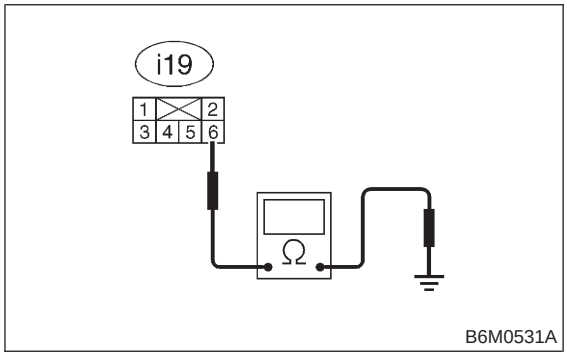


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **7B3**.
NO : Repair or replace wiring harness.

7B3 : CHECK CIRCUIT BETWEEN CRUISE CONTROL MODULE AND CRUISE CONTROL MAIN SWITCH INDICATOR LIGHT.

1) Turn the ignition switch and cruise control main switch to OFF.
2) Remove the connector from the cruise control main switch.
3) Measure resistance of ground circuit between the cruise control main switch connector and chassis ground.

Connector & terminal
(i19) No. 6 (+) — Chassis ground (−):



CHECK : ***Is resistance less than 10 Ω?***
YES : Replace cruise control module.
NO : Repair or replace wiring harness.

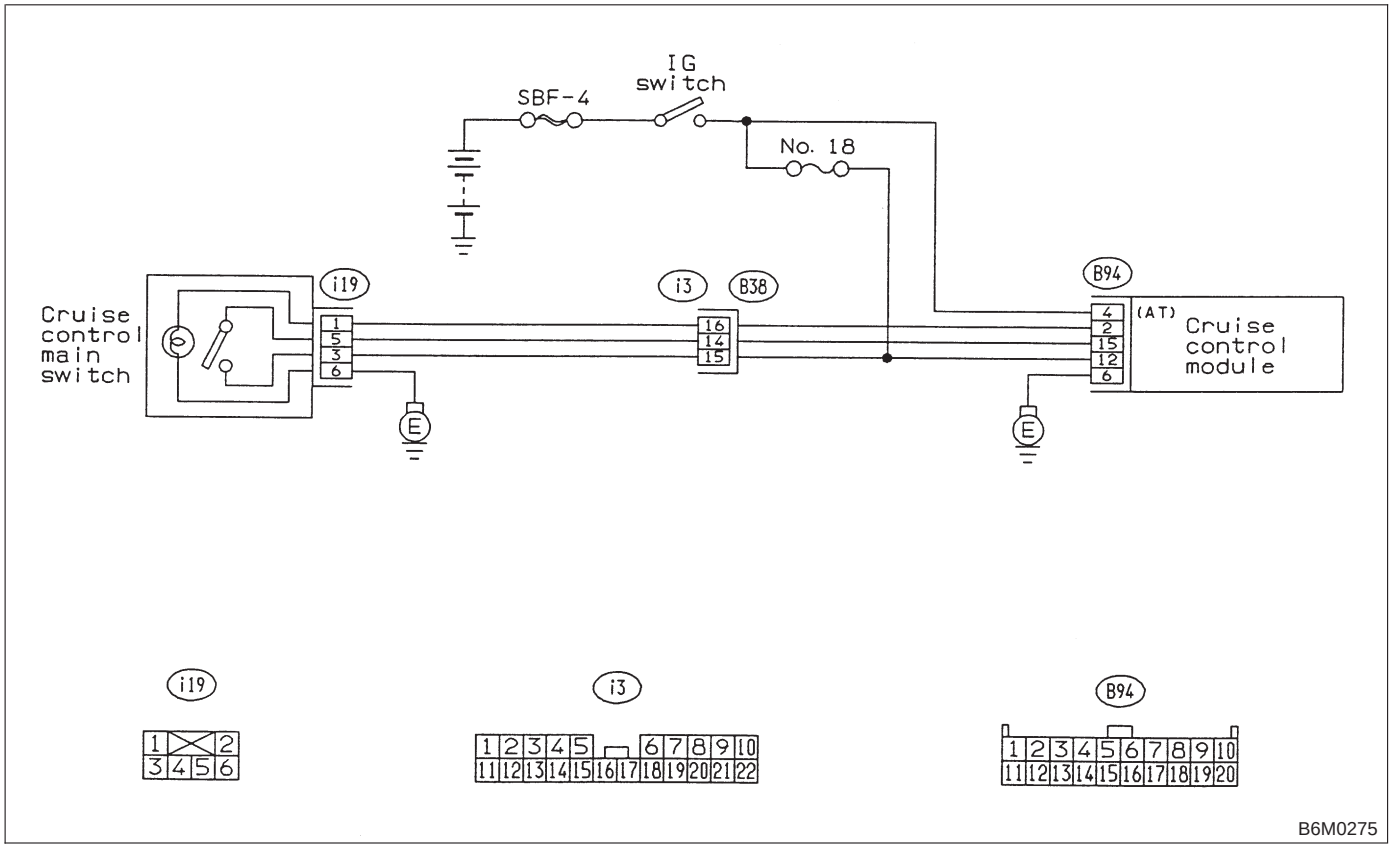
C: CHECK CRUISE CONTROL MAIN SWITCH

DIAGNOSIS:
- Faulty cruise control main switch, or open harness.

TROUBLE SYMPTOM:
- Cruise control main switch is not turned ON and cruise control cannot be set.

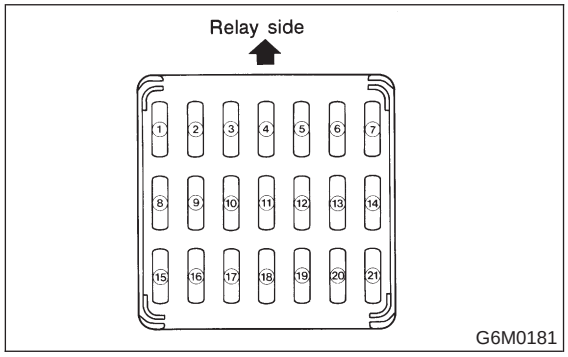
NOTE:
When the main relay (built-in cruise control module) operates, the main switch circuit is in normal condition.
The main relay operation can be checked by hearing the operation sounds.
This operation sounds will be heard when ignition switch and cruise control main switch is turned to ON.

WIRING DIAGRAM:



7C1 : CHECK FUSE.

Check fuse No. 18.



CHECK : ***Is fuse No. 18 blown?***
YES : Replace fuse No. 18. Go to step **7C2**.
NO : Go to step **7C2**.

7C2 : CHECK POWER SUPPLY.

1) Turn ignition switch to ON.
2) Measure voltage between fuse & relay box connector and chassis ground.

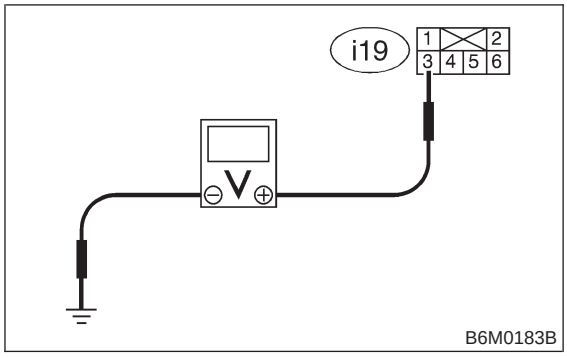
Connector & terminal
(B51) No. 4 (+) — Chassis ground (−):

CHECK : ***Is voltage more than 10 V?***
YES : Go to step **7C3**.
NO : Replace fuse No. 18. When fuse No. 18 is blown again, repair shorted parts of circuit.

7C3 : CHECK CRUISE CONTROL MAIN SWITCH.

1) Turn ignition switch to OFF.
2) Remove cruise control main switch and disconnect connector.
3) Turn ignition switch to ON.
4) Measure voltage between cruise control main switch connector and chassis ground.

Connector & terminal
(i19) No. 3 (+) — Chassis ground (−):

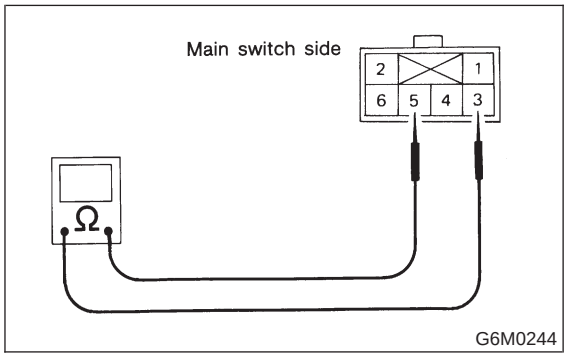


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **7C4**.
NO : Replace cruise control main switch.

7C4 : CHECK CRUISE CONTROL MAIN SWITCH.

Measure resistance between cruise control main switch terminals.

Terminals
No. 3 — No. 5:

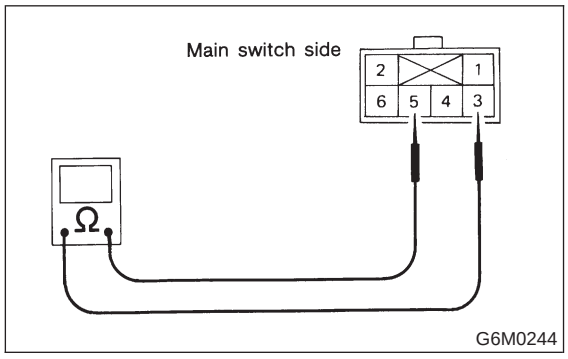


CHECK : ***Is resistance less than 10 Ω? (When switch is ON.)***
YES : Go to step **7C5**.
NO : Replace cruise control main switch.

7C5 : CHECK CRUISE CONTROL MAIN SWITCH.

Measure resistance between cruise control main switch terminals.

Terminals
No. 3 — No. 5:

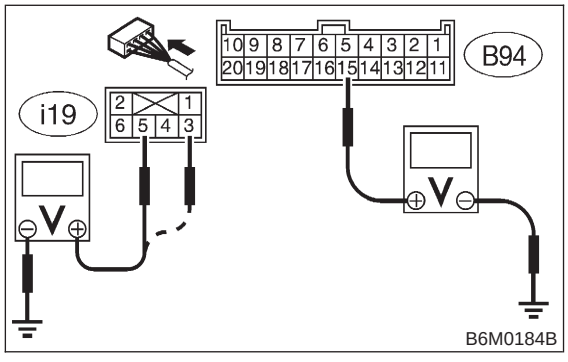


CHECK : ***Is resistance more than 1 MΩ? (When switch is OFF.)***
YES : Go to step **7C6**.
NO : Replace cruise control main switch.

7C6 : CHECK HARNESS BETWEEN CRUISE CONTROL MAIN SWITCH CONNECTOR AND CHASSIS GROUND.

1) Connect connector.
2) Turn ignition switch to ON.
3) Turn cruise control main switch to ON.
4) Measure voltage between terminal of cruise control main switch and chassis ground.

Connector & terminal
(i19) No. 3 (+) — Chassis ground (−):

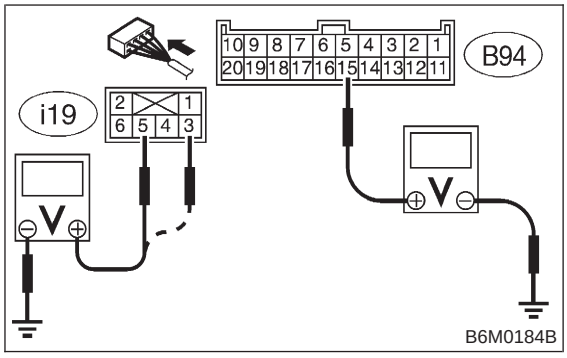


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **7C7**.
NO : Repair or replace wiring harness.

7C7 : CHECK HARNESS BETWEEN CRUISE CONTROL MAIN SWITCH CONNECTOR AND CHASSIS GROUND.

Measure voltage between terminal of cruise control main switch chassis ground.

Connector & terminal
(i19) No. 5 (+) — Chassis ground (−):

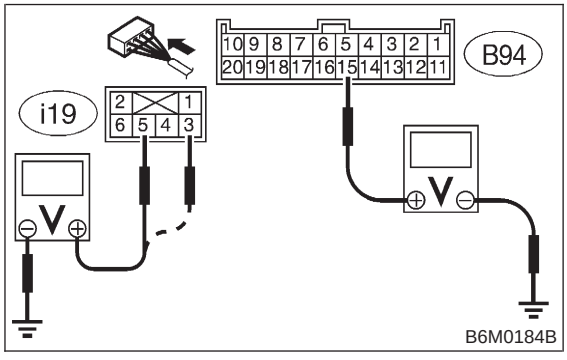


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **7C8**.
NO : Repair or replace wiring harness.

7C8 : CHECK HARNESS BETWEEN CRUISE CONTROL MODULE CONNECTOR AND CHASSIS GROUND.

Measure voltage between terminal of cruise control module and chassis ground.

Connector & terminal
(B94) No. 15 (+) — Chassis ground (−):



CHECK : ***Is voltage more than 10 V?***
YES : Replace cruise control module.
NO : Repair or replace wiring harness.

NOTE:
Depress cruise control main switch with fingers while measuring voltage between (i19) No. 5 and chassis ground.

8. Diagnostics Chart with Trouble Code

A: DIAGNOSTIC TROUBLE CODE LIST

Diagnostic trouble code	Item	Contents of diagnosis	Index No.
11	BRAKE SWITCH/ STOP LIGHT SWITCH/ CLUTCH SWITCH (MT)/ INHIBITOR SWITCH (AT)	● Input signals from brake switch OFF, stop light switch ON. (Brake pedal is depressed.) ● Input signals from clutch switch OFF, or inhibitor switch is in “N” position. [Clutch pedal is depressed (MT), or selector lever is set to N position (AT).]	<Ref. to 6-2a [T8B0].>
12	NO SET SPEED	Out of cruise speed range	<Ref. to 6-2a [T8C0].>
13	LOW SPEED LIMIT	Low-speed control limiter	<Ref. to 6-2a [T8C0].>
14	CANCEL SWITCH	Input signal from cancel switch	<Ref. to 6-2a [T8D0].>
15	NO MEMORY	No memorized cruise speed	—
21	SPEED SENSOR NG	Faulty vehicle speed sensor 2	<Ref. to 6-2a [T8C0].>
22	COMMAND SWITCH NG	Faulty SET/COAST switch or RESUME/ACCEL switch	<Ref. to 6-2a [T8D0].>
23	RELAY NG	Faulty safety relay included in cruise control module	<Ref. to 6-2a [T8E0].>
24	CPU RAM NG	Faulty CPU RAM included in cruise control module	<Ref. to 6-2a [T8E0].>
31	VACUUM MOTOR NG	Faulty vacuum motor or motor drive system	<Ref. to 6-2a [T8F0].>
32	AIR VALVE NG	Faulty air valve or valve drive system	<Ref. to 6-2a [T8F0].>
33	REL VALVE NG	Faulty release valve or valve drive system	<Ref. to 6-2a [T8F0].>

B: DIAGNOSTIC TROUBLE CODE 11 (BRAKE SWITCH, STOP LIGHT SWITCH, CLUTCH SWITCH (MT), INHIBITOR SWITCH (AT))

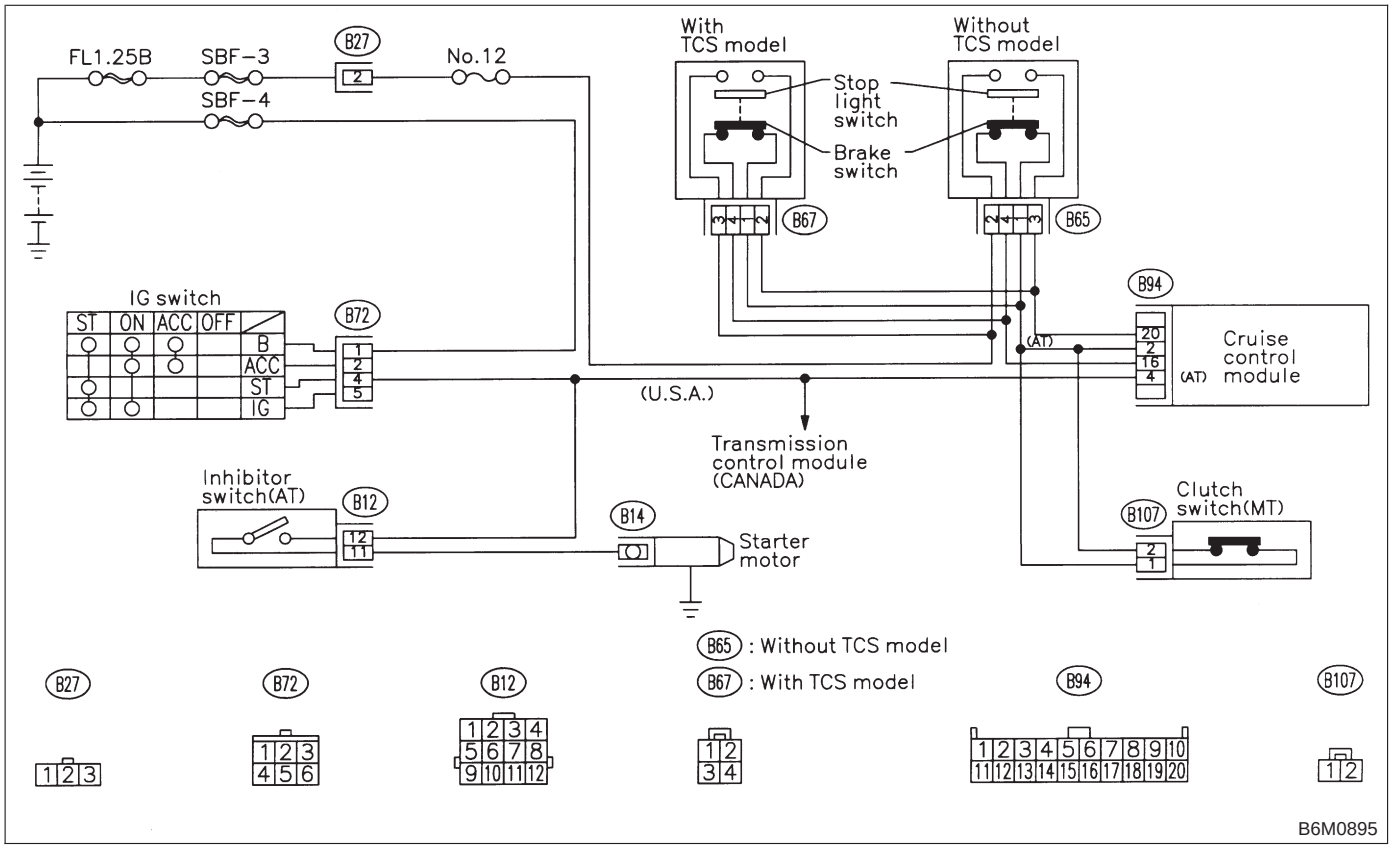
DIAGNOSIS:

- Failure or disconnection of the stop light switch and brake switch.
- Failure or disconnection of the clutch switch (MT).
- Failure or disconnection of the inhibitor switch (AT).

TROUBLE SYMPTOM:

- Cruise control cannot be set.

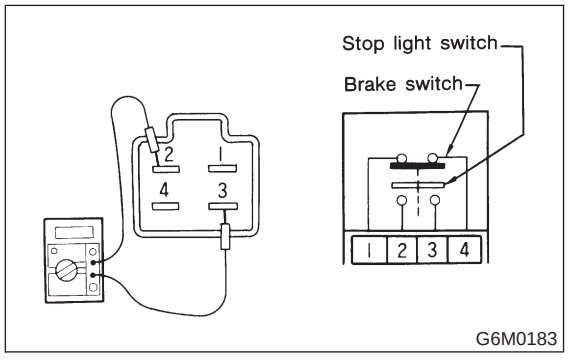
WIRING DIAGRAM:



8B1 : CHECK BRAKE SWITCH.

1) Turn ignition switch to ON.
2) Turn cruise control main switch to ON.
3) Apply parking brake securely.
4) Set select monitor in “Current Data Display & Save” mode.
5) Release the clutch pedal. (MT)
6) Depress the brake pedal and check signals for proper operation.
   (1) The Stop Lamp Switch shown on the display turns from “OFF” to “ON”.
   (2) The Brake Switch shown on the display turns from “OFF” to “ON”.
7) Release the brake pedal.
8) Remove connector of stop and brake switch.
9) Check circuit between brake switch terminal.

Terminals
No. 1 — No. 4: (Brake switch)

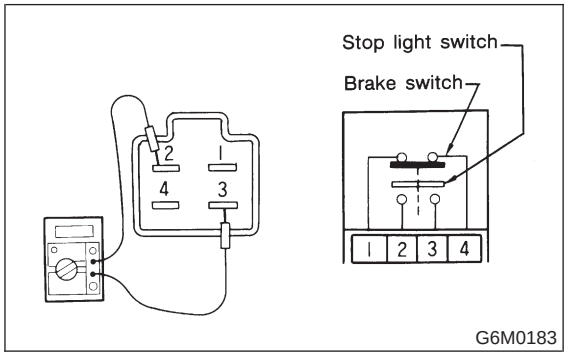


CHECK : ***Is resistance less than 1 Ω? (When brake pedal is released.)***
YES : Go to step **8B2**.
NO : Replace brake and stop light switch.

8B2 : CHECK BRAKE SWITCH.

Check circuit between brake switch terminal.

Terminals
No. 1 — No. 4: (Brake switch)

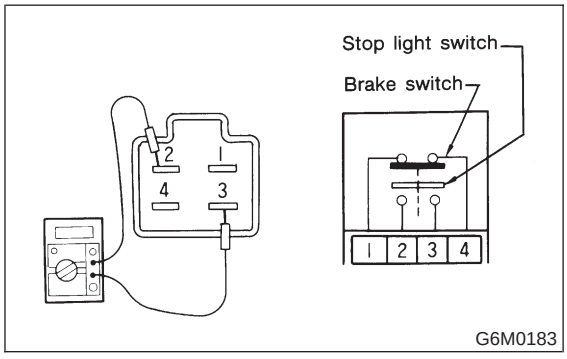


CHECK : ***Is resistance more than 1 MΩ? (When brake pedal is depressed.)***
YES : Go to step **8B3**.
NO : Replace brake and stop light switch.

8B3 : CHECK STOP LIGHT SWITCH.

Check circuit between stop light switch terminal.

Terminals
No. 2 — No. 3: (Stop light switch)



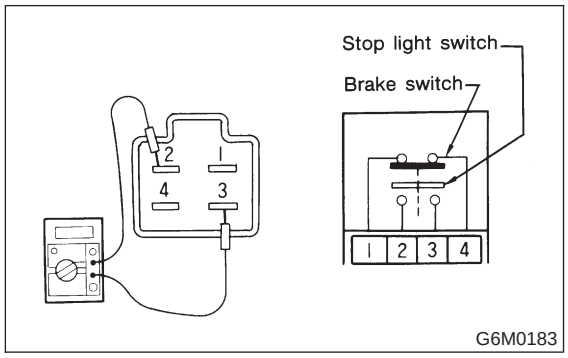
CHECK : ***Is resistance more than 1 MΩ? (When brake pedal is released.)***
YES : Go to step **8B4**.
NO : Replace brake and stop light switch.

8B4 : CHECK STOP LIGHT SWITCH.

Check circuit between stop light switch terminal.

Terminals

No. 2 — No. 3: (Stop light switch)



CHECK : ***Is resistance less than 1 Ω? (When brake pedal is depressed.)***

YES : (MT) Go to step **8B5**. (AT) Go to step **8B7**.

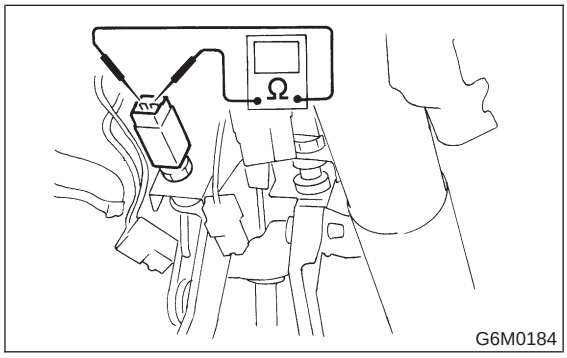
NO : Replace brake and stop light switch.

8B5 : CHECK CLUTCH SWITCH. (MT)

1) Turn ignition switch to ON.
2) Turn cruise control main switch to ON.
3) Apply parking brake securely.
4) Set select monitor in “Current Data Display & Save” mode.
5) Depress the clutch pedal and check signal for proper operation.
The Clutch/Inhibitor Switch shown on the display turns from “ON” to “OFF”.
6) Disconnect connector of clutch switch.
7) Check continuity of the clutch switch.

Terminals

No. 1 — No. 2:



CHECK : ***Is resistance less than 10 Ω? (When clutch pedal is released.)***

YES : Go to step **8B6**.

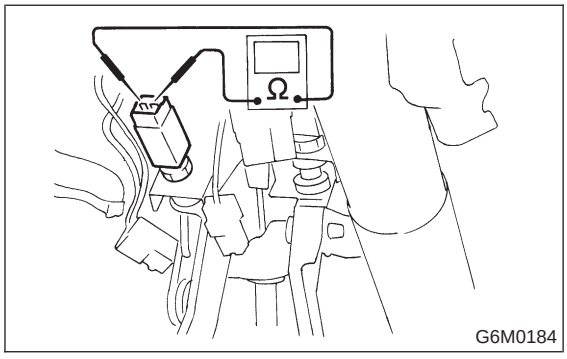
NO : Replace clutch switch.

8B6 : CHECK CLUTCH SWITCH. (MT)

Check continuity of the clutch switch.

Terminals

No. 1 — No. 2:



CHECK : ***Is resistance more than 1 MΩ? (When clutch pedal is depressed.)***

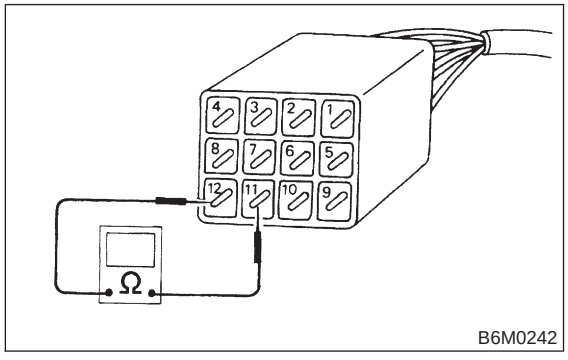
YES : Replace cruise control module.

NO : Replace clutch switch.

8B7 : CHECK INHIBITOR SWITCH. (AT)

1) Turn ignition switch to ON.
2) Turn cruise control main switch to ON.
3) Apply parking brake securely.
4) Set select monitor in “Current Data Display & Save” mode.
5) Set the selector lever from P or N position to D position and check signal for proper operation.
The Clutch/Inhibitor Switch shown on the display turns from “ON” to “OFF”.
6) Set the selector lever to P or N position.
7) Disconnect connector of inhibitor switch.
8) Check continuity of the inhibitor switch.

Terminals
No. 11 — No. 12:

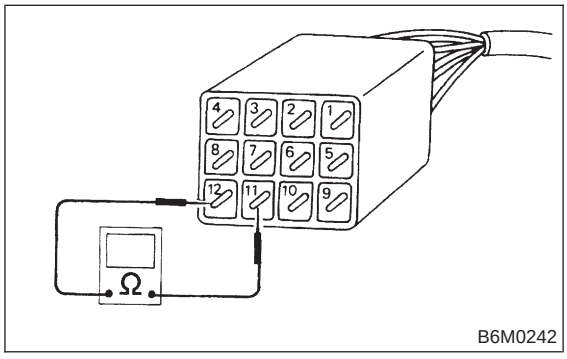


CHECK : ***Is resistance less than 10 Ω? (When selector lever is in P or N.)***
YES : Go to step **8B8**.
NO : Replace inhibitor switch. Repair inhibitor switch wiring harness.

8B8 : CHECK INHIBITOR SWITCH. (AT)

Check continuity of the inhibitor switch.

Terminals
No. 11 — No. 12:



CHECK : ***Is resistance more than 1 MΩ? (When selector lever is not in P or N.)***
YES : Replace cruise control module.
NO : Replace inhibitor switch. Repair inhibitor switch wiring harness.

C: DIAGNOSTIC TROUBLE CODE 12, 13 AND 21 (VEHICLE SPEED SENSOR 2 SYSTEM)

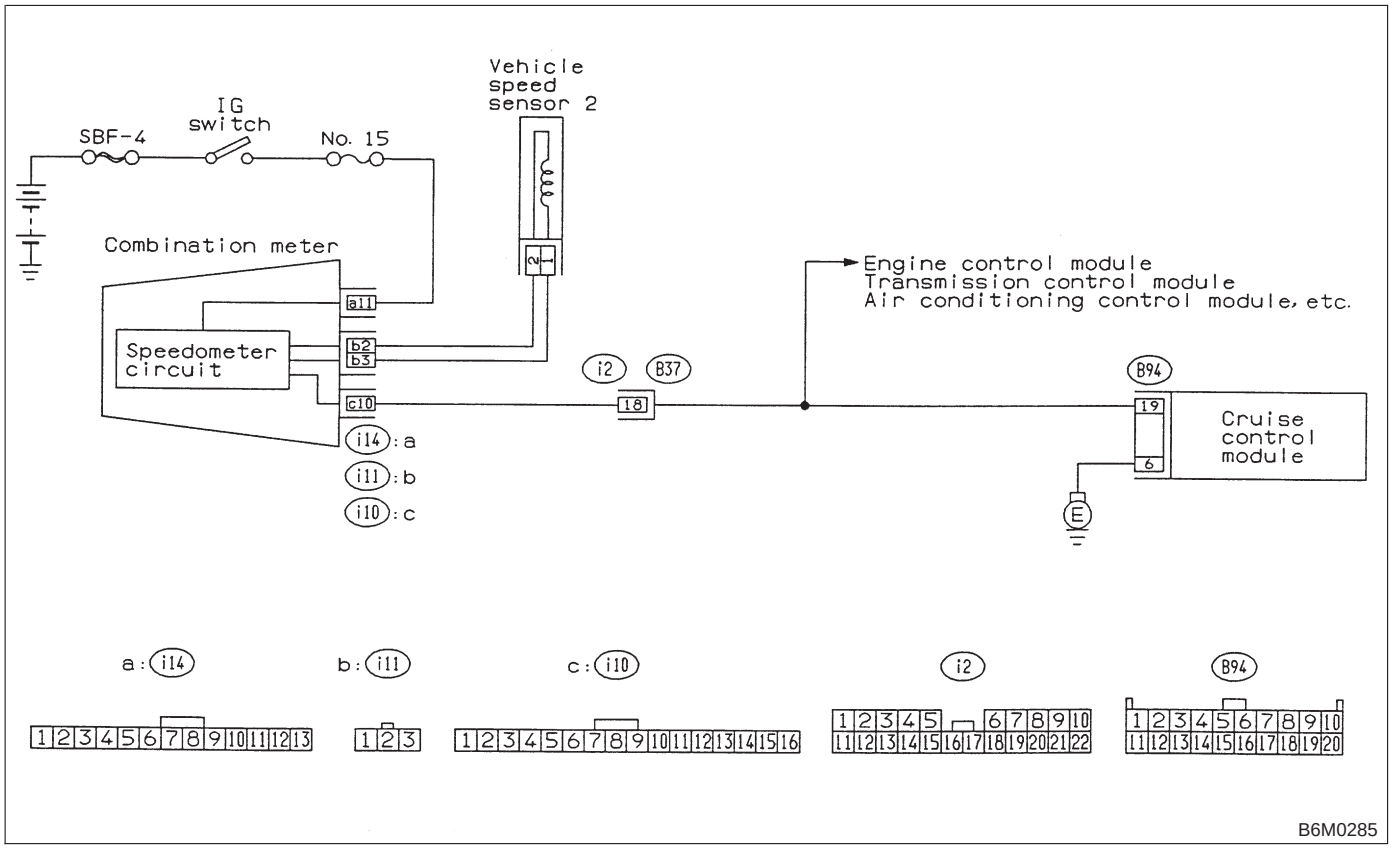
DIAGNOSIS:

- Disconnection or short circuit of vehicle speed sensor 2 system.

TROUBLE SYMPTOM:

- Cruise control cannot be set. (Cancelled immediately.)

WIRING DIAGRAM:



8C1 : CHECK OPERATION OF SPEEDOMETER.

Make sure that speedometer indicates the vehicle speed by driving the vehicle.

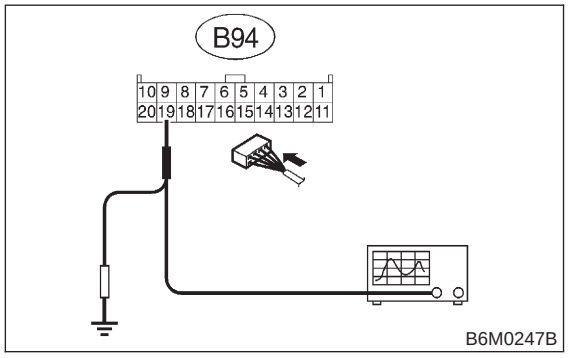
CHECK : ***Does speedometer indicate vehicle speed by driving vehicle?***
YES : Go to step **8C2**.
NO : Repair combination meter circuit.

8C2 : CHECK INPUT SIGNAL FOR CRUISE CONTROL MODULE.

WARNING:
Be careful not to be caught up by the running wheels.

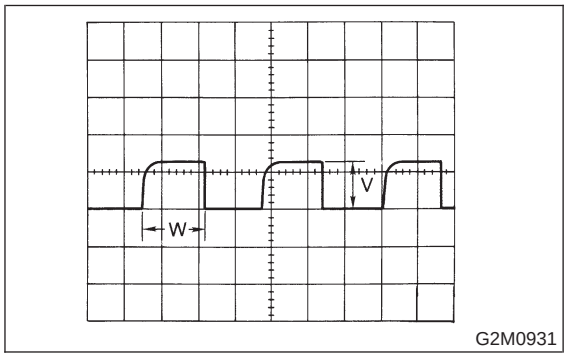
1) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands.
2) Set oscilloscope to cruise control module connector terminals.
3) Start the engine.
4) Shift on the gear position, and keep the vehicle speed at constant.
5) Measure signal voltage.

Connector & terminal
(B94) No. 19 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 2 V?***
YES : Replace cruise control module.
NO : Go to step **8C3**.

NOTE:
● If the vehicle speed increases, the width of amplitude (W) decreases.

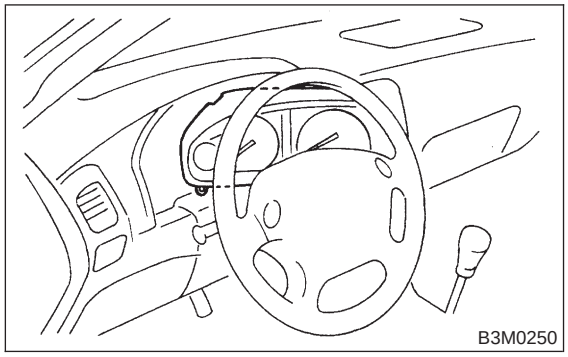


● If oscilloscope is not available, check input signal (vehicle speed signal) by using a select monitor. (Refer to the procedure as described below.)
● Using the select monitor:

1) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands.
2) Turn ignition switch to OFF and set select monitor.
3) Turn ignition switch to ON.
4) Turn cruise control main switch to ON.
5) Set select monitor in “Current Data Display & Save” mode.
6) Drive the vehicle at speed greater than 40 km/h (25 MPH).
7) Check that vehicle speed indication on select monitor and speedometer are equal.
● When there is a disconnection or short circuit in the harness between the meter and the cruise control module, the indicated value will be 0 to 1.0 km/h (0 to 0.6 MPH).

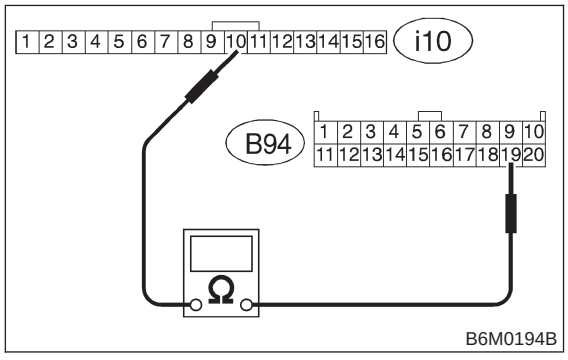
8C3 : PERFORM A CIRCUIT TEST BETWEEN COMBINATION METER AND CRUISE CONTROL MODULE.

1) Turn ignition switch to OFF.
2) Remove combination meter.



3) Disconnect connector from cruise control module.
4) Measure resistance of harness connector between combination meter and cruise control module.

Connector & terminal
(i10) No. 10 — (B94) No. 19:

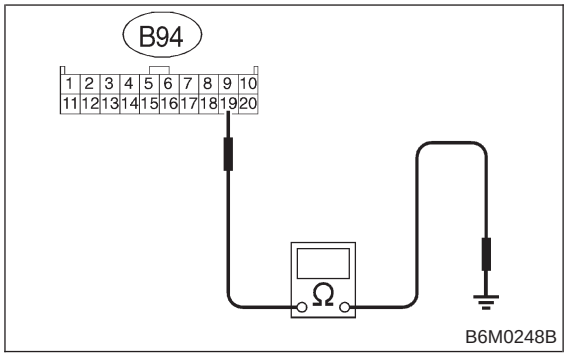


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **8C4**.
NO : Repair or replace harness connector.

8C4 : PERFORM A CIRCUIT TEST BETWEEN COMBINATION METER AND CRUISE CONTROL MODULE.

Measure resistance of harness connector between cruise control module and chassis ground to make sure that circuit does not short.

Connector & terminal
(B94) No. 19 (+) — Chassis ground (−):

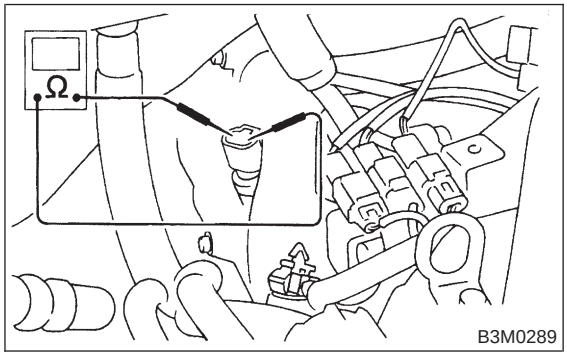


CHECK : ***Is resistance more than 1 MΩ?***
YES : Go to step **8C5**.
NO : Repair or replace harness connector.

8C5 : CHECK VEHICLE SPEED SENSOR 2.

1) Disconnect connector from vehicle speed sensor 2.
2) Measure resistance between terminals of vehicle speed sensor 2.

Terminals
No. 1 — No. 2:



CHECK : ***Is resistance between 350 and 450 Ω?***
YES : Go to step **8C6**.
NO : Replace vehicle speed sensor 2.

8C6 : CHECK VEHICLE SPEED SENSOR 2.

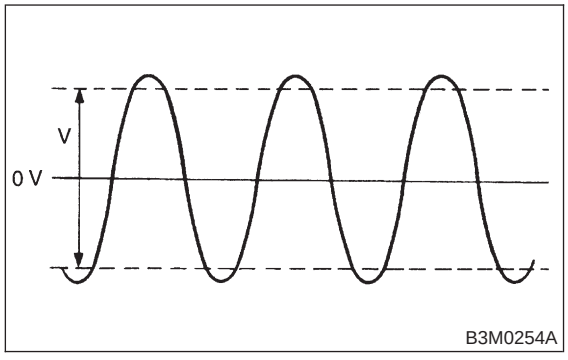
1) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands.

WARNING:
Be careful not to be caught up by the running wheels.

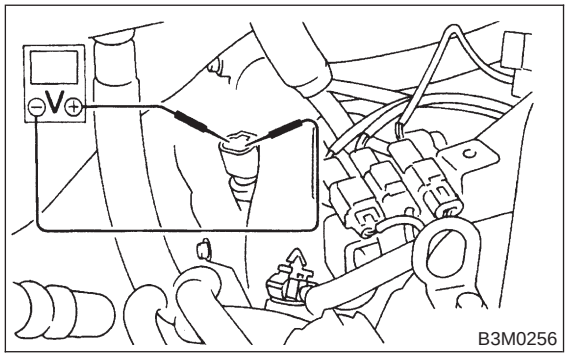
2) Drive the vehicle at speed greater than 20 km/h (12 MPH).
3) Measure voltage between terminals of vehicle speed sensor 2.

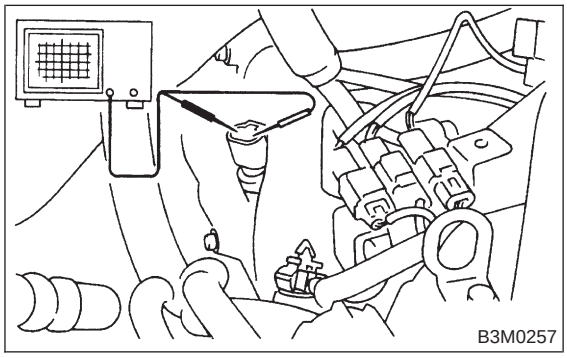
NOTE:
Using an oscilloscope:

(1) Turn ignition switch to OFF.
(2) Set oscilloscope to vehicle speed sensor 2.
(3) Drive the vehicle at speed greater than 20 km/h (12 MPH).
(4) Measure signal voltage.



Terminals
No. 1 — No. 2:





CHECK : ***Is voltage more than 2 V (AC range)?***
YES : Repair or replace combination meter circuit.
NO : Replace vehicle speed sensor 2.

D: DIAGNOSTIC TROUBLE CODE 14 AND 22 (SET/COAST SWITCH, RESUME/ACCEL SWITCH, CANCEL SWITCH)

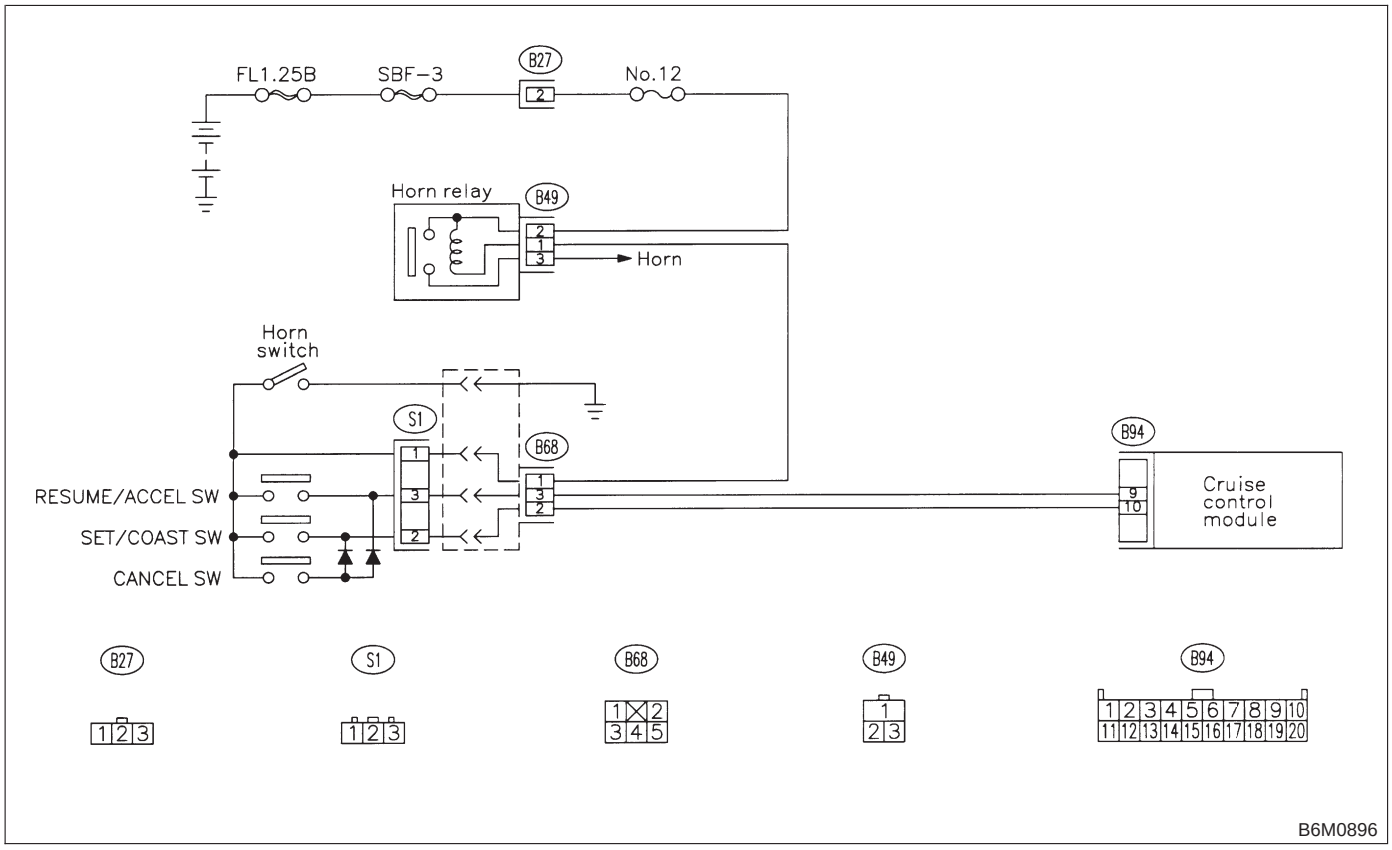
DIAGNOSIS:

- Short circuit inside the SET/COAST SW and RESUME/ACCEL SW.

TROUBLE SYMPTOM:

- Cruise control cannot be set. (Cancelled immediately.)

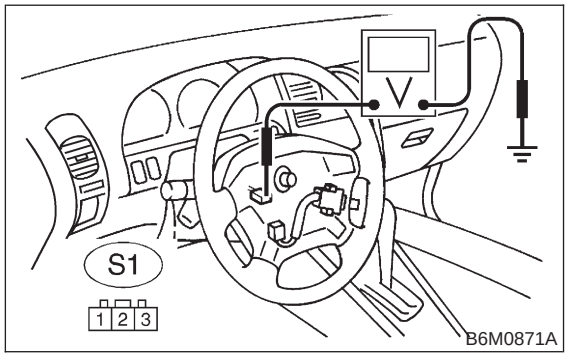
WIRING DIAGRAM:



8D1 : CHECK POWER SUPPLY.

1) Turn ignition switch to ON.
2) Turn cruise control main switch to ON.
3) Set select monitor in “Current Data Display & Save” mode.
4) Check signals for proper operation.
   (1) When pushing the SET/COAST switch:
   The SET/COAST switch shown on the display turns from “OFF” to “ON”.
   (2) When pushing the RESUME/ACCEL switch:
   The RESUME/ACCEL switch shown on the display turns from “OFF” to “ON”.
5) Turn ignition switch to OFF.
6) Disconnect connector from cruise control command switch.
7) Turn ignition switch to ON.
8) Measure voltage between cruise control command switch connector and chassis ground.

Terminals
(S1) No. 1 (+) — Chassis ground (−):

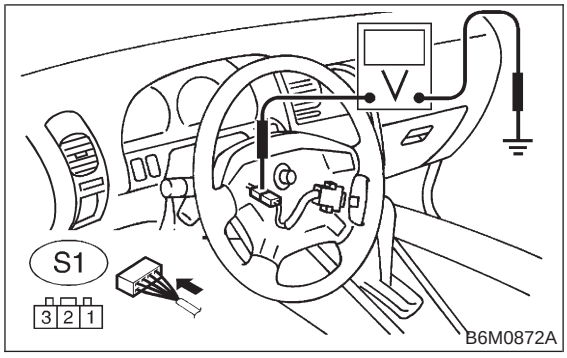


CHECK : ***Is voltage more than 10 V?***
YES : Go to step **8D2**.
NO : Repair or replace wiring harness between fuse & relay box and cruise control command switch.

8D2 : CHECK CRUISE CONTROL COMMAND SWITCH.

1) Turn ignition switch to OFF.
2) Connect connector of cruise control command switch.
3) Turn ignition switch to ON.
4) Measure voltage between cruise control command switch connector and chassis ground.

Terminals
(S1) No. 2 (+) — Chassis ground (−):

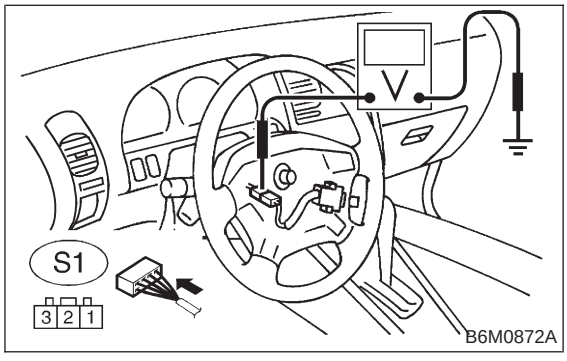


CHECK : ***Is voltage more than 10 V? (When SET/COAST switch is ON.)***
YES : Go to step **8D3**.
NO : Replace cruise control command switch.

8D3 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure voltage between cruise control command switch connector and chassis ground.

Terminals
(S1) No. 3 (+) — Chassis ground (−):

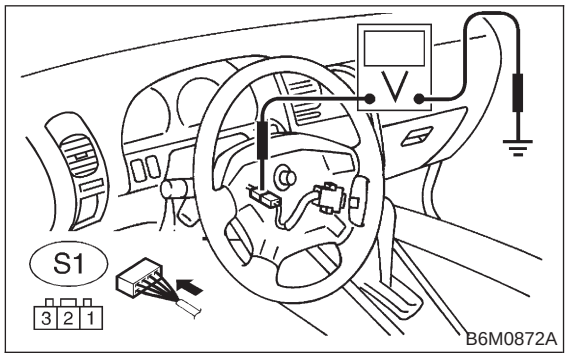


CHECK : ***Is voltage more than 10 V? (When RESUME/ACCEL switch is ON.)***
YES : Go to step **8D4**.
NO : Replace cruise control command switch.

8D4 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure voltage between cruise control command switch connector and chassis ground.

Terminals
(S1) No. 2 (+) — Chassis ground (−):

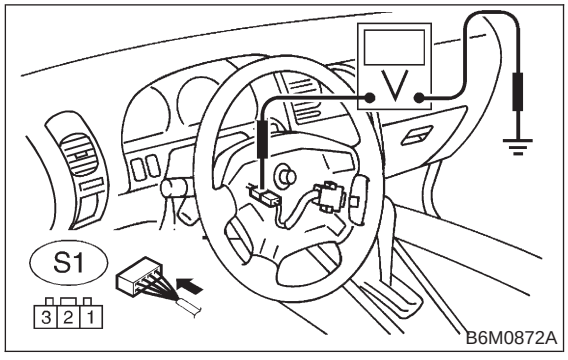


CHECK : ***Is voltage more than 10 V? (When CANCEL switch is ON.)***
YES : Go to step **8D5**.
NO : Replace cruise control command switch.

8D5 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure voltage between cruise control command switch connector and chassis ground.

Terminals
(S1) No. 3 (+) — Chassis ground (−):

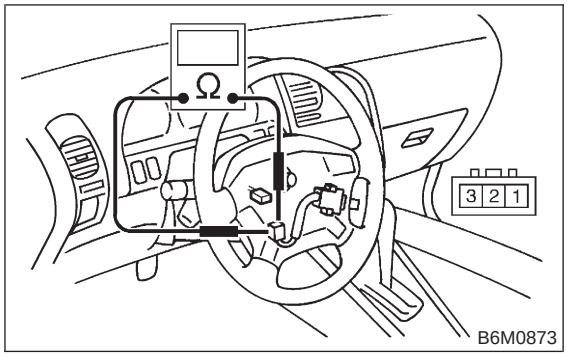


CHECK : ***Is voltage more than 10 V? (When CANCEL switch is ON.)***
YES : Go to step **8D6**.
NO : Replace cruise control command switch.

8D6 : CHECK CRUISE CONTROL COMMAND SWITCH.

1) Turn ignition switch to OFF.
2) Disconnect connector from cruise control command switch.
3) Measure resistance between terminals of cruise control command switch connector (switch side) to check the switch operation.

Terminals
No. 1 — No. 2:

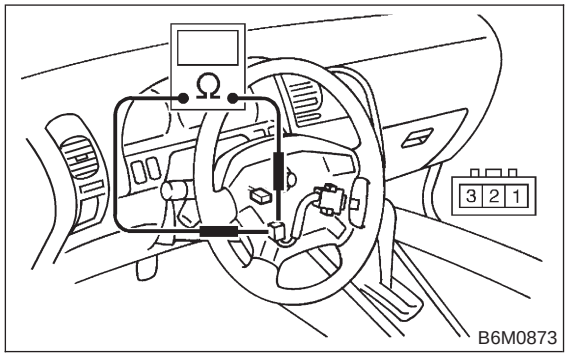


CHECK : ***Is resistance less than 10 Ω? (When SET/COAST switch is ON.)***
YES : Go to step **8D7**.
NO : Replace cruise control command switch.

8D7 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure resistance between terminals of cruise control command switch connector (switch side) to check the switch operation.

Terminals
No. 1 — No. 2:

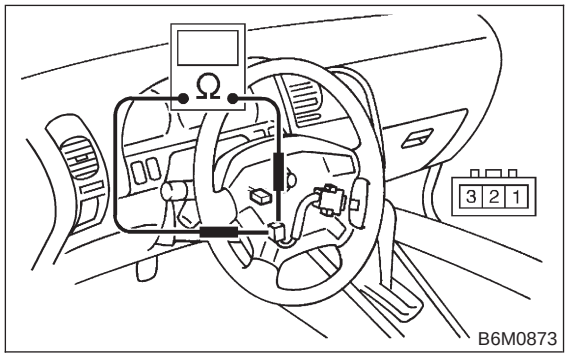


CHECK : ***Is resistance more than 1 MΩ? (When SET/COAST switch is OFF.)***
YES : Go to step **8D8**.
NO : Replace cruise control command switch.

8D8 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure resistance between terminals of cruise control command switch connector (switch side) to check the switch operation.

Terminals
No. 1 — No. 3:

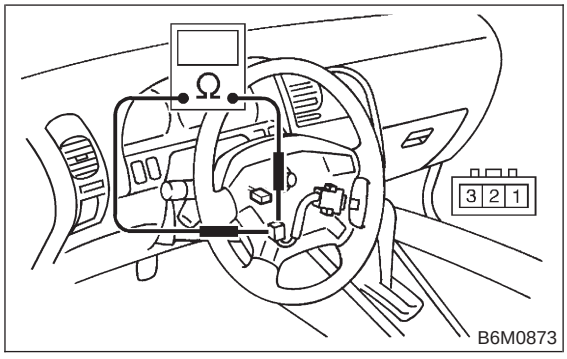


CHECK : ***Is resistance less than 10 Ω? (When RESUME/ACCEL switch is ON.)***
YES : Go to step **8D9**.
NO : Replace cruise control command switch.

8D9 : CHECK CRUISE CONTROL COMMAND SWITCH.

Measure resistance between terminals of cruise control command switch connector (switch side) to check the switch operation.

Terminals
No. 1 — No. 3:

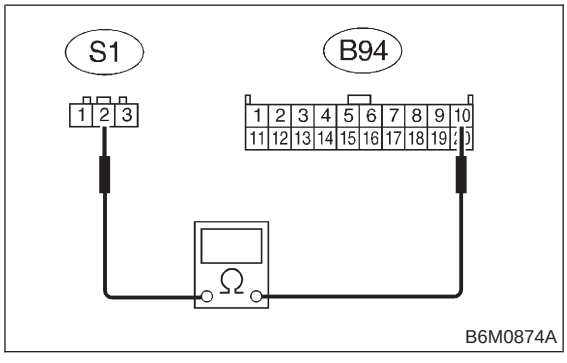


CHECK : ***Is resistance more than 1 MΩ? (When RESUME/ACCEL switch is OFF.)***
YES : Go to step **8D10**.
NO : Replace cruise control command switch.

8D10 : CHECK HARNESS CONNECTOR BETWEEN CRUISE CONTROL COMMAND SWITCH AND CRUISE CONTROL MODULE.

1) Disconnect connector from cruise control module.
2) Measure resistance of harness connector between cruise control command switch and cruise control module.

Connector & terminal
(S1) No. 2 — (B94) No. 10:

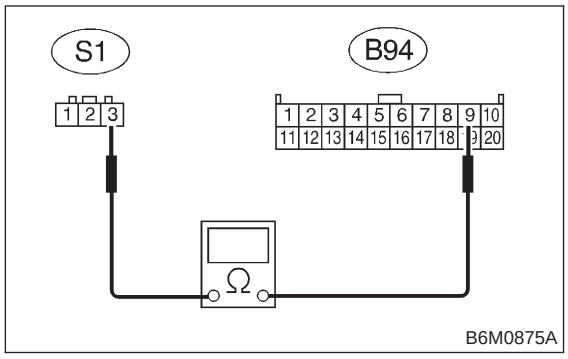


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **8D11**.
NO : Repair or replace wiring harness.

8D11 :	**CHECK HARNESS CONNECTOR BETWEEN CRUISE CONTROL COMMAND SWITCH AND CRUISE CONTROL MODULE.**

Measure resistance of harness connector between cruise control command switch and cruise control module.

Connector & terminal
(S1) No. 3 — (B94) No. 9:



CHECK : ***Is resistance less than 10 Ω?***
YES : Replace cruise control module.
NO : Repair or replace wiring harness.

E: DIAGNOSTIC TROUBLE CODE 23 AND 24 (CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM)

DIAGNOSIS:
● Poor welding of built-in relay of cruise control module.
● Failure of built-in CPU RAM of cruise control module.

TROUBLE SYMPTOM:
● Cruise control is canceled and memorized cruise speed is also canceled.
● Once cruise control is canceled, cruise control cannot be set until the ignition switch and cruise control main switch turns OFF, and then turns ON again.

NOTE:
Check input/output signal and vehicle speed signal with select monitor. When signals are in good condition, failure is in cruise control module. (Check power supply and ground conditions of cruise control module.)

MEMO:

F: DIAGNOSTIC TROUBLE CODE 31, 32 AND 33 (VACUUM PUMP, AIR VALVE, RELEASE VALVE)

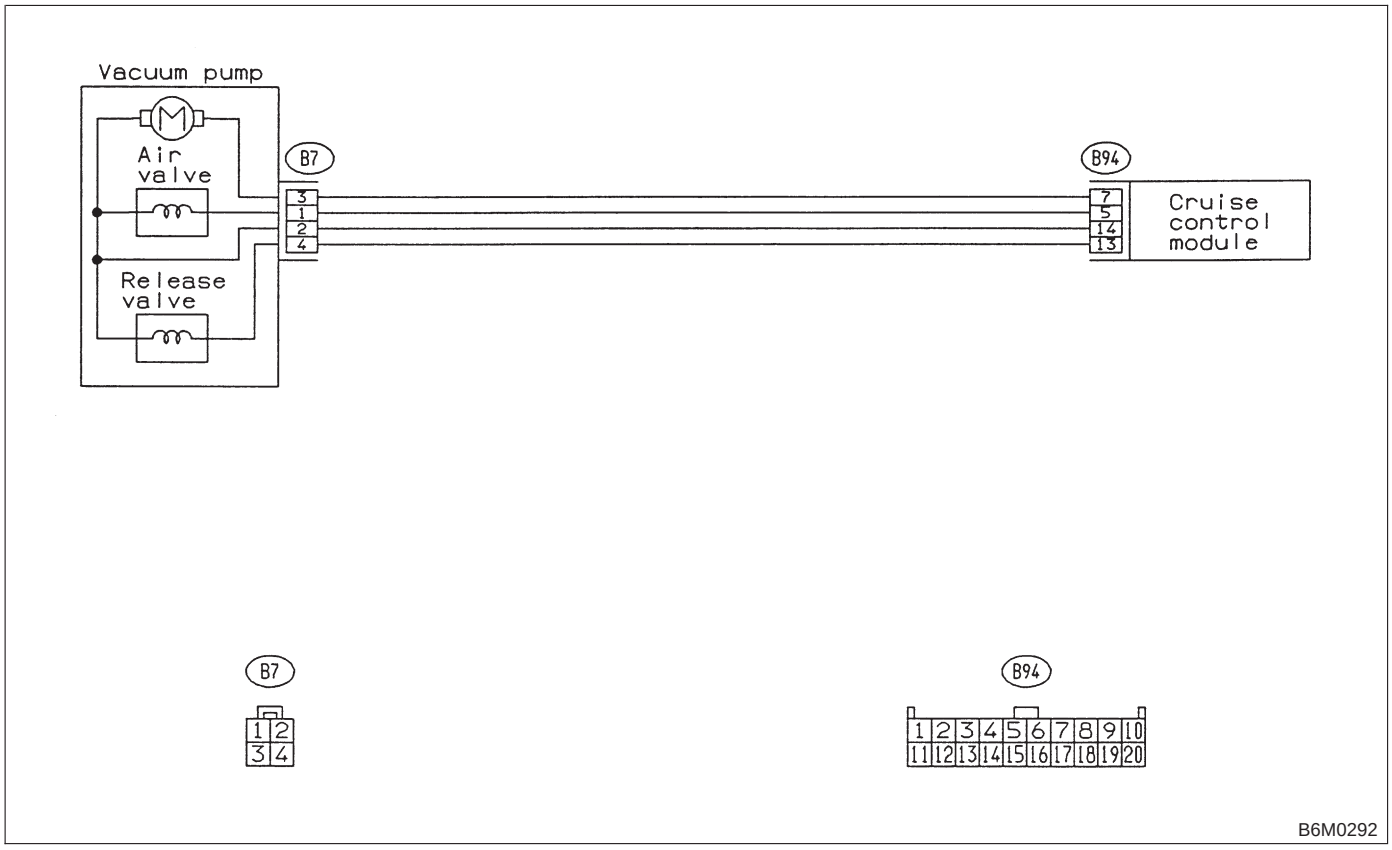
DIAGNOSIS:

- Open or poor contact of vacuum pump motor, air valve and release valve.

TROUBLE SYMPTOM:

- Cruise control cannot be set. (Cancels immediately.)

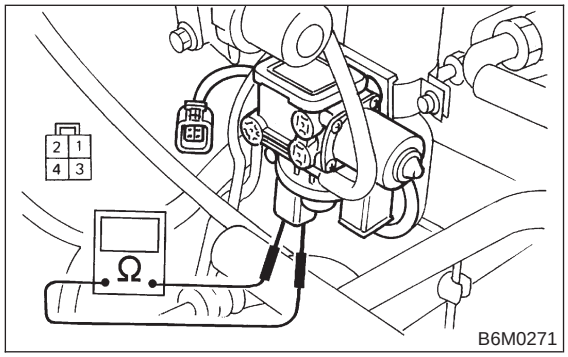
WIRING DIAGRAM:



8F1 : MEASURE RESISTANCE OF VACUUM PUMP MOTOR, AIR VALVE AND RELEASE VALVE.

1) Disconnect connector from vacuum pump and valve.
2) Measure resistance of vacuum pump motor, air valve and release valve.

Terminals
No. 2 — No. 3:

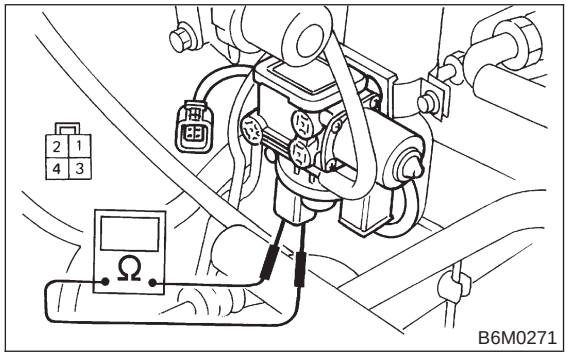


CHECK : ***Is resistance approximately 46 Ω?***
YES : Go to step **8F2**.
NO : Replace vacuum pump and valve.

8F2 : MEASURE RESISTANCE OF VACUUM PUMP MOTOR, AIR VALVE AND RELEASE VALVE.

Measure resistance of vacuum pump motor, air valve and release valve.

Terminals
No. 2 — No. 1:

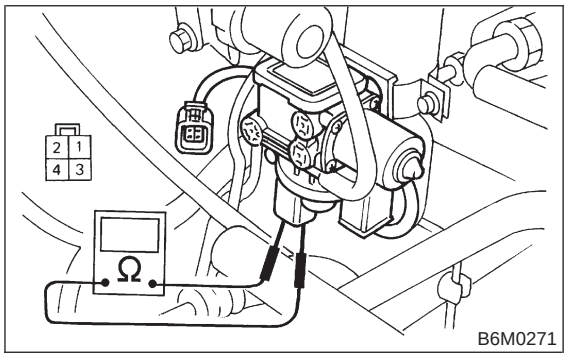


CHECK : ***Is resistance approximately 69 Ω?***
YES : Go to step **8F3**.
NO : Replace vacuum pump and valve.

8F3 : MEASURE RESISTANCE OF VACUUM PUMP MOTOR, AIR VALVE AND RELEASE VALVE.

Measure resistance of vacuum pump motor, air valve and release valve.

Terminals
No. 2 — No. 4:

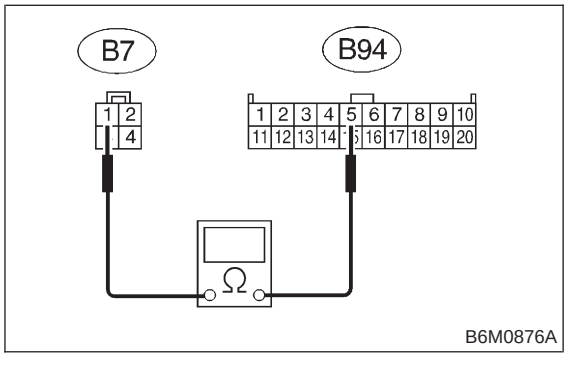


CHECK : ***Is resistance appoximately 69 Ω?***
YES : Go to step **8F4**.
NO : Replace vacuum pump and valve.

8F4 : PERFORM A CIRCUIT TEST IN HARNESS BETWEEN VACUUM PUMP & VALVE AND CRUISE CONTROL MODULE.

1) Disconnect connector from cruise control module.
2) Measure resistance of harness connector between cruise control module, vacuum pump motor, air valve and release valve.

Connector & terminal
(B7) No. 1 — (B94) No. 5:

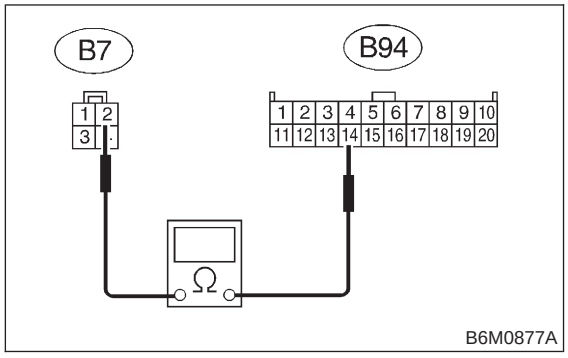


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **8F5**.
NO : Repair or replace wiring harness between vacuum pump & valve and cruise control module.

8F5 : PERFORM A CIRCUIT TEST IN HARNESS BETWEEN VACUUM PUMP & VALVE AND CRUISE CONTROL MODULE.

Measure resistance of harness connector between cruise control module, vacuum pump motor, air valve and release valve.

Connector & terminal
(B7) No. 2 — (B94) No. 14:

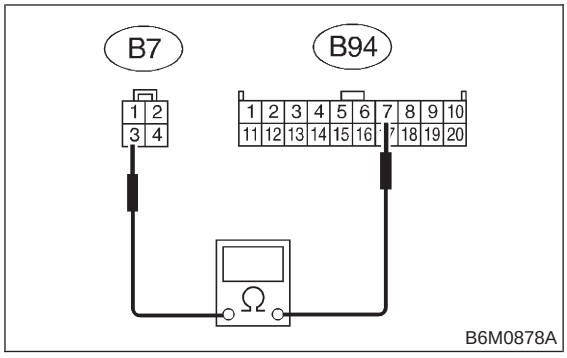


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **8F6**.
NO : Repair or replace wiring harness between vacuum pump & valve and cruise control module.

8F6 : PERFORM A CIRCUIT TEST IN HARNESS BETWEEN VACUUM PUMP & VALVE AND CRUISE CONTROL MODULE.

Measure resistance of harness connector between cruise control module, vacuum pump motor, air valve and release valve.

Connector & terminal
(B7) No. 3 — (B94) No. 7:

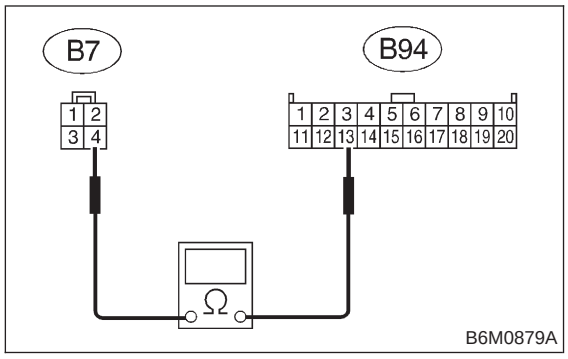


CHECK : ***Is resistance less than 10 Ω?***
YES : Go to step **8F7**.
NO : Repair or replace wiring harness between vacuum pump & valve and cruise control module.

8F7 :	**PERFORM A CIRCUIT TEST IN HARNESS BETWEEN VACUUM PUMP & VALVE AND CRUISE CONTROL MODULE.**

Measure resistance of harness connector between cruise control module, vacuum pump motor, air valve and release valve.

Connector & terminal
(B7) No. 4 — (B94) No. 13:



CHECK : ***Is resistance less than 10 Ω?***
YES : Replace cruise control module.
NO : Repair or replace wiring harness between vacuum pump & valve and cruise control module.

9. Diagnostics Chart with Select Monitor

A: FUNCTION MODE

NOTE:
Applicable select monitor cartridge:
No. 24082AA010

Select the “Cruise Control” system using the select monitor and set the “Current Data Display & Save” mode. The following parameters will then appear on the display.

- Vehicle Speed

The current vehicle speed is shown on the display.

- Stop Lamp Switch

When the brake pedal is depressed, the stop lamp switch shown on the display turns from “OFF” to “ON”.

- Brake Switch

When the brake pedal is depressed, the brake switch shown on the display turns from “OFF” to “ON”.

- “SET/COAST” Switch

When the cruise control command switch is placed in the “SET/COAST” position, the SET/COAST switch shown on the display turns from “OFF” to “ON”.

- “RESUME/ACCEL” Switch

When the cruise control command switch is placed in the “RESUME/ACCEL” position, the RESUME/ACCEL switch shown on the display turns from “OFF” to “ON”.

- Clutch/Inhibitor Switch

When the clutch pedal is depressed, the clutch/inhibitor switch shown on the display turns from “ON” to “OFF”. (MT)
When the selector lever is moved from the “N” or “P” position to any other position, the clutch/inhibitor switch shown on the display turns from “ON” to “OFF”. (AT)

MEMO:

BODY ELECTRICAL SYSTEM (ELECTRICAL PARTS) 6-2b

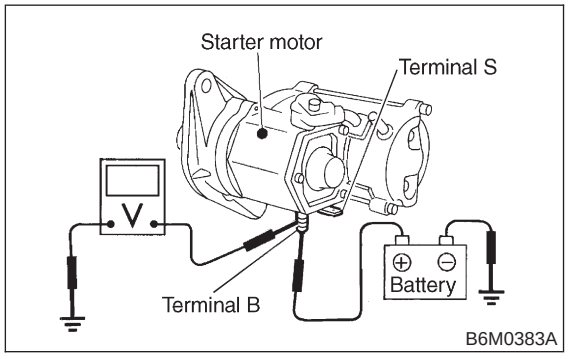
1. Starter Interlock System (MT Model)

A: DIAGNOSTICS PROCEDURE

1A1 : CHECK MAIN POWER SUPPLY FOR STARTER MOTOR.

Measure voltage between starter motor terminal B and chassis ground.

Connector & terminal
Terminal B (+) — Chassis ground (−):

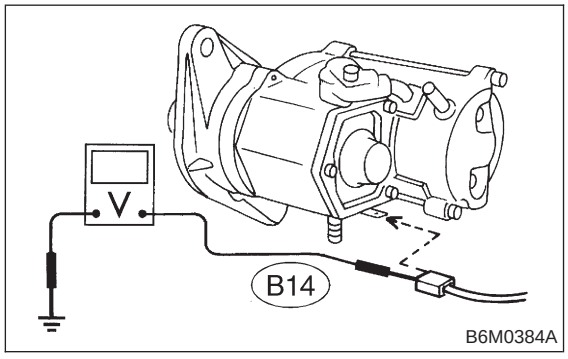


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **1A2**.
NO : Repair wiring harness.

1A2 : CHECK POWER SUPPLY FOR MAGNET COIL OF STARTER MOTOR.

1) Disconnect all connectors from starter motor.
2) Turn ignition switch to ST (START).
3) Depress clutch pedal.
4) Measure voltage between starter motor terminal S connector and chassis ground.

Connector & terminal
(B14) (+) — Chassis ground (−):

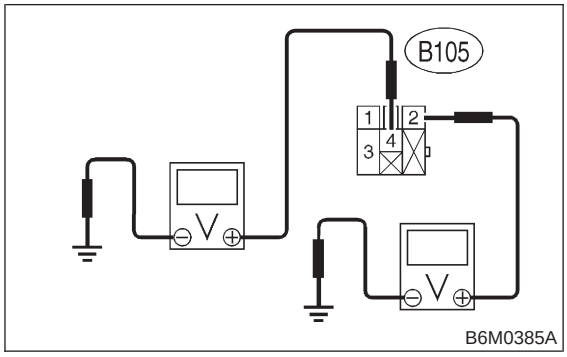


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **1A3**.
NO : Repair or replace starter motor.

1A3 : CHECK POWER SUPPLY FOR STARTER INTERLOCK RELAY.

1) Disconnect all connectors from starter motor.
2) Disconnect connector of starter interlock relay.
3) Turn ignition switch to ST (START).
4) Measure voltage between starter interlock relay connector and chassis ground.

Connector & terminal
(B105) No. 2 (+) — Chassis ground (−):

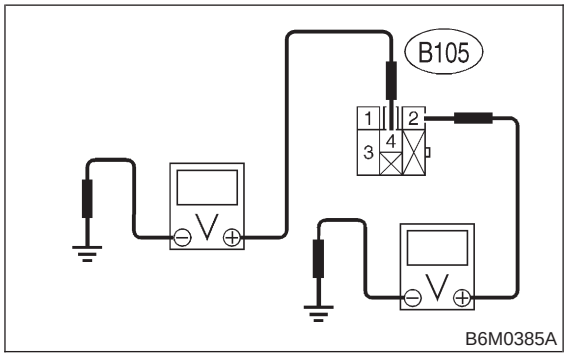


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **1A4**.
NO : Repair wiring harness.

1A4 : CHECK POWER SUPPLY FOR STARTER INTERLOCK RELAY.

Measure voltage between starter interlock relay connector and chassis ground.

Connector & terminal
(B105) No. 4 (+) — Chassis ground (−):

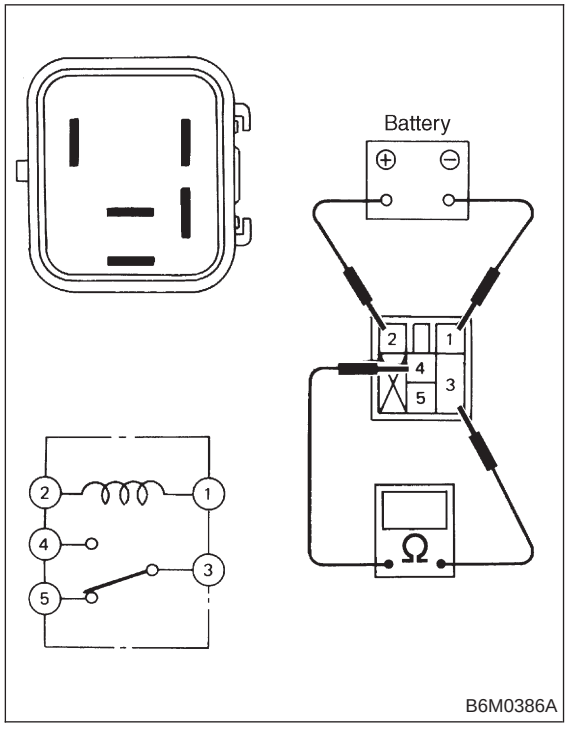


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **1A5**.
NO : Repair wiring harness. Go to step **1A5**.

1A5 : CHECK STARTER INTERLOCK RELAY.

1) Disconnect connector of starter interlock relay.
2) Connect battery to terminal No. 2 and ground terminal No. 1.
3) Check continuity between terminals.

When current flows.	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.

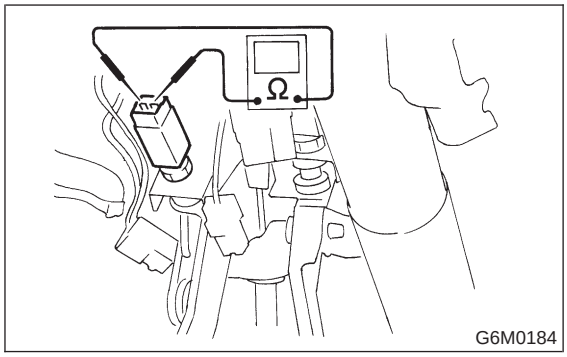


CHECK : ***Is starter interlock relay normal?***
YES : Go to step **1A6**.
NO : Replace starter interlock relay.

1A6 : CHECK CLUTCH SWITCH.

1) Disconnect connector of clutch switch.
2) Check continuity between terminals when clutch pedal is released.

Terminals
No. 1 — No. 2:

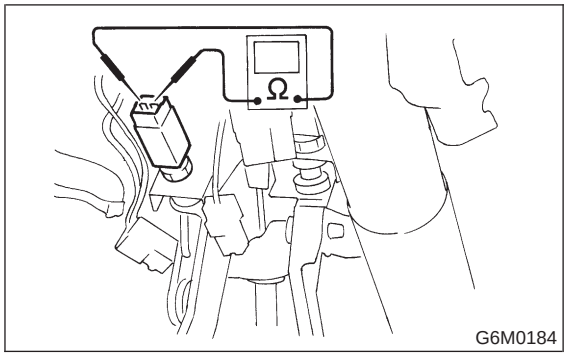


CHECK : ***Is the resistance less than 10 Ω? (With pedal released)***
YES : Go to step **1A7**.
NO : Adjust or replace clutch switch.

1A7 : CHECK CLUTCH SWITCH.

Check continuity between terminals when clutch pedal is depressed.

Terminals
No. 1 — No. 2:



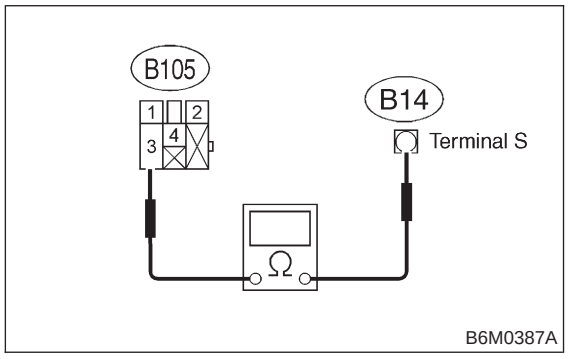
CHECK : ***Is the resistance more than 1 MΩ? (With pedal depressed)***
YES : Go to step **1A8**.
NO : Adjust or replace clutch switch.

1A8 : CHECK HARNESS CONNECTOR BETWEEN STARTER INTERLOCK RELAY AND STARTER MOTOR.

1) Disconnect connectors of starter interlock relay and starter motor.

2) Measure resistance of harness connector between starter interlock relay and starter motor.

Connector & terminal
(B105) No. 3 — (B14):

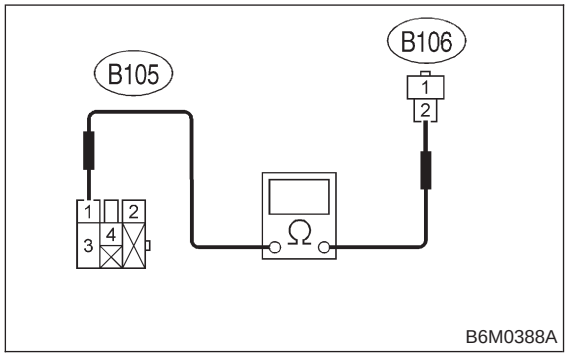


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **1A9**.
NO : Repair wiring harness.

1A9 : CHECK HARNESS CONNECTOR BETWEEN STARTER INTERLOCK RELAY AND CLUTCH SWITCH.

1) Disconnect connectors of starter interlock relay and clutch switch.
2) Measure resistance of harness connector between starter interlock relay and clutch switch.

Connector & terminal
(B105) No. 1 — (B106) No. 2:

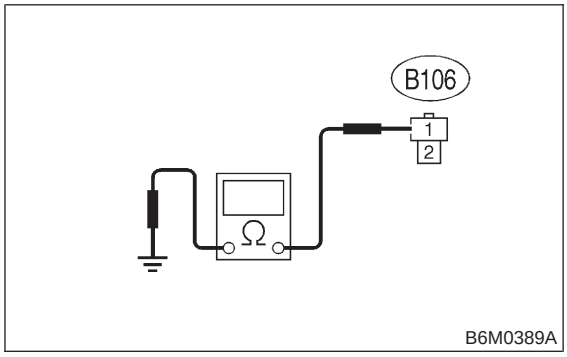


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **1A10**.
NO : Repair wiring harness.

1A10 : CHECK GROUND CIRCUIT OF CLUTCH SWITCH.

1) Disconnect connector of clutch switch.
2) Measure resistance of harness connector between clutch switch and chassis ground.

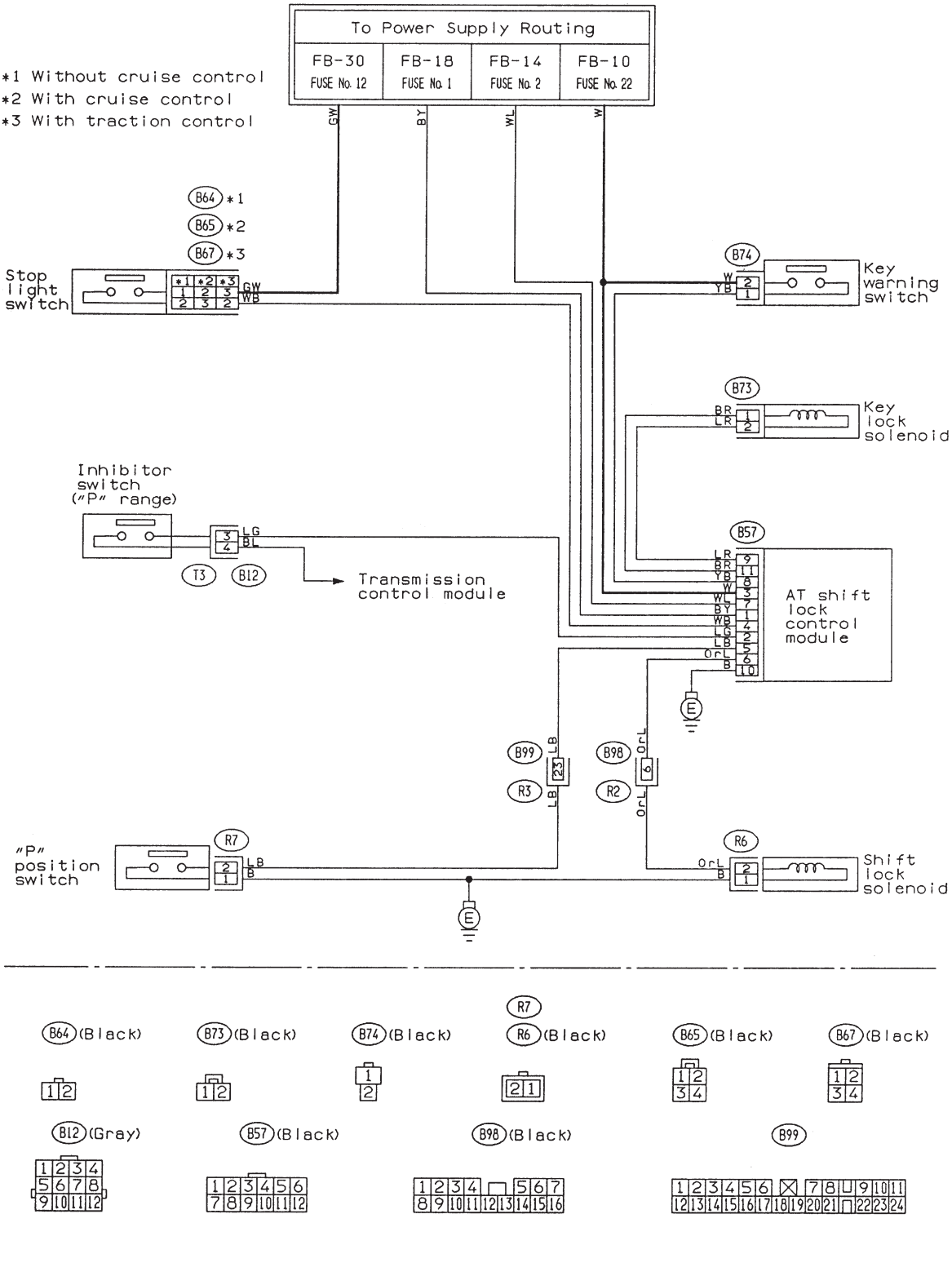
Connector & terminal
(B106) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the resistance less than 10 Ω?***
YES : System is normal.
NO : Repair wiring harness.

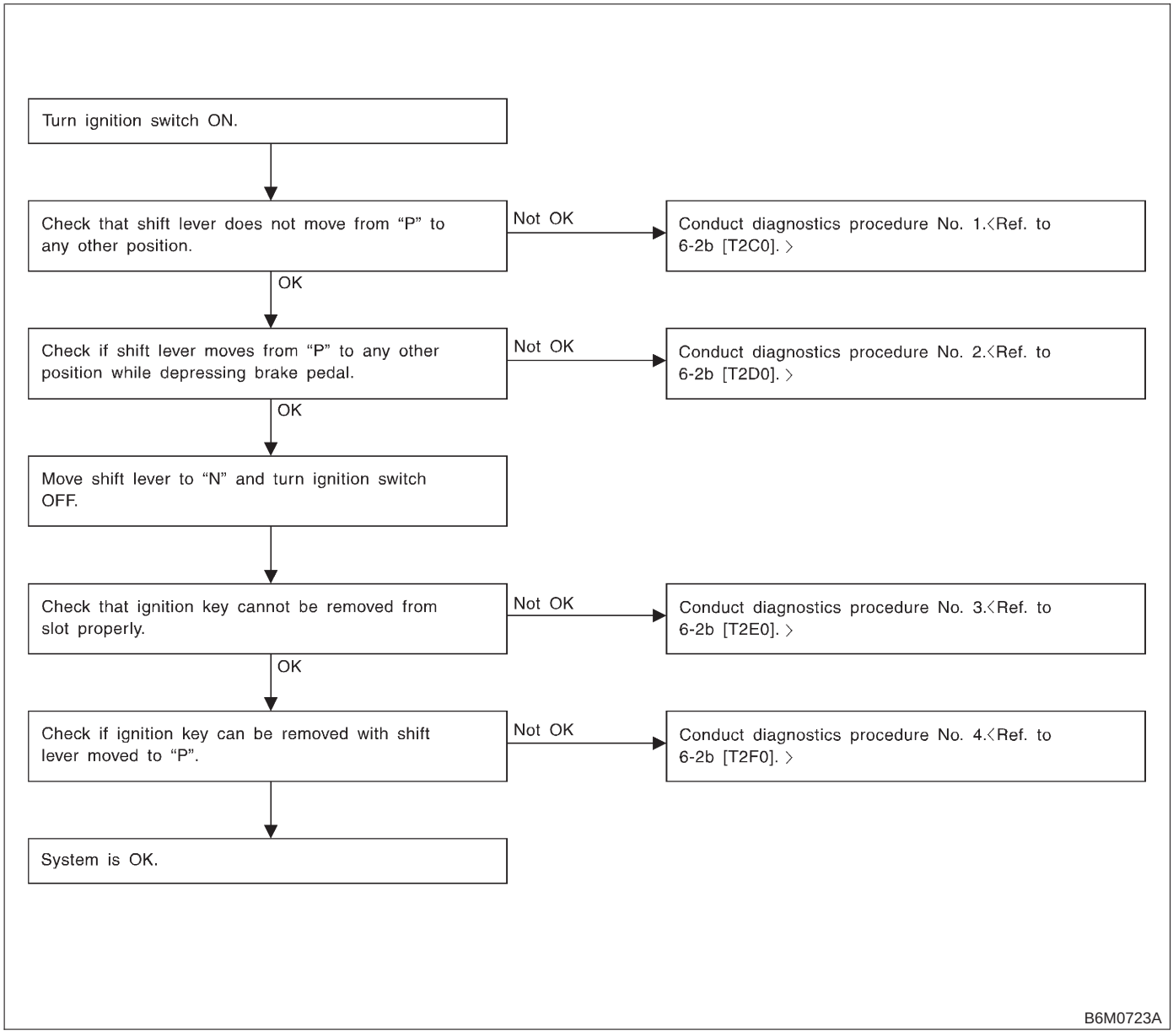
2. AT Shift Lock System

A: WIRING DIAGRAM

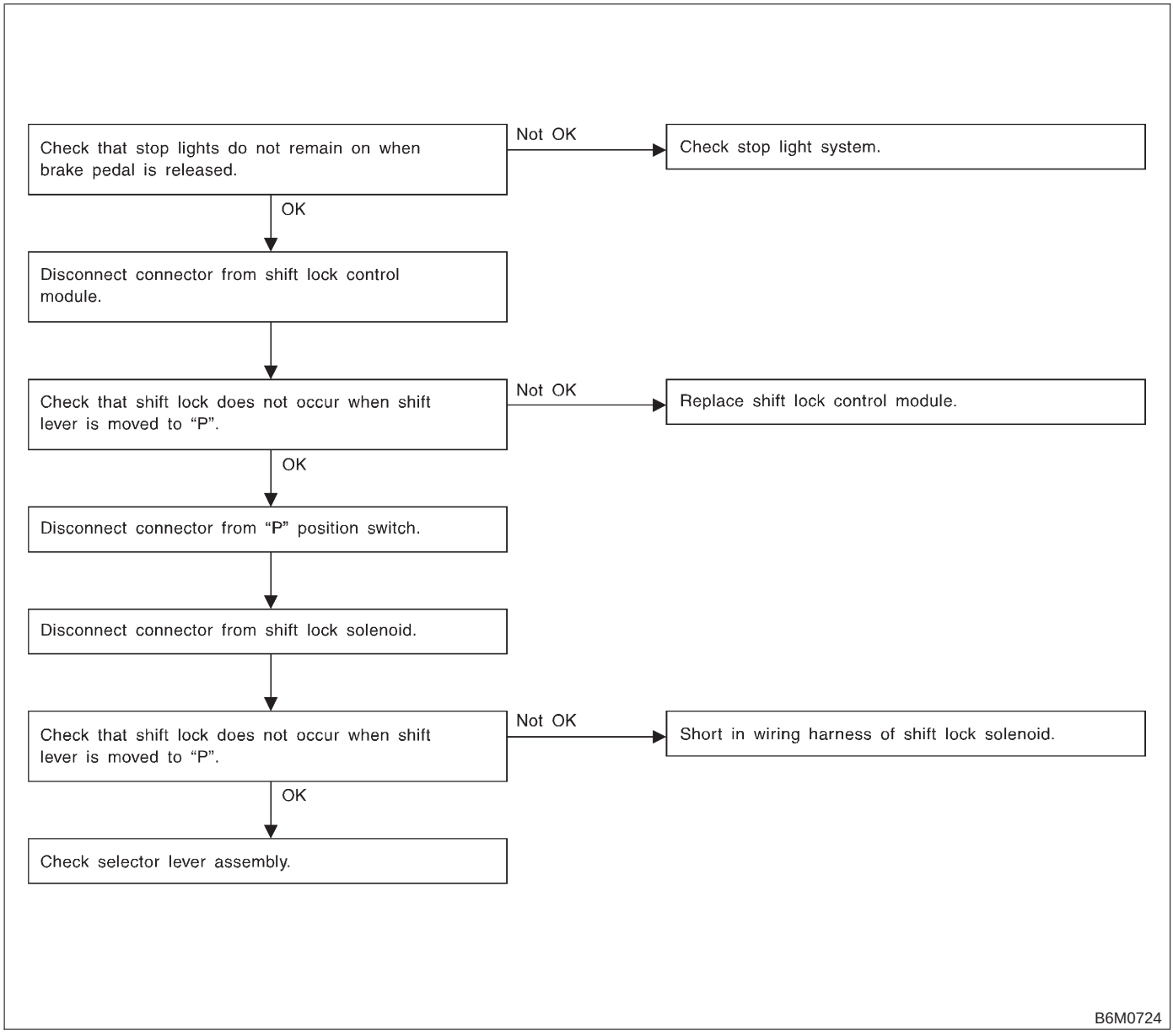


B6M0466

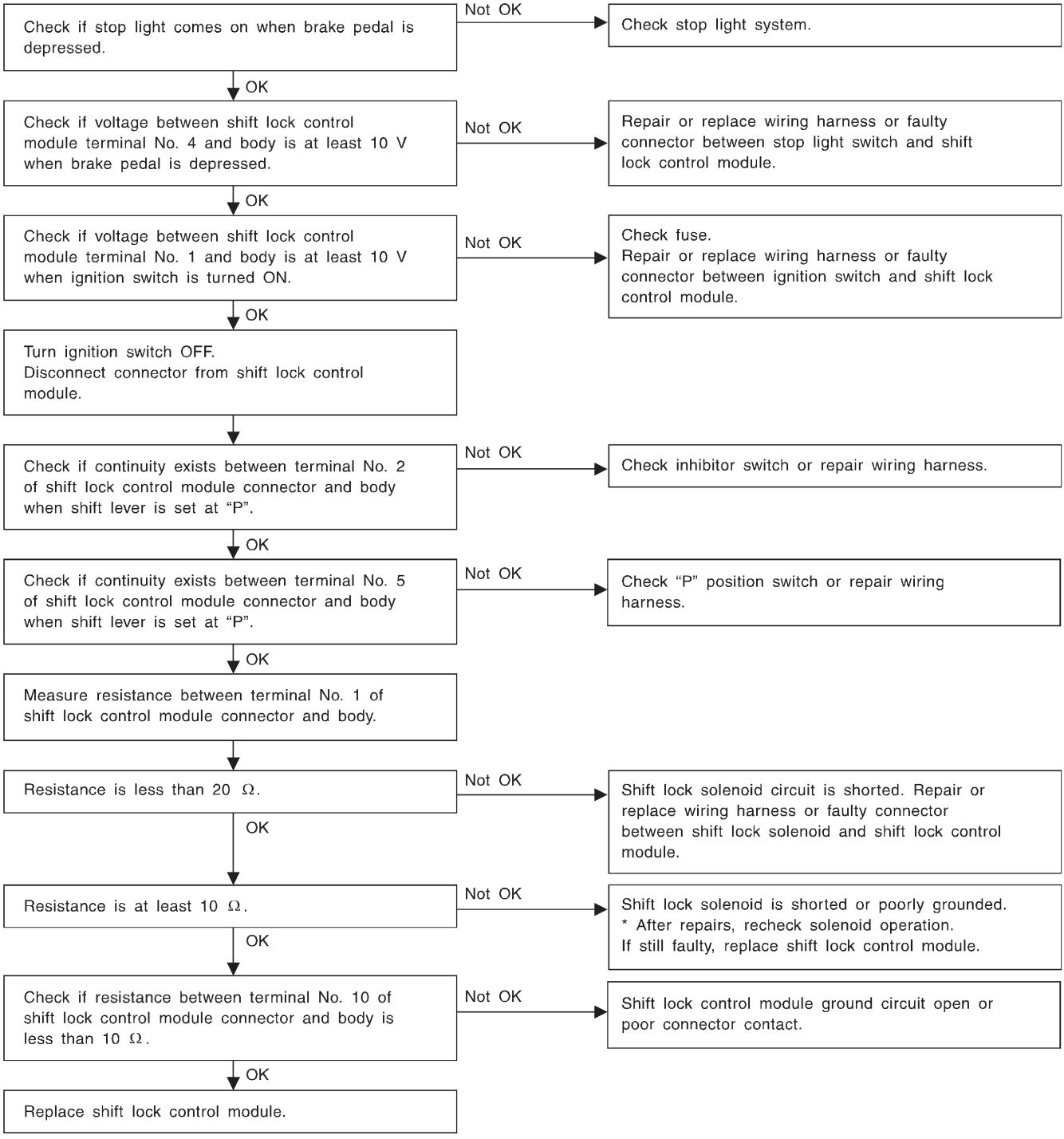
B: BASIC DIAGNOSTICS CHART



C: DIAGNOSTICS PROCEDURE NO. 1

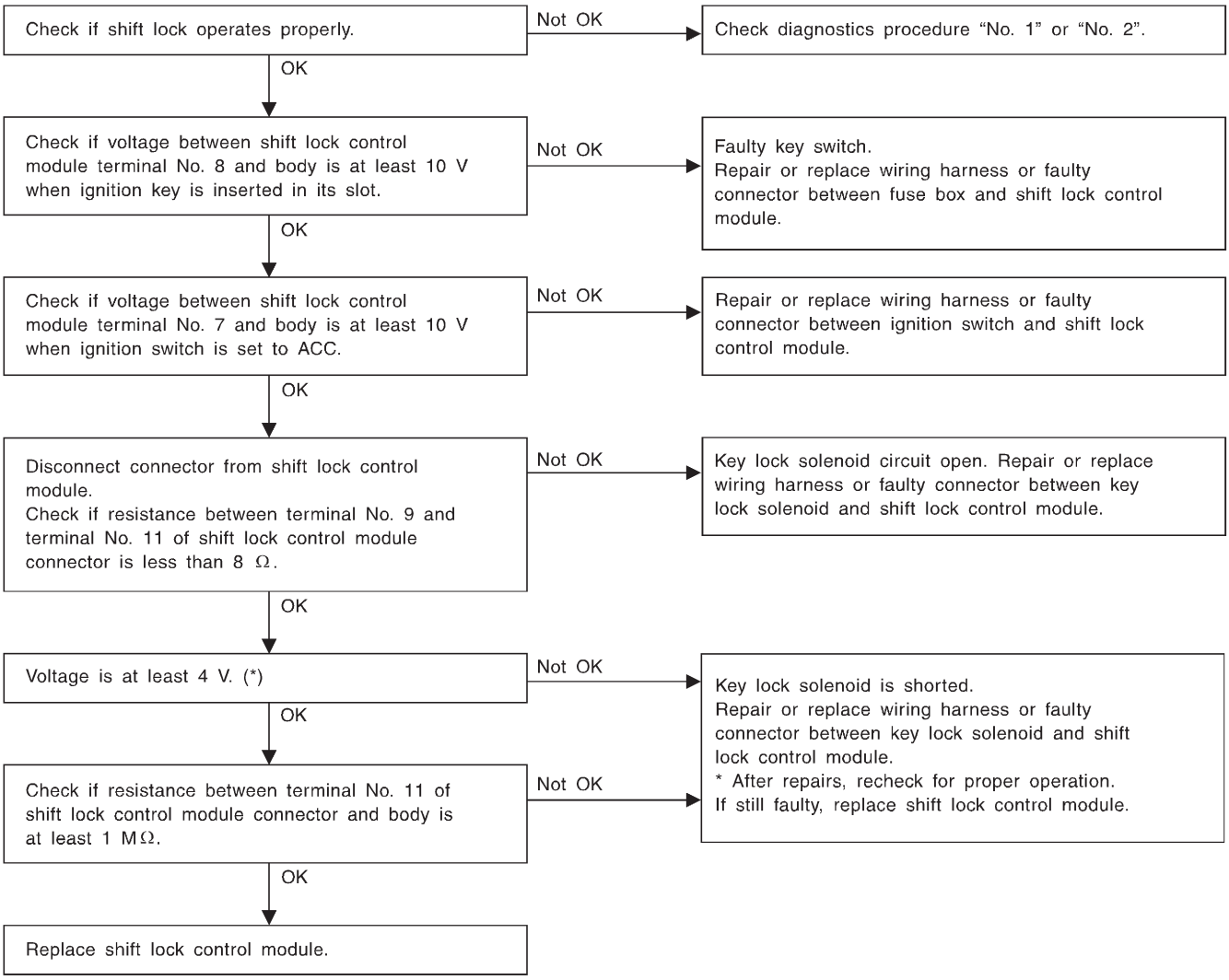


D: DIAGNOSTICS PROCEDURE NO. 2 (SHIFT LOCK DOES NOT RELEASE.)



