

1. Foreword SA01674

A: FOREWORD SA01674G21

These manuals are used when performing maintenance, repair, or diagnosis of the Subaru Legacy.

Applied model: BE***** and BH***** from 2001MY.

The additional manuals below are also available:
AUTOMATIC TRANSMISSION SERVICE
MANUAL (Pub. No. G0853ZE)

The manuals contain the latest information at the time of publication. Changes in specifications, methods, etc. may be made without notice.

1. How to Use This Manuals SA02675

A: HOW TO USE THIS MANUALS

SA02675F69

1. STRUCTURE SA02675F6901

Each section consists of SCT that are broken down into SC that are divided into sections for each component. The specification, maintenance and other information for the components are included, and diagnosis information has also been added where necessary.

2. INDEX SA02675F6902

The first page has an index with tabs. And at the end of each section is an alphabetical index.

3. COMPONENTS SA02675F6903

For each component, a composition drawing is included.

4. SPECIFICATIONS SA02675F6904

If necessary, specifications are also included.

5. INSPECTION SA02675F6905

Inspections are included to be carried out before and after maintenance.

6. MAINTENANCE SA02675F6906

Maintenance instructions are provided for each component. When multiple components comprise one process, refer to the instructions for that process for each component.

7. DIAGNOSIS SA02675F6907

Tables showing a step-by-step process make it easy to conduct diagnosis.

8. CAUTION, WARNING, NOTE SA02675F6908

“**CAUTION**” is used to indicate points that must be followed to protect the person doing the work and people in the area from injury.

“**WARNING**” is used to indicate points that must be followed to protect the vehicle or parts from damage or from secondary physical injury.

“**NOTE**” is used to indicate additional information that can improve the efficiency of doing a process.

9. SI UNITS SA02675F6909

Measurements in these manuals are according to the SI units. Metric and yard/pound measurements are also included.

LEGACY

Specifications

1. Legacy SA08704

A: DIMENSIONS SA08704G28

Model				Sedan	Station WAGON		
				2.5 L			
				AWD	AWD		
				ALL	BRIGHTON	L	GT
Overall length		mm (in)	4,685 (184.4)	4,760 (187.4)			
Overall width		mm (in)	1,745 (68.7)	1,745 (68.7)			
Overall height		mm (in)	1,415 (55.7)	1,435 (56.5)			
Compartment	Leg room	Front Max.	mm (in)	1,101 (43.3)	1,101 (43.3)		
		Rear Min.	mm (in)	868 (34.2)	871 (34.3)		
	Head room	Front	mm (in)	987 (38.9), 967 (38.1)*1	1,020 (40.2), 977 (38.5)*1		
		Rear	mm (in)	930 (36.6)	994 (39.1), 945 (37.2)*1		
	Shoulder room	Front	mm (in)	1,368 (53.9)	1,368 (53.9)		
		Rear	mm (in)	1,362 (53.6)	1,362 (53.6)		
Wheelbase		mm (in)	2,650 (104.3)	2,650 (104.3)			
Tread		Front	mm (in)	1,460 (57.5)	1,460 (57.5)		
		Rear	mm (in)	1,460 (57.5)	1,455 (57.3)		
Minimum road clearance		M.L.V.W.	mm (in)	115 (4.5)	120 (4.7)		125 (4.9)
		C.W.	mm (in)	155 (6.1)	160 (6.3)		

*1: with sun roof

B: ENGINE SA08704G29

Model		Sedan/Station Wagon	
Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
Valve arrangement		Overhead camshaft type	
Bore × Stroke		mm (in)	99.5 × 79.0 (3.917 × 3.110)
Displacement		cm ³ (cu in)	2,457 (149.9)
Compression ratio			10.0
Firing order			1 — 3 — 2 — 4
Idle speed at Park/Neutral position		rpm	650 (MT), 700 (AT)
Maximum output		kW (HP)/rpm	123 (165)/5,600
Maximum torque		N·m (kgf-m, ft-lb)/rpm	226 (23.0, 166)/3,600

C: ELECTRICAL SA08704G30

Model		Sedan/Station Wagon	
Ignition timing at idling speed		BTDC/rpm	10°±10°/650 (MT), 10°±10°/700 (AT)
Spark plug	Type and manufacturer	CHAMPION: RC10YC4 (Standard) NGK: BKR6E-11 CHAMPION: RC8YC4 NIPPONDENSO: K20PR-U11	
Alternator			12V — 90A
Battery	Reserve capacity	min	90 (MT), 110 (AT)
	Cold cranking amperes	amp.	430 (MT), 490 (AT)

D: TRANSMISSION

SA08704G31

Model			Sedan/Station Wagon	
			AWD	
Transmission type			5MT*1	4AT*2
Clutch type			DSPD	TCC
Gear ratio	1st		3.454	2.785*3, 3.027*4
	2nd		2.062	1.545*3, 1.619*4
	3rd		1.448	1.000
	4th		1.088	0.694
	5th		0.780	—
	Reverse		3.333	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	3.900*3, 4.111*4	4.111*3, 4.444*4
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	4.111*3, 4.444*4

5MT*1: 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

*3: L

*4: GT

DSPD: Dry Single Plate Diaphragm

TCC: Torque Converter Clutch

E: STEERING

SA08704G32

Type		Rack and Pinion
Turns, lock to lock		3.2
Minimum turning circle	m (ft)	Curb to curb: 10.8 (35.4), Wall to wall: 11.4 (37.4)

F: SUSPENSION

SA08704G33

Front	Macpherson strut type, Independent, Coil spring
Rear	Multi-link type, Independent, Coil spring

G: BRAKE

SA08704G34

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

H: TIRE

SA08704G35

Model	15-inch wheel		16-inch wheel
Size	P195/60R15 87H	P205/60R15 90H	P205/55R16 89H
Type	Steel belted radial, Tubeless		

LEGACY

Specifications

I: CAPACITY SA08704G36

Model			AWD	
			5MT	4AT
Fuel tank		ℓ (US gal, Imp gal)	64 (16.9, 14.1)	
Engine oil	Upper level	ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)	
	Lower level	ℓ (US qt, Imp qt)	3.0 (3.2, 2.6)	
Transmission gear oil		ℓ (US qt, Imp qt)	3.5 (3.7, 3.1)	—
Automatic transmission fluid		ℓ (US qt, Imp qt)	—	9.3 (9.8, 8.2)
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, 0.7)	
Power steering fluid		ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)	
Engine coolant		ℓ (US qt, Imp qt)	6.8 (7.2, 6.0)	6.7 (7.1, 5.9)

J: WEIGHT SA08704G37

1. U.S. SPEC. VEHICLE SA08704G3701

Model			Sedan			
			2.5 L			
			AWD			
			L		GT	
			5MT*2	4AT*2	5MT*3	4AT*3
Curb weight (C.W.)	Front	kgf (lb)	821 (1,810)	848 (1,870)	839 (1,850)	866 (1,910)
	Rear	kgf (lb)	655 (1,445)	657 (1,450)	678 (1,495)	680 (1,500)
	Total	kgf (lb)	1,476 (3,255)	1,505 (3,320)	1,517 (3,345)	1,546 (3,410)
Gross vehicle weight (G.V.W.)	Front	kgf (lb)	1,007 (2,220)			
	Rear	kgf (lb)	989 (2,180)			
	Total	kgf (lb)	1,995 (4,400)			

*1: Includes the weights of A/C.

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

*3: Includes the weights of P/W, P/D, A/C, C/C and Rear spoiler.

Model			Station WAGON	
			2.5 L	
			AWD	
			BRIGHTON	
			5MT*1	4AT*1
Curb weight (C.W.)	Front	kgf (lb)	807 (1,780)	832 (1,835)
	Rear	kgf (lb)	678 (1,495)	682 (1,505)
	Total	kgf (lb)	1,485 (3,275)	1,514 (3,340)
Gross vehicle weight (G.V.W.)	Front	kgf (lb)	961 (2,120)	
	Rear	kgf (lb)	1,016 (2,240)	
	Total	kgf (lb)	1,977 (4,360)	

Model			Station WAGON			
			2.5 L			
			AWD			
			L		GT	
			5MT*2	4AT*2	5MT*3	4AT*3
Curb weight (C.W.)	Front	kgf (lb)	816 (1,800)	841 (1,855)	834 (1,840)	859 (1,895)
	Rear	kgf (lb)	700 (1,545)	705 (1,555)	730 (1,610)	734 (1,620)
	Total	kgf (lb)	1,517 (3,345)	1,546 (3,410)	1,564 (3,450)	1,594 (3,515)
Gross vehicle weight (G.V.W.)	Front	kgf (lb)	1,002 (2,210)			
	Rear	kgf (lb)	1,063 (2,345)			
	Total	kgf (lb)	2,066 (4,555)			

*1: Includes the weight of A/C.

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

*3: Includes the weights of P/W, P/D, A/C, C/C and S/R.

2. CANADA SPEC. VEHICLE

SA08704G3702

Model			Sedan		
			2.5 L		
			AWD		
			L	GT	
			4AT*1	5MT*2	4AT*2
Curb weight (C.W.)	Front	kgf (lb)	848 (1,870)	839 (1,850)	866 (1,910)
	Rear	kgf (lb)	658 (1,450)	678 (1,495)	680 (1,500)
	Total	kgf (lb)	1,506 (3,320)	1,517 (3,345)	1,546 (3,410)
Gross vehicle weight (G.V.W.)	Front	kgf (lb)	1,007 (2,220)		
	Rear	kgf (lb)	989 (2,180)		
	Total	kgf (lb)	1,996 (4,400)		

Model			Station WAGON				
			2.5 L				
			AWD				
			BRIGHTON		L		GT
			5MT	4AT	5MT*1	4AT*1	4AT*2
Curb weight (C.W.)	Front	kgf (lb)	807 (1,780)	832 (1,835)	816 (1,800)	841 (1,855)	860 (1,895)
	Rear	kgf (lb)	678 (1,495)	683 (1,505)	701 (1,545)	705 (1,555)	735 (1,620)
	Total	kgf (lb)	1,485 (3,245)	1,575 (3,475)	1,517 (3,345)	1,546 (3,410)	1,595 (3,515)
Gross vehicle weight (G.V.W.)	Front	kgf (lb)	962 (2,120)		1,002 (2,210)		
	Rear	kgf (lb)	1,016 (2,240)		1,064 (2,345)		
	Total	kgf (lb)	1,978 (4,360)		2,066 (4,555)		

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

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

LEGACY

Specifications

3. TIWAN SPEC. VEHICLE SA08704G3706

Model			Sedan	Station Wagon
			2.5 L	
			AWD	
			4AT*1	
Curb weight (C.W.)	Front	kgf (lb)	848 (1,870)	839 (1,850)
	Rear	kgf (lb)	658 (1,450)	705 (1,555)
	Total	kgf (lb)	1,506 (3,320)	1,544 (3,405)
Gross vehicle weight (G.V.W.)	Front	kgf (lb)	1,007 (2,220)	1,002 (2,210)
	Rear	kgf (lb)	989 (2,180)	1,063 (2,345)
	Total	kgf (lb)	1,995 (4,400)	2,065 (4,555)

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

4. CHILE SPEC. VEHICLE SA08704G3707

Model			Sedan	Station Wagon
			2.5 L	
			AWD	
			4AT*1	
Curb weight (C.W.)	Front	kgf (lb)	866 (1,910)	859 (1,895)
	Rear	kgf (lb)	680 (1,500)	734 (1,620)
	Total	kgf (lb)	1,546 (3,410)	1,594 (3,515)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,004 (2,215)	1,000 (2,205)
	Rear	kgf (lb)	991 (2,185)	1,065 (2,350)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,995 (4,400)	2,065 (4,555)

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

2. OUTBACK SA08705

A: DIMENSIONS SA08705G28

Model				Sedan	Station Wagon	
				AWD	AWD	
				4AT	5MT	4AT
Overall length		mm (in)	4,685 (184.4)	4,760 (187.4)		
Overall width		mm (in)	1,745 (68.7)	1,745 (68.7)		
Overall height		mm (in)	1,480 (58.3)	1,580 (62.2)		
Compartment	Leg room	Front Max.	mm (in)	1,101 (43.3)	1,101 (43.3)	
		Rear Min.	mm (in)	868 (34.2)	871 (34.3)	
	Head room	Front	mm (in)	987 (38.9), 967 (38.1)*1	1,020 (40.2), 977 (38.5)*1	
		Rear	mm (in)	930 (36.6)	994 (39.1), 945 (37.2)*1	
	Shoulder room	Front	mm (in)	1,368 (53.9)	1,368 (53.9)	
		Rear	mm (in)	1,362 (53.6)	1,362 (53.6)	
Wheelbase		mm (in)	2,650 (104.3)	2,650 (104.3)		
Tread		Front	mm (in)	1,470 (57.9)	1,470 (57.9)	
		Rear	mm (in)	1,465 (57.7)	1,465 (57.7)	
Minimum road clearance		M.L.V.W.	mm (in)	150 (5.9)	150 (5.9)	
		C.W.	mm (in)	185 (7.3)	185 (7.3)	

*1: With sunroof

B: ENGINE SA08705G29

Model	Sedan/Station Wagon		Station Wagon	
	2.5 L		3.0 L	
Engine type	Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine		Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gasoline engine	
Valve arrangement	Overhead camshaft type			
Bore × Stroke	mm (in)	99.5 × 79.0 (3.917 × 3.110)	89.2 × 80.0 (3.512 × 3.150)	
Displacement	cm ³ (cu in)	2,457 (149.9)	3,000 (183.06)	
Compression ratio		10.0	10.7	
Firing order		1 — 3 — 2 — 4	1 — 6 — 3 — 2 — 5 — 4	
Idle speed at Park/Neutral position	rpm	650 (MT), 700 (AT)	600	
Maximum out-put	kW (HP)/rpm	123 (165)/5,600	154 (206)/6,000	
Maximum torque	N·m (kgf-m, ft-lb)/rpm	226 (23.0, 166)/3,600	282 (28.8, 208)/4,400	

OUTBACK

Specifications

C: ELECTRICAL SA08705G30

Model		Sedan/Station Wagon	Station Wagon
		2.5 L	3.0 L
Ignition timing at idling speed BTDC/rpm		10°±10°/650 (MT), 10°±10°/700 (AT)	10°±8°/600
Spark plug	Type and manufacturer	CHAMPION: RC10YC4 (Standard) NGK: BKR6E-11 CHAMPION: RC8YC4 NIPPONDENSO: K20PR-U11	NGK: PLFR6A-11
Alternator		12V — 90A	12V — 100A
Bat-tery	Reserve capacity min	90 (MT), 110 (AT)	110
	Cold cranking amperes amp.	430 (MT), 490 (AT)	490

D: TRANSMISSION SA08705G31

Model			Sedan/Station Wagon	Station Wagon
			2.5 L	3.0 L
			AWD	
Transmission type			4AT	
Clutch type			TCC	
Gear ratio	1st		3.027	2.785
	2nd		1.619	1.545
	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	4.111
Reduction gear (Rear drive)	Transfer reduction	Type of gear	—	
		Gear ratio	—	
	Final reduction	Type of gear	Hypoid	
		Gear ratio	4.444	4.111

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

TCC: Torque Converter Clutch

E: STEERING SA08705G32

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 SA08705G33

Front	Macpherson strut type, Independent, Coil spring
Rear	Multi-link type, Independent, Coil spring

G: BRAKE SA08705G34

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 SA08705G35

Model	16-inch wheel	
Size	P215/60R16*	P225/60R16 97H
Type	Steel belted radial, Tubeless	

*: Recommended winter (snow) tire size.