B6M0725

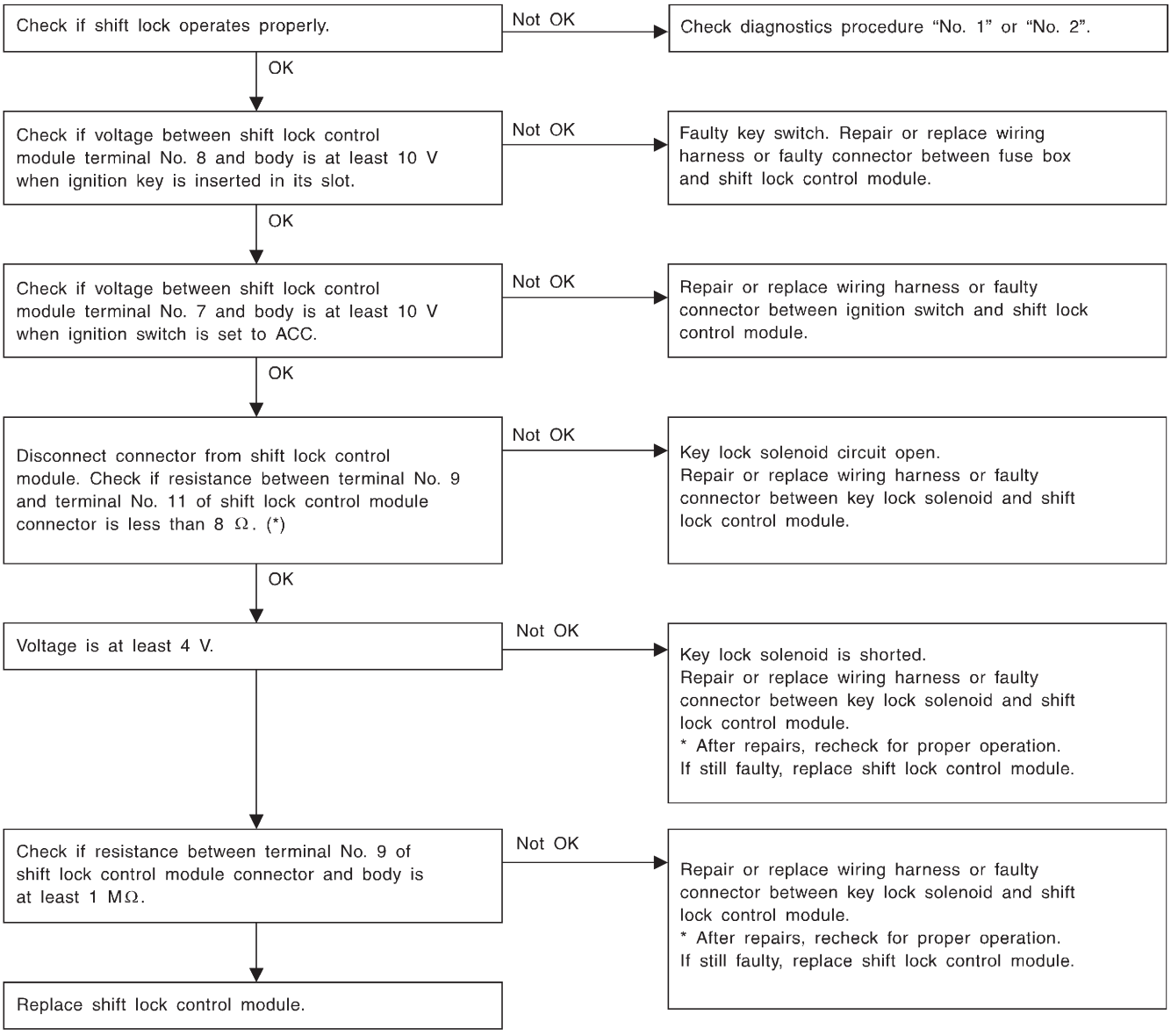
E: DIAGNOSTICS PROCEDURE NO. 3 (KEY INTERLOCK DOES NOT OPERATE.)



*** : When conducting operational checks of the key lock solenoid, do not apply 12 V to solenoid for more than one second, since this may break solenoid circuit.**

B6M0726

F: DIAGNOSTICS PROCEDURE NO. 4 (KEY INTERLOCK DOES NOT RELEASE.)



*** : When conducting operational checks of the key lock solenoid, do not apply 12 V to solenoid for more than one second, since this may break solenoid circuit.**

B6M0727

3. Combination Meter

A: DIAGNOSTICS PROCEDURE

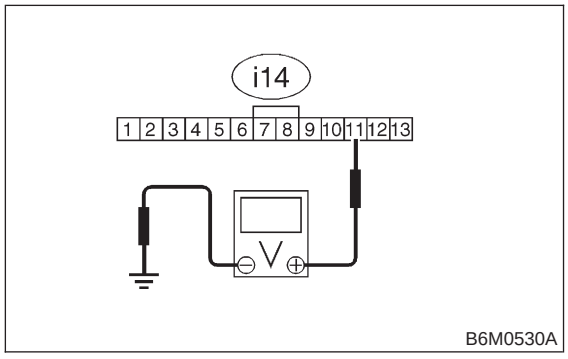
If speedometer does not operate, or operates abnormally, check combination meter circuit.

CAUTION:
Make sure that trouble code of vehicle speed sensor 2 system appears in electrical system on-board diagnosis.

3A1 : CHECK POWER SUPPLY FOR COMBINATION METER.

1) Remove combination meter.
2) Turn ignition switch to ON.
3) Measure voltage at combination meter connector terminal.

Connector & terminal
(i14) No. 11 (+) — Chassis ground (−):

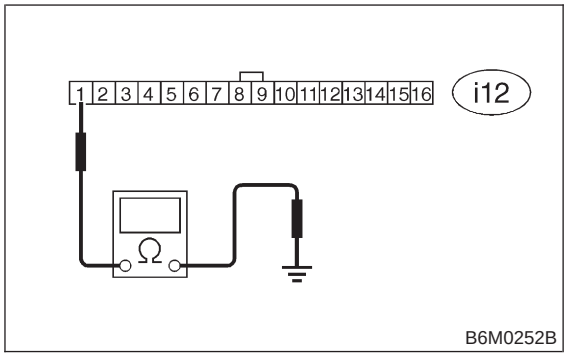


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **3A2**.
NO : Repair wiring harness.

3A2 : CHECK GROUND CIRCUIT OF COMBINATION METER.

1) Turn ignition switch to OFF.
2) Measure resistance of harness connector between combination meter and chassis ground.

Connector & terminal
(i12) No. 1 (+) — Chassis ground (−):

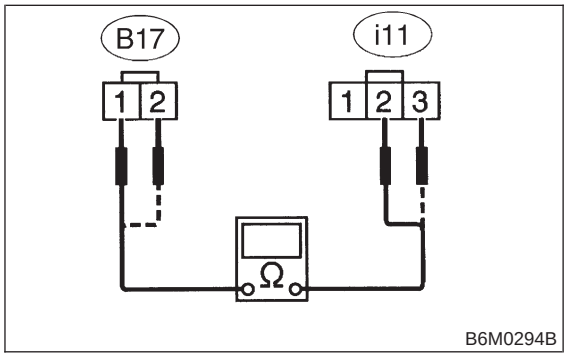


CHECK : ***Is the voltage less than 10 Ω?***
YES : Go to step **3A3**.
NO : Repair wiring harness.

3A3 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND VEHICLE SPEED SENSOR 2.

1) Disconnect connector from vehicle speed sensor 2.
2) Measure resistance of harness connector between vehicle speed sensor 2 and combination meter.

Connector & terminal
(B17) No. 1 — (i11) No. 2:

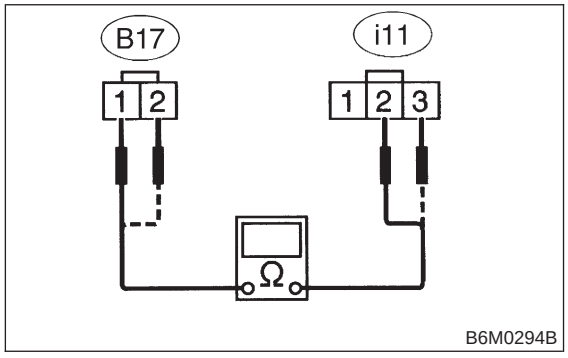


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **3A4**.
NO : Repair wiring harness. Go to step **3A4**.

3A4 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND VEHICLE SPEED SENSOR 2.

Measure resistance of harness connector between vehicle speed sensor 2 and combination meter.

Connector & terminal
(B17) No. 2 — (i11) No. 3:



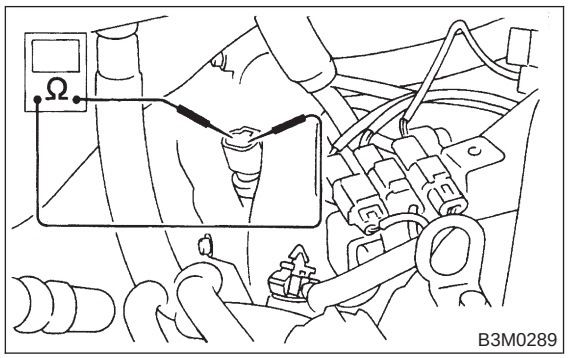
CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **3A5**.
NO : Repair wiring harness.

3A5 : CHECK VEHICLE SPEED SENSOR 2.

NOTE:
● If resistance between terminals of vehicle speed sensor 2 is out of specification, the sensor may have a failure.
● If resistance is OK and voltage between terminals of vehicle speed sensor 2 is out of specification, mechanical trouble may be present between vehicle speed sensor 2 and speedometer shaft in transmission.

1) Disconnect connector from vehicle speed sensor 2.
2) Measure resistance between terminals of vehicle speed sensor 2.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance between 350 and 450 Ω?***
YES : Go to step **3A6**.
NO : Replace vehicle speed sensor 2.

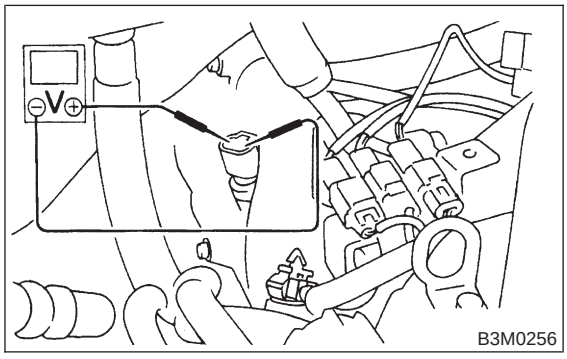
3A6 : CHECK VEHICLE SPEED SENSOR 2.

1) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands.

WARNING:
Be careful not to be caught up by the running wheels.

2) Drive the vehicle at speed greater than 20 km/h (12 MPH).
3) Measure voltage between terminals of vehicle speed sensor 2.

Terminals
No. 1 — No. 2:



CHECK : ***Is the voltage more than 5 V? (AC range)***
YES : Repair or replace speedometer.
NO : Replace vehicle speed sensor 2.

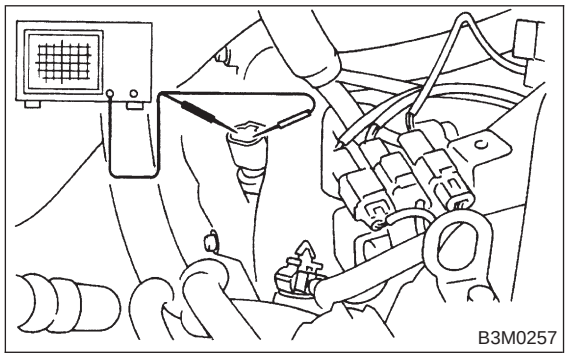
3A7 : CHECK VEHICLE SPEED SENSOR 2.

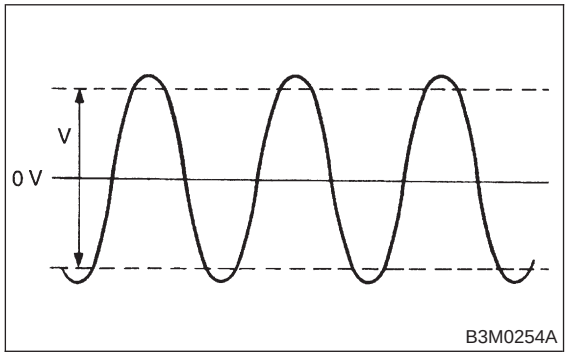
NOTE:
Using an oscilloscope:

1) Turn ignition switch to OFF.
2) Set oscilloscope to vehicle speed sensor 2.
3) Drive the vehicle at speed greater than 20 km/h (12 MPH).

4) Measure signal voltage.

Terminals
No. 1 — No. 2:





CHECK : ***Is the voltage more than 5 V?***
YES : Repair or replace speedometer.
NO : Replace vehicle speed sensor 2.

4. Power Window

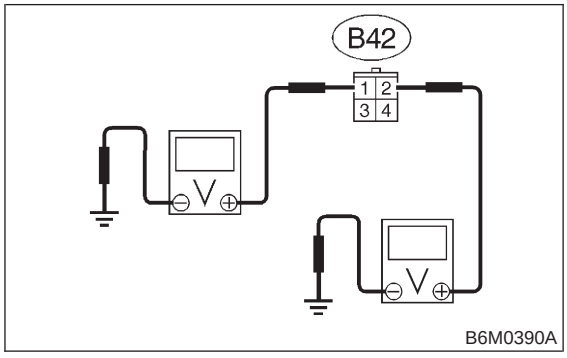
A: DIAGNOSTICS PROCEDURE-1

TROUBLE SYMPTOM
All door windows do not operate.

4A1 : CHECK FUSE AND POWER SUPPLY.

1) Check fuse No. 15.
2) Disconnect connector of power window relay.
3) Turn ignition switch to ON.
4) Measure voltage between power window relay connector and chassis ground.

Connector & terminal
(B42) No. 1 (+) — Chassis ground (−):

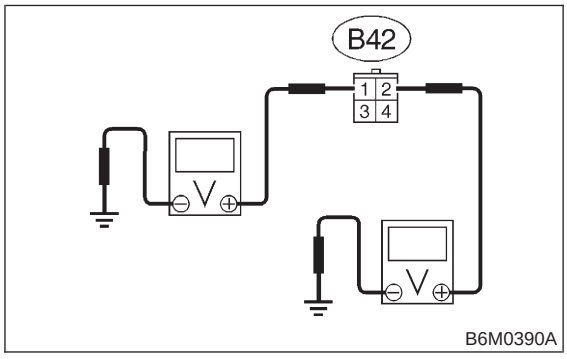


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **4A2**.
NO : Repair wiring harness or replace fuse or circuit breaker. Go to step **4A2**.

4A2 : CHECK FUSE AND POWER SUPPLY.

Measure voltage between power window relay connector and chassis ground.

Connector & terminal
(B42) No. 2 (+) — Chassis ground (−):



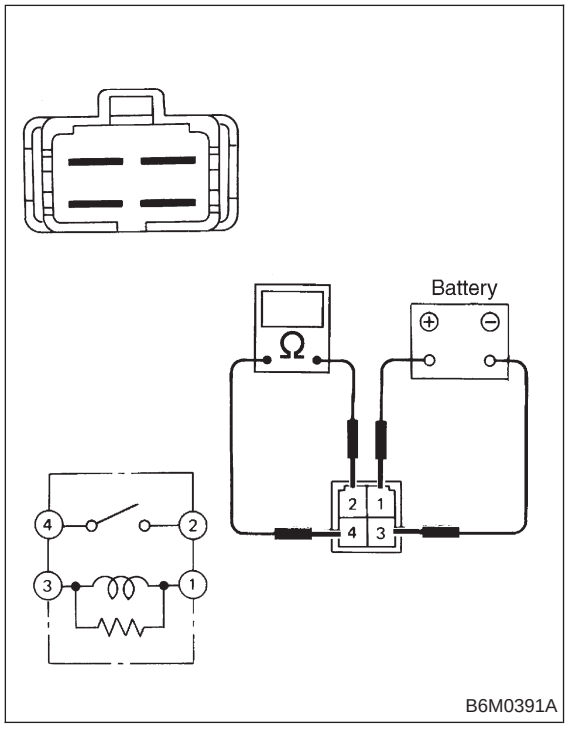
CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **4A3**.

NO : Repair wiring harness or replace fuse or circuit breaker.

4A3 : CHECK POWER WINDOW RELAY.

1) Disconnect connector of power window relay.
2) Connect battery to terminal No. 1 and ground terminal No. 3.
3) Check continuity between terminals.

When current flows.	Between terminals No. 2 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 2 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 3	Continuity exists.

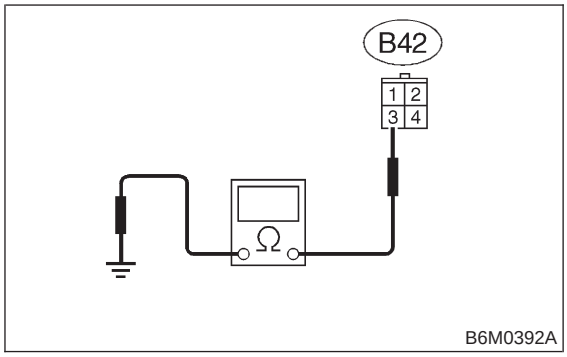


CHECK : ***Is power window relay normal?***
YES : Go to step **4A4**.
NO : Replace power window relay.

4A4 : CHECK GROUND CIRCUIT OF POWER WINDOW RELAY.

1) Disconnect connector of power window relay.
2) Measure resistance of harness connector between power window relay and chassis ground.

Connector & terminal
(B42) No. 3 (+) — Chassis ground (−):

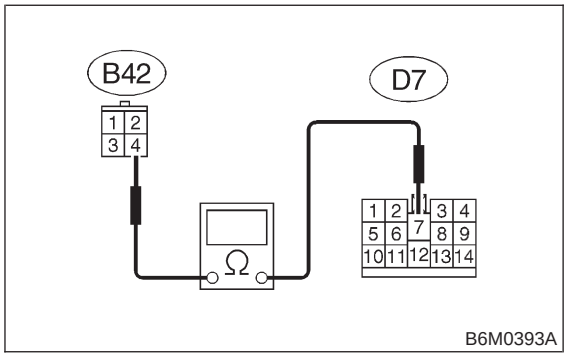


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **4A5**.
NO : Repair wiring harness.

4A5 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW RELAY AND POWER WINDOW MAIN SWITCH (DRIVER'S DOOR SWITCH).

1) Disconnect connectors of power window relay and power window main switch.
2) Measure resistance of harness connector between power window relay and power window main switch.

Connector & terminal
(B42) No. 4 — (D7) No. 7:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **4A6**.
NO : Repair wiring harness.

4A6 : CHECK POWER WINDOW MAIN SWITCH.

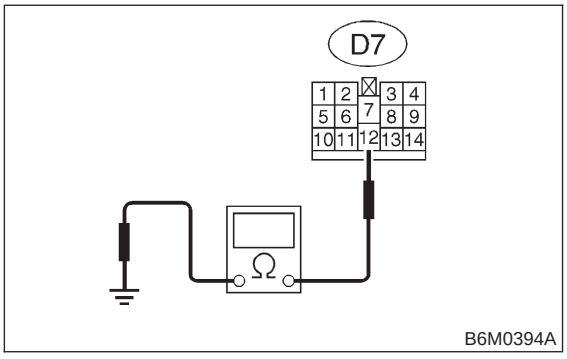
Perform inspection of power window main switch. <Ref. to 6-2 [W17B1].>

CHECK : ***Is power window main switch normal?***
YES : Go to step **4A7**.
NO : Replace power window main switch.

4A7 : CHECK GROUND CIRCUIT OF POWER WINDOW MAIN SWITCH.

1) Disconnect connector of power window main switch.
2) Measure resistance of harness connector between power window main switch and chassis ground.

Connector & terminal
(D7) No. 12 (+) — Chassis ground (−):



CHECK : ***Is the resistance less than 10 Ω?***
YES : System circuit is normal.
NO : Repair wiring harness.

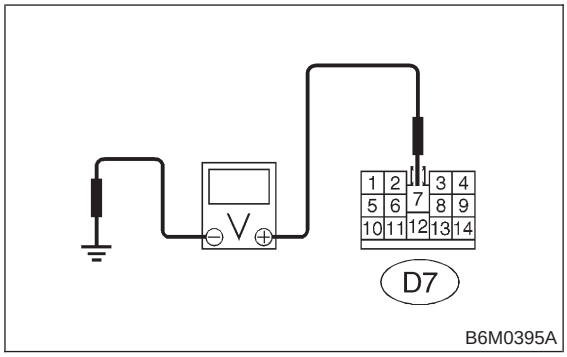
B: DIAGNOSTICS PROCEDURE-2

TROUBLE SYMPTOM
Only driver's door window does not operate.

4B1 : CHECK POWER SUPPLY FOR POWER WINDOW MAIN SWITCH.

1) Disconnect connector of power window main switch.
2) Turn ignition switch to ON.
3) Measure voltage between power window main switch connector and chassis ground.

Connector & terminal
(D7) No. 7 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **4B2**.
NO : Go to diagnostics procedure-1. <Ref. to 6-2b [T4A0].>

4B2 : CHECK POWER WINDOW MAIN SWITCH (DRIVER'S DOOR SWITCH).

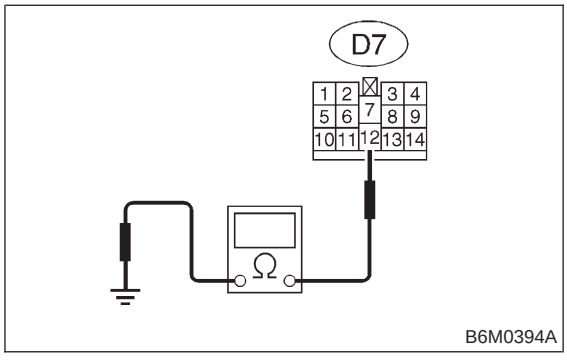
Perform inspection of power window main switch. <Ref. to 6-2 [W17B1].>

CHECK : ***Is power window main switch normal?***
YES : Go to step **4B3**.
NO : Replace power window main switch.

4B3 : CHECK GROUND CIRCUIT OF POWER WINDOW MAIN SWITCH.

1) Disconnect connector of power window main switch.
2) Measure resistance of harness connector between power window main switch and chassis ground.

Connector & terminal
(D7) No. 12 (+) — Chassis ground (−):



CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **4B4**.
NO : Repair wiring harness.

4B4 : CHECK DRIVER'S DOOR WINDOW MOTOR.

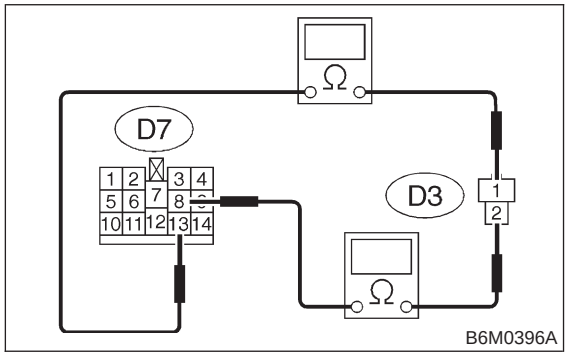
1) Disconnect connector of power window motor (driver's door).
2) Make sure that power window motor rotates properly when battery voltage is applied to terminals of motor connector.
3) Change polarity of battery connections to terminals to ensure that motor rotates in reverse direction.

CHECK : ***Is driver side power window motor normal?***
YES : Go to step **4B5**.
NO : Replace driver side power window motor.

4B5 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW MAIN SWITCH AND DRIVER'S DOOR WINDOW MOTOR.

1) Disconnect connectors of power window main switch and power window motor (driver's door).
2) Measure resistance of harness connector between power window main switch and power window motor.

Connector & terminal
(D7) No. 8 — (D3) No. 2:

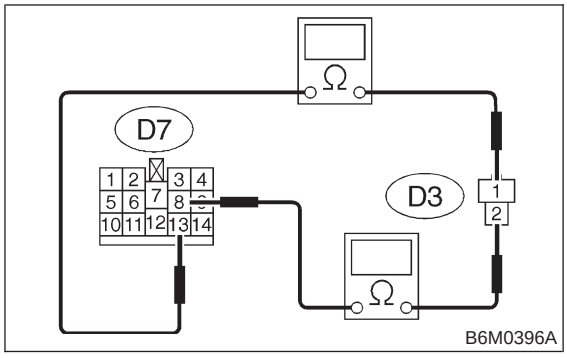


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **4B6**.
NO : Repair wiring harness. Go to step **4B6**.

4B6 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW MAIN SWITCH AND DRIVER'S DOOR WINDOW MOTOR.

Measure resistance of harness connector between power window main switch and power window motor.

Connector & terminal
(D7) No. 13 — (D3) No. 1:



CHECK : ***Is the resistance less than 10 Ω?***
YES : System circuit is normal but mechanical trouble may be caused in door window system such as break of window regulator.
NO : Repair wiring harness.

C: DIAGNOSTICS PROCEDURE-3

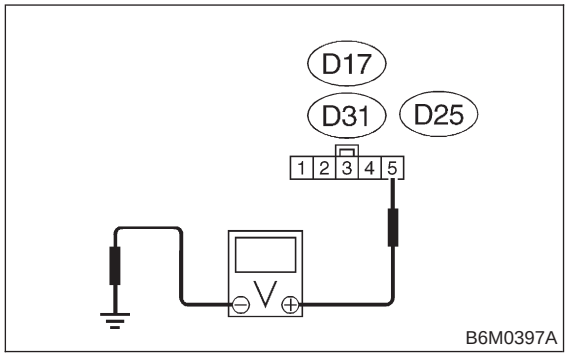
TROUBLE SYMPTOM
One or more of passenger's door window do not operate.

4C1 : CHECK POWER SUPPLY FOR POWER WINDOW SUB SWITCH WHICH IS OUT OF ORDER.

1) Disconnect connector of power window sub switch.
2) Turn ignition switch to ON.

3) Measure voltage between power window sub switch connector and chassis ground.

Connector & terminal
(D17) No. 5 (+) — Chassis ground (−):

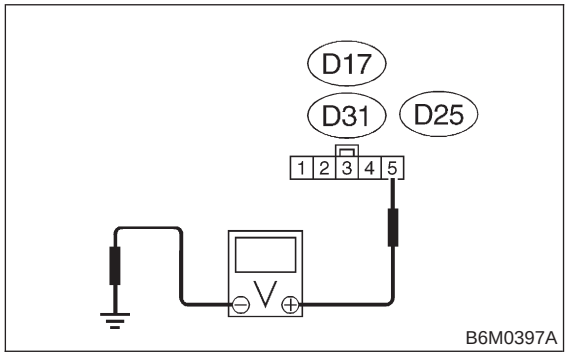


CHECK : ***Is the voltage more than 10 V? (Front passenger side)***
YES : Go to step **4C2**.
NO : Repair wiring harness. Go to step **4C2**.

4C2 : CHECK POWER SUPPLY FOR POWER WINDOW SUB SWITCH WHICH IS OUT OF ORDER.

Measure voltage between power window sub switch connector and chassis ground.

Connector & terminal
(D31) No. 5 (+) — Chassis ground (−):

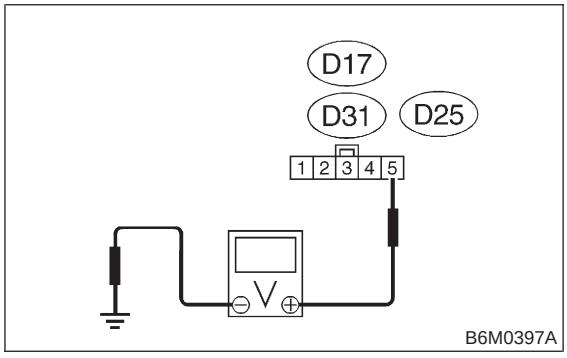


CHECK : ***Is the voltage more than 10 V? (Rear RH side)***
YES : Go to step **4C3**.
NO : Repair wiring harness. Go to step **4C3**.

4C3 : CHECK POWER SUPPLY FOR POWER WINDOW SUB SWITCH WHICH IS OUT OF ORDER.

Measure voltage between power window sub switch connector and chassis ground.

Connector & terminal
(D25) No. 5 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V? (Rear LH side)***
YES : Go to step **4C4**.
NO : Repair wiring harness.

4C4 : CHECK POWER WINDOW SUB SWITCH WHICH IS OUT OF ORDER.

Perform inspection of power window sub switch. <Ref. to 6-2 [W17B2].>

CHECK : ***Is power window sub switch normal?***
YES : Go to step **4C5**.
NO : Replace power window sub switch.

4C5 : CHECK POWER WINDOW MOTOR WHICH IS OUT OF ORDER.

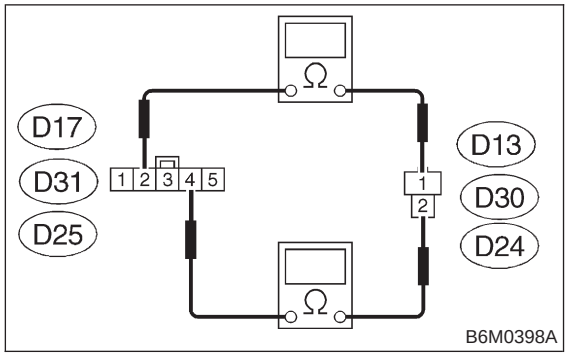
1) Disconnect connector of power window motor.
2) Make sure that power window motor rotates properly when battery voltage is applied to terminals of motor connector.
3) Change polarity of battery connections to terminals to ensure that motor rotates in reverse direction.

CHECK : ***Is passenger side power window motor normal?***
YES : Go to step **4C6**.
NO : Replace passenger side power window motor.

4C6 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND POWER WINDOW MOTOR.

1) Disconnect connectors of power window sub switch and power window motor.
2) Measure resistance of harness connector between power window sub switch and power window motor.

Connector & terminal
(D17) No. 2 — (D13) No. 1:

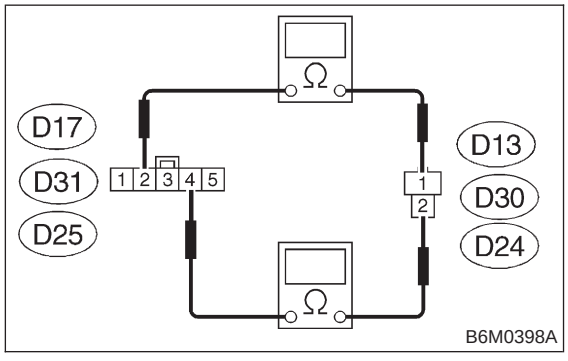


CHECK : ***Is the resistance less than 10 Ω? (Front passenger side)***
YES : Go to step **4C7**.
NO : Repair wiring harness. Go to step **4C7**.

4C7 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND POWER WINDOW MOTOR.

Measure resistance of harness connector between power window sub switch and power window motor.

Connector & terminal
(D17) No. 4 — (D13) No. 2:

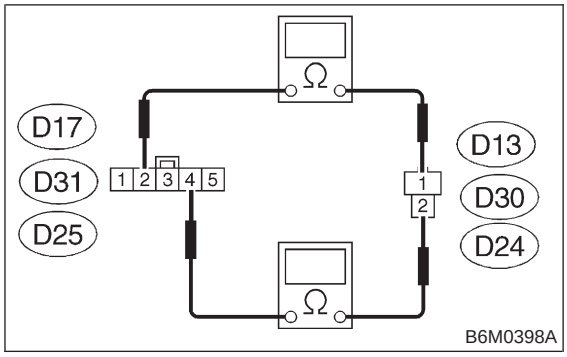


CHECK : ***Is the resistance less than 10 Ω? (Front passenger side)***
YES : Go to step **4C8**.
NO : Repair wiring harness. Go to step **4C8**.

4C8 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND POWER WINDOW MOTOR.

Measure resistance of harness connector between power window sub switch and power window motor.

Connector & terminal
(D31) No. 2 — (D30) No. 1:

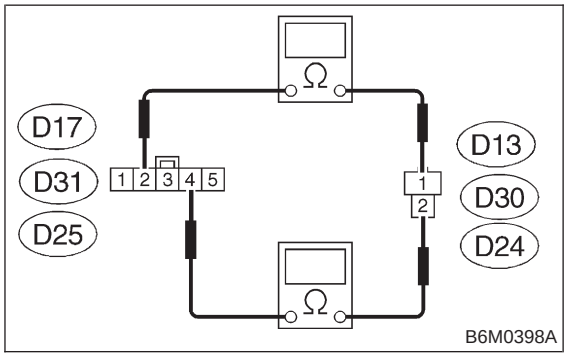


CHECK : ***Is the resistance less than 10 Ω? (Rear RH side)***
YES : Go to step **4C9**.
NO : Repair wiring harness. Go to step **4C9**.

4C9 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND POWER WINDOW MOTOR.

Measure resistance of harness connector between power window sub switch and power window motor.

Connector & terminal
(D31) No. 4 — (D30) No. 2:



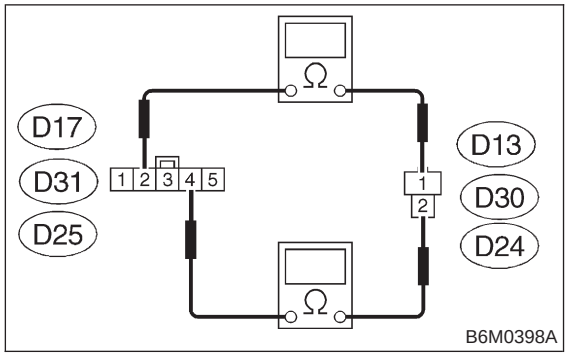
CHECK : ***Is the resistance less than 10 Ω? (Rear RH side)***
YES : Go to step **4C10**.

NO : Repair wiring harness. Go to step **4C10**.

4C10 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND POWER WINDOW MOTOR.

Measure resistance of harness connector between power window sub switch and power window motor.

Connector & terminal
(D25) No. 2 — (D24) No. 1:

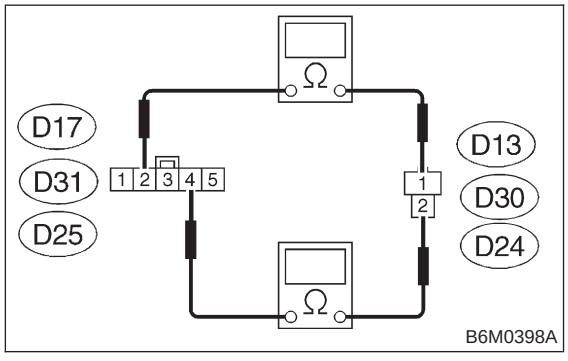


CHECK : ***Is the resistance less than 10 Ω? (Rear LH side)***
YES : Go to step **4C11**.
NO : Repair wiring harness. Go to step **4C11**.

4C11 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND POWER WINDOW MOTOR.

Measure resistance of harness connector between power window sub switch and power window motor.

Connector & terminal
(D25) No. 4 — (D24) No. 2:



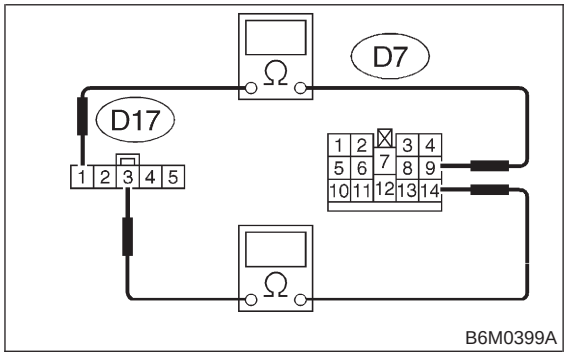
CHECK : ***Is the resistance less than 10 Ω? (Rear LH side)***
YES : Go to step **4C12**.

NO : Repair wiring harness.

4C12 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND MAIN SWITCH.

1) Disconnect connectors of power window sub switch and main switch.
2) Measure resistance of harness connector between power window sub switch and main switch.

Connector & terminal
(D17) No. 1 — (D7) No. 9:

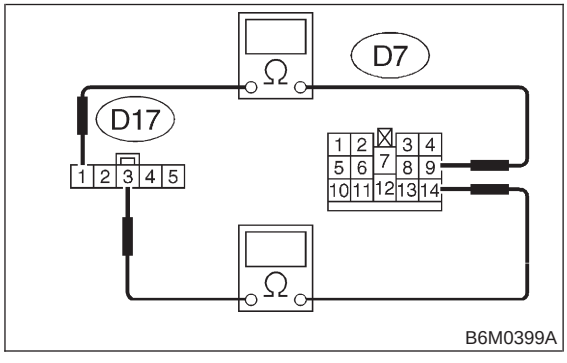


CHECK : ***Is the resistance less than 10 Ω? (Front passenger side)***
YES : Go to step **4C13**.
NO : Repair wiring harness. Go to step **4C13**.

4C13 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND MAIN SWITCH.

Measure resistance of harness connector between power window sub switch and main switch.

Connector & terminal
(D17) No. 3 — (D7) No. 14:



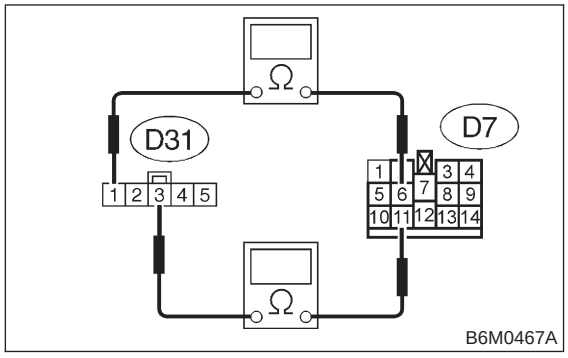
CHECK : ***Is the resistance less than 10 Ω? (Front passenger side)***
YES : Go to step **4C14**.

NO : Repair wiring harness. Go to step **4C14**.

4C14 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND MAIN SWITCH.

Measure resistance of harness connector between power window sub switch and main switch.

Connector & terminal
(D31) No. 1 — (D7) No. 6:

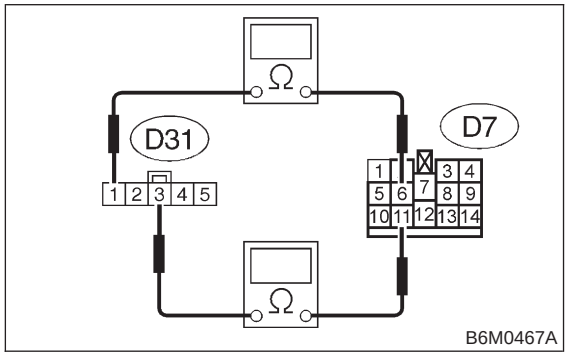


CHECK : ***Is the resistance less than 10 Ω? (Rear RH side)***
YES : Go to step **4C15**.
NO : Repair wiring harness. Go to step **4C15**.

4C15 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND MAIN SWITCH.

Measure resistance of harness connector between power window sub switch and main switch.

Connector & terminal
(D31) No. 3 — (D7) No. 11:

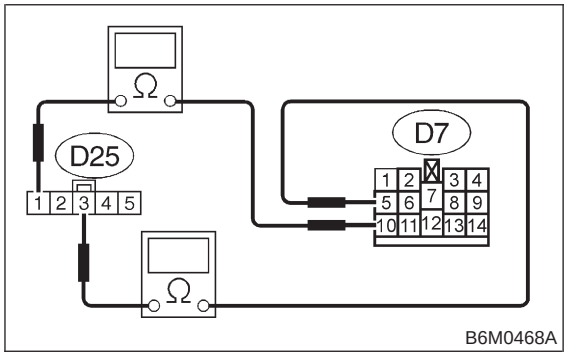


CHECK : ***Is the resistance less than 10 Ω? (Rear RH side)***
YES : Go to step **4C16**.
NO : Repair wiring harness. Go to step **4C16**.

4C16 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND MAIN SWITCH.

Measure resistance of harness connector between power window sub switch and main switch.

Connector & terminal
(D25) No. 1 — (D7) No. 10:

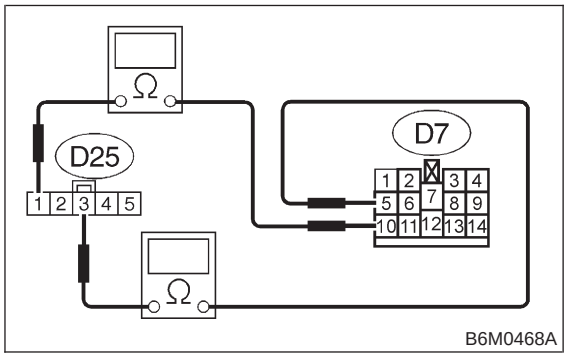


CHECK : ***Is the resistance less than 10 Ω? (Rear LH side)***
YES : Go to step **4C17**.
NO : Repair wiring harness. Go to step **4C17**.

4C17 : CHECK HARNESS CONNECTOR BETWEEN POWER WINDOW SUB SWITCH AND MAIN SWITCH.

Measure resistance of harness connector between power window sub switch and main switch.

Connector & terminal
(D25) No. 3 — (D7) No. 5:



CHECK : ***Is the resistance less than 10 Ω? (Rear LH side)***
YES : Go to step **4C18**.
NO : Repair wiring harness.

4C18 : CHECK POWER WINDOW MAIN SWITCH.

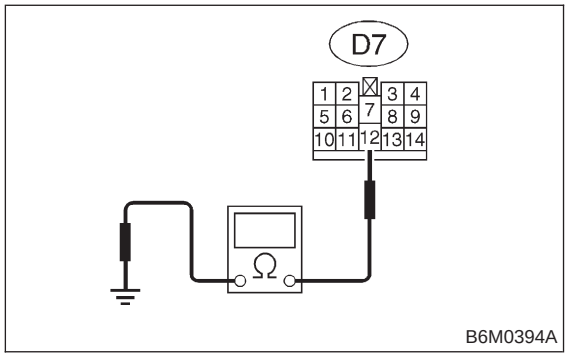
Perform inspection of power window main switch. <Ref. to 6-2 [W17B1].>

CHECK : ***Is power window main switch normal?***
YES : Go to step **4C19**.
NO : Replace power window main switch.

4C19 : CHECK GROUND CIRCUIT OF POWER WINDOW MAIN SWITCH.

1) Disconnect connector of power window main switch.
2) Measure resistance of harness connector between power window main switch and chassis ground.

Connector & terminal
(D7) No. 12 (+) — Chassis ground (−):



CHECK : ***Is the resistance less than 10 Ω?***
YES : System circuit is normal but mechanical trouble may be caused in door window system such as break of window regulator.
NO : Repair wiring harness.

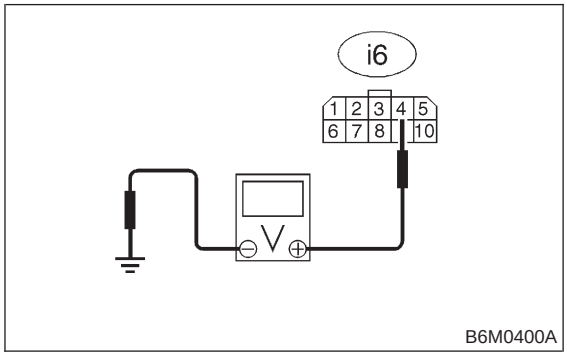
5. Remote Controlled Rearview Mirror

A: DIAGNOSTICS PROCEDURE

5A1 : CHECK FUSE AND POWER SUPPLY FOR REMOTE CONTROLLED REARVIEW MIRROR SWITCH.

1) Check fuse No. 3.
2) Disconnect connector of rearview mirror switch.
3) Turn ignition switch to ON.
4) Measure voltage between rearview mirror switch connector and chassis ground.

Connector & terminal
(i6) No. 4 (+) — Chassis ground (−):

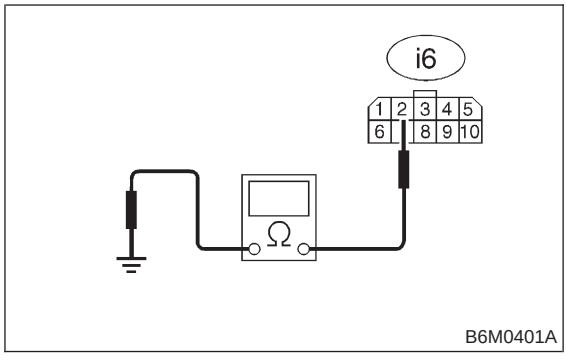


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **5A2**.
NO : Replace fuse or repair wiring harness.

5A2 : CHECK GROUND CIRCUIT OF REARVIEW MIRROR SWITCH.

1) Disconnect connector of rearview mirror switch.
2) Measure resistance of harness connector between rearview mirror switch and chassis ground.

Connector & terminal
(i6) No.2 (+) — Chassis ground (−):



CHECK : ***Is the resistance less than 10 Ω?***

YES : Go to step **5A3**.
NO : Repair wiring harness.

5A3 : CHECK REARVIEW MIRROR SWITCH.

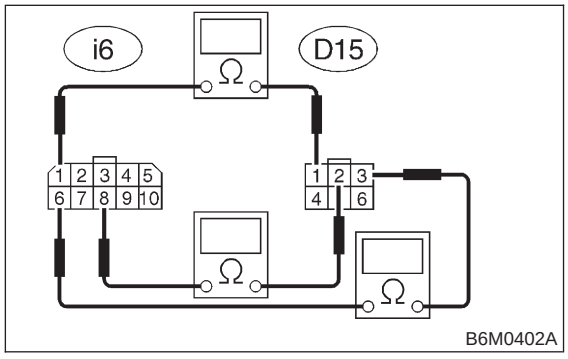
Perform inspection of rearview mirror switch. <Ref. to 6-2 [W19B1].>

CHECK : ***Is rearview mirror switch normal?***
YES : Go to step **5A4**.
NO : Replace rearview mirror switch.

5A4 : CHECK HARNESS CONNECTOR BETWEEN REARVIEW MIRROR SWITCH AND REARVIEW MIRROR (RH AND LH).

1) Disconnect connectors of rearview mirror switch and rearview mirror.
2) Measure resistance of harness connector between rearview mirror switch and rearview mirror.

Connector & terminal
(i6) No. 1 — (D15) No. 1:

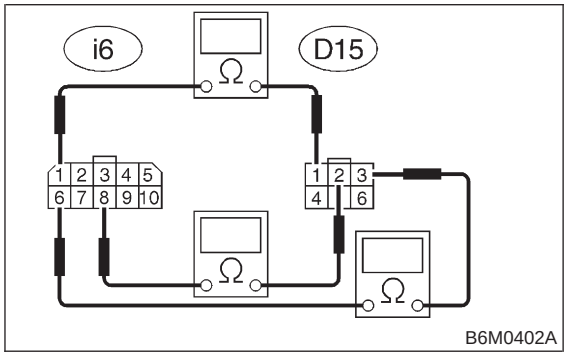


CHECK : ***Is the resistance less than 10 Ω? (RH side)***
YES : Go to step **5A5**.
NO : Repair wiring harness. Go to step **5A5**.

5A5 : CHECK HARNESS CONNECTOR BETWEEN REARVIEW MIRROR SWITCH AND REARVIEW MIRROR (RH AND LH).

Measure resistance of harness connector between rearview mirror switch and rearview mirror.

Connector & terminal
(i6) No. 8 — (D15) No. 2:

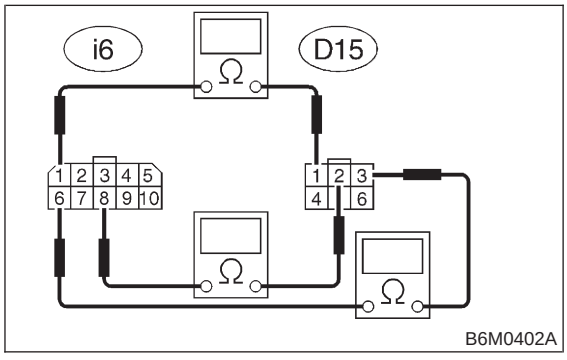


CHECK : ***Is the resistance less than 10 Ω? (RH side)***
YES : Go to step **5A6**.
NO : Repair wiring harness. Go to step **5A6**.

5A6 : CHECK HARNESS CONNECTOR BETWEEN REARVIEW MIRROR SWITCH AND REARVIEW MIRROR (RH AND LH).

Measure resistance of harness connector between rearview mirror switch and rearview mirror.

Connector & terminal
(i6) No. 6 — (D15) No. 3:

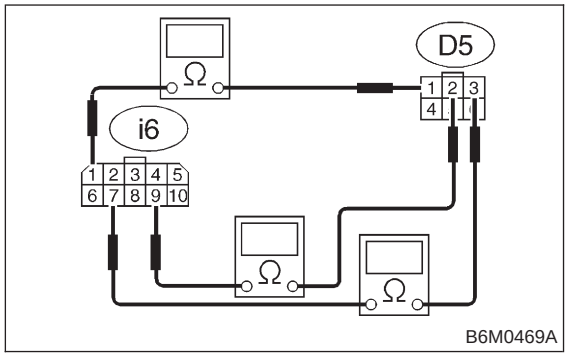


CHECK : ***Is the resistance less than 10 Ω? (RH side)***
YES : Go to step **5A7**.
NO : Repair wiring harness. Go to step **5A7**.

5A7 : CHECK HARNESS CONNECTOR BETWEEN REARVIEW MIRROR SWITCH AND REARVIEW MIRROR (RH AND LH).

Measure resistance of harness connector between rearview mirror switch and rearview mirror.

Connector & terminal
(i6) No. 1 — (D5) No. 1:

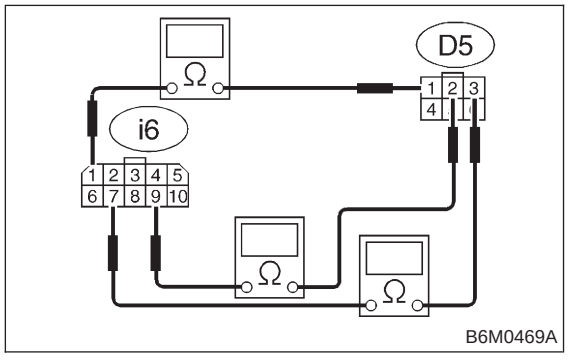


CHECK : ***Is the resistance less than 10 Ω? (LH side)***
YES : Go to step **5A8**.
NO : Repair wiring harness. Go to step **5A8**.

5A8 : CHECK HARNESS CONNECTOR BETWEEN REARVIEW MIRROR SWITCH AND REARVIEW MIRROR (RH AND LH).

Measure resistance of harness connector between rearview mirror switch and rearview mirror.

Connector & terminal
(i6) No. 9 — (D5) No. 2:

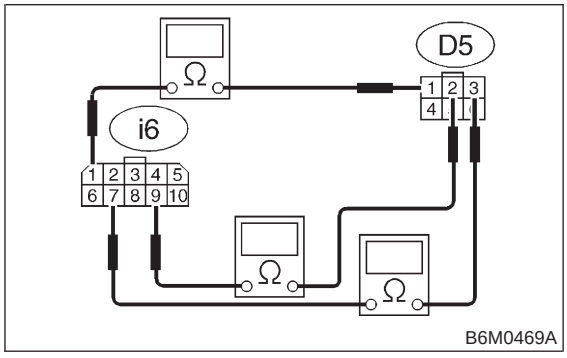


CHECK : ***Is the resistance less than 10 Ω? (LH side)***
YES : Go to step **5A9**.
NO : Repair wiring harness. Go to step **5A9**.

5A9 : CHECK HARNESS CONNECTOR BETWEEN REARVIEW MIRROR SWITCH AND REARVIEW MIRROR (RH AND LH).

Measure resistance of harness connector between rearview mirror switch and rearview mirror.

Connector & terminal
(i6) No. 7 — (D5) No. 3:



CHECK : ***Is the resistance less than 10 Ω? (LH side)***
YES : Go to step **5A10**.
NO : Repair wiring harness.

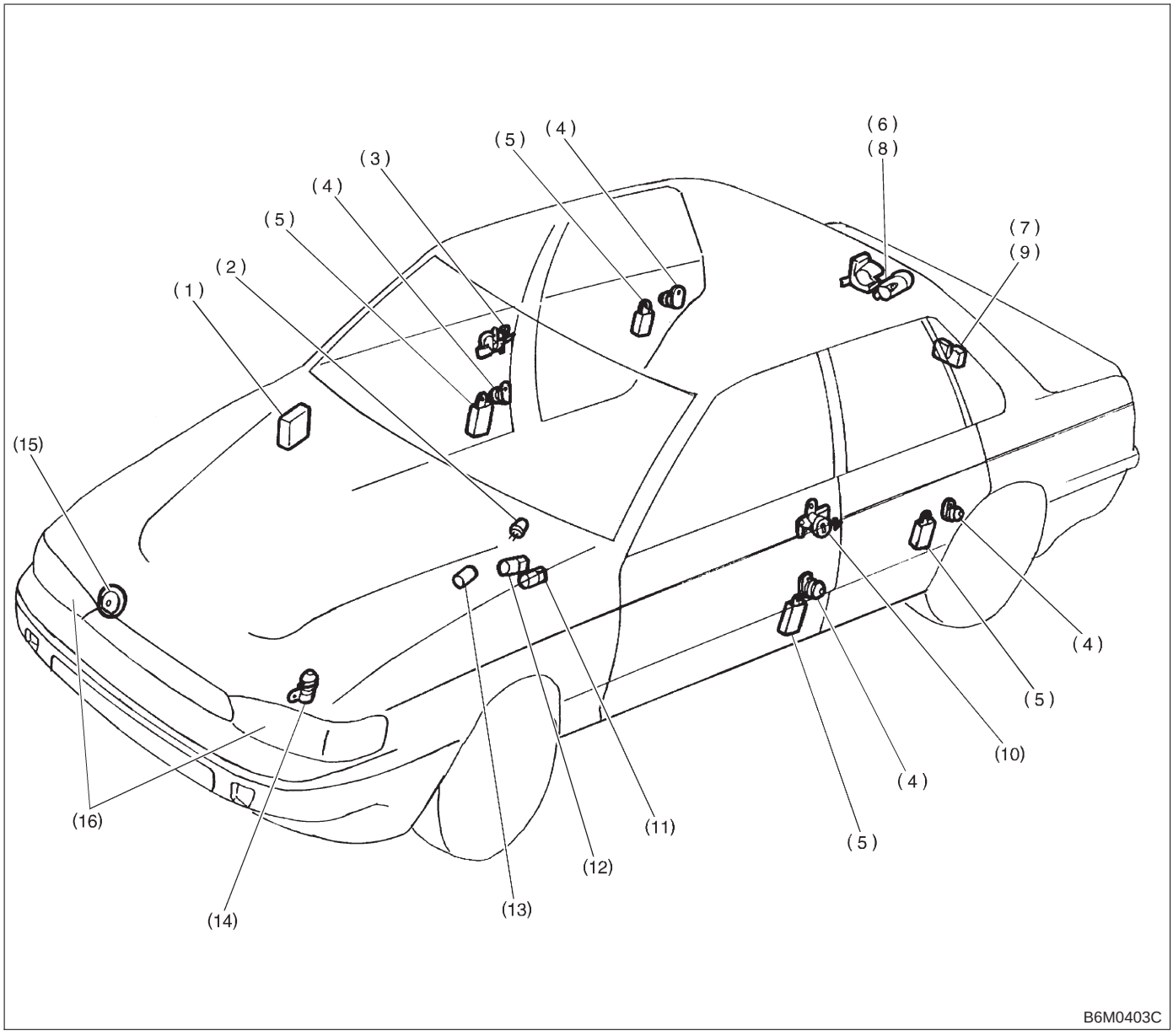
5A10 : CHECK REARVIEW MIRROR MOTOR.

Perform inspection of rearview mirror motor. <Ref. to 6-2 [W19B2].>

CHECK : ***Is rearview mirror motor normal?***
YES : System circuit is normal.
NO : Replace rearview mirror assembly.

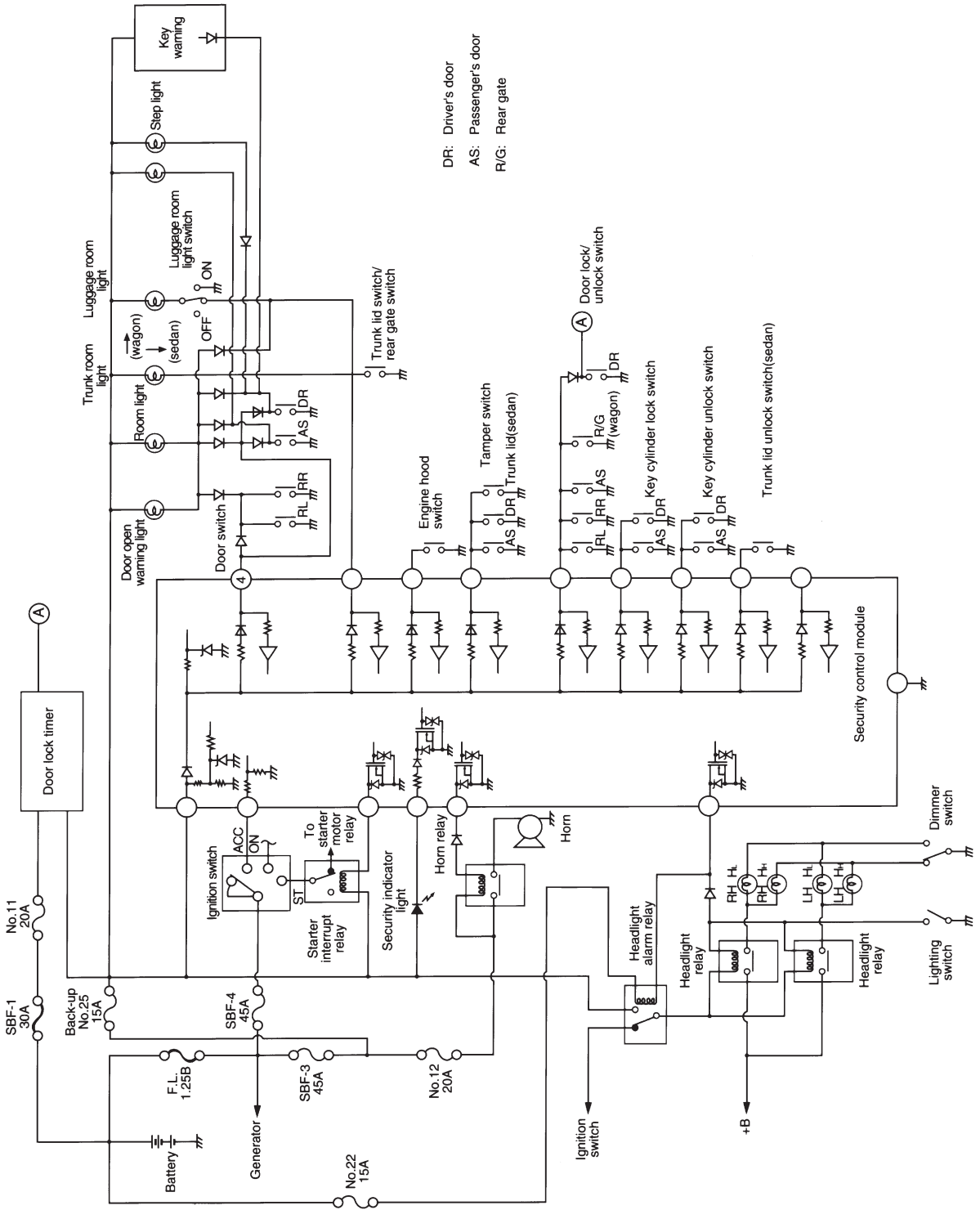
6. Security System

A: ELECTRICAL COMPONENTS LOCATION



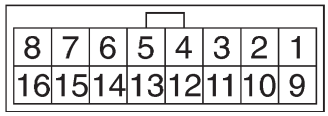
(1) Security control module
(2) Security indicator light
(3) RH door key cylinder lock/unlock switch (built-in tamper switch)
(4) Door switch
(5) Door lock/unlock switch
(6) Trunk lid key cylinder unlock switch (SEDAN) (built-in tamper switch)
(7) Trunk lid switch (SEDAN)
(8) Rear gate key cylinder lock/unlock switch (WAGON)
(9) Rear gate switch (WAGON)
(10) LH door key cylinder lock/unlock switch (built-in tamper switch)
(11) Starter interrupt relay
(12) Headlight alarm relay
(13) Ignition switch (ACC position)
(14) Engine hood switch
(15) Horn
(16) Headlight

B: SCHEMATIC



B6H0319

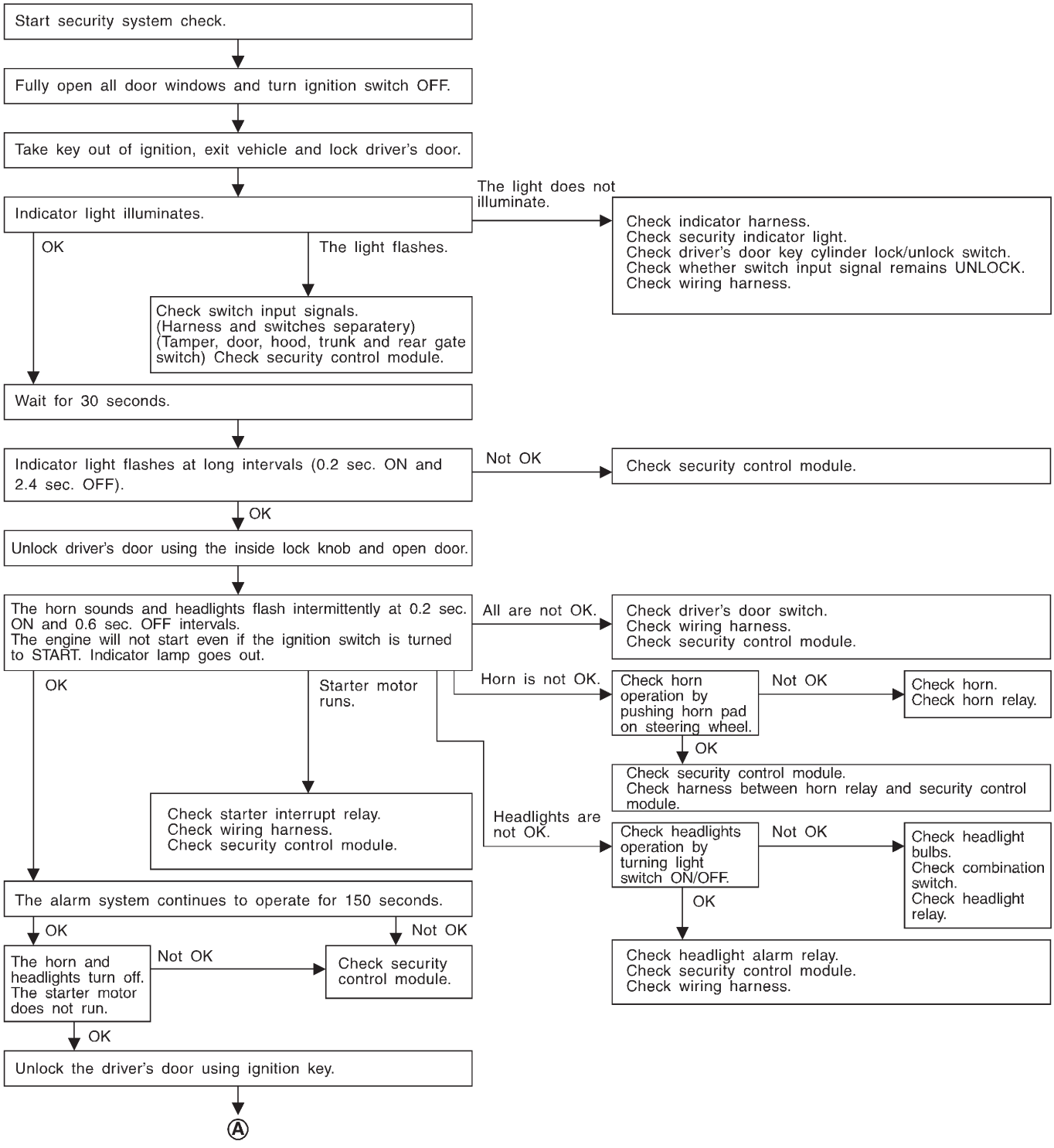
C: CONTROL MODULE I/O SIGNAL



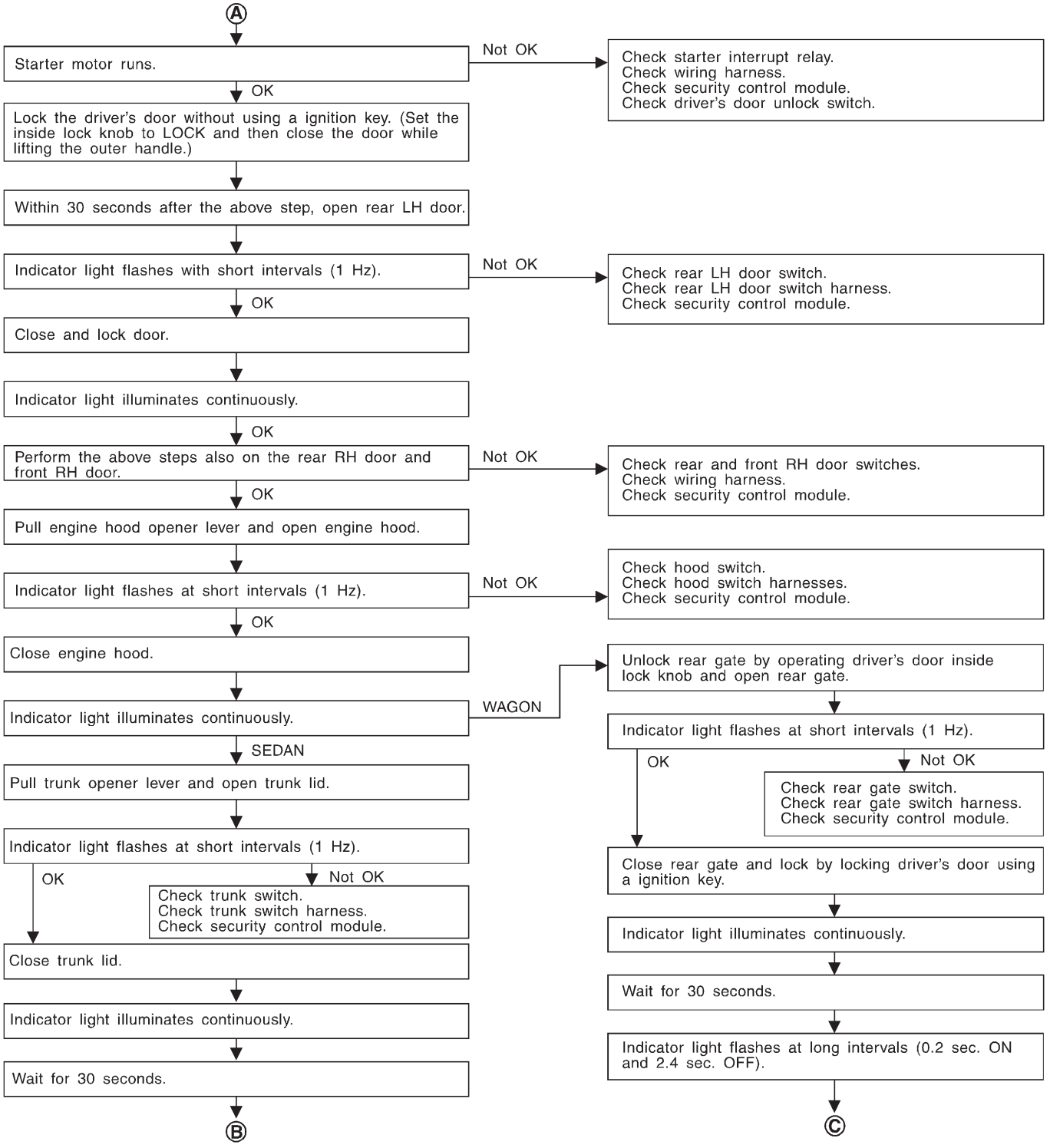
B6M0405

Content	Terminal No.	Measuring conditions and I/O signals (Ignition switch ACC position)
Door lock/unlock switch	1 (INPUT)	● Battery voltage is present when all doors and rear gate (WAGON) are locked. ● "0" volt is present when one of the doors or rear gate (WAGON) is unlocked.
Key cylinder lock switch	2 (INPUT)	● "0" volt is present when key cylinder is turned to LOCK position. ● Battery voltage is present when key cylinder is in positions other than LOCK.
Tamper switch	3 (INPUT)	● Battery voltage is present when key cylinder switch is installed to key cylinder. ● "0" volt is present when key cylinder switch is removed from key cylinder.
Door switch	4 (INPUT)	● Battery voltage is present when all doors are closed. ● "0" volt is present when one of the door is open.
Starter interrupt relay	5 (OUTPUT)	● Battery voltage is present when ignition switch is turned ACC or ON. ● "0" volt is present when security system is in alarm state.
Ignition switch (ACC)	6 (INPUT)	● Battery voltage is present when ignition switch is turned ACC or ON. ● "0" volt is present when ignition switch is turned OFF.
Security indicator light	7 (OUTPUT)	● Battery voltage is present when indicator light goes off. ● "0" volt is present when indicator light illuminates.
Power supply (back-up)	8	Battery voltage is constantly present.
Ground	9	—
Engine hood switch	10 (INPUT)	● Battery voltage is present when engine hood is closed. ● "0" volt is present when engine hood is open.
Trunk lid switch (SEDAN) Rear gate switch (WAGON)	11 (INPUT)	● Battery voltage is present when trunk lid or rear gate is closed. ● "0" volt is present when trunk lid or rear gate is open.
Headlight alarm relay	12 (OUTPUT)	● Battery voltage is present when ignition switch is turned ACC or ON. ● "0" volt and battery voltage repeats in alarm state. (Headlights flash intermittently at 0.2 sec. ON and 0.6 sec. OFF intervals).
Horn relay	13 (OUTPUT)	● Battery voltage is present when ignition switch is turned ACC or ON. ● "0" volt and battery voltage repeats in alarm state. (Horn sounds intermittently at 0.2 sec. ON and 0.6 sec. OFF intervals.)
Key cylinder unlock switch	14 (INPUT)	● "0" volt is present when key cylinder is turned to UNLOCK position. ● Battery voltage is present when key cylinder is in positions other than UNLOCK.
Trunk lid key cylinder unlock switch (SEDAN)	15 (INPUT)	● "0" volt is present when trunk lid key cylinder is turned to UNLOCK position. ● Battery voltage is present when trunk lid key cylinder is in positions other than UNLOCK.

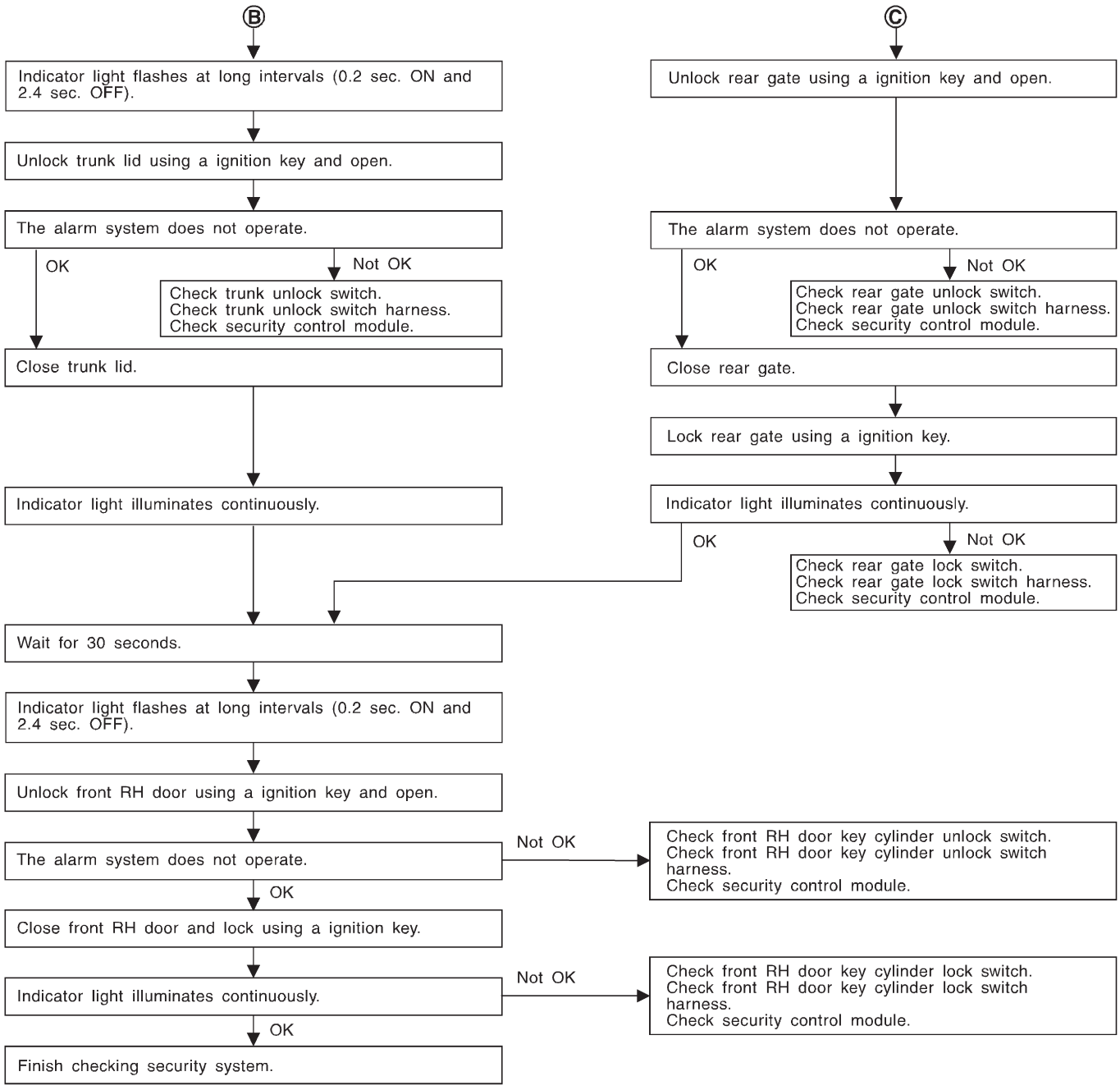
D: BASIC DIAGNOSTICS PROCEDURE



B6M0734


Ⓐ
Starter motor runs.
Not OK
Check starter interrupt relay.
Check wiring harness.
Check security control module.
Check driver's door unlock switch.
OK
Lock the driver's door without using a ignition key. (Set the inside lock knob to LOCK and then close the door while lifting the outer handle.)
Within 30 seconds after the above step, open rear LH door.
Indicator light flashes with short intervals (1 Hz).
Not OK
Check rear LH door switch.
Check rear LH door switch harness.
Check security control module.
OK
Close and lock door.
Indicator light illuminates continuously.
OK
Perform the above steps also on the rear RH door and front RH door.
Not OK
Check rear and front RH door switches.
Check wiring harness.
Check security control module.
OK
Pull engine hood opener lever and open engine hood.
Indicator light flashes at short intervals (1 Hz).
Not OK
Check hood switch.
Check hood switch harnesses.
Check security control module.
OK
Close engine hood.
Indicator light illuminates continuously.
WAGON
Unlock rear gate by operating driver's door inside lock knob and open rear gate.
Indicator light flashes at short intervals (1 Hz).
OK
Not OK
Check rear gate switch.
Check rear gate switch harness.
Check security control module.
Close rear gate and lock by locking driver's door using a ignition key.
Indicator light illuminates continuously.
Wait for 30 seconds.
Indicator light flashes at long intervals (0.2 sec. ON and 2.4 sec. OFF).
Ⓒ
SEDAN
Pull trunk opener lever and open trunk lid.
Indicator light flashes at short intervals (1 Hz).
OK
Not OK
Check trunk switch.
Check trunk switch harness.
Check security control module.
Close trunk lid.
Indicator light illuminates continuously.
Wait for 30 seconds.
Ⓑ

B6M0735


Ⓑ
Indicator light flashes at long intervals (0.2 sec. ON and 2.4 sec. OFF).
Unlock trunk lid using a ignition key and open.
The alarm system does not operate.
OK
Not OK
Check trunk unlock switch.
Check trunk unlock switch harness.
Check security control module.
Close trunk lid.
Indicator light illuminates continuously.
Wait for 30 seconds.
Indicator light flashes at long intervals (0.2 sec. ON and 2.4 sec. OFF).
Unlock front RH door using a ignition key and open.
The alarm system does not operate.
Not OK
Check front RH door key cylinder unlock switch.
Check front RH door key cylinder unlock switch harness.
Check security control module.
OK
Close front RH door and lock using a ignition key.
Indicator light illuminates continuously.
Not OK
Check front RH door key cylinder lock switch.
Check front RH door key cylinder lock switch harness.
Check security control module.
OK
Finish checking security system.
Ⓒ
Unlock rear gate using a ignition key and open.
The alarm system does not operate.
OK
Not OK
Check rear gate unlock switch.
Check rear gate unlock switch harness.
Check security control module.
Close rear gate.
Lock rear gate using a ignition key.
Indicator light illuminates continuously.
OK
Not OK
Check rear gate lock switch.
Check rear gate lock switch harness.
Check security control module.

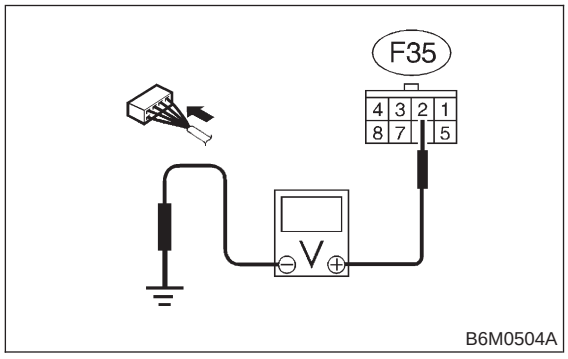
B6M0736

E: DIAGNOSTICS PROCEDURE FOR SECURITY CONTROL MODULE POWER SUPPLY/GROUND CIRCUIT

6E1 : CHECK FUSE AND POWER SUPPLY CIRCUIT.

1) Check fuse No. 25.
2) Measure voltage between main fuse box connector and chassis ground.

Connector & terminal
(F35) No. 2 (+) — Chassis ground (−):

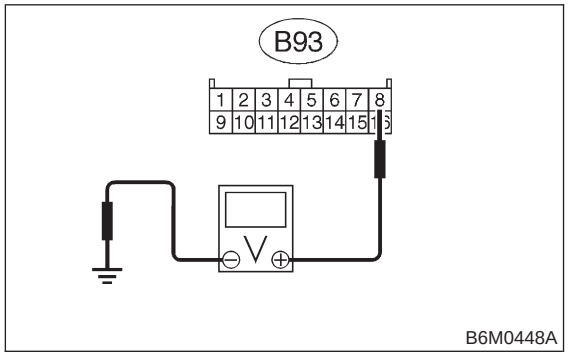


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6E2**.
NO : Replace fuse or repair wiring harness. Go to step **6E2**.

6E2 : CHECK FUSE AND POWER SUPPLY CIRCUIT.

1) Disconnect connector from security control module.
2) Measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 8 (+) — Chassis ground (−):

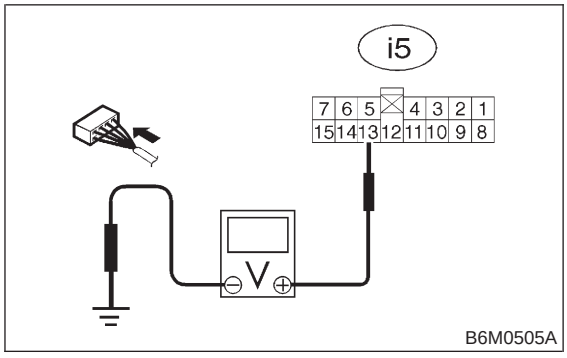


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6E3**.
NO : Replace fuse or repair wiring harness. Go to step **6E3**.

6E3 : CHECK FUSE AND POWER SUPPLY CIRCUIT.

1) Check fuse No. 3.
2) Turn ignition switch to ACC.
3) Measure voltage between fuse and relay box connector and chassis ground.

Connector & terminal
(i5) No. 13 (+) — Chassis ground (−):

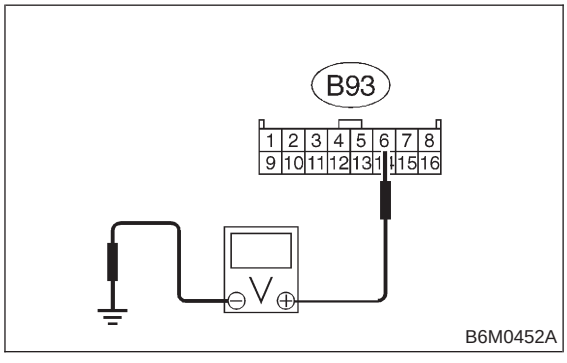


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6E4**.
NO : Replace fuse or repair wiring harness. Go to step **6E4**.

6E4 : CHECK FUSE AND POWER SUPPLY CIRCUIT.

1) Disconnect connector from security control module.
2) Measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 6 (+) — Chassis ground (−):

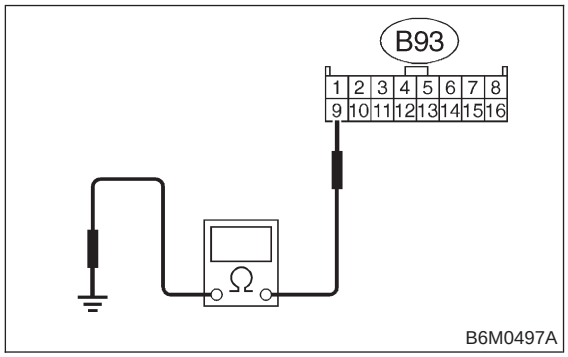


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6E5**.
NO : Replace fuse or repair wiring harness.

6E5 : CHECK GROUND CIRCUIT BETWEEN SECURITY CONTROL MODULE AND BODY.

1) Turn ignition switch to OFF.
2) Disconnect connector of security control module.
3) Measure resistance of harness connector between security control module and chassis ground.

Connector & terminal
(B93) No. 9 (+) — Chassis ground (−):



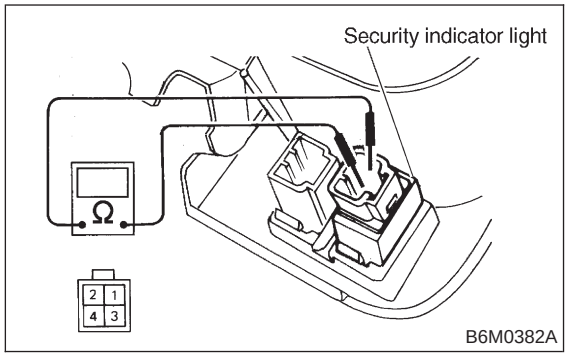
CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 6-2b [T6D0].>.
NO : Repair wiring harness.

F: DIAGNOSTICS PROCEDURE FOR SECURITY INDICATOR LIGHT AND INDICATOR LIGHT CIRCUIT

6F1 : CHECK SECURITY INDICATOR LIGHT.

1) Remove security indicator light.
2) Measure resistance between security indicator light connector terminals.

Terminals
No. 2 — No. 4:

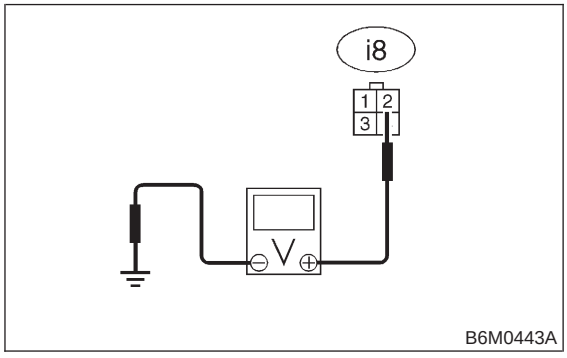


CHECK : ***Is the resistance approx. 120 Ω?***
YES : Go to step **6F2**.
NO : Replace indicator light.

6F2 : CHECK POWER SUPPLY FOR INDICATOR LIGHT.

1) Disconnect connector of security indicator light.
2) Measure voltage between security indicator light connector and chassis ground.

Connector & terminal
(i8) No. 2 (+) — Chassis ground (−):

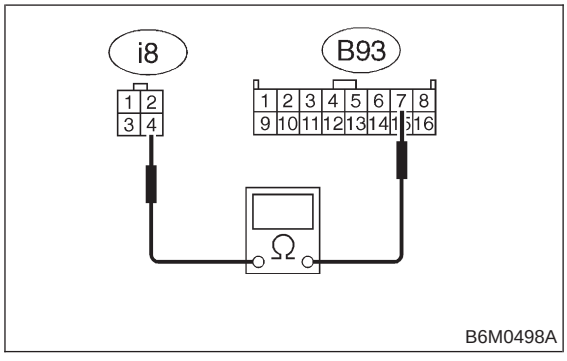


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6F3**.
NO : Repair wiring harness.

6F3 : CHECK HARNESS CONNECTOR BETWEEN SECURITY INDICATOR LIGHT AND SECURITY CONTROL MODULE.

1) Disconnect connectors of security indicator light and security control module.
2) Measure resistance of harness connector between security indicator light and security control module.

Connector & terminal
(i8) No. 4 — (B93) No. 7:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to "BASIC DIAGNOSTICS PROCE-

DURE". <Ref. to 6-2b [T6D0].>.

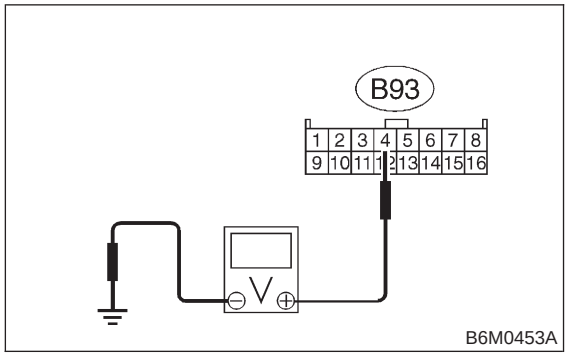
NO : Repair wiring harness.

G: DIAGNOSTICS PROCEDURE FOR DOOR SWITCH SIGNAL

6G1 : CHECK DOOR SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Remove security control module without disconnecting connector.
2) Turn door switch ON/OFF and measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V? (Door closed)***

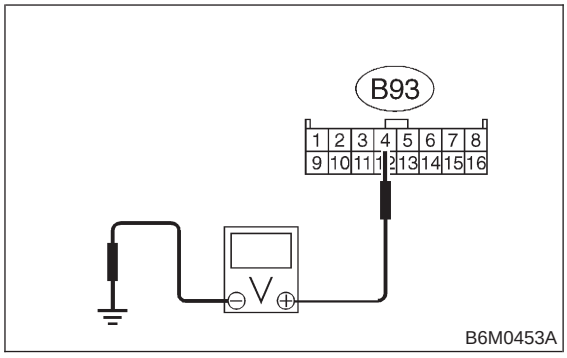
YES : Go to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 6-2b [T6D0].> Go to step **6G2**.

NO : Go to step **6G2**.

6G2 : CHECK DOOR SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE.

Turn door switch ON/OFF and measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V? (Door opened)***

YES : Go to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 6-2b [T6D0].>.

NO : Go to step **6G3**.

NOTE:
When one of the doors is open, the voltage may be 1 V, max.

6G3 : CHECK DOOR SWITCH.

Perform inspection of door switch. <Ref. to 6-2 [W9B1].>

NOTE:
The door switch is used for interior light also.

CHECK : ***Is door switch normal?***

YES : Repair wiring harness between door switch and security control module.

NO : Replace door switch.

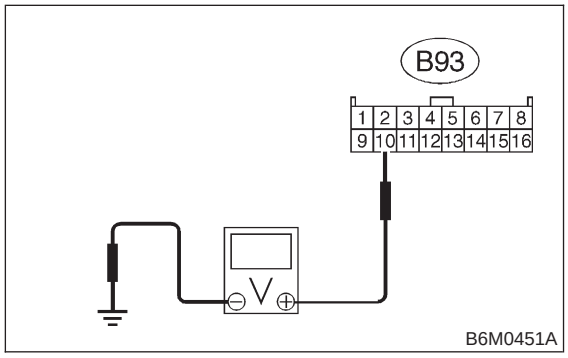
H: DIAGNOSTICS PROCEDURE FOR ENGINE HOOD SWITCH SIGNAL

6H1 : CHECK ENGINE HOOD SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Remove security control module without disconnecting connector.

2) Turn engine hood switch ON/OFF and measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 10 (+) — Chassis ground (−):

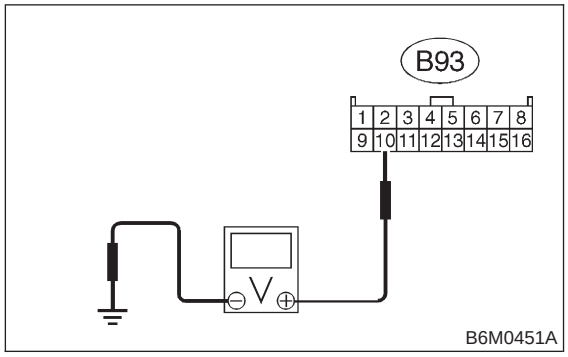


CHECK : ***Is the voltage more than 10 V? (Hood closed)***
YES : Go to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 6-2b [T6D0].> Go to step **6H2**.
NO : Go to step **6H2**.

6H2 : CHECK ENGINE HOOD SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE.

Turn engine hood switch ON/OFF and measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 10 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V? (Hood opened)***
YES : Go to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 6-2b [T6D0].>
NO : Go to step **6H3**.

6H3 : CHECK ENGINE HOOD SWITCH.

Perform inspection of engine hood switch. <Ref. to 6-2 [W23B3].>

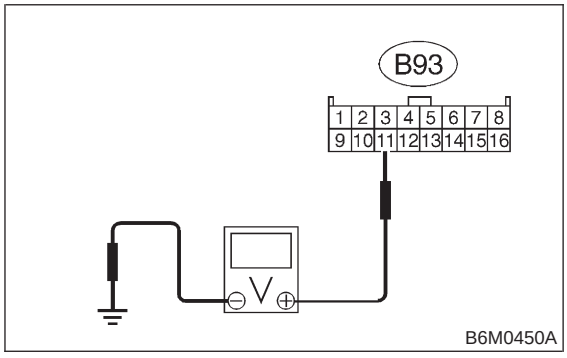
CHECK : ***Is engine hood switch normal?***
YES : Repair wiring harness between engine hood switch and security control module.
NO : Replace engine hood switch.

I: DIAGNOSTICS PROCEDURE FOR TRUNK LID SWITCH (SEDAN) OR REAR GATE SWITCH (WAGON) SIGNAL

6I1 : CHECK TRUNK LID SWITCH (SEDAN) OR REAR GATE SWITCH (WAGON) INPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Remove security control module without disconnecting connector.
2) Turn trunk lid switch (or rear gate switch) ON/OFF and measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 11 (+) — Chassis ground (−):

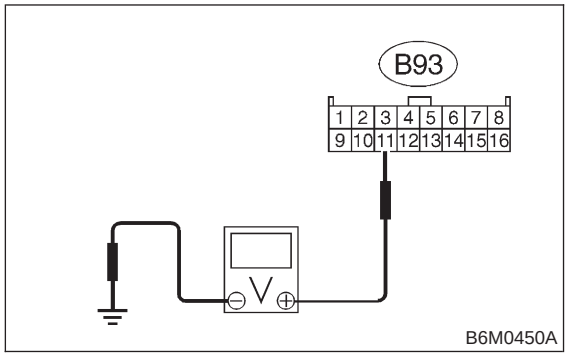


CHECK : ***Is the voltage more than 10 V? (Lid or gate closed)***
YES : Go to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 6-2b [T6D0].> Go to step **6I2**.
NO : Go to step **6I2**.

6I2 : CHECK TRUNK LID SWITCH (SEDAN) OR REAR GATE SWITCH (WAGON) INPUT SIGNAL FOR SECURITY CONTROL MODULE.

Turn trunk lid switch (or rear gate switch) ON/OFF and measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 11 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V? (Lid or gate opened)***
YES : Go to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 6-2b [T6D0].>
NO : Go to step **6I3**.

6I3 : CHECK TRUNK LID SWITCH (SEDAN) OR REAR GATE SWITCH (WAGON).

Perform inspection of trunk lid switch/rear gate switch. <Ref. to 6-2 [W9B2].> — <Ref. to 6-2 [W9B3].>

NOTE:
The trunk lid switch/rear gate switch is used for both trunk room light/luggage room light.

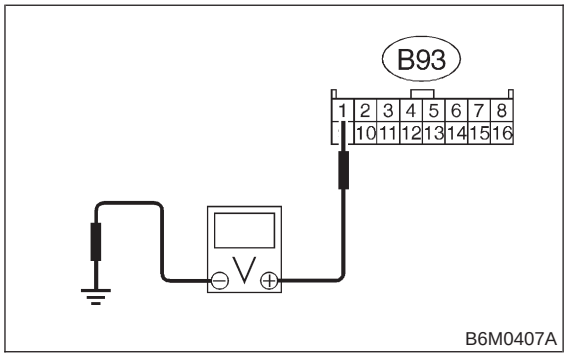
CHECK : ***Is trunk lid or rear gate switch normal?***
YES : Repair wiring harness between trunk lid or rear gate switch and security control module.
NO : Replace trunk lid or rear gate switch.

J: DIAGNOSTICS PROCEDURE FOR DOOR LOCK/UNLOCK SWITCH SIGNAL

6J1 : CHECK DOOR LOCK/UNLOCK SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Remove security control module without disconnecting connector.
2) Close all the doors and rear gate (WAGON), and lock with ignition key.
3) Measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to "BASIC DIAGNOSTICS PROCEDURE". <Ref. to 6-2b [T6D0].> Go to step **6J2**.
NO : Go to step **6J2**.

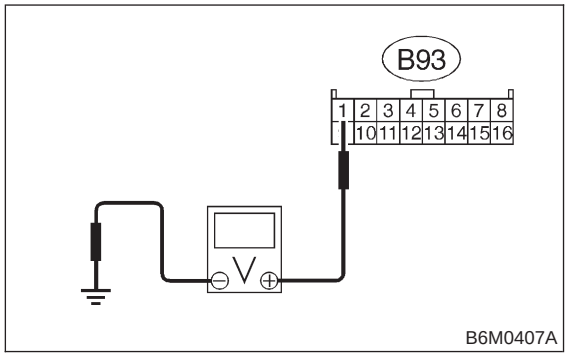
NOTE:
When one of the door (driver, passenger or rear gate) lock knobs is in unlocked position, the voltage may be 1 V, max.

6J2 : CHECK DOOR LOCK/UNLOCK SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Unlock the door with ignition key.

2) Measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Go to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 6-2b [T6D0].>
NO : Go to step **6J3**.

6J3 : CHECK DOOR LOCK/UNLOCK SWITCH.

Perform inspection of door lock/unlock switch. <Ref. to 6-2 [W23B5].>

CHECK : ***Is door lock/unlock switch normal?***
YES : Repair wiring harness between door lock/unlock switch and security control module.
NO : Replace door lock/unlock switch.

K: DIAGNOSTICS PROCEDURE FOR KEY CYLINDER LOCK/UNLOCK SWITCH AND TAMPER SWITCH SIGNAL

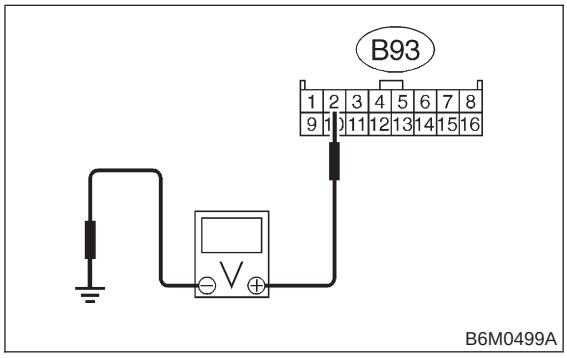
NOTE:
Key cylinder lock switch, key cylinder unlock switch and tamper switch are combined as a control module.

6K1 : CHECK KEY CYLINDER SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE (ALL DOORS AND REAR GATE).

1) Remove security control module without disconnecting connector.

2) Measure voltage between security control module connector and chassis ground while turning key cylinder with ignition key.

Connector & terminal
(B93) No. 2 (+) — Chassis ground (−):

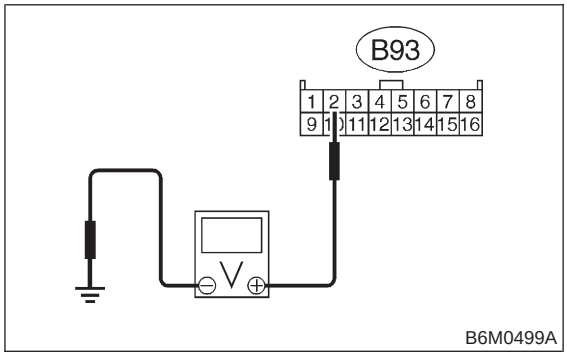


CHECK : ***Is the voltage less than 1 V? (LOCK position)***
YES : Go to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 6-2b [T6D0].> Go to step **6K2**.
NO : Go to step **6K2**.