I: CAPACITY SA08705G36

Model		2.5 L	3.0 L
		AWD	
		4AT	
Fuel tank	ℓ (US gal, Imp gal)	64 (16.9, 14.1)	
Engine oil	Upper level ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)	5.8 (6.1, 5.1)
	Lower level ℓ (US qt, Imp qt)	3.0 (3.2, 2.6)	4.8 (5.1, 4.2)
Transmission gear oil	ℓ (US qt, Imp qt)	—	
Automatic transmission fluid	ℓ (US qt, Imp qt)	9.3 (9.8, 8.2)	
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, 0.7)	
Power steering fluid	ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)	
Engine coolant	ℓ (US qt, Imp qt)	6.7 (7.1, 5.9)	7.7 (8.1, 6.8)

J: WEIGHT SA08705G37

1. U.S. SPEC. VEHICLE SA08705G3701

Model			Sedan	Wagon		
			2.5 L			3.0 L
			AWD			
			4AT*1	5MT*2	4AT*2	4AT*3
Curb weight (C.W.)	Front	kgf (lb)	894 (1,970)	841 (1,855)	866 (1,910)	943 (2,080)
	Rear	kgf (lb)	692 (1,525)	712 (1,570)	716 (1,580)	742 (1,635)
	Total	kgf (lb)	1,586 (3,495)	1,553 (3,425)	1,582 (3,490)	1,685 (3,715)
Gross vehicle weight (G.V.W.)	Front	kgf (lb)	1,007 (2,220)	1,002 (2,210)		1,061 (2,340)
	Rear	kgf (lb)	989 (2,180)	1,063 (2,345)		1,070 (2,360)
	Total	kgf (lb)	1,995 (4,400)	2,066 (4,555)		2,131 (4,700)

*1: Includes the weights of P/W, P/D, A/C, C/C, Leather interior, Rear spoiler, Side A/B and S/R.

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

*3: Includes the weights of P/W, P/D, A/C, C/C, Leather interior, Side A/B and S/R.

OUTBACK

Specifications

NOTE:

When following optional parts are installed, add the weight to the curb weight.

Weight of optional parts		Built-in child restraint (B/R)
Front	kgf (lb)	0.4 (0.9)
Rear	kgf (lb)	4.2 (9.3)
Total	kgf (lb)	4.6 (10.1)

2. CANADA SPEC. VEHICLE

SA08705G3702

Model			Sedan		Wagon	
			2.5 L			3.0 L
			AWD			
			4AT*1	5MT*2	4AT*2	4AT*3
Curb weight (C.W.)	Front	kgf (lb)	894 (1,970)	844 (1,860)	869 (1,915)	943 (2,080)
	Rear	kgf (lb)	692 (1,525)	712 (1,570)	717 (1,581)	742 (1,635)
	Total	kgf (lb)	1,586 (3,495)	1,556 (3,430)	1,586 (3,495)	1,685 (3,715)
Gross vehicle weight (G.V.W.)	Front	kgf (lb)	1,007 (2,220)	1,002 (2,210)		1,061 (2,340)
	Rear	kgf (lb)	989 (2,180)	1,063 (2,345)		1,070 (2,360)
	Total	kgf (lb)	1,995 (4,400)	2,066 (4,555)		2,131 (4,700)

*1: Includes the weights of P/W, P/D, A/C, C/C, Leather interior, Rear spoiler, Side A/B and S/R.

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

*3: Includes the weights of P/W, P/D, Audio, Rear spoiler, Side A/B, S/R and child seat.

3. TAIWAN SPEC. VEHICLE

SA08705G3706

Model			Station Wagon	
			2.5 L	
			AWD	
			4AT*1	
Curb weight (C.W.)	Front	kgf (lb)	882 (1,945)	
	Rear	kgf (lb)	739 (1,630)	
	Total	kgf (lb)	1,621 (3,575)	
Gross vehicle weight (G.V.W.)	Front	kgf (lb)	1,002 (2,210)	
	Rear	kgf (lb)	1,063 (2,345)	
	Total	kgf (lb)	2,065 (4,555)	

*1: Includes the weights of P/W, P/D, C/C, Leather interior, A/C, Side A/B and S/R.

1. Precaution SA04677

A: PRECAUTION SA04677F59

Please clearly understand and adhere to the following general precautions. They must be strictly followed to avoid minor or serious injury to the person doing the work or people in the area.

1. ABS SA04677F5901

Handle the ABS as a total system. Do not disassemble or attempt to repair individual parts. Doing so could prevent the ABS system from operating when needed or cause it to operate incorrectly and result in injury.

2. BRAKE FLUID SA04677F5902

If brake fluid gets in your eyes or on your skin, do the following:

- Wash out your eyes and seek immediate medical attention.
- Wash your skin with soap and then rinse thoroughly with water.

3. ELECTRIC FAN SA04677F5903

The electric fan may rotate without warning, even when the engine is not on. Do not place your hand, cloth, tools, or other items near the fan at any time.

4. ROAD TESTS SA04677F5904

Always conduct road tests in accordance with traffic rules and regulations to avoid bodily injury and interrupting traffic.

5. AIRBAG SA04677F5905

To prevent bodily injury from unexpected deployment of airbags and unnecessary maintenance, follow the instructions in this manual when performing maintenance on airbag components or nearby, and airbag wiring harnesses or nearby. To prevent unexpected deployment, perform one of the steps below and then wait at least ten seconds to discharge electricity before beginning work.

- Step 1: Turn the ignition switch OFF.
- Step 2: Remove the fuse for the airbag system.
- Step 3: Remove the negative battery terminal.

6. AIRBAG DISPOSAL SA04677F5906

To prevent bodily injury from unexpected airbag deployment, do not dispose airbag modules in the same way as other refuse. Follow the special instructions for disposal in this manual. Follow all government regulations concerning disposal of refuse.

7. AIRBAG MODULE SA04677F5907

Adhere to the following when handling and storing the airbag module to prevent bodily injury from unexpected deployment:

- Do not hold harnesses or connectors to carry the module.
- Do not face the bag in the direction that it opens towards yourself or other people.
- Do not face the bag in the direction that it opens towards the floor or walls.

8. AIRBAG SPECIAL TOOLS SA04677F5908

To prevent unexpected deployment, only use special tools.

9. WINDOW SA04677F5909

Always wear safety glasses when working around any glass to prevent glass fragments from damaging your eyes.

10. WINDOW ADHESIVE SA04677F5910

Always use the specified urethane adhesive when attaching glass to prevent it from coming loose and falling, resulting in accidents and injury.

1. Note SA03676

A: NOTE SA03676A15

This is information that can improve efficiency of maintenance and assure sound work.

1. FASTENER NOTICE SA03676A1501

Fasteners are used to prevent parts from damage and dislocation due to looseness. Fasteners must be tightened to the specified torque.

Do not apply paint, lubricant, rust retardant, or other substances to the surface around bolts, fasteners, etc. Doing so will make it difficult to obtain the correct torque and result in looseness and other problems.

2. STATIC ELECTRICITY DAMAGE SA03676A1502

Do not touch the ECM, connectors, logic boards, and other such parts when there is a risk of static electricity. Always use a static electricity prevention cord or touch grounded metal before conducting work.

3. IGNITION OFF BATTERY SA03676A1503

When removing the battery cables, always be sure to turn the ignition off to prevent electrical damage to the ECM from rush current.