6K2 : CHECK KEY CYLINDER SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE (ALL DOORS AND REAR GATE).

Measure voltage between security control module connector and chassis ground while turning key cylinder with ignition key.

Connector & terminal
(B93) No. 2 (+) — Chassis ground (−):

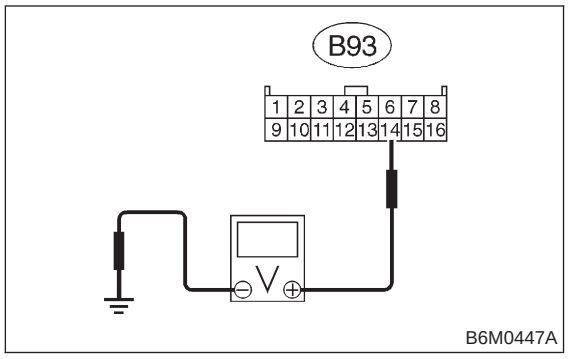


CHECK : ***Is the voltage more than 10 V? (Other than LOCK position)***
YES : Go to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 6-2b [T6D0].> Go to step **6K3**.
NO : Go to step **6K3**.

6K3 : CHECK KEY CYLINDER SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE (ALL DOORS AND REAR GATE).

Measure voltage between security control module connector and chassis ground while turning key cylinder with ignition key.

Connector & terminal
(B93) No. 14 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V? (UNLOCK position)***

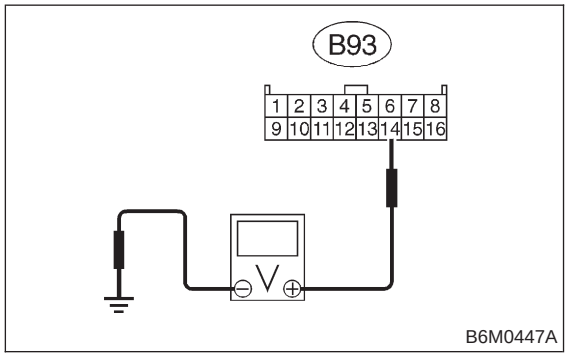
YES : Go to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 6-2b [T6D0].> Go to step **6K4**.

NO : Go to step **6K4**.

6K4 : CHECK KEY CYLINDER SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE (ALL DOORS AND REAR GATE).

Measure voltage between security control module connector and chassis ground while turning key cylinder with ignition key.

Connector & terminal
(B93) No. 14 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V? (Other than UNLOCK position)***

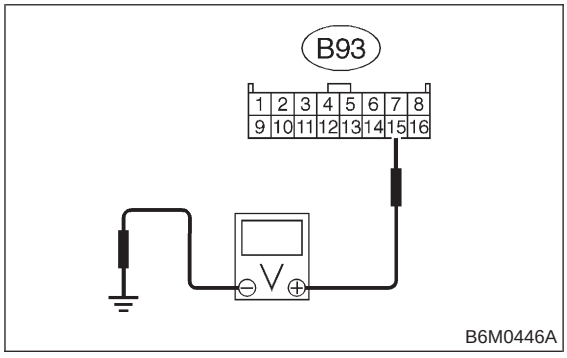
YES : Go to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 6-2b [T6D0].> Go to step **6K5**.

NO : Go to step **6K5**.

6K5 : CHECK KEY CYLINDER SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE (TRUNK LID).

Measure voltage between security control module connector and chassis ground while turning key cylinder with ignition key.

Connector & terminal
(B93) No. 15 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V? (UNLOCK position)***

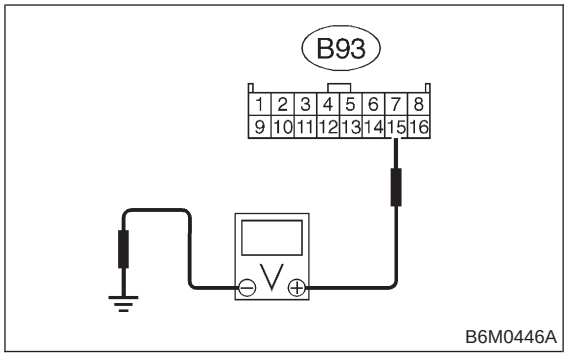
YES : Go to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 6-2b [T6D0].> Go to step **6K6**.

NO : Go to step **6K6**.

6K6 : CHECK KEY CYLINDER SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE (TRUNK LID).

Measure voltage between security control module connector and chassis ground while turning key cylinder with ignition key.

Connector & terminal
(B93) No. 15 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V? (Other***

than UNLOCK position)

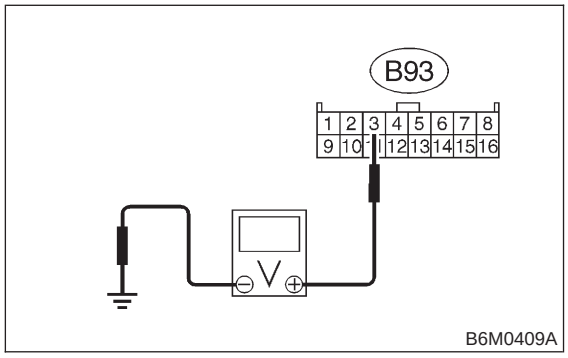
YES : Go to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 6-2b [T6D0].> Go to step **6K7**.

NO : Go to step **6K7**.

6K7 : CHECK KEY CYLINDER SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE.

Measure voltage between security control module connector and chassis ground while installing key cylinder switch to door outer handle.

Connector & terminal
(B93) No. 3 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V? (Switch is installed.)***

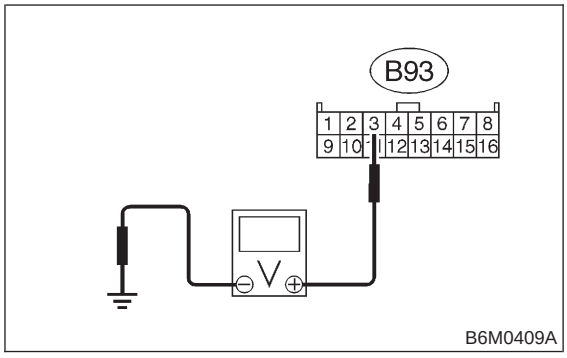
YES : Go to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 6-2b [T6D0].> Go to step **6K8**.

NO : Go to step **6K8**.

6K8 : CHECK KEY CYLINDER SWITCH INPUT SIGNAL FOR SECURITY CONTROL MODULE.

Measure voltage between security control module connector and chassis ground while removing key cylinder switch from door outer handle.

Connector & terminal
(B93) No. 3 (+) — Chassis ground (−):



CHECK : ***Is the voltage less than 1 V? (Switch is removed.)***

YES : Go to “BASIC DIAGNOSTICS PROCEDURE”. <Ref. to 6-2b [T6D0].>

NO : Go to step **6K9**.

NOTE:
For SEDAN vehicles, remove key cylinder switch from trunk lid key cylinder to perform the above inspection.

6K9 : CHECK KEY CYLINDER SWITCH.

Perform inspection of key cylinder lock/unlock switch and tamper switch. <Ref. to 6-2 [W23B4].>

CHECK : ***Is key cylinder switch normal?***

YES : Repair wiring harness between key cylinder switch and security control module.

NO : Replace key cylinder switch.

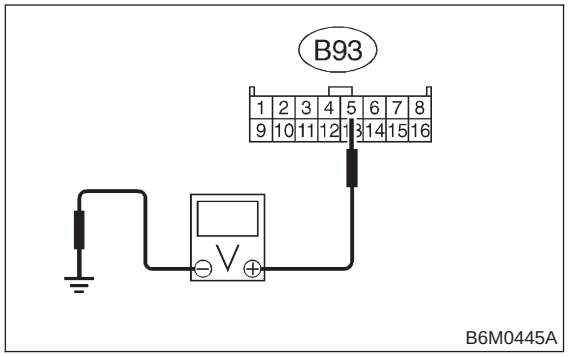
L: DIAGNOSTICS PROCEDURE FOR STARTER INTERRUPT SIGNAL

6L1 : CHECK STARTER INTERRUPT OUTPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Remove security control module without disconnecting connector.

2) Measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 5 (+) — Chassis ground (−):

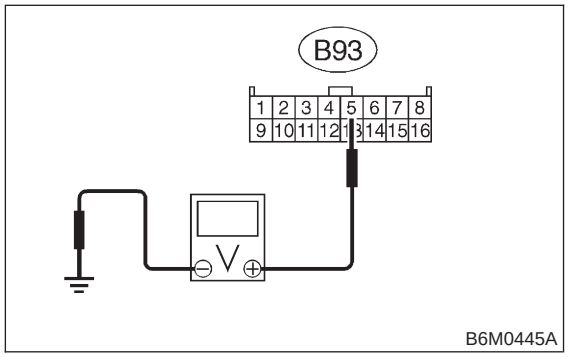


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6L6**.
NO : Go to step **6L2**.

6L2 : CHECK STARTER INTERRUPT OUTPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Set security system in armed state.
2) Open the door without ignition key to operate the security system (alarm state).
3) Measure voltage between security control module and chassis ground during alarm state.

Connector & terminal
(B93) No. 5 (+) — Chassis ground (−):



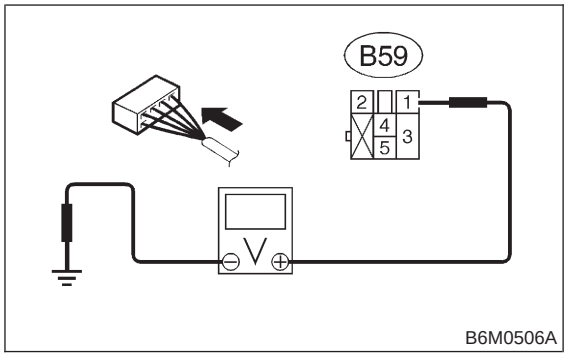
CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **6L6**.
NO : Go to step **6L3**.

6L3 : CHECK POWER SUPPLY FOR STARTER INTERRUPT RELAY.

1) Remove starter interrupt relay without disconnecting connector.

2) Measure voltage between starter interrupt relay connector and chassis ground.

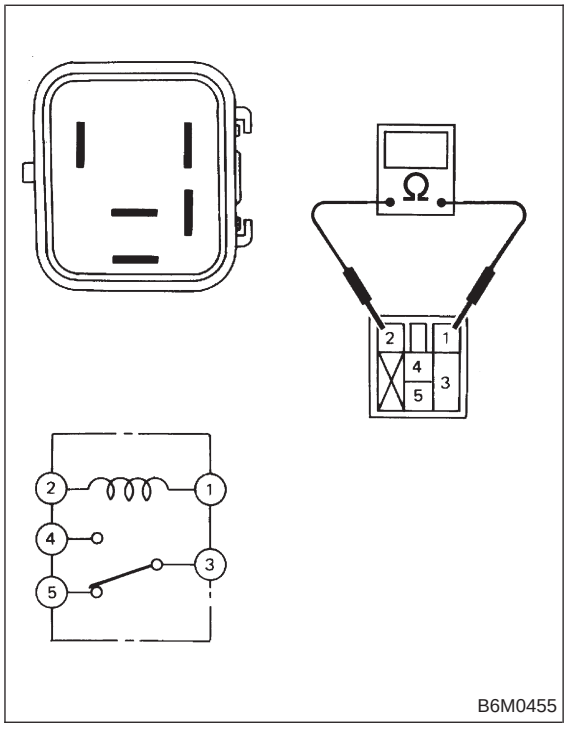
Connector & terminal
(B59) No. 1 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6L4**.
NO : Repair wiring harness between starter interrupt relay and battery.

6L4 : CHECK CONTINUITY OF STARTER INTERRUPT RELAY.

1) Remove starter interrupt relay.
2) Check continuity between terminals No. 1 and No. 2 of starter interrupt relay.

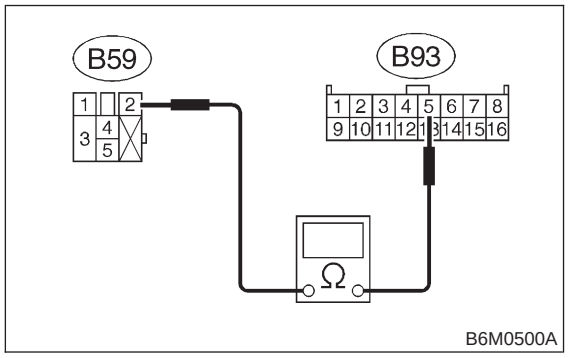


CHECK : ***Is starter interrupt relay normal?***
YES : Go to step **6L5**.
NO : Replace starter interrupt relay.

6L5 : CHECK HARNESS CONNECTOR BETWEEN STARTER INTERRUPT RELAY AND SECURITY CONTROL MODULE.

1) Disconnect connectors of starter interrupt relay and security control module.
2) Measure resistance of harness connector between starter interrupt relay and security control module.

Connector & terminal
(B59) No. 2 — (B93) No. 5:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Replace security control module.
NO : Repair wiring harness between starter interrupt relay and security control module.

6L6 : CHECK STARTER INTERRUPT RELAY.

Perform inspection of starter interrupt relay. <Ref. to 6-2 [W23B1].>

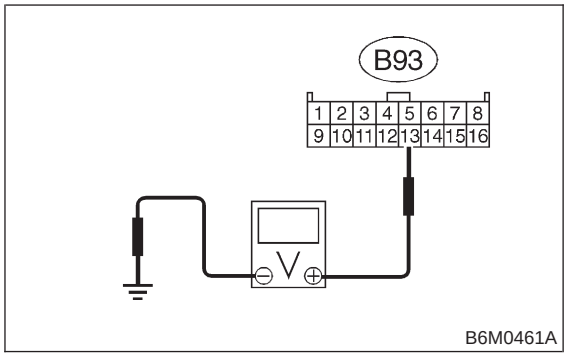
CHECK : ***Is starter interrupt relay normal?***
YES : Repair wiring harness of starter motor circuit.
NO : Replace starter interrupt relay.

M: DIAGNOSTICS PROCEDURE FOR HORN ALARM SIGNAL

6M1 : CHECK HORN ALARM OUTPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Remove security control module without disconnecting connector.
2) Measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 13 (+) — Chassis ground (−):

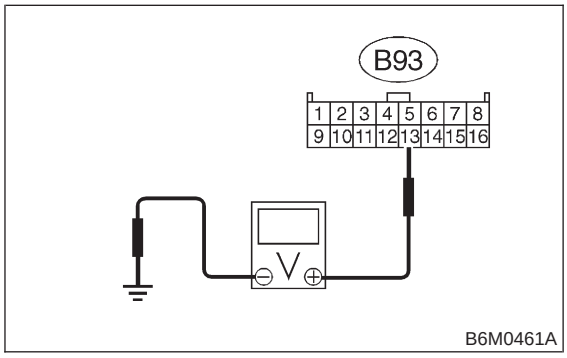


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6M6**.
NO : Go to step **6M2**.

6M2 : CHECK HORN ALARM OUTPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Set security system in armed state.
2) Open the door without ignition key to operate the security system (alarm state).
3) Measure voltage between security control module and chassis ground during alarm state.

Connector & terminal
(B93) No. 13 (+) — Chassis ground (−):

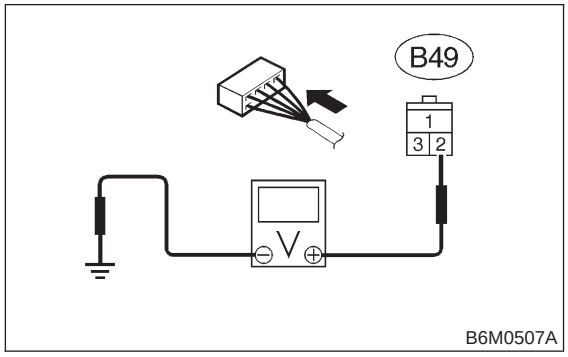


CHECK : ***Does the voltage interval repeat between less than 1 V (0.2 sec.) and more than 10 V (0.6 sec.)?***
YES : Go to step **6M6**.
NO : Go to step **6M3**.

6M3 : CHECK POWER SUPPLY FOR HORN RELAY.

1) Check fuse No. 12.
2) Remove horn relay without disconnecting connector.
3) Measure voltage between horn relay connector and chassis ground.

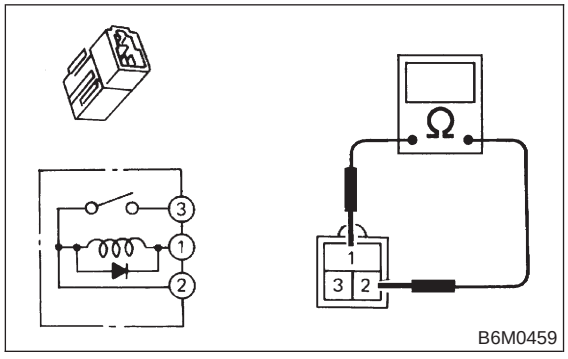
Connector & terminal
(B49) No. 2 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6M4**.
NO : Repair wiring harness between horn relay and battery.

6M4 : CHECK CONTINUITY OF HORN RELAY.

1) Remove horn relay.
2) Check continuity between terminals No. 1 and No. 2 of horn relay.

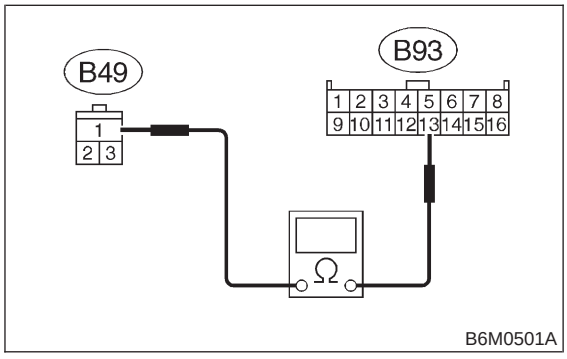


CHECK : ***Is horn relay normal?***
YES : Go to step **6M5**.
NO : Replace horn relay.

6M5 : CHECK HARNESS CONNECTOR BETWEEN HORN RELAY AND SECURITY CONTROL MODULE.

1) Disconnect connectors of horn relay and security control module.
2) Measure resistance of harness connector between horn relay and security control module.

Connector & terminal
(B49) No. 1 (+) — (B93) No. 13:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Replace security control module.
NO : Repair wiring harness between horn relay and security control module.

6M6 : CHECK HORN RELAY.

Perform inspection of horn relay. <Ref. to 6-2 [W16B2].>

CHECK : ***Is horn relay normal?***
YES : Repair wiring harness of horn circuit.
NO : Replace horn relay.

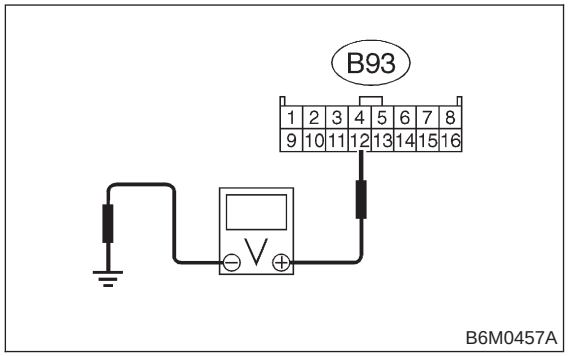
N: DIAGNOSTICS PROCEDURE FOR HEADLIGHT ALARM SIGNAL

6N1 : CHECK HEADLIGHT ALARM OUTPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Remove security control module without disconnecting connector.

2) Measure voltage between security control module connector and chassis ground.

Connector & terminal
(B93) No. 12 (+) — Chassis ground (−):

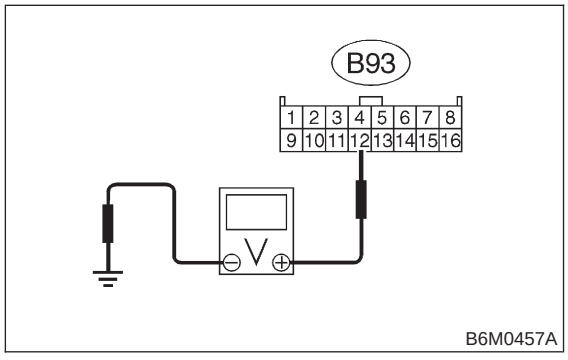


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6N6**.
NO : Go to step **6N2**.

6N2 : CHECK HEADLIGHT ALARM OUTPUT SIGNAL FOR SECURITY CONTROL MODULE.

1) Set security system in armed state.
2) Open the door without ignition key to operate the security system (alarm state).
3) Measure voltage between security control module and chassis ground during alarm state.

Connector & terminal
(B93) No. 12 (+) — Chassis ground (−):

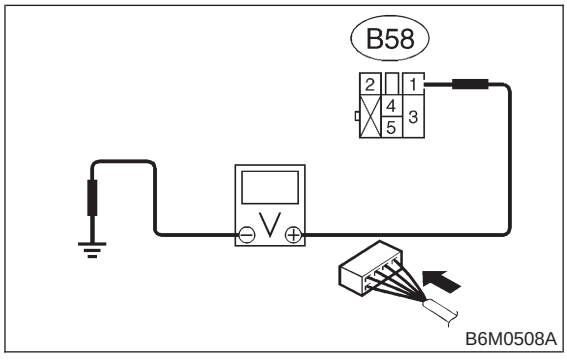


CHECK : ***Does the voltage interval repeat between less than 1 V (0.2 sec.) and more than 10 V (0.6 sec.)?***
YES : Go to step **6N6**.
NO : Go to step **6N3**.

6N3 : CHECK POWER SUPPLY FOR HEADLIGHT ALARM RELAY.

1) Remove headlight alarm relay without disconnecting connector.
2) Measure voltage between headlight alarm relay connector and chassis ground.

Connector & terminal
(B58) No. 1 (+) — Chassis ground (−):

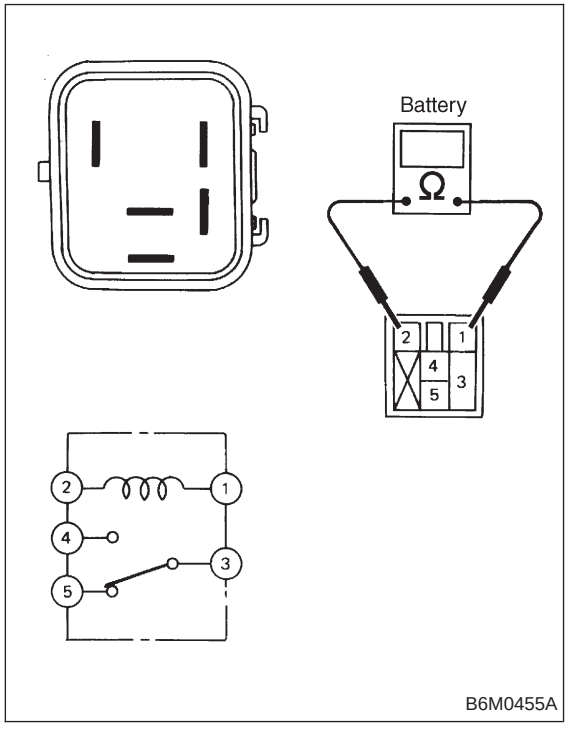


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **6N4**.
NO : Repair wiring harness between headlight alarm relay and battery.

6N4 : CHECK CONTINUITY OF HEADLIGHT ALARM RELAY.

1) Remove headlight alarm relay.

2) Check continuity between terminals No. 1 and No. 2 of headlight alarm relay.



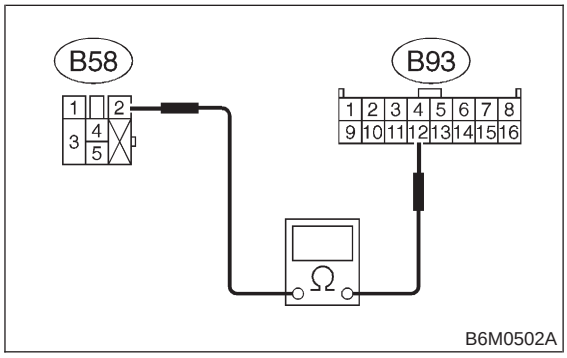
CHECK : ***Is headlight alarm relay normal?***
YES : Go to step **6N5**.
NO : Replace headlight alarm relay.

6N5 : CHECK HARNESS CONNECTOR BETWEEN HEADLIGHT ALARM RELAY AND SECURITY CONTROL MODULE.

1) Disconnect connectors of headlight alarm relay and security control module.

2) Measure resistance of harness connector between headlight alarm relay and security control module.

Connector & terminal
(B58) No. 2 — (B93) No. 12:



CHECK : ***Is the resistance less than 10 Ω?***
YES : Replace security control module.
NO : Repair wiring harness between headlight alarm relay and security control module.

6N6 : CHECK HEADLIGHT ALARM RELAY.

Perform inspection of headlight alarm relay. <Ref. to 6-2 [W23B2].>

CHECK : ***Is headlight alarm relay normal?***
YES : Repair wiring harness of headlight circuit.
NO : Replace headlight alarm relay.

WIRING DIAGRAM SECTION

FOREWORD

This portion of the service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
The manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of both the fully qualified and the less-experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

Important safety notice

- Providing appropriate service and repair is a matter of great importance in the serviceman's safety maintenance and safe operation, function and performance which the SUBARU vehicle possesses.
- In case the replacement of parts or replenishment of consumables is required, genuine SUBARU parts whose parts numbers are designated or their equivalents must be utilized.
- It must be made well known that the safety of the serviceman and the safe operation of the vehicle would be jeopardized if he used any service parts, consumables, special tools and work procedure manuals which are not approved or designated by SUBARU.

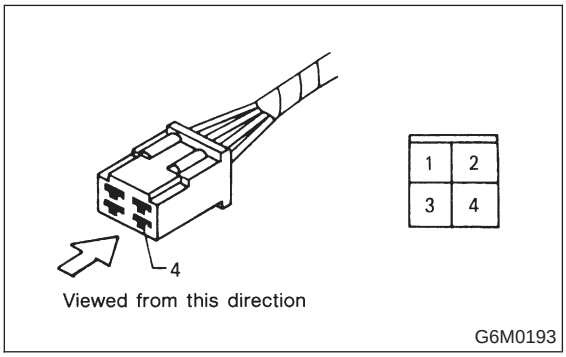
WIRING DIAGRAM 6-3

1. General Description

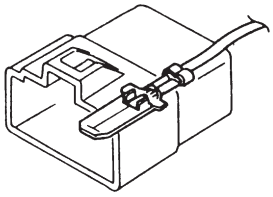
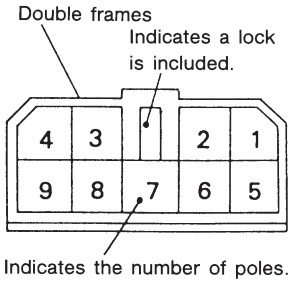
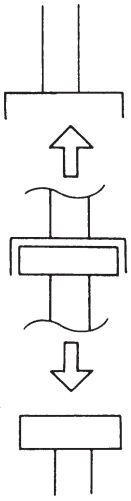
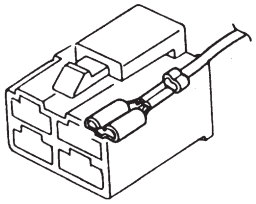
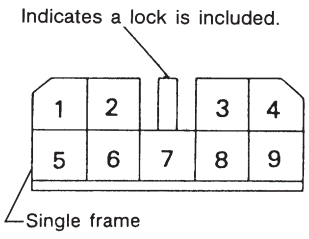
A: WIRING DIAGRAM

The wiring diagram of each system is illustrated so that you can understand the path through which the electric current flows from the battery.
Sketches and codes are used in the diagrams. They should read as follows:

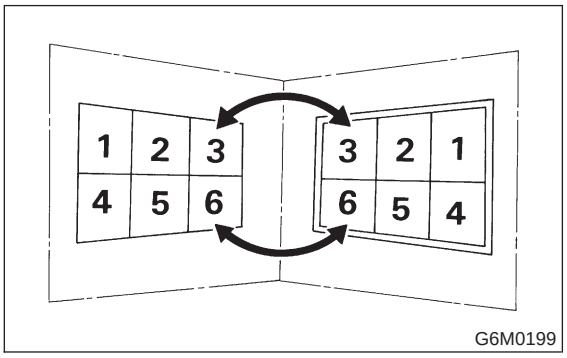
- Each connector and its terminal position are indicated by a sketch of the connector in a disconnected state which is viewed from the front, as shown in figure.



- The number of poles or pins, presence of a lock, and pin number of each terminal are indicated in the sketch of each connector. In the sketch, the highest pole number refers to the number of poles which the connector has. For example, the sketch of the connector shown in figure indicates the connector has 9 poles.

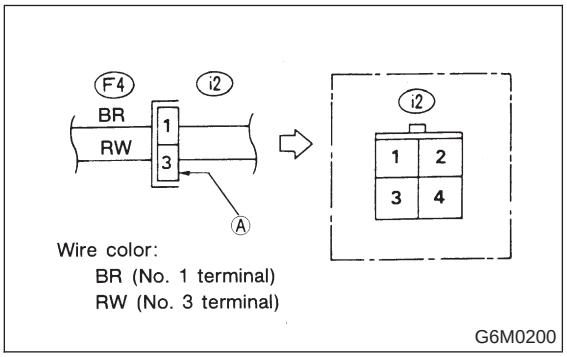
Connector used in vehicle	Connector shown in wiring diagram		
	Sketch	Symbol	Number of poles
 G6M0194	 G6M0196	 G6M0198	Numbered in order from upper right to lower left.
 G6M0195	 G6M0197		Numbered in order from upper left to lower right.

● When one set of connectors is viewed from the front side, the pole numbers of one connector are symmetrical to those of the other. When these two connectors are connected as a unit, the poles which have the same number are joined.

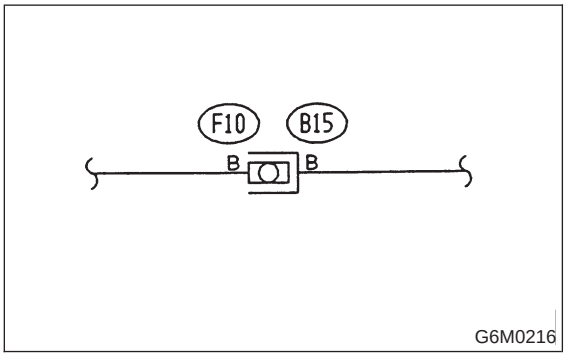


● Electrical wiring harness:
The connectors are numbered along with the number of poles, external colors, and mating connections in the accompanying list.
● The sketch of each connector in the wiring diagram usually shows the “A” side of the connector. The relationship between the wire color, terminal number and connector is described in figure.

NOTE:
A wire which runs in one direction from a connector terminal sometimes may have a different color from that which runs in the other direction from that terminal.

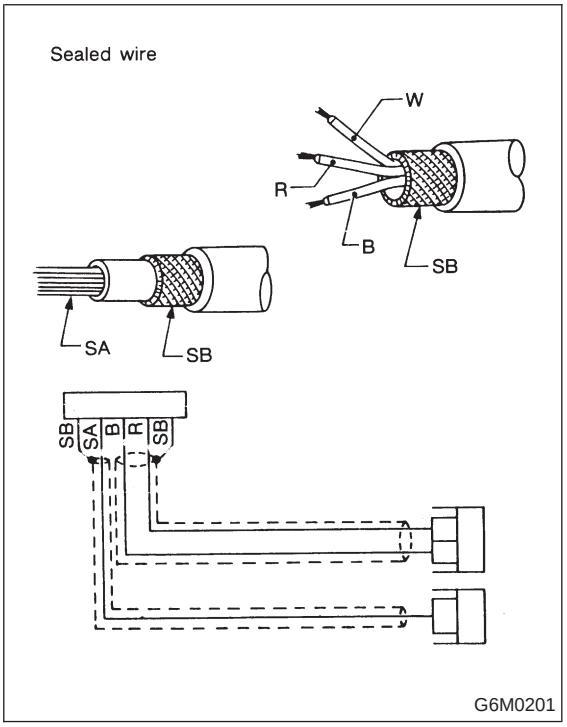


● In wiring diagram, connectors which have no terminal number refer to one-pole types. Sketches of these connectors are omitted intentionally.



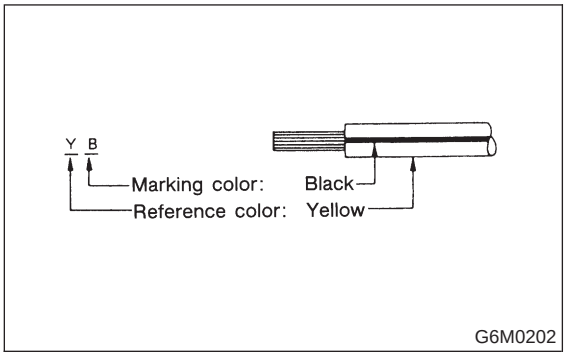
● The following color codes are used to indicate the colors of the wires used.

Color code	Color
L	Blue
B	Black
Y	Yellow
G	Green
R	Red
W	White
Br	Brown
Lg	Light green
Gr	Gray
P	Pink
Or	Orange
Lb	Light Blue
V	Violet
SA	Sealed (Inner)
SB	Sealed (Outer)



WIRING DIAGRAM

● The wire color code, which consists of two letters (or three letters including Br or Lg), indicates the standard color (base color of the wire covering) by its first letter and the stripe marking by its second letter.



● The table lists the nominal sectional areas and allowable currents of the wires.

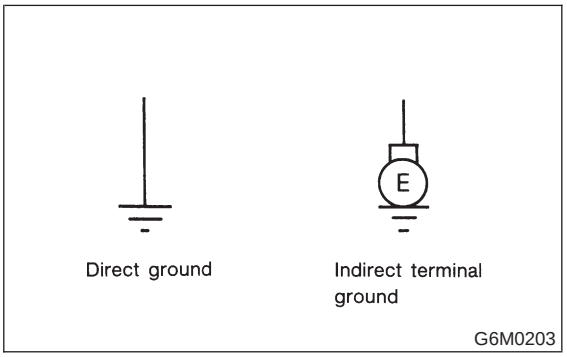
Nominal sectional area mm^2	No. of strands/ strand diameter	Outside diameter of finished wiring mm	Allowable current Amps/40°C
0.3	7/0.26	1.8	7
0.5	7/0.32	2.2 (or 2.0)	12
0.75	30/0.18	2.6 (or 2.4)	16
0.85	11/0.32	2.4 (or 2.2)	16
1.25	16/0.32	2.7 (or 2.5)	21
2	26/0.32	3.1 (or 2.9)	28
3	41/0.32	3.8 (or 3.6)	38
5	65/0.32	4.6 (or 4.4)	51
8	50/0.45	5.5	67

CAUTION:
When replacing or repairing a wire, be sure to use the same size and type of the wire which was originally used.

NOTE:
● The allowable current in the above table indicates the tolerable amperage of each wire at an ambient temperature of 40°C (104°F).

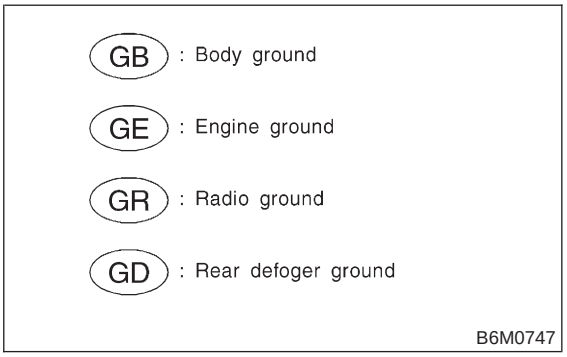
● The allowable current changes with ambient temperature. Also, it changes if a bundle of more than two wires is used.

● Each unit is directly grounded to the body or indirectly grounds through a harness ground terminal. Different symbols are used in the wiring diagram to identify the two grounding systems.

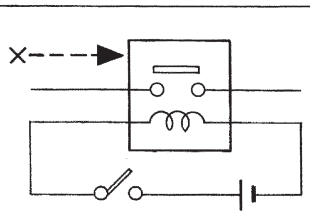
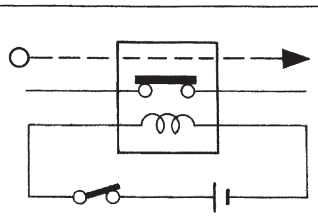
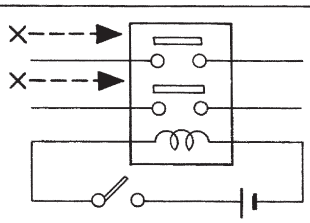
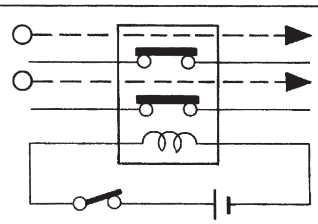
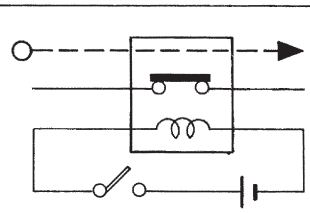
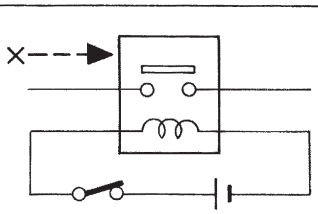
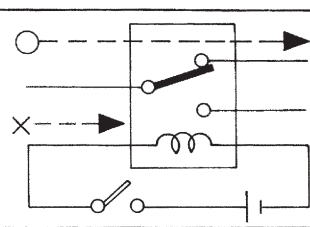
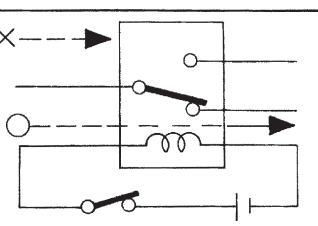


● The ground points shown in the wiring diagram refer to the following:

NOTE:
All wiring harnesses are provided with a ground point which should be securely connected.



● Relays are classified as normally-open or normally-closed.
The normally-closed relay has one or more contacts. The wiring diagram shows the relay mode when the energizing circuit is OFF.

Relay type		Energizing circuit OFF	Energizing circuit ON
Normally-open type	4-pole		
	6-pole		
Normally-closed type	4-pole		
Mixed type	6-pole		

Key to symbols:

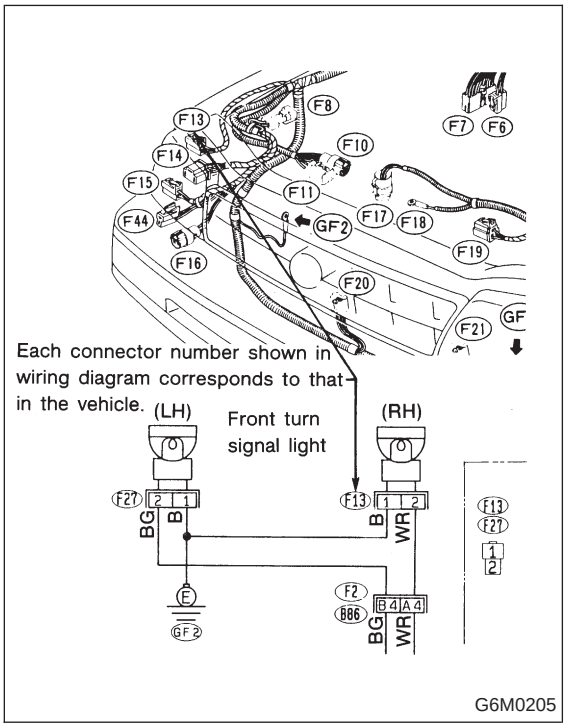
○ ⟶ : Current flows.

× ⟶ : Current does not flow.

B6M0748

● Each connector number shown in the wiring diagram corresponds to that in the wiring harness. The location of each connector in the actual vehicle is determined by reading the first character of the connector (for example, a “F” for F8, “i” for i16, etc.) and the type of wiring harness.
The first character of each connector number refers to the area or system of the vehicle.

Symbol	Wiring harness and Cord
F	Front wiring harness
B	Bulkhead wiring harness
E	Engine wiring harness
T	Transmission cord
D	Door cord LH & RH, Rear gate cord
I	Instrument panel wiring harness
R	Rear wiring harness, Rear defogger cord Room light cord, Fuel tank cord, Sunroof cord, Trunk lid cord
P	Floor wiring harness



2. Basic Diagnostics Procedures

A: BASIC PROCEDURE

1. GENERAL

The most important purpose of diagnostics is to determine which part is malfunctioning quickly, to save time and labor.

2. IDENTIFICATION OF TROUBLE SYMPTOM

Determine what the problem is based on the symptom.

3. PROBABLE CAUSE OF TROUBLE

Look at the wiring diagram and check the system’s circuit. Then check the switch, relay, fuse, ground, etc.

4. LOCATION AND REPAIR OF TROUBLE

1) Using the diagnostics narrow down the causes.
2) If necessary, use a voltmeter, ohmmeter, etc.
3) Before replacing certain component parts (switch, relay, etc.), check the power supply, ground, for open wiring harness, poor connectors, etc. If no problems are encountered, check the component parts.

5. CONFIRMATION OF SYSTEM OPERATION

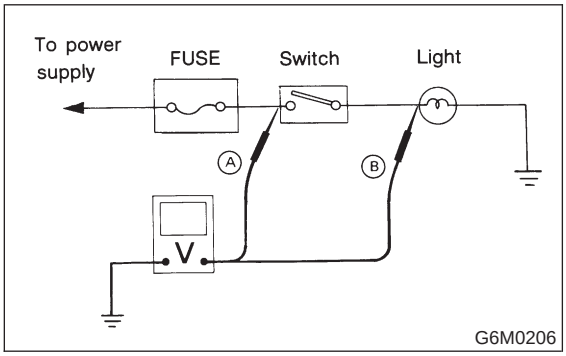
After repairing, ensure that the system operates properly.

B: INSPECTION

1. VOLTAGE MEASUREMENT

1) Using a voltmeter, connect the negative lead to a good ground point or negative battery terminal and the positive lead to the connector or component terminal.
2) Contact the positive probe of the voltmeter on connector (A).
The voltmeter will indicate a voltage.

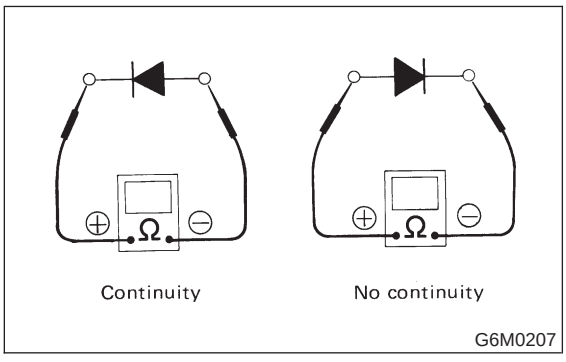
3) Shift the positive probe to connector (B). The voltmeter will indicate no voltage.



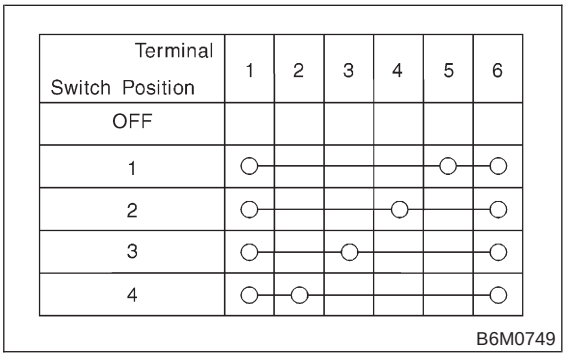
4) With test set-up held as it is, turn switch ON. The voltmeter will indicate a voltage and, at the same time, the light will come on.
5) The circuit is in good order. If a problem such as a lamp failing to light occurs, use the procedures outlined above to track down the malfunction.

2. CIRCUIT CONTINUITY CHECKS

1) Disconnect the battery terminal or connector so there is no voltage between the check points.
Contact the two leads of an ohmmeter to each of the check points.
If the circuit has diodes, reverse the two leads and check again.
2) Use an ohmmeter to check for diode continuity.
When contacting the negative lead to the diode positive side and the positive lead to the negative side, there should be continuity.
When contacting the two leads in reverse, there should be no continuity.



3) Symbol "◯-◯" indicates that continuity exists between two points or terminals. For example, when a switch position is "3", continuity exists among terminals 1, 3 and 6, as shown in table.



Terminal / Switch Position	1	2	3	4	5	6
OFF						
1	○				○	○
2	○			○		○
3	○		○			○
4	○	○				○

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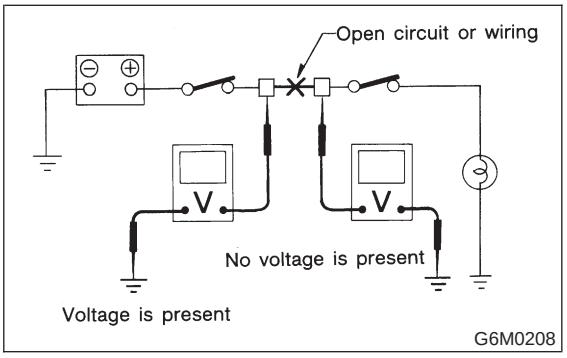
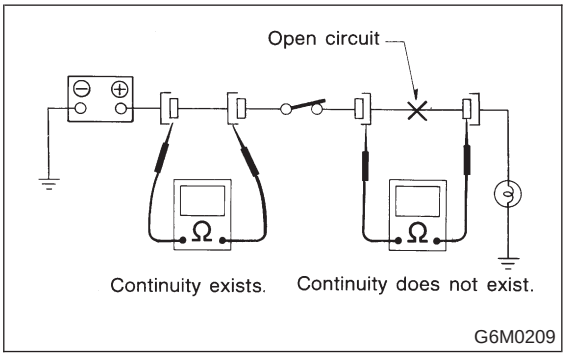
3. HOW TO DETERMINE AN OPEN CIRCUIT

1) Voltmeter method:
An open circuit is determined by measuring the voltage between respective connectors and ground using a voltmeter, starting with the connector closest to the power supply. The power supply must be turned ON so that current flows in the circuit. If voltage is not present between a particular connector and ground, the circuit between that connector and the previous connector is open.

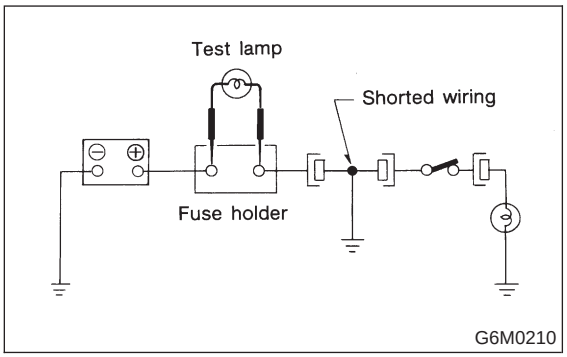


2) Ohmmeter method:
Disconnect all connectors affected, and check continuity in the wiring between adjacent connectors. When the ohmmeter indicates "infinite", the wiring is open.

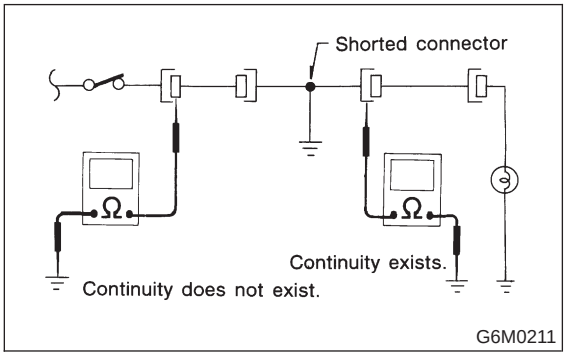


4. HOW TO DETERMINE A SHORT-CIRCUIT

1) Test lamp method:
Connect a test lamp (rated at approximately 3 watts) in place of the blown fuse and allow current to flow through the circuit. Disconnect one connector at a time from the circuit, starting with the one located farthest from the power supply. If the test lamp goes out when a connector is disconnected, the wiring between that connection and the next connector (farther from the power supply) is shorted.



2) Ohmmeter method:
Disconnect all affected connectors, and check continuity between each connector and ground. When ohmmeter indicates continuity between a particular connector and ground, that connector is shorted.



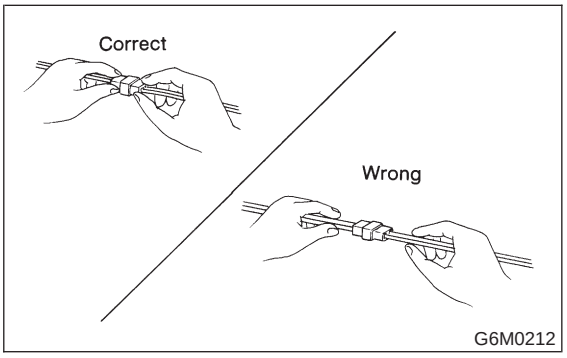
3. Working Precautions

A: PRECAUTIONS WHEN WORKING WITH THE PARTS MOUNTED ON THE VEHICLE

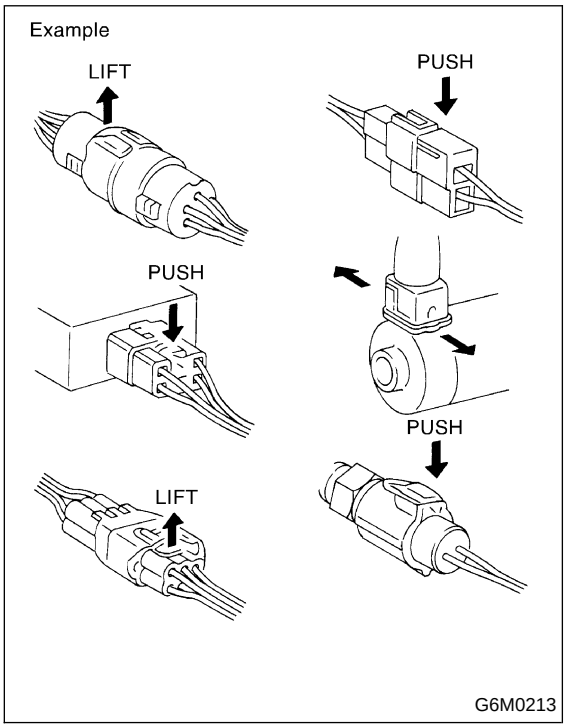
1) When working under a vehicle which is jacked-up, always be sure to use safety stands.
2) The parking brake must always be applied during working. Also, in automatic transmission vehicles, keep the select lever set to the P (Parking) range.
3) Be sure the workshop is properly ventilated when running the engine. Further, be careful not to touch the belt or fan while the engine is operating.
4) Be careful not to touch hot metal parts, especially the radiator and exhaust system immediately after the engine has been shut off.

B: PRECAUTIONS IN TROUBLE DIAGNOSIS AND REPAIR OF ELECTRIC PARTS

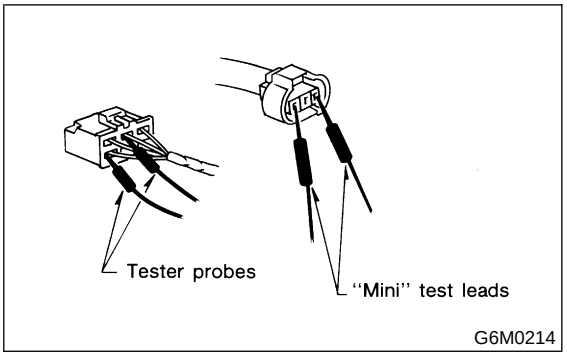
1) The battery cable must be disconnected from the battery's (−) terminal, and the ignition switch must be set to the OFF position, unless otherwise required by the diagnostics.
2) Securely fasten the wiring harness with clamps and slips so that the harness does not interfere with the body end parts or edges and bolts or screws.
3) When installing parts, be careful not to catch them on the wiring harness.
4) When disconnecting a connector, do not pull the wires, but pull while holding the connector body.



5) Some connectors are provided with a lock. One type of such a connector is disconnected by pushing the lock, and the other, by moving the lock up. In either type the lock shape must be identified before attempting to disconnect the connector.
To connect, insert the connector until it snaps and confirm that it is tightly connected.

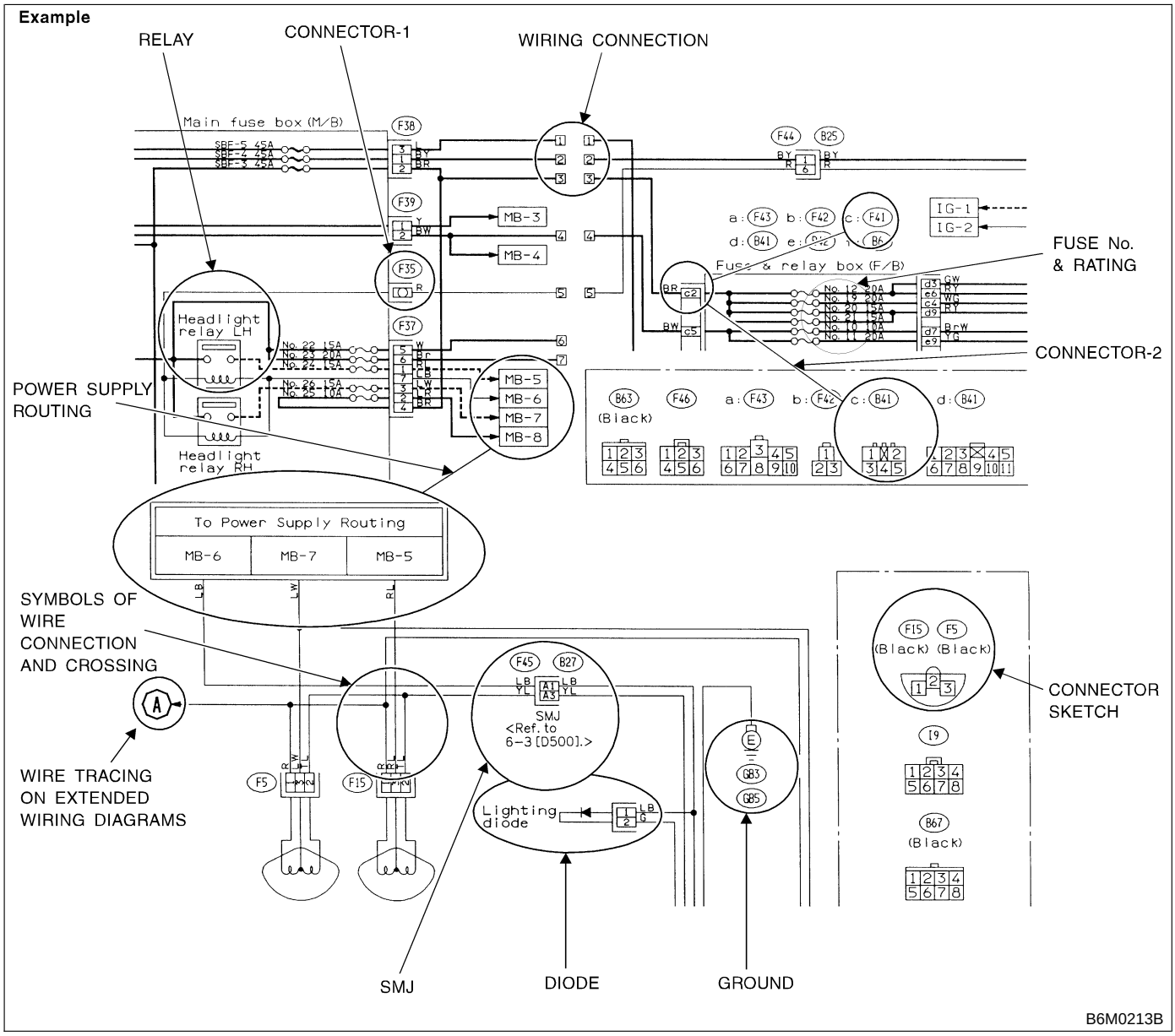


6) When checking continuity between connector terminals, or measuring voltage across the terminal and ground, always contact tester probe(s) on terminals from the wiring connection side. If the probe is too thick to gain access to the terminal, use “mini” test leads.
To check water-proof connectors (which are not accessible from the wiring side), contact test probes on the terminal side being careful not to bend or damage the terminals.



7) Sensors, relays, electrical unit, etc., are sensitive to strong impacts.
Handle them with care so that they are not dropped or mishandled.

4. How to Use Wiring Diagram



A: RELAY

A symbol used to indicate a relay.

B: CONNECTOR-1

The sketch of the connector indicates the one-pole types.

C: WIRING CONNECTION

Some wiring diagrams are indicated in foldouts for convenience. Wiring destinations are indicated where necessary by corresponding symbols (as when two pages are needed for clear indication).

D: FUSE NO. & RATING

The “FUSE No. & RATING” corresponds that used in the fuse box (main fuse box, and joint box).

E: CONNECTOR-2

- Each connector is indicated by a symbol.
- Each terminal number is indicated in the corresponding wiring diagram in an abbreviated form.
- For example, terminal number “C2” refers to No. 2 terminal of connector (C: F41) shown in the connector sketch.

F: CONNECTOR SKETCH

- Each connector sketch clearly identifies the shape and color of a connector as well as terminal

locations. Non-colored connectors are indicated in natural color.
● When more than two types of connector number are indicated in a connector sketch, it means that the same type connectors are used.

G: GROUND

Each grounding point can be located easily by referring to the corresponding wiring harness.

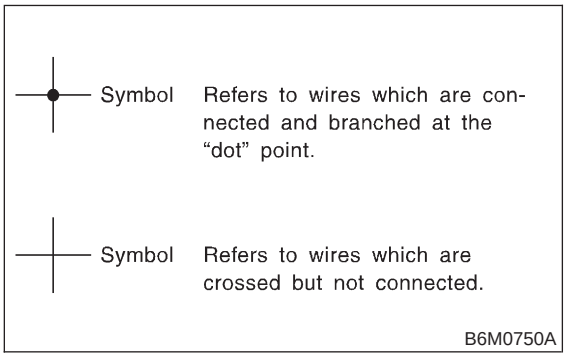
H: DIODE

A symbol is used to indicate a diode.

I: WIRE TRACING ON EXTENDED WIRING DIAGRAMS

For a wiring diagram extending over at least two pages, a symbol (consisting of the same characters with arrows), as shown below, facilitates wire tracing from one page to the next.
A ←→ A, B ←→ B

J: SYMBOLS OF WIRE CONNECTION AND CROSSING



K: POWER SUPPLY ROUTING

A symbol is used to indicate the power supply in each wiring diagram.
"MB-5", "MB-6", etc., which are used as power supply symbols throughout the text, correspond with those shown in the POWER SUPPLY ROUTING in the wiring diagram.
Accordingly, using the POWER SUPPLY ROUTING and wiring diagrams permits service personnel to understand the entire electrical arrangement of a system.

L: S.M.J.

A symbol is used to indicate the terminal arrangement of the super multiple junction. The S.M.J. is not shown in respective wiring diagrams but is indicated on the next page.

M: SYMBOLS AND ABBREVIATIONS

A number of symbols and abbreviations are used in each wiring diagram to easily identify parts or circuits.

N: ABBREVIATION LIST

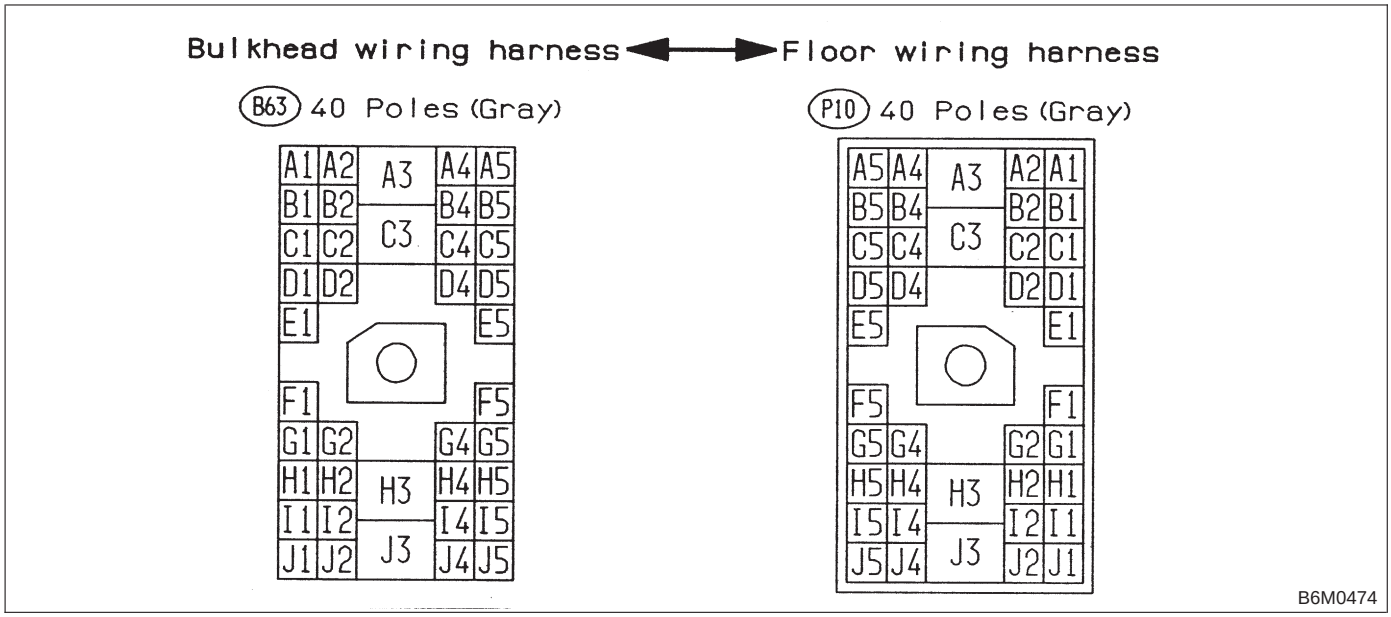
Abbr.	Full name
ABS	Antilock Brake System
ACC	Accessory
A/C	Air Conditioning
AD	Auto Down
AT	Automatic Transmission
AU	Auto Up
+B	Battery
DN	Down
DRL	Daytime Running Light
E	Ground
F/B	Fuse & Joint Box
FL1.5	Fusible link 1.5 mm^2
IG	Ignition
Illumi.	Illumination
LH	Left Hand
Lo	Low
M	Motor
M/B	Main Fuse Box
MG	Magnet
Mi	Middle
OP	Optional Parts
PASS	Passing
RH	Right Hand
SBF	Slow Blow Fuse
S.M.J.	Super Multiple Junction
ST	Starter
SW	Switch
TCS	Traction Control System
UP	Up
WASH	Washer

5. How to Use Super Multiple Junction (S.M.J.)

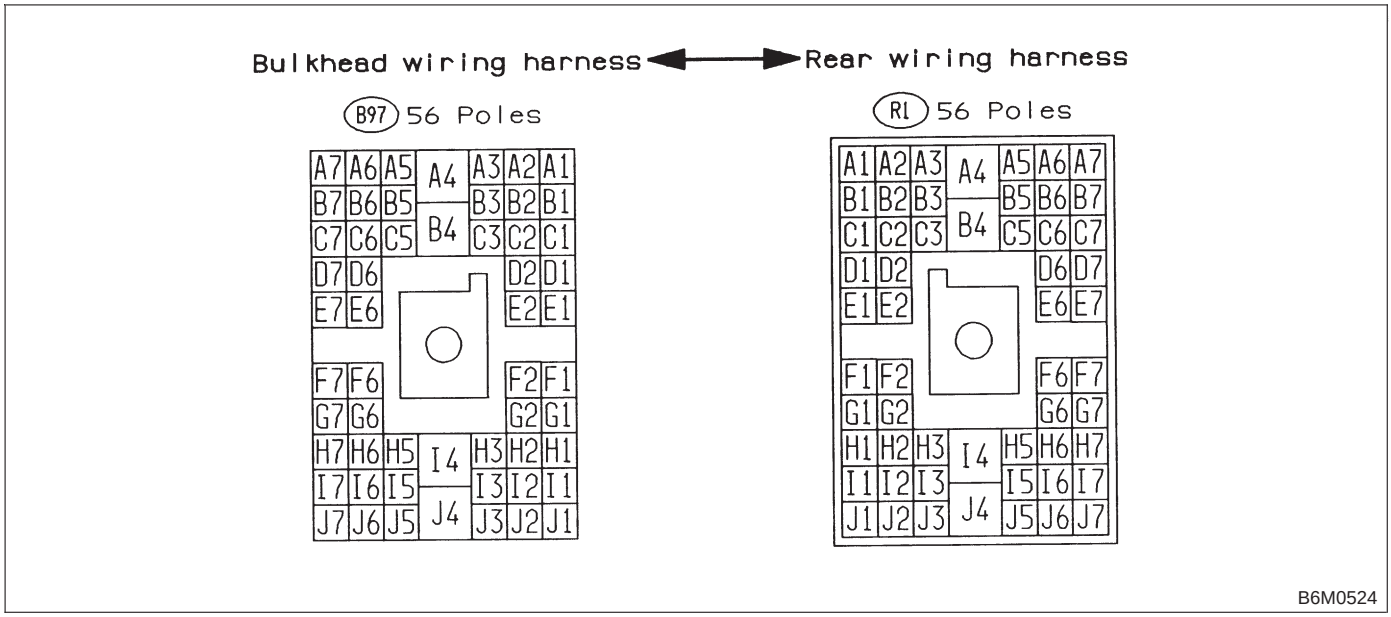
A: TERMINAL ARRANGEMENT

The “S.M.J.” indicated in wiring diagrams is shown in a simplified form.

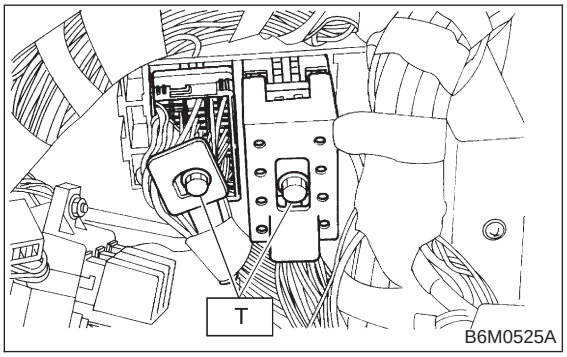
1. LHD MODEL



2. RHD MODEL



B: INSTALLATION

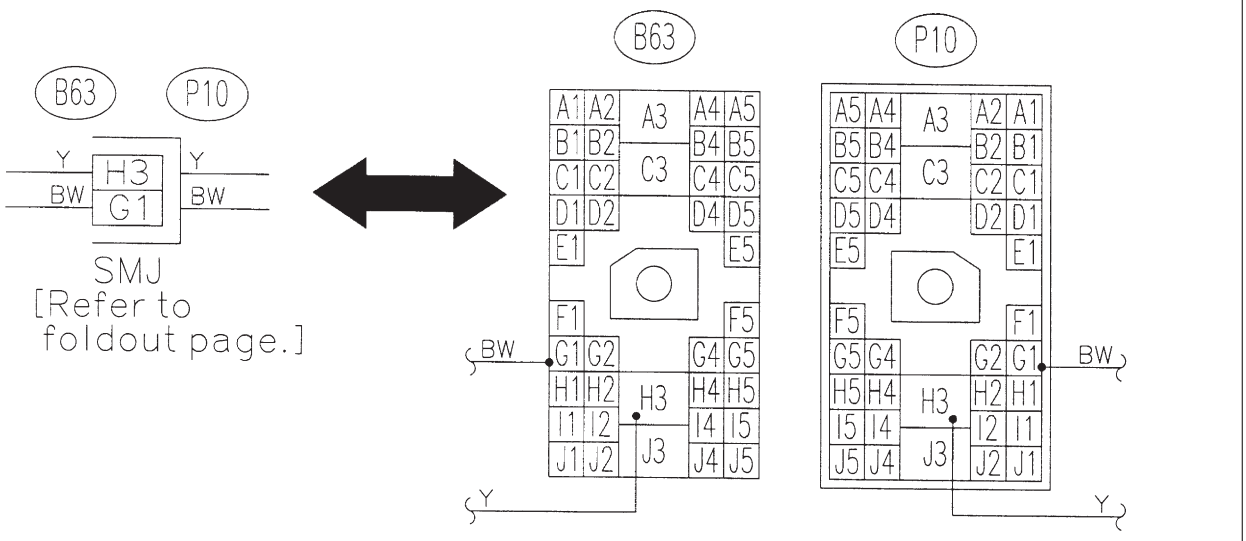


Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-cm, 4.3±1.1 in-lb)

NOTE:
- Align the cutout portion of one connector with that of other before tightening the connecting bolt.
- Do not tighten the bolt excessively since this may deform the connectors.

C: EXPLANATION OF S.M.J. SHOWN IN THE WIRING DIAGRAM

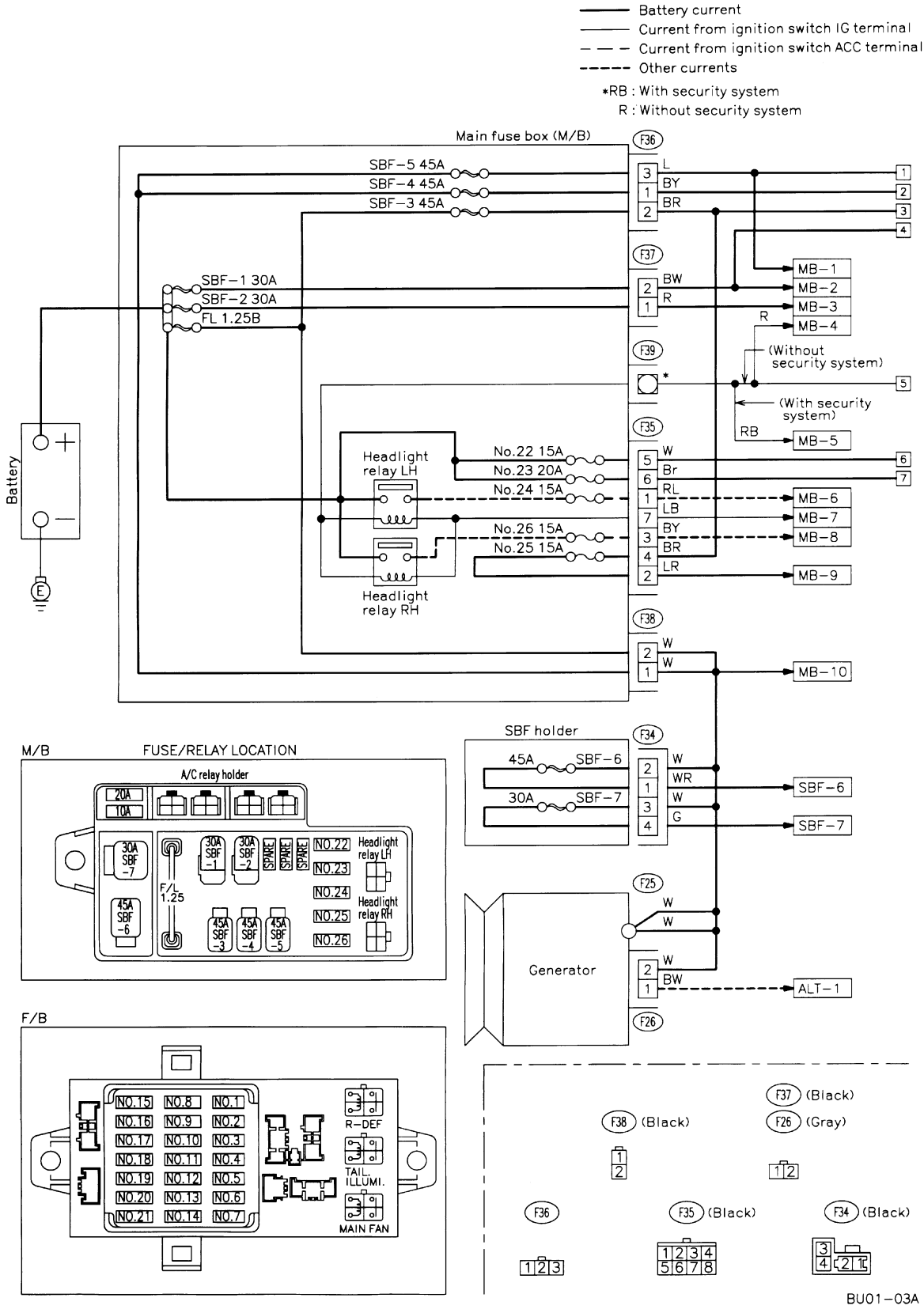
Example

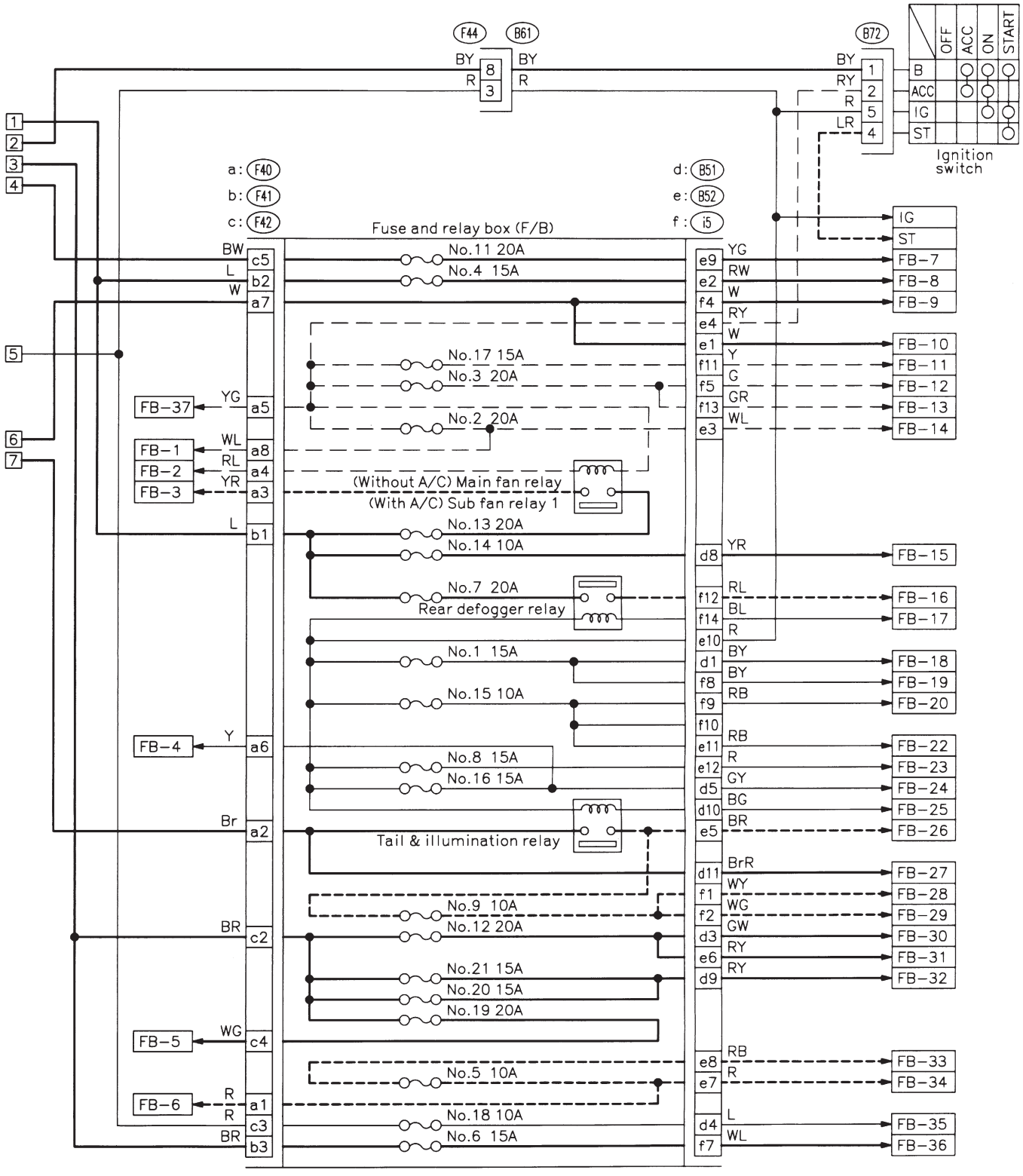


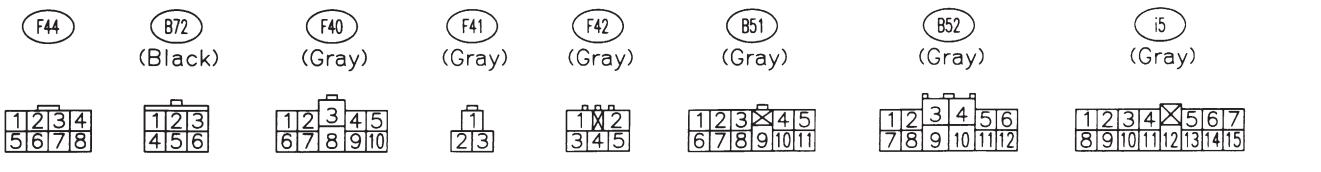
6. Wiring Diagram

A: POWER SUPPLY ROUTING

1. LHD MODEL




F44
B61
B72
BY
R
OFF
ACC
ON
START
B
ACC
IG
ST
Ignition switch
a: F40
b: F41
c: F42
d: B51
e: B52
f : i5
Fuse and relay box (F/B)
No.11 20A
No.4 15A
No.17 15A
No.3 20A
No.2 20A
No.13 20A
No.14 10A
No.7 20A
Rear defogger relay
No.1 15A
No.15 10A
No.8 15A
No.16 15A
No.9 10A
No.12 20A
No.21 15A
No.20 15A
No.19 20A
No.5 10A
No.18 10A
No.6 15A
(Without A/C) Main fan relay
(With A/C) Sub fan relay 1
Tail & illumination relay
FB-37
FB-1
FB-2
FB-3
FB-4
FB-5
FB-6
FB-7
FB-8
FB-9
FB-10
FB-11
FB-12
FB-13
FB-14
FB-15
FB-16
FB-17
FB-18
FB-19
FB-20
FB-22
FB-23
FB-24
FB-25
FB-26
FB-27
FB-28
FB-29
FB-30
FB-31
FB-32
FB-33
FB-34
FB-35
FB-36
IG
ST


F44
B72 (Black)
F40 (Gray)
F41 (Gray)
F42 (Gray)
B51 (Gray)
B52 (Gray)
i5 (Gray)

BU01-03B

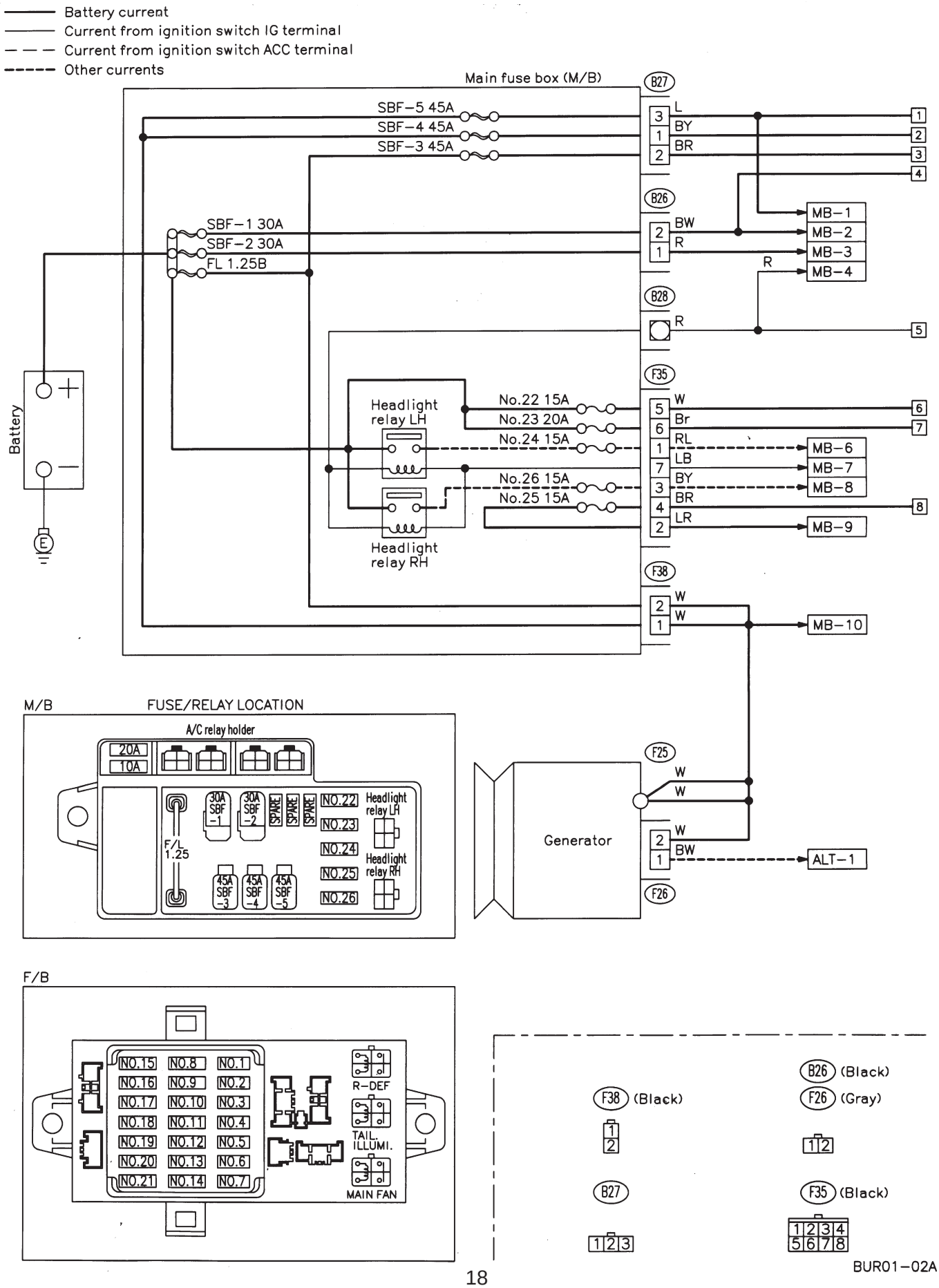
No.	Load
MB-1	Fuse holder (Rear power supply & seat heater)
MB-2	Power window circuit breaker
MB-3	Engine control module Fuel pump relay Main relay OBD-II service connector
MB-4	A/C relay holder
MB-5	Headlight alarm relay (with security)
MB-6	Headlight LH
MB-7	Daytime running light control module Diode (Lighting) Diode (Security) Lighting switch
MB-8	Combination meter Front fog light switch Headlight RH Front fog light relay
MB-9	Door lock timer Headlight alarm relay Interrupt relay Radio Security control module Security indicator light Spot light Room light Step light Combination meter Luggage room light Trailer connector Trunk room light
MB-10	A/C relay holder
SBF-6	ABS relay box TCS motor relay
SBF-7	TCS valve relay
ALT-1	Combination meter Daytime running light control module Diode (TCS)
IG	Headlight alarm relay
ST	Cruise control module Engine control module Inhibitor switch (AT) Interrupt relay Starter interlock relay (MT)
FB-1	Front washer motor Rear washer motor
FB-2	Engine control module Main fan relay 1
FB-3	Sub fan relay 2 Sub fan motor
FB-4	Engine control module Fuel pump relay Ignition coil Transmission control module
FB-5	ABS relay box
FB-6	Side marker light LH Side marker light RH

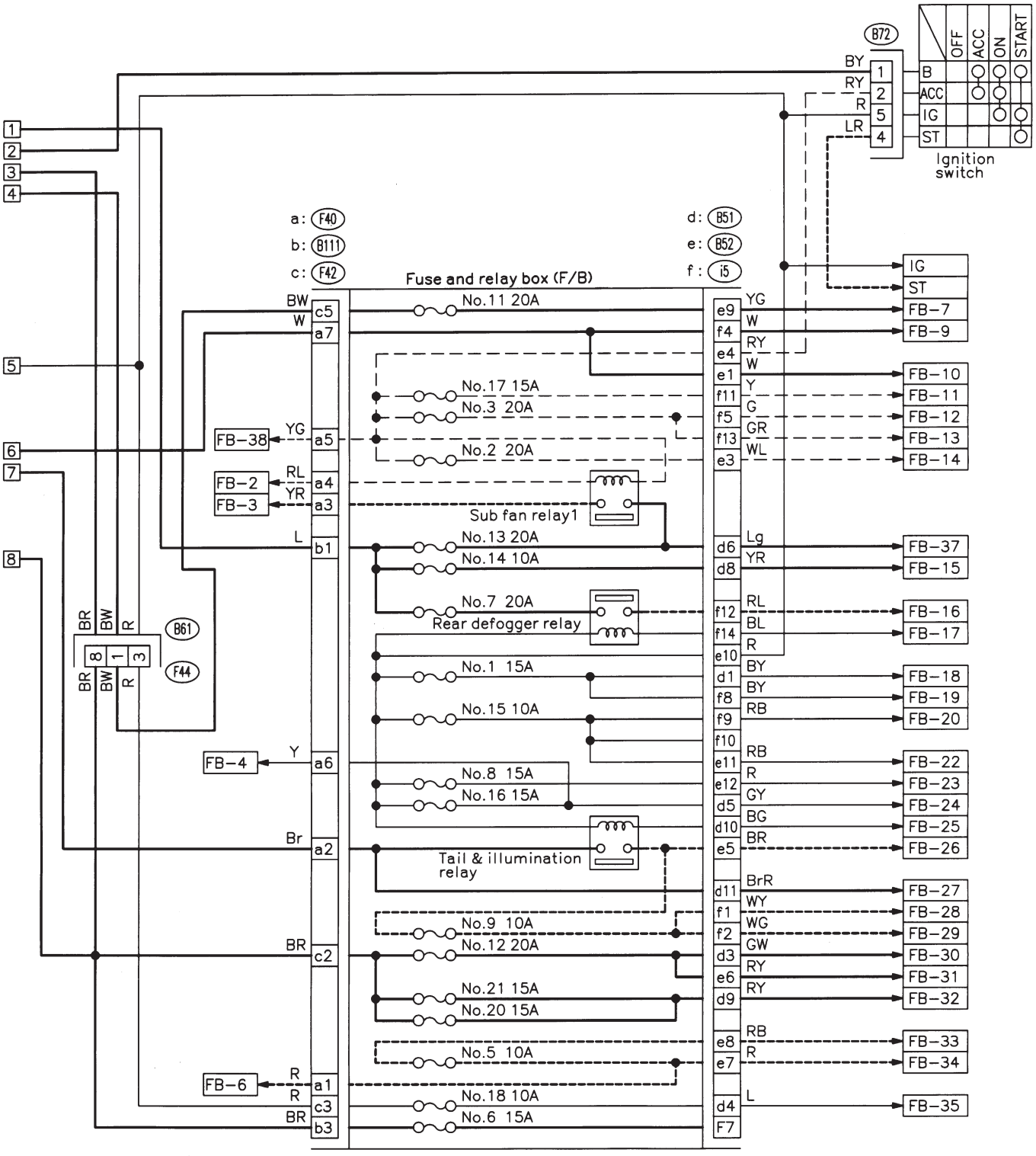
No.	Load
FB-7	Door lock timer
FB-8	Wiper deicer relay
FB-9	Hazard switch
FB-10	AT shift lock control module Key warning switch Power antenna
FB-11	Radio
FB-12	Front accessory power supply
FB-13	Mirror heater Rear power supply relay Remote control rearview mirror switch Security control module Vanity mirror illumination light
FB-14	AT shift lock control module Combination switch Front wiper motor Rear wiper motor Rear wiper relay
FB-15	ABS/TCS control module Transmission control module
FB-16	Rear defogger Rear defogger condenser Rear defogger switch
FB-17	Rear defogger timer
FB-18	AT shift lock control module Back-up light switch (MT) Inhibitor switch (AT)
FB-19	Hazard switch
FB-20	A/C switch Combination meter Mode control panel Rear defogger timer TCS off switch
FB-22	Blower motor relay Check connector Daytime running light control module Daytime running light relay FRESH/RECIRC actuator Hi-beam relay Power window and sunroof relay Seat belt timer Wiper deicer relay Wiper deicer timer
FB-23	Airbag control module
FB-24	Airbag control module
FB-25	Lighting switch
FB-26	Parking switch
FB-27	Parking switch
FB-28	Illumination light
FB-29	Illumination light
FB-30	Pedal stroke switch Stop light switch Stop & brake switch
FB-31	Horn relay
FB-32	Blower motor relay
FB-33	Parking switch

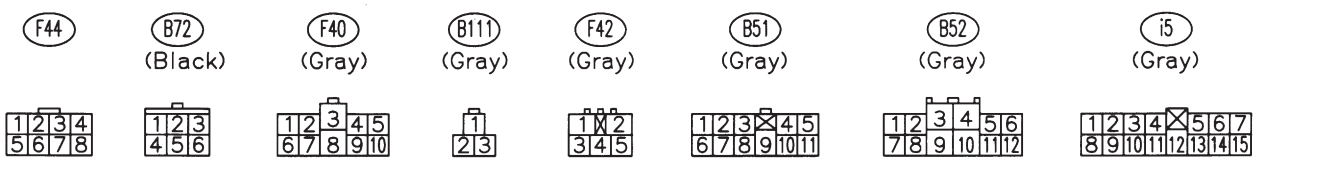
No.	Load
FB-34	License plate light Rear combination light LH Rear combination light RH Rear finisher light LH Rear finisher light RH
FB-35	ABS control module ABS/TCS control module TCS valve relay Cruise control main switch Cruise control module
FB-36	Front fog light relay
FB-37	Main fan relay 1

WIRING DIAGRAM

2. RHD MODEL




B72
OFF
ACC
ON
START
B
ACC
IG
ST
BY
RY
R
LR
Ignition switch
a: F40
b: B111
c: F42
d: B51
e: B52
f: i5
Fuse and relay box (F/B)
No.11 20A
No.17 15A
No.3 20A
No.2 20A
Sub fan relay1
No.13 20A
No.14 10A
No.7 20A
Rear defogger relay
No.1 15A
No.15 10A
No.8 15A
No.16 15A
Tail & illumination relay
No.9 10A
No.12 20A
No.21 15A
No.20 15A
No.5 10A
No.18 10A
No.6 15A
FB-38
FB-2
FB-3
FB-4
FB-6
B61
F44
IG
ST
FB-7
FB-9
FB-10
FB-11
FB-12
FB-13
FB-14
FB-37
FB-15
FB-16
FB-17
FB-18
FB-19
FB-20
FB-22
FB-23
FB-24
FB-25
FB-26
FB-27
FB-28
FB-29
FB-30
FB-31
FB-32
FB-33
FB-34
FB-35


F44
B72 (Black)
F40 (Gray)
B111 (Gray)
F42 (Gray)
B51 (Gray)
B52 (Gray)
i5 (Gray)

BUR01–02B

WIRING DIAGRAM

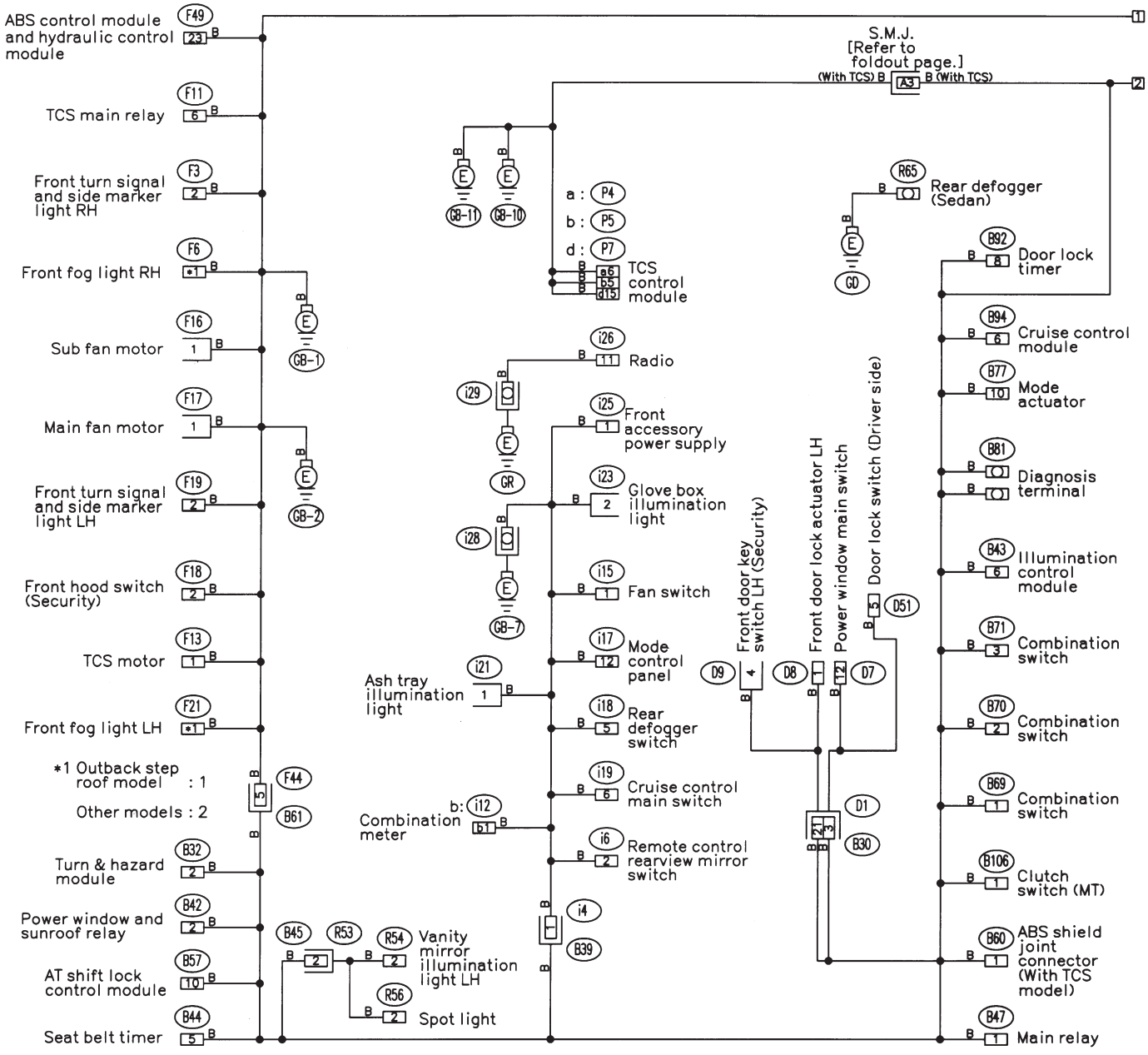
No.	Load
MB-2	Power window circuit breaker
MB-3	Engine control module Fuel pump relay Main relay OBD-II service connector
MB-4	A/C relay holder
MB-6	Headlight LH
MB-7	Diode (Lighting) Lighting switch
MB-8	Combination meter Headlight RH
MB-9	Combination meter Door lock timer Luggage room light Radio Room light
MB-10	A/C relay holder
ALT-1	Combination meter
IG	A/C relay holder
ST	Cruise control module Engine control module Inhibitor switch
FB-2	Engine control module Main fan relay 1
FB-3	Sub fan motor Sub fan relay-2
FB-4	Engine control module Fuel pump relay Ignition coil Transmission control module
FB-6	Side marker light LH Side marker light RH
FB-7	Door lock timer
FB-9	Hazard switch
FB-10	AT shift lock control module Key warning switch Power antenna
FB-11	Radio
FB-12	Cigarette lighter
FB-13	Remote control rearview mirror switch
FB-14	AT shift lock control module Combination switch Front washer motor Front wiper motor Rear washer motor Rear wiper motor Rear wiper relay
FB-15	Transmission control module
FB-16	Rear defogger Rear defogger condenser Rear defogger switch
FB-17	Rear defogger timer
FB-18	AT shift lock control module Inhibitor switch
FB-19	Hazard switch

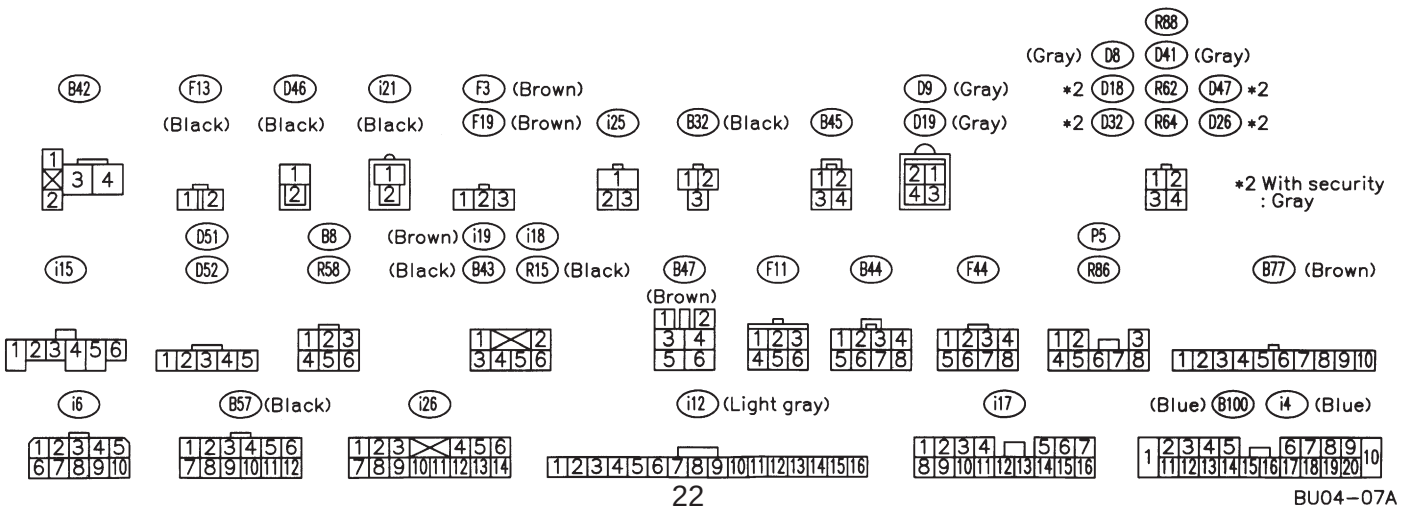
No.	Load
FB-20	Combination meter Mode control panel Rear defogger timer
FB-22	Blower motor relay Check connector FRESH/RECIRC actuator Mode actuator Power window relay Seat belt timer
FB-23	Airbag control module
FB-24	Airbag control module
FB-25	Lighting switch
FB-26	Parking switch
FB-27	Parking switch
FB-28	Illumination light
FB-29	Illumination light
FB-30	Stop light switch Stop & brake switch
FB-31	Horn relay
FB-32	Blower motor relay
FB-33	Parking switch
FB-34	License plate light LH License plate light RH Rear combination light LH Rear combination light RH Rear finisher light LH Rear finisher light RH
FB-35	Cruise control main switch Cruise control module
FB-38	Main fan relay 1

MEMO:

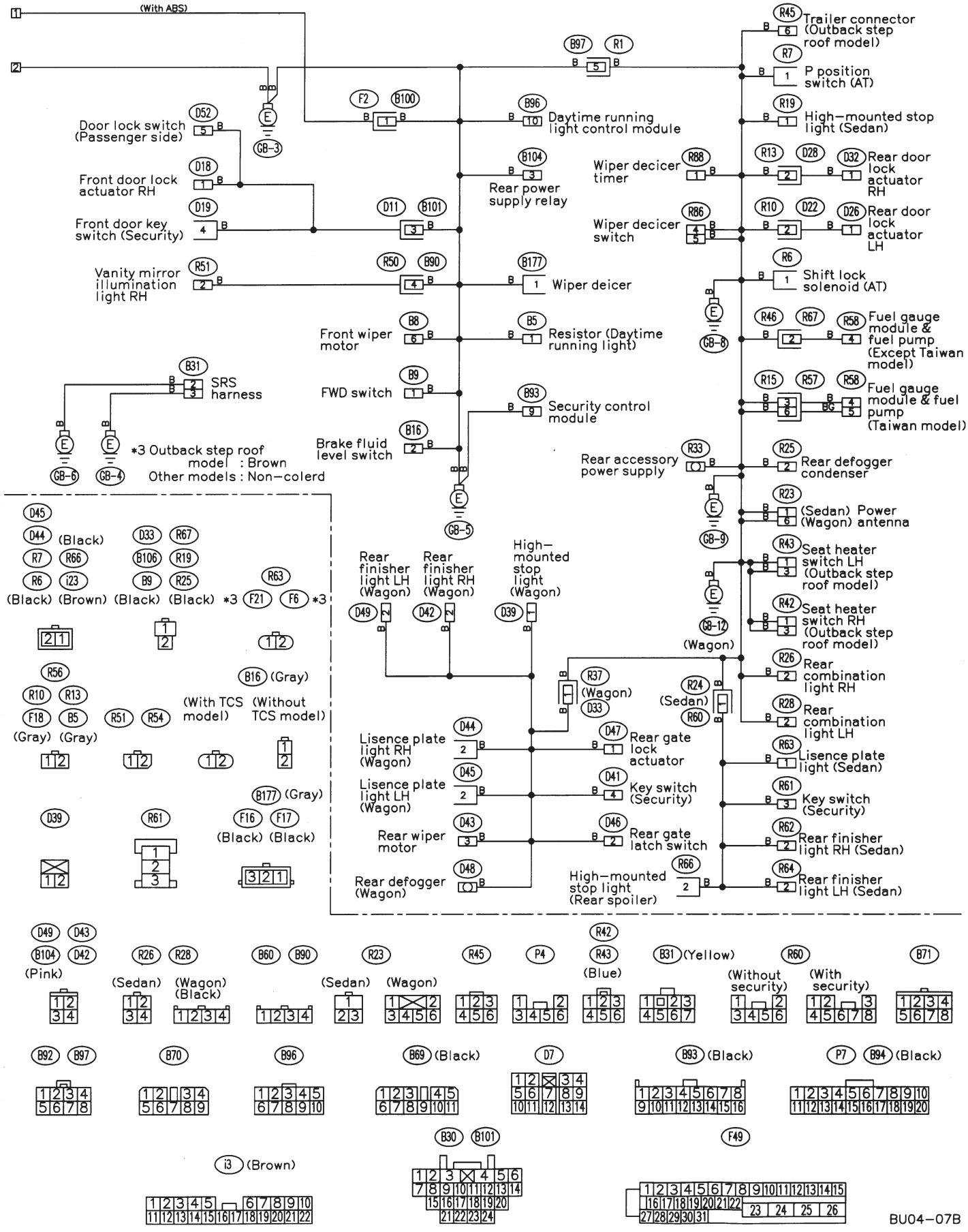
B: GROUND DISTRIBUTION

1. LHD MODEL

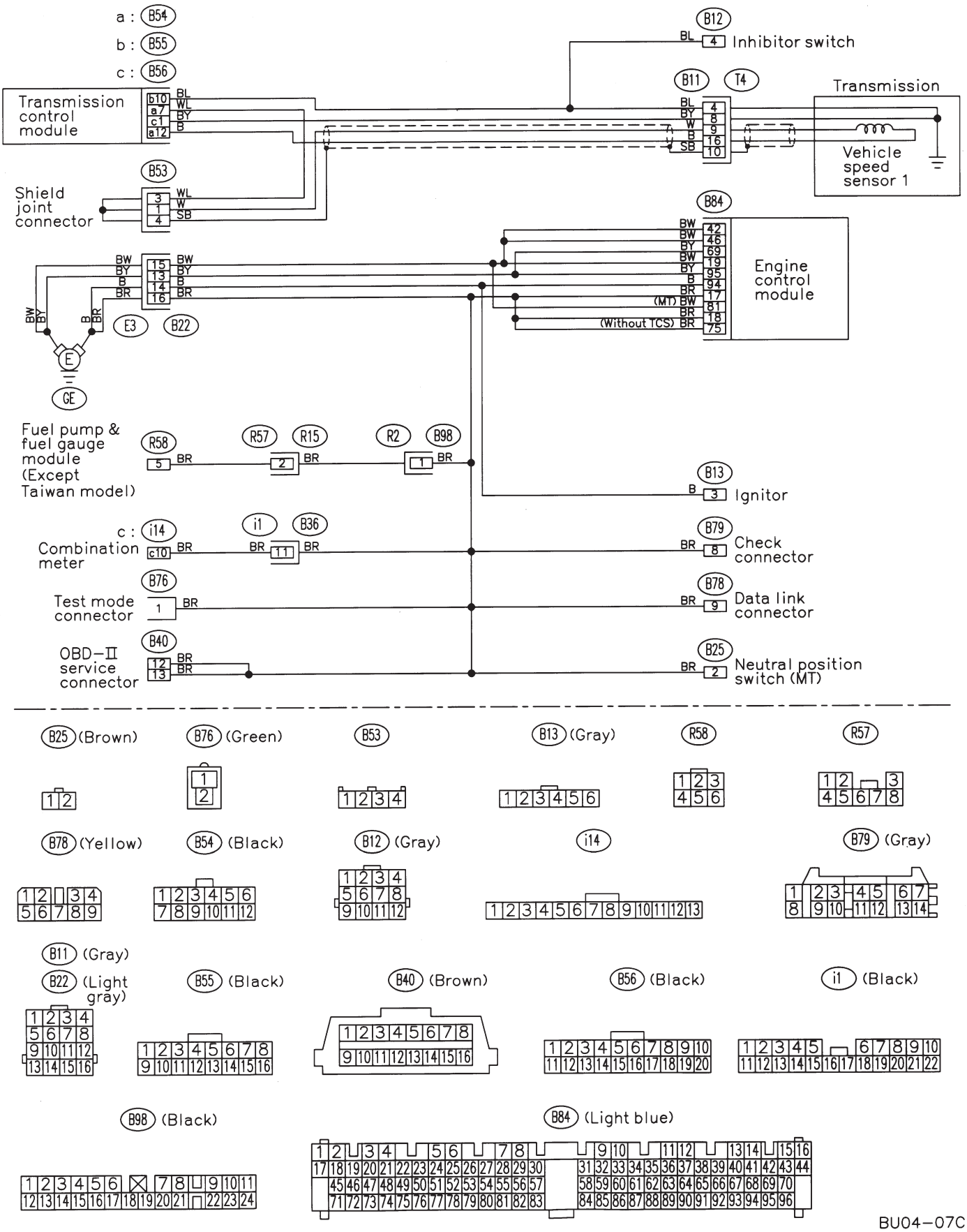




BU04–07A


(With ABS)
Door lock switch (Passenger side)
Front door lock actuator RH
Front door key switch (Security)
Vanity mirror illumination light RH
Front wiper motor
SRS harness
FWD switch
Brake fluid level switch
*3 Outback step roof model : Brown
Other models : Non-colerd
Daytime running light control module
Rear power supply relay
Wiper deicer
Resistor (Daytime running light)
Security control module
Wiper deicer timer
Wiper deicer switch
Rear accessory power supply
Trailer connector (Outback step roof model)
P position switch (AT)
High-mounted stop light (Sedan)
Rear door lock actuator RH
Rear door lock actuator LH
Shift lock solenoid (AT)
Fuel gauge module & fuel pump (Except Taiwan model)
Fuel gauge module & fuel pump (Taiwan model)
Rear defogger condenser
(Sedan) Power (Wagon) antenna
Seat heater switch LH (Outback step roof model)
Seat heater switch RH (Outback step roof model)
Rear combination light RH
Rear combination light LH
Lisence plate light (Sedan)
Key switch (Security)
Rear finisher light RH (Sedan)
Rear finisher light LH (Sedan)
Rear finisher light RH (Wagon)
Rear finisher light LH (Wagon)
High-mounted stop light (Wagon)
Lisence plate light RH (Wagon)
Lisence plate light LH (Wagon)
Rear wiper motor
Rear defogger (Wagon)
Rear gate lock actuator
Key switch (Security)
Rear gate latch switch
High-mounted stop light (Rear spoiler)
(Black)
(Brown)
(Gray)
(With TCS model)
(Without TCS model)
(Pink)
(Blue)
(Yellow)
(Without security)
(With security)
BU04-07B

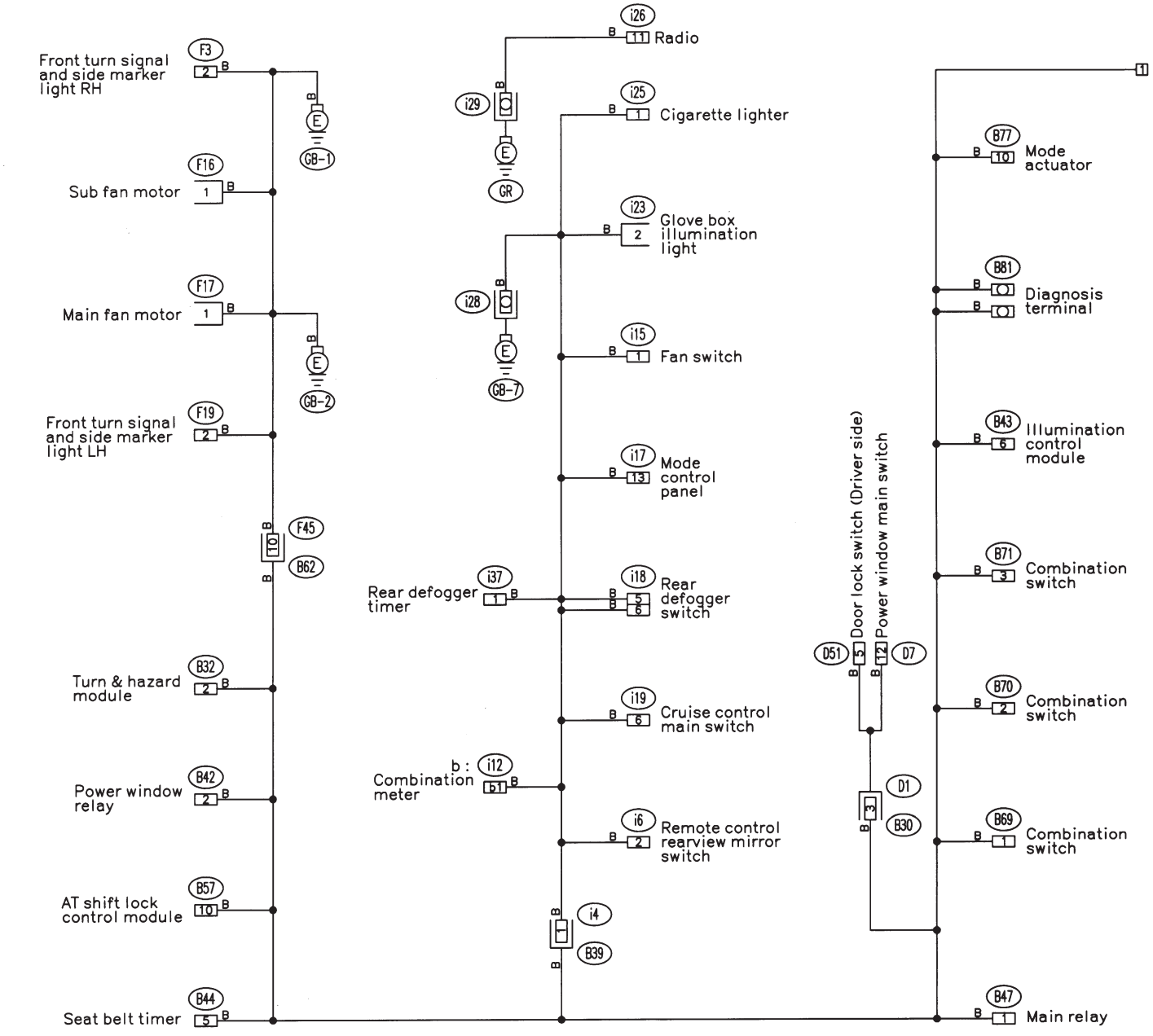
WIRING DIAGRAM

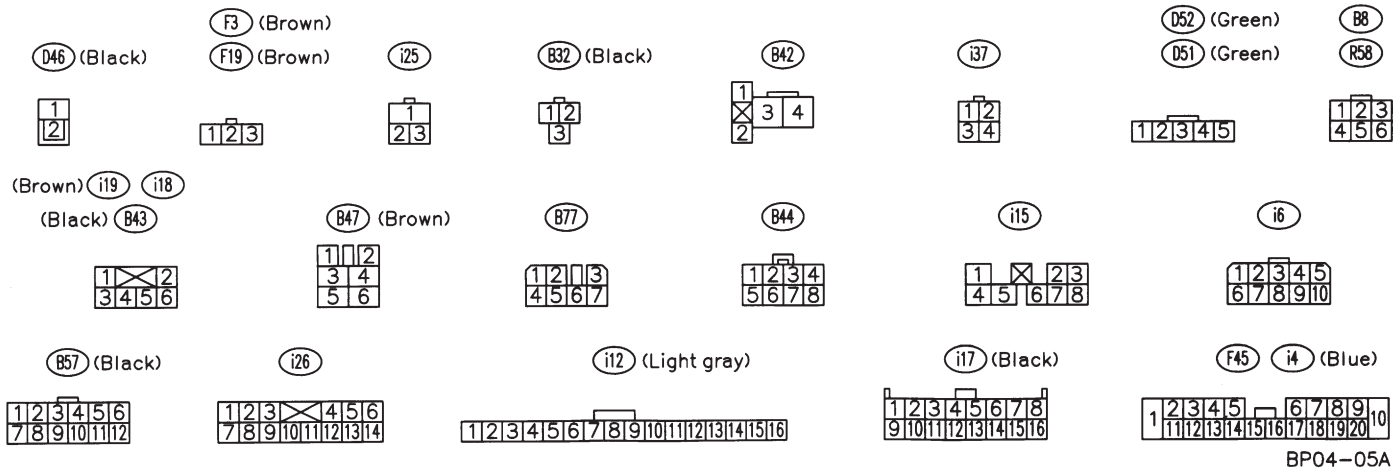


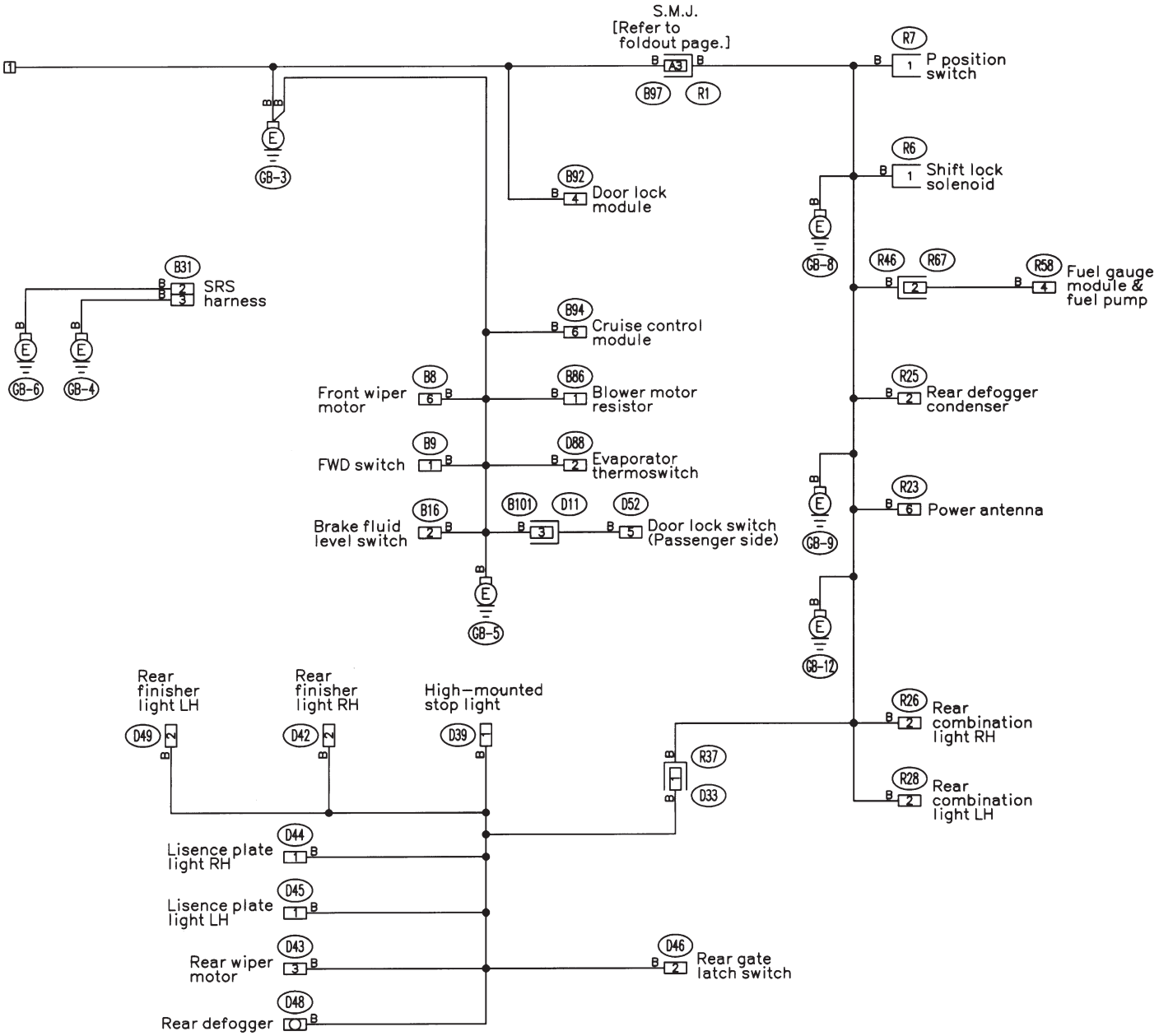
BU04−07C

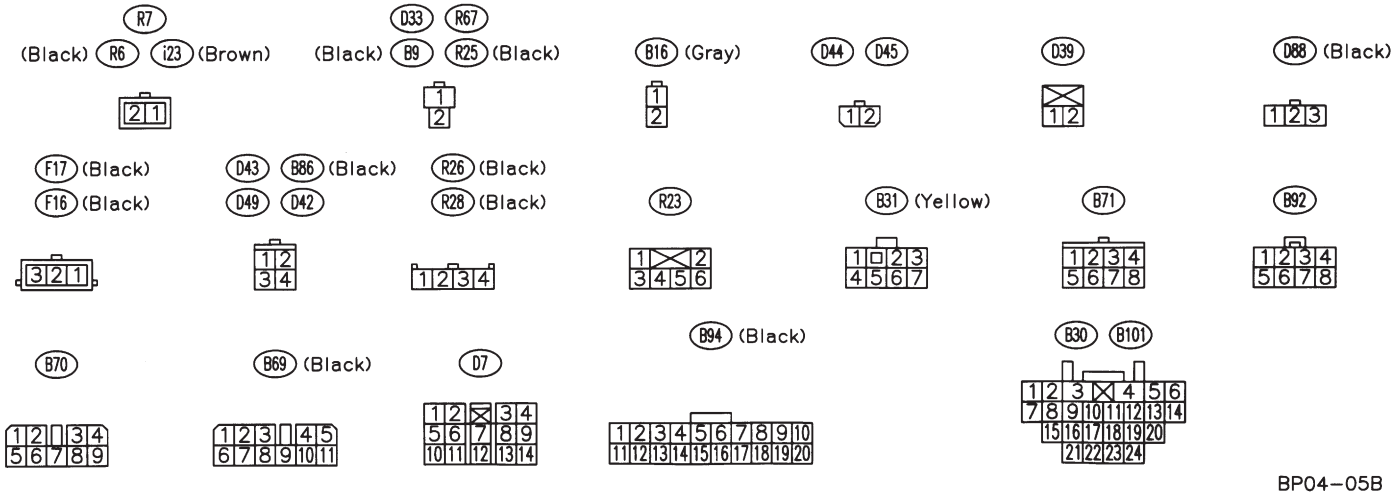
MEMO:

2. RHD MODEL

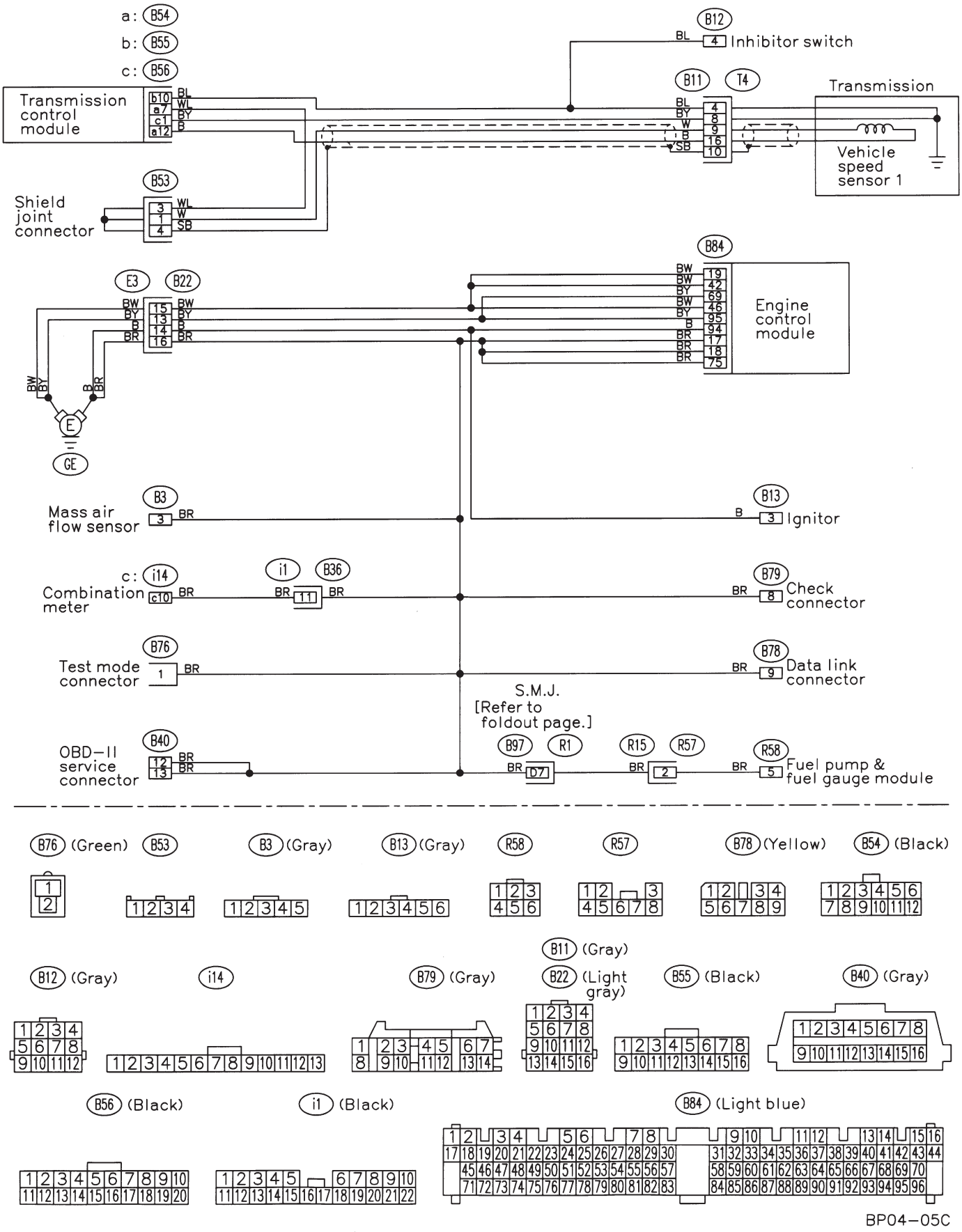

Front turn signal and side marker light RH
Sub fan motor
Main fan motor
Front turn signal and side marker light LH
Turn & hazard module
Power window relay
AT shift lock control module
Seat belt timer
Radio
Cigarette lighter
Glove box illumination light
Fan switch
Mode control panel
Rear defogger timer
Rear defogger switch
Cruise control main switch
Combination meter
Remote control rearview mirror switch
Door lock switch (Driver side)
Power window main switch
Mode actuator
Diagnosis terminal
Illumination control module
Combination switch
Combination switch
Combination switch
Main relay
GB-1
GB-2
GB-7
GR
B62
B39
B30


D46 (Black)
F3 (Brown)
F19 (Brown)
i25
B32 (Black)
B42
i37
D52 (Green)
D51 (Green)
B8
R58
(Brown) i19 i18
(Black) B43
B47 (Brown)
B77
B44
i15
i6
B57 (Black)
i26
i12 (Light gray)
i17 (Black)
F45 i4 (Blue)
BP04−05A

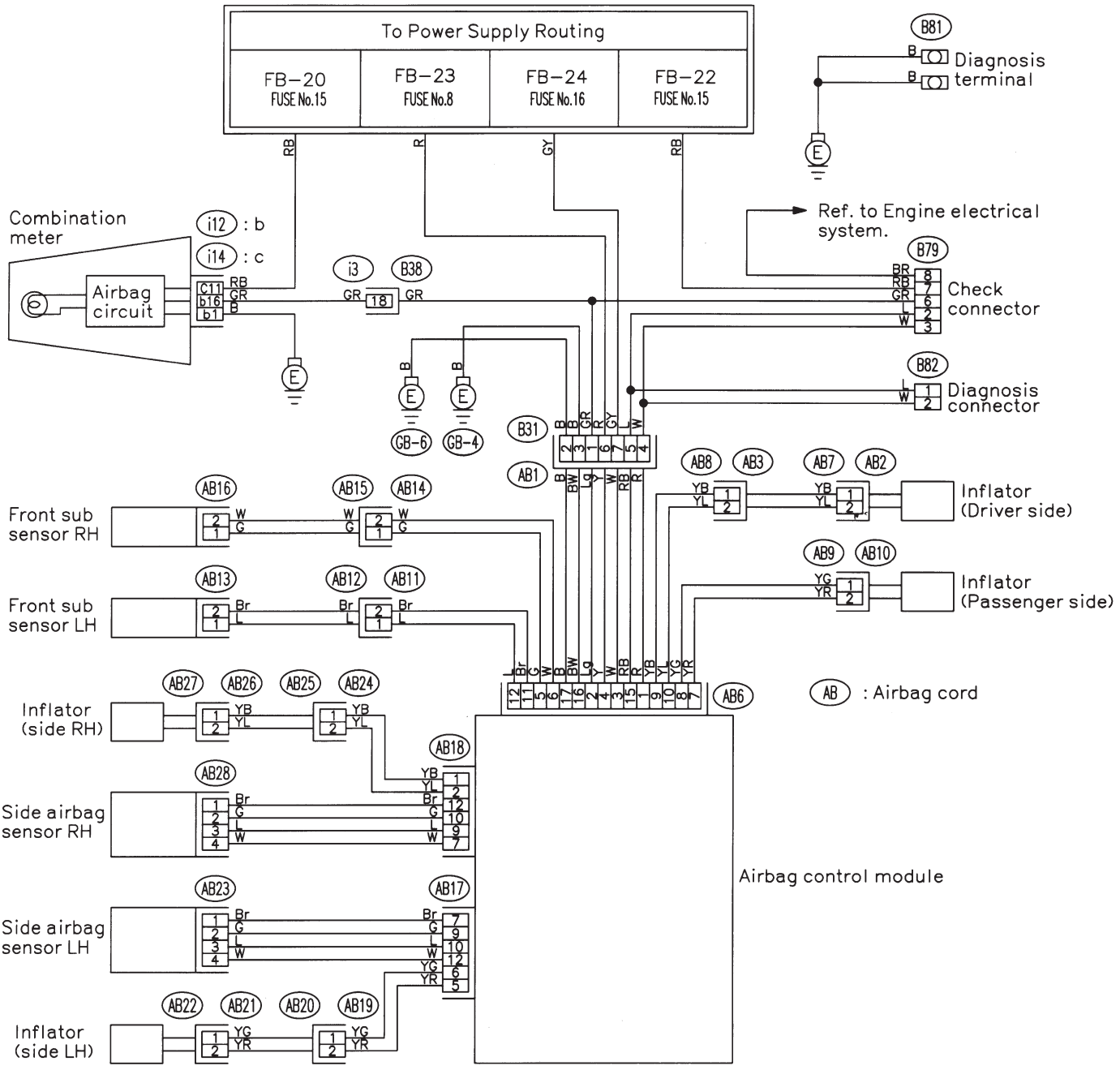

S.M.J.
[Refer to foldout page.]
A3
B97
R1
R7
P position switch
R6
Shift lock solenoid
B92
Door lock module
GB-3
GB-8
R46
R67
R58
Fuel gauge module & fuel pump
B31
SRS harness
B94
Cruise control module
GB-6
GB-4
B8
Front wiper motor
B86
Blower motor resistor
R25
Rear defogger condenser
B9
FWD switch
D88
Evaporator thermoswitch
B16
Brake fluid level switch
B101
D11
D52
Door lock switch (Passenger side)
R23
Power antenna
GB-9
GB-5
GB-12
Rear finisher light LH
Rear finisher light RH
High-mounted stop light
D49
D42
D39
R26
Rear combination light RH
R37
D33
R28
Rear combination light LH
D44
Lisence plate light RH
D45
Lisence plate light LH
D43
Rear wiper motor
D46
Rear gate latch switch
D48
Rear defogger


R7 (Black) R6 i23 (Brown)
D33 R67 (Black) B9 R25 (Black)
B16 (Gray)
D44 D45
D39
D88 (Black)
F17 (Black)
F16 (Black)
D43 B86 (Black)
D49 D42
R26 (Black)
R28 (Black)
R23
B31 (Yellow)
B71
B92
B70
B69 (Black)
D7
B94 (Black)
B30 B101
BP04-05B

WIRING DIAGRAM

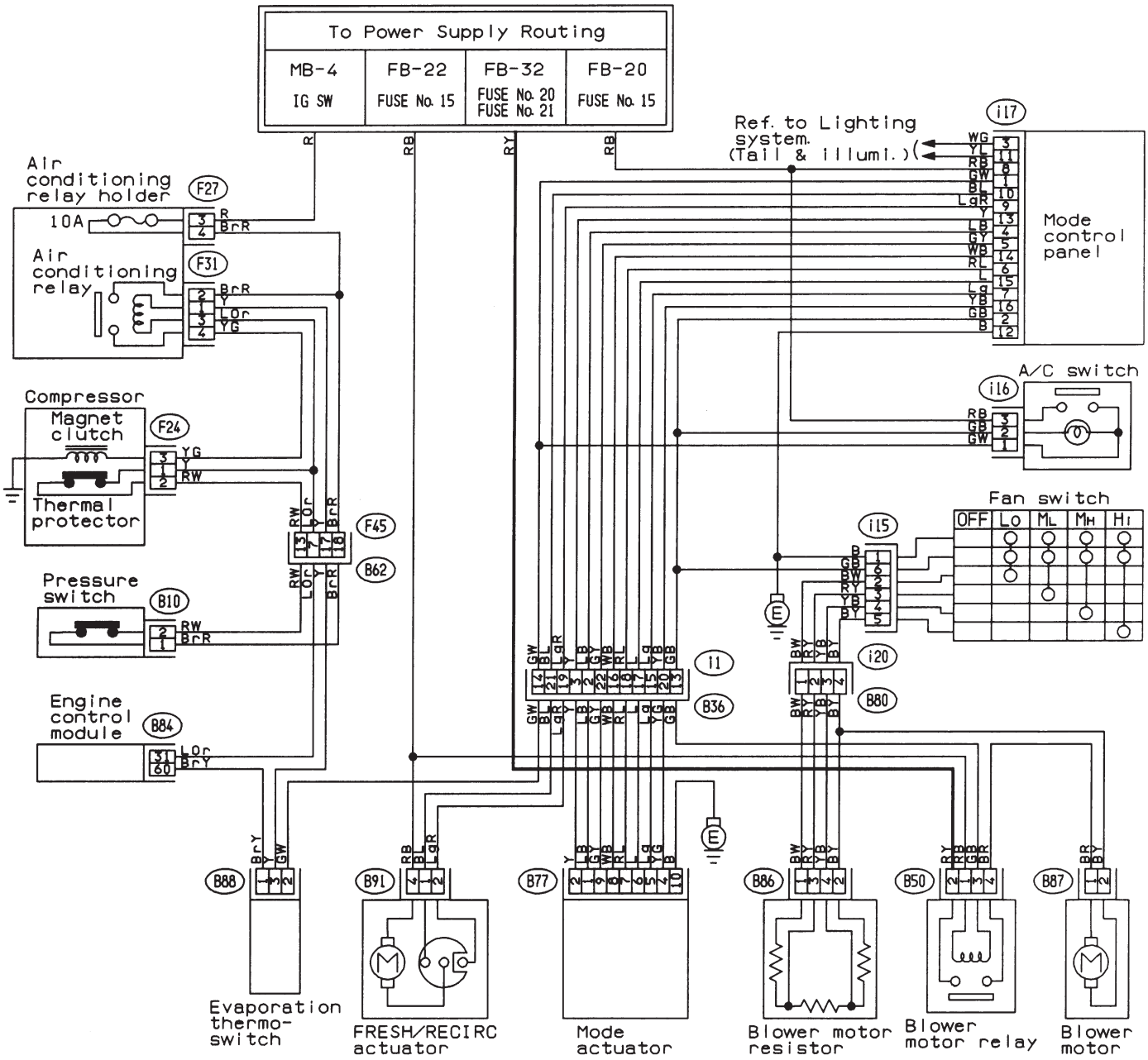


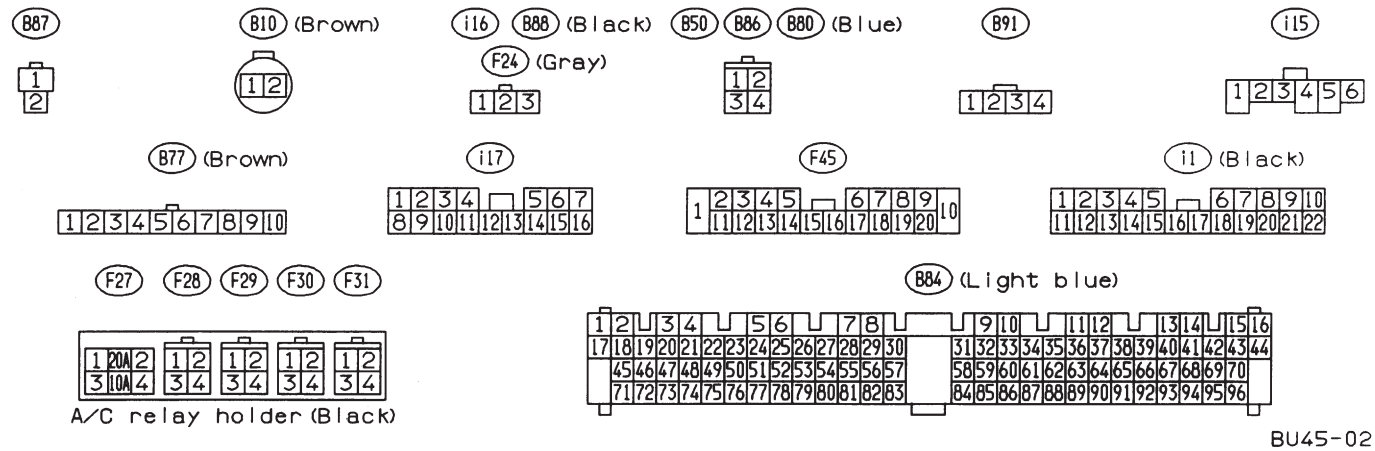
C: AIRBAG SYSTEM



D: AIR CONDITIONING SYSTEM

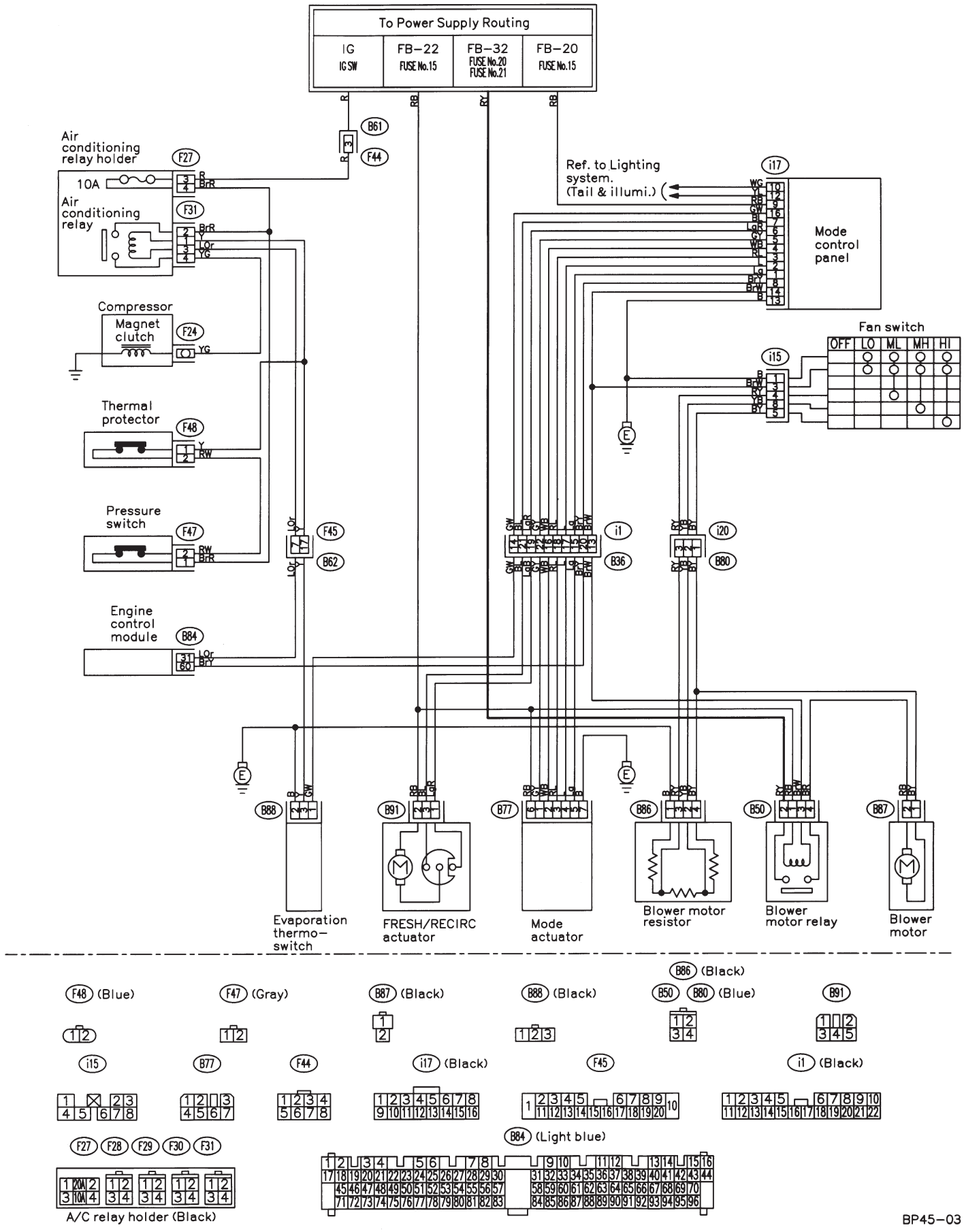
1. LHD MODEL



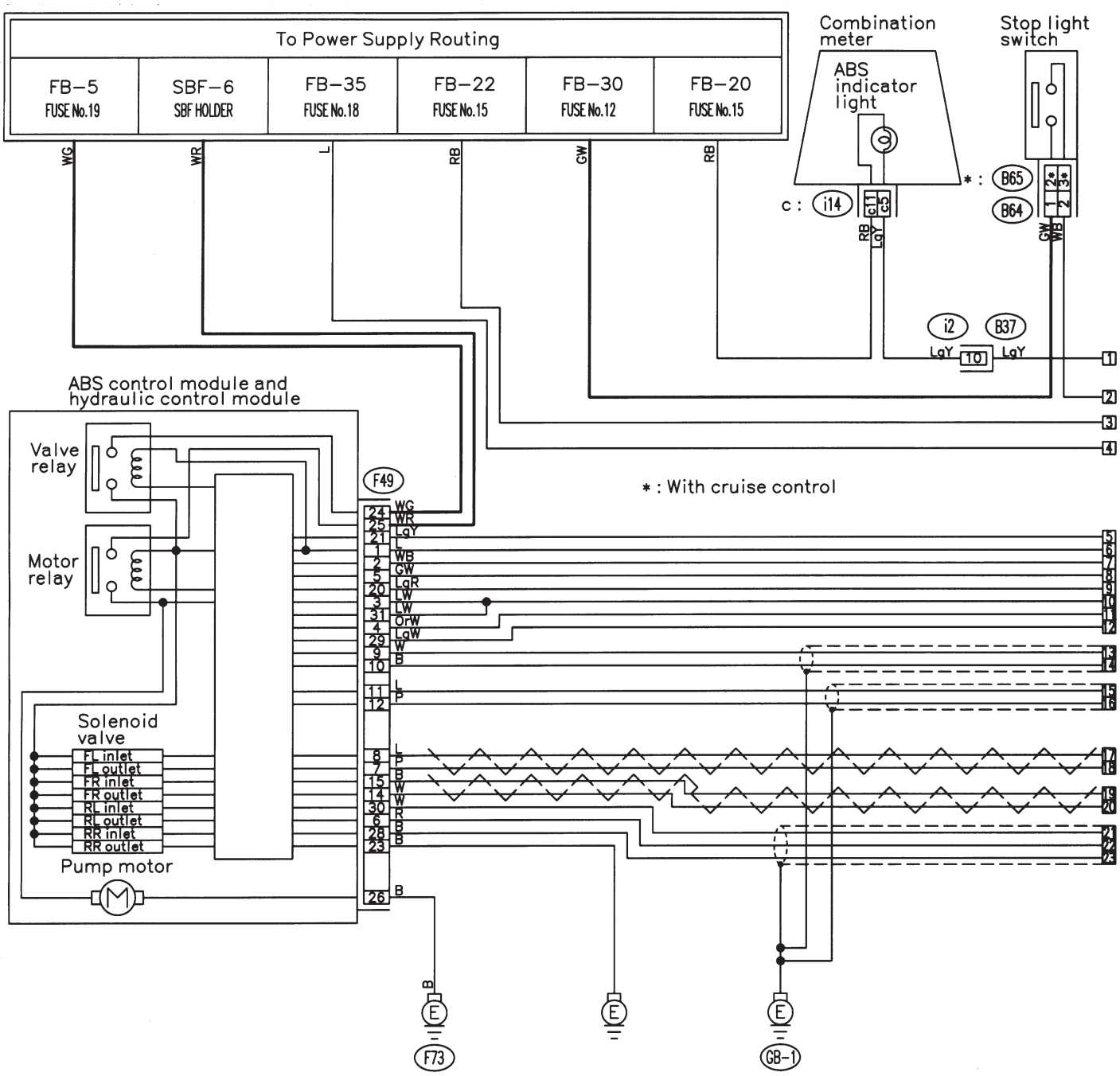


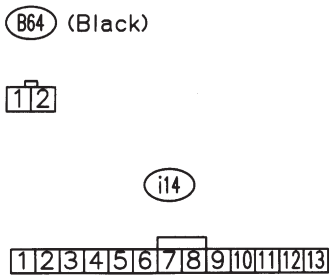
BU45-02

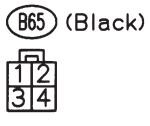
2. RHD MODEL

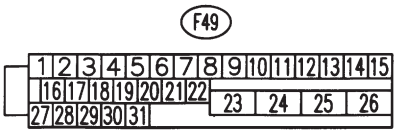

To Power Supply Routing
IG
IG SW
FB–22
FUSE No.15
FB–32
FUSE No.20
FUSE No.21
FB–20
FUSE No.15
Air conditioning relay holder
F27
10A
Air conditioning relay
F31
Compressor
Magnet clutch
F24
Thermal protector
F48
Pressure switch
F47
Engine control module
B84
B61
F44
F45
B62
Ref. to Lighting system. (Tail & illumi.)
i17
Mode control panel
Fan switch
OFF
LO
ML
MH
HI
i15
i1
B36
i20
B80
B88
B91
B77
B86
B50
B87
Evaporation thermo–switch
FRESH/RECIRC actuator
Mode actuator
Blower motor resistor
Blower motor relay
Blower motor
F48 (Blue)
F47 (Gray)
B87 (Black)
B88 (Black)
B86 (Black)
B50
B80 (Blue)
B91
i15
B77
F44
i17 (Black)
F45
i1 (Black)
F27
F28
F29
F30
F31
A/C relay holder (Black)
B84 (Light blue)
BP45–03

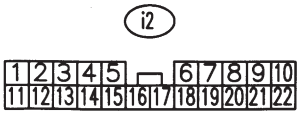
E: ANTI-LOCK BRAKE SYSTEM



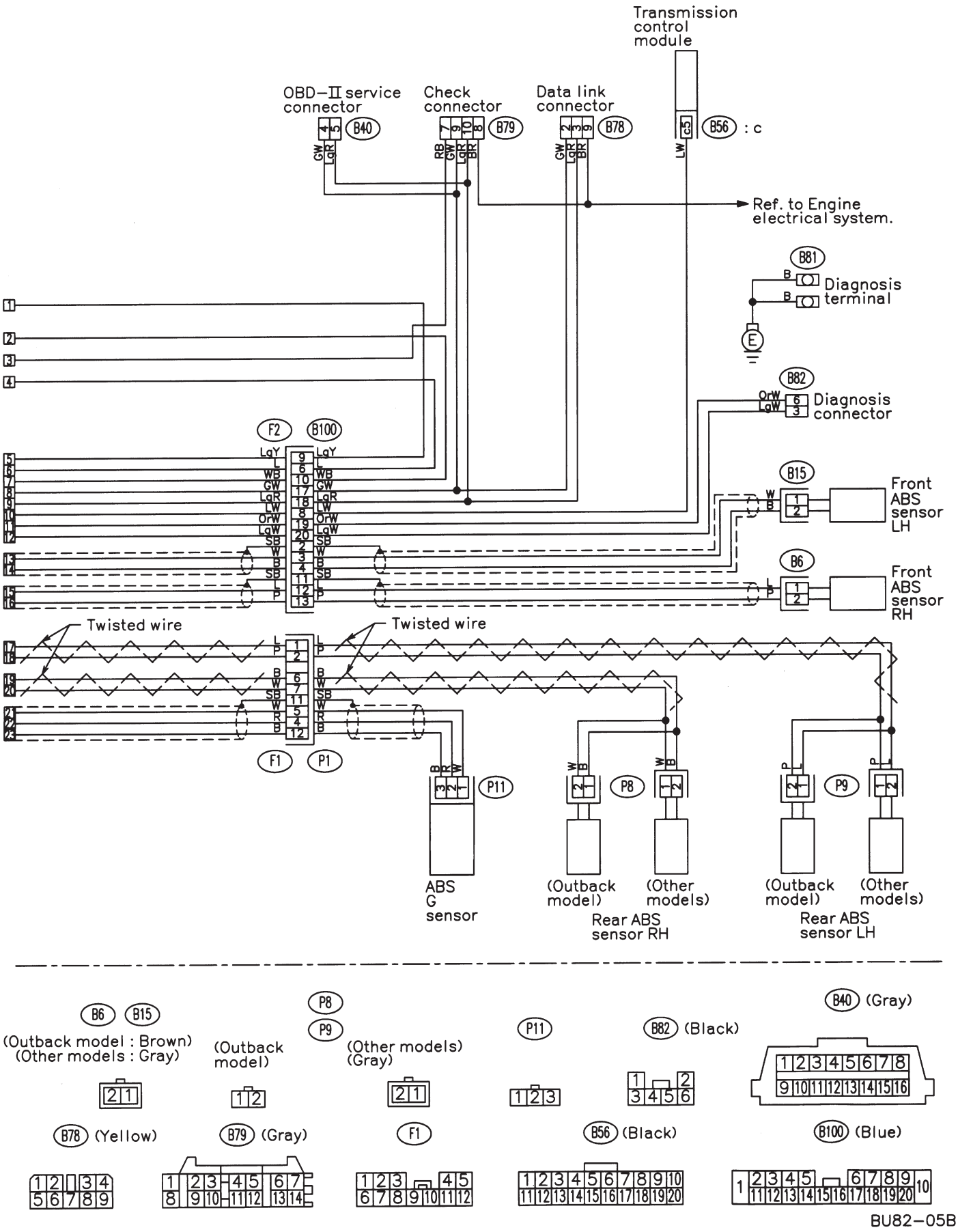






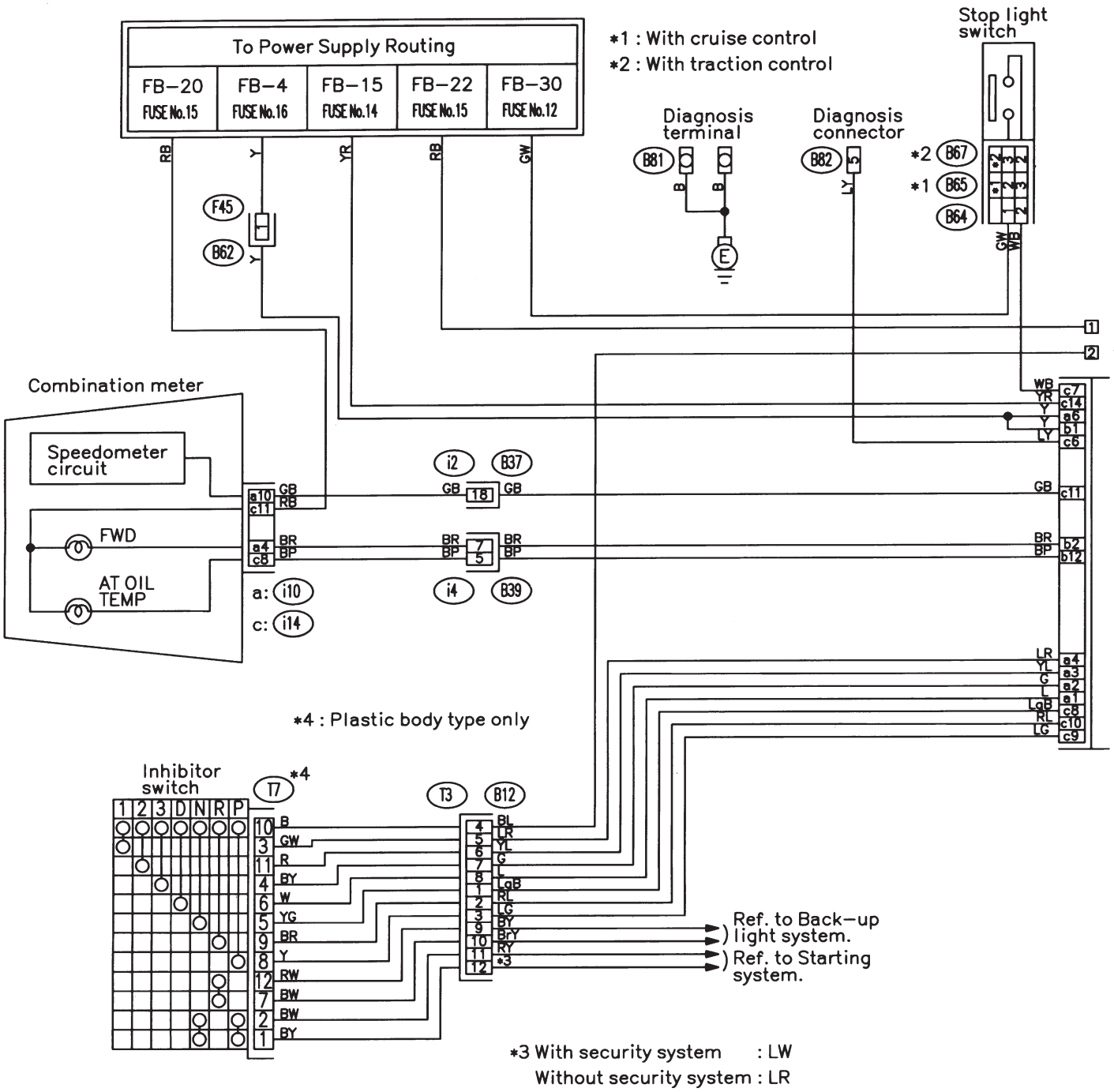


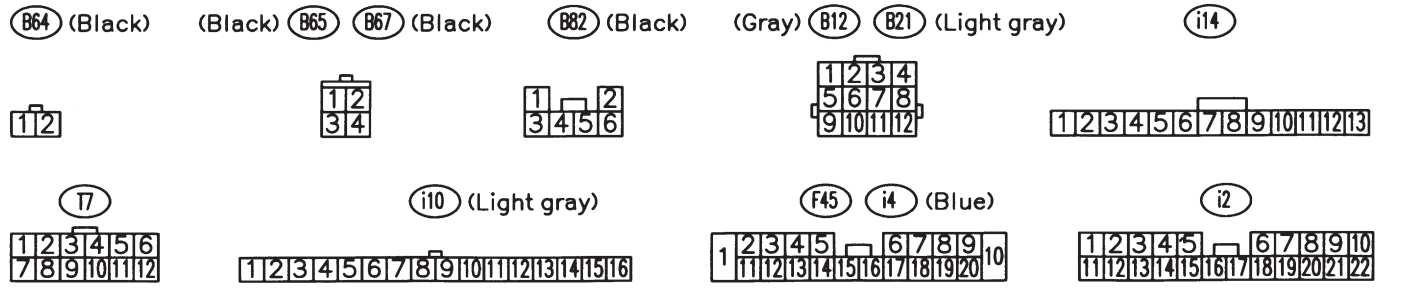
BU82–05A

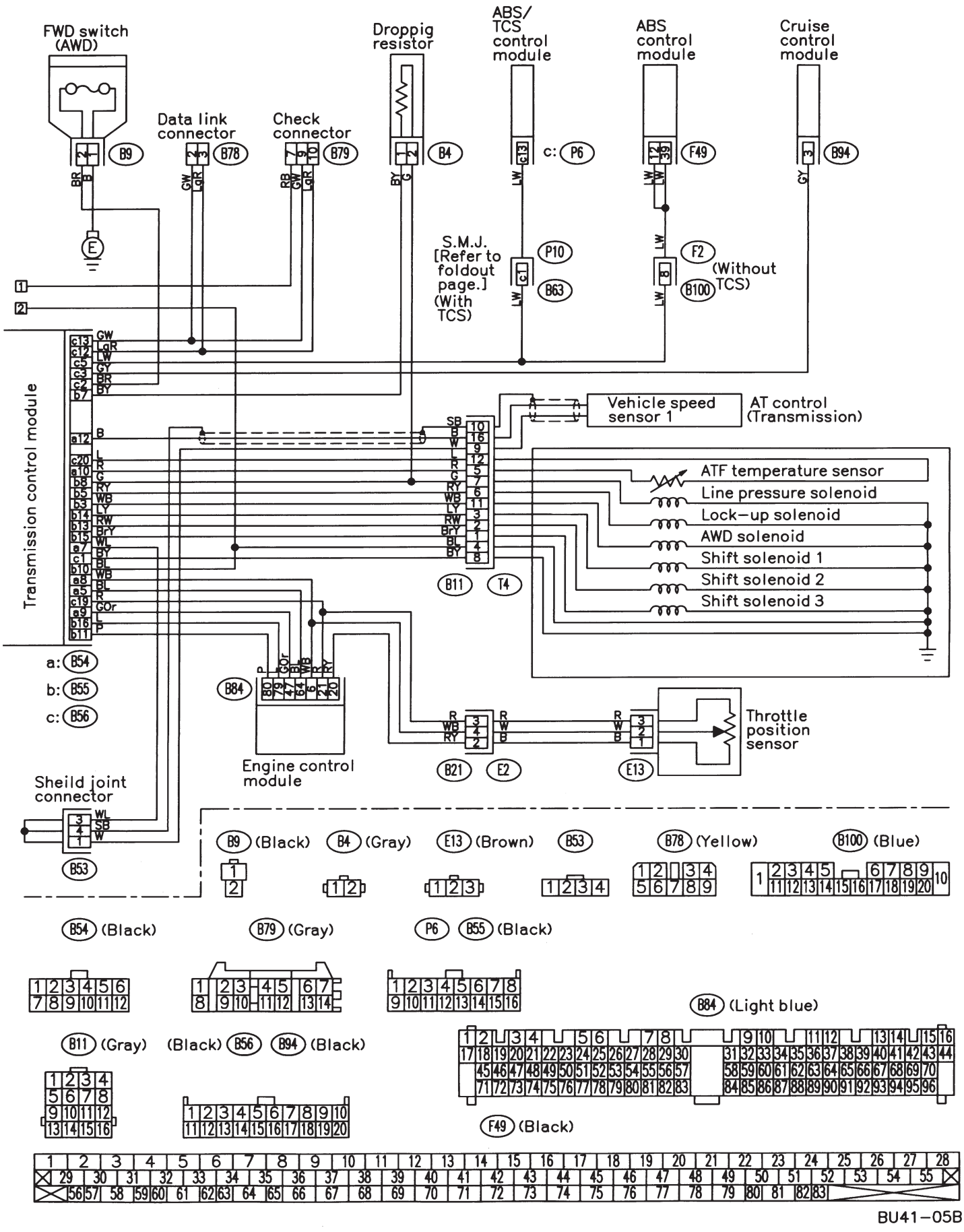

Transmission control module
OBD−II service connector
Check connector
Data link connector
B40
B79
B78
B56 : c
Ref. to Engine electrical system.
B81
Diagnosis terminal
B82
Diagnosis connector
F2
B100
B15
Front ABS sensor LH
B6
Front ABS sensor RH
Twisted wire
Twisted wire
F1
P1
P11
P8
P9
ABS G sensor
(Outback model)
(Other models)
Rear ABS sensor RH
(Outback model)
(Other models)
Rear ABS sensor LH
B6 B15
(Outback model : Brown)
(Other models : Gray)
P8
P9
(Outback model)
(Other models)
(Gray)
P11
B82 (Black)
B40 (Gray)
B78 (Yellow)
B79 (Gray)
F1
B56 (Black)
B100 (Blue)
BU82−05B

F: A/T CONTROL SYSTEM

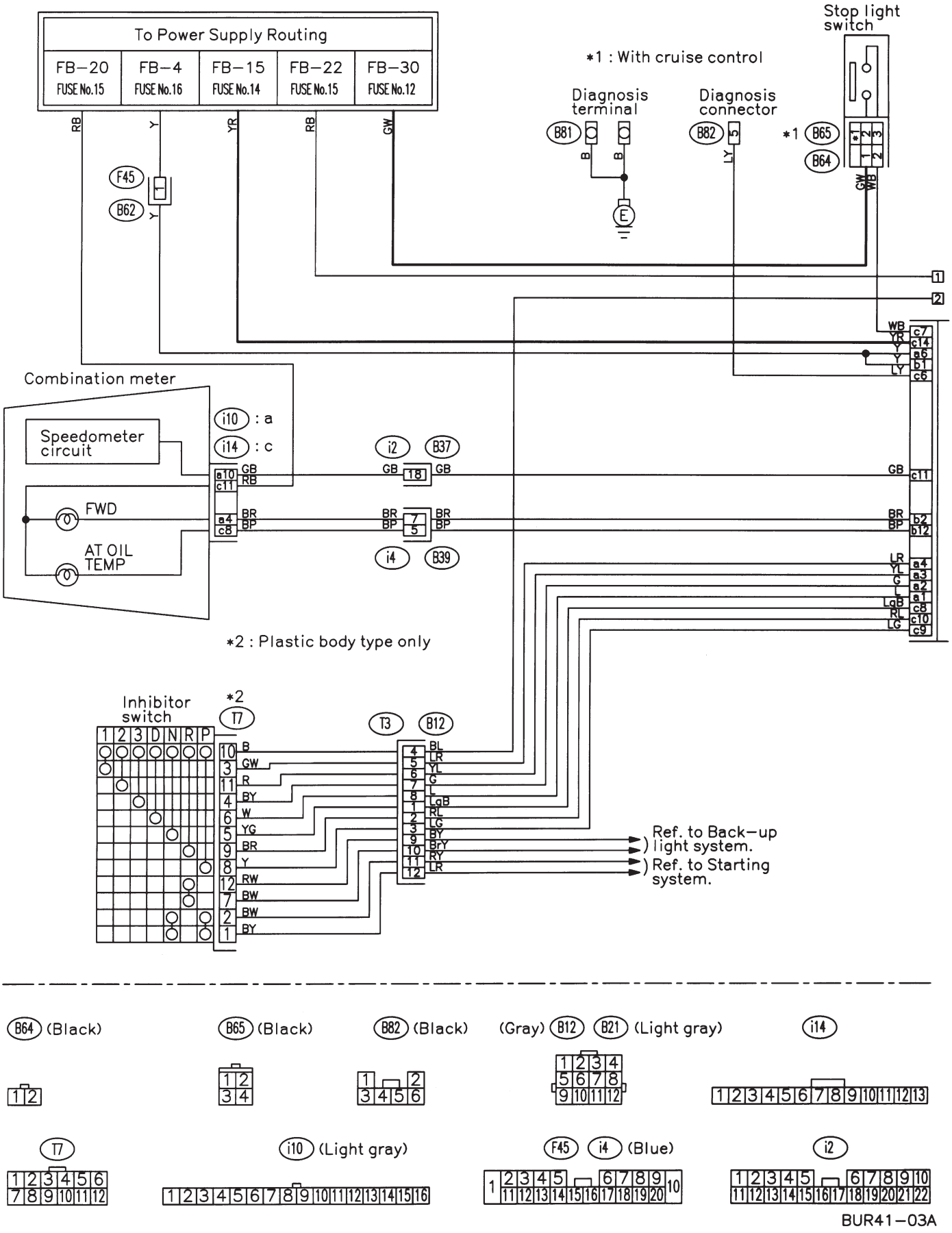
1. LHD MODEL

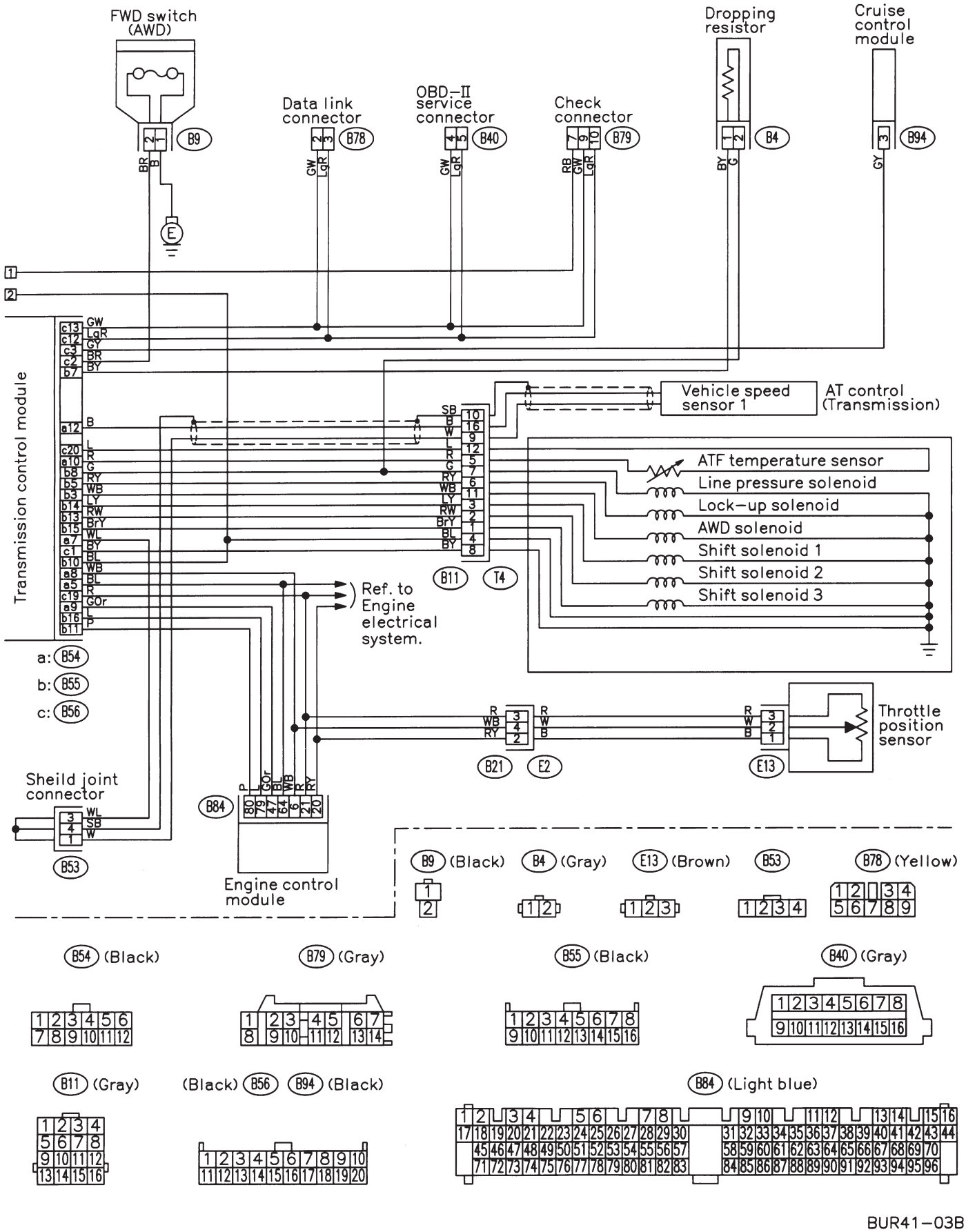





FWD switch (AWD)
Data link connector
Check connector
Droppig resistor
ABS/ TCS control module
ABS control module
Cruise control module
S.M.J. [Refer to foldout page.] (With TCS)
(Without TCS)
Transmission control module
Vehicle speed sensor 1
AT control (Transmission)
ATF temperature sensor
Line pressure solenoid
Lock–up solenoid
AWD solenoid
Shift solenoid 1
Shift solenoid 2
Shift solenoid 3
Throttle position sensor
Engine control module
Sheild joint connector
(Black)
(Gray)
(Brown)
(Yellow)
(Blue)
(Light blue)
BU41–05B

2. RHD MODEL

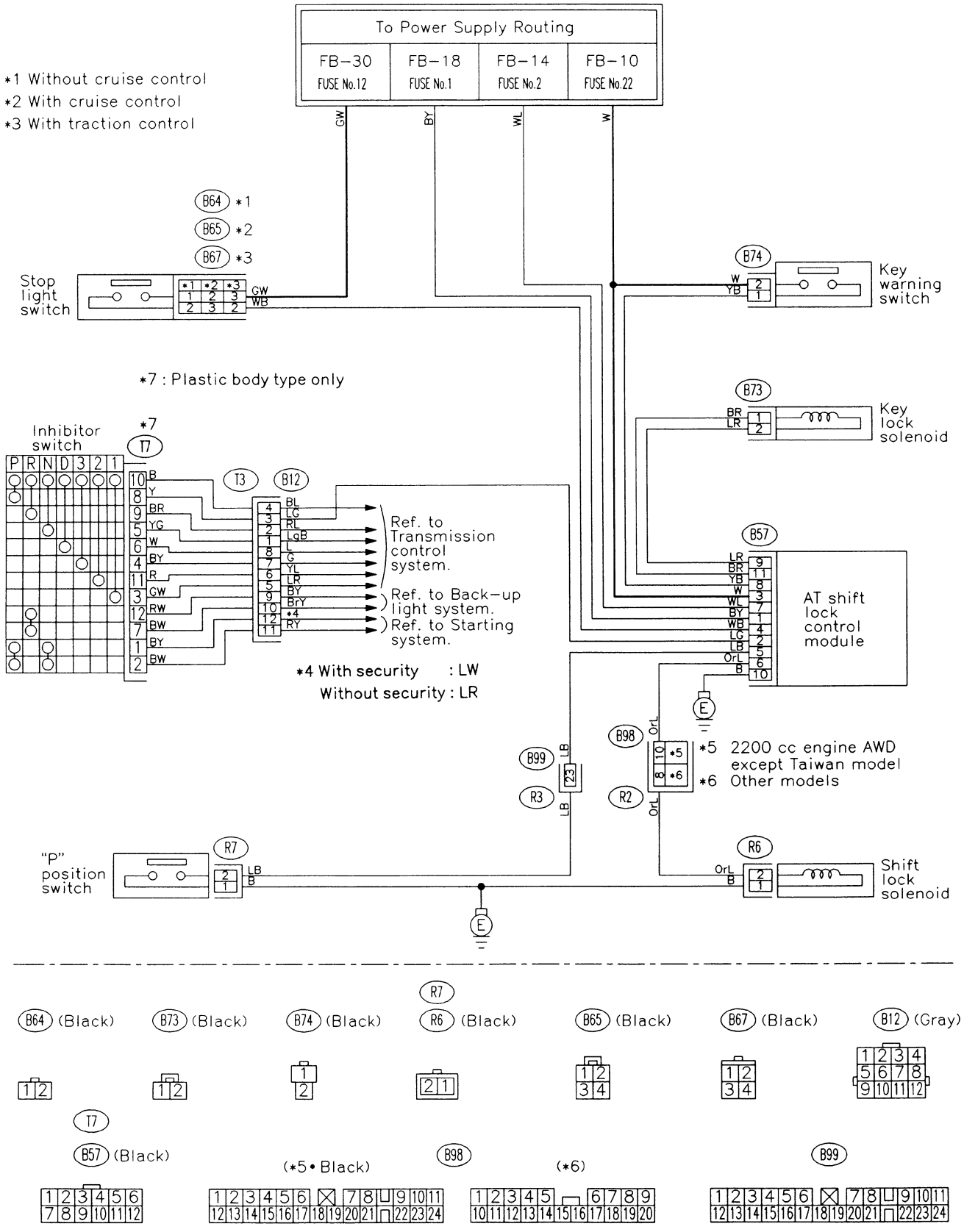

To Power Supply Routing
FB−20 FUSE No.15
FB−4 FUSE No.16
FB−15 FUSE No.14
FB−22 FUSE No.15
FB−30 FUSE No.12
*1 : With cruise control
Stop light switch
Diagnosis terminal
Diagnosis connector
Combination meter
Speedometer circuit
FWD
AT OIL TEMP
*2 : Plastic body type only
Inhibitor switch
Ref. to Back−up light system.
Ref. to Starting system.
B64 (Black)
B65 (Black)
B82 (Black)
(Gray) B12 B21 (Light gray)
i14
T7
i10 (Light gray)
F45 i4 (Blue)
i2
BUR41−03A


FWD switch (AWD)
Data link connector
OBD–II service connector
Check connector
Dropping resistor
Cruise control module
Transmission control module
Vehicle speed sensor 1
AT control (Transmission)
ATF temperature sensor
Line pressure solenoid
Lock–up solenoid
AWD solenoid
Shift solenoid 1
Shift solenoid 2
Shift solenoid 3
Ref. to Engine electrical system.
Throttle position sensor
Sheild joint connector
Engine control module
B9 (Black)
B4 (Gray)
E13 (Brown)
B53
B78 (Yellow)
B54 (Black)
B79 (Gray)
B55 (Black)
B40 (Gray)
B11 (Gray)
B56 (Black)
B94 (Black)
B84 (Light blue)

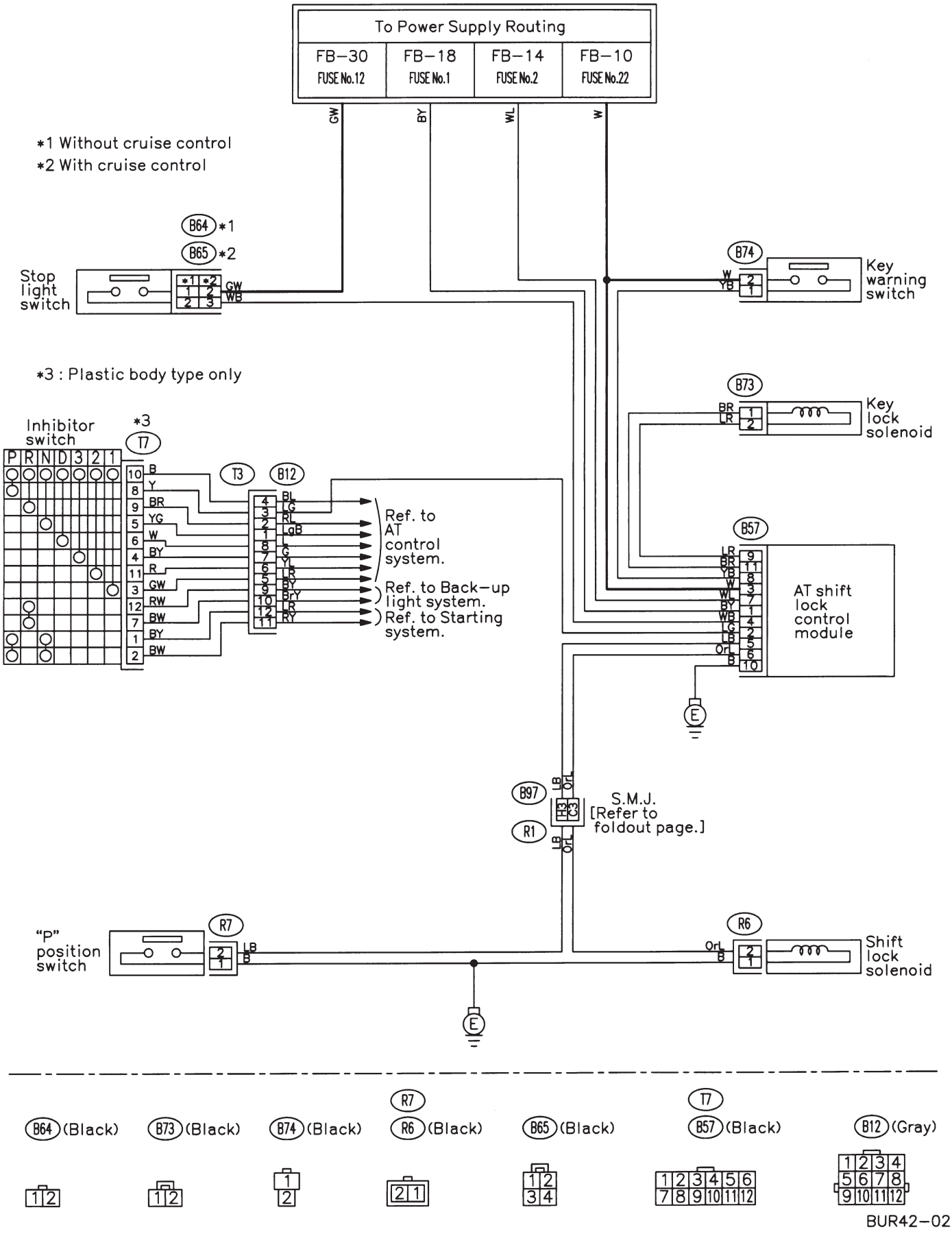
BUR41–03B

G: A/T SHIFT LOCK SYSTEM

1. LHD MODEL



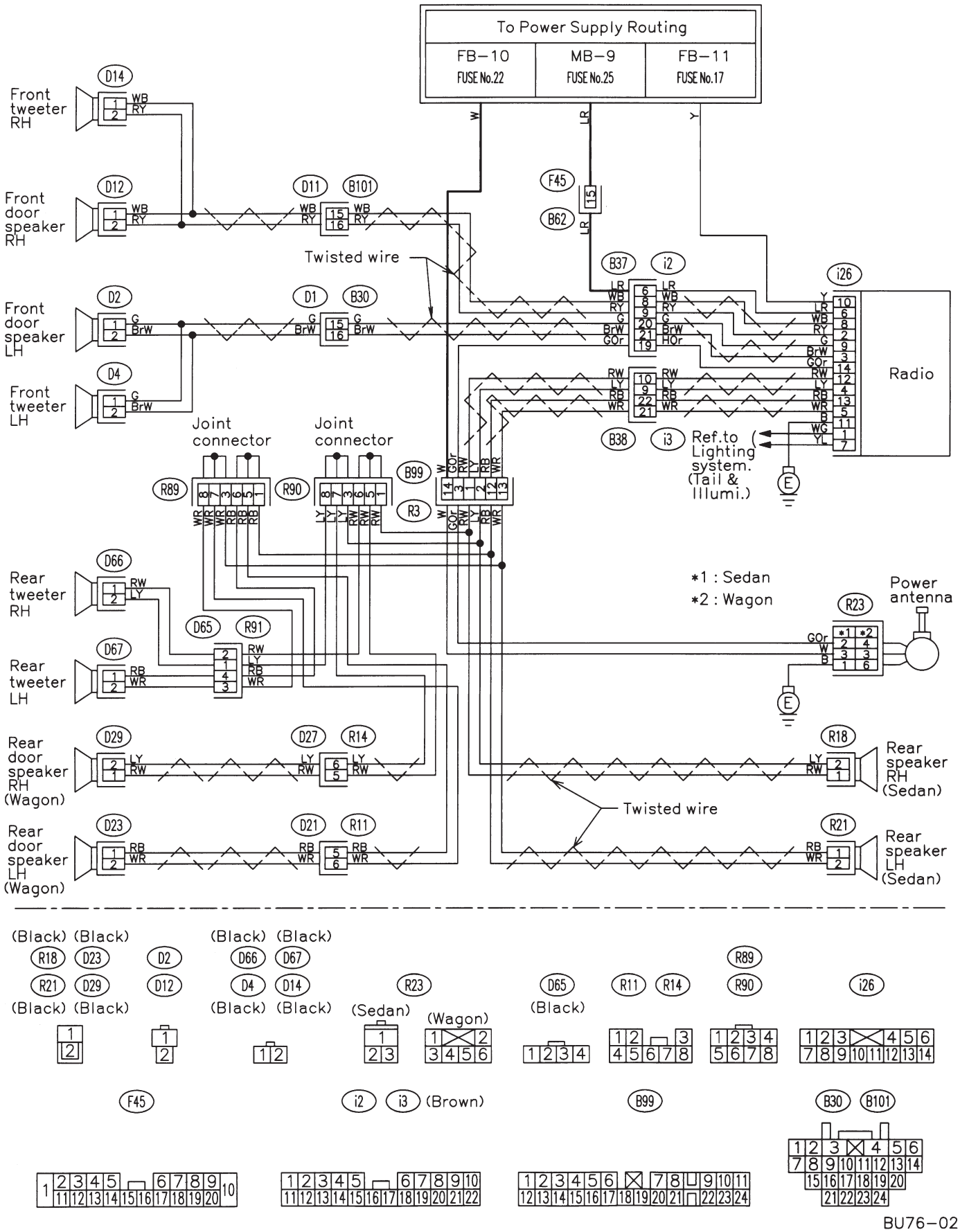
2. RHD MODEL



BUR42–02

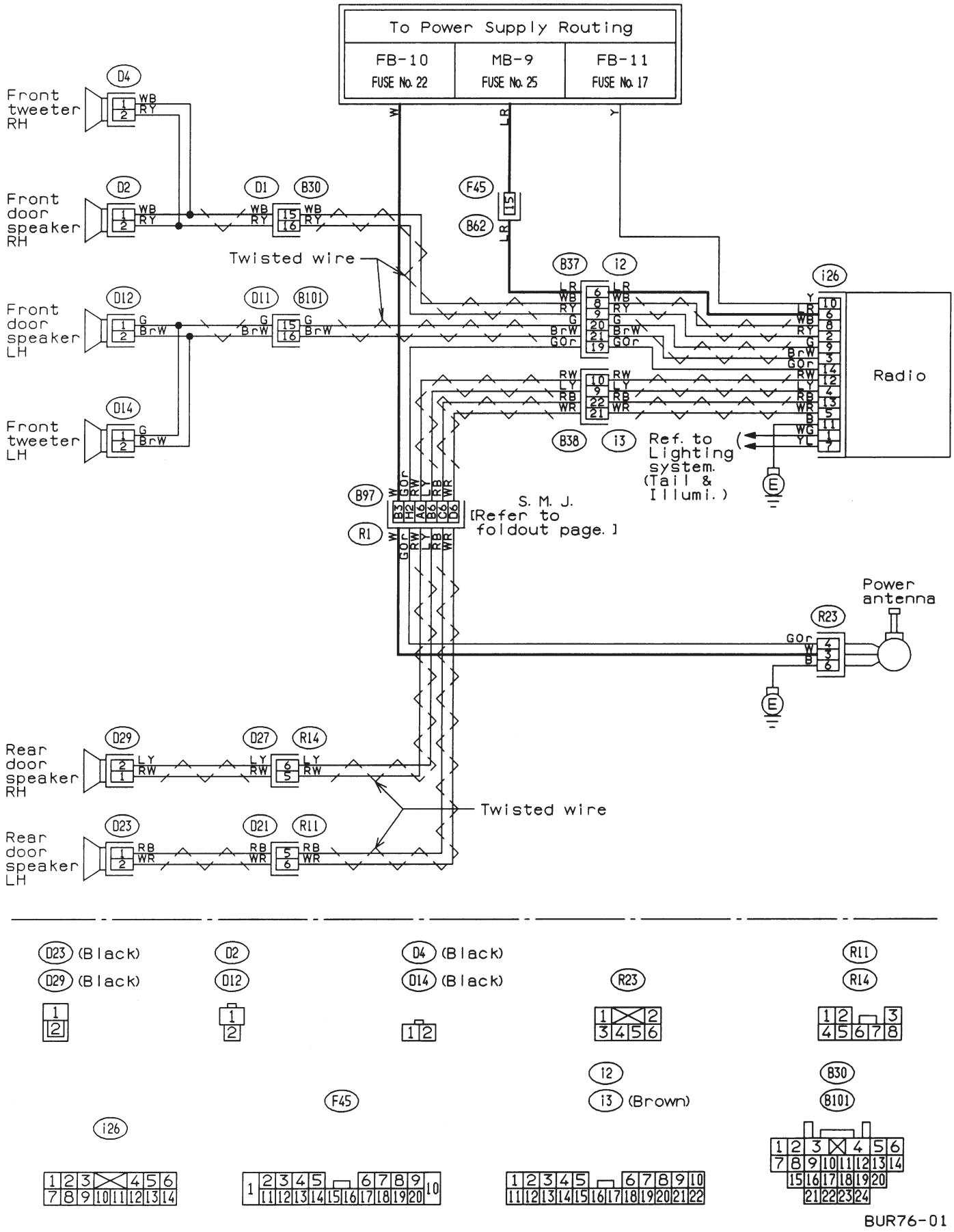
H: AUDIO SYSTEM

1. LHD MODEL



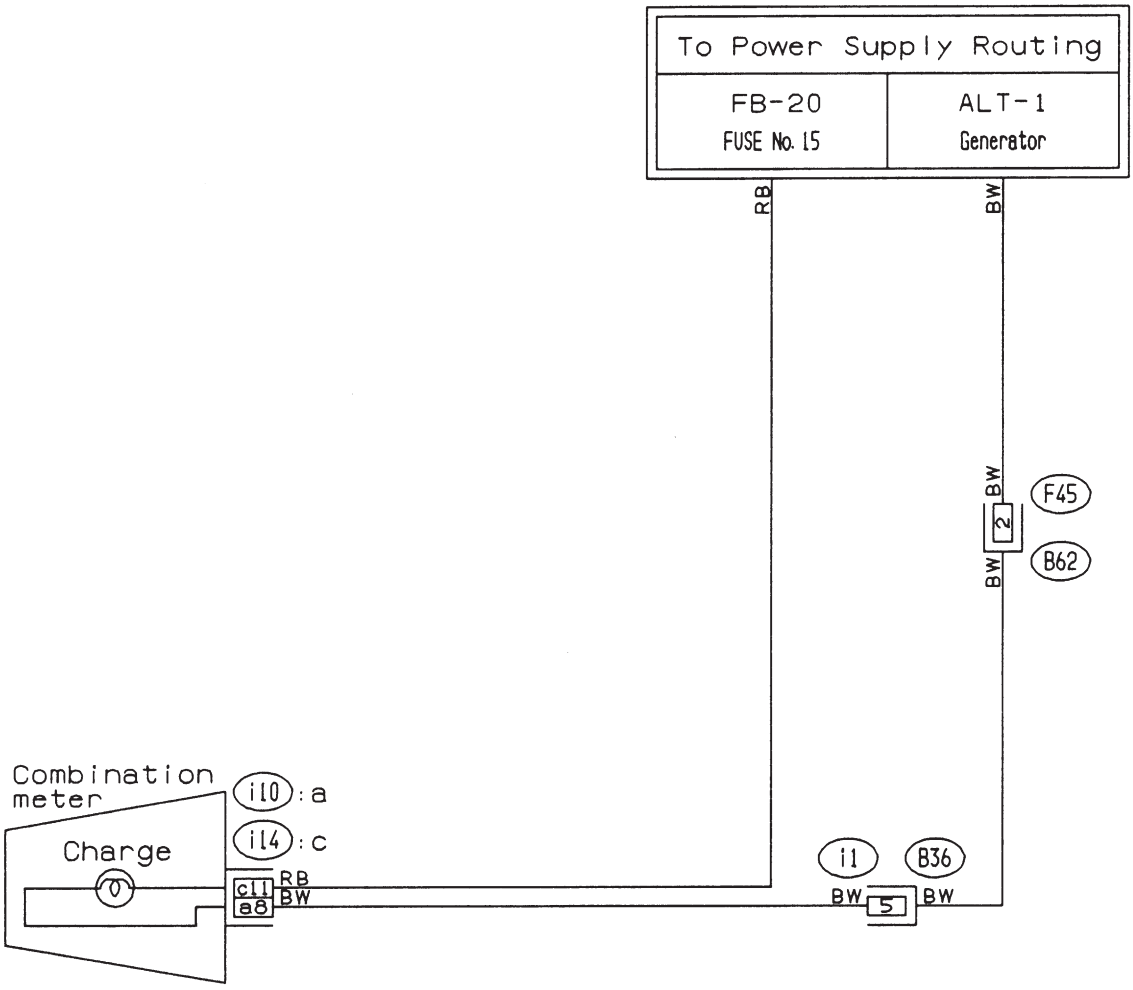
BU76−02

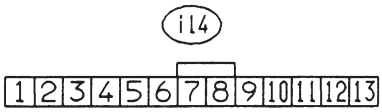
2. RHD MODEL

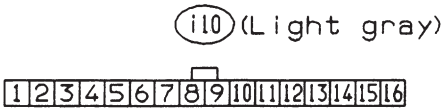


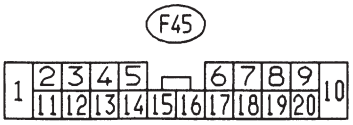
BUR76-01

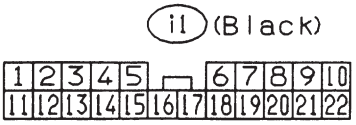
I: CHARGING SYSTEM







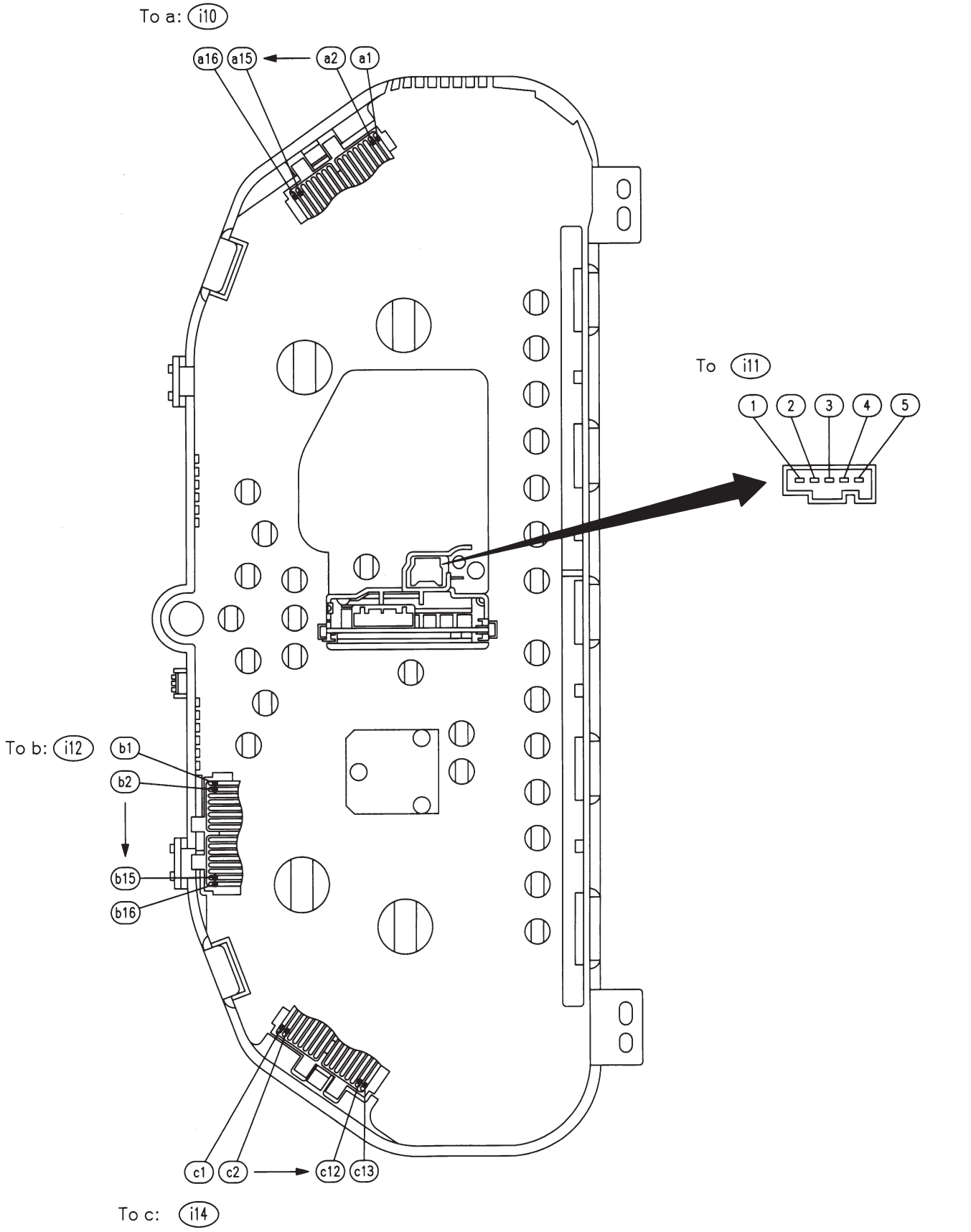


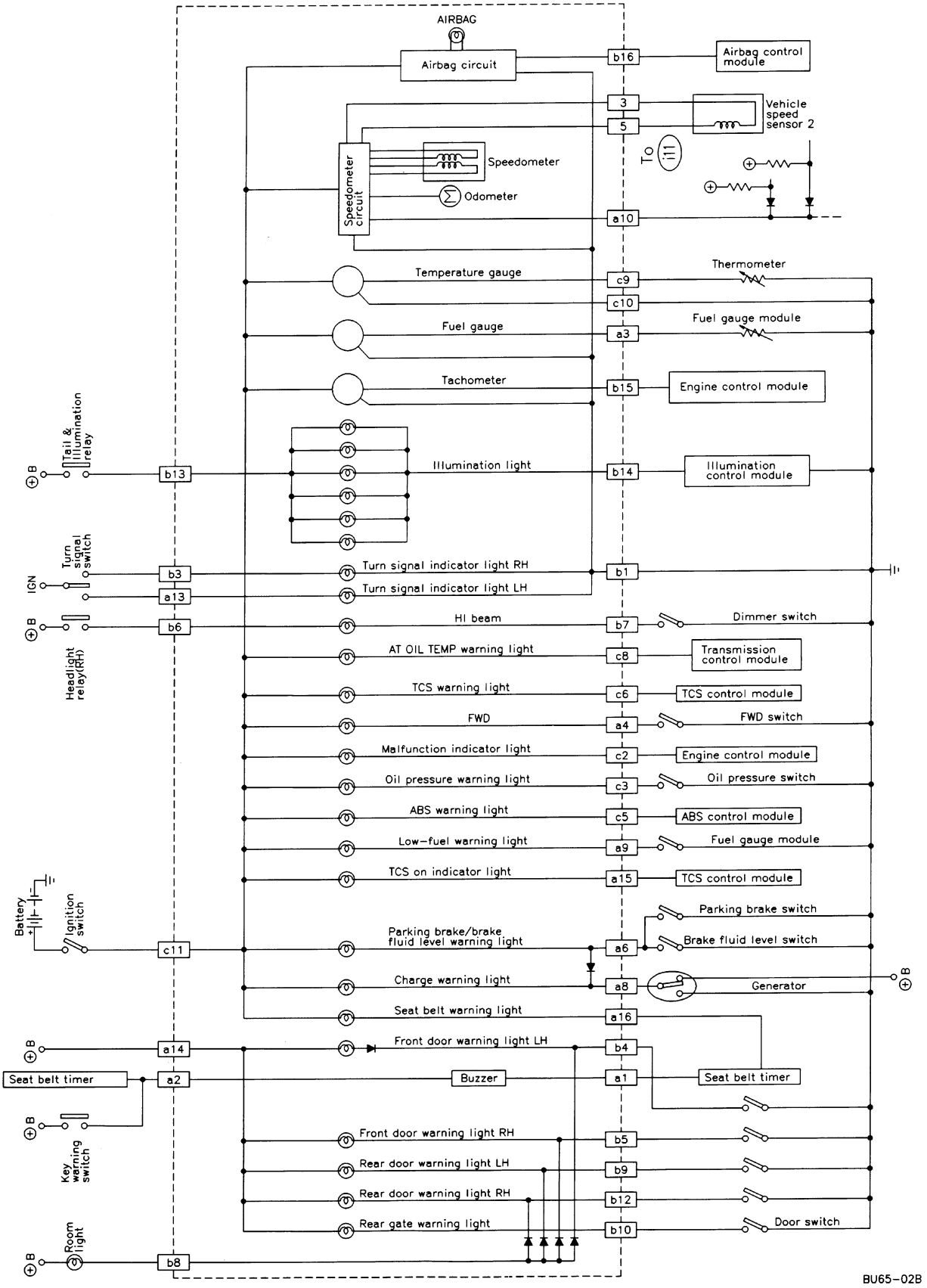


BU02-01

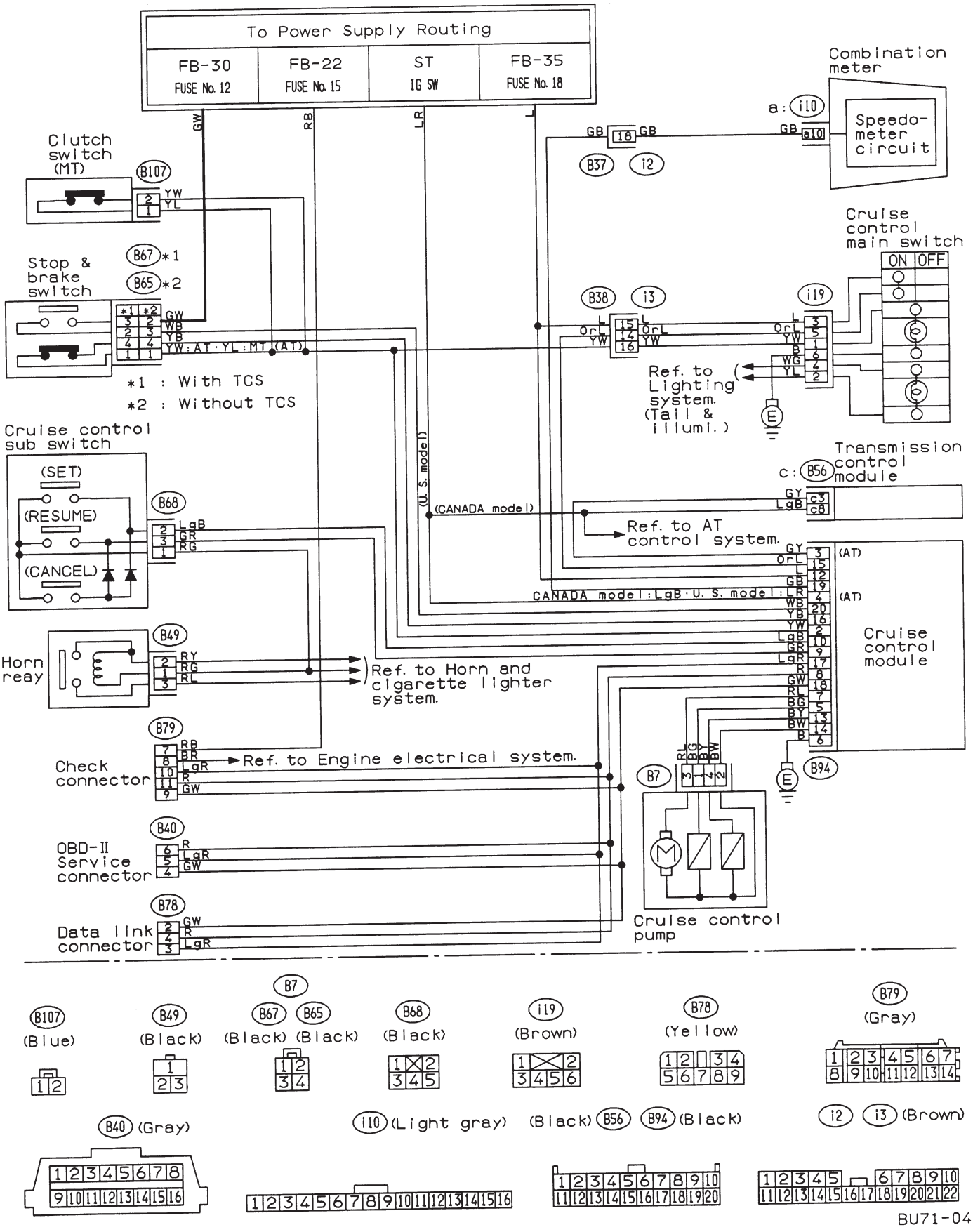
MEMO:

J: COMBINATION METER




AIRBAG
Airbag circuit
b16
Airbag control module
3
5
Vehicle speed sensor 2
To i11
Speedometer circuit
Speedometer
Odometer
a10
Temperature gauge
c9
Thermometer
c10
Fuel gauge
a3
Fuel gauge module
Tachometer
b15
Engine control module
Tail & illumination relay
B
b13
Illumination light
b14
Illumination control module
Turn signal switch
IGN
b3
Turn signal indicator light RH
b1
a13
Turn signal indicator light LH
B
b6
HI beam
b7
Dimmer switch
Headlight relay(RH)
AT OIL TEMP warning light
c8
Transmission control module
TCS warning light
c6
TCS control module
FWD
a4
FWD switch
Malfunction indicator light
c2
Engine control module
Oil pressure warning light
c3
Oil pressure switch
ABS warning light
c5
ABS control module
Low-fuel warning light
a9
Fuel gauge module
TCS on indicator light
a15
TCS control module
Battery
Ignition switch
c11
Parking brake/brake fluid level warning light
a6
Parking brake switch
Brake fluid level switch
Charge warning light
a8
Generator
B
Seat belt warning light
a16
B
a14
Front door warning light LH
b4
Seat belt timer
a2
Buzzer
a1
Seat belt timer
B
Key warning switch
Front door warning light RH
b5
Rear door warning light LH
b9
Rear door warning light RH
b12
Rear gate warning light
b10
Door switch
B
Room light
b8
BU65-02B

K: CRUISE CONTROL SYSTEM

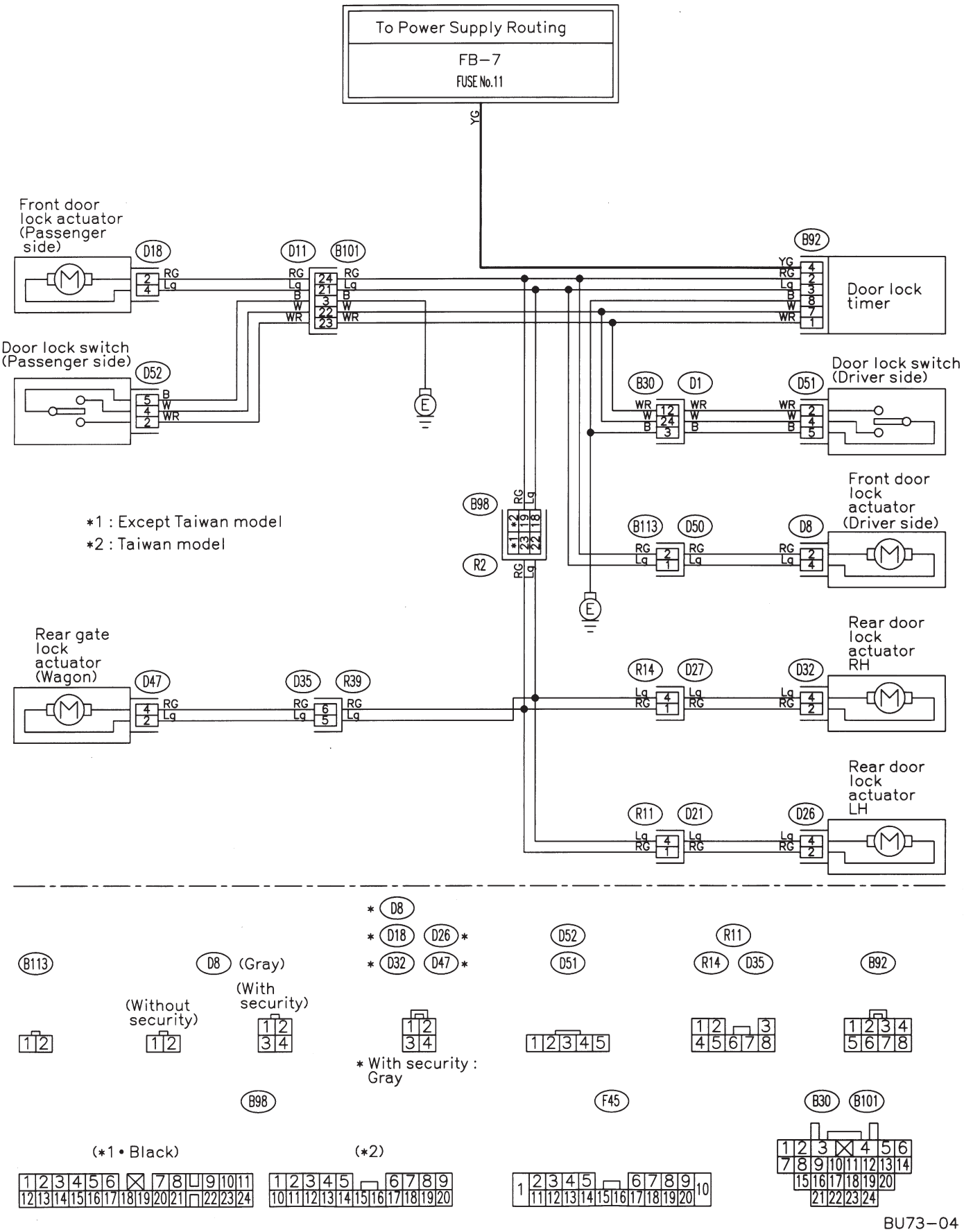


BU71-04

MEMO:

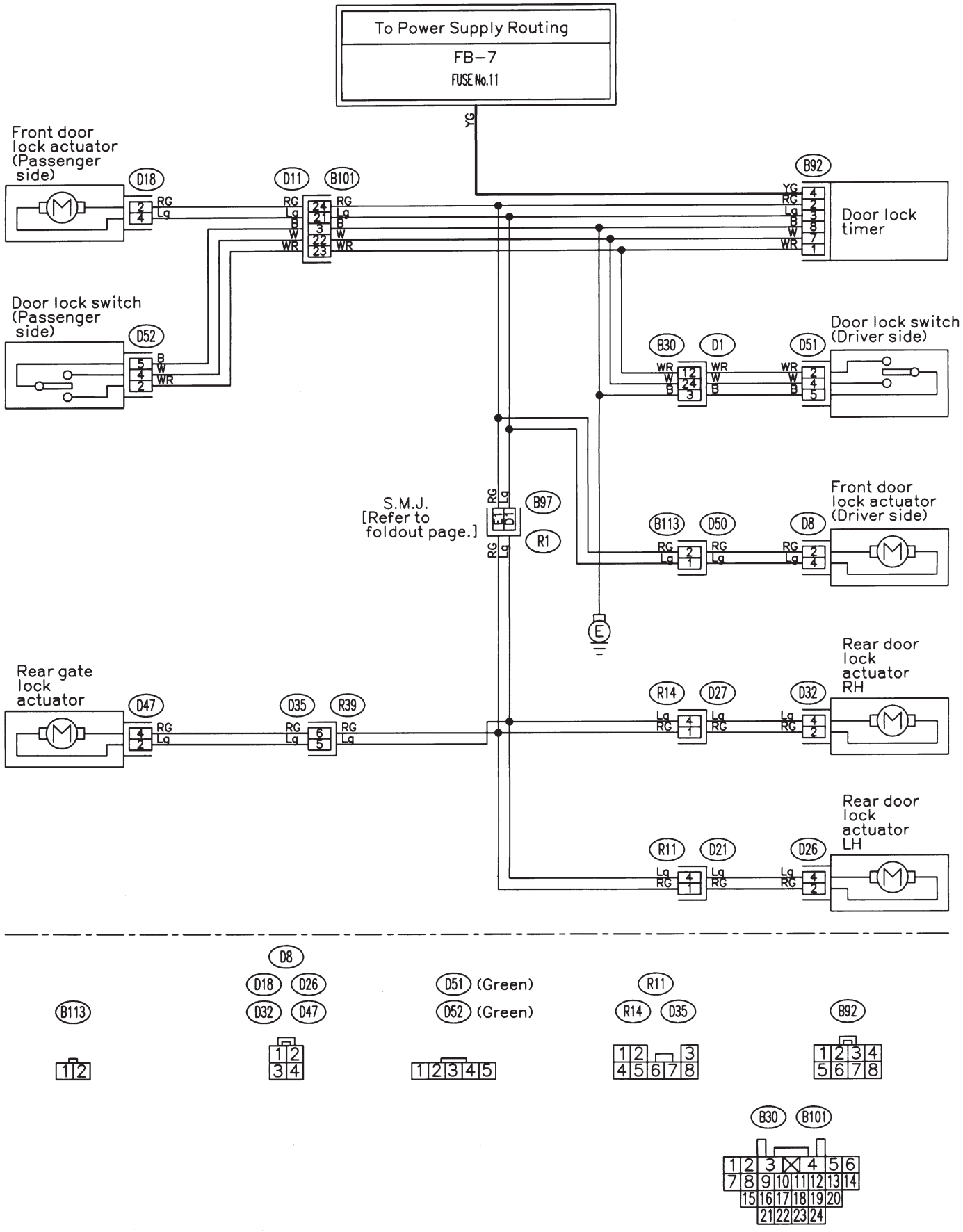
L: DOOR LOCK SYSTEM

1. LHD MODEL



BU73−04

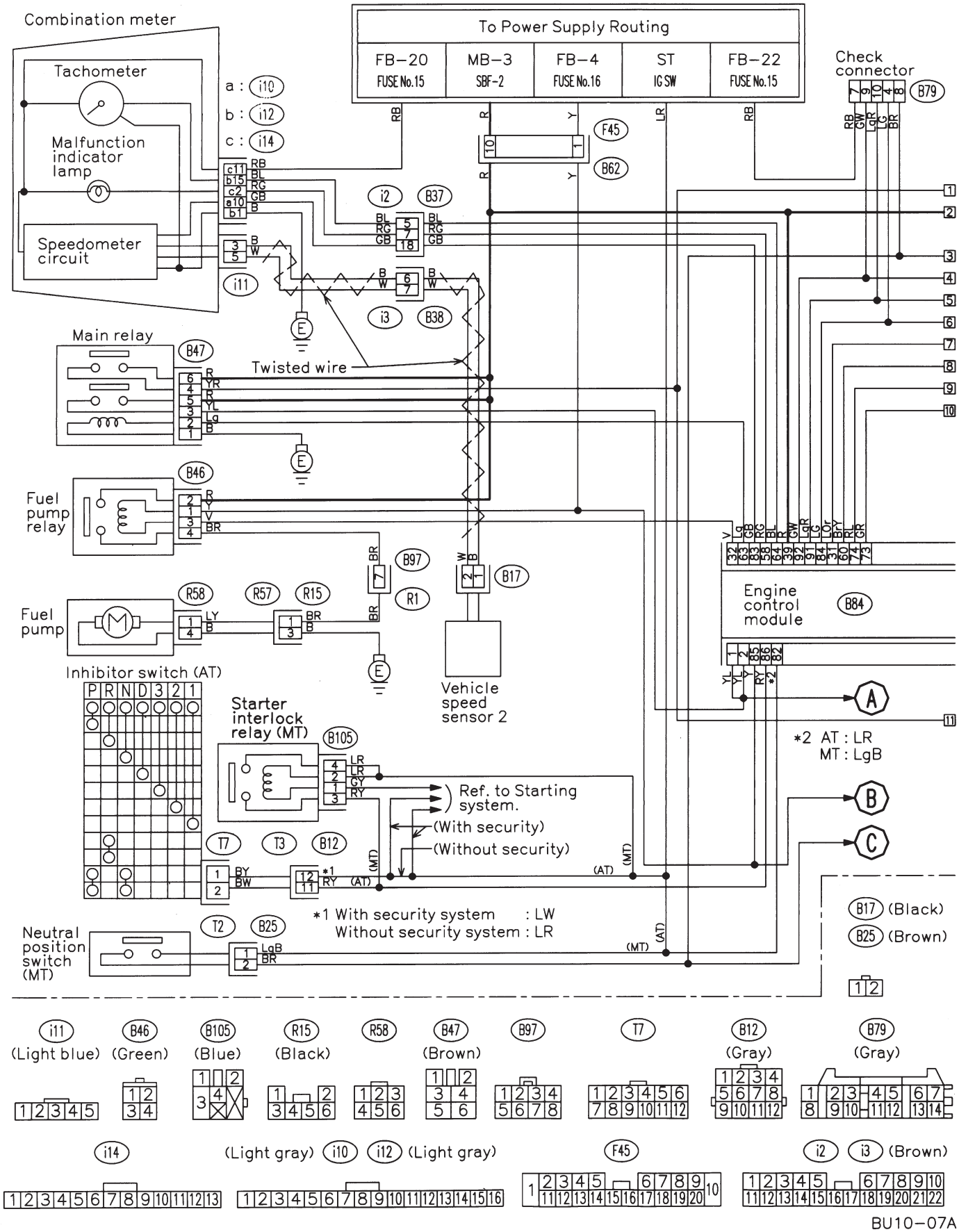
2. RHD MODEL

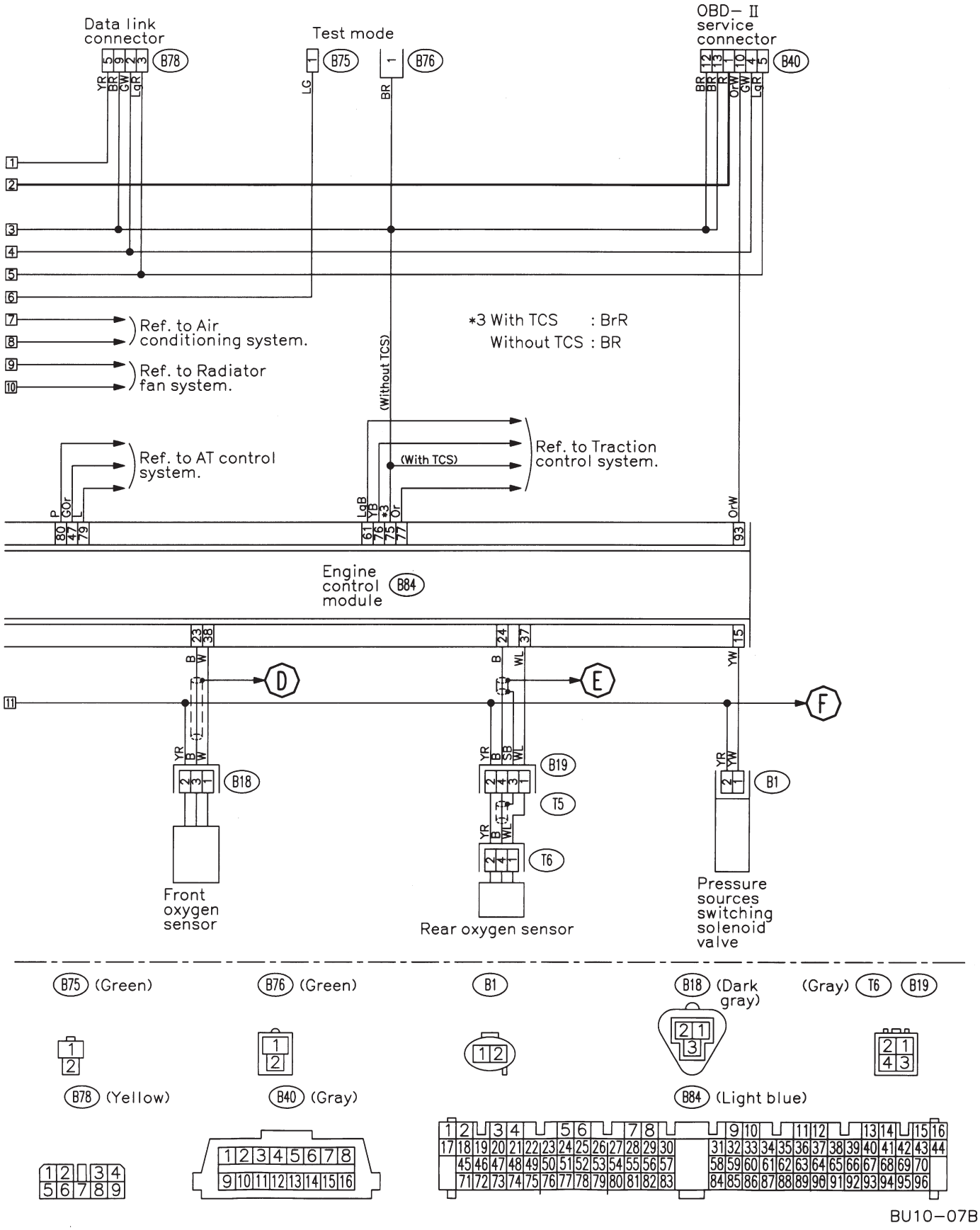


BUR73−02

M: ENGINE ELECTRICAL SYSTEM

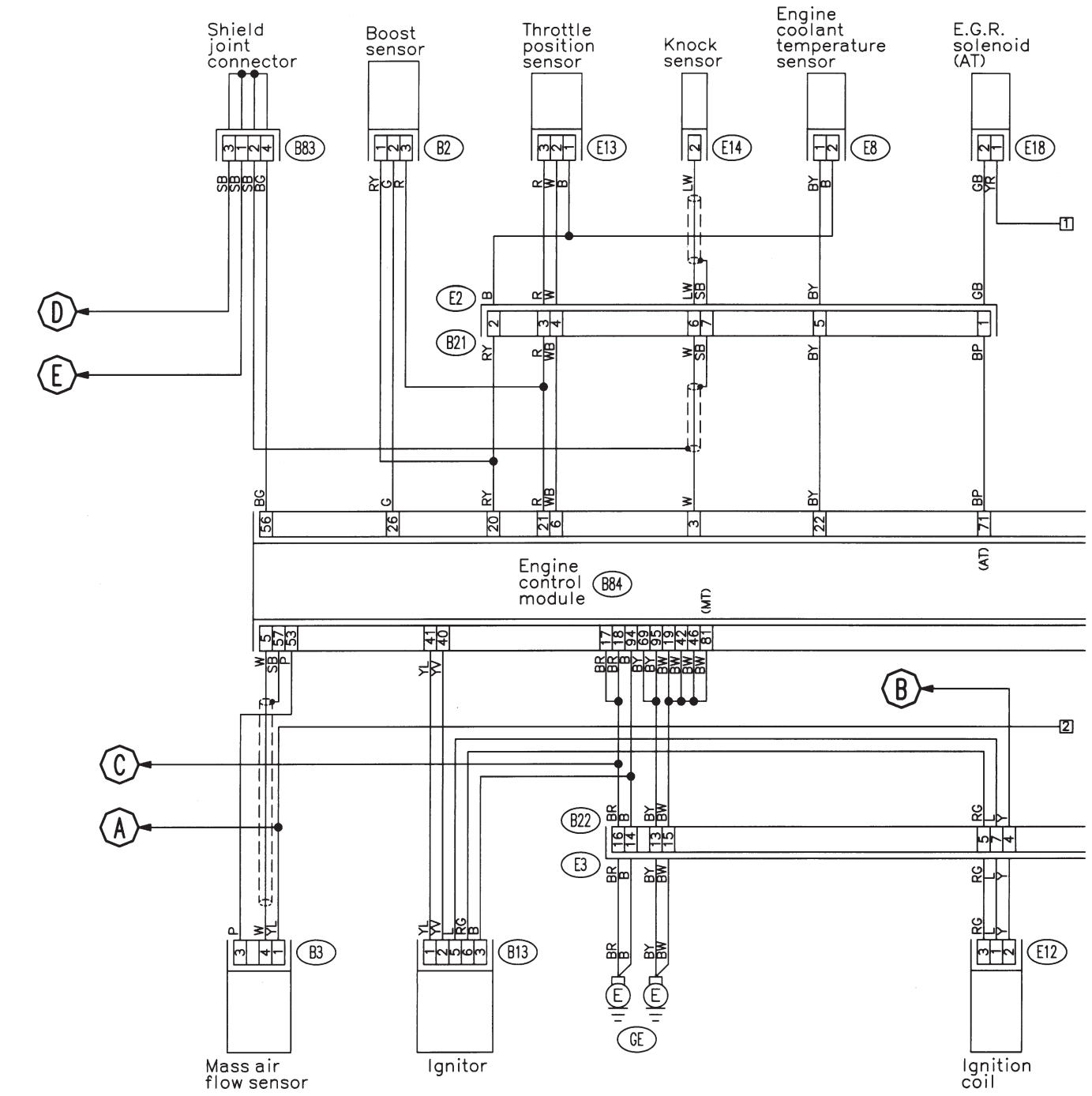
1. TAIWAN MODEL

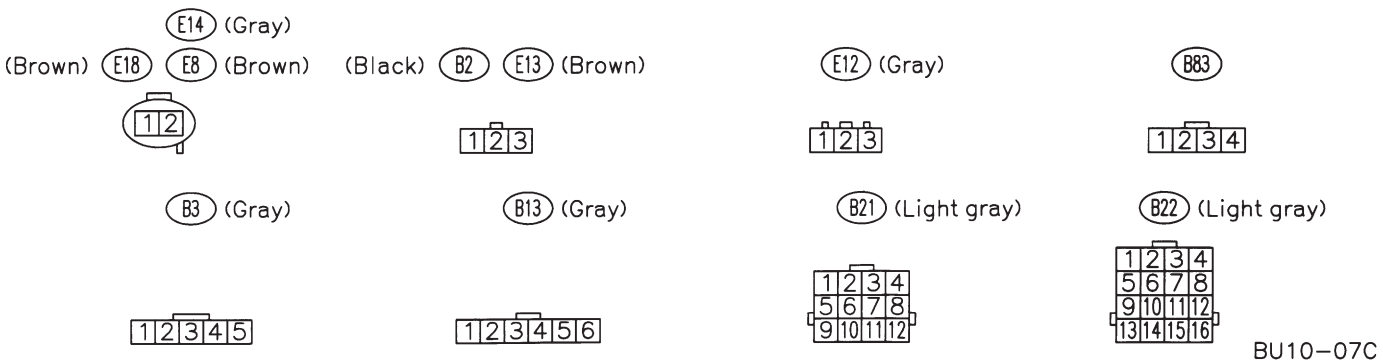



Data link connector
B78
Test mode
B75
B76
OBD– II service connector
B40
Ref. to Air conditioning system.
Ref. to Radiator fan system.
*3 With TCS : BrR
Without TCS : BR
(Without TCS)
(With TCS)
Ref. to AT control system.
Ref. to Traction control system.
Engine control module
B84
D
E
F
B18
B19
T5
T6
B1
Front oxygen sensor
Rear oxygen sensor
Pressure sources switching solenoid valve
B75 (Green)
B76 (Green)
B1
B18 (Dark gray)
(Gray) T6 B19
B78 (Yellow)
B40 (Gray)
B84 (Light blue)

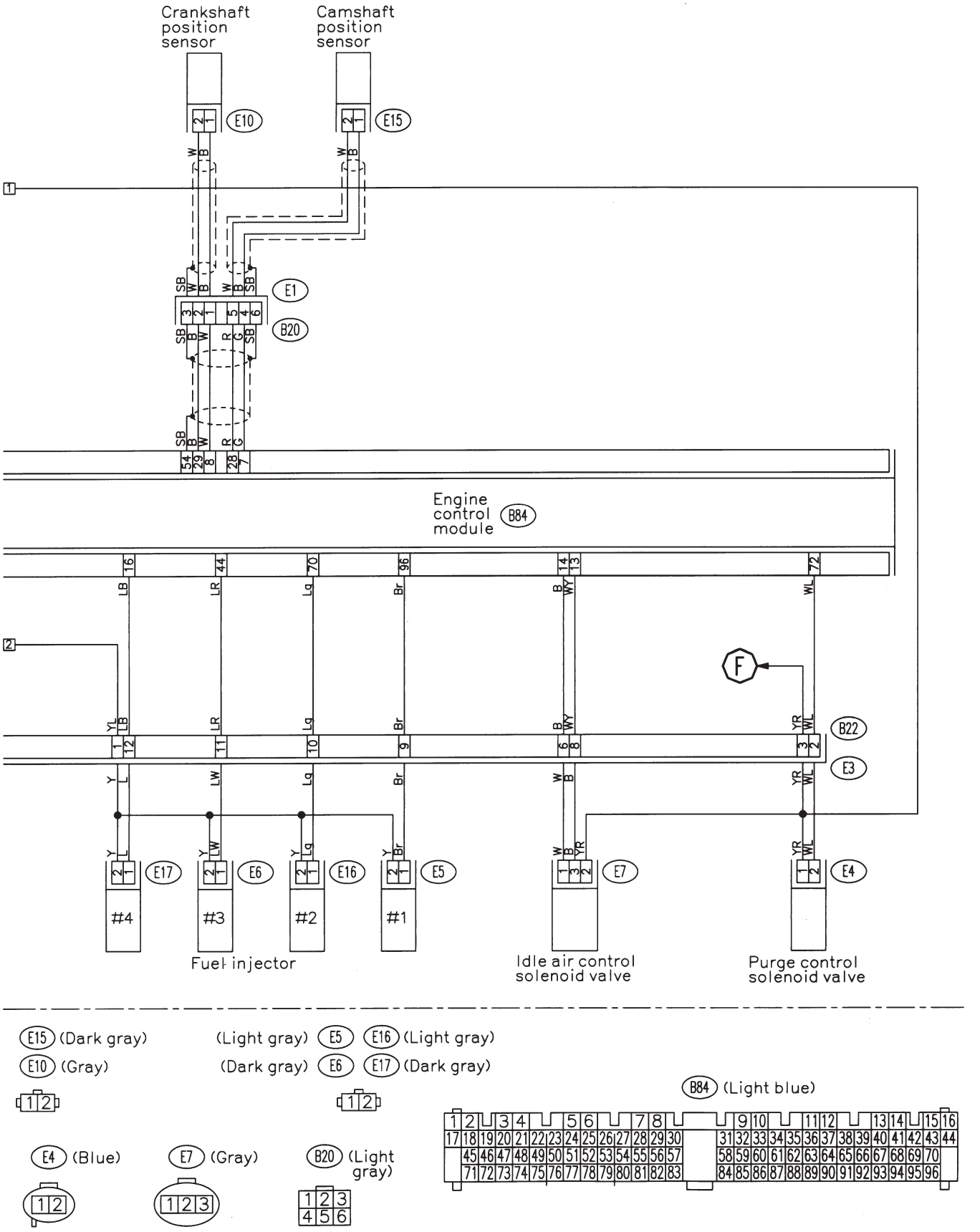
BU10–07B

WIRING DIAGRAM





BU10−07C



E15 (Dark gray) E10 (Gray)

(Light gray) E5 (Dark gray) E6

E16 (Light gray) E17 (Dark gray)

B84 (Light blue)

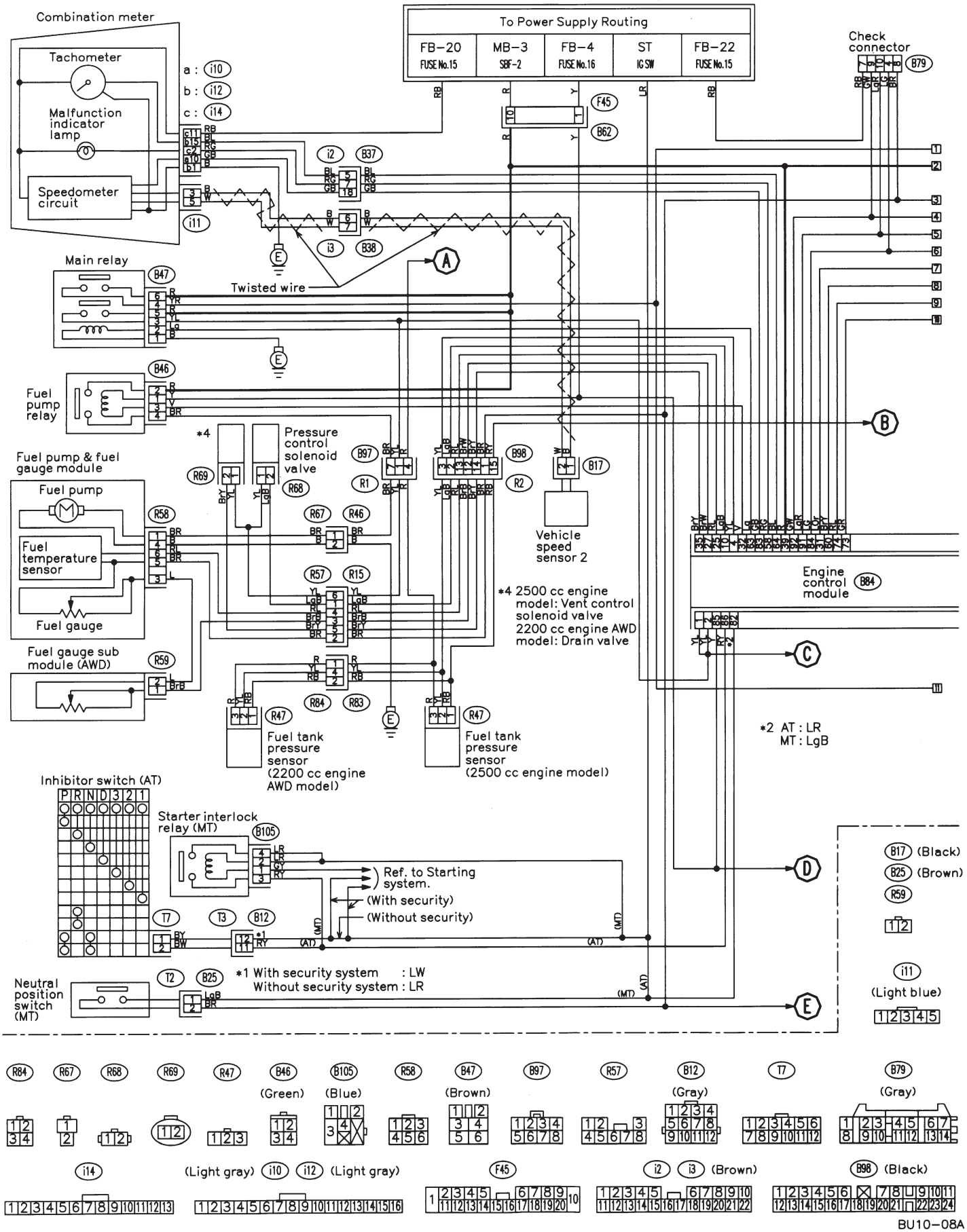
E4 (Blue)

E7 (Gray)

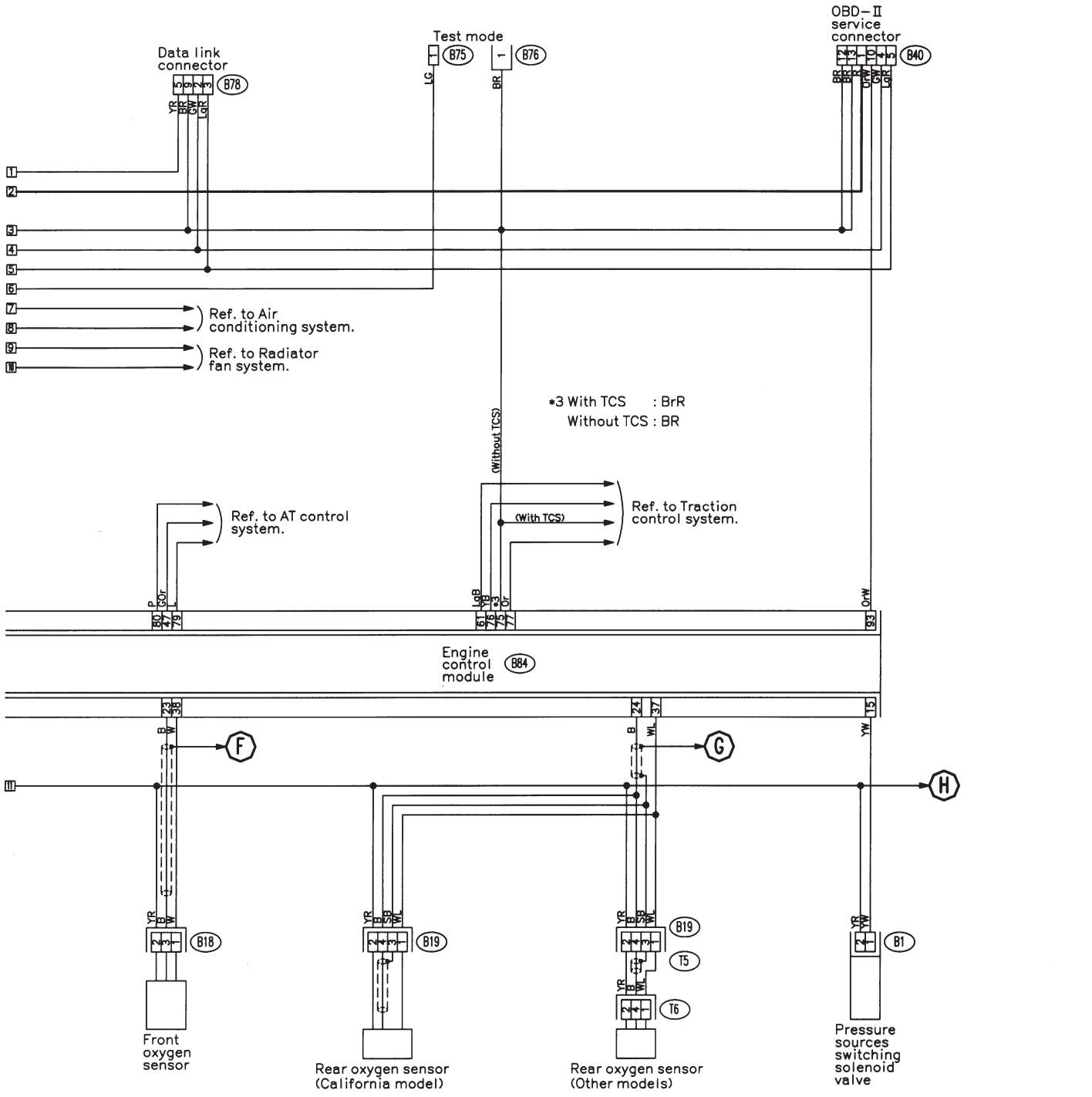
B20 (Light gray)

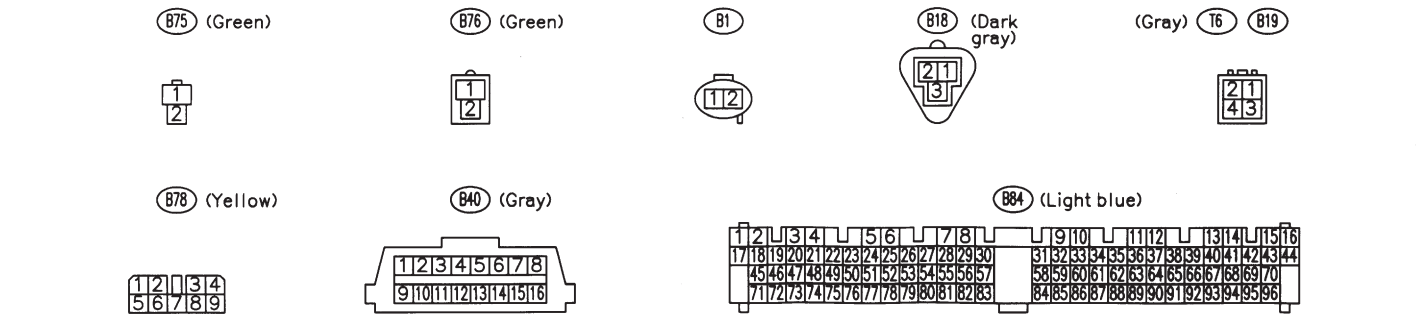
BU10−07D

2. LHD EXCEPT TAIWAN MODEL



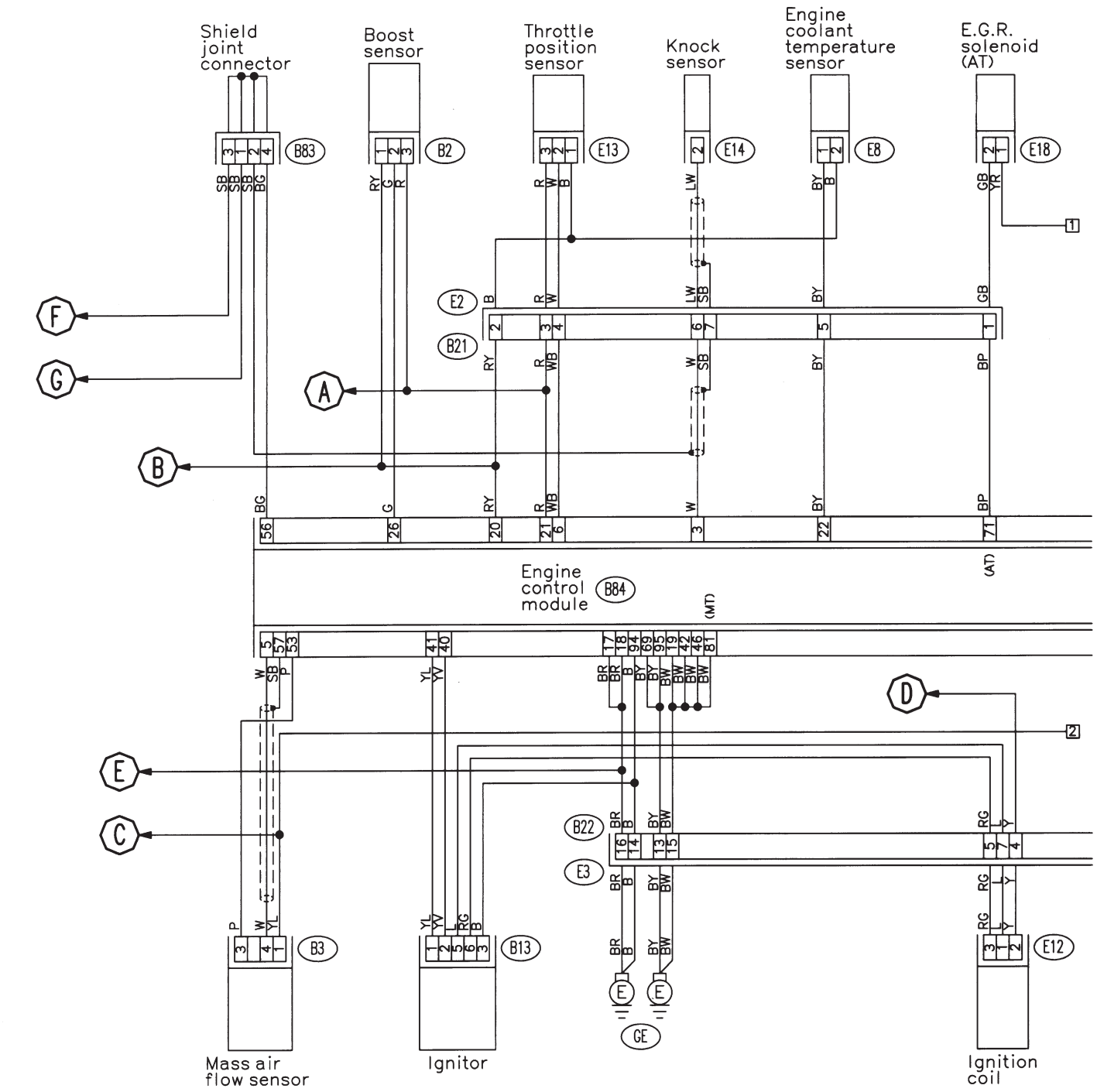
BU10−08A

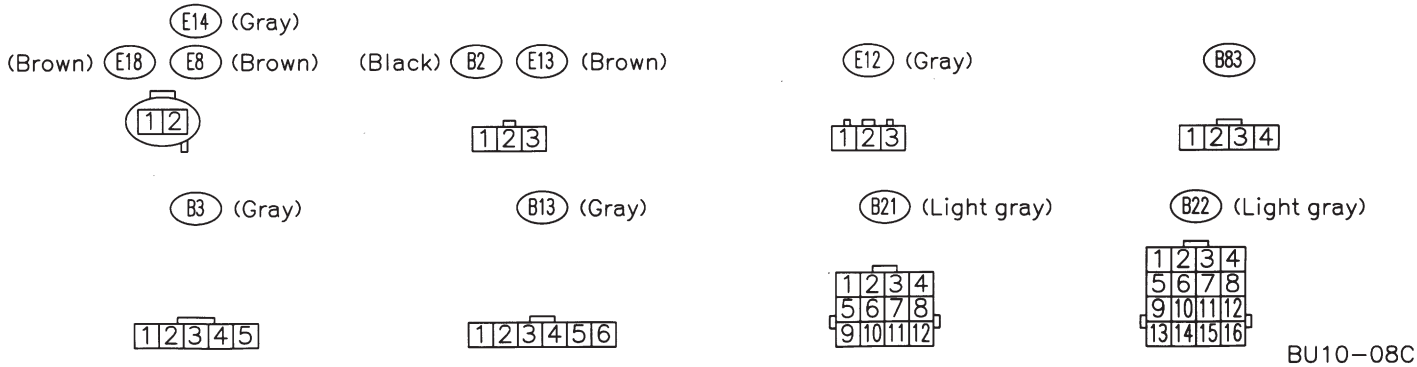

Data link connector
B78
Test mode
B75
B76
OBD−II service connector
B40
Ref. to Air conditioning system.
Ref. to Radiator fan system.
*3 With TCS : BrR
Without TCS : BR
(Without TCS)
(With TCS)
Ref. to AT control system.
Ref. to Traction control system.
Engine control module
B84
F
G
H
B18
B19
T5
T6
B1
Front oxygen sensor
Rear oxygen sensor (California model)
Rear oxygen sensor (Other models)
Pressure sources switching solenoid valve

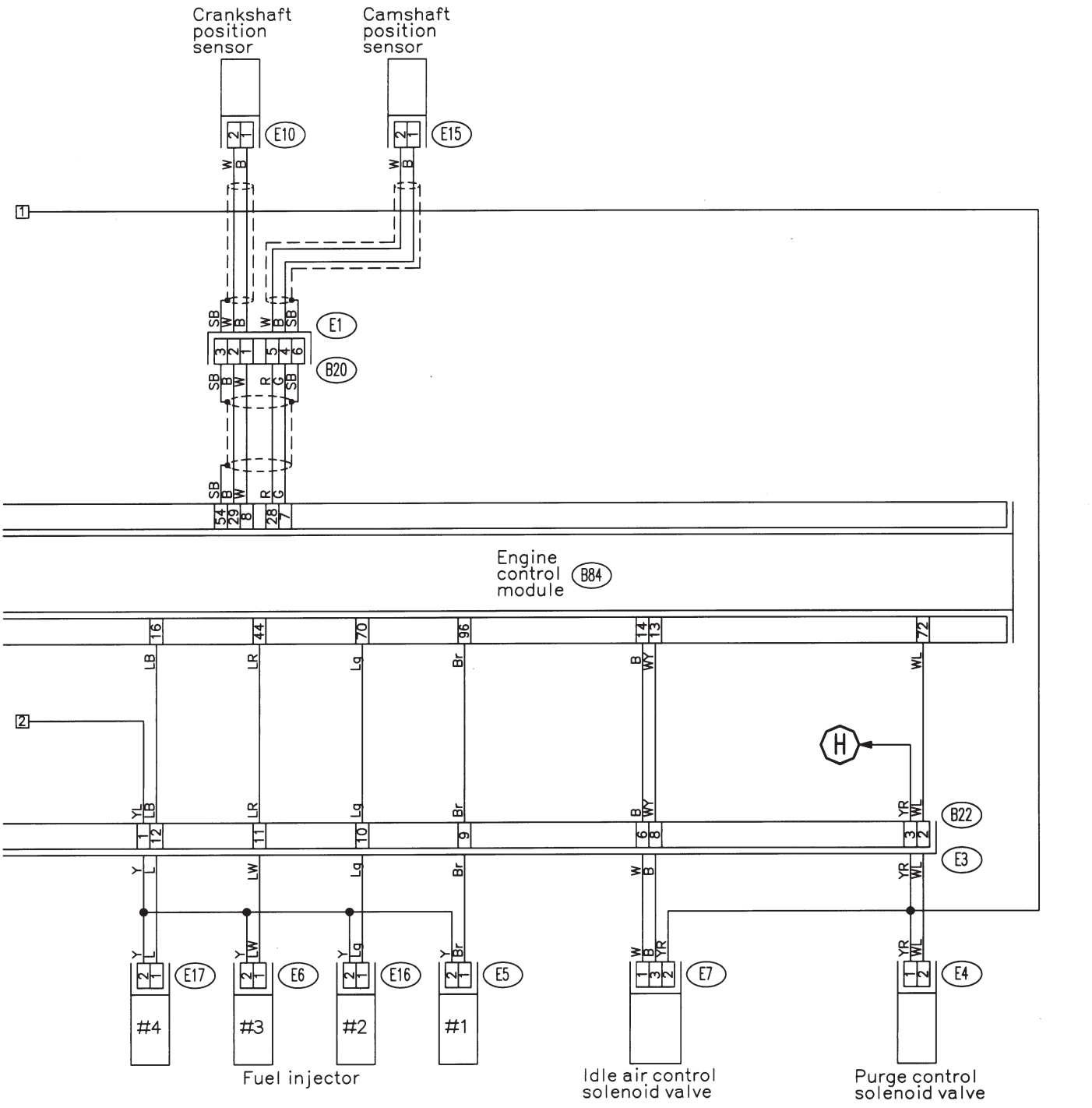

B75 (Green)
B76 (Green)
B1
B18 (Dark gray)
(Gray) T6 B19
B78 (Yellow)
B40 (Gray)
B84 (Light blue)

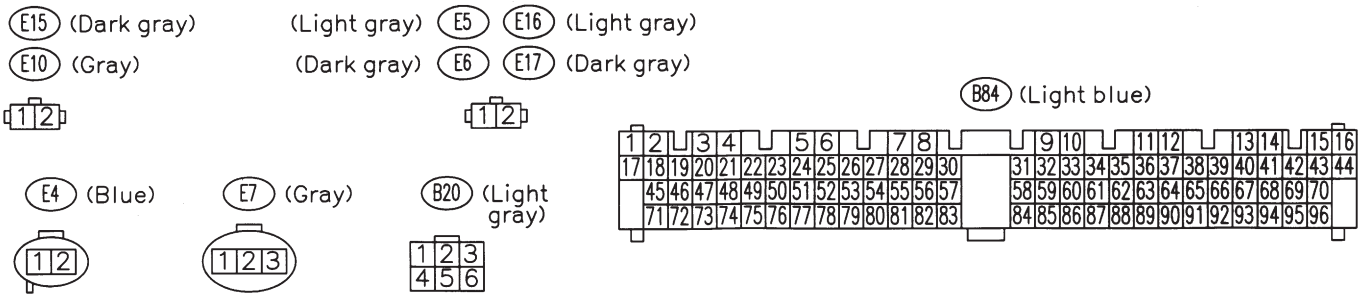
BU10−08B

WIRING DIAGRAM





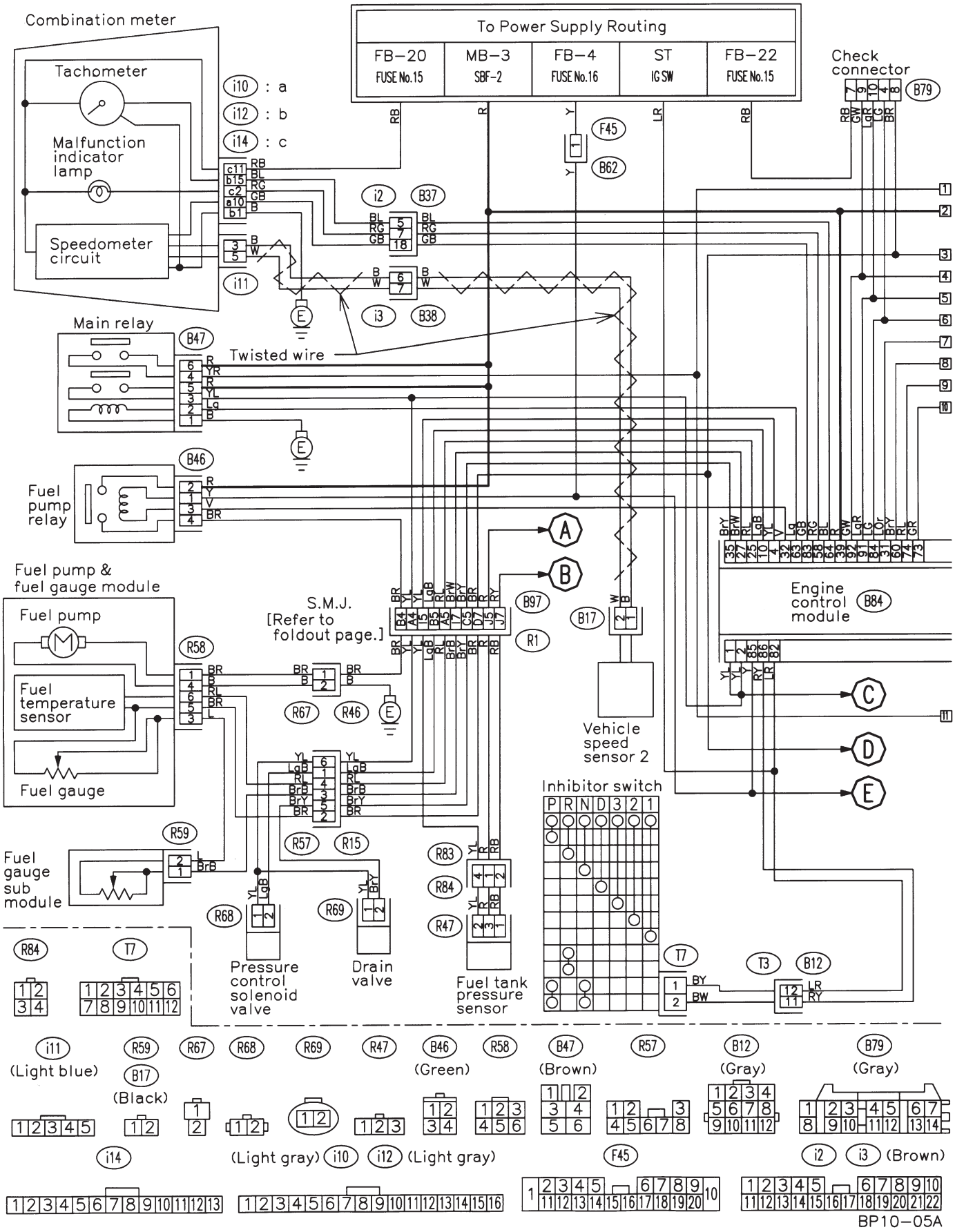

Crankshaft position sensor
Camshaft position sensor
E10
E15
E1
B20
Engine control module
B84
B22
E3
H
E17
E6
E16
E5
E7
E4
#4
#3
#2
#1
Fuel injector
Idle air control solenoid valve
Purge control solenoid valve

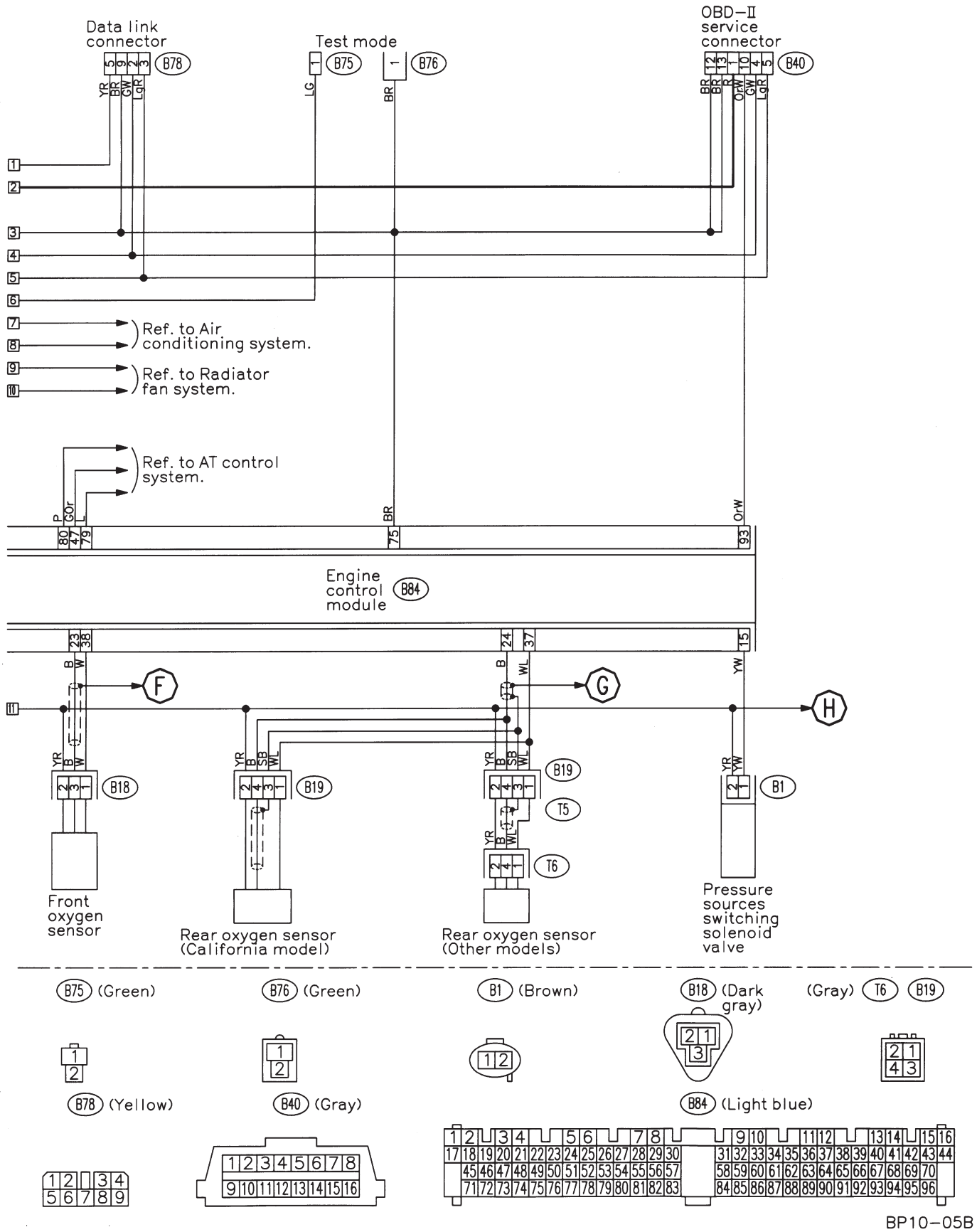

E15 (Dark gray)
E10 (Gray)
(Light gray) E5 E16 (Light gray)
(Dark gray) E6 E17 (Dark gray)
B84 (Light blue)
E4 (Blue)
E7 (Gray)
B20 (Light gray)

BU10–08D

WIRING DIAGRAM

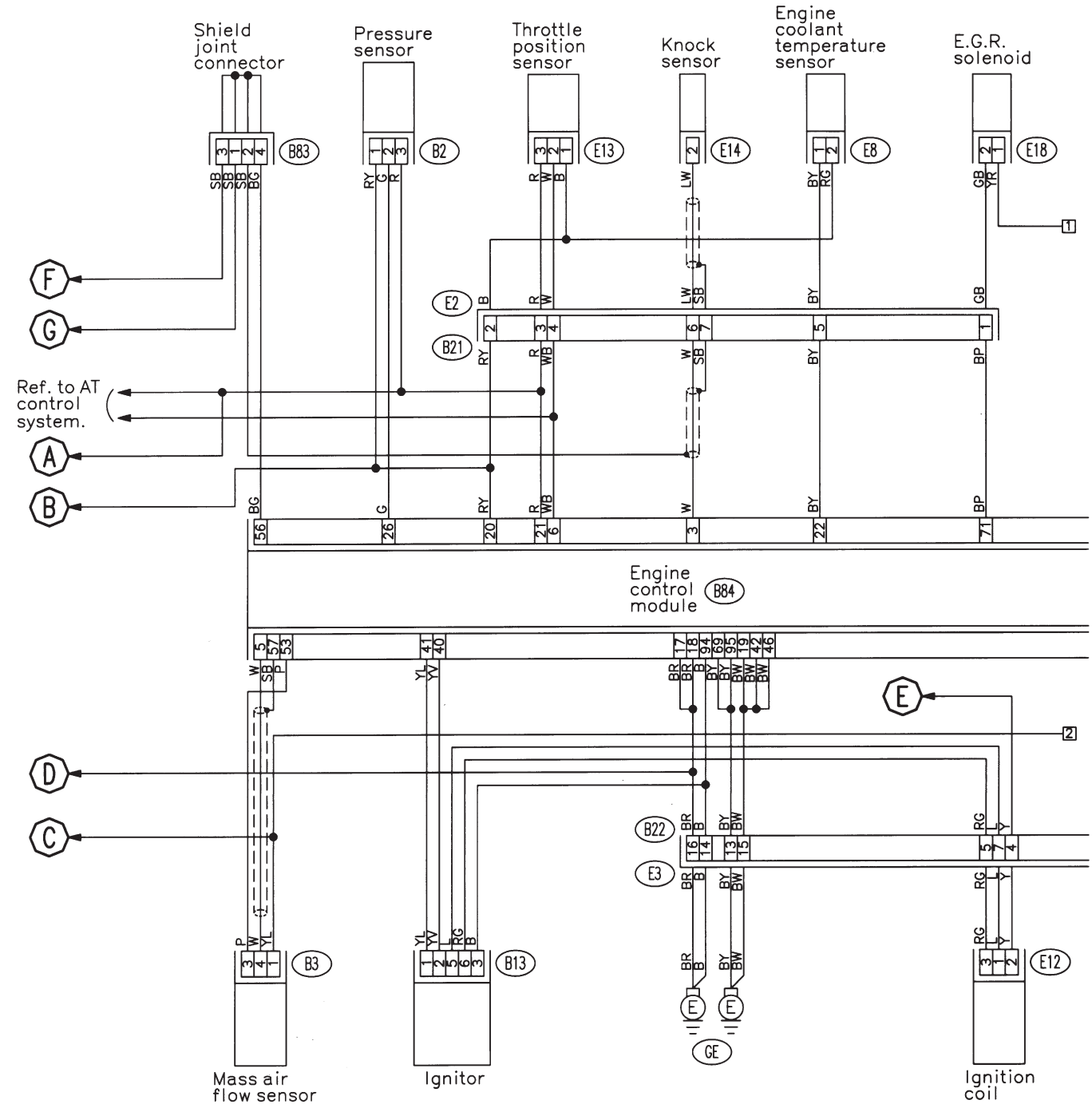
3. RHD MODEL

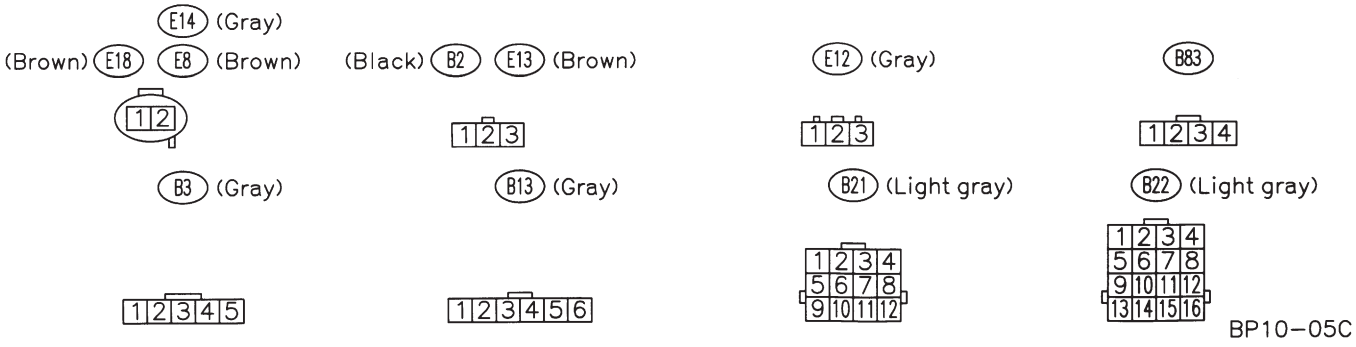


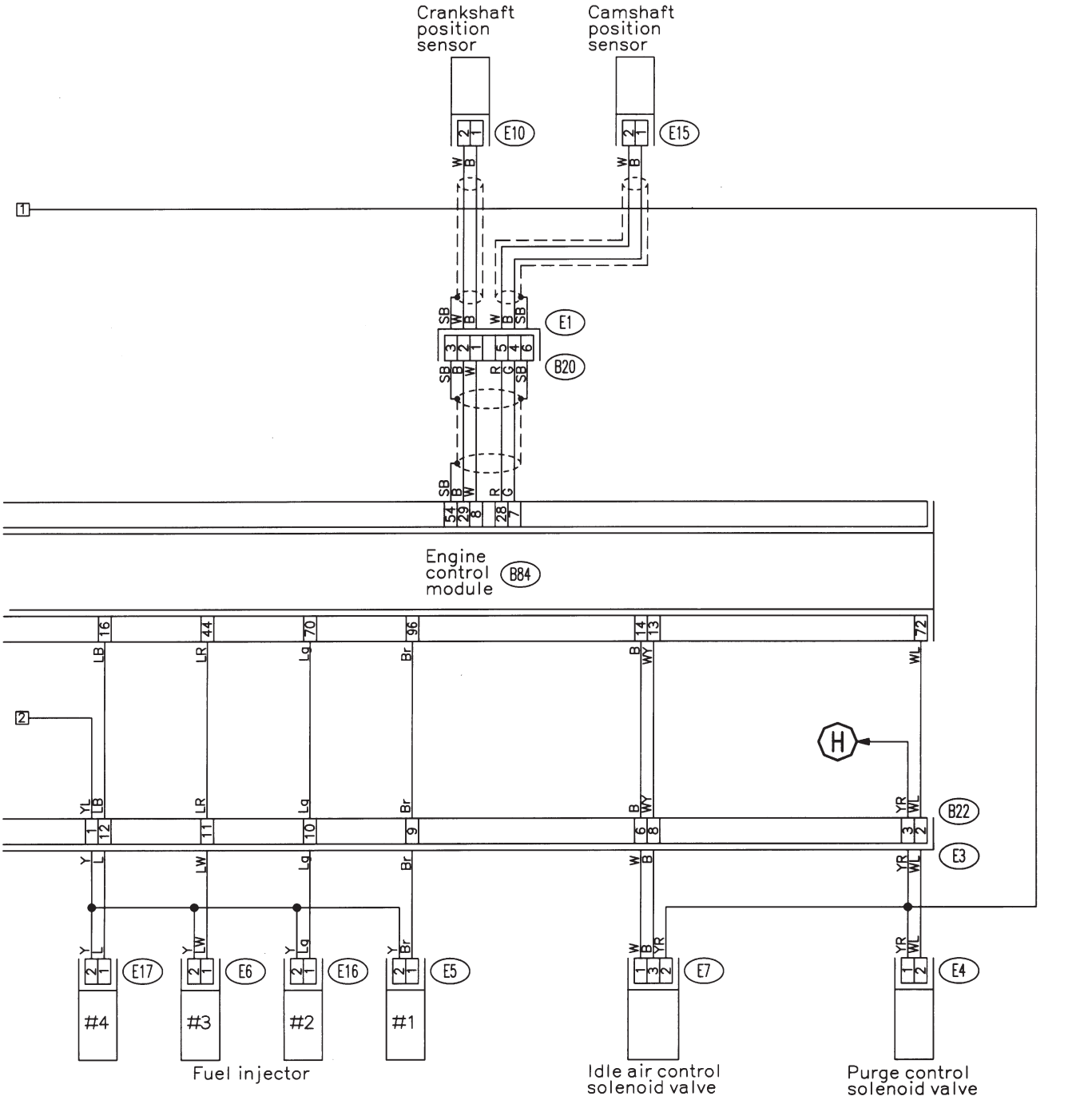

Data link connector
B78
Test mode
B75
B76
OBD–II service connector
B40
Ref. to Air conditioning system.
Ref. to Radiator fan system.
Ref. to AT control system.
Engine control module
B84
F
G
H
B18
B19
T5
T6
B1
Front oxygen sensor
Rear oxygen sensor (California model)
Rear oxygen sensor (Other models)
Pressure sources switching solenoid valve
B75 (Green)
B76 (Green)
B1 (Brown)
B18 (Dark gray)
(Gray) T6
B19
B78 (Yellow)
B40 (Gray)
B84 (Light blue)

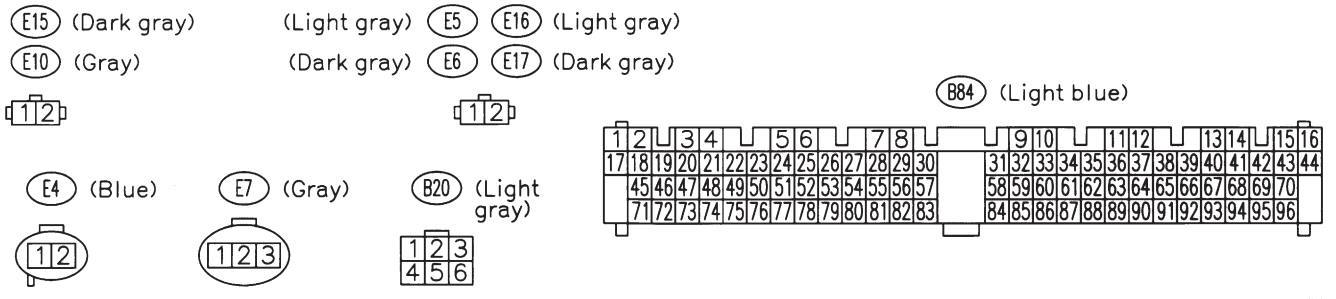
BP10–05B

WIRING DIAGRAM





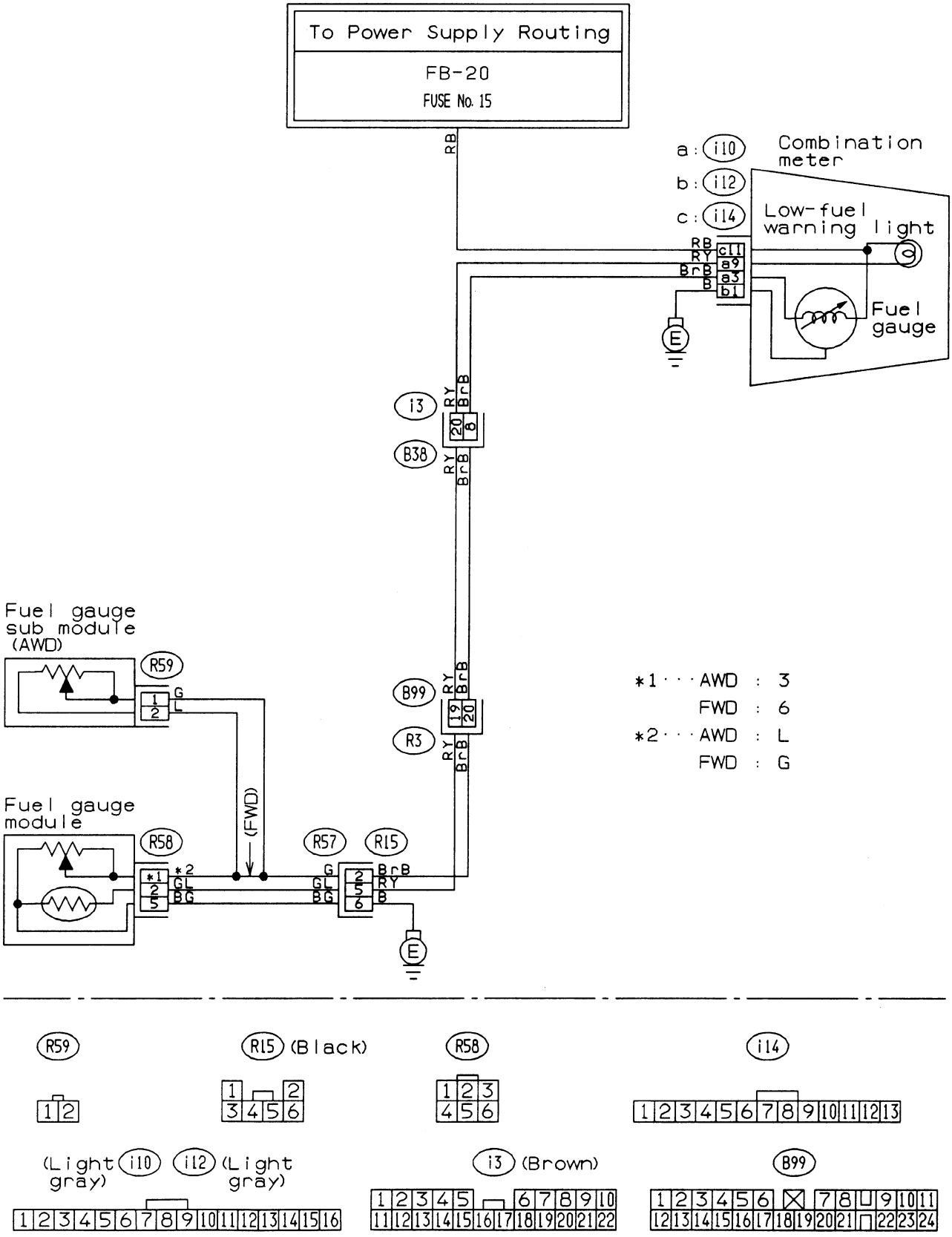

Crankshaft position sensor
Camshaft position sensor
E10
E15
E1
B20
Engine control module
B84
B22
E3
H
E17
E6
E16
E5
E7
E4
#4
#3
#2
#1
Fuel injector
Idle air control solenoid valve
Purge control solenoid valve


E15 (Dark gray)
E10 (Gray)
(Light gray) E5 E16 (Light gray)
(Dark gray) E6 E17 (Dark gray)
B84 (Light blue)
E4 (Blue)
E7 (Gray)
B20 (Light gray)

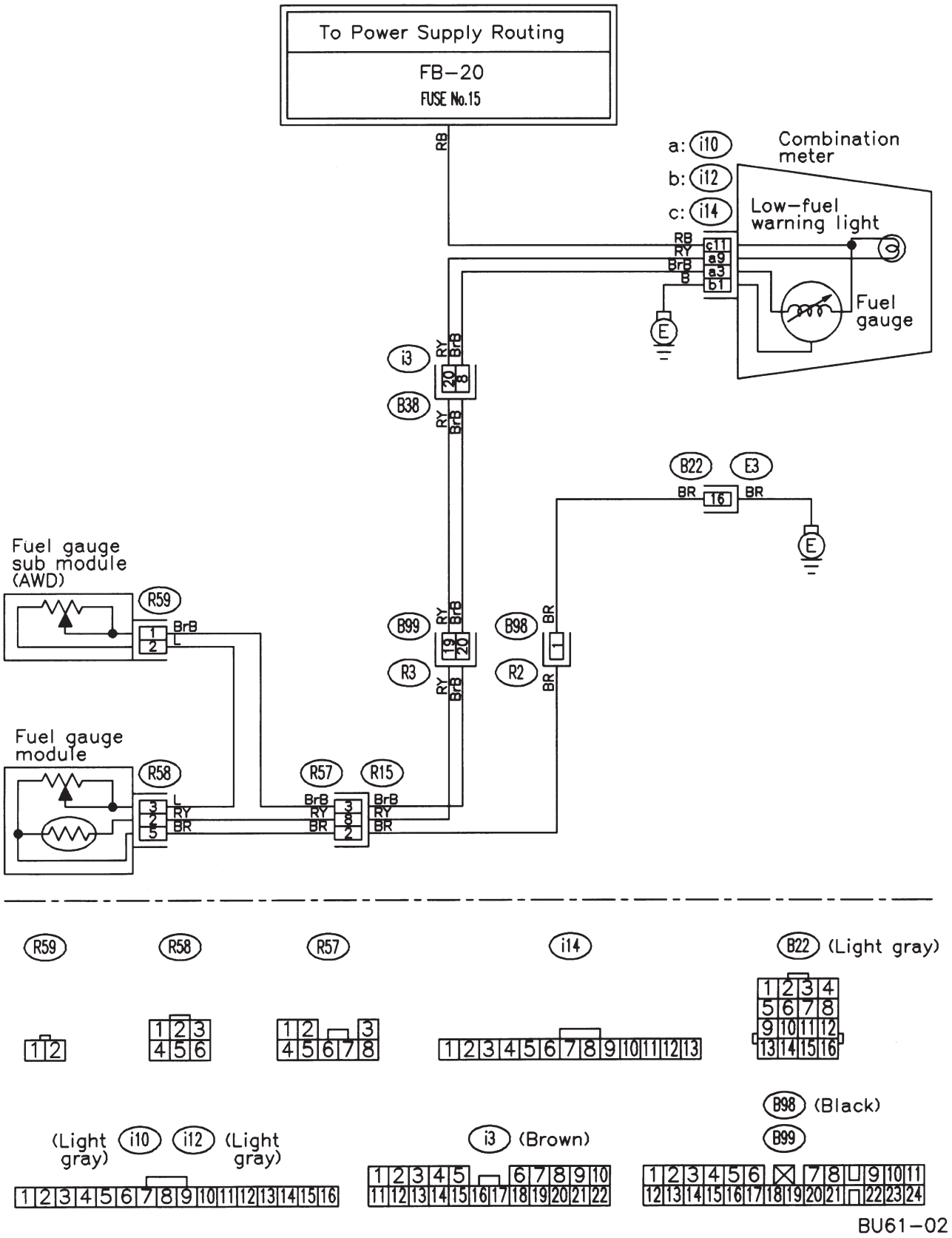
BP10–05D

N: FUEL GAUGE SYSTEM

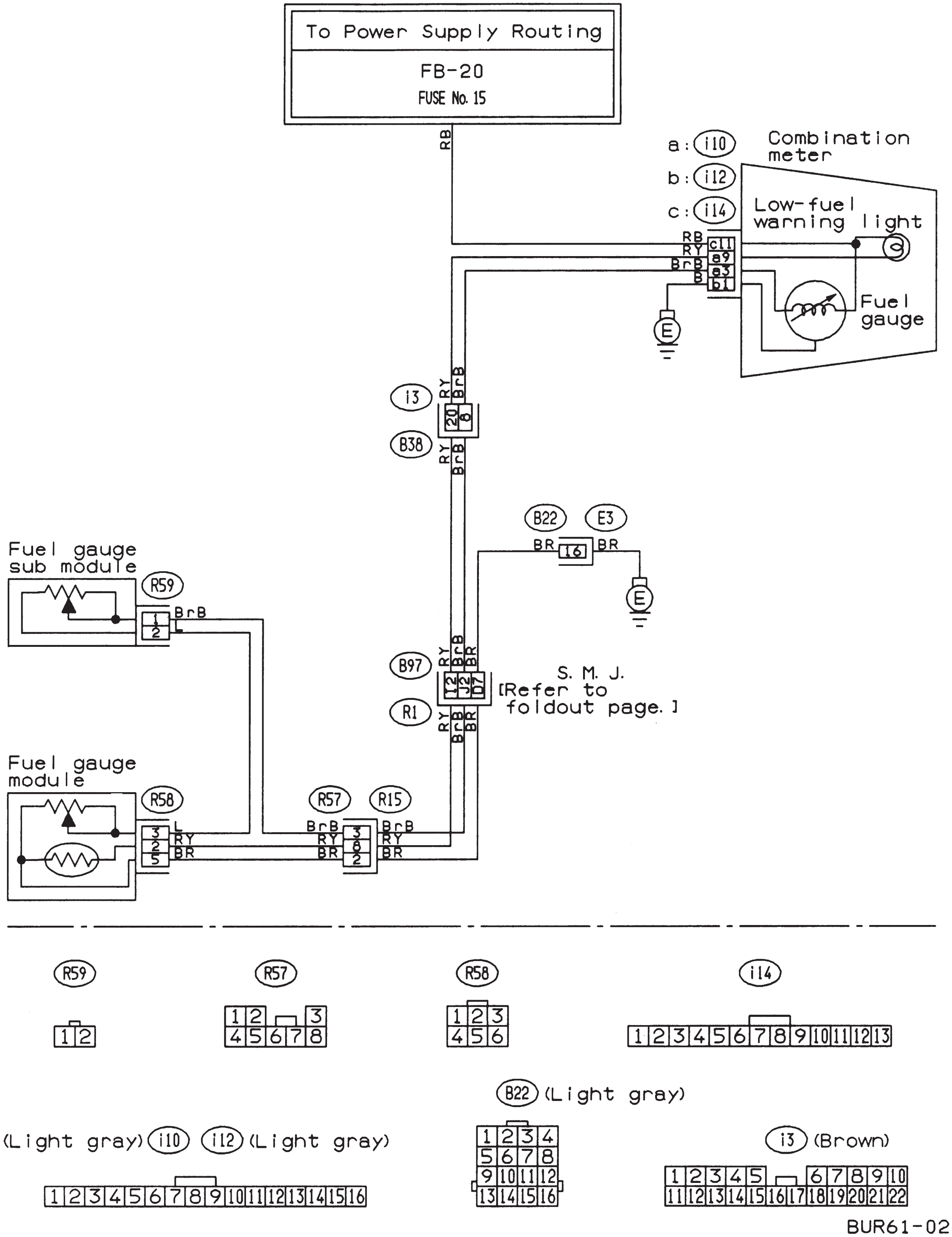
1. TAIWAN MODEL



2. LHD EXCEPT TAIWAN MODEL



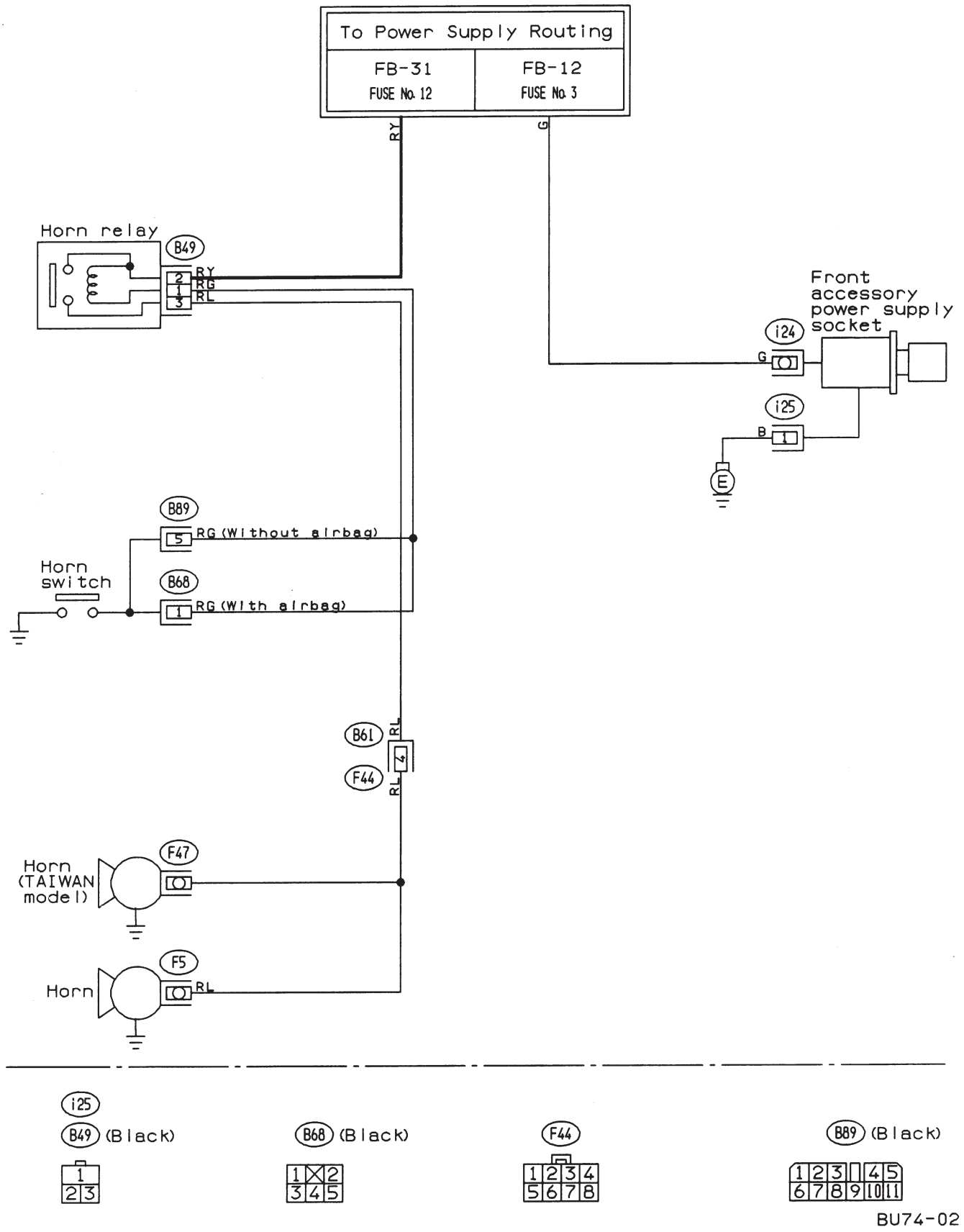
3. RHD MODEL


To Power Supply Routing
FB-20
FUSE No. 15
RB
a: i10
b: i12
c: i14
Combination meter
Low-fuel warning light
Fuel gauge
RB RY BrB B
c11 a9 a3 b1
E
i3
B38
RY BrB
20 8
B22 E3
BR 16 BR
Fuel gauge sub module
R59
BrB L
1 2
B97
R1
RY BrB BR
I2 J2 D7
S. M. J.
[Refer to foldout page.]
Fuel gauge module
R58
3 2 5
L RY BR
R57 R15
BrB RY BR
3 8 2
R59
R57
R58
i14
B22 (Light gray)
(Light gray) i10 i12 (Light gray)
i3 (Brown)
BUR61-02

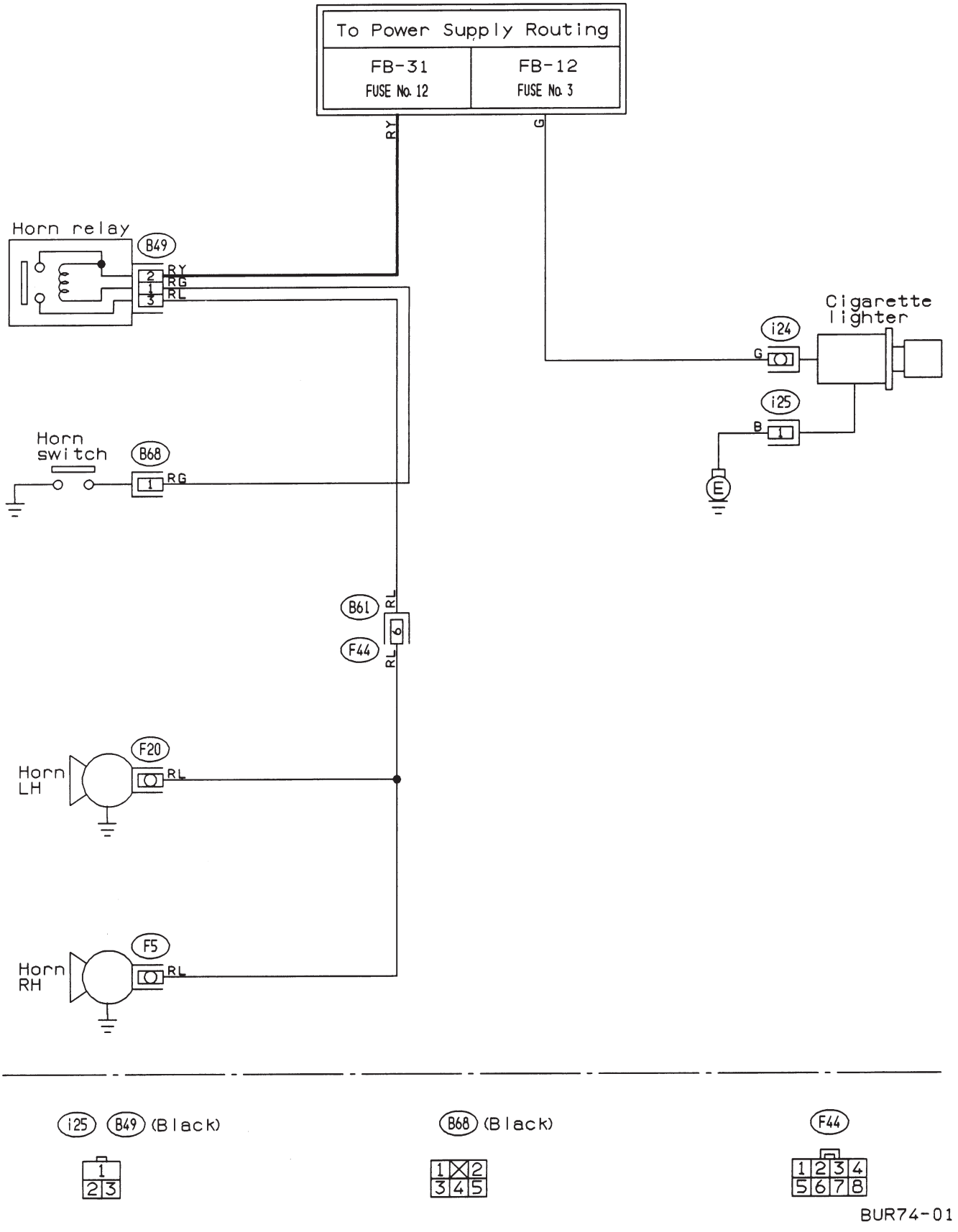
MEMO:

O: HORN AND FRONT ACCESSORY POWER SUPPLY SYSTEM

1. LHD MODEL

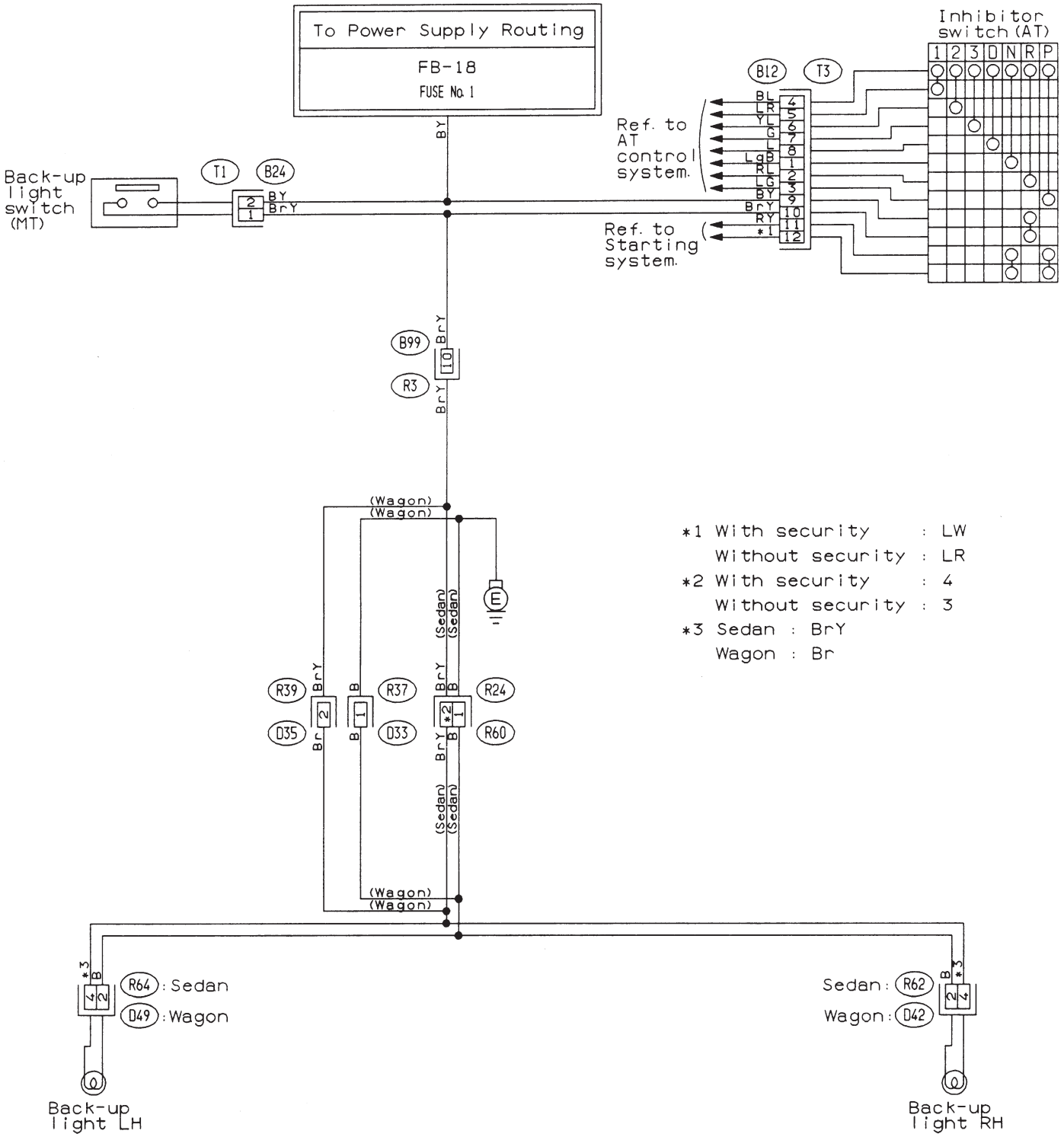


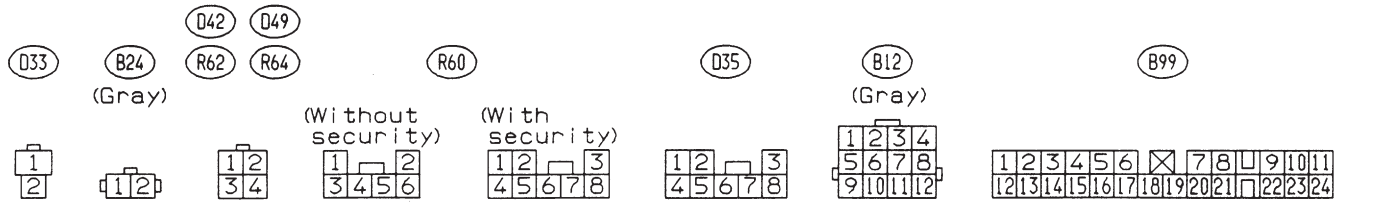
2. RHD MODEL


To Power Supply Routing
FB-31
FUSE No. 12
FB-12
FUSE No. 3
RY
G
Horn relay
B49
2
1
3
RY
RG
RL
Cigarette lighter
i24
G
i25
B
E
Horn switch
B68
1
RG
B61
RL
6
F44
RL
F20
Horn LH
RL
F5
Horn RH
RL
i25 B49 (Black)
1
2 3
B68 (Black)
1 2
3 4 5
F44
1 2 3 4
5 6 7 8
BUR74-01

P: LIGHTING SYSTEM (BACK-UP LIGHT)

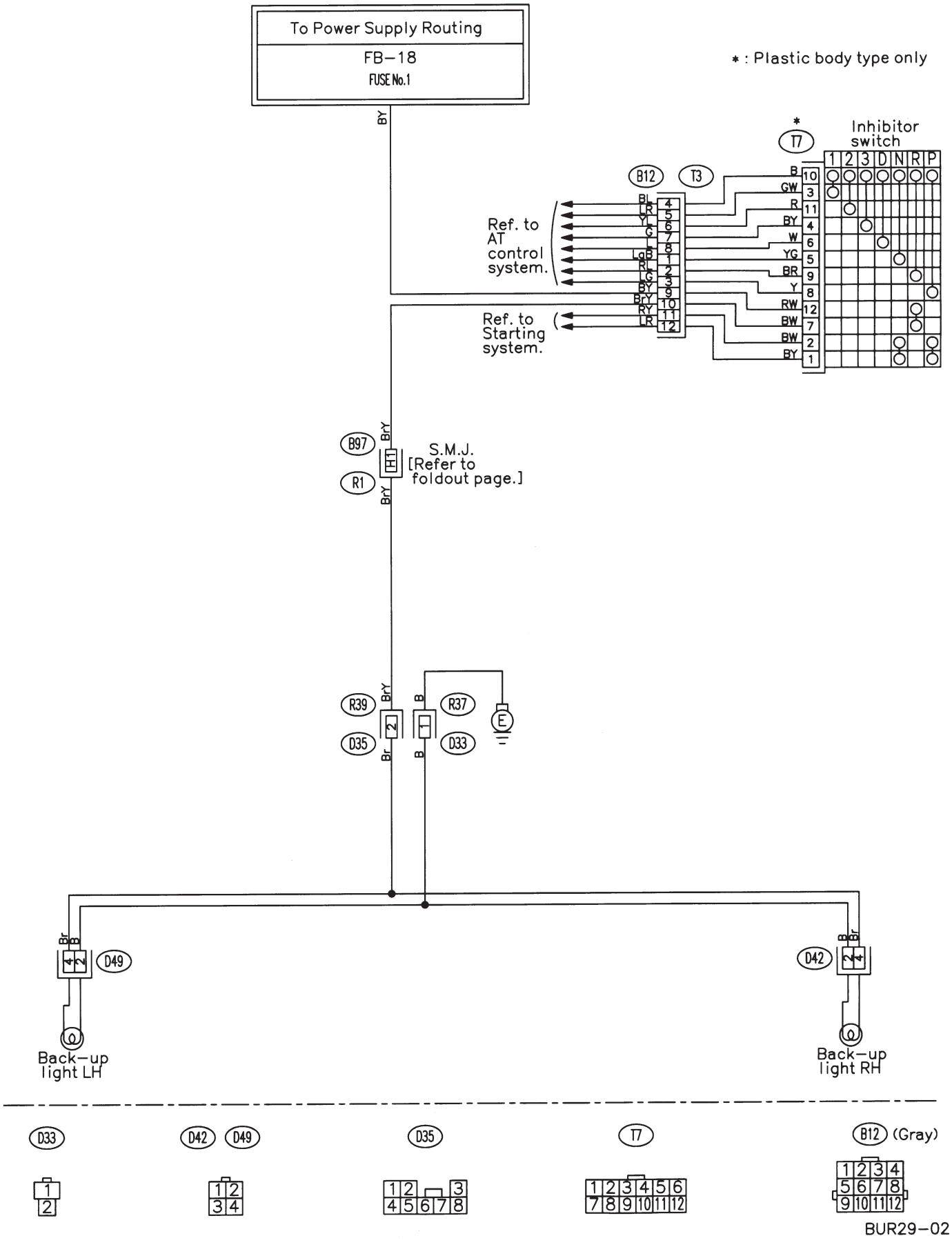
1. LHD MODEL





BU29-01

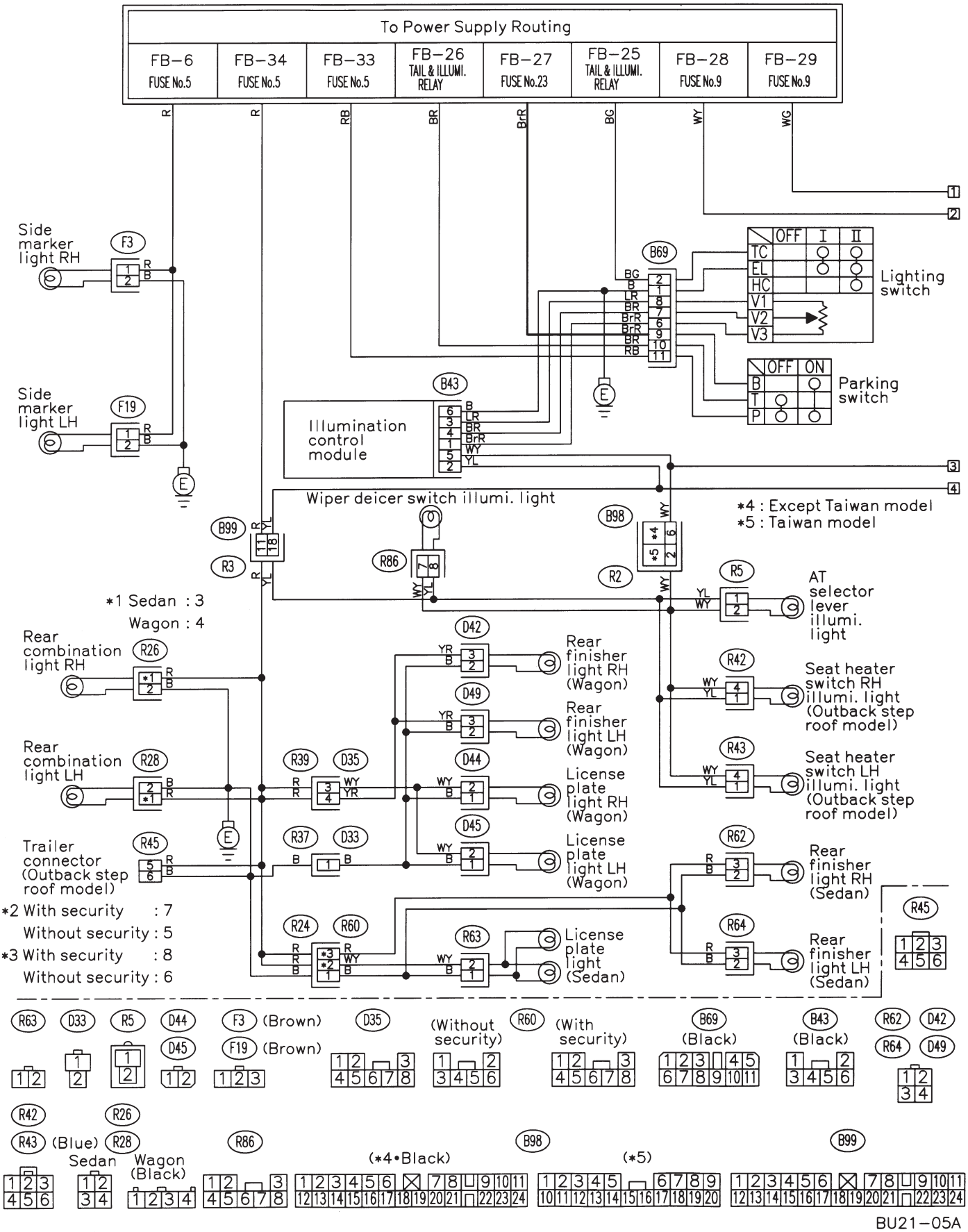
2. RHD MODEL

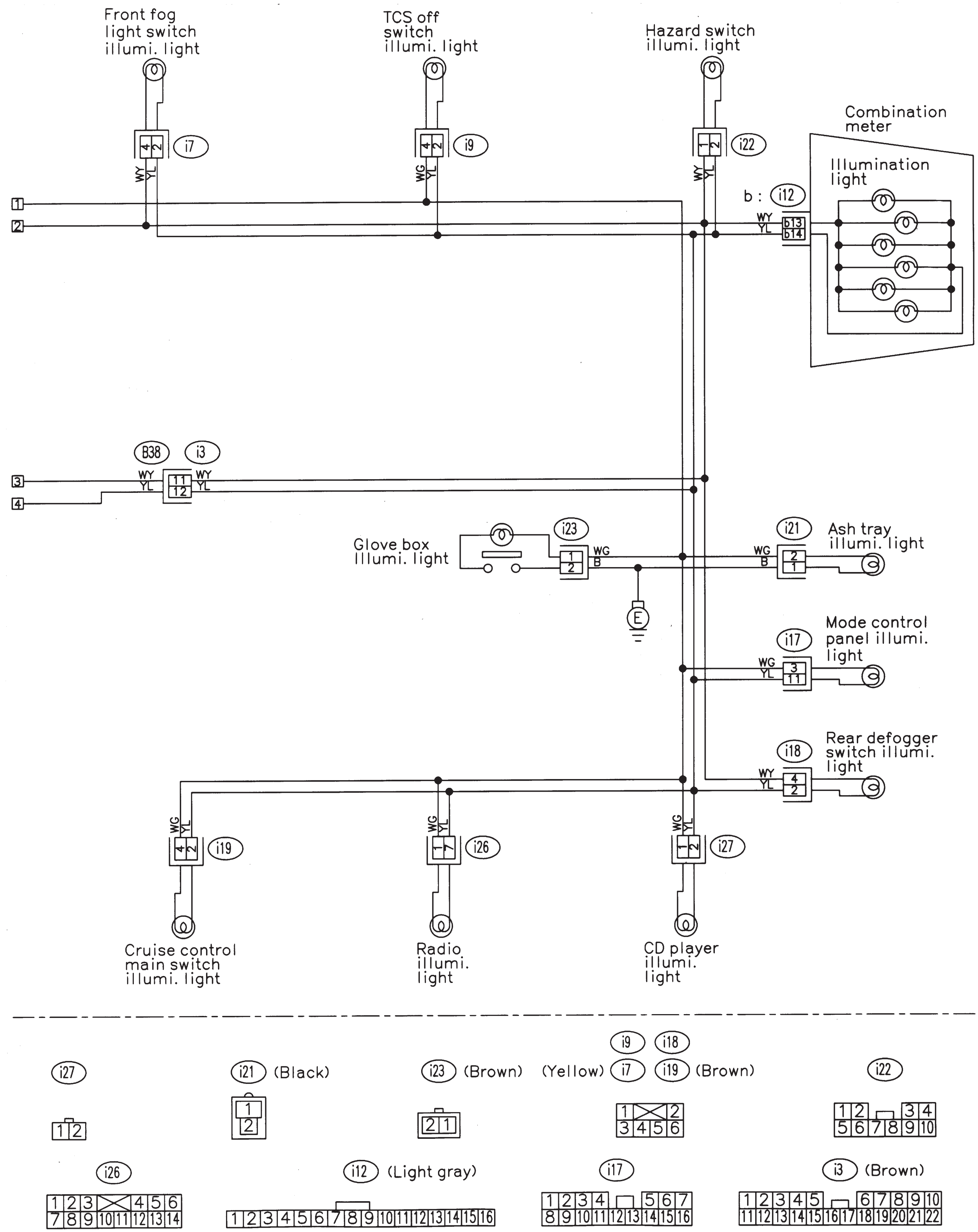


BUR29−02

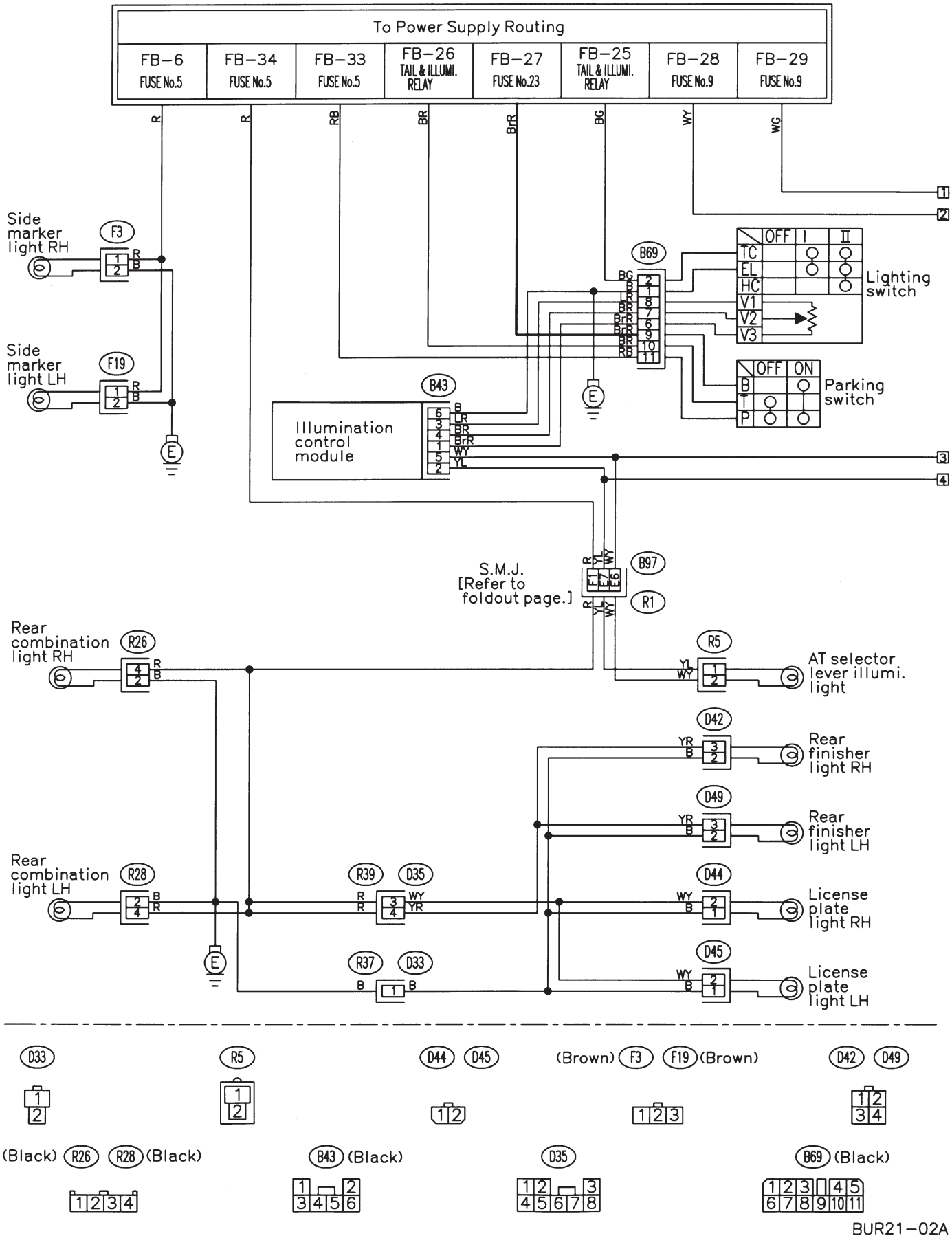
Q: LIGHTING SYSTEM (CLEARANCE LIGHT AND ILLUMINATION LIGHT)