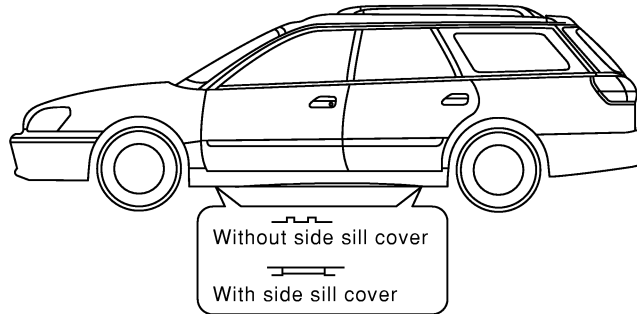
4. SERVICE PARTS SA03676A1504

Use authentic service parts for maximum performance and maintenance, when conducting repairs. Subaru/FHI will not be responsible for poor performance resulting from the use of parts not specified by a genuine dealer.

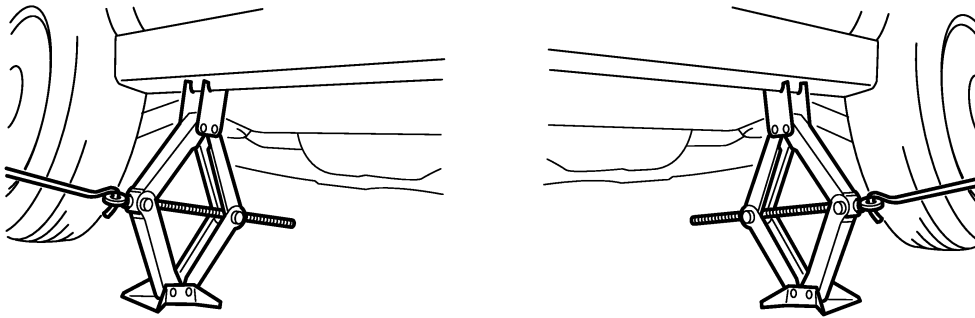
5. LIFTS AND JACKS SA03676A1505

When using a lift or jack-ridged rack to raise a vehicle, always follow instructions concerning jack-up points and weight limits to prevent the vehicle from falling, which could result in injury. Be especially careful to make sure the vehicle is balanced before raising it.

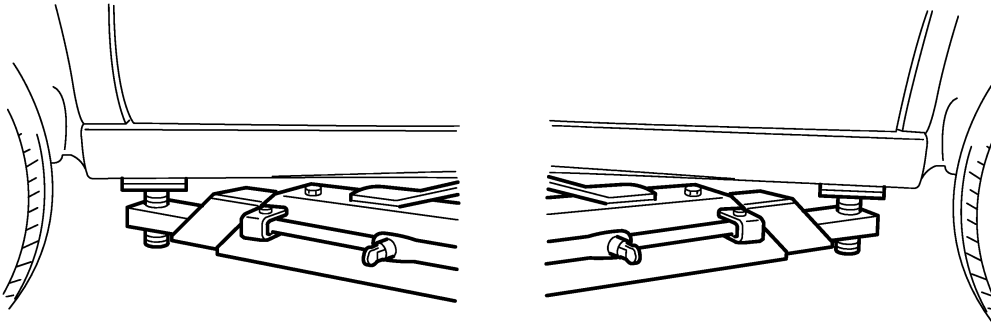
Support locations



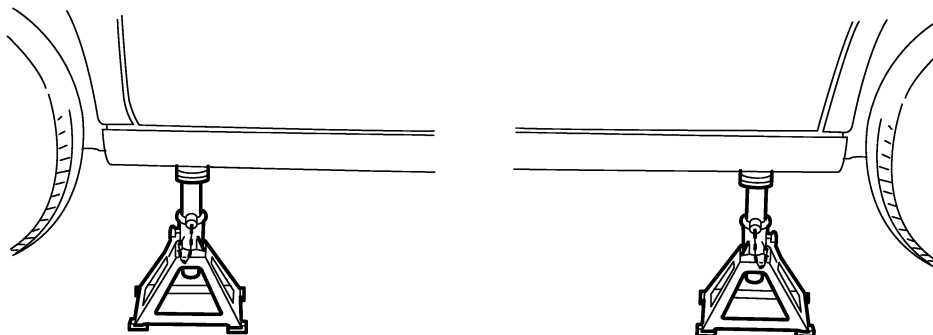
Pantograph jack



Lift

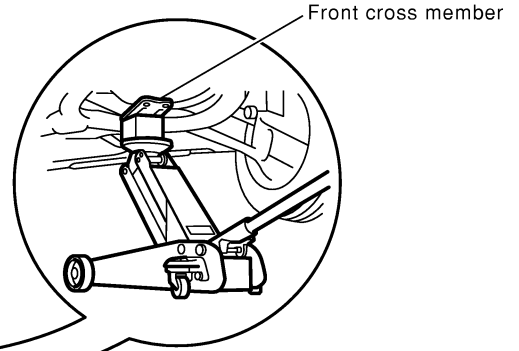
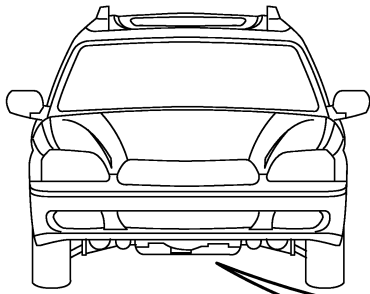


Safety stand

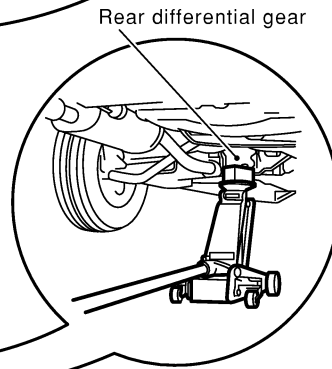
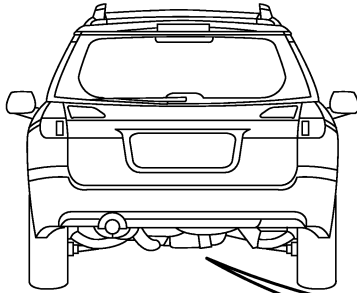


NOTE

Front



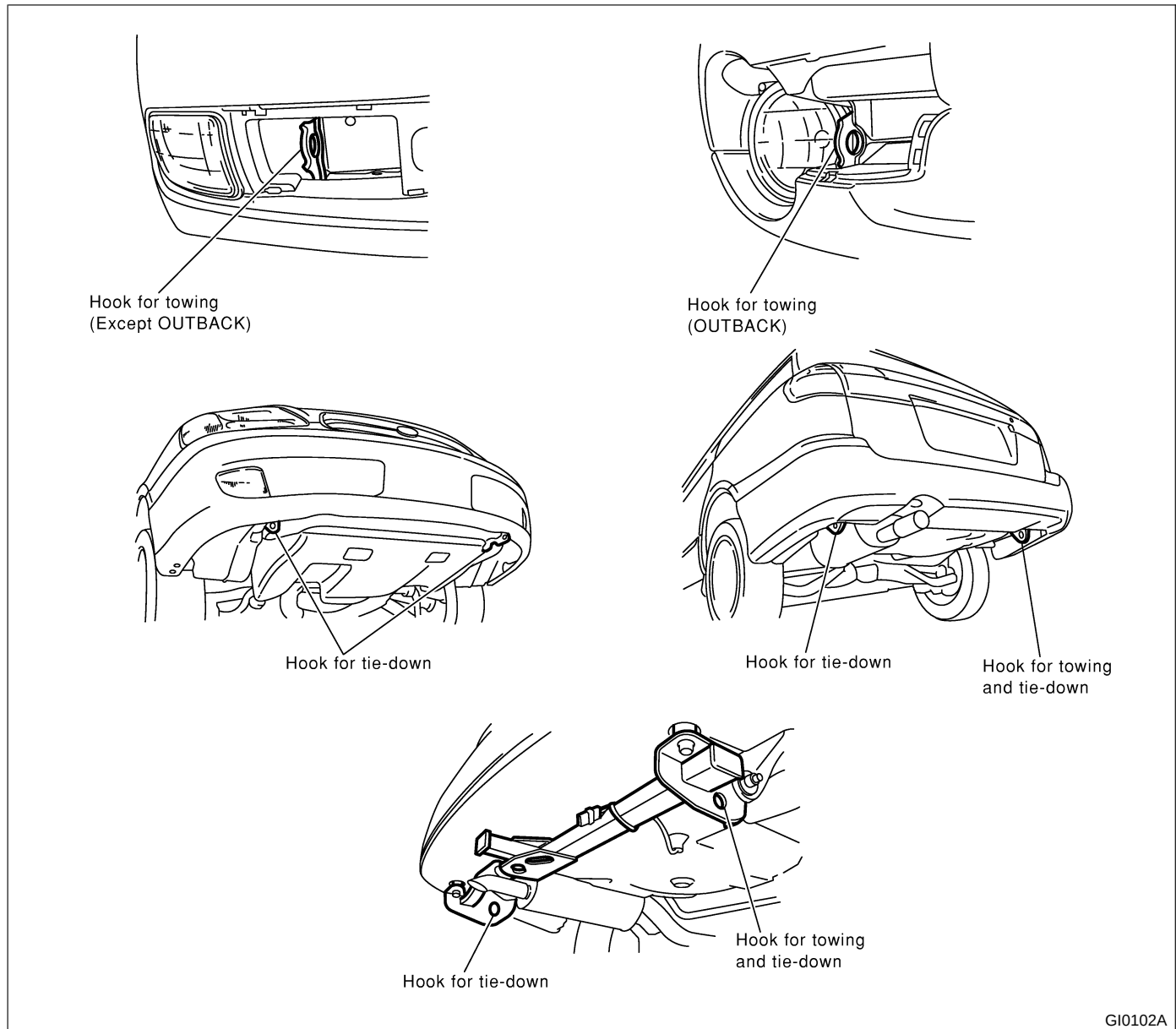
Rear

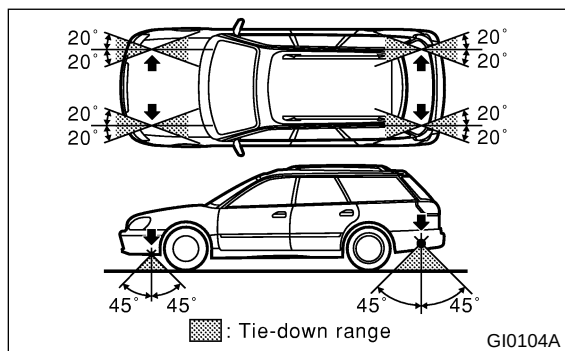
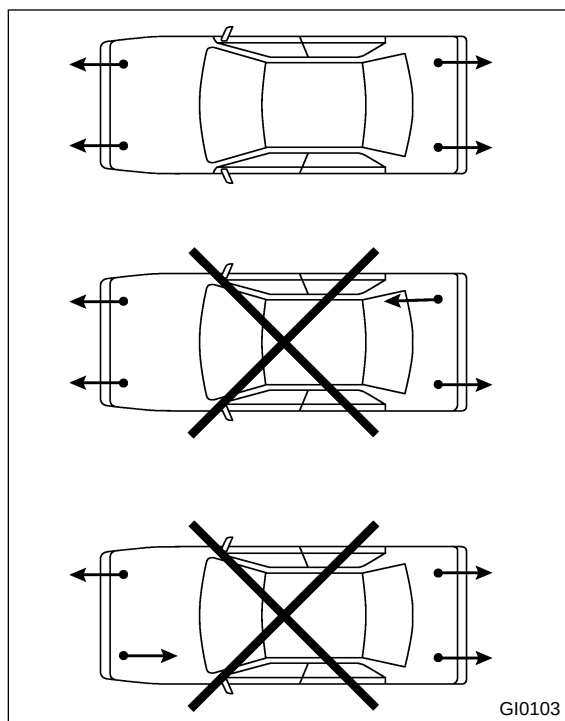


GI0101A

6. TIE DOWNS SA03676A1506

Tie downs are used when transporting vehicles and when using the chassis dynamo. Attach tie downs only to the specified points on the vehicle.





7. TOWING SA03676A1507

Avoid towing vehicles except when the vehicle cannot be driven. For vehicles with AWD, AT, or VTD, use a loader instead of towing. When towing other vehicles, to prevent excessive weight from damaging the hook or vehicle:

- Do not tow other vehicles with a front towing hook.
- Make sure the vehicle towing is heavier than the vehicle being towed.

8. TRAINING SA03676A1508

For information about training, contact a dealer or agent.

9. GENERAL SCAN TOOL SA03676A1509

Using general scan tools will greatly improve efficiency of repairing engine electronic controls. The Subaru Select Monitor can be used to diagnose the engine and also the ABS, the air conditioner, and other parts.

IDENTIFICATION

Identification

1. Identification

SA06679

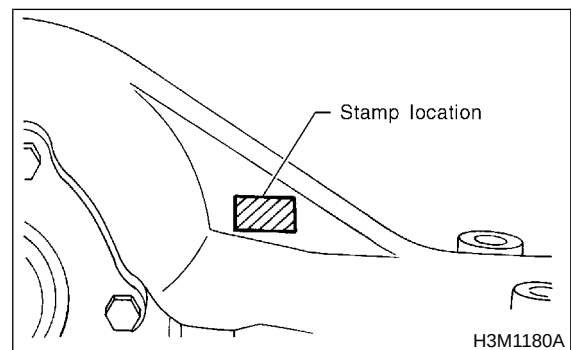
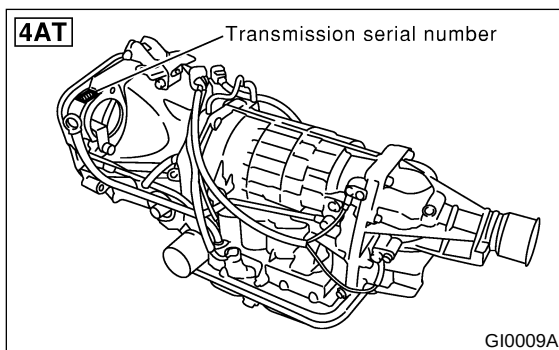
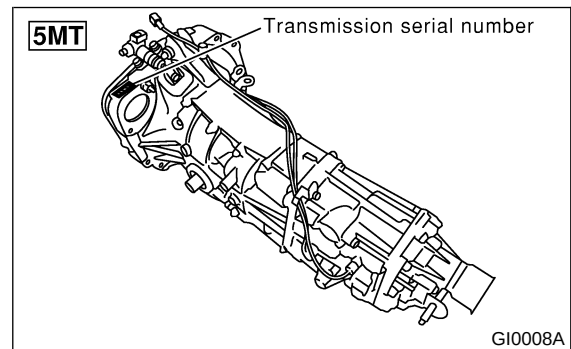
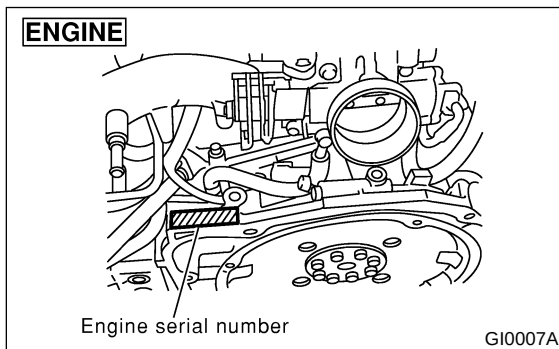
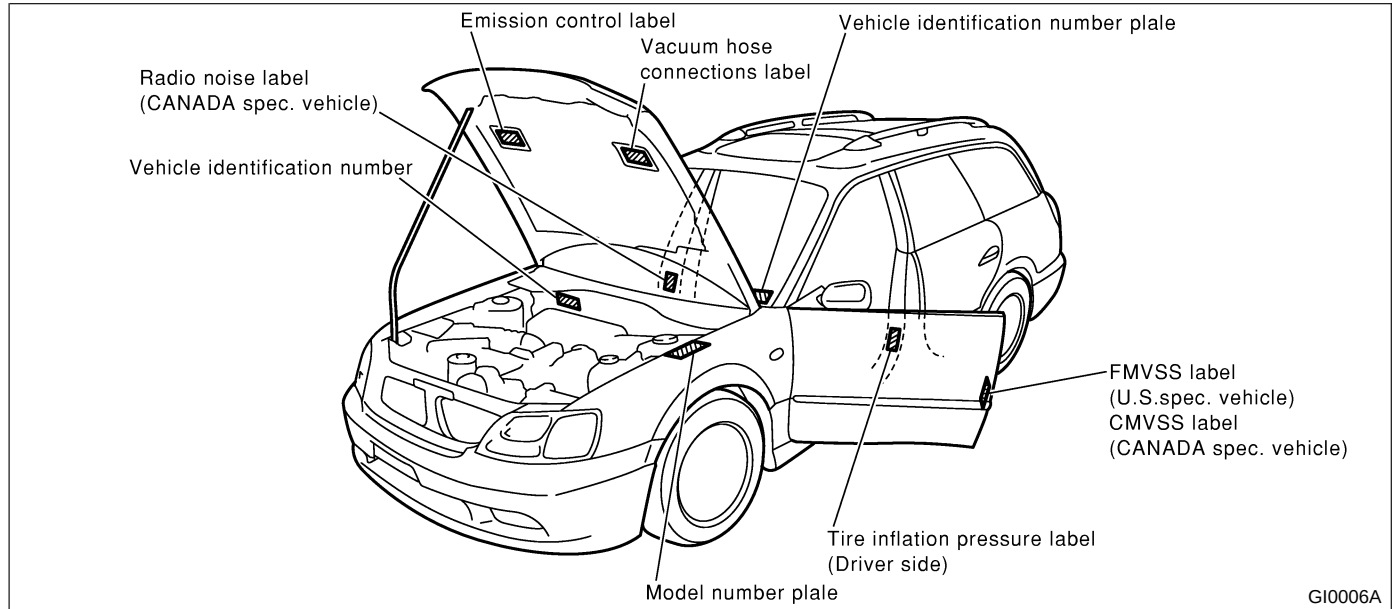
A: IDENTIFICATION