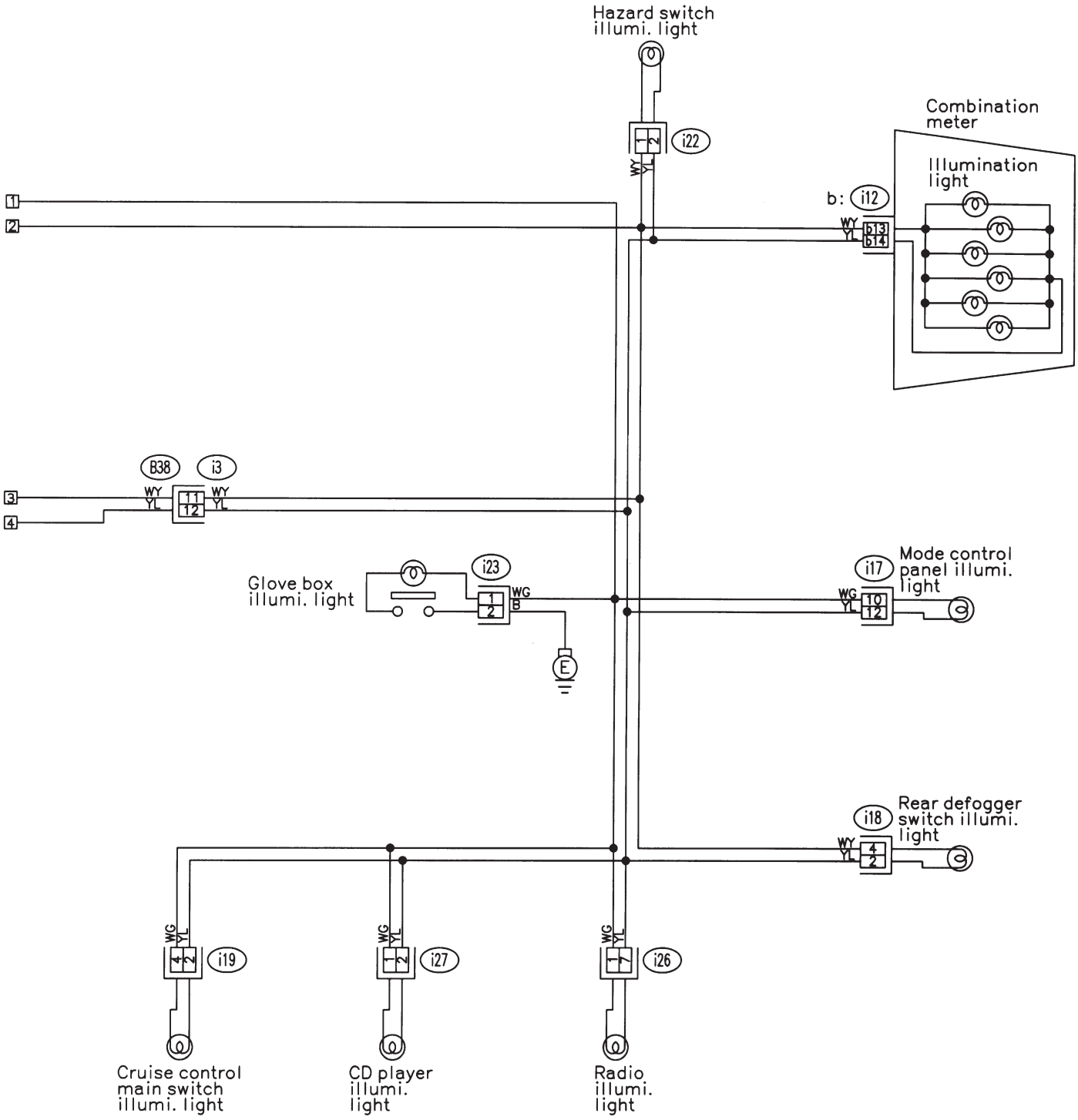
1. LHD MODEL

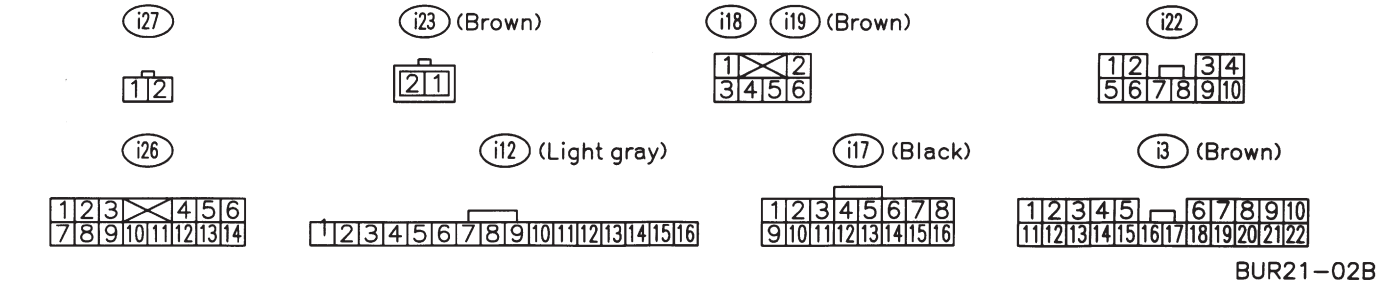



Front fog light switch illumi. light
TCS off switch illumi. light
Hazard switch illumi. light
Combination meter
Illumination light
b : i12
i7
i9
i22
B38
i3
Glove box Illumi. light
i23
i21
Ash tray illumi. light
Mode control panel illumi. light
i17
Rear defogger switch illumi. light
i18
i19
i26
i27
Cruise control main switch illumi. light
Radio illumi. light
CD player illumi. light
i27
i21 (Black)
i23 (Brown)
(Yellow) i7 i9
i18 i19 (Brown)
i22
i26
i12 (Light gray)
i17
i3 (Brown)
BU21−05B

2. RHD MODEL


To Power Supply Routing
FB-6 FUSE No.5
FB-34 FUSE No.5
FB-33 FUSE No.5
FB-26 TAIL & ILLUMI. RELAY
FB-27 FUSE No.23
FB-25 TAIL & ILLUMI. RELAY
FB-28 FUSE No.9
FB-29 FUSE No.9
Side marker light RH
Side marker light LH
Illumination control module
Lighting switch
Parking switch
S.M.J. [Refer to foldout page.]
Rear combination light RH
Rear combination light LH
AT selector lever illumi. light
Rear finisher light RH
Rear finisher light LH
License plate light RH
License plate light LH
(Black) (Black) (Brown) (Brown)
BUR21-02A

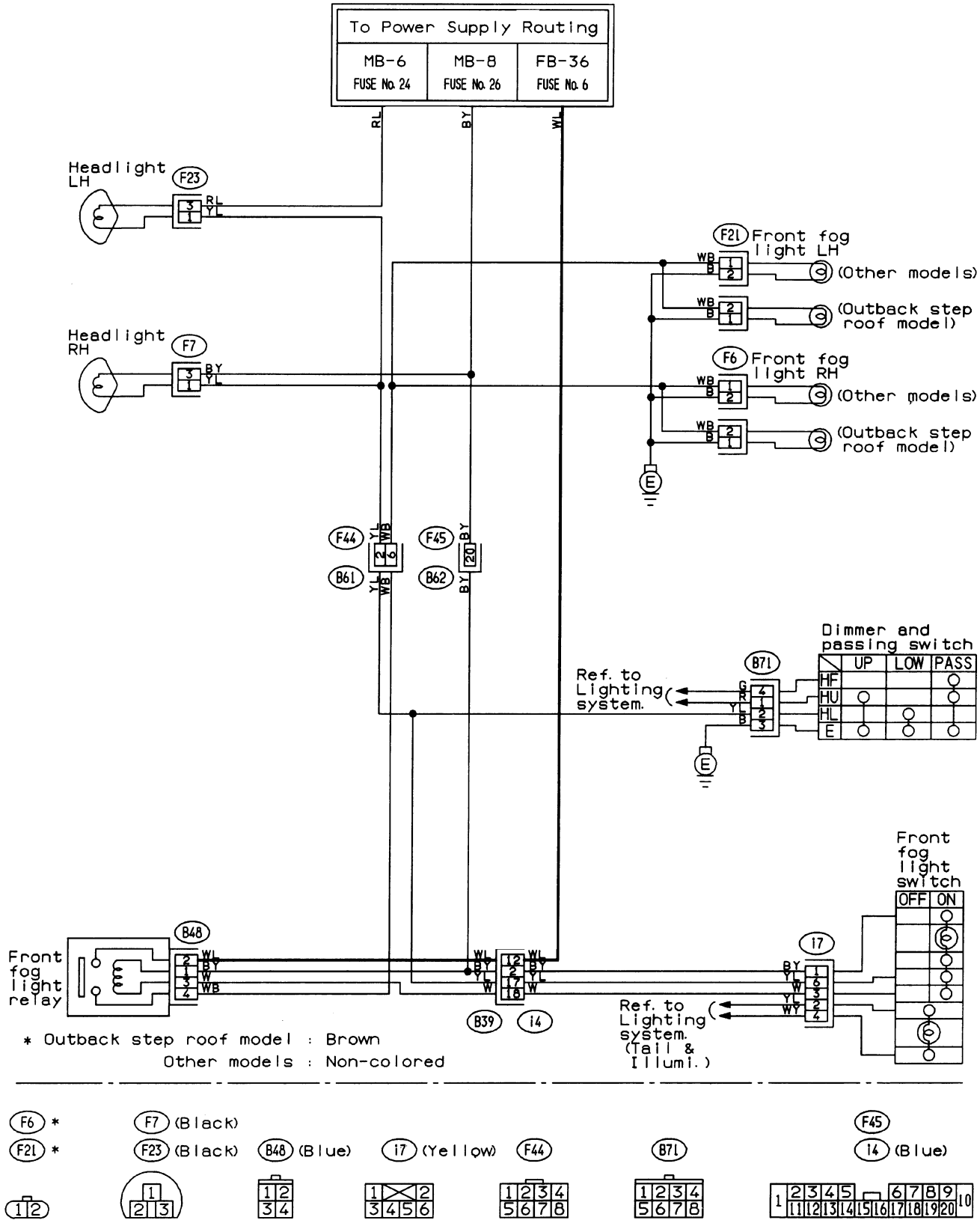

Hazard switch illumi. light
i22
Combination meter
Illumination light
b: i12
b13
b14
1
2
B38
i3
3
4
Glove box illumi. light
i23
WG
B
E
i17
Mode control panel illumi. light
i18
Rear defogger switch illumi. light
i19
i27
i26
Cruise control main switch illumi. light
CD player illumi. light
Radio illumi. light


i27
i23 (Brown)
i18 i19 (Brown)
i22
i26
i12 (Light gray)
i17 (Black)
i3 (Brown)

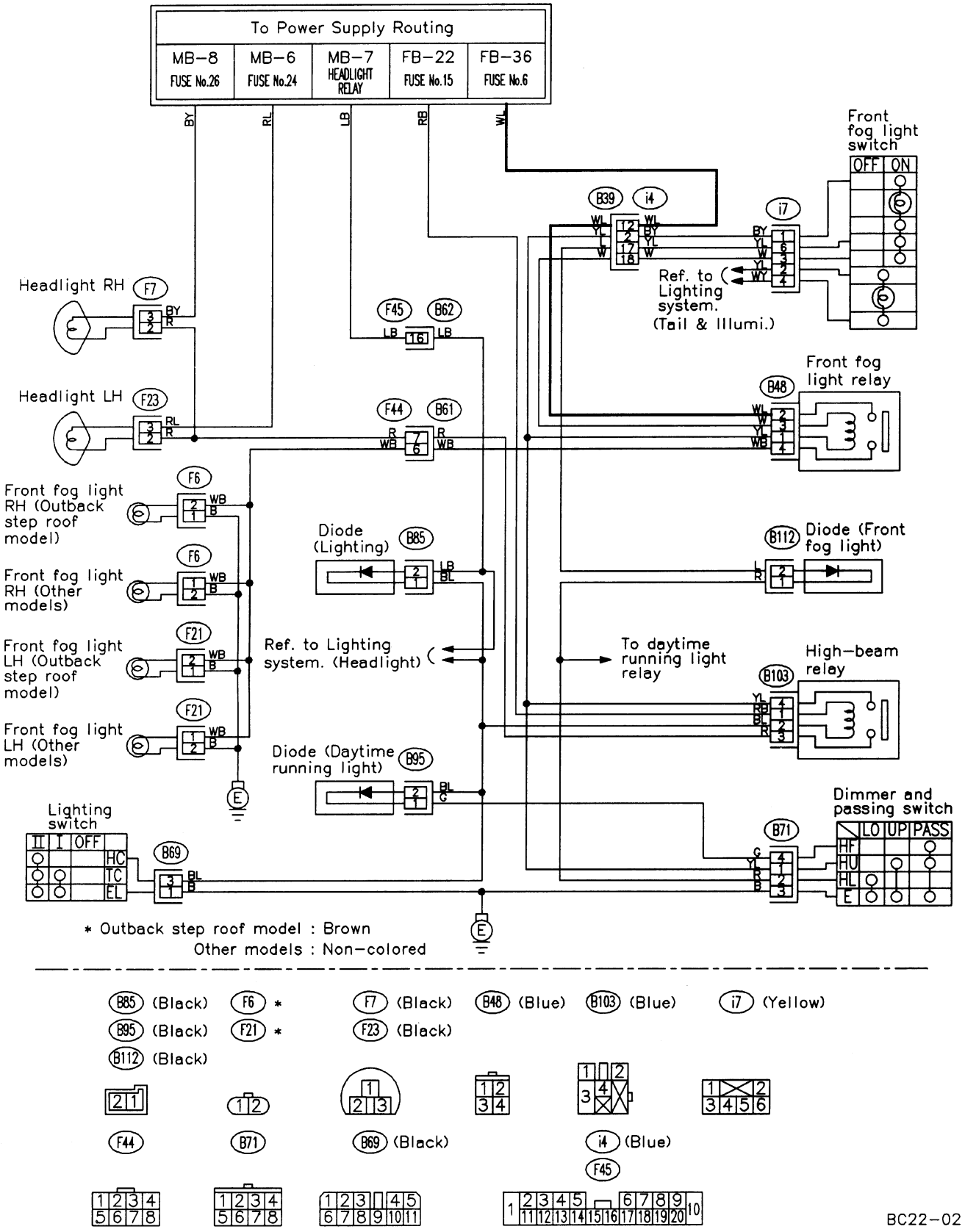
BUR21−02B

R: LIGHTING SYSTEM (FRONT FOG LIGHT)

1. WITHOUT DRL MODEL



2. WITH DRL MODEL

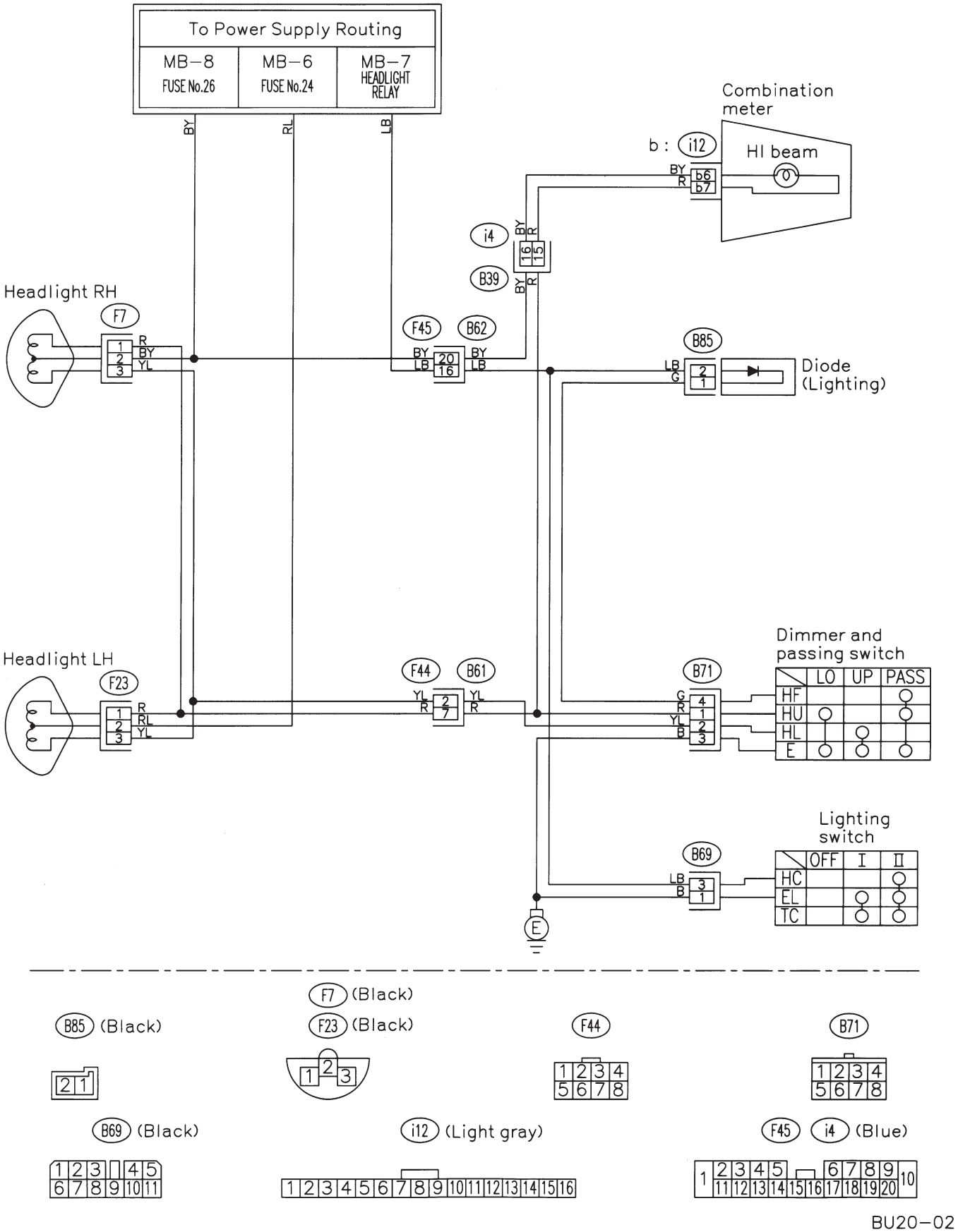


WIRING DIAGRAM

MEMO:

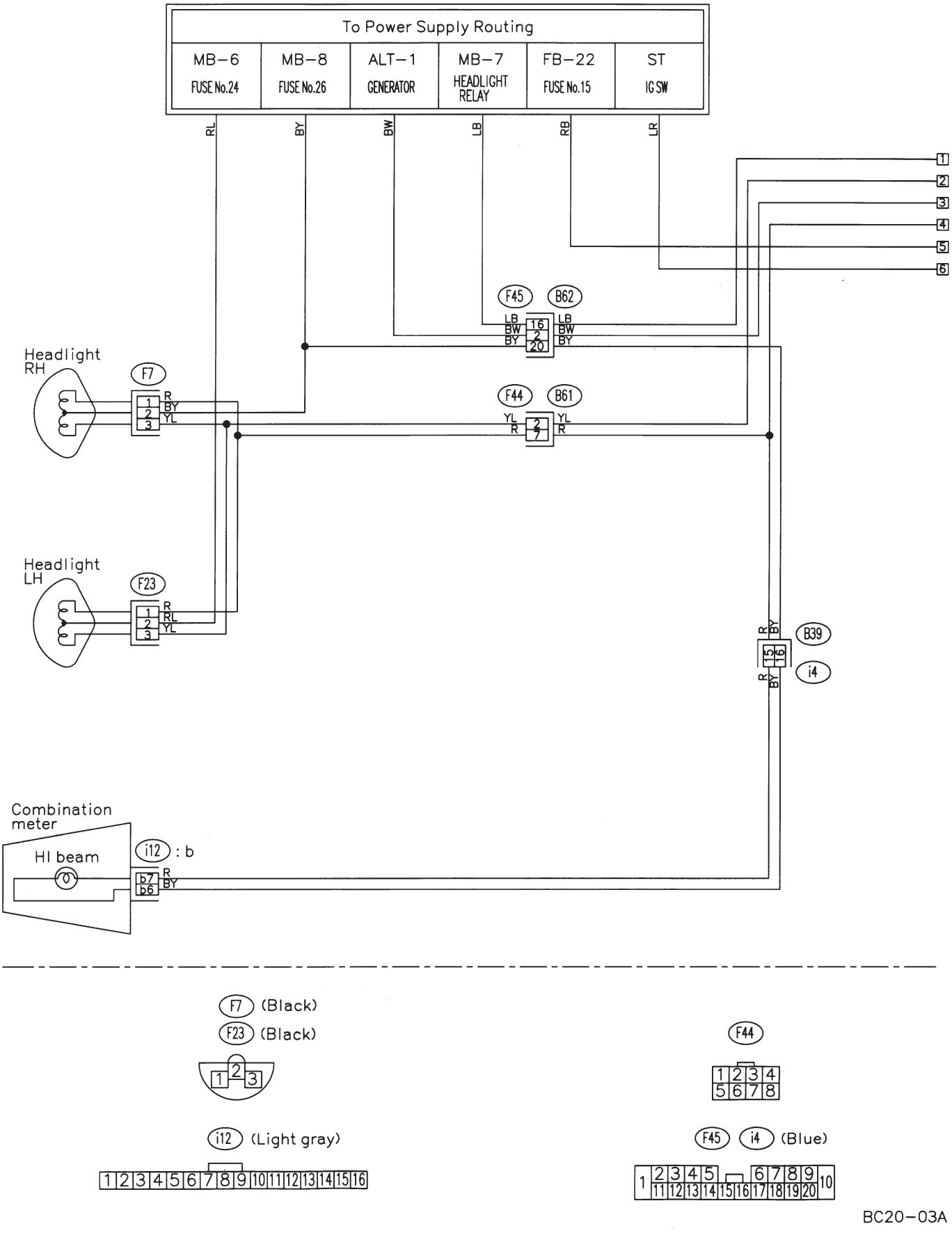
S: LIGHTING SYSTEM (HEADLIGHT)

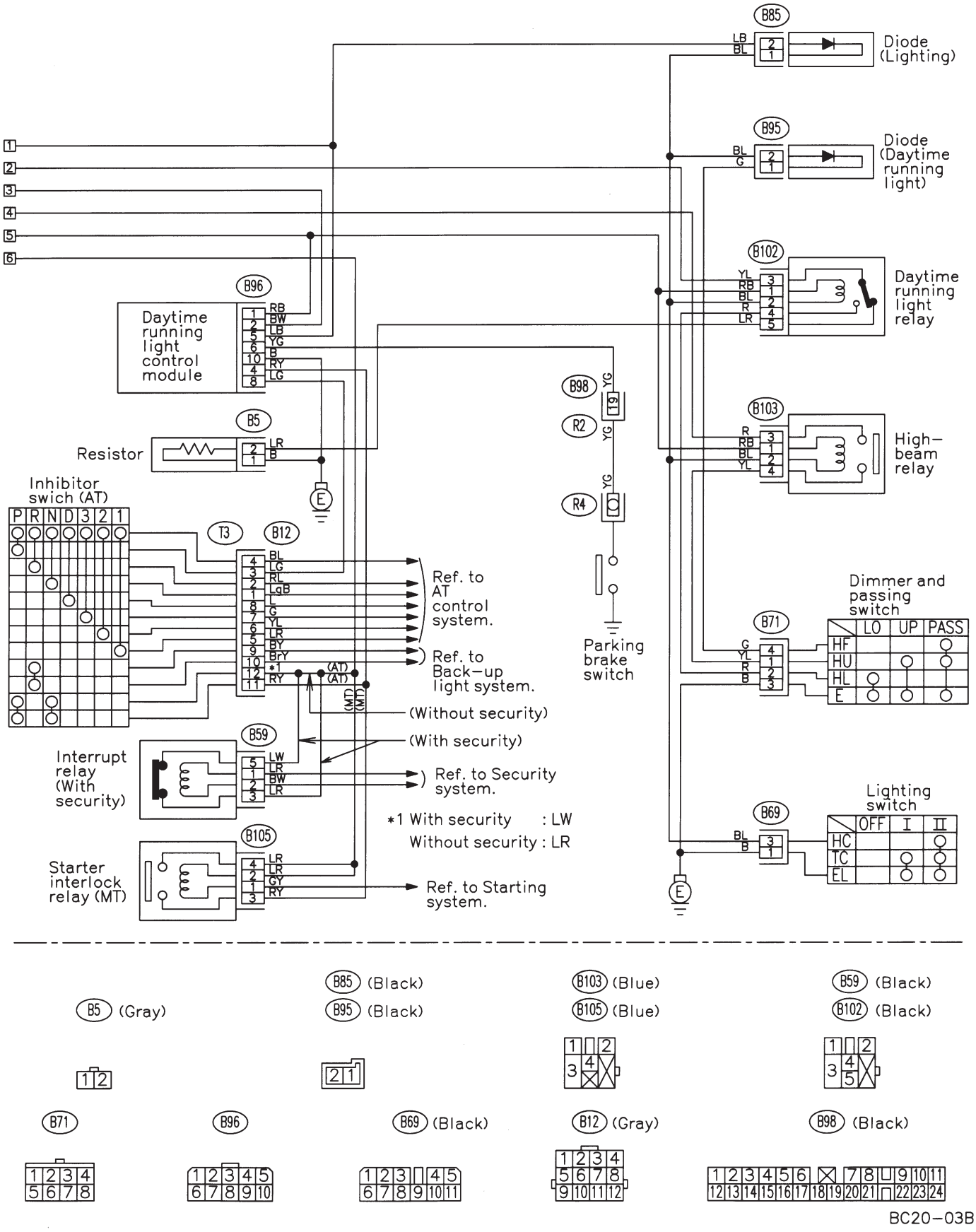
1. WITHOUT DRL (LHD) MODEL



BU20−02

2. WITH DRL (LHD) MODEL

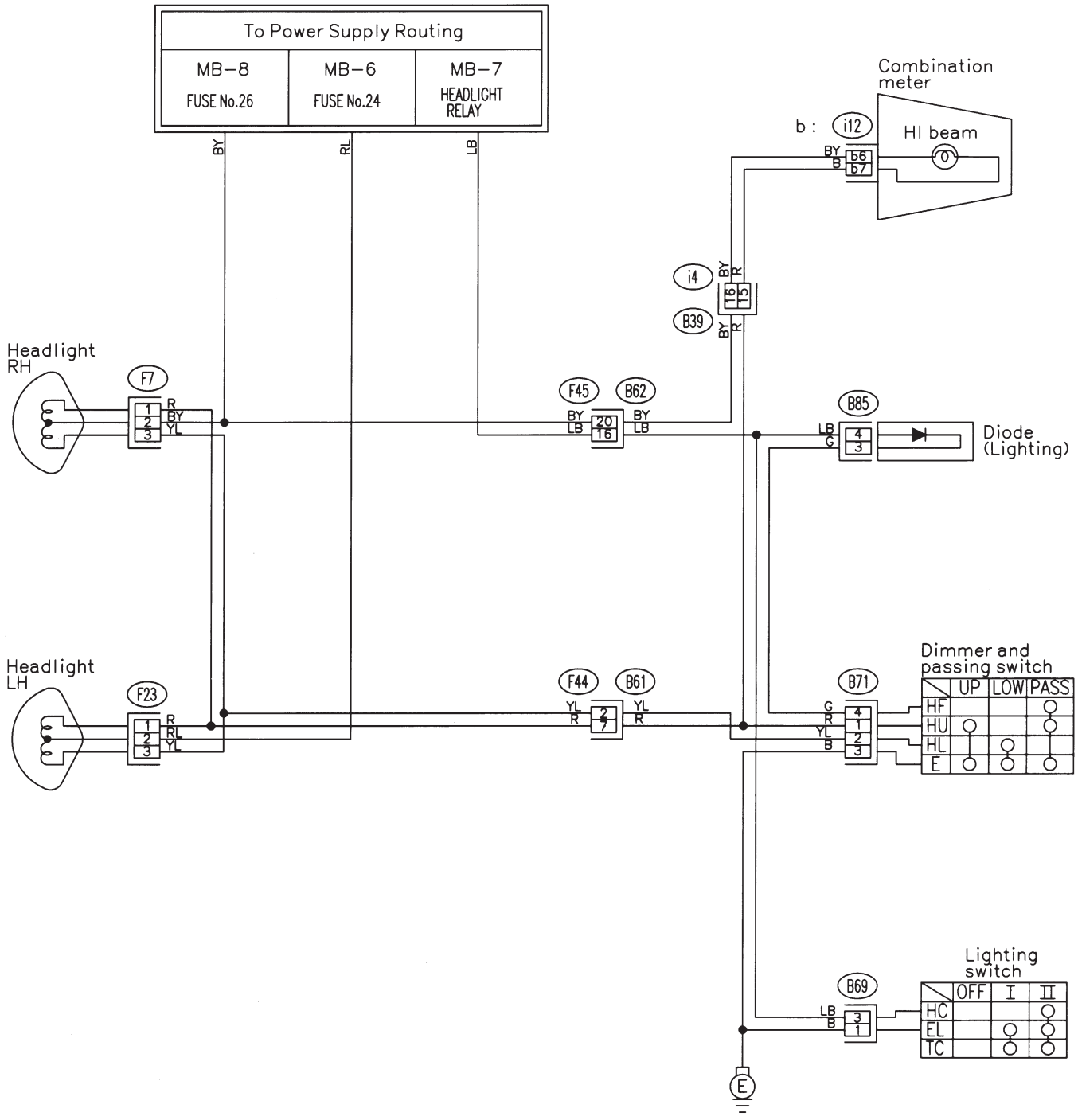


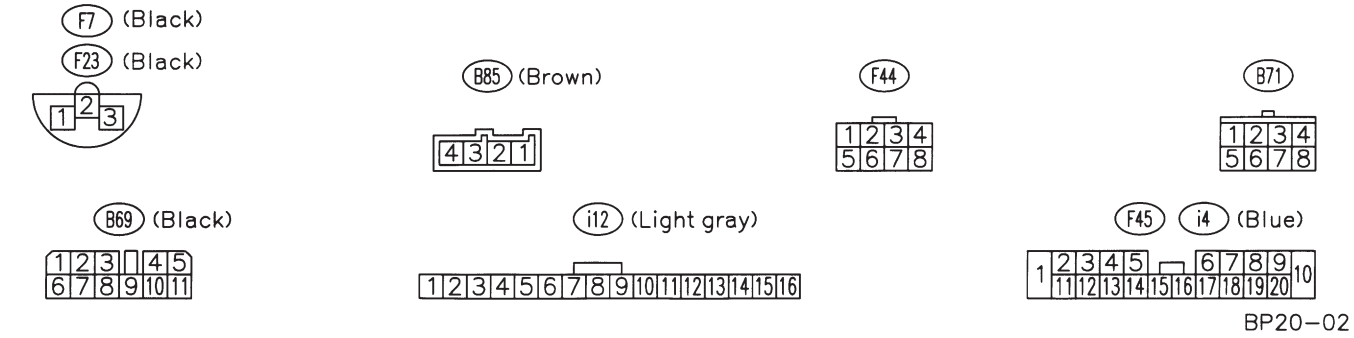

B85
Diode (Lighting)
B95
Diode (Daytime running light)
B102
Daytime running light relay
B103
High–beam relay
B96
Daytime running light control module
B98
R2
R4
Parking brake switch
B5
Resistor
Inhibitor swich (AT)
P R N D 3 2 1
T3
B12
Ref. to AT control system.
Ref. to Back–up light system.
(Without security)
(With security)
B59
Interrupt relay (With security)
Ref. to Security system.
*1 With security : LW
Without security : LR
B105
Starter interlock relay (MT)
Ref. to Starting system.
B71
Dimmer and passing switch
LO UP PASS
HF
HU
HL
E
B69
Lighting switch
OFF I II
HC
TC
EL
B5 (Gray)
B85 (Black)
B95 (Black)
B103 (Blue)
B105 (Blue)
B59 (Black)
B102 (Black)
B71
B96
B69 (Black)
B12 (Gray)
B98 (Black)

BC20–03B

WIRING DIAGRAM

3. RHD MODEL



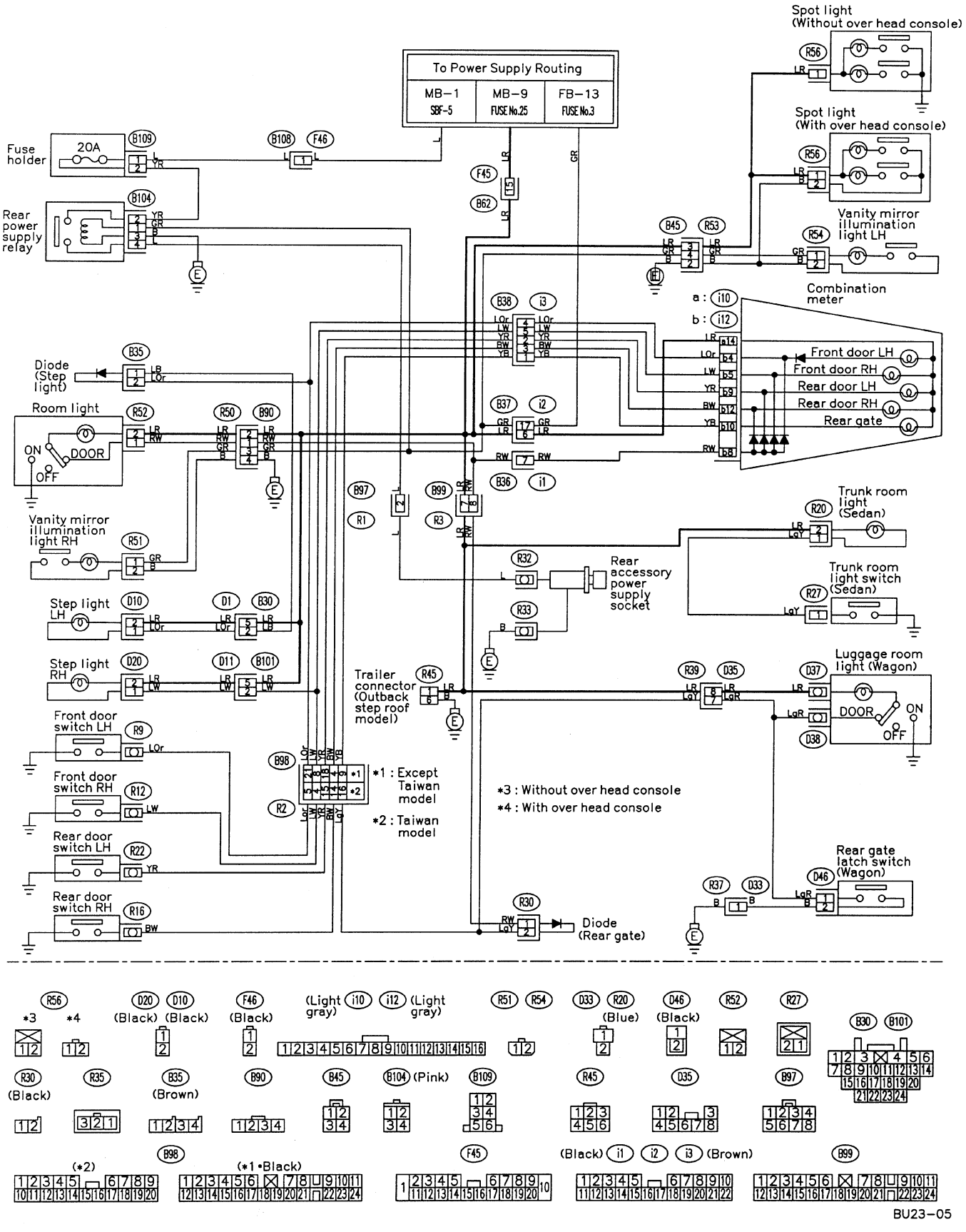


BP20−02

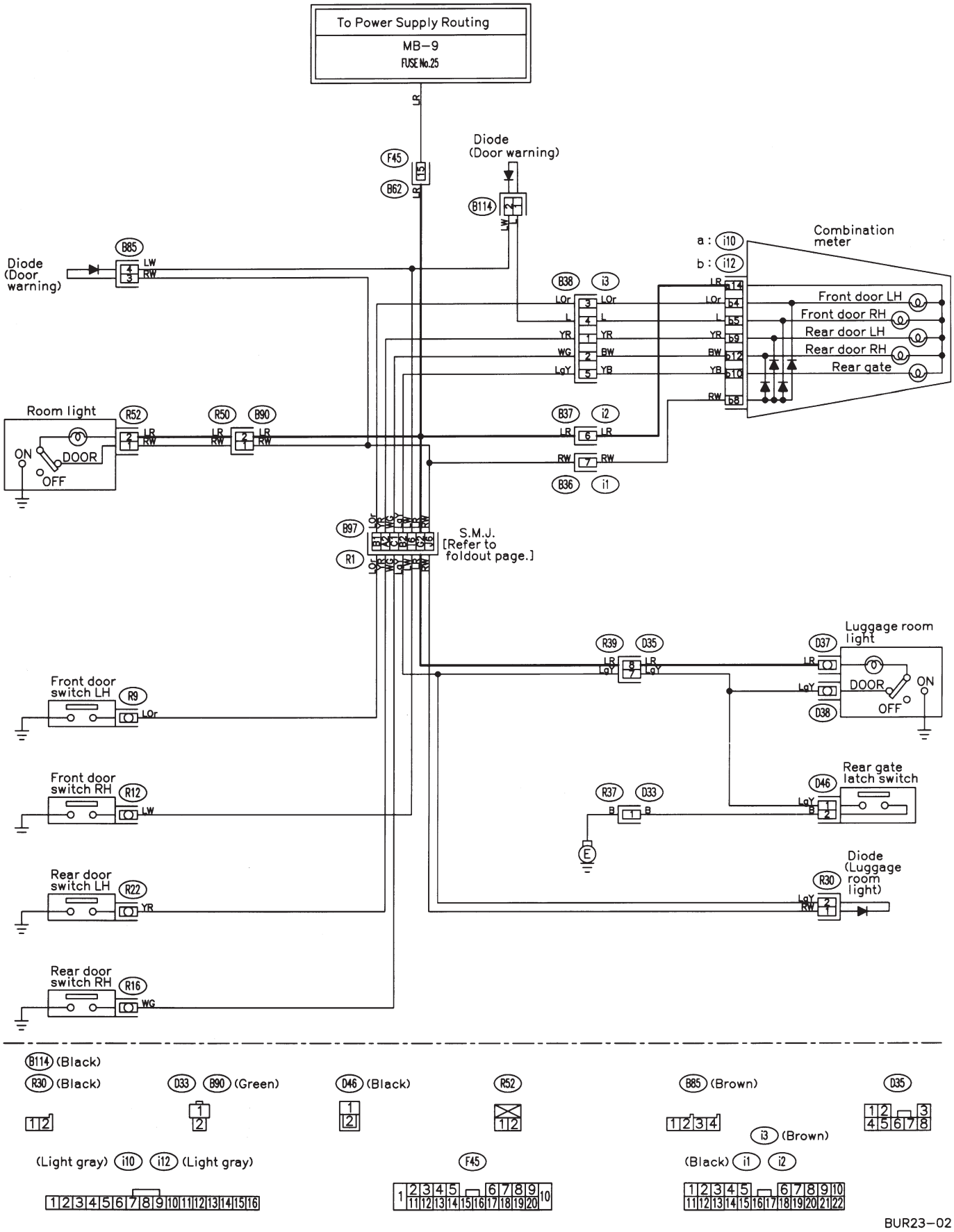
MEMO:

T: LIGHTING SYSTEM (IN COMPARTMENT)

1. LHD MODEL

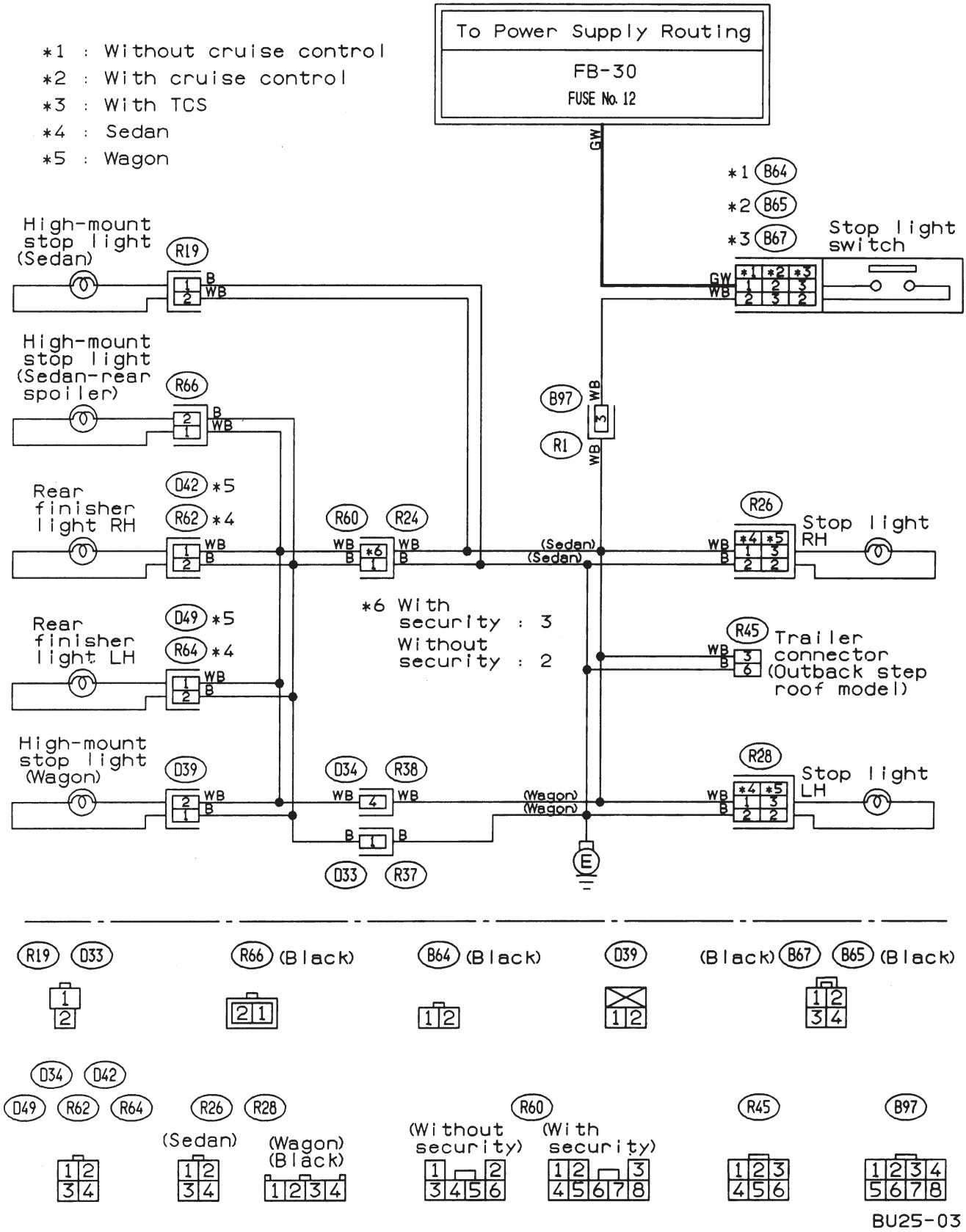


2. RHD MODEL

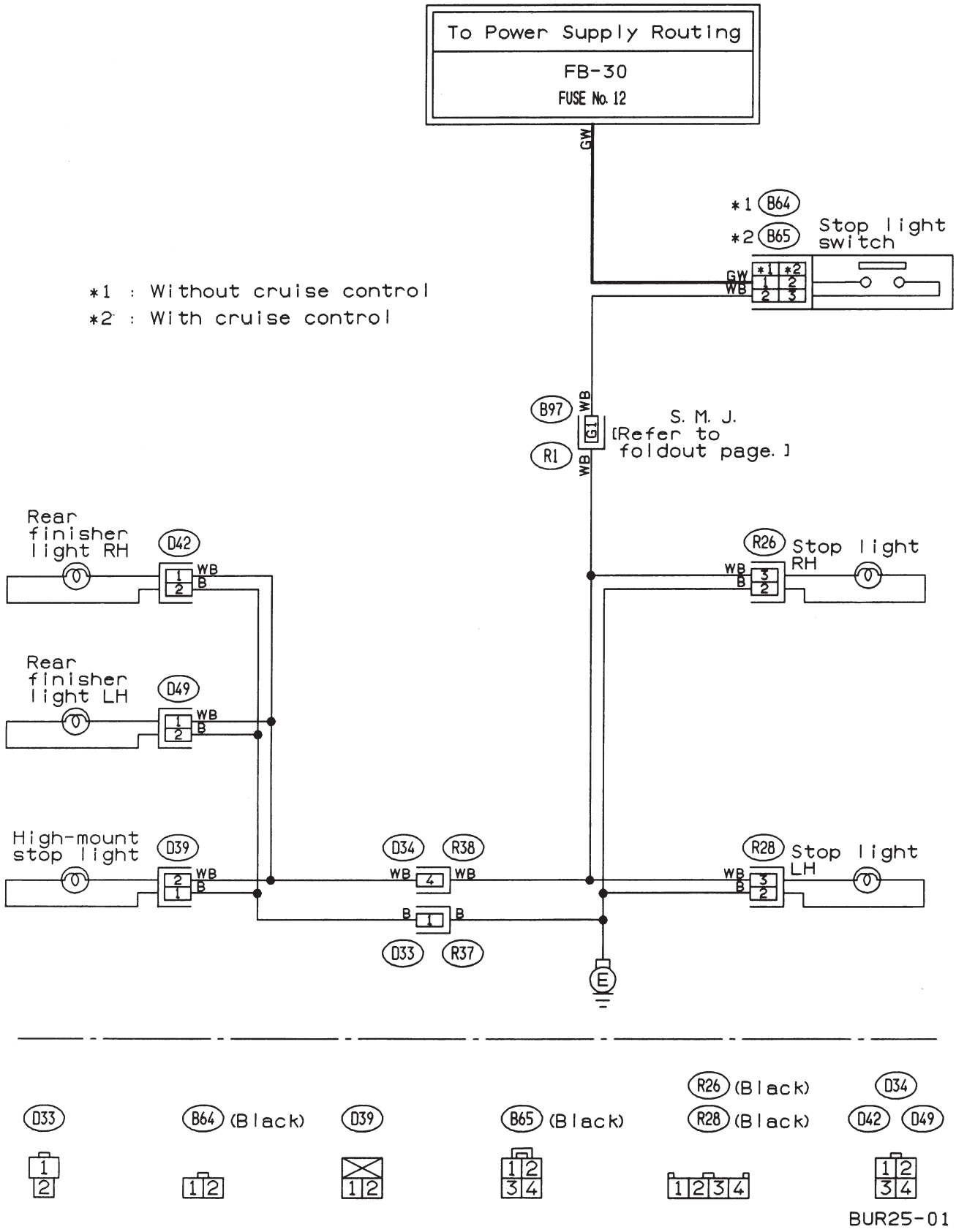

To Power Supply Routing
MB−9
FUSE No.25
Diode
(Door warning)
F45
B62
B114
Diode
(Door warning)
B85
Combination meter
a : i10
b : i12
B38
i3
Front door LH
Front door RH
Rear door LH
Rear door RH
Rear gate
Room light
R52
R50
B90
DOOR
ON
OFF
B37
i2
B36
i1
B97
R1
S.M.J.
[Refer to foldout page.]
Luggage room light
R39
D35
D37
D38
Front door switch LH
R9
Front door switch RH
R12
Rear door switch LH
R22
Rear door switch RH
R16
Rear gate latch switch
D46
R37
D33
Diode (Luggage room light)
R30
B114 (Black)
R30 (Black)
D33 B90 (Green)
D46 (Black)
R52
B85 (Brown)
D35
i3 (Brown)
(Light gray) i10 i12 (Light gray)
F45
(Black) i1 i2
BUR23−02

U: LIGHTING SYSTEM (STOP LIGHT)

1. LHD MODEL

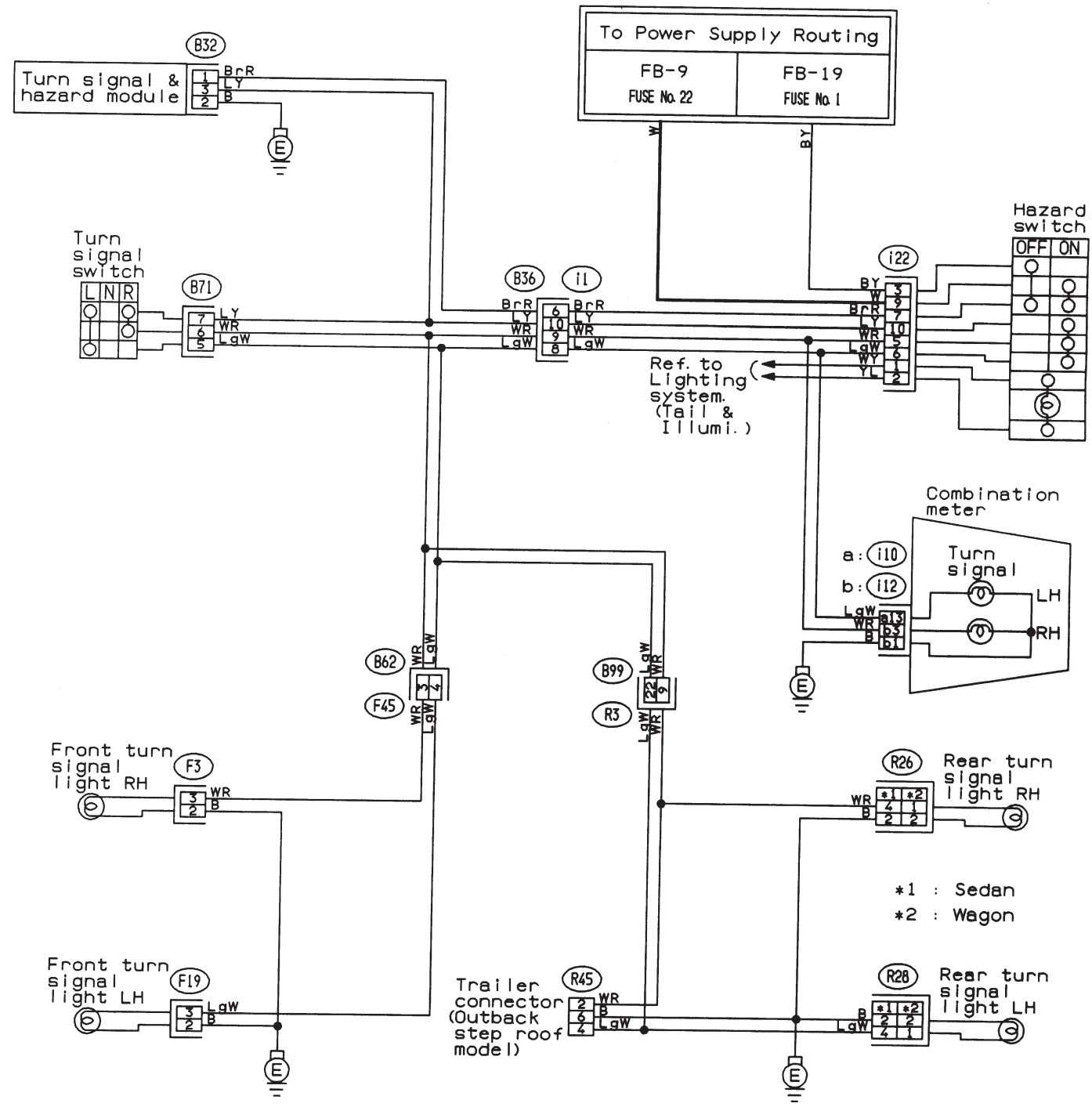


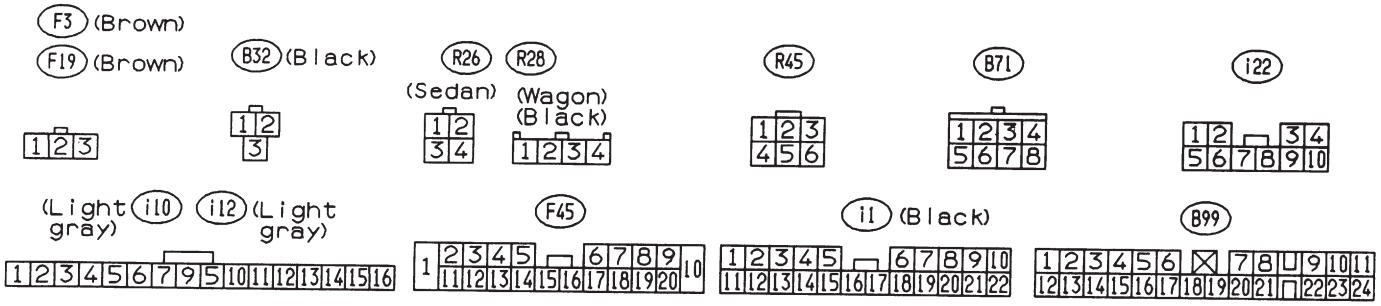
2. RHD MODEL


To Power Supply Routing
FB-30
FUSE No. 12
GW
*1 B64
*2 B65
Stop light switch
GW
WB
*1 : Without cruise control
*2 : With cruise control
B97
WB
G1
S. M. J.
[Refer to foldout page.]
R1
WB
Rear finisher light RH
D42
WB
B
R26
Stop light RH
WB
B
Rear finisher light LH
D49
WB
B
High-mount stop light
D39
WB
B
D34
R38
WB
WB
B
B
D33
R37
R28
Stop light LH
WB
B
E
D33
B64 (Black)
D39
B65 (Black)
R26 (Black)
R28 (Black)
D34
D42
D49
BUR25-01

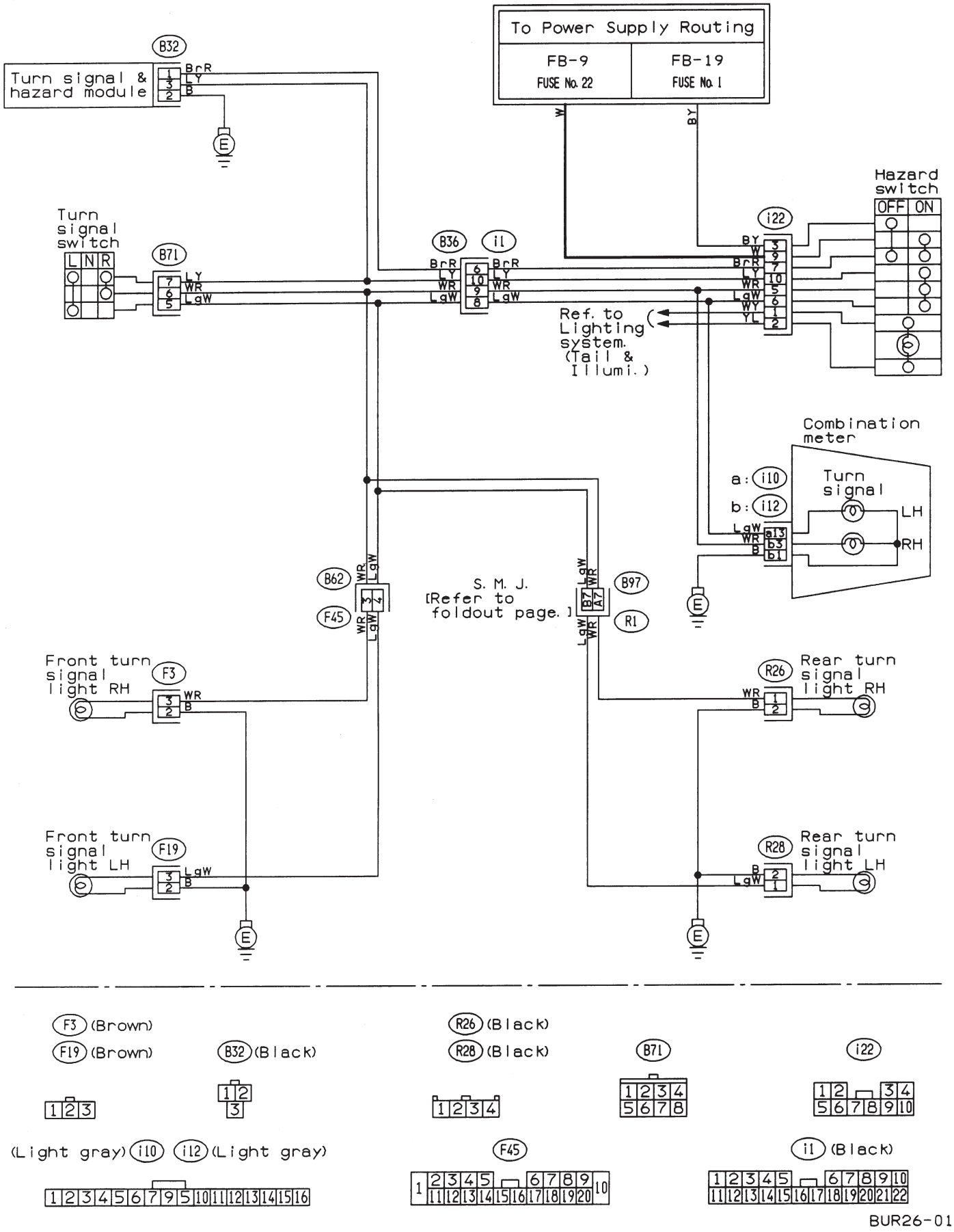
V: LIGHTING SYSTEM (TURN SIGNAL LIGHT AND HAZARD LIGHT)

1. LHD MODEL



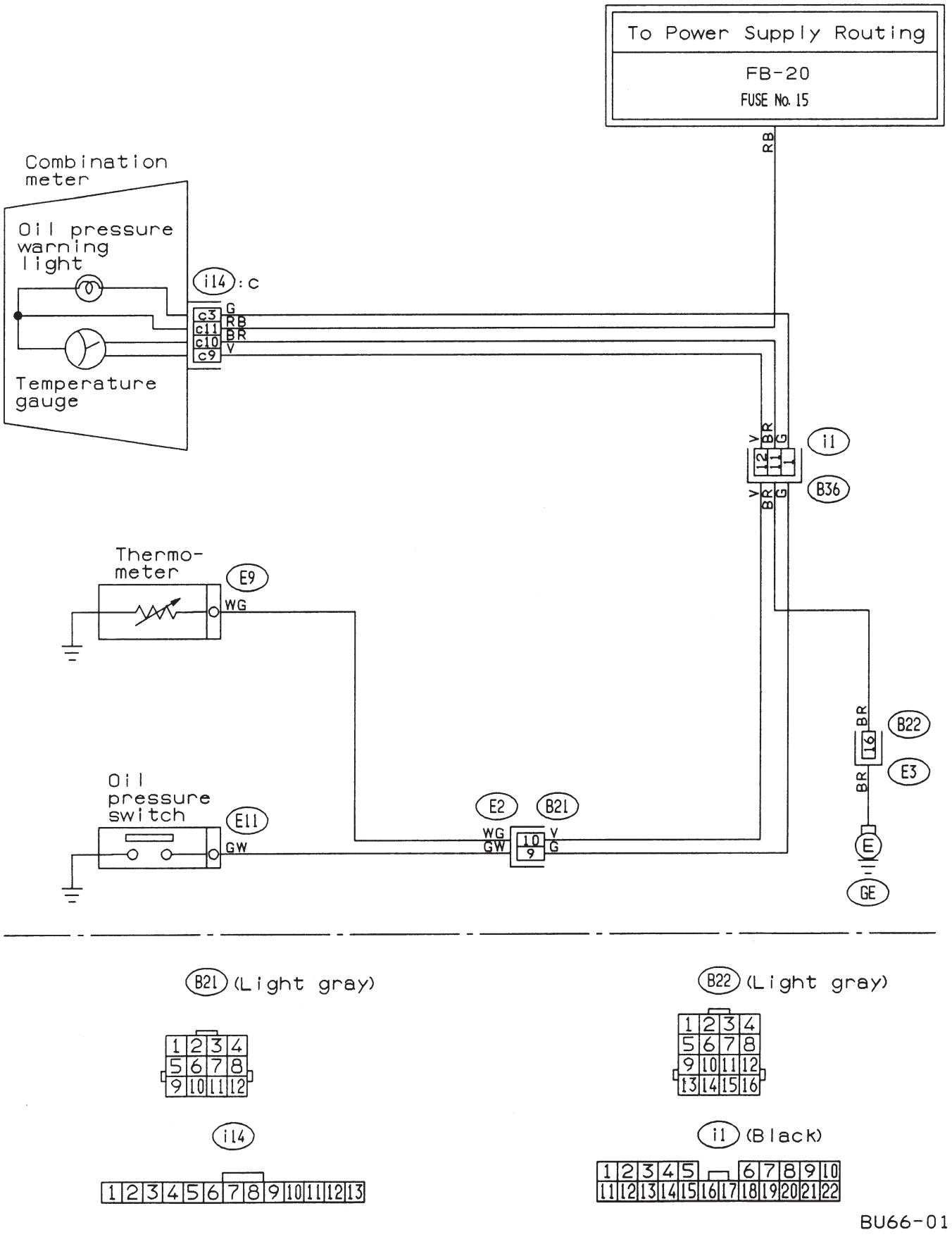


2. RHD MODEL



BUR26-01

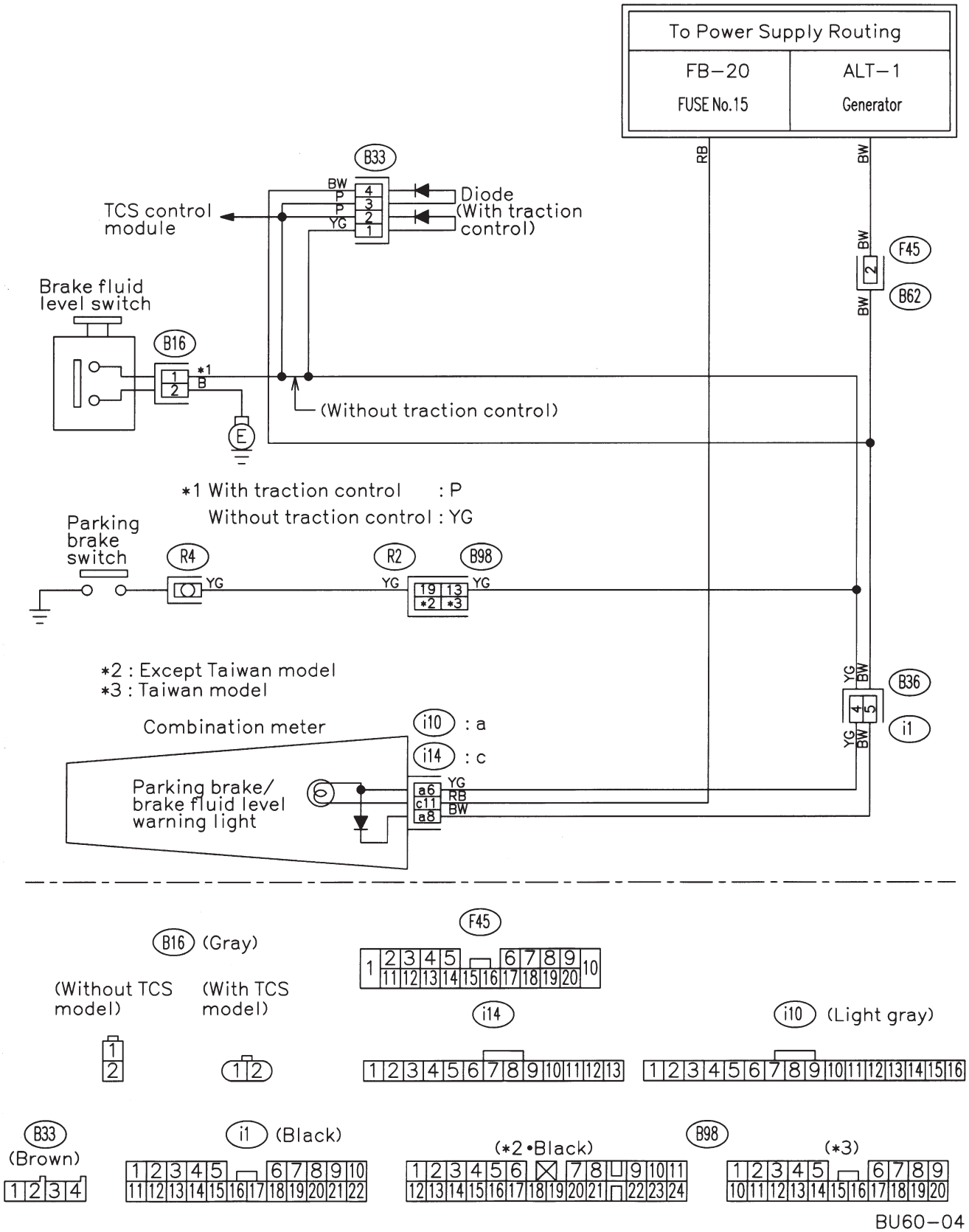
W: OIL PRESSURE AND TEMPERATURE GAUGE SYSTEM



MEMO:

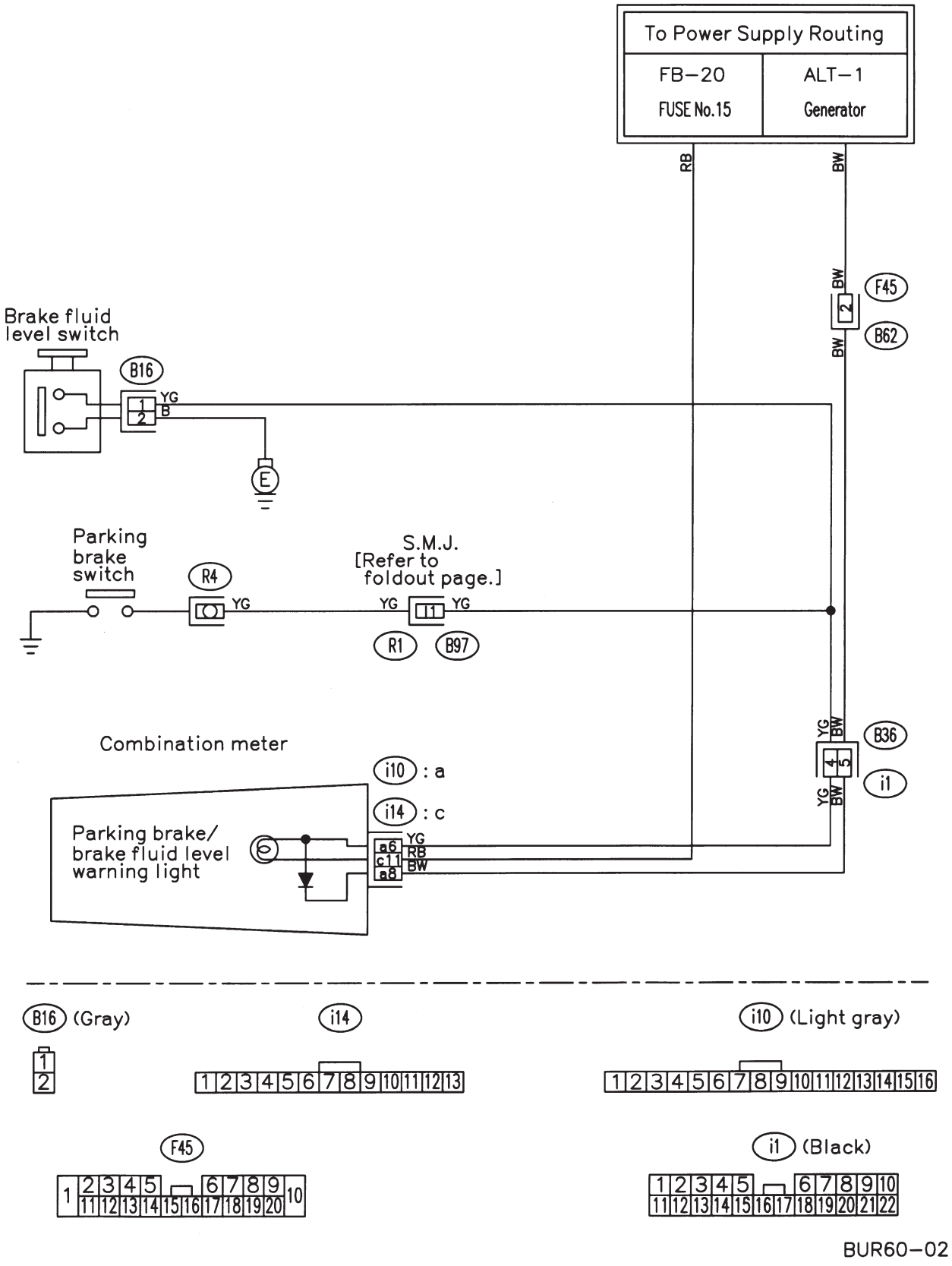
X: PARKING BRAKE AND BRAKE FLUID LEVEL WARNING SYSTEM

1. LHD MODEL



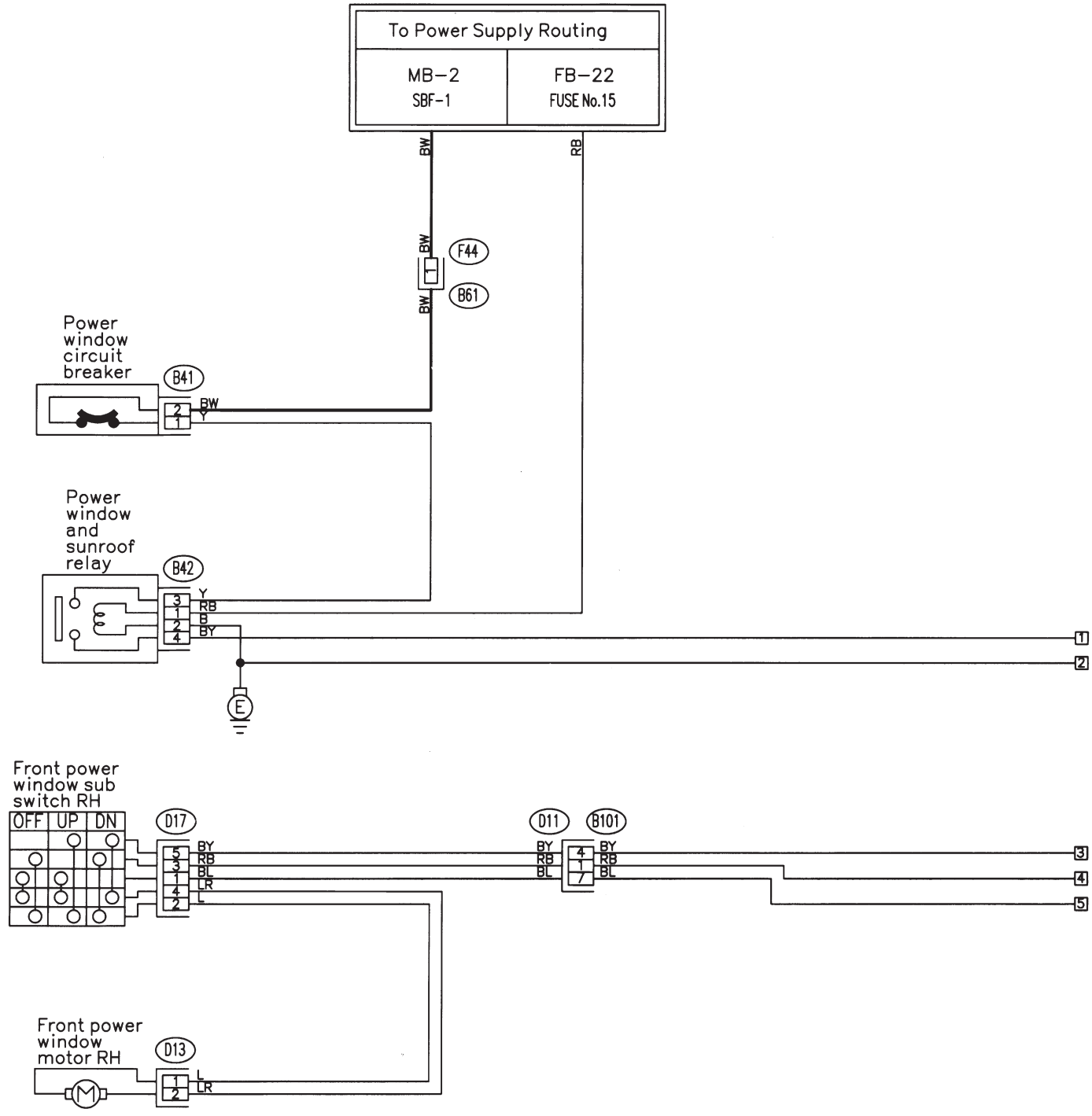
BU60−04

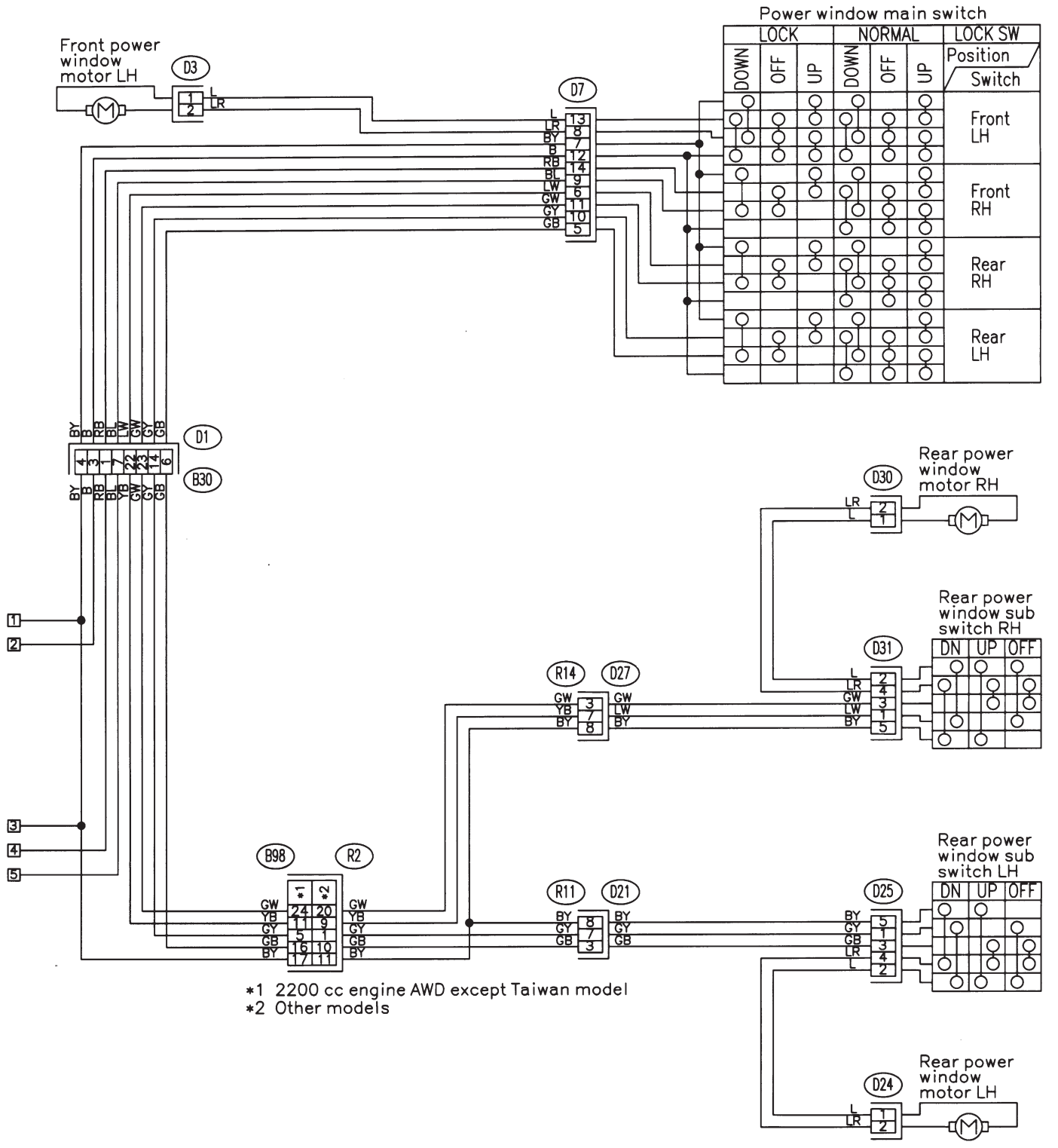
2. RHD MODEL

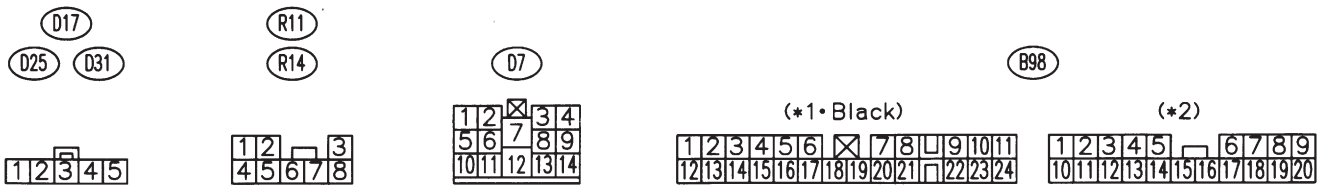

To Power Supply Routing
FB−20
FUSE No.15
ALT−1
Generator
RB
BW
F45
B62
Brake fluid level switch
B16
YG
B
E
Parking brake switch
R4
S.M.J.
[Refer to foldout page.]
R1
B97
Combination meter
i10 : a
i14 : c
Parking brake/ brake fluid level warning light
B36
i1
B16 (Gray)
i14
i10 (Light gray)
F45
i1 (Black)
BUR60−02

Y: POWER WINDOW SYSTEM

1. LHD MODEL

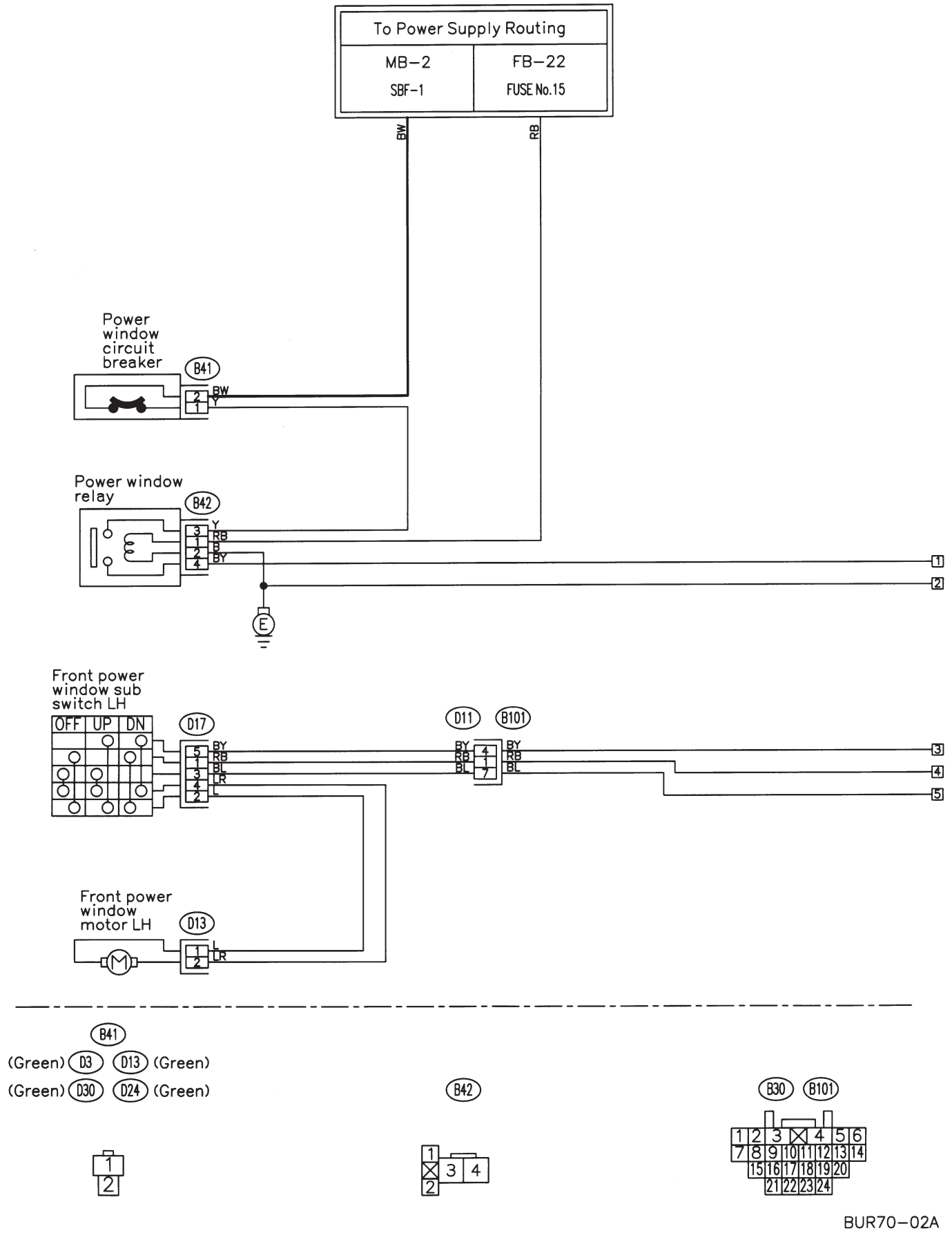



Power window main switch
LOCK
NORMAL
LOCK SW
Position
Switch
DOWN
OFF
UP
Front LH
Front RH
Rear RH
Rear LH
Front power window motor LH
D3
D7
D1
B30
Rear power window motor RH
D30
Rear power window sub switch RH
D31
DN
UP
OFF
R14
D27
B98
R2
R11
D21
Rear power window sub switch LH
D25
Rear power window motor LH
D24
*1 2200 cc engine AWD except Taiwan model
*2 Other models

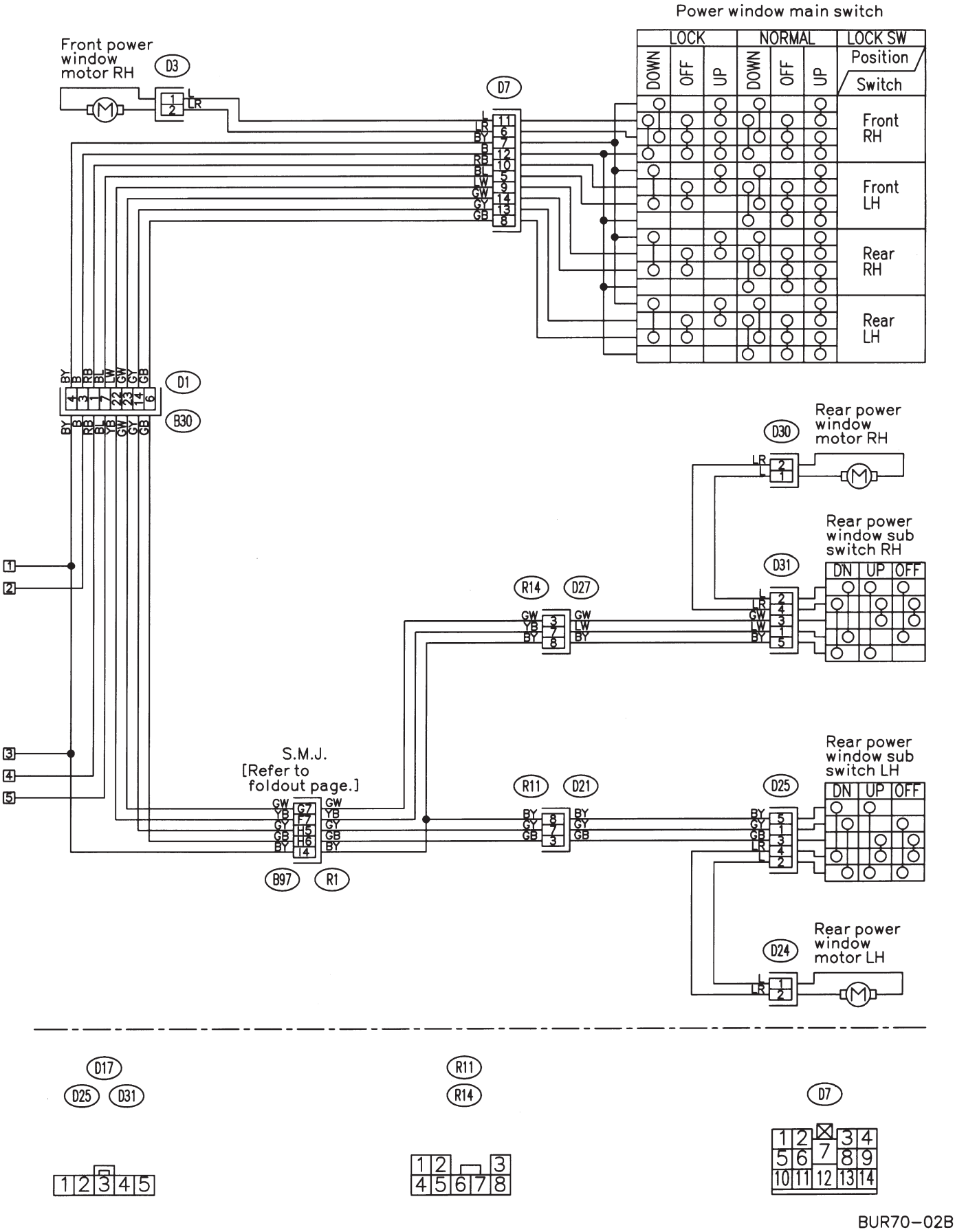

D17
D25
D31
R11
R14
D7
B98
(*1 • Black)
(*2)

BU70–03B

2. RHD MODEL

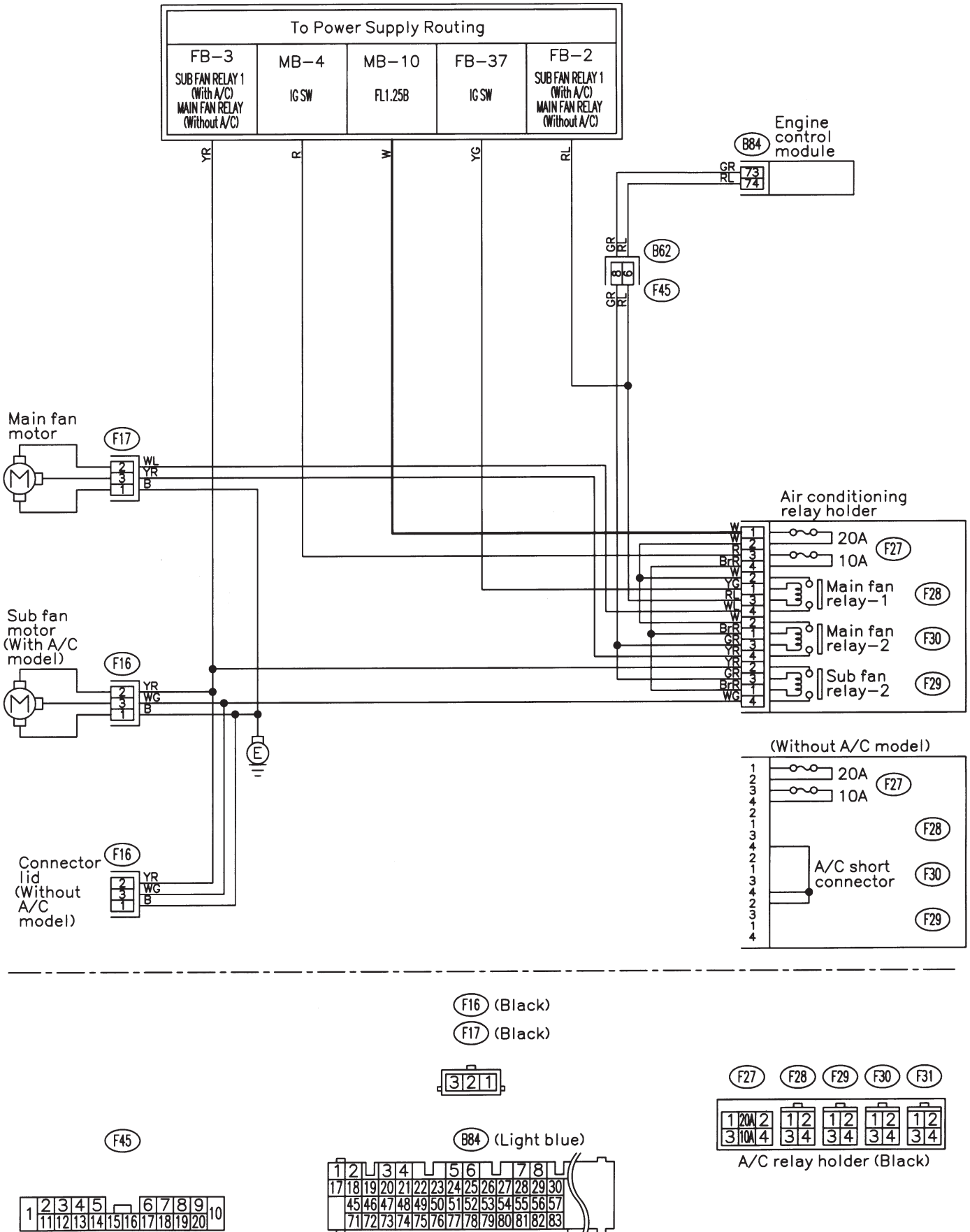


BUR70−02A


Power window main switch
LOCK
NORMAL
LOCK SW
DOWN
OFF
UP
DOWN
OFF
UP
Position
Switch
Front RH
Front LH
Rear RH
Rear LH
Front power window motor RH
D3
D7
D1
B30
Rear power window motor RH
D30
Rear power window sub switch RH
D31
DN
UP
OFF
R14
D27
S.M.J.
[Refer to foldout page.]
B97
R1
R11
D21
Rear power window sub switch LH
D25
Rear power window motor LH
D24
D17
D25
D31
R11
R14
D7
BUR70-02B