SA06679F70

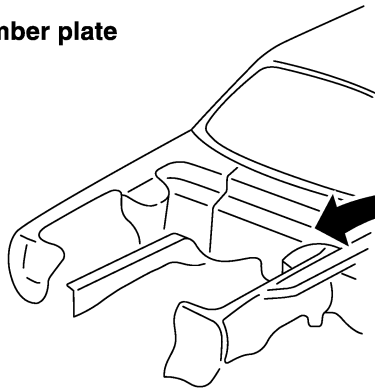
1. IDENTIFICATION NUMBER AND LABEL LOCATIONS

SA06679F7001

The VIN (Vehicle Identification Numbers) is used to classify the vehicle.
Positioning of the plate label for identification



Model number plate



FUJI HEAVY INDUSTRIES LTD.

型 式

車 台 番 号

VIN

○ アプライトモデル オプションコード ○
 applied model option code

トリムコード エンジン型式
 trim code engine type

外装飾コード ミッション型式
 Color code transmission type

富士重工業株式会社

GI0011A

2. MEANING OF VIN SA06679F7002

The meaning of the VIN is as follows:

● North America

J4S3BE635X17200001

The starting and ending brackets ([]) are stop marks.

Digits	Code	Meaning	Details
1 to 3	4S3	Manufacturer body area	Passenger car, SIA made, For US/Canada/Taiwan/Chile
4	B	Car line	Legacy/OUTBACK series
5	E	Body type	E: Sedan/OUTBACK Sedan H: Station Wagon/OUTBACK
6	6	Displacement	6: 2.5 L AWD 8: 3.0 L AWD
7	3	Grade	2: Brighton 3: L 4: GT 5: GT-LTD 6: OUTBACK 7: OUTBACK-cold weather 8: OUTBACK-LTD 9: OUTBACK-6 cylinders 0: OUTBACK-6 cylinders LL-bean
8	5	Restraint	5: Manual belts, dual airbag 6: Manual belts, dual airbag, side airbag
9	X	Check digit	
10	1	Model year	1: 2001MY 2: 2002MY
11	7	Transmission type	6: Full-time AWD 5-speed MT 7: Full-time AWD 4-speed AT
12 to 17	200001	Manufacture number	From 200001: Sedan/OUTBACK Sedan From 300001: Station Wagon From 600001: OUTBACK

IDENTIFICATION

Identification

3. MODEL NUMBER PLATE SA06679F7003

The model number plate indicates: the applied model, the option code, the trim code, the engine type, the transmission type, and the exterior color code. This information is helpful when placing orders for parts.

BE9BY3J

Digits	Code	Meaning	Details
1	B	Series	B: Legacy/OUTBACK
2	E	Body style	E: Sedan/OUTBACK Sedan H: Station Wagon/OUTBACK
3	9	Engine displacement Drive system Suspension system	9: 2.5 L AWD E: 3.0 L AWD
4	B	Minor change	SIA made 2001MY (SIA made)
5	Y	Destination	K: Right-hand drive for general market L: Left-hand drive for general market Y: Left-hand drive for United States, Canada, and Taiwan
6	3	Grade	SIA made 1: Brighton 3: L 4: OUTBACK 5: GT 6: GT-LTD 9: OUTBACK Sedan-LTD A: OUTBACK-cold weather B: OUTBACK-LTD C: OUTBACK-6 cylinders D: OUTBACK-6 cylinders LL-bean
7	J	Transmission, fuel feed system	E: DOHC MPI 4-speed AT J: SOHC MPI center differential AWD R: SOHC MPI 4-speed AT

The engine and transmission type are as follows:

● Engine

EZ30DAXBBB

Digits	Code	Meaning	Details
1 and 2	EZ	Engine type	EJ: 4 cylinders EZ: 6 cylinders
3 and 4	30	Displacement	20: 2.0 L 25: 2.5 L 30: 3.0 L
5	D	Fuel feed system	1: D-MPI SOHC-A phase-2 or-3 2: D-MPI SOHC-B phase-2 or-3 3: MPI SOHC phase-2 or-3 D: D-MPI DOHC 6 cylinders phase-3
6	A	Exhaust regulations	A: US Federal & California C: US California
7	X	Transmission	W: AWD MT X: AWD AT
8 to 10	BBB	Detailed specifications	Used when ordering parts. See the parts catalog for details.

● Transmission

TV1A4YCAAA

Digits	Code	Meaning	Details
1	T	Transmission	T: Transmission
2	V	Transmission type	Y: Full-time AWD MT center differential V: Full-time AWD AT VTD Z: Full-time AWD AT MPT
3 and 4	1A	Classification	75: MT 1A: New AT
5	4	Series	4: 3rd Generation Legacy
6	A	Transmission specifications	V: Full-time AWD 5-speed MT with viscous coupling center differential single range X: Full-time AWD 5-speed MT with viscous coupling center differential dual range Z: Full-time AWD 4-speed AT with MPT Y: Full-time AWD 4-speed AT with VTD
7	C	Mounted body	C: US 2.5 L SOHC M: US 3.0 L DOHC
8 to 10	AAA	Detailed specifications	Used when ordering parts. See the parts catalog for details.

● Rear differential 1

VA1REF

Digits	Code	Meaning	Details
1	V	For AWD	V: AED
2	A	Type	A: A type
3	1	Hypoid gear diameter	1: 152 dia. 2: 160 dia.
4	R	Installation position	R: Rear
5	E	Reduction gear ratio	E: 4.111 F: 4.444
6	F	Specification differences	F: Case A G: Case B H: Case B with cooling fin

● Rear differential 2

T1

Code	Reduction gear ratio	LSD
T1	3.900	No
T2	4.111	No
TP	4.444	No
BK	4.111	Viscous
BP	4.111	Viscous strengthened type
BL	4.444	Viscous strengthened type
CD	4.444	Viscous
VB	3.700	No

IDENTIFICATION

Identification

MEMO:

1. Recommended Materials SA05678

A: RECOMMENDED MATERIALS

SA05678G22

1. GENERAL SA05678G2201

To insure the best performance, always use the specified oil, gasoline, adhesive, sealant, etc. or that of equivalent quality.

2. FUEL SA05678G2202

Always use a gasoline of the same or higher octane value than specified in the owner's manual. Ignoring the specifications below will result in damage or poor operation of the engine and fuel injection system. Use the specified gasoline to correct performance.

● Unleaded gasoline

Use unleaded gasoline and not leaded gasoline on vehicles with catalytic converter installed to reduce air pollution. Using leaded gasoline will damage the catalytic converter.

● Leaded gasoline

On vehicles without catalytic converter, use gasoline with an octane value of 90 RON or higher.

● Methanol

Use gasoline with a methanol content of 5% or less.

● Ethanol

Use gasoline with an ethanol content of 10% or less.

● MTBE

Use gasoline with an MTBE content of 15% or less.

● California specifications

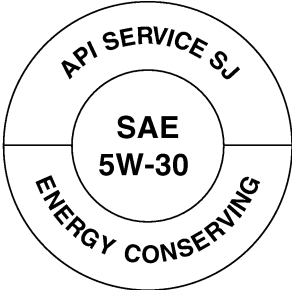
All Subaru vehicles are LEV, and thus can use California specification gasoline.

● Reformulated gasoline

Reformulated gasoline may be used.

Recommended Materials

Use either the lubricants in the table below or equivalent lubricants. See the table below to choose the correct SAE viscosity.

Lubricant	Recommended			Alternative
	API Spec.	CCMC Spec.	ACEA Spec.	
Engine oil	SJ Grade “Energy conserving”  GI0001  GI0002	G4 or G5	A1, A2 or A3	API: SH or SG
Manual transmission oil	GL-5	—	—	—
Front differential	GL-5	—	—	—
Rear differential	GL-5	—	—	—

SAE viscosity	SAE viscosity No. and applicable temperature SAE J300								
Engine oil	(°C)	-30	-20	-10	0	10	20	30	40
	(°F)	-22	-4	14	32	50	68	86	104
		10W-30 or 10W-40							
	5W-30 Recommend								

GI0003A

RECOMMENDED MATERIALS

Recommended Materials

SAE viscosity	SAE viscosity No. and applicable temperature SAE J300								
Manual transmission oil	(°C)	-30	-20	-10	0	10	20	30	40
	(°F)	-22	-4	14	32	50	68	86	104
	90								
	85W								
Rear differential	80W								
	75W-90								
Front differential	(°C)	-30	-20	-10	0	10	20	30	40
	(°F)	-22	-4	14	32	50	68	86	104
	90								
	85W								
	80W								
	80W-90								

GI0004A

GI0005A

GI0004A

GI0005A

4. FLUID SA05678G2204

Use the fluids specified in the table below. Do not mix two different kinds or makes of fluid.

Fluid	Recommended	Alternative	Remarks
Automatic transmission fluid	DEXRON III	—	
Power steering fluid	DEXRON III	—	
Brake fluid	FMVSS No. 116 DOT3	FMVSS No. 116 DOT4	
Clutch fluid	FMVSS No. 116 DOT3	FMVSS No. 116 DOT4	

5. COOLANT SA05678G2205

Use genuine coolant to protect the engine. The table below shows the ratio of coolant to distilled water.

Coolant	Recommended	Item number	Alternative
Coolant	SUBARU coolant	000016218	None
Water for dilution	Distilled water	—	Tap water

6. REFRIGERANT SA05678G2206

Standard air conditioners on Subaru vehicles use HFC134a refrigerant. Do not mix it with other refrigerants. Also, do not use any air compressor oil except for ZXL200PG.

Air conditioner	Recommended	Item number	Alternative
Refrigerant	HFC134a	—	None
Compressor oil	ZXL200PG	—	None

RECOMMENDED MATERIALS

Recommended Materials

7. GREASE SA05678G2207

Use the grease and supplementary lubricants shown in the table below.

Grease	Application point	Recommended	Item number	Alternative
Supplementary lubricants	● O2 sensor ● Bolts, etc.	SUBARU CRC	004301003	—
Grease	MT main shaft	FX clutch grease	000040901	—
	Clutch master cylinder push rod	Slicolube G-40M	004404003	—
	● Steering shaft bearing ● Gear shift bushing	SUNLIGHT2	003602010	—
	Steering gear box	Valiant grease M-2	003608001	—
	Disc brake	Niglube RX-2	003606000 or 725191040	—
	Drum brake	Molykote No. 7439	72519460	—
	● Brake pad ● Brake shoe	Molykote AS-880N	26298AC000	—
	Front axle SFJ	SSG-6003	28093TA000	—
	Front axle BJ	NTG2218	28093AA000	—
	Rear axle BJ	Molykote No. 2	723223010	—
	Rear axle DOJ	VU-3A702	23223GA050	—
	● Control cable ● Throttle linkage ● Water pump ● Door latch ● Door striker	Slicolube G-30M	004404002	—

8. ADHESIVES SA05678G2210

Use the adhesives shown in the table below, or equivalent.

Adhesive	Application point	Recommended	Item number	Alternative
Adhesive	Windshield and body	Essex Chemical Crop's Urethane E	—	Sunstar 580
	Weatherstrip, rubber parts	Cemedine 5430L	—	3M's EC-1770 EC-1368
	Soft vinyl	Cemedine 540	—	3M's EC-776 EC-847 or EC-1022 (Spray type)
	Momentary sealant	Cemedine 3000	—	Armstrong's Eastman 910

9. SEAL MATERIAL SA05678G2209

Use seal material shown in the table below, or equivalent.

Seal material	Application point	Recommended	Item number	Alternative
	Engine case	Three Bond 1215	004403007	Dow Corning's No. 7038
	Transmission	Three Bond 1217B	K0877YA020	—
	Rear differential	Three Bond 1324	004403042	—
	Rear differential	Three Bond 1105	004403010	Dow Corning's No. 7038
	Weatherstrip	Starcalking B-33A	000018901	Butyl Rubber sealant
	Steering adjusting screw	Three Bond 1102	004403006	—
	SOHC cam cap	Three Bond 1280B	K0877YA018	—

RECOMMENDED MATERIALS

Recommended Materials

MEMO:

1. Pre-delivery Inspection SA09719

A: GENERAL SA09719G23

The purposes of the pre-delivery inspection (PDI) are as follows.

- Remove the additional parts used for ensuring the vehicle quality during transportation and restore the vehicle to its normal state.
- Check if the vehicle before delivery is in a normal state.
- Check for any damage or missing parts that may have taken place during transportation or storage.
- Make sure to provide a complete vehicle to the customer.

Because of the above reasons, all dealerships must always carry out the PDIs before delivering a vehicle.

In addition, all franchised shops and PDI centers must check the status of every vehicle received to identify who is responsible for any possible defects.

B: PDI PROCEDURE SA09719G50

Follow the procedures shown in the table below.