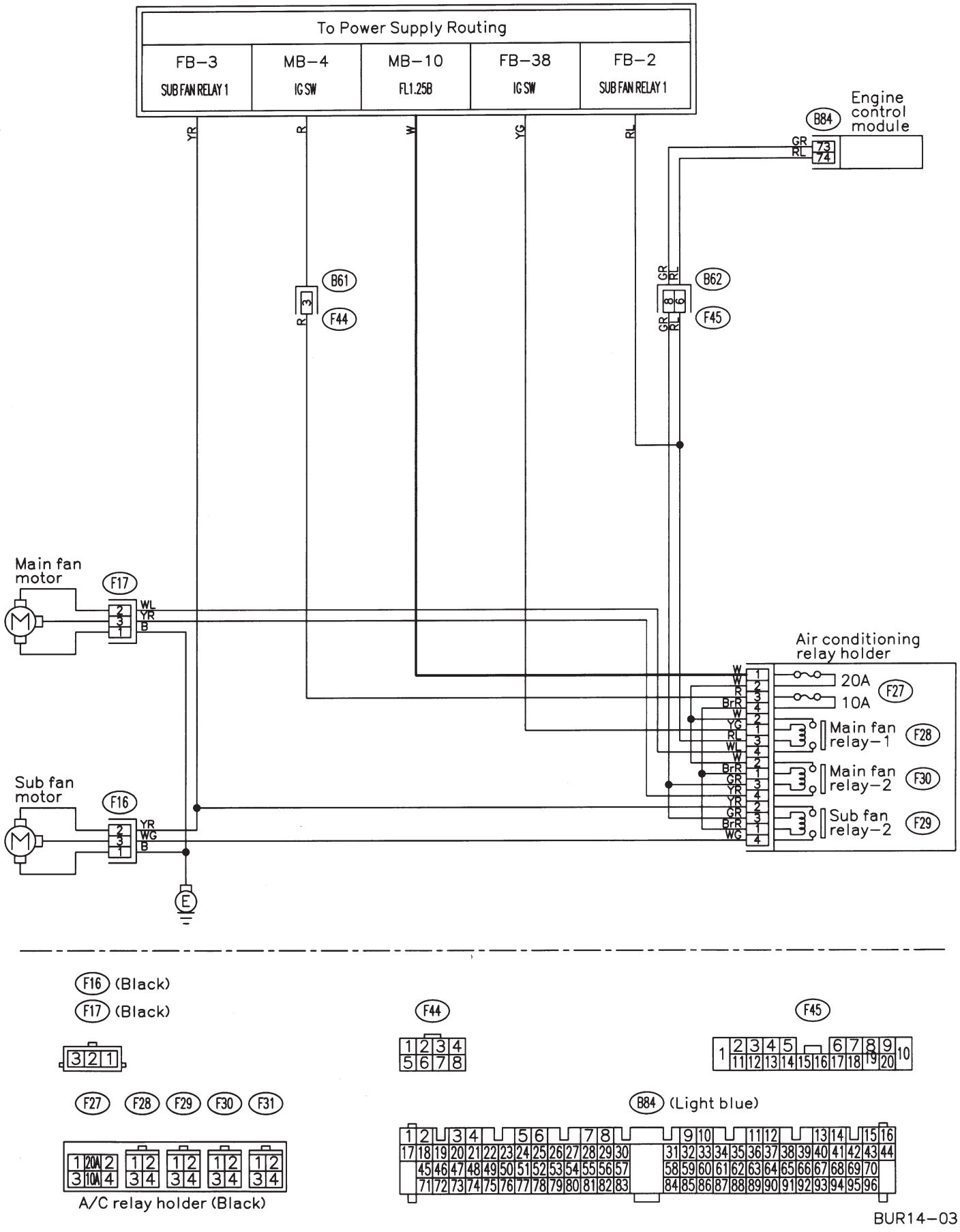
Z: RADIATOR FAN SYSTEM

1. LHD MODEL



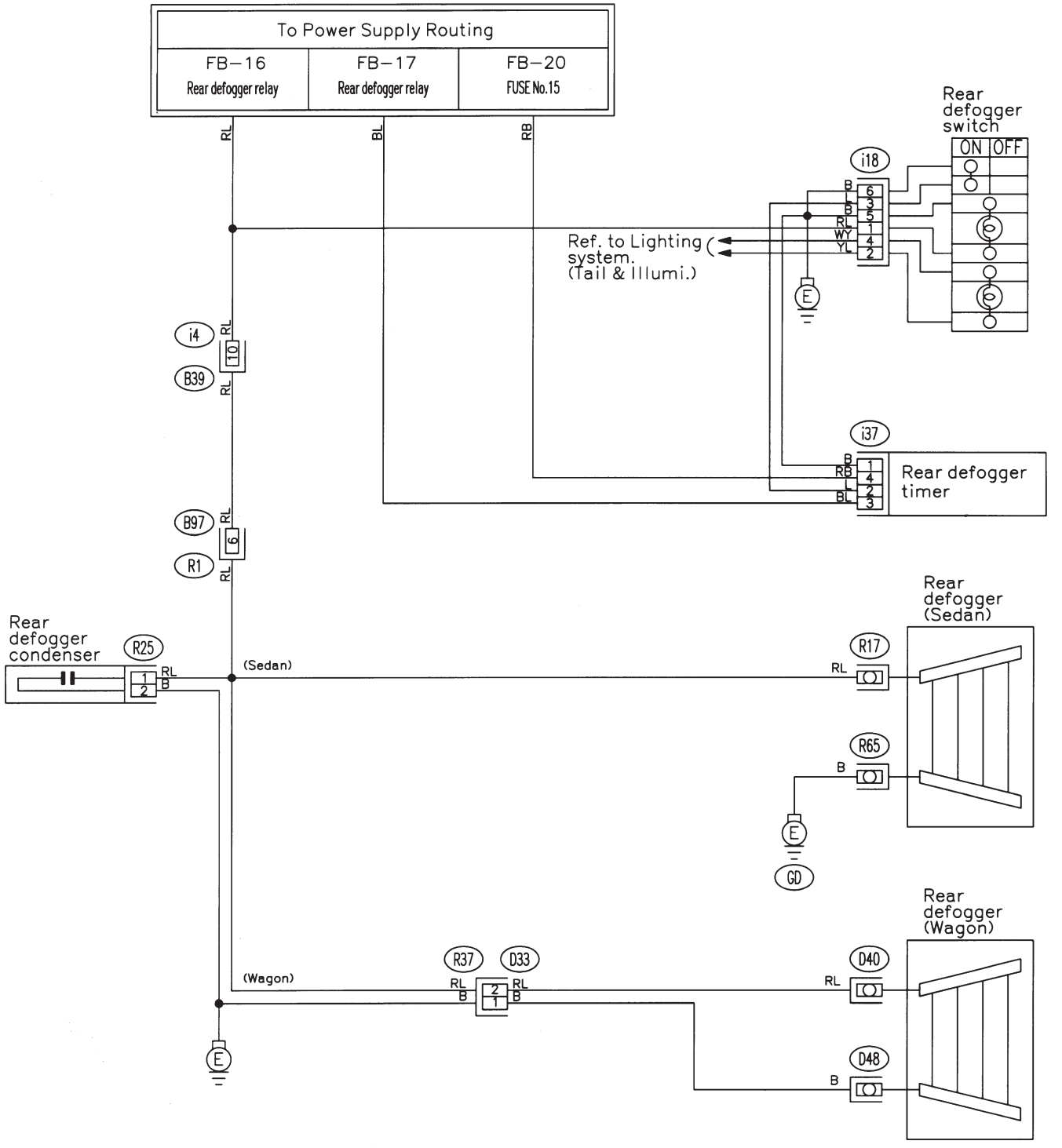
BU14–04

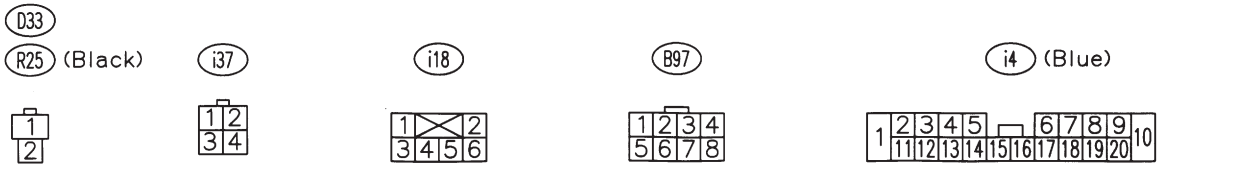
2. RHD MODEL


To Power Supply Routing
FB–3
SUB FAN RELAY 1
MB–4
IG SW
MB–10
FL1.25B
FB–38
IG SW
FB–2
SUB FAN RELAY 1
Engine control module
B84
GR
RL
73
74
YR
R
W
YG
RL
B61
F44
B62
F45
Main fan motor
F17
WL
YR
B
Sub fan motor
F16
YR
WG
B
E
Air conditioning relay holder
20A
10A
F27
Main fan relay–1
F28
Main fan relay–2
F30
Sub fan relay–2
F29
F16 (Black)
F17 (Black)
F44
F45
F27
F28
F29
F30
F31
A/C relay holder (Black)
B84 (Light blue)
BUR14–03

AA: REAR WINDOW DEFOGGER SYSTEM

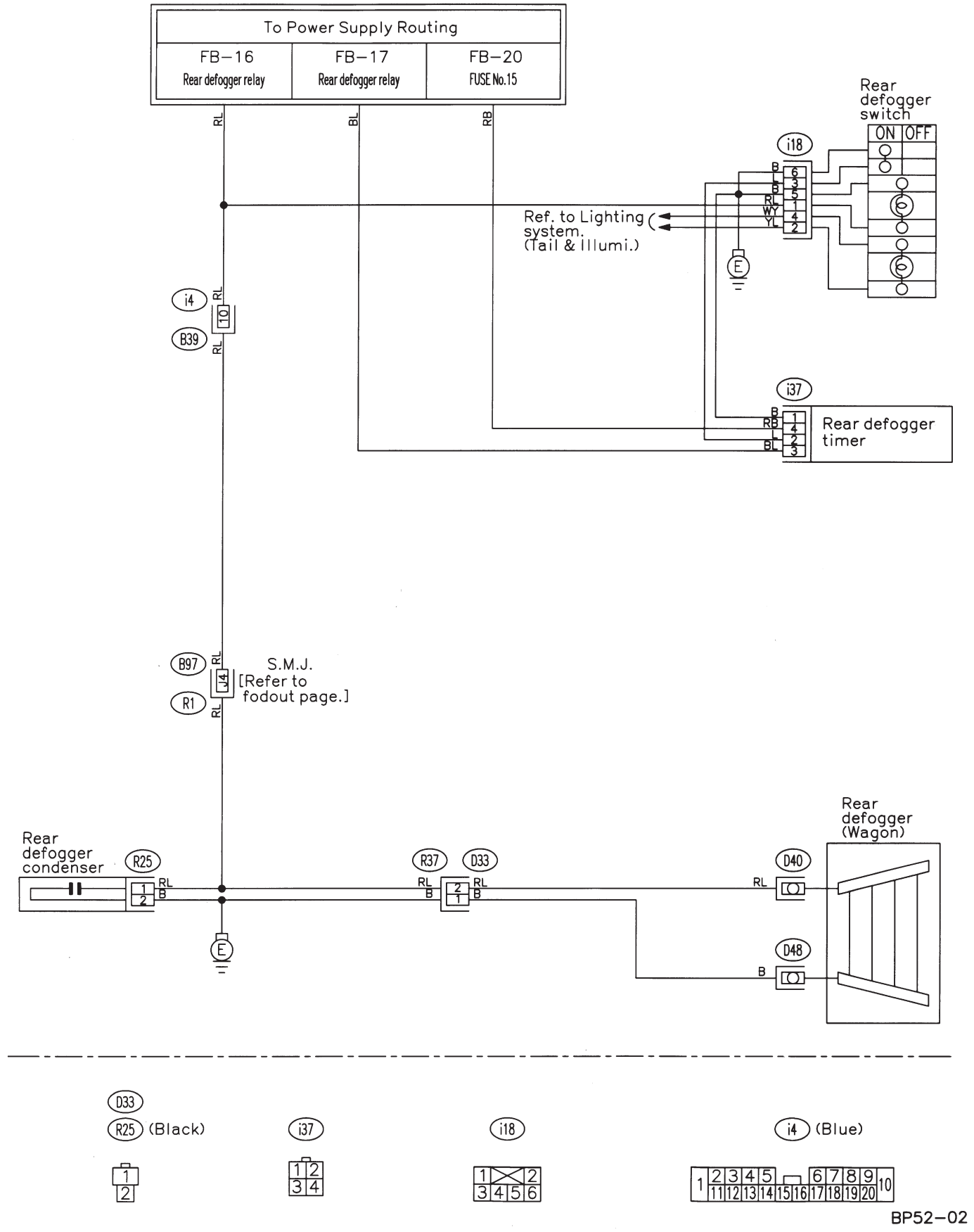
1. LHD MODEL





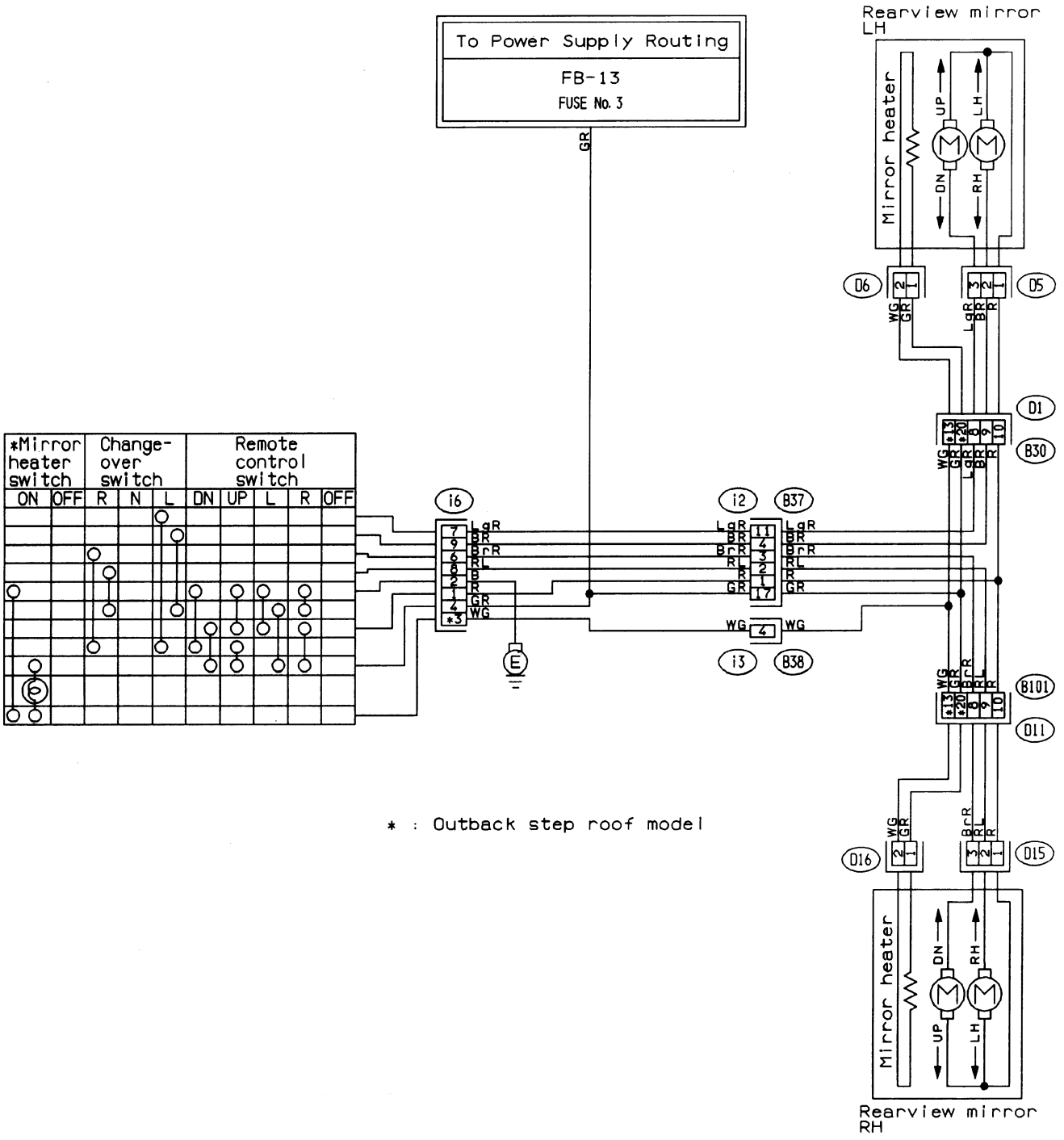
BU52−03

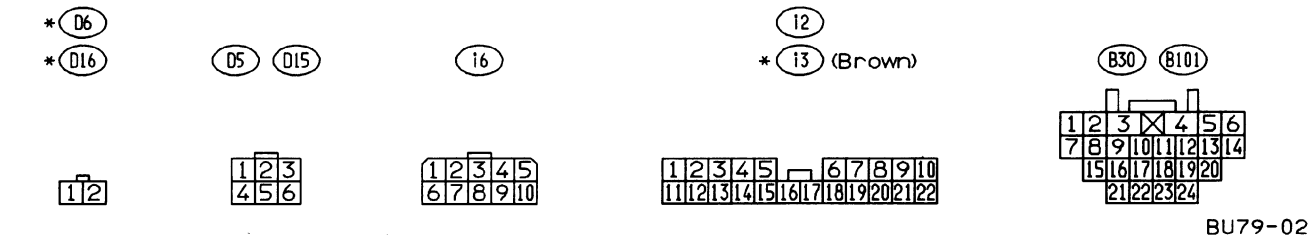
2. RHD MODEL


To Power Supply Routing
FB−16
Rear defogger relay
FB−17
Rear defogger relay
FB−20
FUSE No.15
Rear defogger switch
ON
OFF
i18
Ref. to Lighting system. (Tail & Illumi.)
i4
B39
i37
Rear defogger timer
B97
J4
S.M.J.
[Refer to fodout page.]
R1
Rear defogger condenser
R25
R37
D33
D40
D48
Rear defogger (Wagon)
D33
R25 (Black)
i37
i18
i4 (Blue)
BP52−02

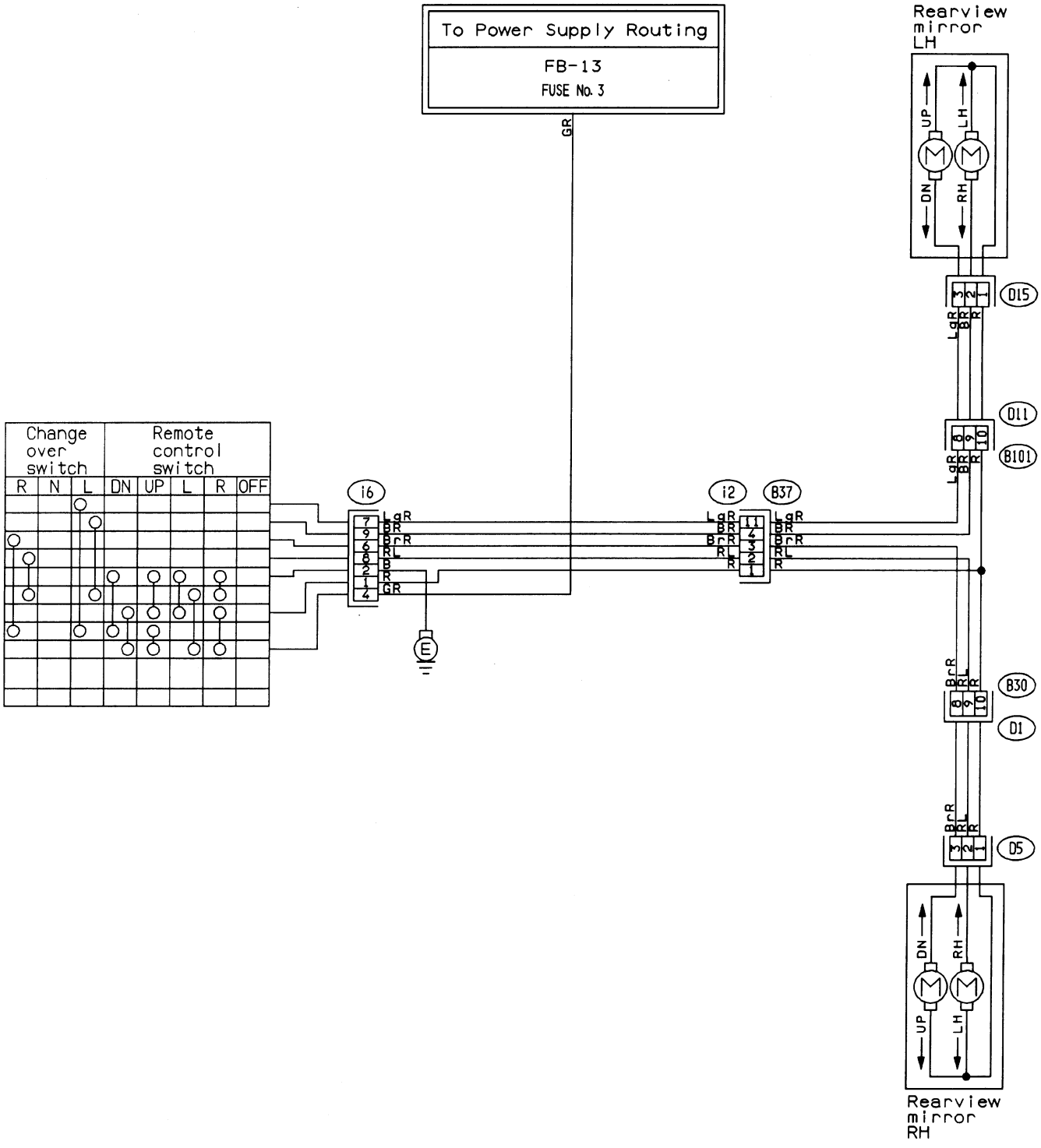
AB: REMOTE CONTROLLED REARVIEW MIRROR SYSTEM

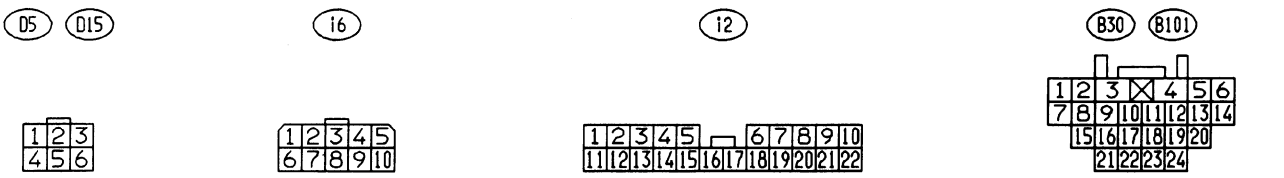
1. LHD MODEL





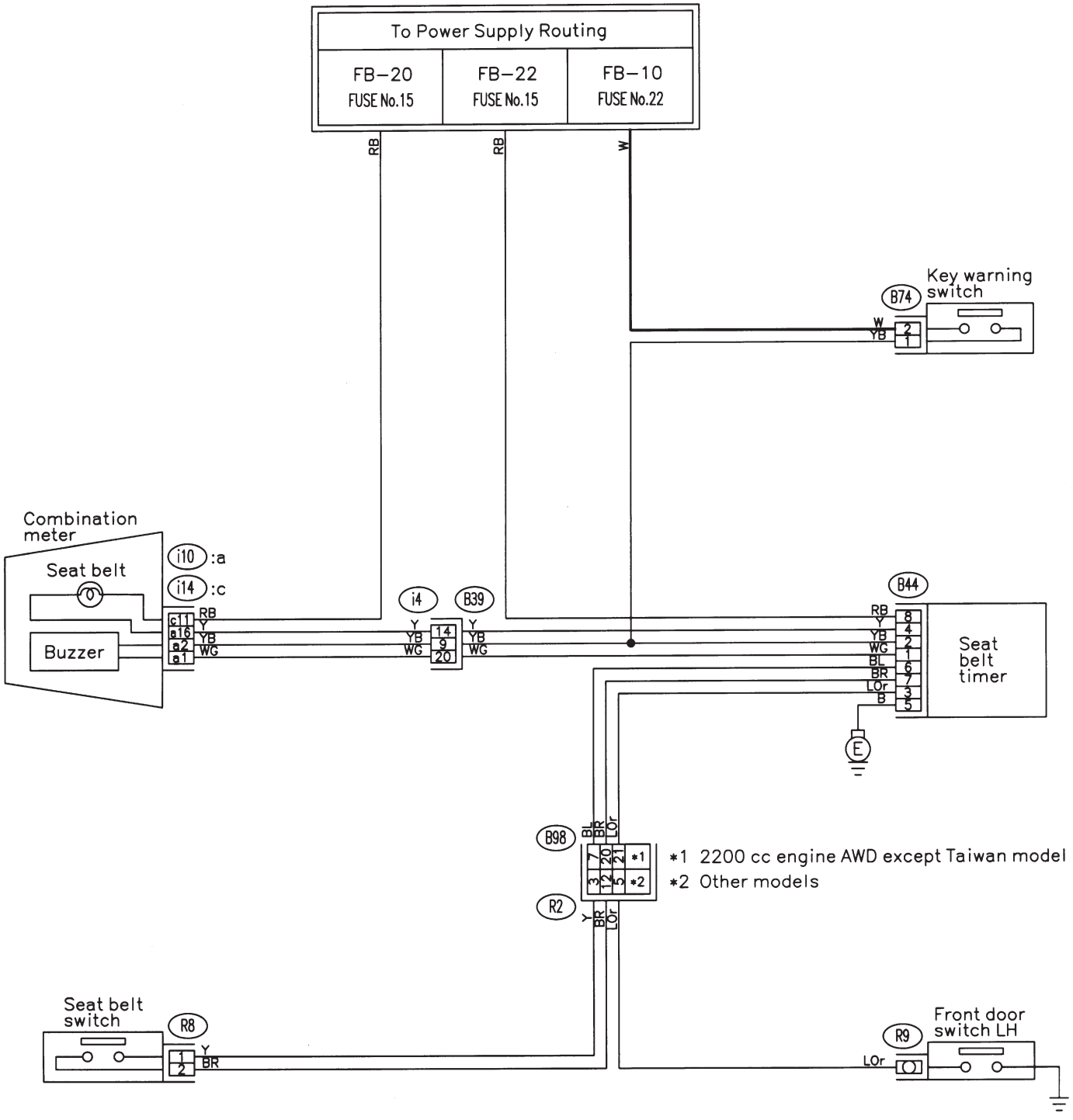
2. RHD MODEL

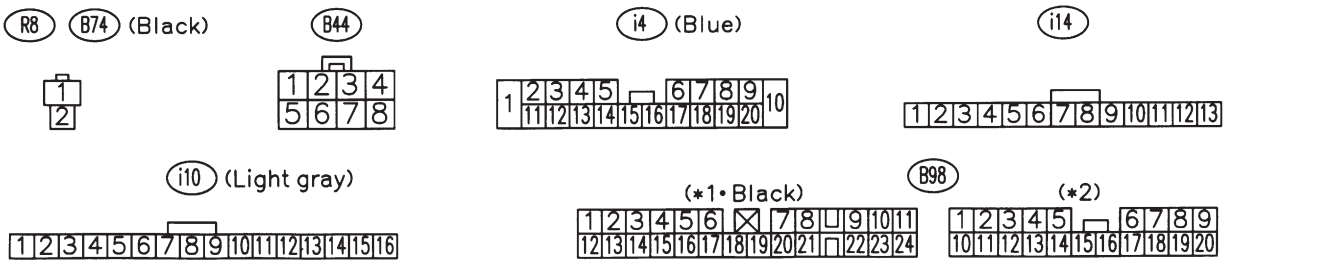

To Power Supply Routing
FB-13
FUSE No. 3
GR
Rearview mirror LH
UP
LH
DN
RH
D15
D11
B101
B30
D1
D5
Rearview mirror RH
Change over switch
Remote control switch
R
N
L
DN
UP
L
R
OFF
i6
i2
B37
E
LgR
BR
BrR
RL
R
GR


D5
D15
i6
i2
B30
B101

AC: SEAT BELT WARNING AND KEY WARNING SYSTEM

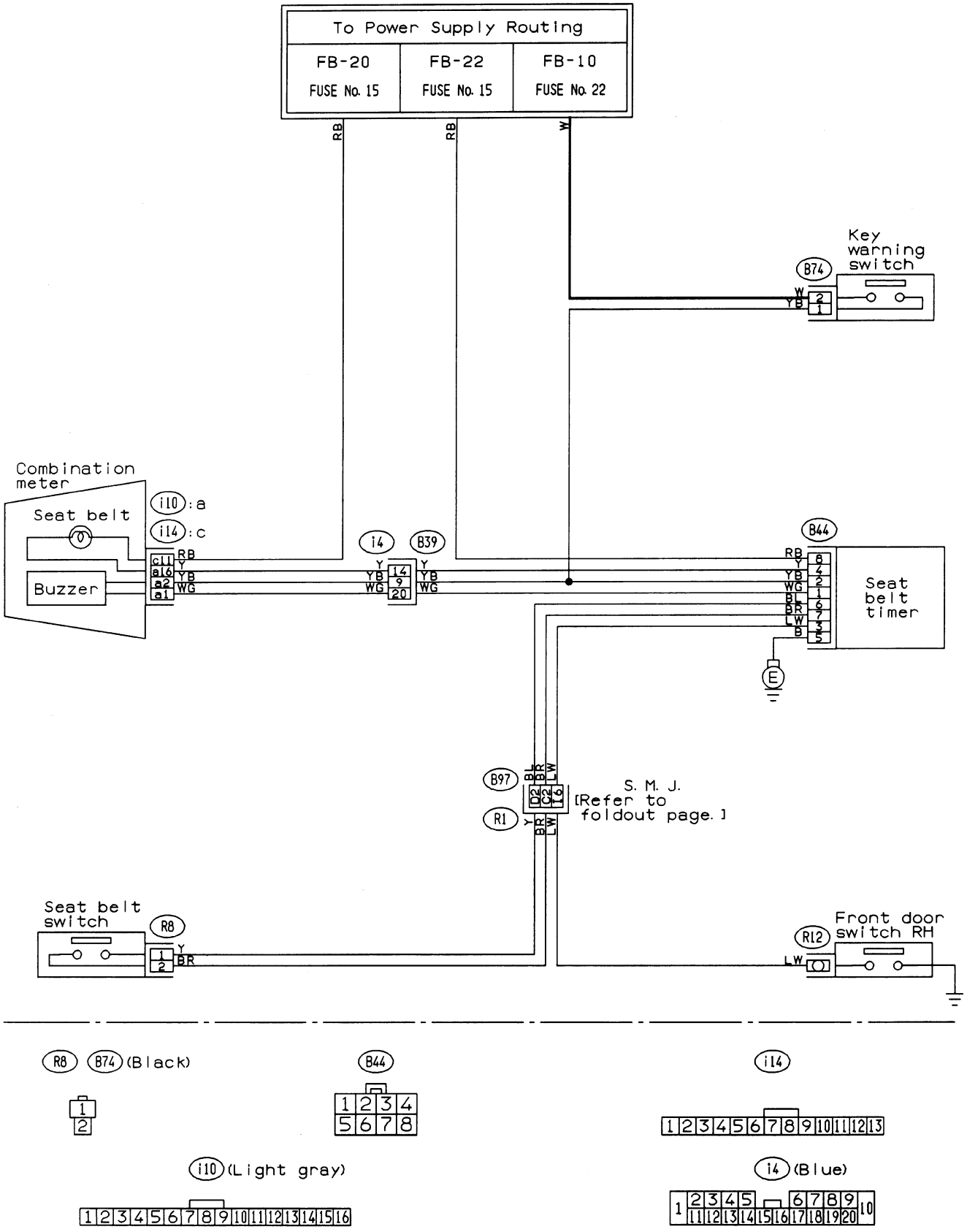
1. LHD MODEL



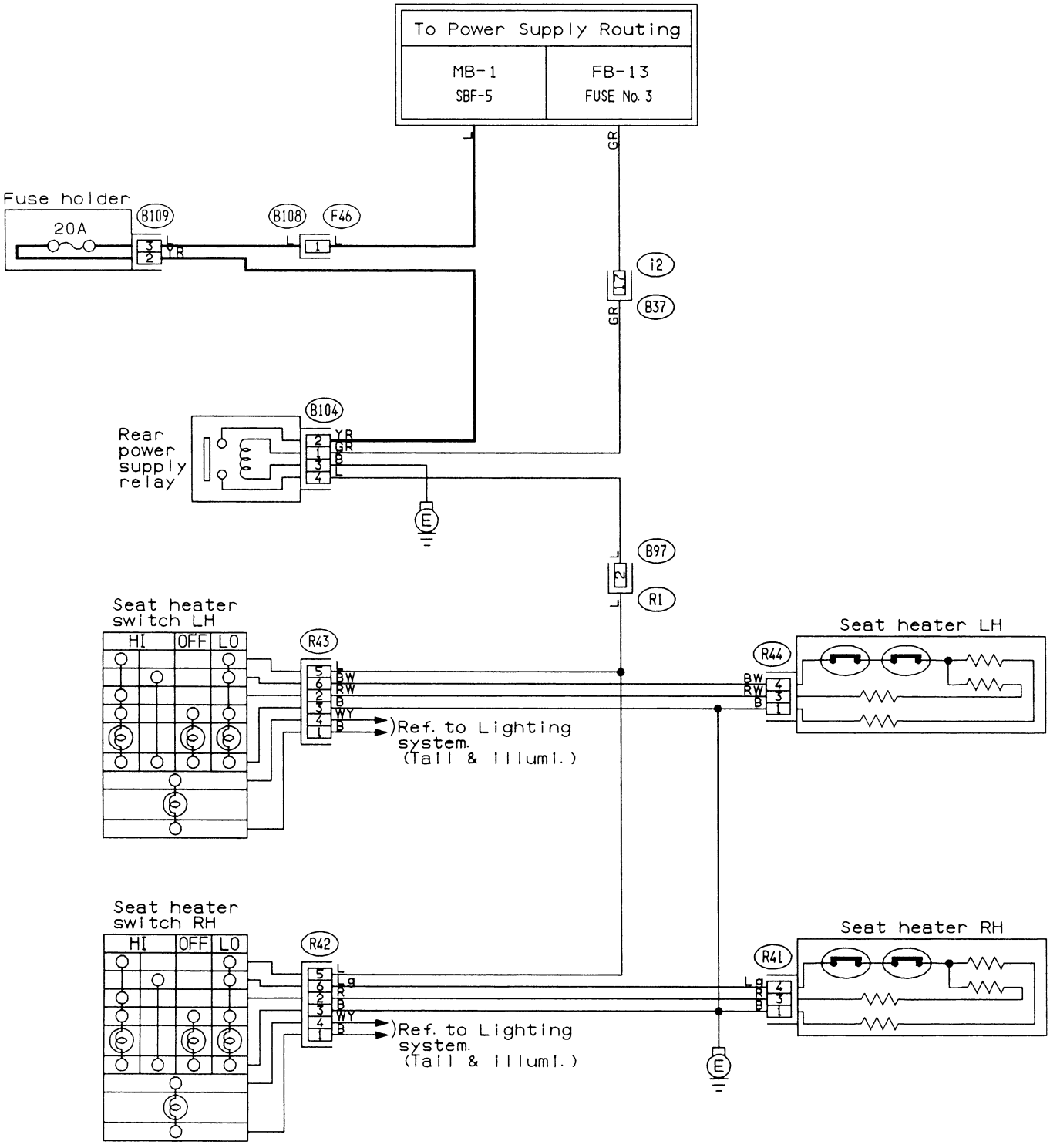


BU81−03

2. RHD MODEL

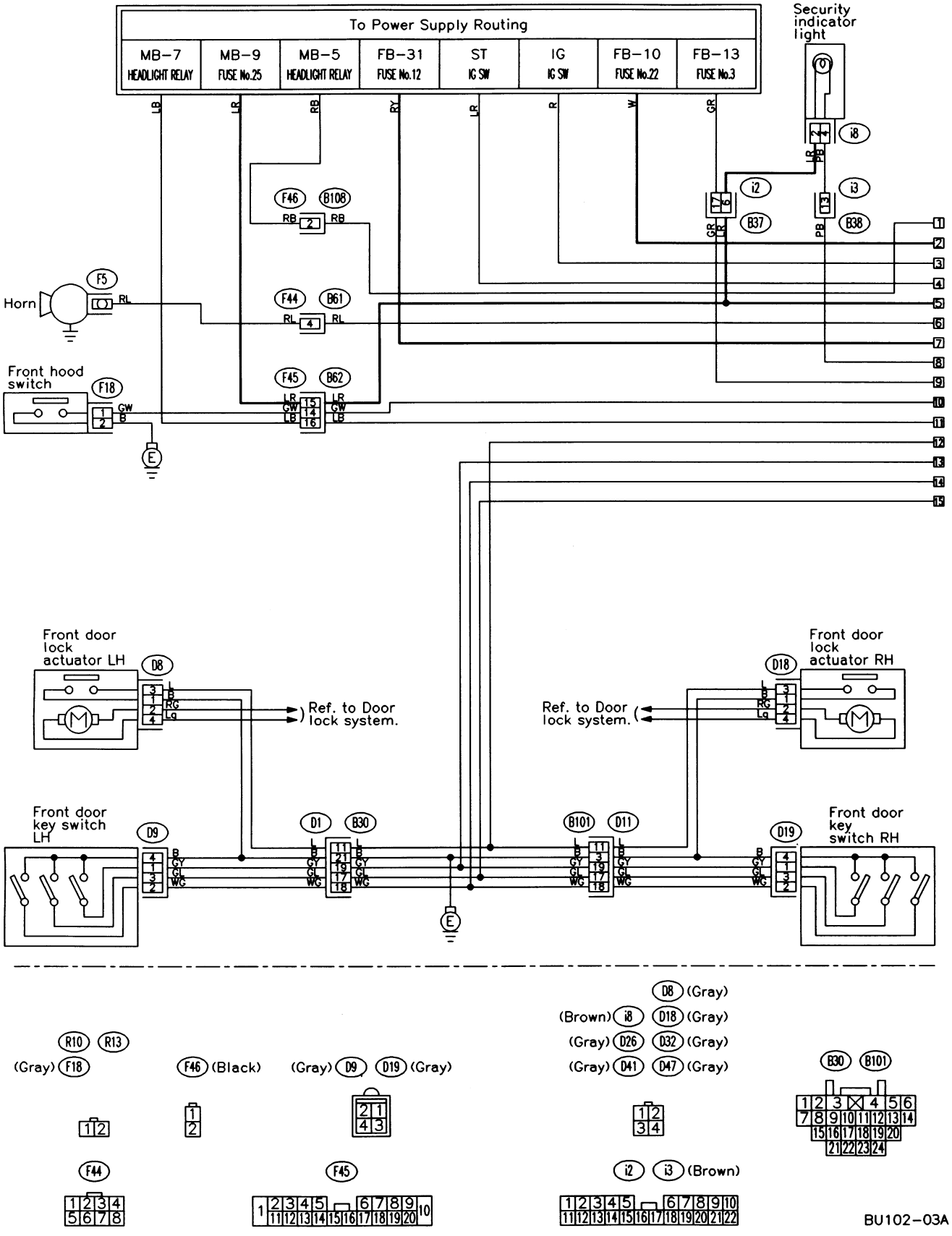

To Power Supply Routing
FB-20
FUSE No. 15
FB-22
FUSE No. 15
FB-10
FUSE No. 22
Key warning switch
B74
Combination meter
Seat belt
Buzzer
i10 : a
i14 : c
i4
B39
B44
Seat belt timer
B97
R1
S. M. J.
(Refer to foldout page.)
Seat belt switch
R8
Front door switch RH
R12
(Black)
(Light gray)
(Blue)

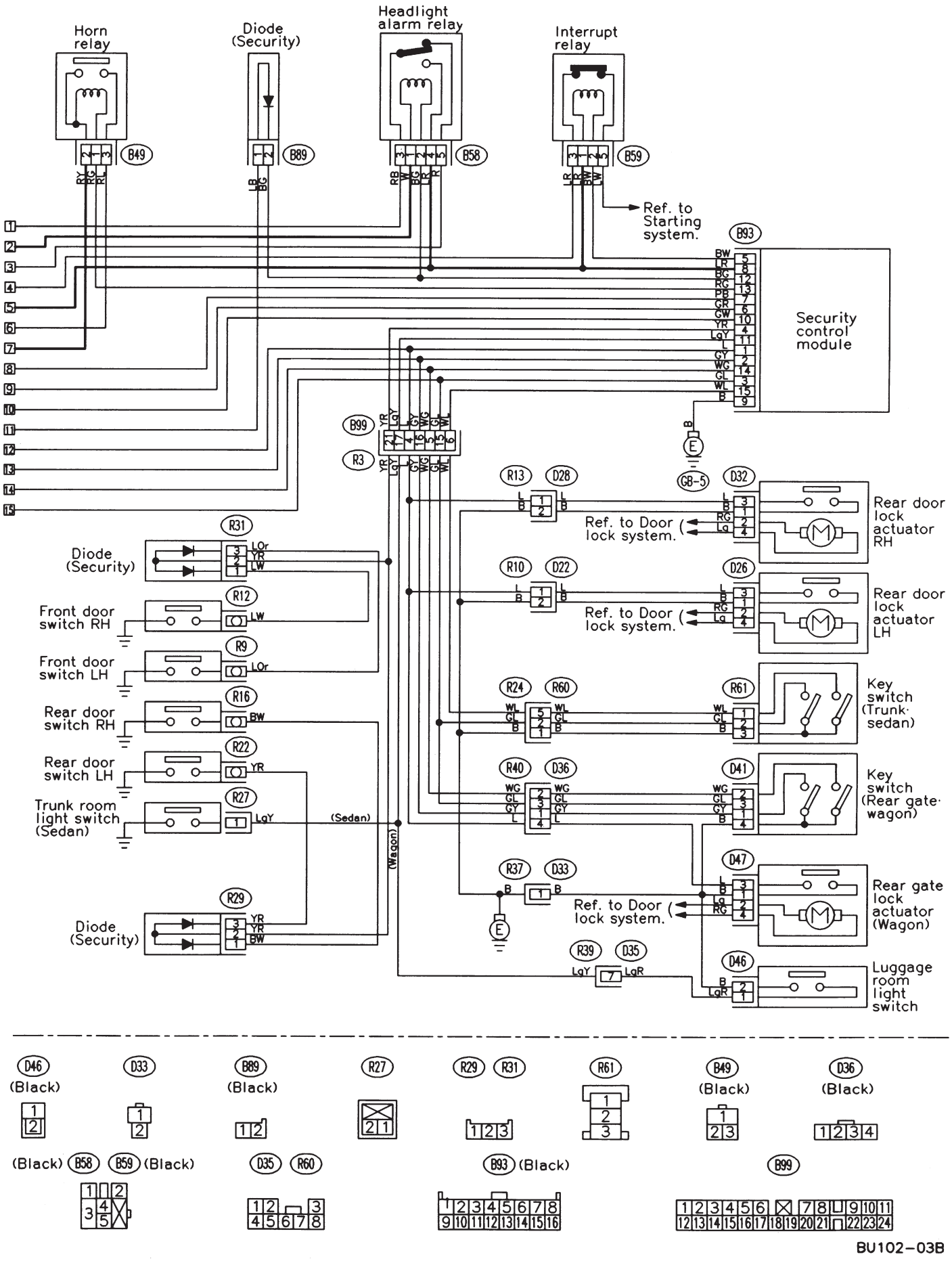
AD: SEAT HEATER SYSTEM



MEMO:

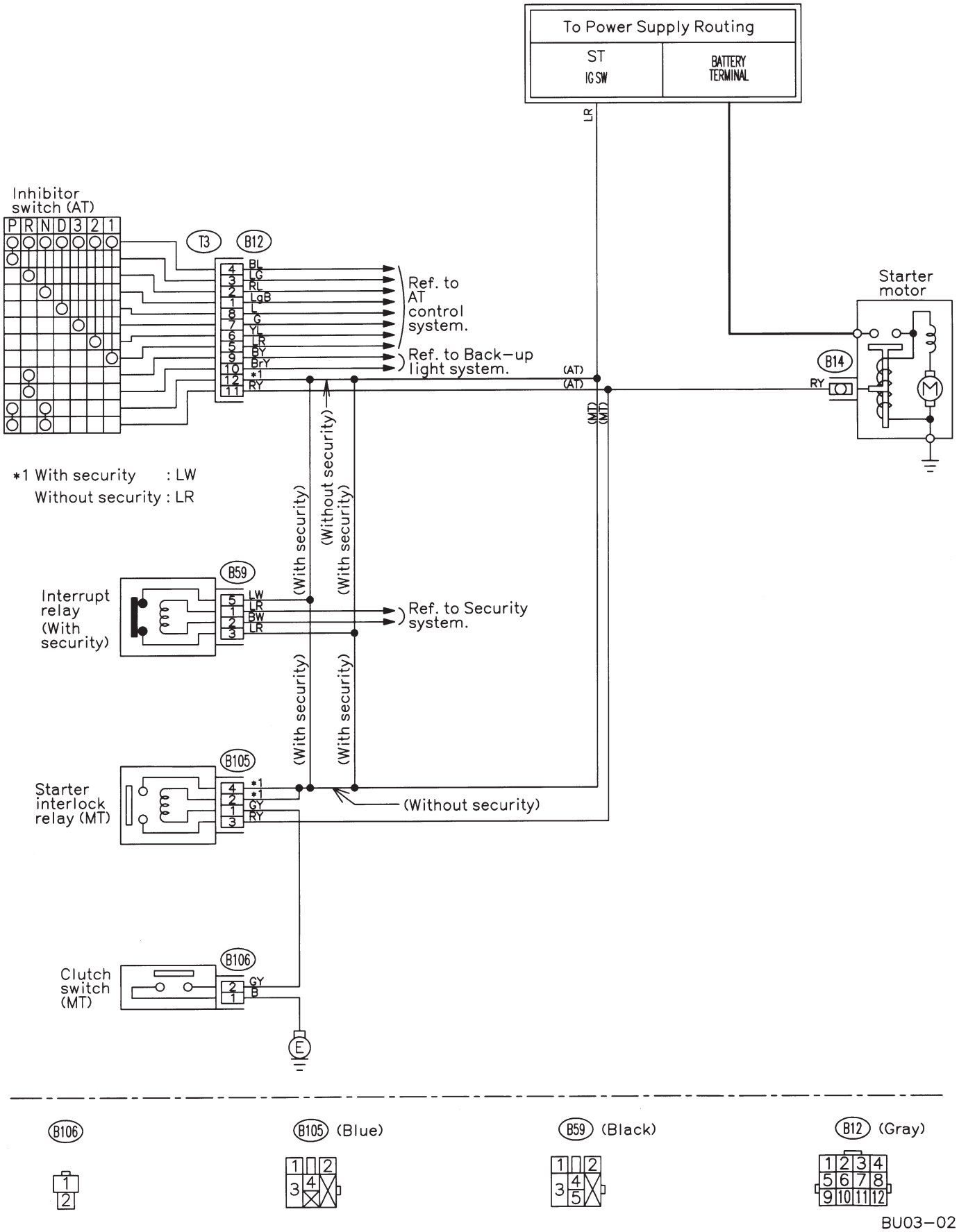
AE: SECURITY SYSTEM



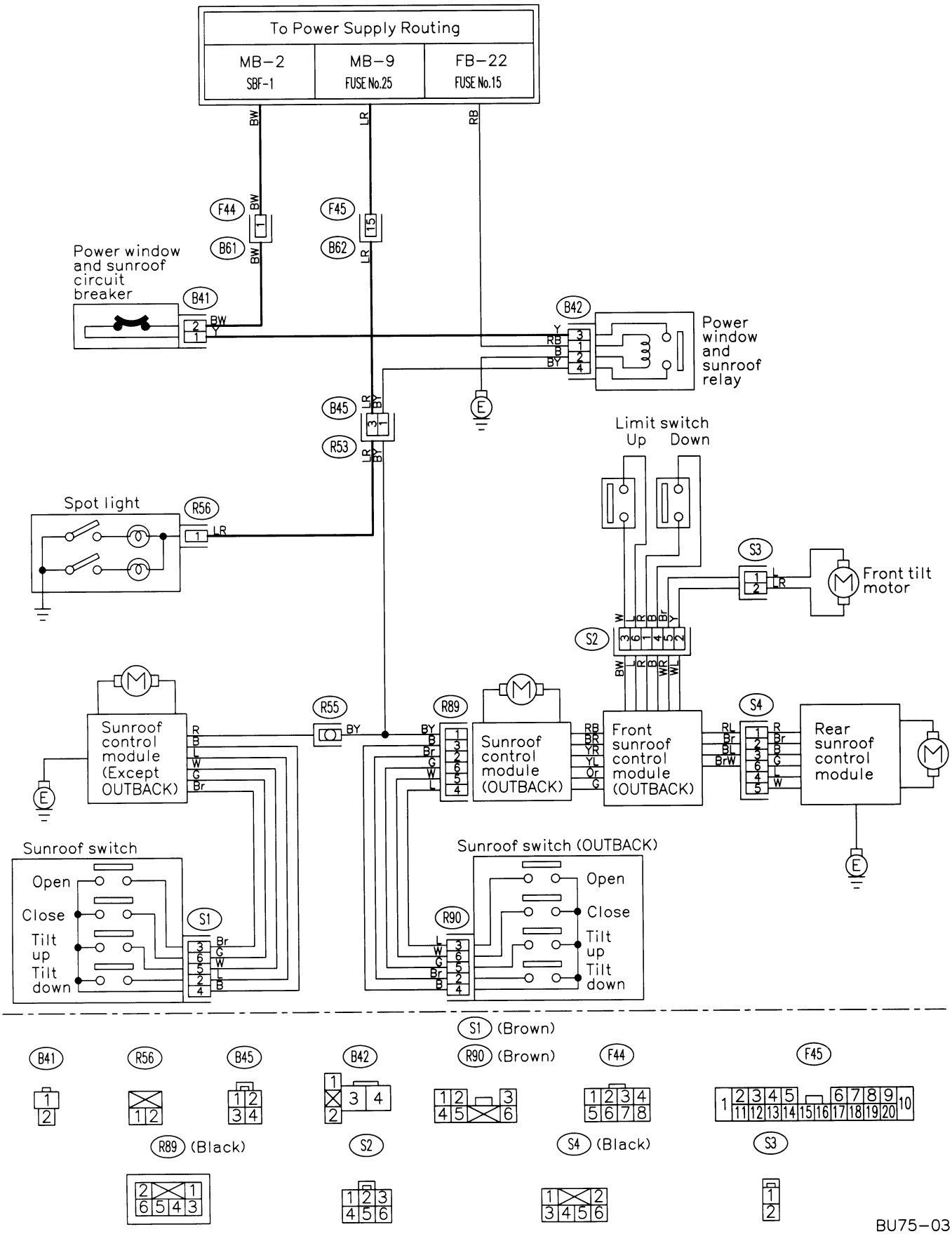

Horn relay
Diode (Security)
Headlight alarm relay
Interrupt relay
B49
B89
B58
B59
Ref. to Starting system.
B93
Security control module
B99
R3
R13
D28
R10
D22
R24
R60
R40
D36
R37
D33
R39
D35
GB-5
D32
D26
R61
D41
D47
D46
Rear door lock actuator RH
Rear door lock actuator LH
Key switch (Trunk· sedan)
Key switch (Rear gate· wagon)
Rear gate lock actuator (Wagon)
Luggage room light switch
Ref. to Door lock system.
R31
Diode (Security)
R12
Front door switch RH
R9
Front door switch LH
R16
Rear door switch RH
R22
Rear door switch LH
R27
Trunk room light switch (Sedan)
(Sedan)
(Wagon)
R29
Diode (Security)
(Black)
(Black)
(Black)
(Black)
(Black)
B58
B59
(Black)
D35
R60
B93
(Black)
B99

BU102-03B

AF: STARTER SYSTEM

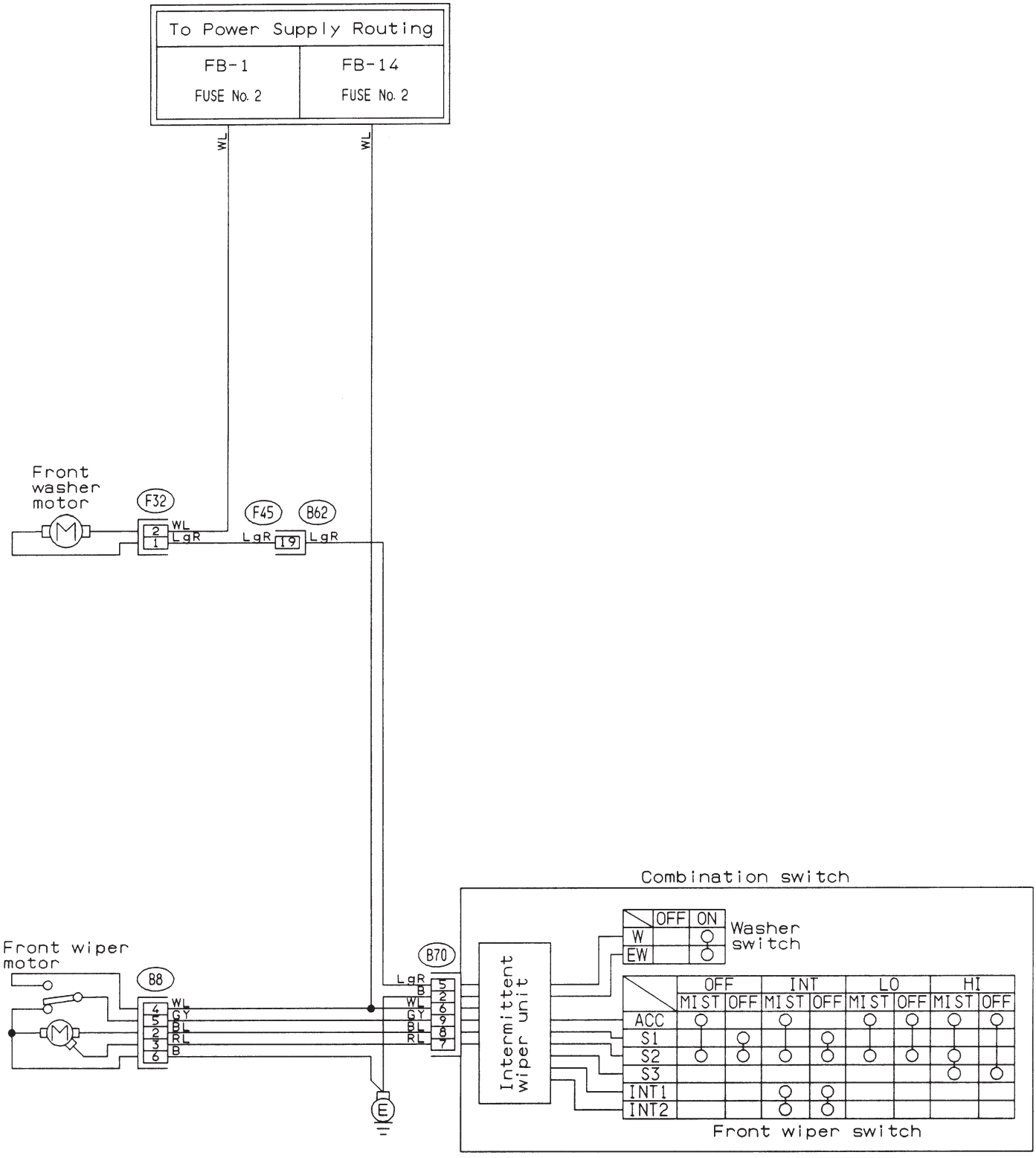


AG: SUNROOF SYSTEM

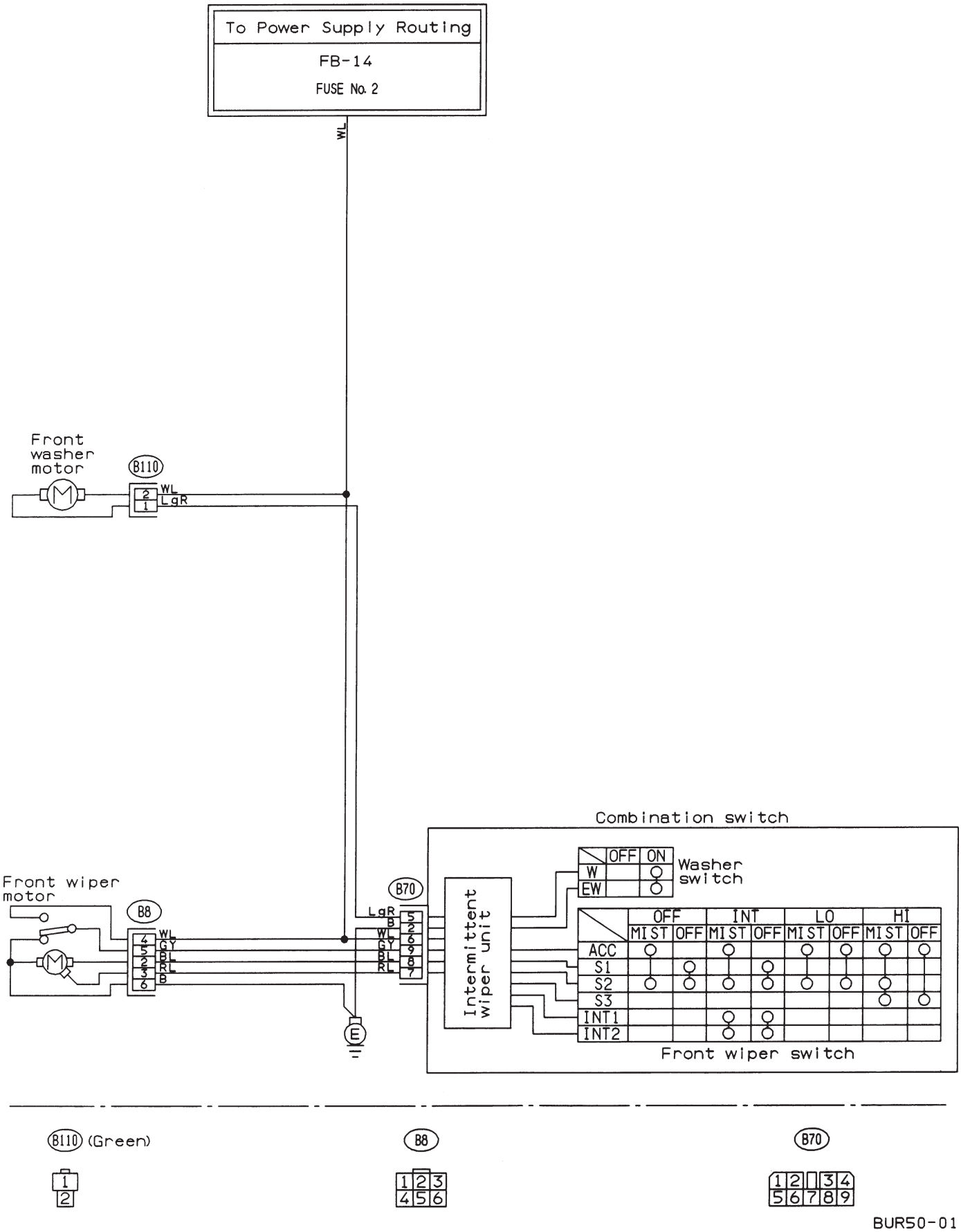


AH: WIPER AND WASHER SYSTEM (FRONT)

1. LHD MODEL

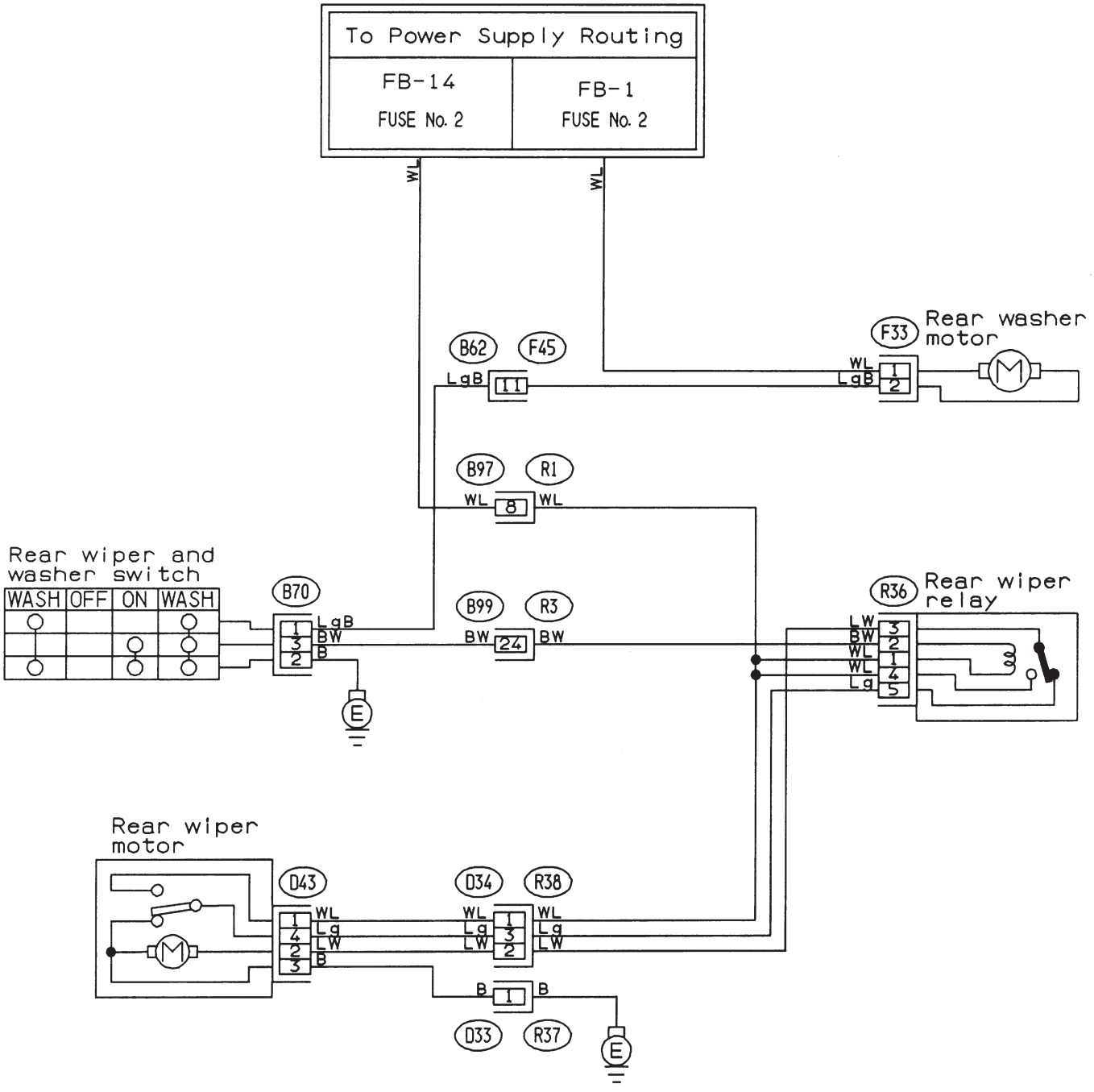


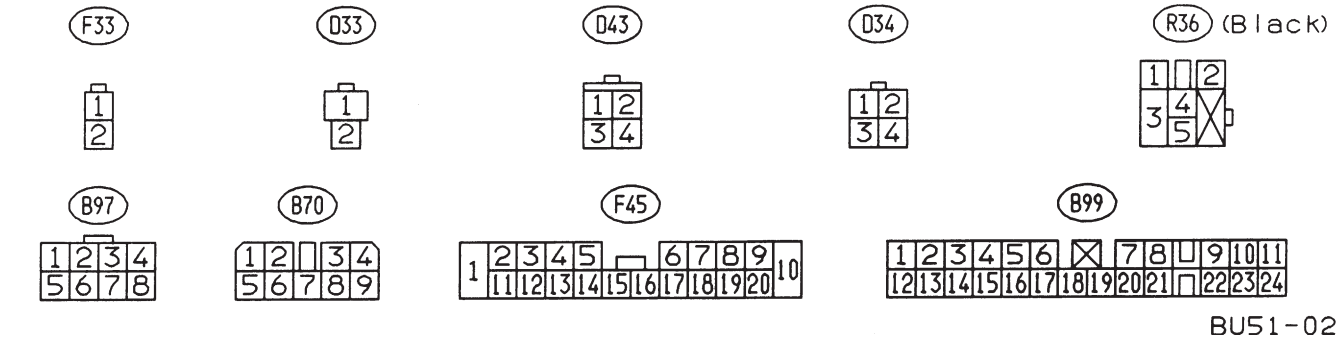
2. RHD MODEL


To Power Supply Routing
FB-14
FUSE No. 2
WL
Front washer motor
B110
WL
LgR
Front wiper motor
B8
B70
Combination switch
Intermittent wiper unit
OFF
ON
W
EW
Washer switch
OFF
INT
LO
HI
MIST
OFF
ACC
S1
S2
S3
INT1
INT2
Front wiper switch
E
B110 (Green)
B8
B70
BUR50-01

AI: WIPER AND WASHER SYSTEM (REAR)

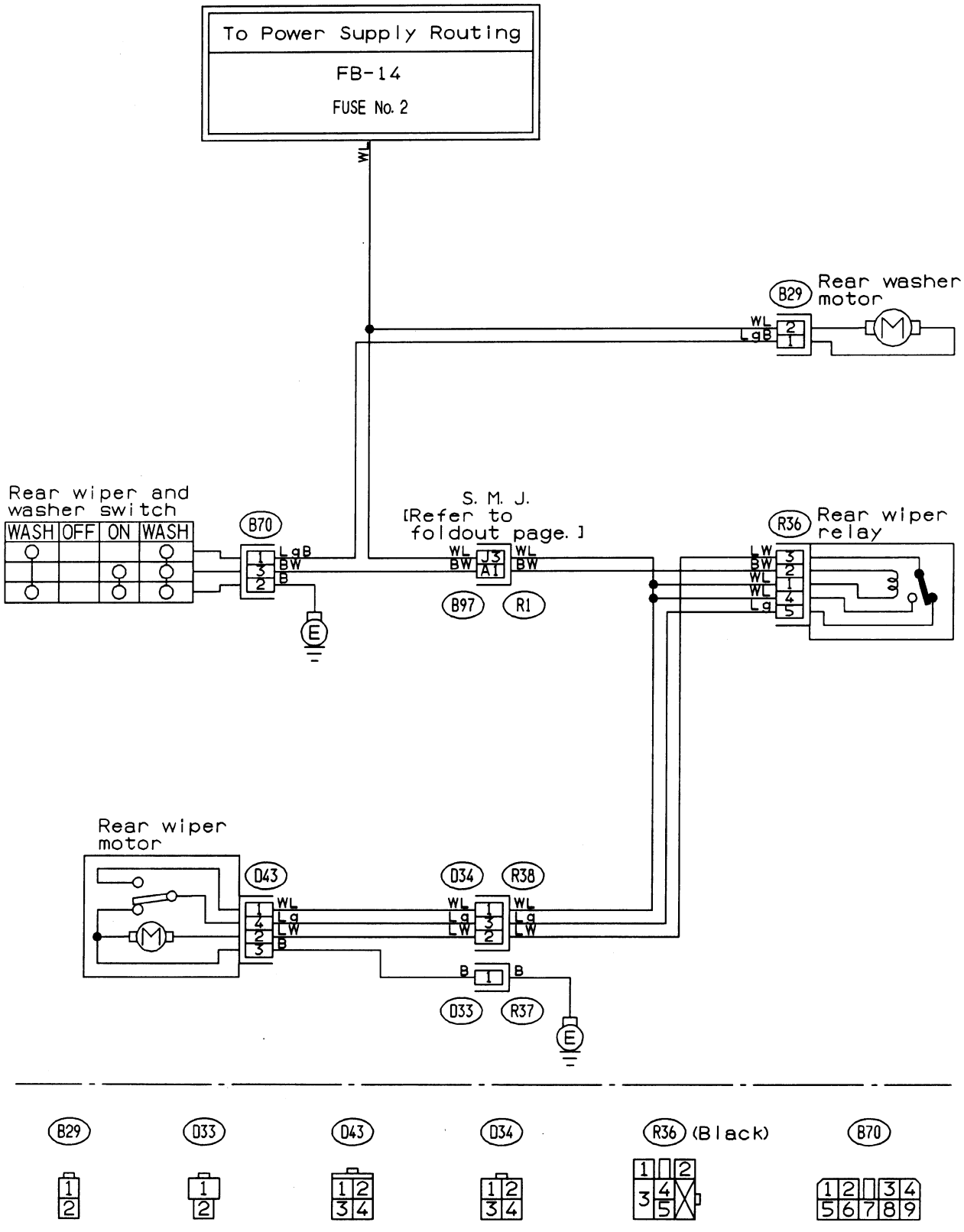
1. LHD MODEL



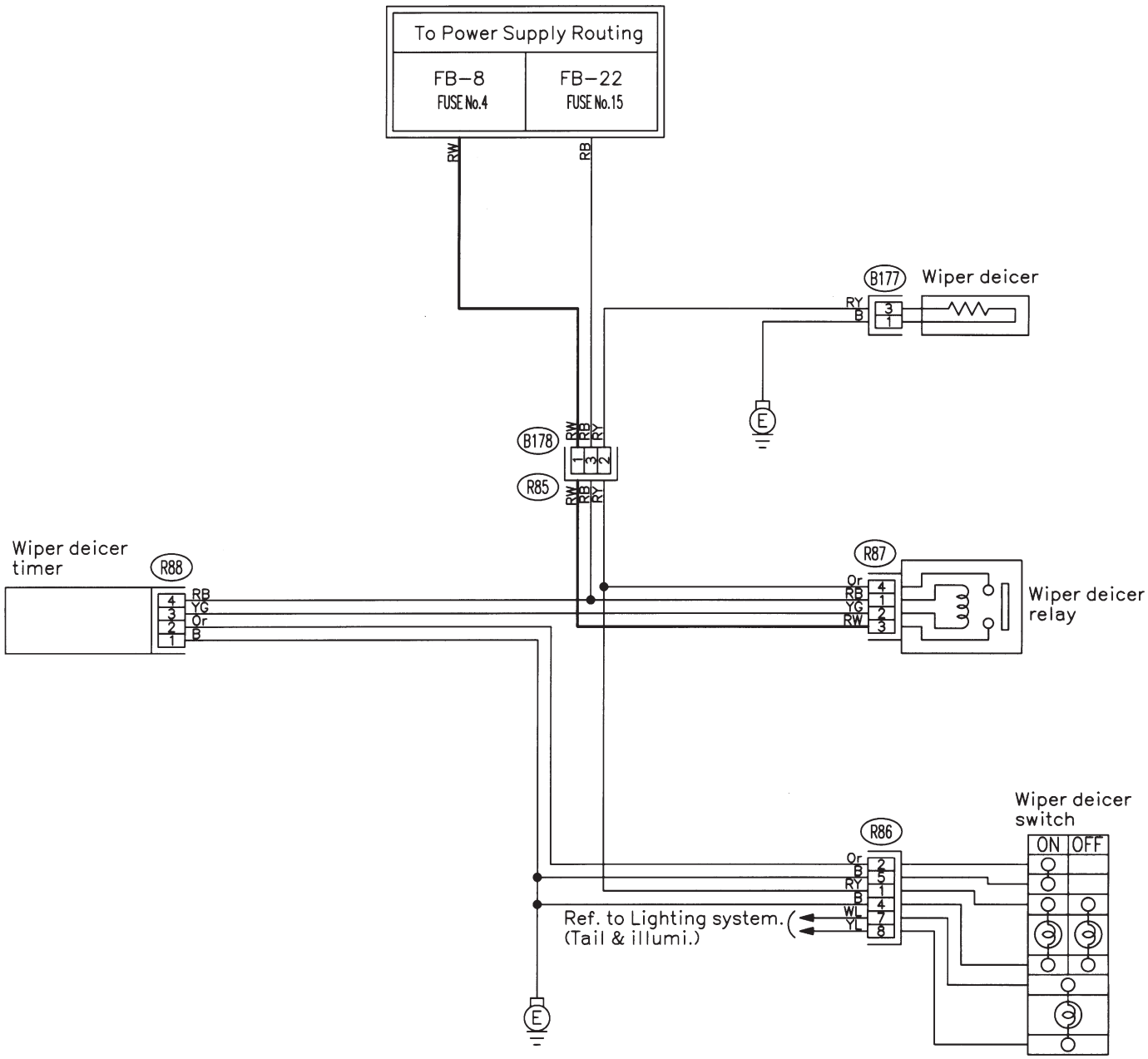


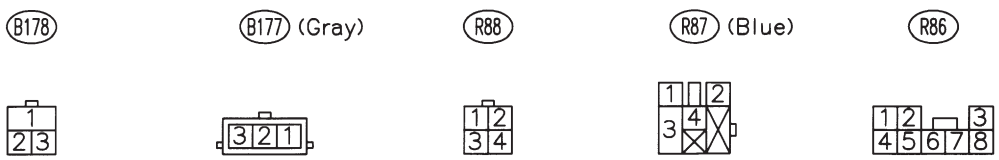
BU51-02

2. RHD MODEL


To Power Supply Routing
FB-14
FUSE No. 2
WL
B29
Rear washer motor
WL
LgB
2
1
Rear wiper and washer switch
WASH
OFF
ON
WASH
B70
LgB
BW
B
S. M. J.
[Refer to foldout page.]
WL
BW
J3
A1
WL
BW
B97
R1
R36
Rear wiper relay
LW
BW
WL
WL
Lg
3
2
1
4
5
Rear wiper motor
D43
WL
Lg
LW
B
D34
R38
WL
Lg
LW
1
3
2
B
1
B
D33
R37
B29
D33
D43
D34
R36 (Black)
B70
1
2
1
2
1 2
3 4
1 2
3 4
1 2
3 4 5
1 2 3 4 5 6 7 8 9

AJ: WIPER DEICER SYSTEM





BU78−01

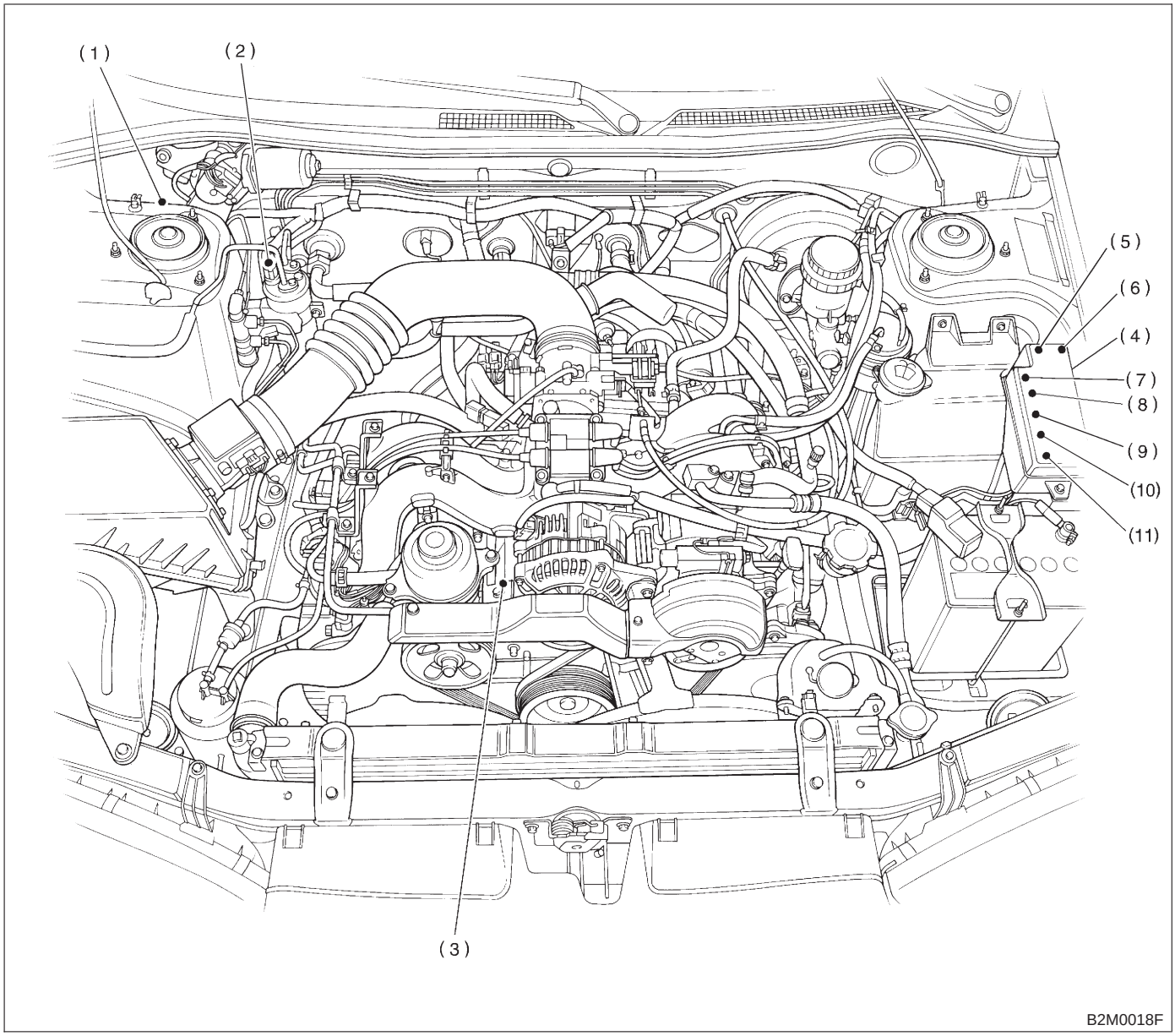
7. Electrical Unit Location

A: LIST

Electrical unit	Index No.
ABS control module	4-4 [T300]
ABS G sensor (MT)	4-4 [T300]
A/C compressor relay	6-3 [D7B1]
A/C fuse	6-3 [D7B1]
A/C main fan relay 1	6-3 [D7B1]
A/C main fan relay 2	6-3 [D7B1]
A/C pressure switch	6-3 [D7B1]
A/C sub fan relay 2	6-3 [D7B1]
ATF temperature sensor	2-7 [T2D2]
Blower motor resistor	6-3 [D7B2]
Blower relay	6-3 [D7B2]
Camshaft position sensor	2-7 [T2A2],[T2B2],[T2C2]
Check connector	6-3 [D7B2]
Clutch switch (MT)	6-2 a[T300]
Crankshaft position sensor	2-7 [T2A2],[T2B2],[T2C2]
Cruise control module	6-2a [T300]
Cruise control pump	6-2a [T300]
Data link connector (for OBD-II G.S.T.)	2-7 [T2A1],[T2B1],[T2C1]
Data link connector (for S.S.M.)	2-7 [T2A1],[T2B1],[T2C1]
Diagnosis connector	4-4 [T300]
Diagnosis terminal (Ground)	4-4 [T300]
Door lock timer	6-3 [D7B2]
Engine control module	2-7 [T2A1],[T2B1],[T2C1]
Engine coolant temperature sensor	2-7 [T2A2],[T2B2],[T2C2]
Engine hood switch (Security)	6-2 b[T6A0]
Evaporator thermoswitch	6-3 [D7B2]
F/B	6-3 [D7B2]
FRESH/RECIRC actuator	6-3 [D7B2]
Fuel pump relay	2-7 [T2A3],[T2B3],[T2C3]
Fuel gauge module	6-3 [D7B3]
Fuel gauge sub module (AWD)	6-3 [D7B3]
FWD switch (AT)	6-3 [D7B1]
Headlight alarm relay (Security)	6-2 b[T6A0]
Headlight relay LH	6-3 [D7B1]
Headlight relay RH	6-3 [D7B1]
Horn relay	6-3 [D7B2]
Hydraulic unit (ABS)	4-4 [T300]
Ignition coil	2-7 [T2A3],[T2B3],[T2C3]
Ignitor	2-7 [T2A3],[T2B3],[T2C3]
Idle air control solenoid valve	2-7 [T2A3],[T2B3],[T2C3]
Illumination control module	6-3 [D7B2]
Inhibitor switch	6-2 a[T300]
Knock sensor	2-7 [T2A2],[T2B2],[T2C2]
Main fan relay	6-3 [D7B2]
Main relay	2-7 [T2A3],[T2B3],[T2C3]
Mass air flow sensor	2-7 [T2A2],[T2B2],[T2C2]
Mode actuator	6-3 [D7B2]
M/B	6-3 [D7B1]
Oil pressure switch	6-3 [D7B1]
Oxygen sensor	2-7 [T2A2],[T2B2],[T2C2]
Pedal stroke sensor (TCS)	4-4b [T300]
Power window and sunroof relay	6-3 [D7B2]
Power window circuit breaker	6-3 [D7B2]
Purge control solenoid valve	2-7 [T2A3],[T2B3],[T2C3]
Rear defogger relay	6-3 [D7B2]
Seat belt timer	6-3 [D7B2]
Security control module	6-2 b[T6A0]
Shift lock control module	6-3 [D7B2]
Starter interrupt relay (Security)	6-2 b[T6A0]
Stop & brake switch (With cruise control)	6-2a [T300]
Sunroof control module	6-3 [D7B3]
Tail and illumination relay	6-3 [D7B2]
TCS control module	4-4b [T300]
TCS motor relay	4-4b [T300]
TCS valve relay	4-4b [T300]
Throttle position sensor	2-7 [T2A2],[T2B2],[T2C2]
Test mode connector	2-7 [T2A1],[T2B1],[T2C1]
Transmission control module	2-7 [T2D1]
Turn & hazard module	6-3 [D7B2]
Vehicle speed sensor 1	2-7 [T2D2]
Vehicle speed sensor 2	2-7 [T2D2]

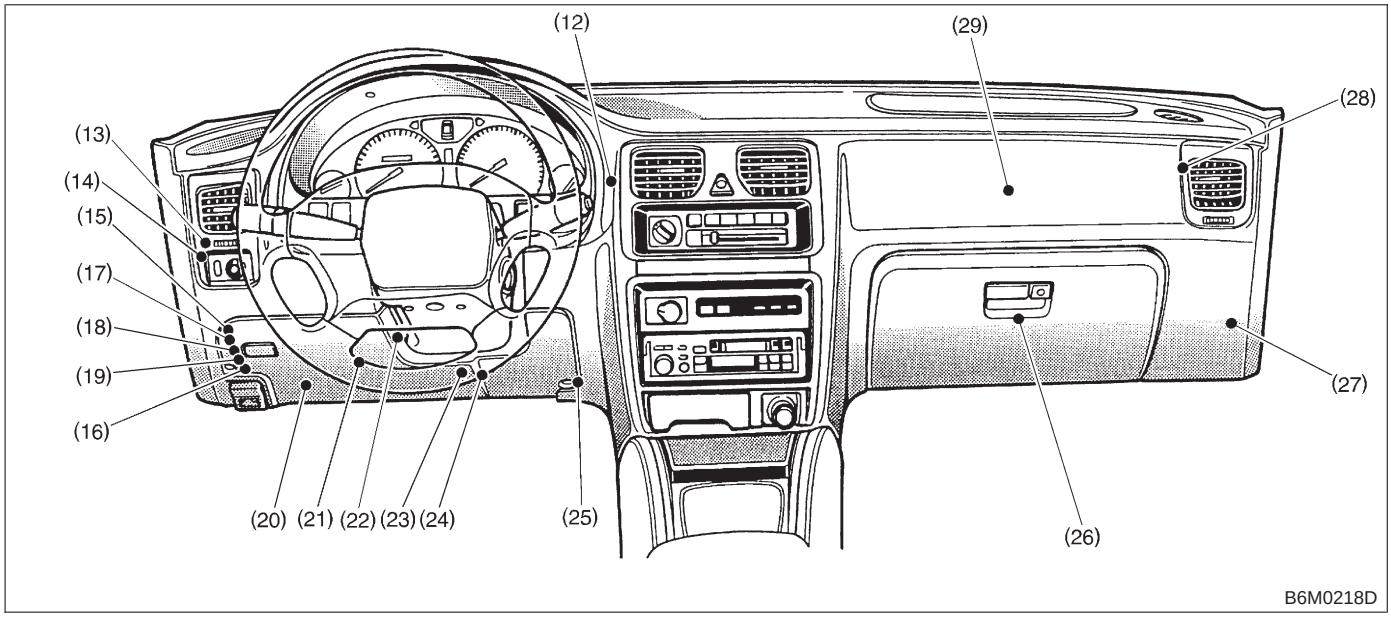
B: LOCATION

1. ENGINE ROOM



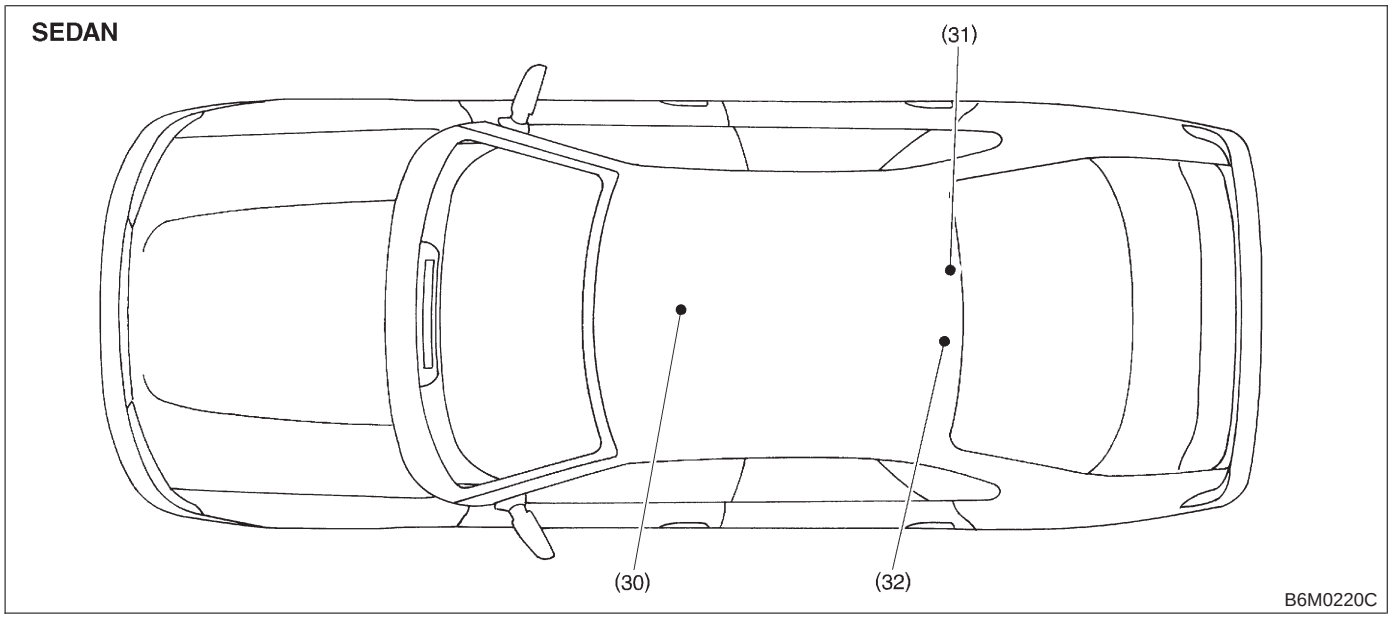
(1) FWD switch (AT) <Refer to 6–3 [D7B4].>
(2) A/C pressure switch <Refer to 6–3 [D7B4].>
(3) Oil pressure switch <Refer to 6–3 [D7B4].>
(4) M/B <Refer to 6–3 [D7B4].>
(5) Headlight relay LH <Refer to 6–3 [D7B4].>
(6) Headlight relay RH <Refer to 6–3 [D7B4].>
(7) A/C compressor relay <Refer to 6–3 [D7B4].>
(8) A/C main fan relay 2 <Refer to 6–3 [D7B4].>
(9) A/C sub fan relay 2 <Refer to 6–3 [D7B4].>
(10) A/C main fan relay 1 <Refer to 6–3 [D7B4].>
(11) A/C fuse <Refer to 6–3 [D7B4].>

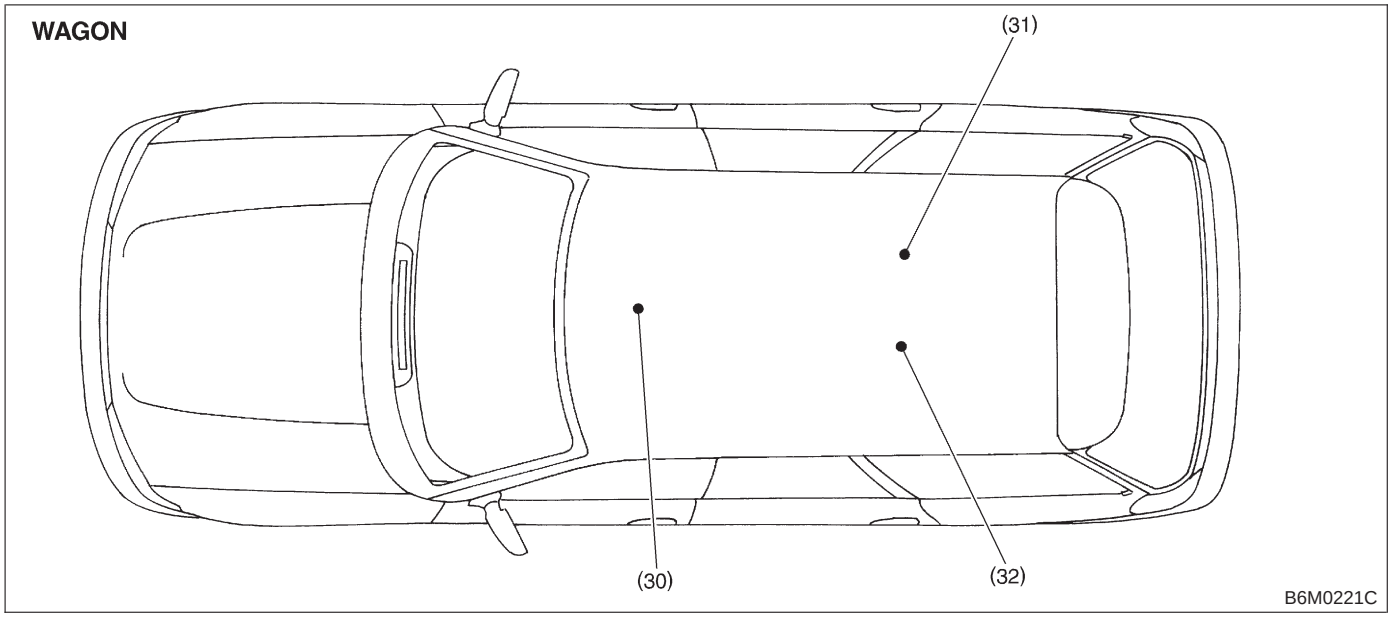
2. INSTRUMENT PANEL



(12) Mode actuator <Refer to 6–3 [D7B4].>
(13) Blower relay <Refer to 6–3 [D7B4].>
(14) Horn relay <Refer to 6–3 [D7B4].>
(15) F/B <Refer to 6–3 [D7B4].>
(16) Turn & hazard module <Refer to 6–3 [D7B4].>
(17) Rear defogger relay <Refer to 6–3 [D7B4].>
(18) Tail & illumination relay <Refer to 6–3 [D7B4].>
(19) Main fan relay <Refer to 6–3 [D7B4].>
(20) Seat belt timer <Refer to 6–3 [D7B4].>
(21) Illumination control module <Refer to 6–3 [D7B4].>
(22) Shift lock control module <Refer to 6–3 [D7B4].>
(23) Power window circuit breaker <Refer to 6–3 [D7B4].>
(24) Power window & sunroof relay <Refer to 6–3 [D7B4].>
(25) Check connector <Refer to 6–3 [D7B4].>
(26) Blower motor resistor <Refer to 6–3 [D7B4].>
(27) Door lock timer <Refer to 6–3 [D7B4].>
(28) FRESH/RECIRC actuator <Refer to 6–3 [D7B4].>
(29) Evaporator thermoswitch <Refer to 6–3 [D7B4].>

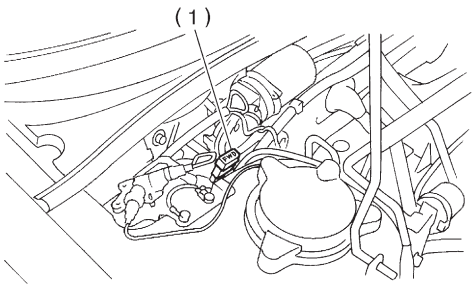
3. COMPARTMENT

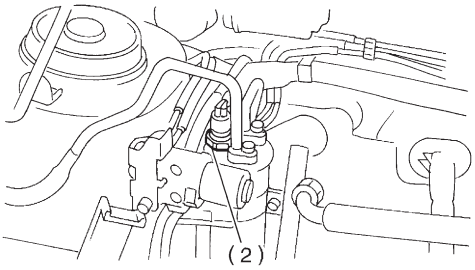


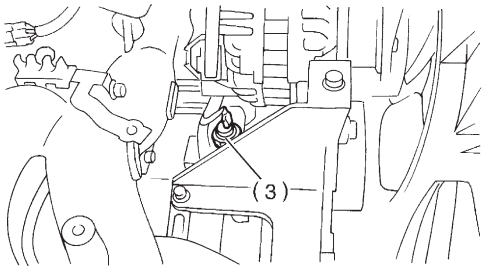


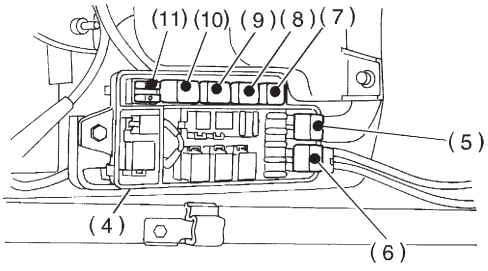
(30) Sunroof control module <Refer to 6–3 [D7B4].>
(31) Fuel gauge module <Refer to 6–3 [D7B4].>
(32) Fuel gauge sub module (AWD) <Refer to 6–3 [D7B4].>

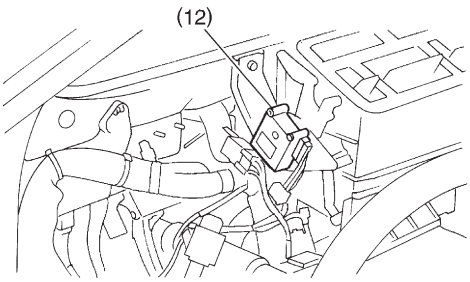
4. DETAIL



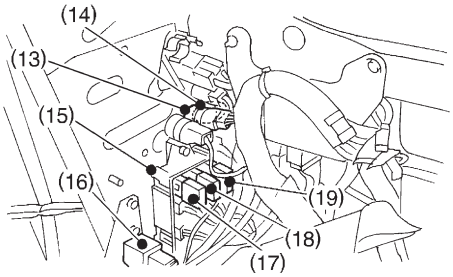








B6M0226B



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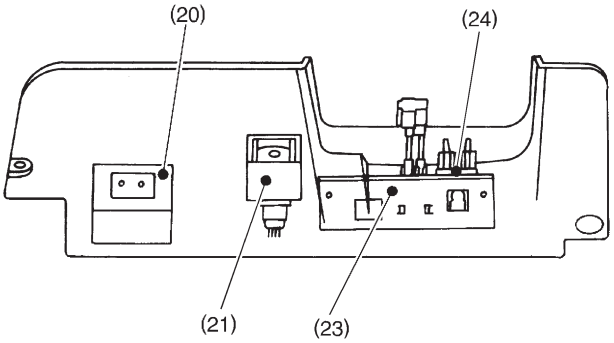
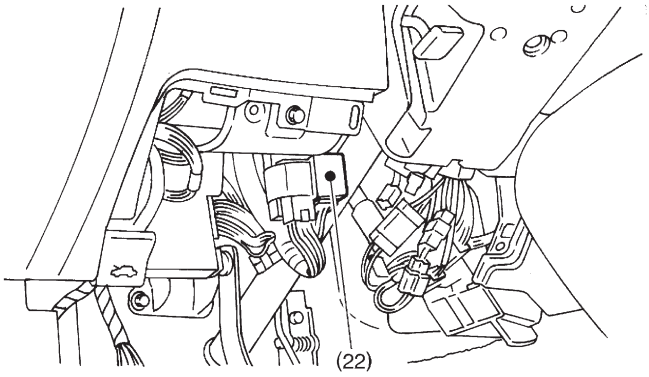


B6M0494B



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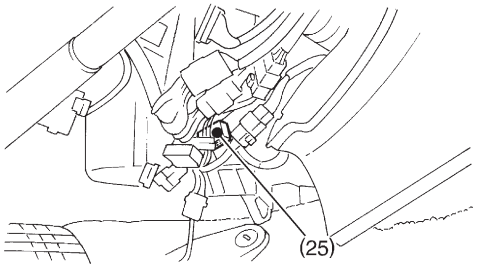

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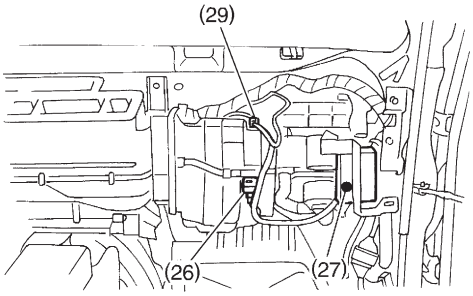
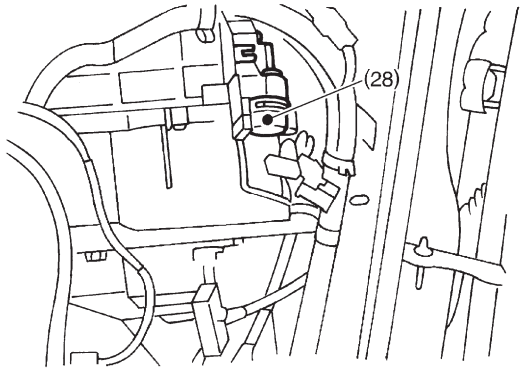
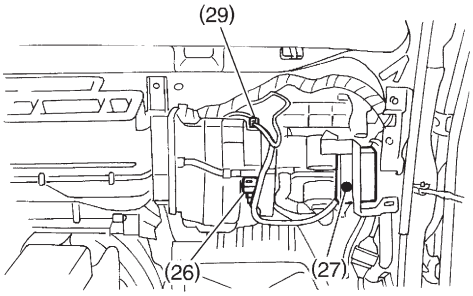


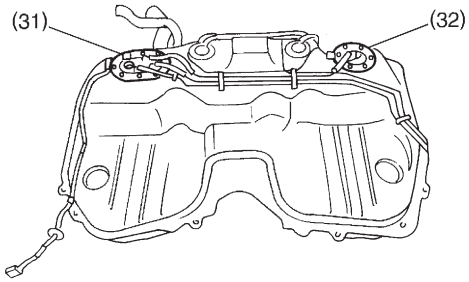
B6M0231C



B6M0495B



B6M0231C

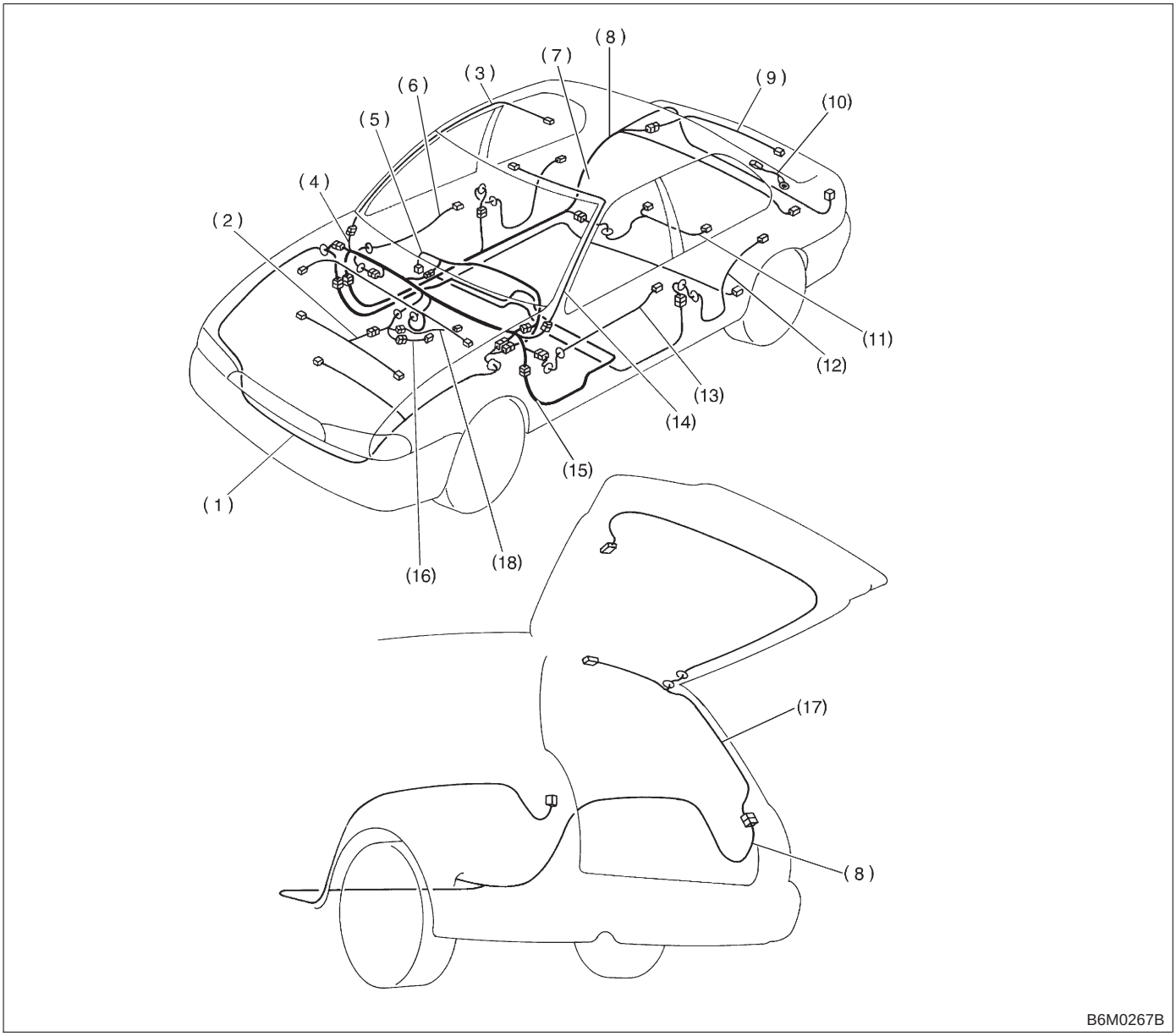


B6M0235C

8. Electrical Wiring Harness and Ground Point

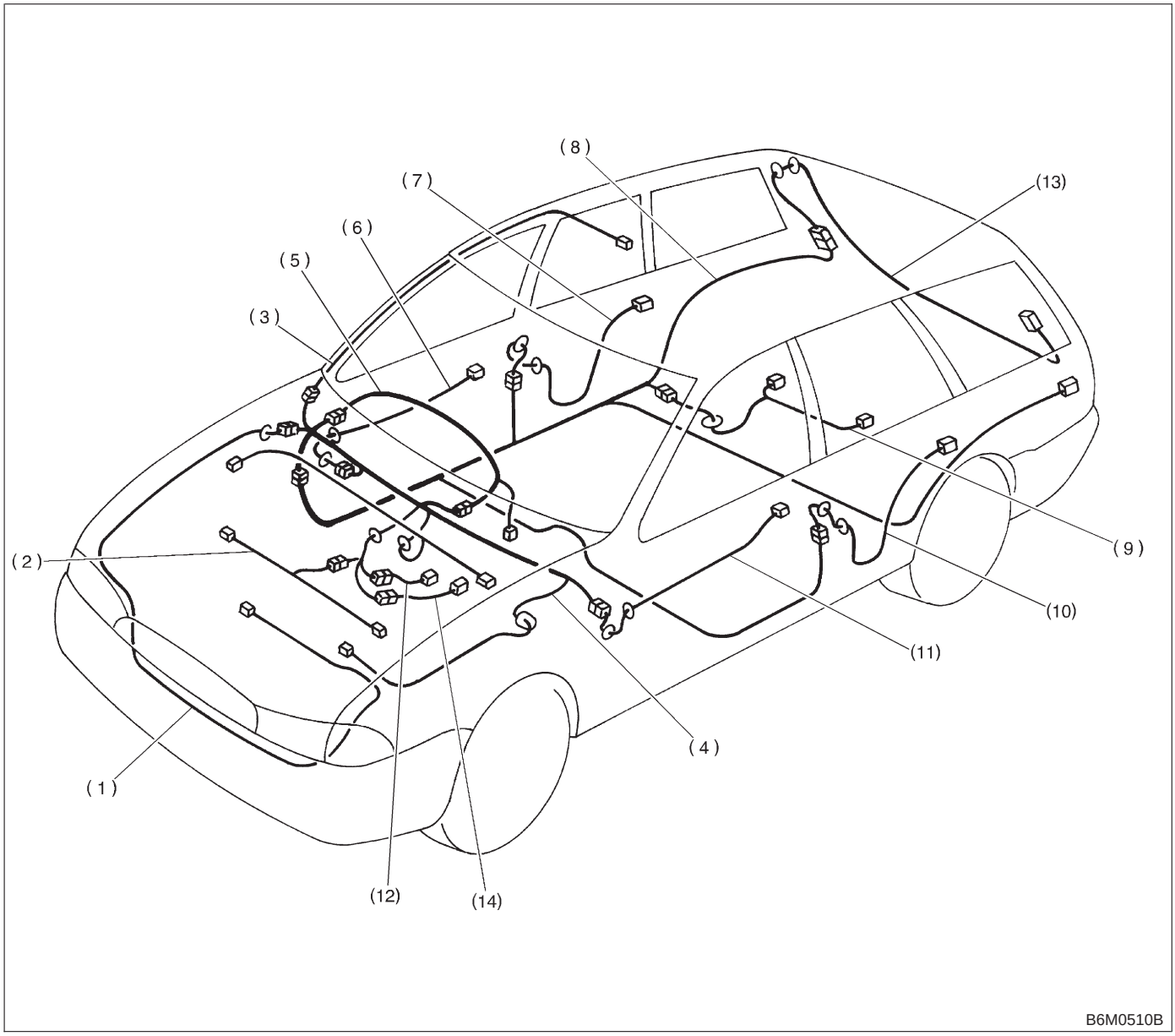
A: OVERALL LOCATION

1. LHD MODEL



(1) Front wiring harness
(2) Engine wiring harness
(3) Room light cord
(4) Bulkhead wiring harness
(5) Instrument panel wiring harness
(6) Front door cord RH
(7) Rear door cord RH
(8) Rear wiring harness
(9) Trunk lid cord (Sedan)
(10) Rear defogger ground cord (Sedan)
(11) Fuel tank cord
(12) Rear door cord LH
(13) Front door cord LH
(14) Sunroof cord
(15) Floor wiring harness
(16) Transmission cord
(17) Rear gate cord (Wagon)
(18) Rear oxygen sensor cord

2. RHD MODEL



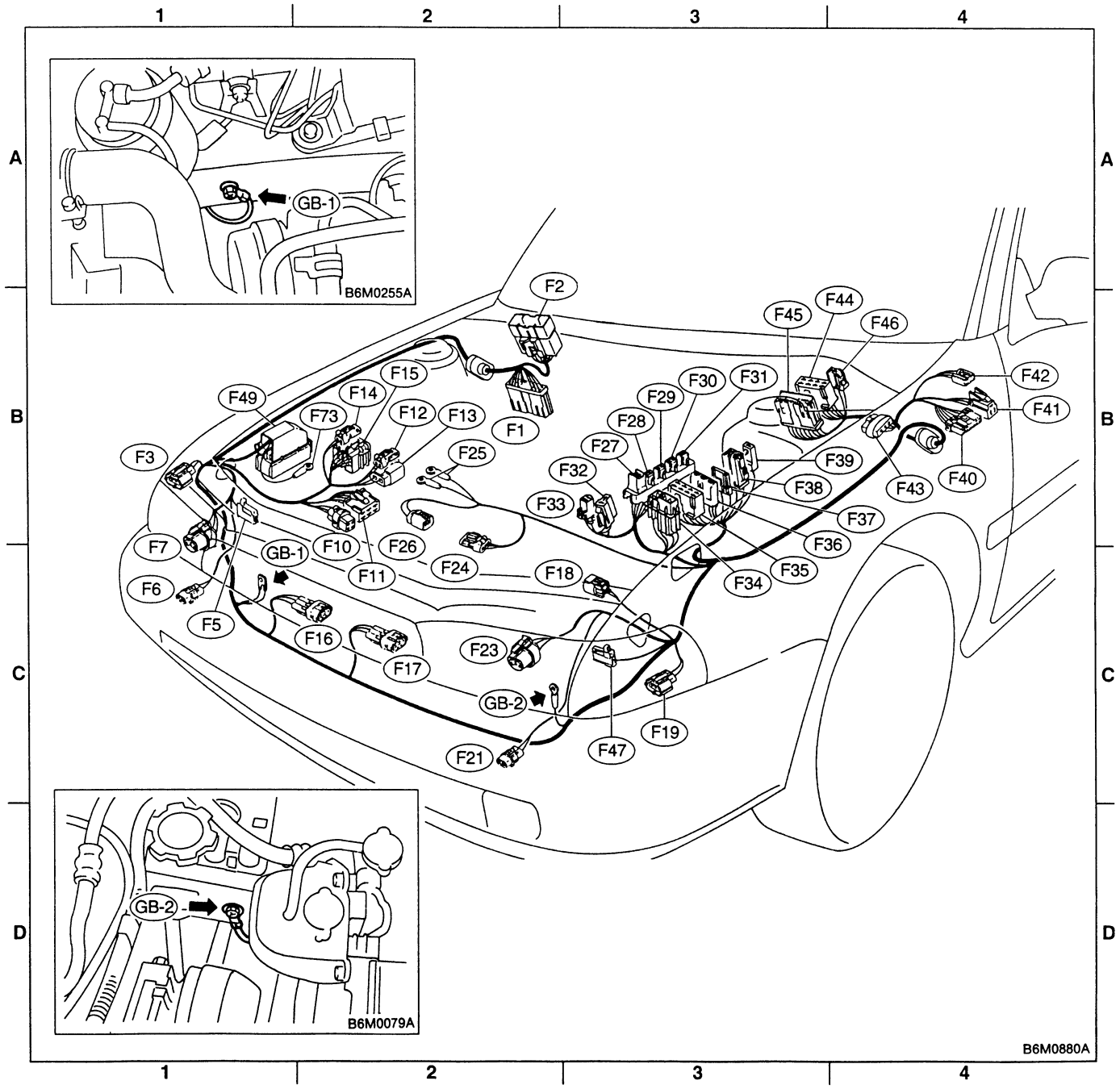
(1) Front wiring harness
(2) Engine wiring harness
(3) Room light cord
(4) Bulkhead wiring harness
(5) Instrument panel wiring harness
(6) Front door cord RH
(7) Rear door cord RH
(8) Rear wiring harness
(9) Fuel tank cord
(10) Rear door cord LH
(11) Front door cord LH
(12) Transmission cord
(13) Rear gate cord
(14) Rear oxygen sensor cord

B: FRONT WIRING HARNESS

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F1	20	Blue	B-2	P1	Floor wiring harness (With TCS model)
	8	*	B-2	P1	Floor wiring harness (With ABS model)
F2	20	Blue	B-2	B100	Bulkhead wiring harness (With ABS model)
F3	3	Brown	B-1		Front turn signal and side marker light RH
F5	1	Black	B-1		Horn
F6	2	*	C-1		Front fog light RH
	2	Brown	C-1		Front fog light RH (Outback with step roof)
F7	3	Black	B-1		Headlight RH
F10	4	*	B-2		TCS motor relay
F11	6	*	B-2		TCS valve relay
F12	2	Black	B-2		TCS pressure switch
F13	2	Black	B-2		TCS motor
F14	2	Gray	B-2		Hydraulic unit (TCS)
F15	12	Gray	B-2		
F16	3	Black	C-1		Sub fan motor
F17	3	Black	C-2		Radiator main fan motor
F18	2	Gray	C-3		Front hood switch (Security)
F19	3	Brown	C-3		Front turn signal and side marker light LH
F21	2	*	C-2		Front fog light LH
	2	Brown	C-2		Front fog light LH (Outback with step roof)
F23	3	Black	C-2		Headlight LH
F24	3	Gray	B-2		A/C compressor
F25	1 × 2	*	B-2		Generator
F26	2	Gray	B-2		
F27	4	Black	B-3		A/C fuse (Relay holder)
F28	4	Black	B-3		A/C main fan relay-1 (Relay holder)
F29	4	Black	B-3		A/C sub fan relay-2 (Relay holder)
F30	4	Black	B-3		A/C main fan relay-2 (Relay holder)
F31	4	Black	B-3		A/C relay (Relay holder)
F32	2	Green	B-2		Front washer motor
F33	2	*	B-3		Rear washer motor
F34	4	Black	B-3		SBF holder
F35	8	Black	B-3		M/B
F36	3	*	B-3		
F37	2	Black	B-3		
F38	2	Black	B-3		
F39	1	Brown	B-3		
F40	10	Gray	B-4		F/B
F41	3	Gray	B-4		
F42	5	Gray	B-4		
F43	3	Orange	B-4		A/C diode
F44	8	*	B-3	B61	Bulkhead wiring harness
F45	20	*	B-3	B62	
F46	2	Black	B-4	B108	Bulkhead wiring harness (Outback)
F47	1	Black	C-3		Horn (TAIWAN model)
F48	6	*	B-3		Shield joint connector (ABS)
F49	31	Black	B-1		ABS control module and hydraulic control module

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F73	1	*	B-1		ABS pump motor ground
*: Non-colored					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GB-1
B6M0255A
F2
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F45
F46
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F73
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GB-1
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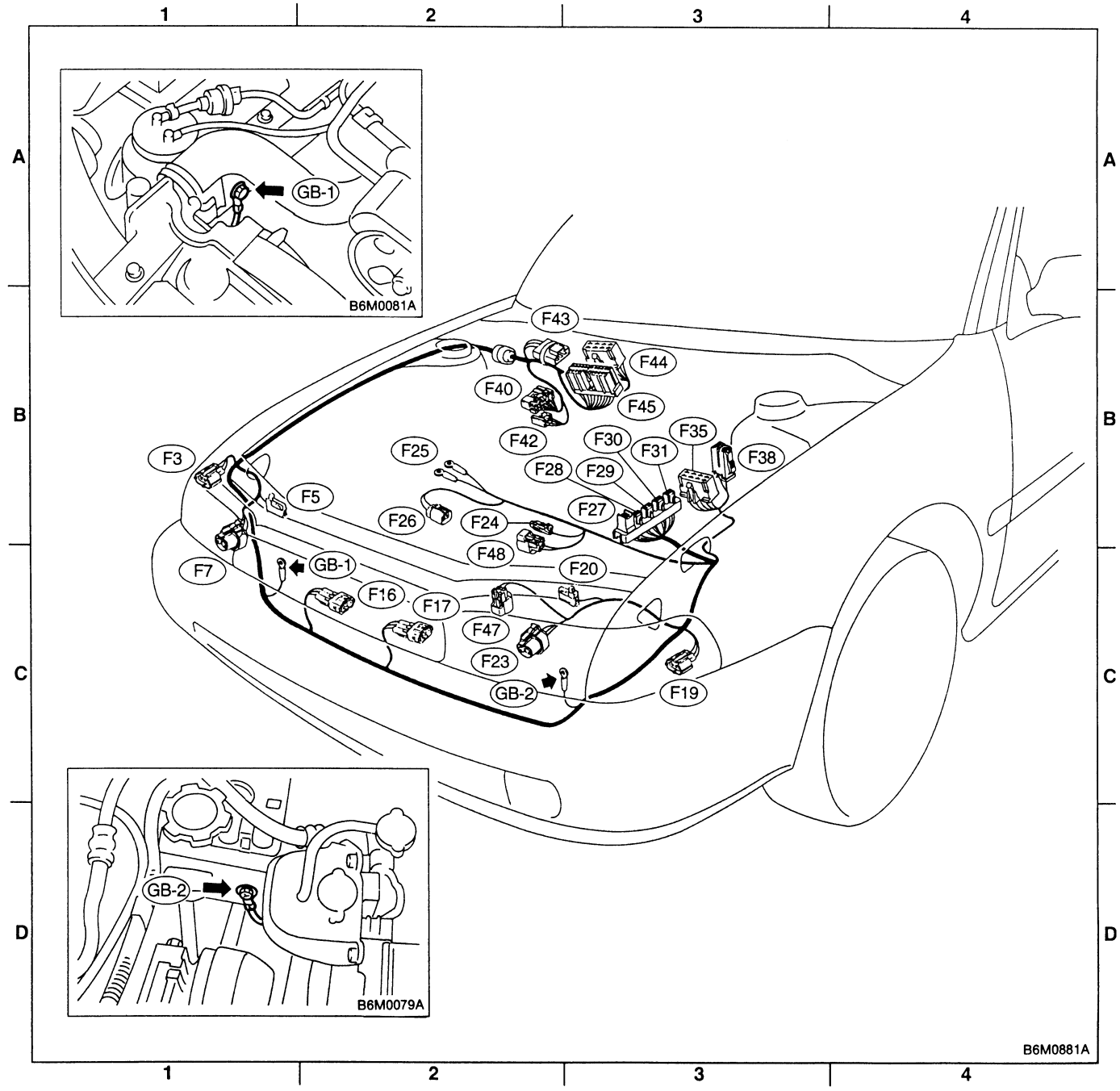
F16
F23
F17
GB-2
F19
F21
F47
GB-2
B6M0079A
B6M0880A

2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F3	3	Brown	B-1		Front turn signal and side marker light RH
F5	1	Black	B-1		Horn
F7	3	Black	B-1		Headlight RH
F16	3	Black	C-1		Sub fan motor
F17	3	Black	C-2		Radiator main fan motor
F19	3	Brown	C-3		Front turn signal and side marker light LH
F20	1	Black	C-2		Horn
F23	3	Black	C-2		Headlight LH
F24	1	Black	B-2		A/C compressor
F25	1 × 2	*	B-2		Generator
F26	2	Gray	B-2		
F27	4	Black	B-3		A/C fuse (Relay holder)
F28	4	Black	B-3		A/C main fan relay-1 (Relay holder)
F29	4	Black	B-3		A/C sub fan relay-2 (Relay holder)
F30	4	Black	B-3		A/C main fan relay-2 (Relay holder)
F31	4	Black	B-3		A/C relay (Relay holder)
F35	8	Black	B-3		M/B
F38	2	Black	B-3		
F40	10	Gray	B-2		F/B
F42	5	Gray	B-2		
F43	3	Orange	B-2		A/C diode
F44	8	*	B-2	B61	Bulkhead wiring harness
F45	20	*	B-2	B62	
F47	2	Gray	C-2		A/C pressure switch
F48	2	Blue	B-2		Thermal protector
*: Non-colored					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GB-1
B6M0081A
F43
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F48
F20
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GB-1
F16
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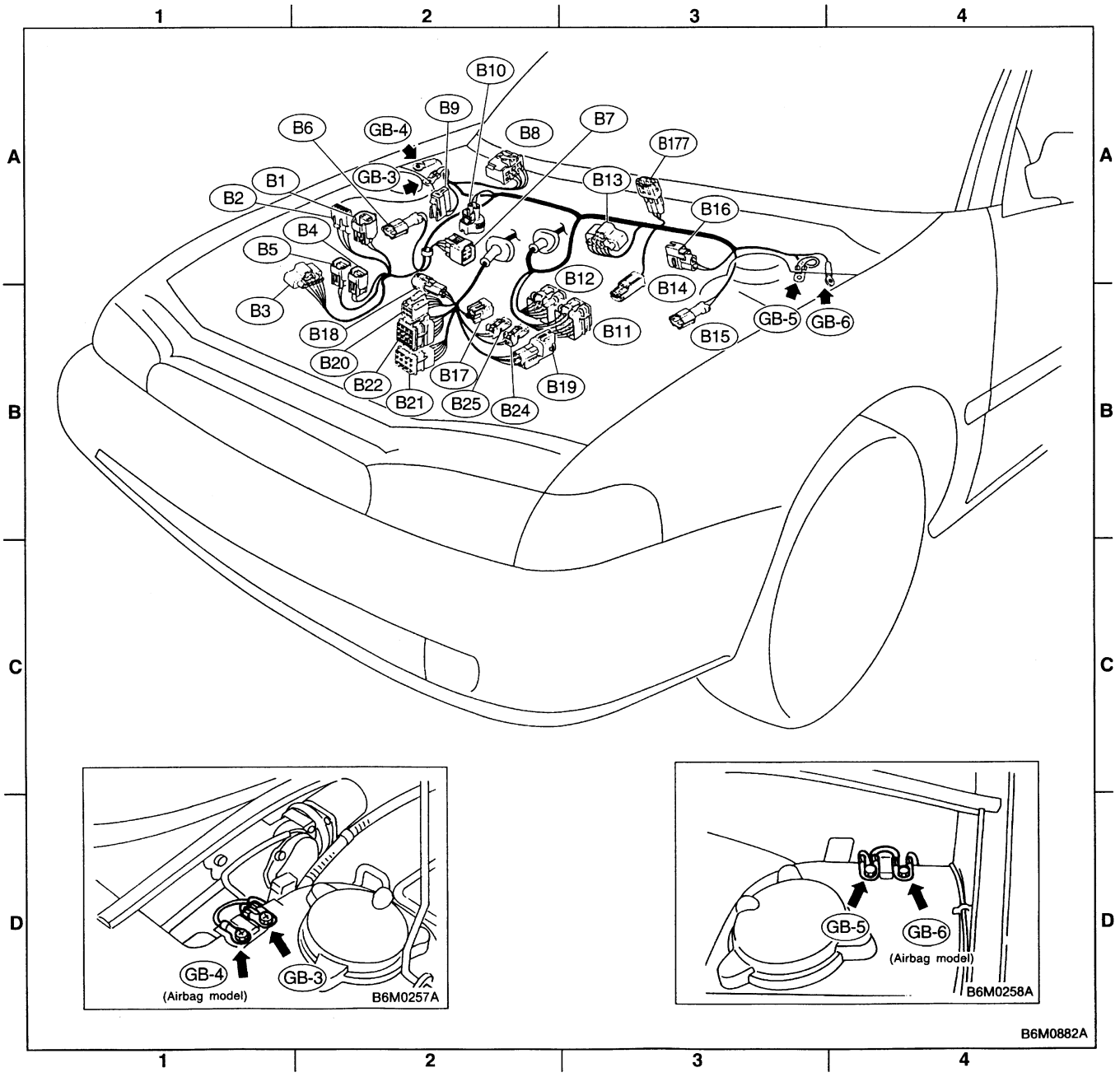
F47
F23
GB-2
F19
GB-2
B6M0079A
B6M0881A

C: BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B1	2	*	B-2		Pressure source switching solenoid
B2	3	Black	B-2		Pressure sensor
B3	5	Gray	B-2		Mass air flow sensor
B4	2	Gray	B-2		AT dropping resistor
B5	2	Gray	B-2		Resistor (Daytime running light)
B6	2	Gray	B-2		ABS front sensor RH
	2	Brown	B-2		ABS front sensor RH (Outback with step roof)
B7	4	*	B-2		Cruise control pump
B8	6	*	A-2		Front wiper motor
B9	2	Black	A-2		FWD switch (AT)
B10	2	Brown	B-2		A/C pressure switch
B11	16	Gray	B-3	T4	Transmission (AT)
B12	12	Gray	B-2	T3	
B13	6	Gray	B-3		Ignitor
B14	1	Black	B-3		Starter (Magnet)
B15	2	Gray	B-3		ABS front sensor LH
	2	Brown	B-3		ABS front sensor LH (Outback with step roof)
B16	2	Gray	B-3		Brake fluid level switch
B17	2	Black	B-2		Vehicle speed sensor
B18	3	Dark gray	B-2		Front oxygen sensor
B19	4	*	B-2	T5	Rear oxygen sensor cord (Other models)
	4	*	B-2		Rear oxygen sensor (California model)
B20	6	Light gray	B-2	E1	Engine wiring harness
B21	12	Light gray	B-2	E2	
B22	16	Light gray	B-2	E3	
B24	2	Gray	B-2	T1	Back-up light switch (MT)
B25	2	Brown	B-2	T2	Neutral position switch (MT)
B177	3	Gray	A-3		Wiper deicer
*: Non-colored					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GB-6
B18
B11
B15
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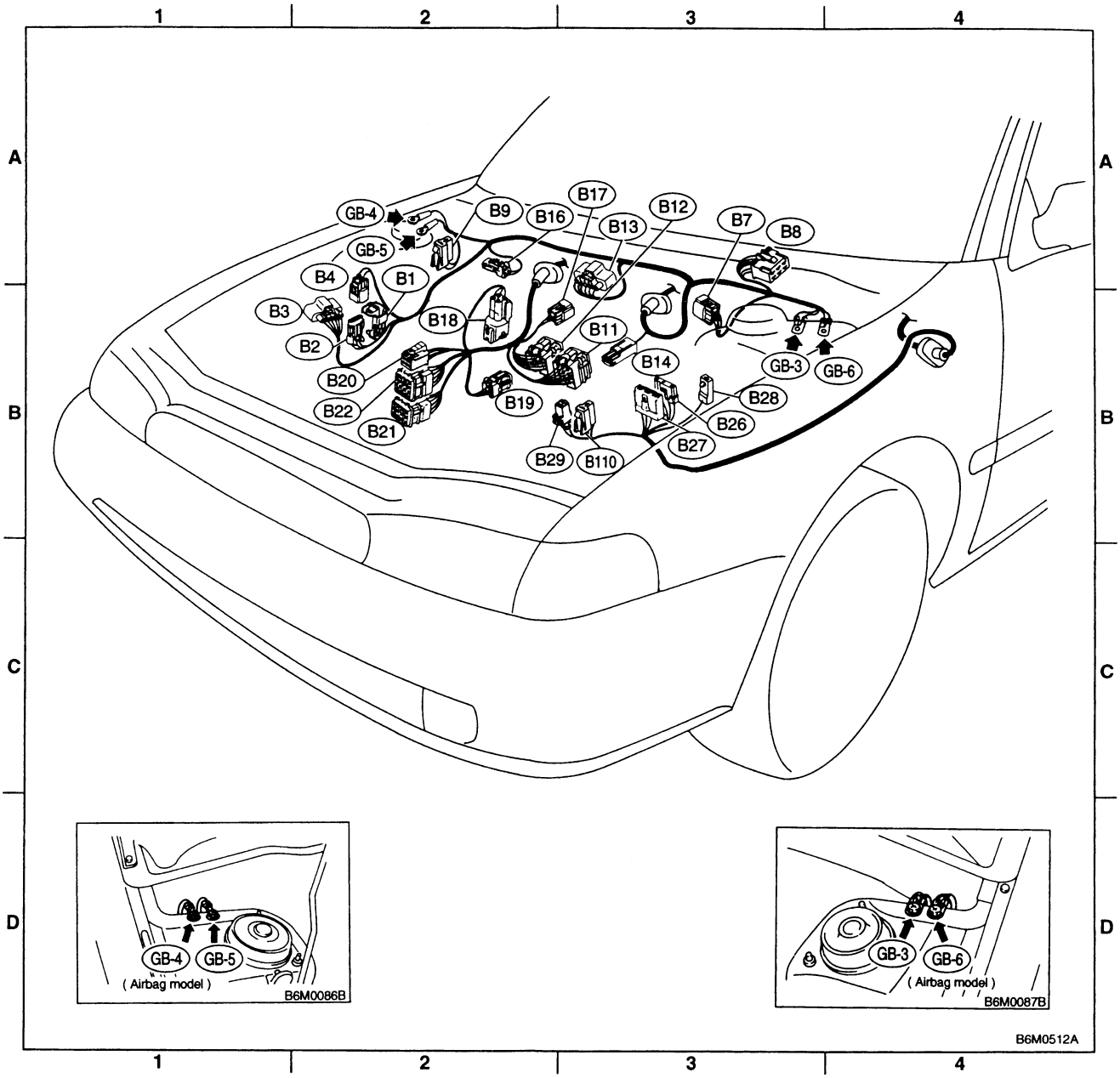
B25
B24
GB-4
(Airbag model)
GB-3
B6M0257A
GB-5
GB-6
(Airbag model)
B6M0258A
B6M0882A

2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B1	2	Brown	B-2		Pressure sources switching solenoid
B2	3	Black	B-2		Pressure sensor
B3	5	Gray	B-2		Mass air flow sensor
B4	2	Gray	B-2		AT dropping resistor
B7	4	Gray	B-3		Cruise control pump
B8	6	*	B-3		Front wiper motor
B9	2	Black	A-2		FWD switch
B11	16	Gray	B-3	T4	Transmission
B12	12	Gray	B-2	T3	
B13	6	Gray	B-3		Ignitor
B14	1	Black	B-3		Starter (Magnet)
B16	2	Gray	B-2		Brake fluid level switch
B17	2	Black	B-3		Vehicle speed sensor
B18	3	Dark gray	B-2		Front oxygen sensor
B19	4	*	B-2	T5	Rear oxygen sensor cord (Other models)
	4	*	B-2		Rear oxygen sensor (California model)
B20	6	Light gray	B-2	E1	Engine wiring harness
B21	12	Light gray	B-2	E2	
B22	16	Light gray	B-2	E3	
B26	2	Black	B-3		M/B
B27	3	*	B-3		
B28	1	Brown	B-3		
B29	2	*	B-2		Rear washer motor
B110	2	Green	B-3		Front washer motor
*: Non-colored					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GB-3
GB-6
B28
B26
B27
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B29
B110
(Airbag model)
B6M0086B
GB-3
GB-6
(Airbag model)
B6M0087B
B6M0512A

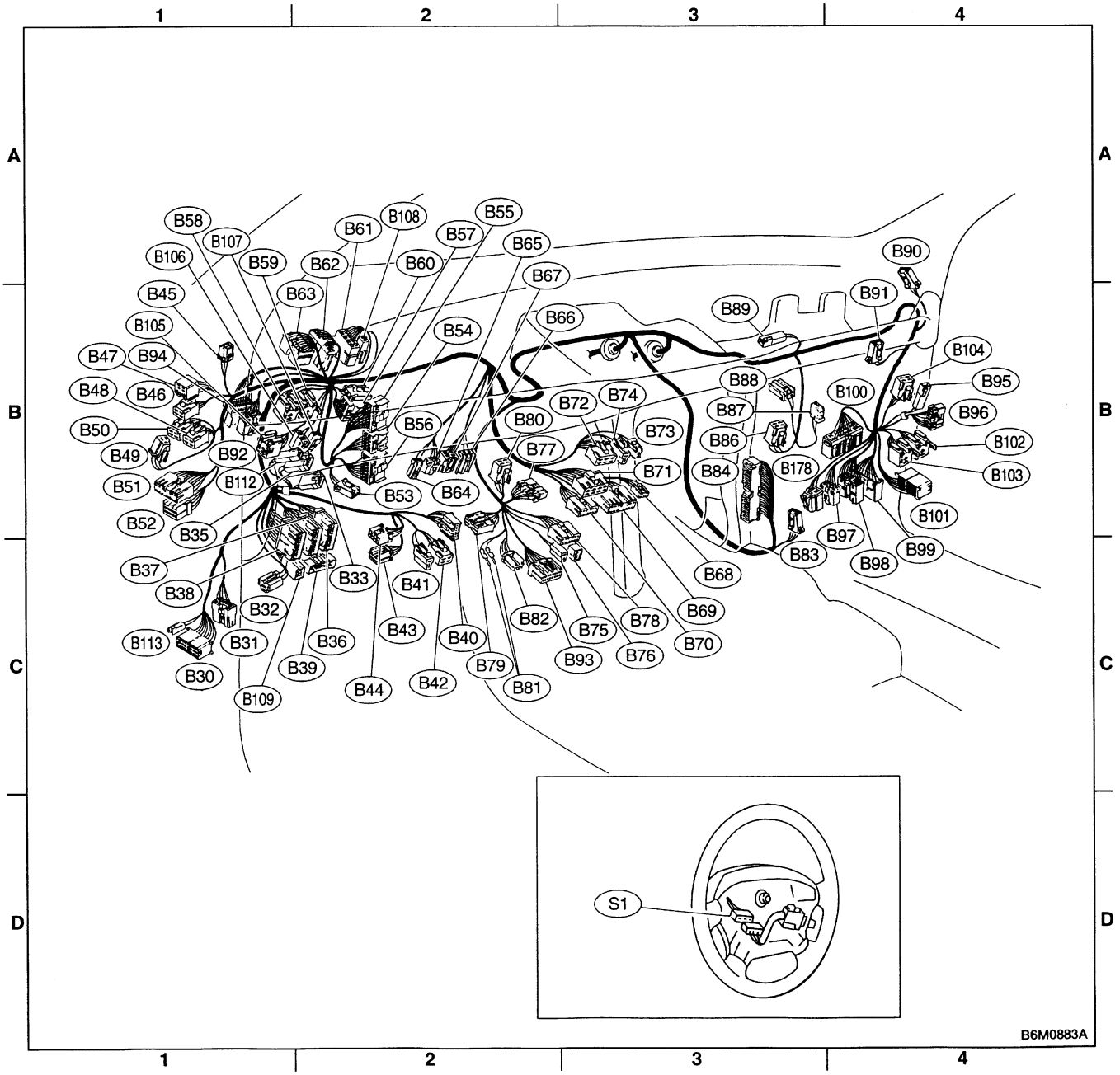
D: BULKHEAD WIRING HARNESS (IN COMPARTMENT)

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	24	*	C-1	D1	Front door cord LH
B31	7	Yellow	C-1	AB1	SRS (Airbag) harness
B32	3	Black	C-1		Turn & hazard module
B33	4	Brown	B-1		Diode (Brake fluid level)
B35	2	Black	B-1		Diode (Without step light)
	4	Brown	B-1		Diode (With step light)
B36	22	Black	C-1	i1	Instrument panel wiring harness
B37	22	*	C-1	i2	
B38	22	Brown	C-1	i3	
B39	20	Blue	C-1	i4	
B40	16	Gray	C-2		OBD-II service connector
B41	2	*	C-2		Power window circuit breaker
B42	4	*	C-2		Power window and sunroof relay
B43	6	Black	C-2		Illumination control module
B44	8	*	C-2		Seat belt timer
B45	4	*	B-1	R53	Sunroof cord
B46	4	Green	B-1		Fuel pump relay
B47	6	Brown	B-1		Main relay
B48	4	Blue	B-1		Front fog light relay
B49	3	Black	B-1		Horn relay
B50	4	*	B-1		Blower relay
B51	11	Gray	B-1		F/B
B52	12	Gray	B-1		
B53	4	*	B-2		Shield joint connector (AT)
B54	12	Black	B-2		Transmission control module
B55	16	Black	B-2		
B56	20	Black	B-2		
B57	12	Black	B-2		Shift-lock control module
B58	5	Black	B-1		Headlight alarm relay (Security)
B59	5	Black	B-1		Interrupt relay (Security)
B60	4	*	B-2		Shield joint connector (With TCS model)
B61	8	*	B-2	F44	Front wiring harness
B62	20	*	B-1	F45	
B63	40	Gray	B-1	P10	Floor harness (With TCS model)
B64	2	Black	B-2		Stop light switch
B65	4	Black	B-2		Stop & brake switch (With cruise control)
B66	3	Black	B-2		Pedal stroke sensor (TCS)
B67	4	Black	B-2		Pedal stroke switch (TCS)
B68	5	Black	B-3		Slip ring
B69	11	Black	B-3		Combination switch
B70	9	*	B-3		
B71	8	*	B-3		
B72	6	Black	B-3		Ignition switch
B73	2	Black	B-3		Key lock solenoid (AT)
B74	2	Black	B-3		Key warning switch
B75	2	Green	C-2	B76	Test mode connector
B76	2	Green	C-3	B75	
B77	10	Brown	B-2		Mode actuator
B78	9	Yellow	C-2		Data link connector
B79	14	Gray	C-2		Check connector
B80	4	Blue	B-2	i20	Instrument panel wiring harness
B81	1 × 2	*	C-2		Diagnosis terminal (Ground)
B82	6	Black	C-2		Diagnosis connector
B83	4	*	C-3		Shield joint connector (E/G)
B84	96	Light blue	B-3		Engine control module
B86	4	*	B-3		Blower motor resistor
B87	2	*	B-3		Blower motor
B88	3	Black	B-3		Evaporator thermoswitch
B89	2	Black	B-3		Diode (Security)
B90	4	*	B-4	R50	Room light cord
B91	4	*	B-4		FRESH/RECIRC actuator
B92	8	*	B-4		Door lock timer
B93	16	Black	B-4		Security control module
B94	20	Black	B-4		Cruise control module
B95	2	Black	B-4		Diode (Daytime running light)
B96	10	*	B-4		Daytime running light control module
B97	8	*	B-4	R1	Rear wiring harness
B98	20	*	B-4	R2	Rear wiring harness (Taiwan model)
	24	Black	B-4	R2	Rear wiring harness (Except Taiwan model)
B99	24	*	B-4	R3	Rear wiring harness
B100	20	Blue	B-4	F2	Front wiring harness (With ABS model)
B101	24	*	B-4	D11	Front door cord RH
B102	5	Black	B-4		Daytime running light relay
B103	4	Blue	B-4		High-beam relay (Daytime running light)
B104	4	Pink	B-4		Rear power supply relay
B105	4	Blue	B-1		Starter interlock relay (MT)
B106	2	*	B-1		Clutch switch (MT)
B107	2	Blue	B-1		Clutch switch (Cruise control)
B108	2	Black	B-2	F46	Front wiring harness (Outback)
B109	4	Black	C-1		Fuse holder (Outback)
B112	2	Black	B-1		Diode (Front fog light)
B113	2	*	C-1	D50	Front door cord LH
B178	3	*	B-4	R85	Rear wiring harness (Wiper deicer)

*: Non-colored

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
S1	3	White	D-3		Cruise control sub switch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B92
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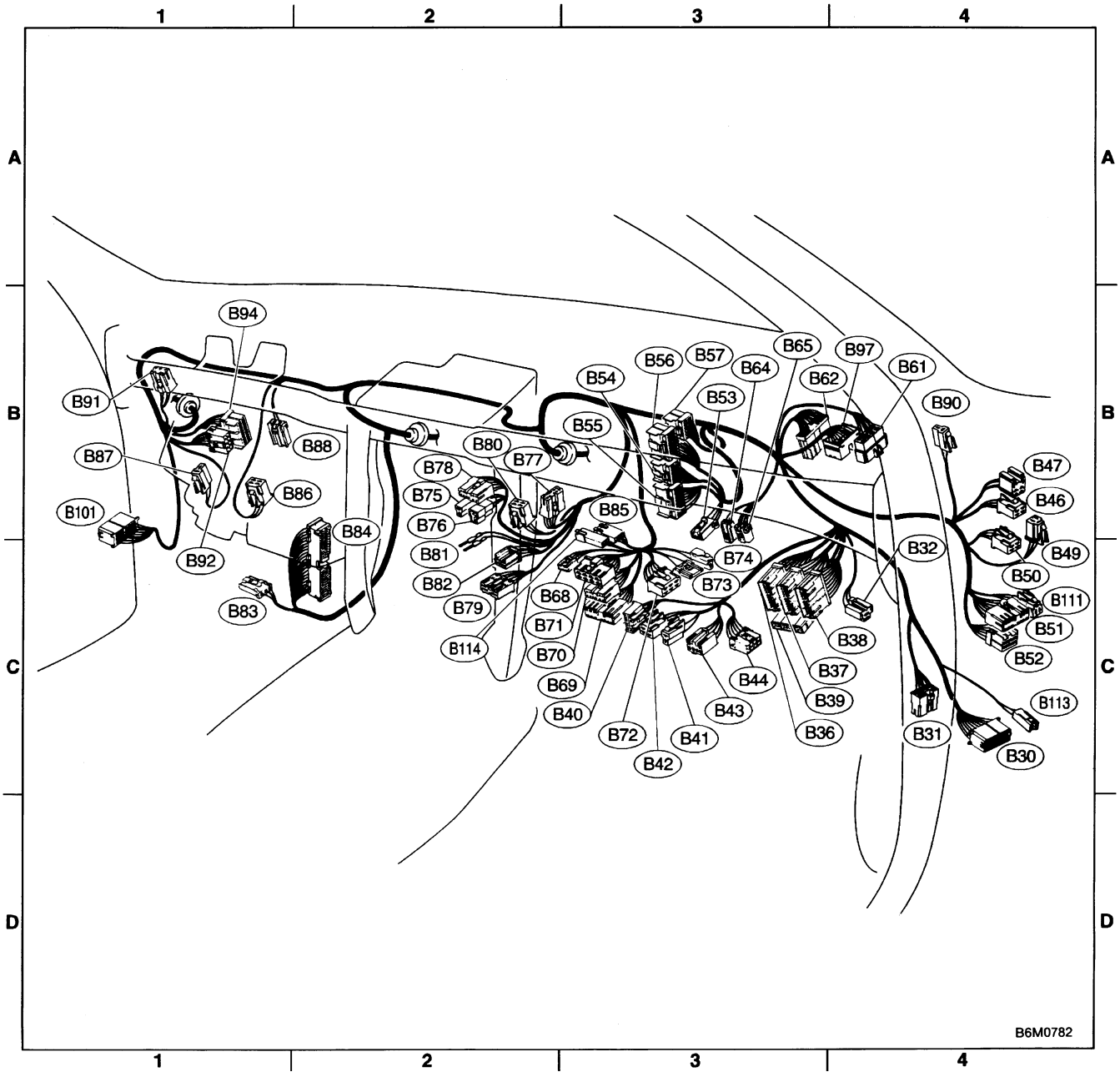
S1
B6M0883A

2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	24	*	C-4	D1	Front door cord RH
B31	7	Yellow	C-4	AB1	SRS (Airbag) harness
B32	3	Black	C-4		Turn & hazard module
B36	22	Black	C-3	i1	Instrument panel wiring harness
B37	22	*	C-3	i2	
B38	22	Brown	C-3	i3	
B39	20	Blue	C-3	i4	
B40	16	Gray	C-3		OBD-II service connector
B41	2	*	C-3		Power window circuit breaker
B42	4	*	C-3		Power window relay
B43	6	Black	C-3		Illumination control module
B44	8	*	C-3		Seat belt timer
B46	4	Green	B-4		Fuel pump relay
B47	6	Brown	B-4		Main relay
B49	3	Black	B-4		Horn relay
B50	4	*	B-4		Blower relay
B51	11	Gray	C-4		F/B
B52	12	Gray	C-4		
B53	4	*	B-3		Shield joint connector (AT)
B54	12	Black	B-3		Transmission control module
B55	16	Black	B-3		
B56	20	Black	B-3		
B57	12	Black	B-3		Shift-lock control module
B61	8	*	B-4	F44	Front wiring harness
B62	20	*	B-4	F45	
B64	2	Black	B-3		Stop light switch
B65	4	Black	B-3		Stop & brake switch (With cruise control)
B68	5	Black	B-3		Cruise control sub switch
B69	11	Black	C-3		Combination switch
B70	9	*	C-3		
B71	8	*	B-3		
B72	6	Black	C-3		Ignition switch
B73	2	Black	B-3		Key lock solenoid
B74	2	Black	B-3		Key warning switch
B75	2	Green	B-2	B76	Test mode connector
B76	2	Green	B-2	B75	
B77	7	*	B-2		Mode actuator
B78	9	Yellow	B-2		Data link connector
B79	14	Gray	C-2		Check connector

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B80	4	Blue	B-2	i20	Instrument panel wiring harness
B81	1 × 2	*	B-2		Diagnosis terminal (Ground)
B82	6	Black	B-2		Diagnosis connector
B83	4	*	C-1		Shield joint connector (E/G)
B84	96	Light blue	C-2		Engine control module
B85	4	Brown	B-3		Diode (Lighting)
B86	4	Black	B-1		Blower motor resistor
B87	2	Black	B-1		Blower motor
B88	3	Black	B-1		Evaporator thermoswitch
B90	2	Green	B-4	R50	Room light cord
B91	5	*	B-1		FRESH/RECIRC actuator
B92	8	*	B-1		Door lock timer
B94	20	Black	B-1		Cruise control module
B97	56	*	B-4	R1	Rear wiring harness (S.M.J.)
B101	24	*	B-1	D11	Front door cord LH
B111	3	Gray	C-4		F/B
B113	2	*	C-4	D50	Front door cord RH
B114	2	Black	C-3		Diode (Door warning)

*: Non-colored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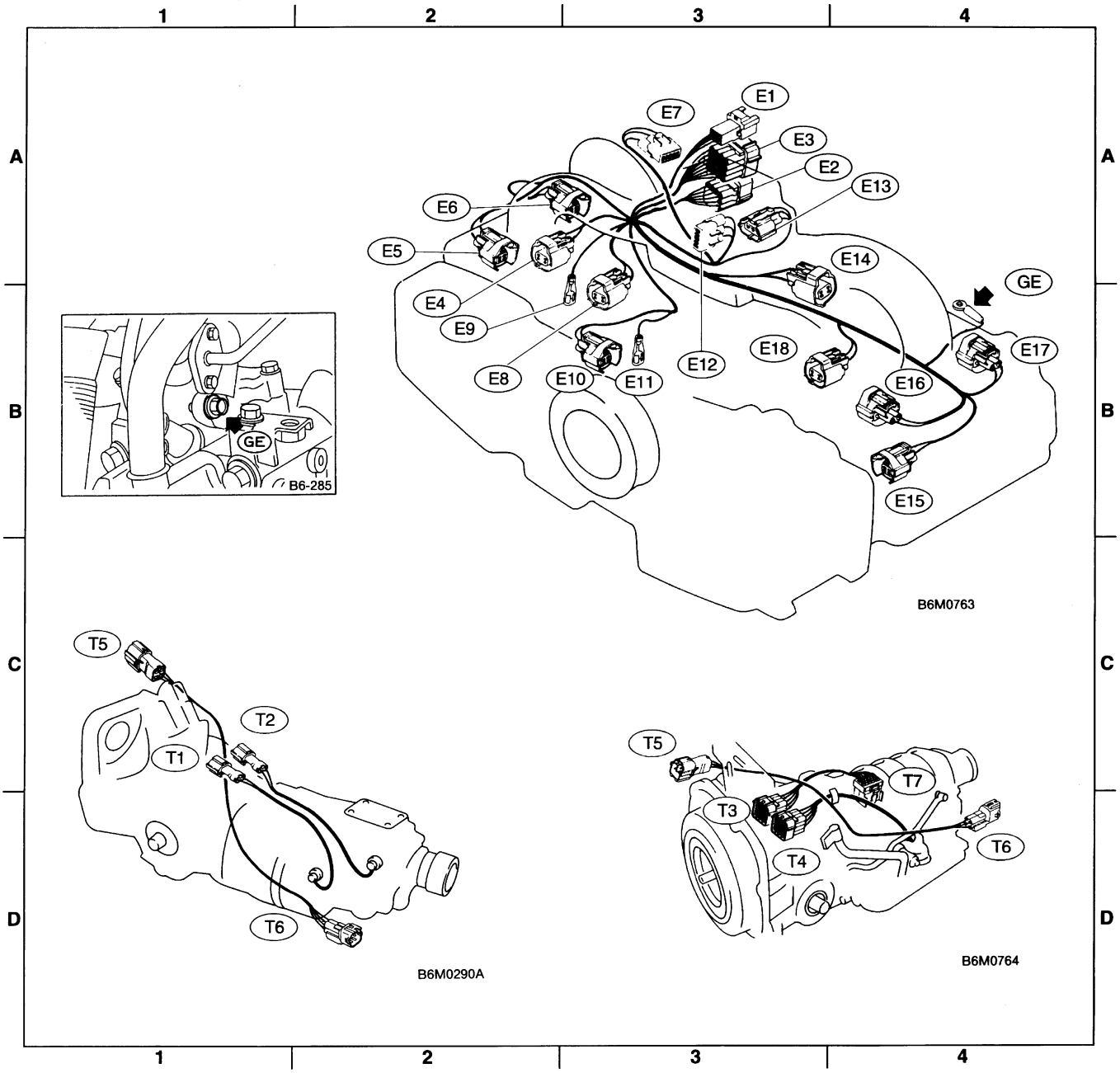
B6M0782

E: ENGINE WIRING HARNESS AND TRANSMISSION CORD

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E1	6	*	A-3	B20	Bulkhead wiring harness
E2	12	Gray	A-3	B21	
E3	16	Gray	A-3	B22	
E4	2	Blue	A-2		Purge control solenoid valve
E5	2	Light gray	A-2		Injector #1
E6	2	Dark gray	A-3		Injector #3
E7	3	Gray	A-3		Idle air control solenoid valve
E8	2	Brown	B-3		Engine coolant temperature sensor
E9	1	*	B-3		Thermometer
E10	2	Gray	B-3		Crankshaft position sensor
E11	1	*	B-3		Oil pressure switch
E12	3	Gray	A-3		Ignition coil
E13	3	Brown	A-3		Throttle position sensor
E14	2	Gray	B-3		Knock sensor
E15	2	Dark gray	B-4		Camshaft position sensor
E16	2	Light gray	B-4		Injector #2
E17	2	Dark gray	B-4		Injector #4
E18	2	Brown	B-3		EGR solenoid (AT)
*: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T1	2	Gray	C-1	B24	Bulkhead wiring harness (MT)
T2	2	Brown	C-1	B25	
T3	12	Gray	D-3	B12	Bulkhead wiring harness (AT)
T4	16	Gray	D-3	B11	
T5	4	Gray	C-1/C-3	B19	Bulkhead wiring harness
T6	4	Gray	D-2/D-4		Rear oxygen sensor
T7	12	*	C-4		Inhibitor switch (AT)
*: Non-colored					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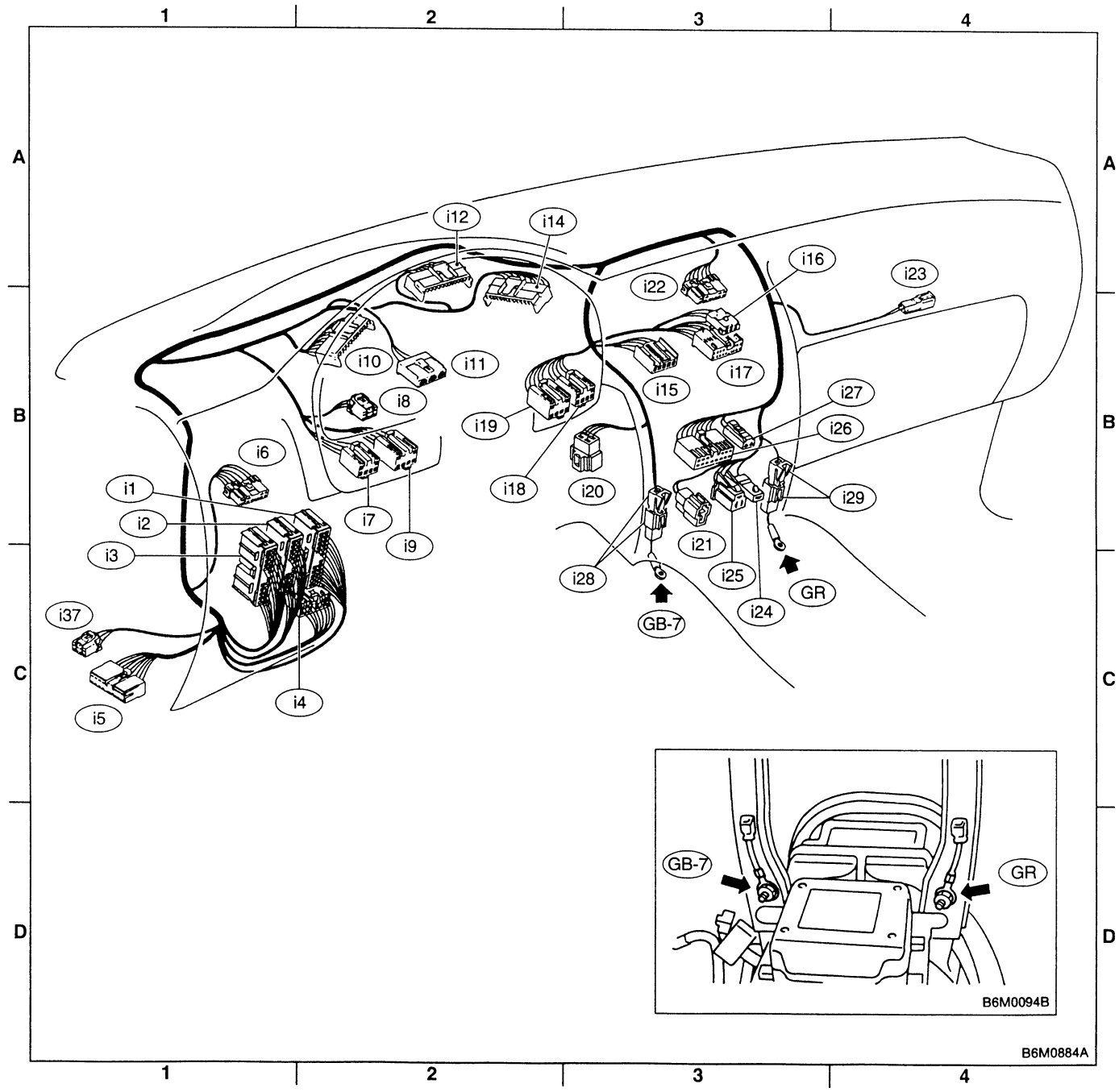
B6-285
B6M0763
T5
T2
T1
T6
B6M0290A
T5
T7
T3
T6
T4
B6M0764

F: INSTRUMENT PANEL WIRING HARNESS

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
i1	22	Black	C-2	B36	Bulkhead wiring harness
i2	22	*	C-1	B37	
i3	22	Brown	C-1	B38	
i4	20	Blue	C-2	B39	
i5	15	Gray	C-1		F/B
i6	10	*	C-1		Remote control rearview mirror switch
i7	6	Yellow	B-2		Front fog light switch
i8	4	Brown	B-2		Security indicator light
i9	6	*	B-2		TCS off switch
i10	16	Light gray	B-2		Combination meter
i11	5	Light blue	B-2		
i12	16	Light gray	B-2		Combination meter
i14	13	*	B-2		Combination meter
i15	6	*	B-3		Fan switch
i16	3	*	B-3		A/C switch
i17	16	*	B-3		Mode control panel
i18	6	*	B-3		Rear defogger switch
i19	6	Brown	B-2		Cruise control main switch
i20	4	Blue	B-3	B80	Bulkhead wiring harness
i21	2	Black	C-3		Ash tray illumination light
i22	10	*	B-3		Hazard switch
i23	2	Brown	B-4		Glove box illumination light
i24	1	*	C-3		Front accessory power supply
i25	3	*	C-3		
i26	14	*	B-3		Radio
i27	2	*	B-3		CD player illumination light
i28	1	Black	C-3		Ground
i29	1	Black	C-3		Ground (Radio)
i37	4	*	C-1		Rear defogger timer
*: Non-colored					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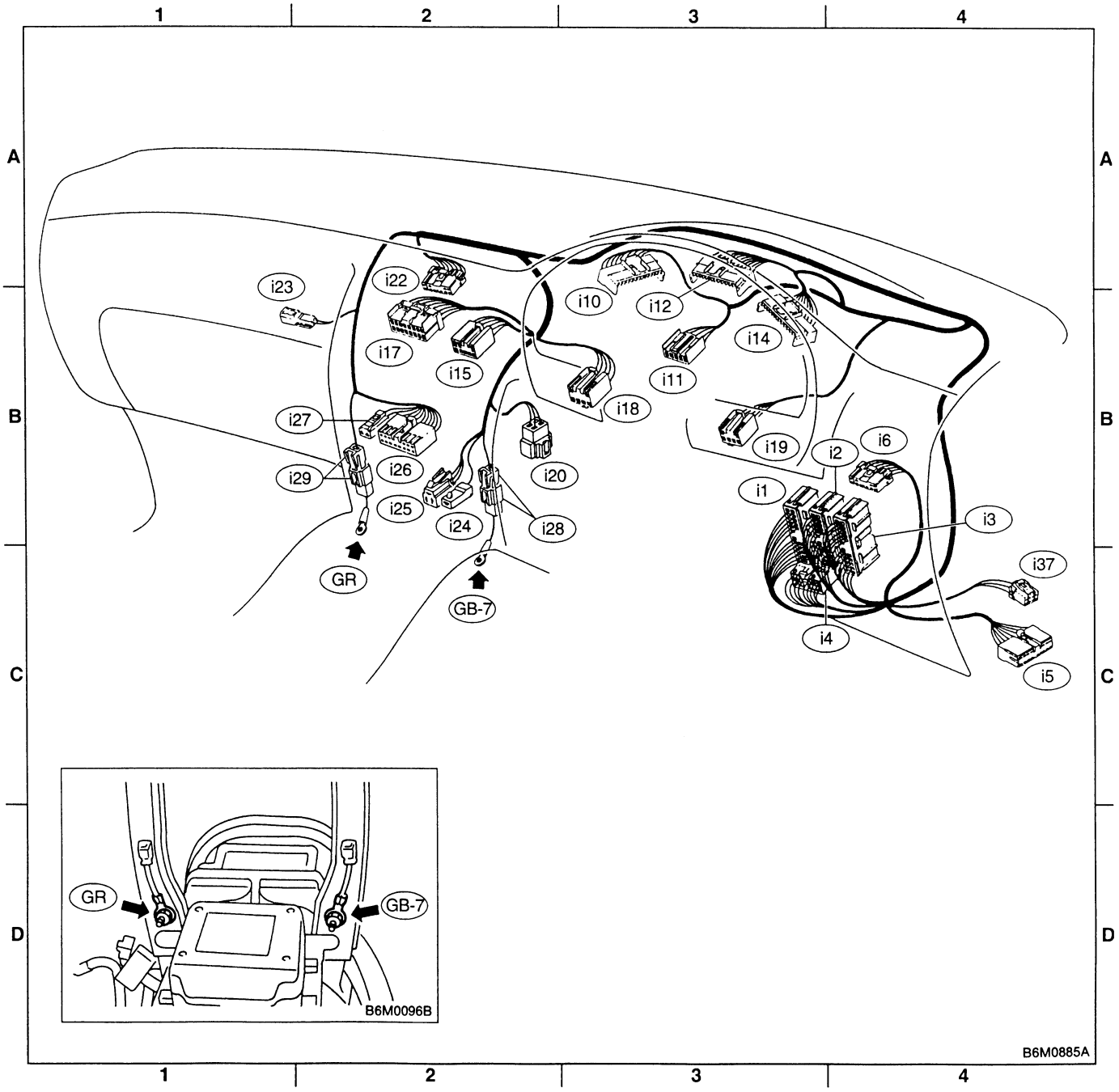
i4
i5
GB-7
GR
B6M0094B
B6M0884A

2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
i1	22	Black	C-4	B36	Bulkhead wiring harness
i2	22	*	C-4	B37	
i3	22	Brown	C-4	B38	
i4	20	Blue	C-4	B39	
i5	15	Gray	C-4		F/B
i6	10	*	C-4		Remote control rearview mirror switch
i10	16	Light gray	B-3		Combination meter
i11	5	Light blue	B-3		
i12	16	Light gray	B-3		Combination meter
i14	13	*	B-3		Combination meter
i15	8	*	B-2		Fan switch
i17	16	Black	B-2		Mode control panel
i18	6	*	B-3		Rear defogger switch
i19	6	Brown	B-3		Cruise control main switch
i20	4	Blue	B-2	B80	Bulkhead wiring harness
i22	10	*	B-2		Hazard switch
i23	2	Brown	B-2		Glove box illumination light
i24	1	*	C-2		Front accessory power supply
i25	3	*	C-2		
i26	14	*	B-2		Radio
i27	2	*	B-2		CD player illumination light
i28	1	Black	C-2		Ground
i29	1	Black	C-2		Ground (Radio)
i37	4	*	C-4		Rear defogger timer
Non-colored					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i5
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B6M0885A

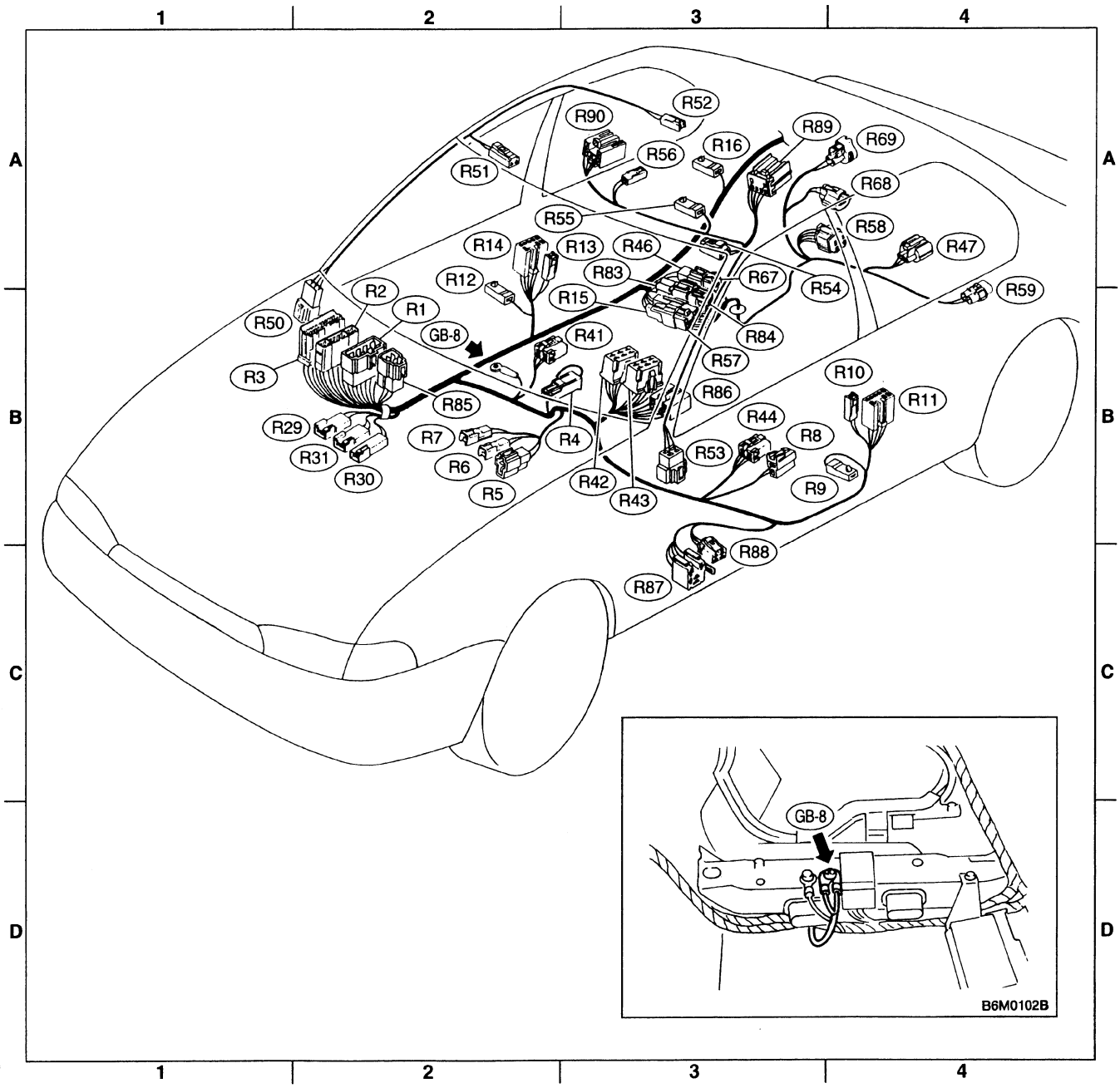
G: REAR WIRING HARNESS

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R1	8	*	B-2	B97	Bulkhead wiring harness
R2	24	Black	B-2	B98	Bulkhead wiring harness (2200 cc engine AWD except Taiwan model)
	20	*	B-2	B98	Bulkhead wiring harness (Other models)
R3	24	*	B-2	B99	Bulkhead wiring harness
R4	1	Black	B-2		Parking brake switch
R5	2	*	C-2		Select lever illumination light (AT)
R6	2	Black	C-2		Shift lock solenoid (AT)
R7	2	*	C-2		P position switch (AT)
R8	2	*	C-3		Seat belt switch
R9	1	Brown	C-4		Front door switch LH
R10	2	*	C-4	D22	Rear door cord LH (Security)
R11	8	*	C-4	D21	Rear door cord LH
R12	1	Brown	B-2		Front door switch RH
R13	2	*	B-2	D28	Rear door cord RH (Security)
R14	8	*	B-2	D27	Rear door cord RH
R15	8	*	B-3	R57	Fuel tank cord (Except Taiwan model)
	6	Black	B-3	R57	Fuel tank cord (Taiwan model)
R16	1	Brown	B-3		Rear door switch RH
R29	3	*	C-2		Diode (Security)
R30	2	Black	C-2		Diode (Rear gate latch switch) (Wagon)
R31	3	*	C-2		Diode (Security)
R41	4	Blue	B-2		Seat heater (Passenger)
R42	6	*	B-3		Seat heater switch (Passenger)
R43	6	Blue	B-3		Seat heater switch (Driver)
R44	4	Blue	C-3		Seat heater (Driver)
R46	2	*	B-3	R67	Fuel tank cord (Except Taiwan model)
R47	3	*	B-4		Fuel tank pressure sensor (2200 cc engine AWD model)
R50	4	*	B-2	B90	Bulkhead wiring harness
R51	2	*	B-2		Vanity mirror illumination light RH
R52	2	*	A-3		Room light
R53	4	*	C-3	B45	Bulkhead wiring harness
R54	2	*	B-3		Vanity mirror illumination light LH
R55	1	*	B-3		Sunroof control module (Except OUTBACK)
R56	2	*	B-3		Spot light
R57	8	*	B-3	R15	Rear wiring harness (Except Taiwan model)
	6	Black	B-3	R15	Rear wiring harness (Taiwan model)
R58	6	*	B-3		Fuel gauge module & fuel pump
R59	2	*	B-4		Fuel gauge sub module (AWD)
R67	2	*	B-3	R46	Rear wiring harness (Except Taiwan model)
R68	2	*	B-3		Pressure control solenoid valve
R69	2	*	B-3		Vent control solenoid valve
R83	4	*	B-3	R84	Fuel tank cord (2200 cc engine AWD model)
R84	4	*	B-3	R83	Rear wiring harness (2200 cc engine AWD model)
R85	3	*	B-2	B178	Bulkhead wiring harness (Wiper deicer)
R86	8	*	B-3		Wiper deicer switch
R87	4	Blue	C-3		Wiper deicer relay
R88	4	*	C-3		Wiper deicer timer

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R89	6	Black	A-3		Sunroof control module (OUTBACK)
R90	6	Brown	A-3		Sunroof switch (OUTBACK)
*: Non-colored					

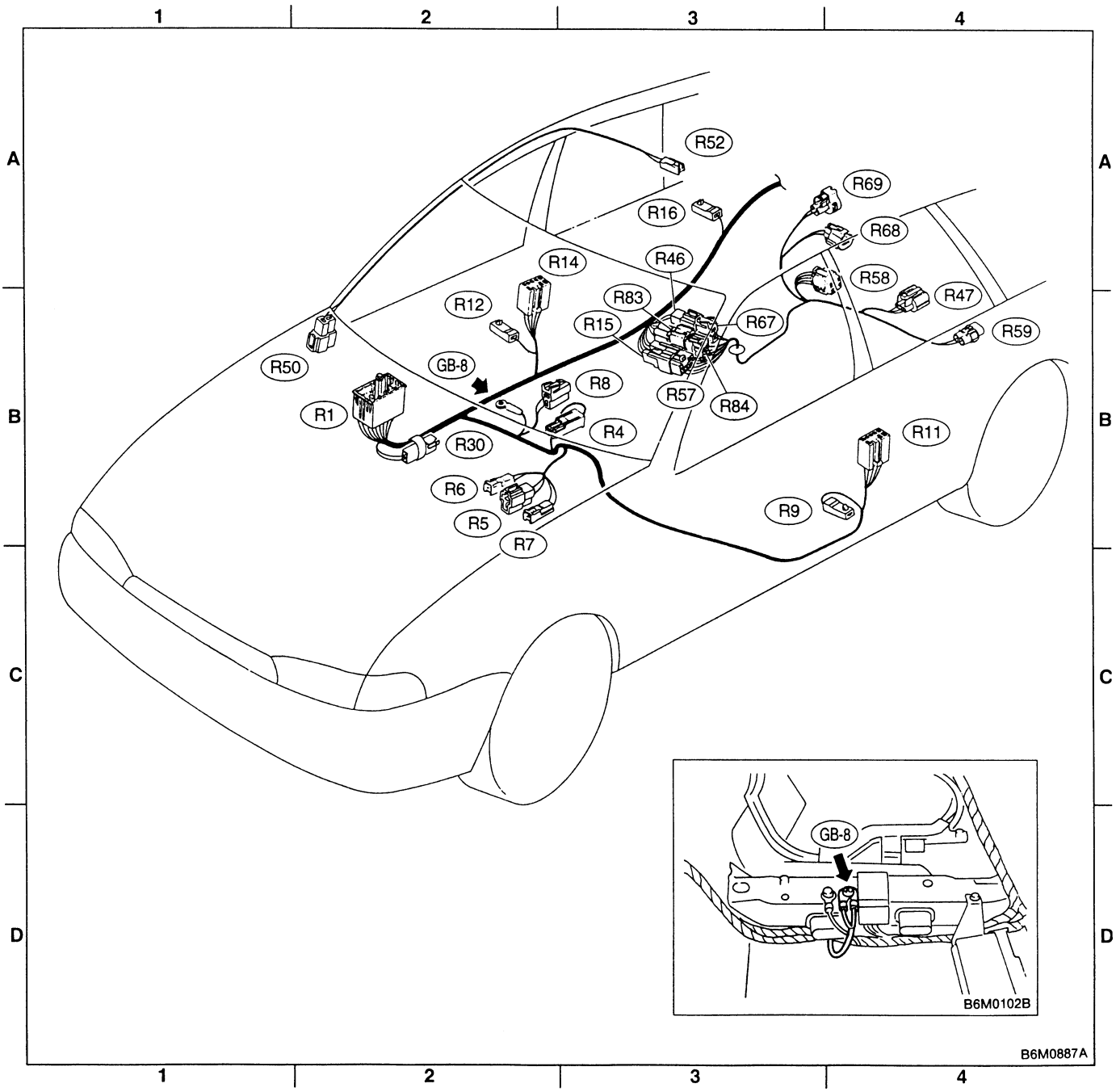
8. Electrical Wiring Harness and Ground Point



2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R1	56	*	B-2	B97	Bulkhead wiring harness (S.M.J.)
R4	1	Black	B-2		Parking brake switch
R5	2	*	B-2		Select lever illumination light
R6	2	Black	B-2		Shift lock solenoid
R7	2	*	B-2		P position switch
R8	2	*	B-2		Seat belt switch
R9	1	Brown	B-3		Front door switch LH
R11	8	*	B-4	D21	Rear door cord LH
R12	1	Brown	B-2		Front door switch RH
R14	8	*	B-2	D27	Rear door cord RH
R15	8	*	B-3	R57	Fuel tank cord
R16	1	Brown	A-3		Rear door switch RH
R30	2	Black	B-2		Diode (Rear gate latch switch)
R46	2	*	B-3	R67	Fuel tank cord
R47	3	*	B-4		Fuel tank pressure sensor
R50	2	Green	B-2	B90	Bulkhead wiring harness
R52	2	*	A-3		Room light
R57	8	*	B-3	R15	Rear wiring harness
R58	6	*	A-3		Fuel gauge module & fuel pump
R59	2	*	B-4		Fuel gauge sub module
R67	2	*	B-3	R46	Rear wiring harness
R68	2	*	B-3		Pressure control solenoid valve
R69	2	*	A-3		Vent control solenoid valve
R83	4	*	B-3	R84	Fuel tank cord
R84	4	*	B-3	R83	Rear wiring harness
*: Non-colored					

8. Electrical Wiring Harness and Ground Point



H: FLOOR WIRING HARNESS AND DOOR CORD

1. LHD MODEL

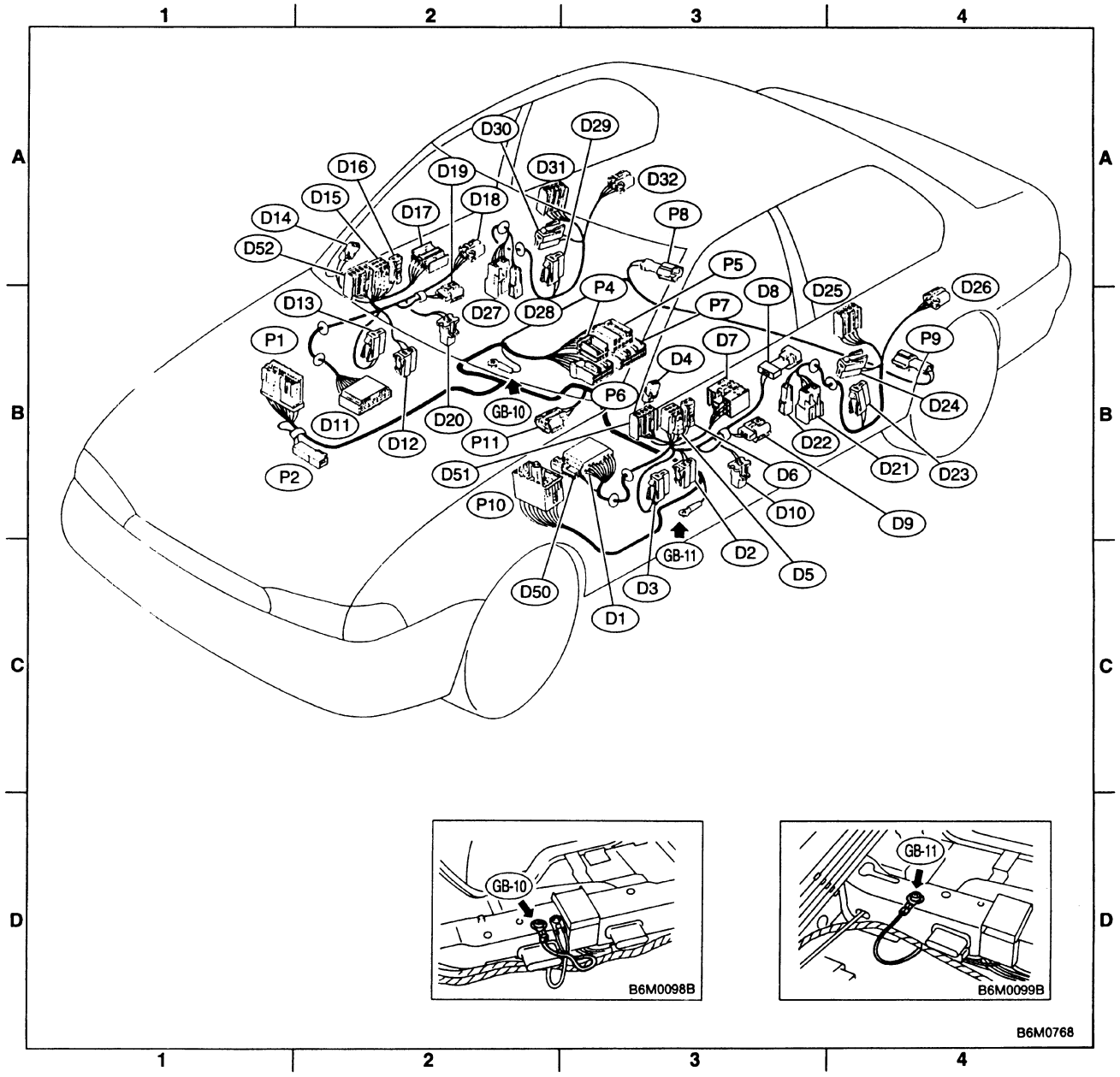
Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
P1	20	Blue	B-1	F1	Front wiring harness (With TCS model)
	8	*	B-1	F1	Front wiring harness (With ABS model)
P2	2	Black	C-2		Diode (TCS)
P4	6	*	B-3		ABS/TCS control module
P5	8	*	B-3		
P6	16	*	B-3		
P7	20	*	B-3		
P8	2	Gray	B-3		Rear ABS sensor RH
	2	*	B-3		Rear ABS sensor RH (Outback with step roof)
P9	2	Gray	B-4		Rear ABS sensor LH
	2	*	B-4		Rear ABS sensor LH (Outback with step roof)
P10	40	Gray	B-2	B63	Bulkhead wiring harness (With TCS model)
P11	3	*	B-2		ABS G sensor

*: Non-colored

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D1	24	*	C-3	B30	Bulkhead wiring harness
D2	2	*	C-3		Front door speaker LH
D3	2	Green	C-3		Front power window motor LH
D4	2	Black	B-3		Front tweeter LH
D5	6	*	B-3		Remote control rear-view mirror LH
D6	2	*	B-3		Mirror heater LH
D7	14	*	B-3		Power window main switch
D8	4	*	B-3		Front door lock actuator LH
	4	Gray	B-3		Front door lock actuator LH (With security system)
D9	4	Gray	B-3		Front door key switch LH (Security)
D10	2	Black	C-3		Step light LH
D11	24	*	B-2	B101	Bulkhead wiring harness
D12	2	*	B-2		Front door speaker RH

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D13	2	Green	B-2		Front power window motor RH
D14	2	Black	B-2		Front tweeter RH
D15	6	*	B-2		Remote control rear-view mirror RH
D16	2	*	B-2		Mirror heater RH
D17	5	*	B-2		Front power window sub switch RH
D18	4	*	B-2		Front door lock actuator RH
	4	Gray	B-2		Front door lock actuator RH (With security system)
D19	4	Gray	B-2		Front door key switch RH (Security)
D20	2	Black	B-2		Step light RH
D21	8	*	B-3	R11	Rear wiring harness
D22	2	*	B-3	R10	Rear wiring harness (Security)
D23	2	Black	B-4		Rear door speaker LH
D24	2	Green	B-4		Rear power window motor LH
D25	5	*	B-4		Rear power window sub switch LH
D26	4	*	B-4		Rear door lock actuator LH
	4	Gray	B-4		Rear door lock actuator LH (With security system)
D27	8	*	B-2	R14	Rear wiring harness
D28	2	*	B-2	R13	Rear wiring harness (Security)
D29	2	Black	B-2		Rear door speaker RH
D30	2	Green	B-3		Rear power window motor RH
D31	5	*	A-2		Rear power window sub switch RH
D32	4	*	A-3		Rear door lock actuator RH
	4	Gray	A-3		Rear door lock actuator RH (With security system)
D50	2	*	C-2	B113	Bulkhead wiring harness
D51	5	*	B-3		Front door lock switch LH
D52	5	*	B-2		Front door lock switch RH

*: Non-colored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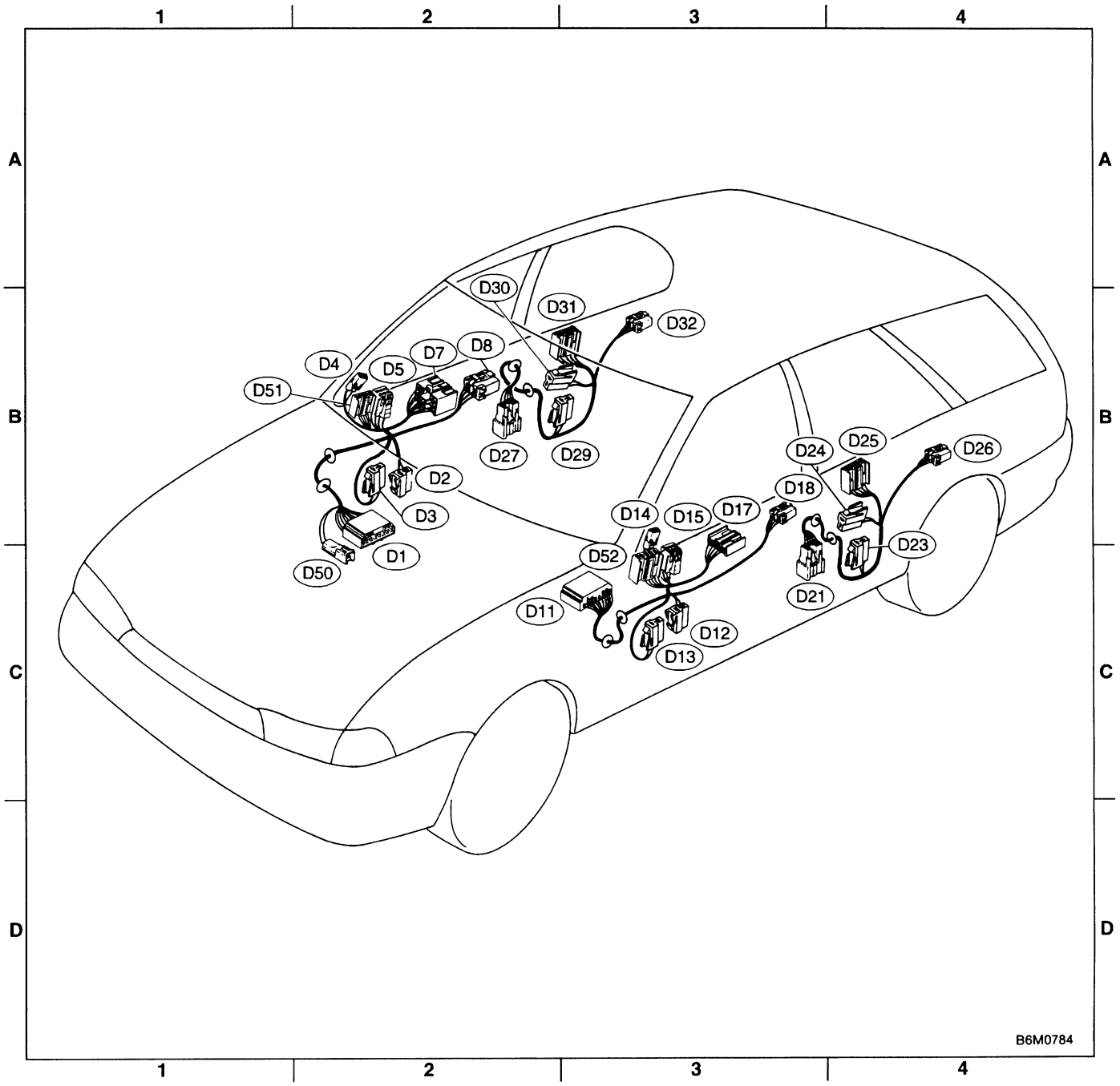
B6M0099B
B6M0768

2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D1	24	*	B-2	B30	Bulkhead wiring harness
D2	2	*	B-2		Front door speaker RH
D3	2	Green	B-2		Front power window motor RH
D4	2	Black	A-2		Front tweeter RH
D5	6	*	B-2		Remote control rearview mirror RH
D7	14	*	B-2		Power window main switch
D8	4	*	A-2		Front door lock actuator RH
D11	24	*	B-3	B101	Bulkhead wiring harness
D12	2	*	B-3		Front door speaker LH
D13	2	Green	B-3		Front power window motor LH
D14	2	Black	B-3		Front tweeter LH
D15	6	*	B-3		Remote control rearview mirror LH
D17	5	*	B-3		Front power window sub switch LH
D18	4	*	B-3		Front door lock actuator LH
D21	8	*	B-3	R11	Rear wiring harness
D23	2	Black	B-4		Rear door speaker LH
D24	2	Green	B-4		Rear power window motor LH
D25	5	*	B-4		Rear power window sub switch LH
D26	4	*	B-4		Rear door lock actuator LH
D27	8	*	B-2	R14	Rear wiring harness
D29	2	Black	B-3		Rear door speaker RH
D30	2	Green	A-3		Rear power window motor RH
D31	5	*	A-3		Rear power window sub switch RH
D32	4	*	A-3		Rear door lock actuator RH
D50	2	*	B-2	B113	Bulkhead wiring harness
D51	5	Green	B-2		Front door lock switch RH
D52	5	Green	C-3		Front door lock switch LH
*: Non-colored					

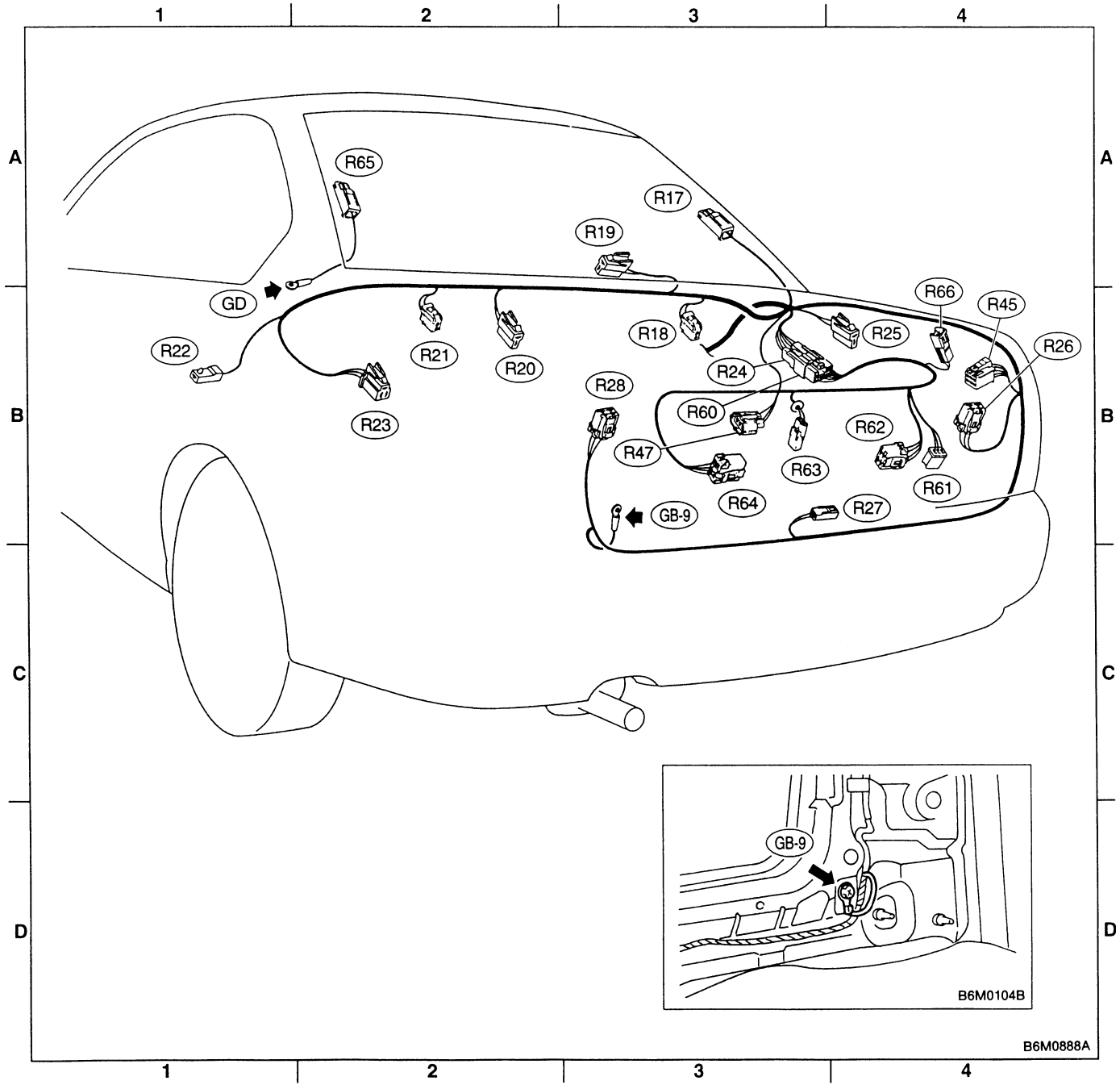
8. Electrical Wiring Harness and Ground Point



I: REAR END WIRING HARNESS (SEDAN)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R17	1	Black	A-3		Rear defogger (Power)
R18	2	Black	B-3		Rear speaker RH
R19	2	*	B-3		High-mounted stop light
R20	2	Blue	B-2		Trunk room light
R21	2	Black	B-2		Rear speaker LH
R22	1	Brown	B-1		Rear door switch LH
R23	3	*	B-2		Power antenna
R24	6	*	B-3	R60	Trunk lid cord (Without security system)
	8	*	B-3	R60	Trunk lid cord (With security system)
R25	2	Black	B-4		Rear defogger condenser
R26	4	*	B-4		Rear combination light RH
R27	2	*	B-4		Trunk room light switch
R28	4	*	B-3		Rear combination light LH
R45	6	*	B-4		Trailer connector
R47	3	*	B-3		Fuel tank pressure sensor (2200 cc engine FWD and 2500 cc engine model)
R60	6	*	B-4	R24	Rear wiring harness (Without security system)
	8	*	B-4	R24	Rear wiring harness (With security system)
R61	3	*	B-4		Key switch (Security)
R62	4	*	B-4		Rear finisher light RH
R63	2	*	B-3		License plate light
R64	4	*	B-3		Rear finisher light LH
R65	1	Black	A-2		Rear defogger (Ground)
R66	2	Black	B-4		High-mounted stop light (Rear spoiler)
*: Non-colored					

8. Electrical Wiring Harness and Ground Point

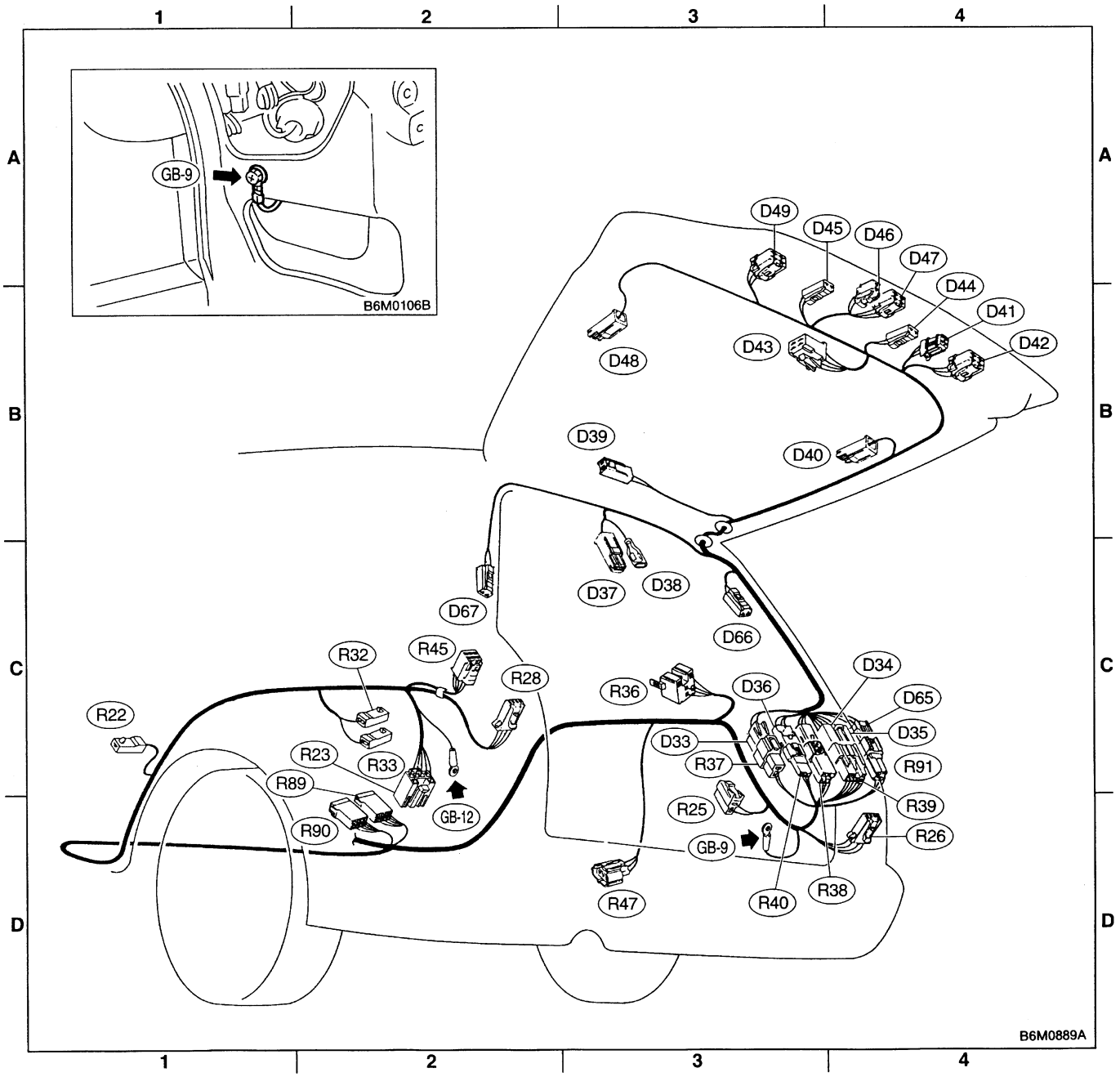


J: REAR END WIRING HARNESS (WAGON)

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R22	1	Brown	C-1		Rear door switch LH
R23	6	*	C-2		Power antenna
R25	2	Black	C-3		Rear defogger condenser
R26	4	Black	D-4		Rear combination light RH
R28	4	Black	C-2		Rear combination light LH
R32	1	*	C-2		Rear accessory power supply (Power)
R33	1	Black	C-2		Rear accessory power supply (Ground)
R36	5	Black	C-3		Rear wiper relay
R37	2	*	C-3	D33	Rear gate cord
R38	4	*	C-3	D34	
R39	8	*	C-4	D35	
R40	4	Black	C-3	D36	Rear gate cord (With security)
R45	6	*	C-2		Trailer connector (Outback with step roof)
R47	3	*	D-3		Fuel tank pressure sensor (2200 cc engine FWD and 2500 cc engine model)
R89	8	*	D-2		Joint connector (Rear speaker)
R90	8	*	D-2		Joint connector (Rear speaker)
R91	4	Black	C-4	D65	Rear gate cord (With rear tweeter)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D33	2	*	C-3	R37	Rear wiring harness
D34	4	*	C-3	R38	
D35	8	*	C-4	R39	
D36	4	Black	C-3	R40	Rear wiring harness (With security)
D37	1	Black	B-3		Luggage room light
D38	1	*	B-3		
D39	2	*	B-3		High-mounted stop light
D40	1	Black	B-4		Rear defogger (Power)
D41	4	Gray	B-4		Key switch (Security)
D42	4	*	B-4		Rear finisher light RH
D43	4	*	B-3		Rear wiper motor
D44	2	*	B-4		License plate light RH
D45	2	*	A-3		License plate light LH
D46	2	Black	A-4		Rear gate latch switch
D47	4	*	A-4		Rear gate lock actuator (Without security system)
	4	Gray	A-4		Rear gate lock actuator (With security system)
D48	1	Black	B-3		Rear defogger (Ground)
D49	4	*	A-3		Rear finisher light LH
D65	4	Black	C-4	R91	Rear wiring harness (With rear tweeter)
D66	2	Black	C-3		Rear tweeter RH
D67	2	Black	B-2		Rear tweeter LH
*: Non-colored					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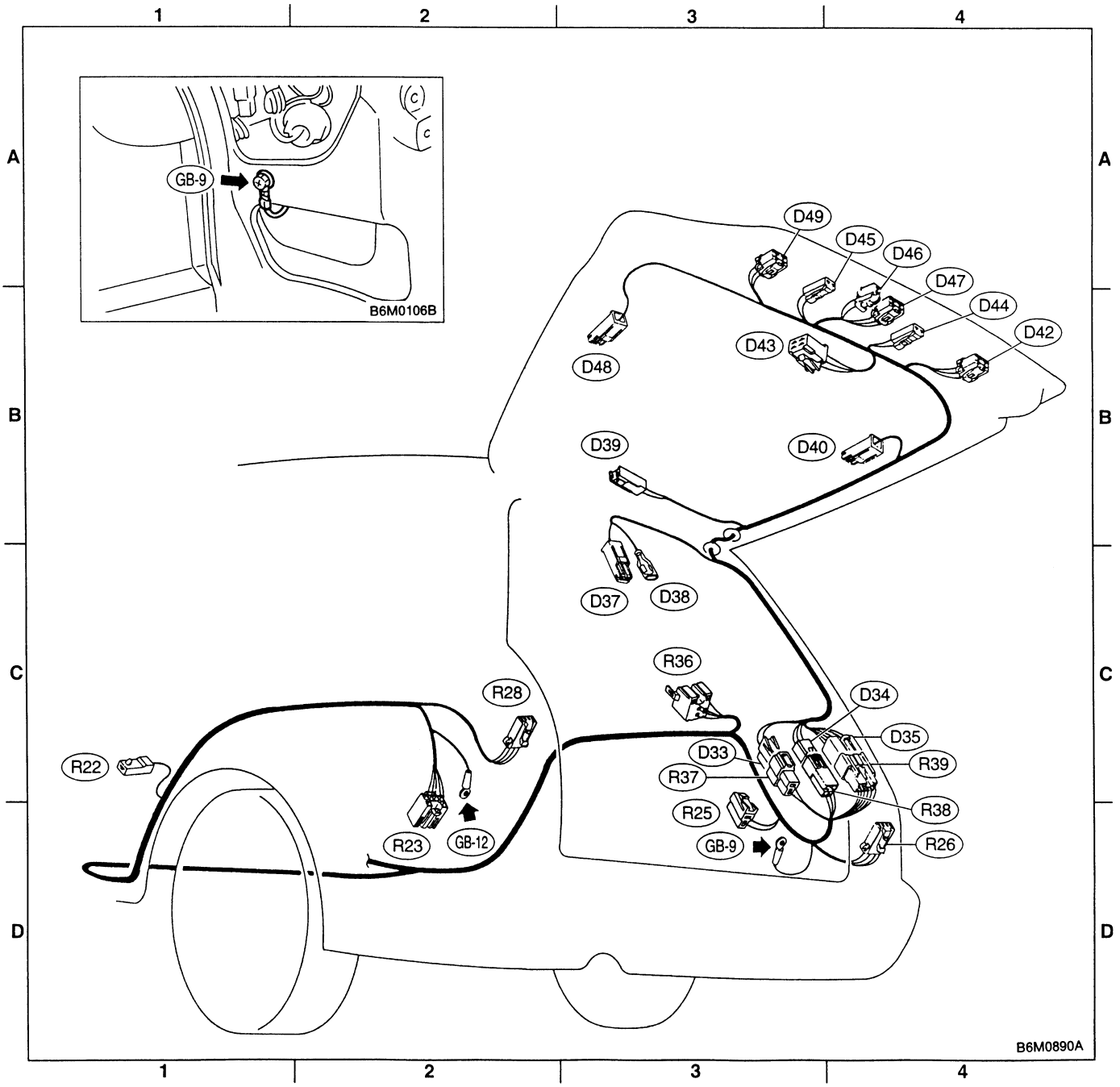
2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R22	1	Brown	C-1		Rear door switch LH
R23	6	*	C-2		Power antenna
R25	2	Black	C-3		Rear defogger condenser
R26	4	Black	D-4		Rear combination light RH
R28	4	Black	C-2		Rear combination light LH
R36	5	Black	C-3		Rear wiper relay
R37	2	*	C-3	D33	Rear gate cord
R38	4	*	C-3	D34	
R39	8	*	C-4	D35	

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D33	2	*	C-3	R37	Rear wiring harness
D34	4	*	C-3	R38	
D35	8	*	C-4	R39	
D37	1	Black	B-3		Luggage room light
D38	1	*	B-3		
D39	2	*	B-3		High-mounted stop light
D40	1	Black	B-4		Rear defogger (Power)
D42	4	*	B-4		Rear finisher light RH
D43	4	*	B-3		Rear wiper motor
D44	2	*	B-4		License plate light RH
D45	2	*	A-3		License plate light LH
D46	2	Black	A-4		Rear gate latch switch
D47	4	*	A-4		Rear gate lock actuator
D48	1	Black	B-3		Rear defogger (Ground)
D49	4	*	A-3		Rear finisher light LH
*: Non-colored					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