Static Checks Just After Vehicle Receipt

Step	Check point
1. Appearance check	(1) If the vehicle is covered with protective coating, visually check the vehicle body for damage and dents. If the protective coating has been removed, visually check the body paints for small areas of damage or stains. (2) Visually check the glass and light lenses for any damage and cracks or excessive gaps to the body sheet metal. (3) Visually check the plated parts for any damage.
2. Tire check	(1) Check the tires for damage, abnormal conditions, and dents on the wheels. (2) Check the tire air pressure.
3. Fuse installation	(1) If the vehicle is about to be delivered to the customer, attach a fuse.
4. Connection of air conditioner relay	(1) If the vehicle is about to be delivered to the customer, connect the air conditioner relay.
5. Check the doors for lock/unlock and open/close operations.	(1) Using the key, check if the door can be locked and unlocked normally. (2) Open and close the all doors to see that there are no abnormal conditions.
6. Power window operation check	(1) Check the power window for correct operations.
7. Operation check of trunk lock release lever	(1) Operate the trunk lock release lever to check that the trunk opens normally.
8. Operation check of rear gate lock release lever	(1) Operate the rear gate lock release lever to check that the rear gate is unlocked normally.
9. Operation check of fuel lid opener lock release lever	(1) Operate the fuel lid opener to check that the fuel lid is unlocked normally.
10. Accessory check	Check the following accessories are provided: ● Owner's manual ● Warranty booklet ● Service booklet ● Spare key ● Jack ● Tool set ● Spare tire
11. Operation check of hood lock release system	(1) Operate the hood lock release lever to check that the hood opens normally.
12. Battery	(1) Check the battery for any abnormal conditions such as rust and trace of battery fluid leaks.
13. Brake fluid	(1) Check the fluid amount.
14. Engine oil	(1) Check the oil amount.
15. Transmission fluid	(1) Check the fluid amount. (2) For AT, check the front differential oil.
16. AT front differential oil	(1) Check the AT front differential oil amount.
17. Coolant	(1) Check the coolant amount.
18. Clutch fluid	(1) Check the clutch fluid amount.
19. Window washer fluid	(1) Check the window washer fluid amount.
20. Hood latch check	(1) Check that the hood is closed and latched securely.
21. Keyless entry system	(1) Check that the keyless entry system operates normally.
22. Security system	(1) Check that the security system operates normally.
23. Seat	(1) Check the seat surfaces for smears or dirt. (2) Check the seat installation conditions and functionality.
24. Seat belt	(1) Check the seat belt installation conditions and functionality.
25. Child seat	(1) Check that an instruction tag for handling a child seat is attached.
26. Wheel alignment	(1) Check that the wheel alignments are properly adjusted.

PRE-DELIVERY INSPECTION

Pre-delivery Inspection

Checks with the Engine Running

Step	Check point
1. Test mode connector	(1) Disconnect the test mode connector.
2. Operation check of shift lock system, key interlock, and starter interlock	(1) For a MT vehicle, check the starter interlock system operations. (2) For an AT vehicle, check the shift lock and key interlock system operations.
3. Starting condition	(1) Start the engine and check that the engine starts smoothly.
4. Exhaust system	(1) Check that the exhaust noise is normal and no leaks are found.
5. Indicator light	(1) Check that all the indicator lights operate normally.
6. Clock	(1) Check that the clock operate normally.
7. Radio	(1) Check that the radio system operates normally.
8. Cigarette lighter	(1) Check that the cigarette lighter operates normally.
9. Lighting system	(1) Check that the lighting systems operate normally.
10. Window washer	(1) Check that the window washer system operates normally.
11. Wiper	(1) Check that the wiper system operates normally.

Dynamic Test with the Vehicle Running

Step	Check point
1. Brake test	(1) Check that the foot brake operates normally.
2. Parking brake	(1) Check that the parking brake operates normally.
3. AT shift control	(1) Check the AT shift patterns are correct.
4. Heater & ventilation	(1) Check that the heater & ventilation system operates normally.
5. Air conditioner	(1) Check that the air conditioner operates normally.
6. Cruise control	(1) Check that the cruise control system operates normally.

Checks after Dynamic Test

Step	Check point
1. ATF level	(1) Check that the ATF level is normal.
2. Power steering fluid level	(1) Check that the power steering fluid level is normal.
3. Fluid leak check	(1) Check for fluid/oil leaks.
4. Water leak check	(1) Spray the vehicle with water and check for water leaks.
5. Appearance check 2	(1) Remove the protective coating (if any). (2) Check the body paints for damage and smears. (3) Check the plated parts for damage and rust.

1. APPEARANCE CHECK SA09719G5001

- If the vehicle is covered with protective coating, visually check the vehicle body for damage and dents.
- If there is no protective coating, check the body paints for small areas of damage or stains and repair as necessary.
- Check the window glass, door glass, and lights for any cracks or damage and repair or replace the parts as necessary.
- Check the plated parts, such as the grilles and door knobs, for damage or loss of gloss and repair or replace the parts as necessary.

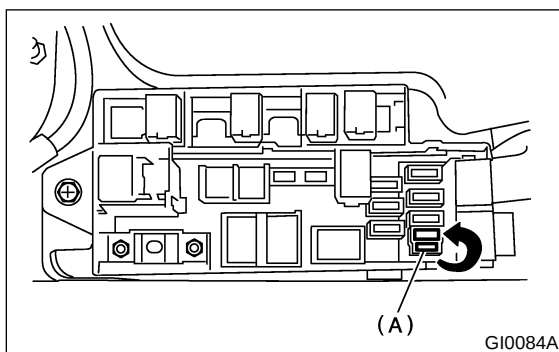
2. TIRE CHECK SA09719G5002

- Check the tire outer faces for any damage.
- Check the tire air pressure by referring to the following table.

Tire size	Tire inflation pressure kPa (kg/cm ² , psi)	
	Front	Rear
P195/60R15	230 (2.3, 33)	220 (2.2, 32)
P205/60R15	220 (2.2, 32)	210 (2.1, 30)
R205/55R16	220 (2.2, 32)	210 (2.1, 30)
P225/60R16	210 (2.1, 30)	200 (2.0, 29)

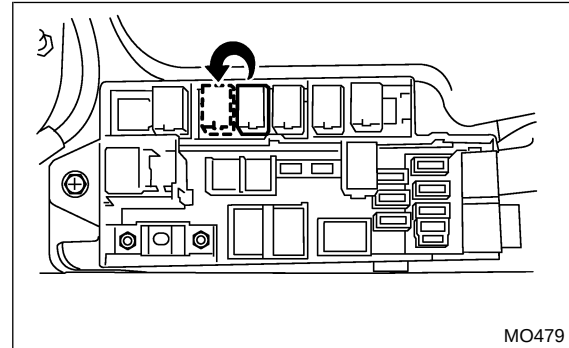
3. FUSE INSTALLATION SA09719G5010

A vehicle just delivered has no fuses for the circuit to prevent battery discharge. Attach a 15 A fuse as shown in the figure.



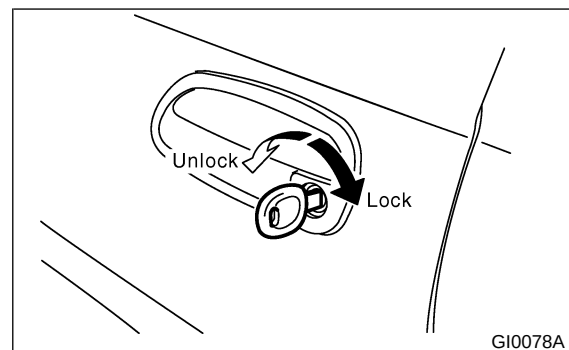
4. CONNECTION OF AIR CONDITIONER RELAY SA09719G5050

A vehicle just delivered has its air conditioner relay disconnected to protect the air conditioner compressor. Switch air conditioner relay position as shown in the figure below.



5. CHECK THE DOOR OPERATIONS, LOCK/UNLOCK AND OPEN/CLOSE, AS FOLLOWS. SA09719G5003

Using the key, lock and unlock the door several times to check for normal operation. Open and close the door several times for smooth movement.



● Vehicles with manual door locks:

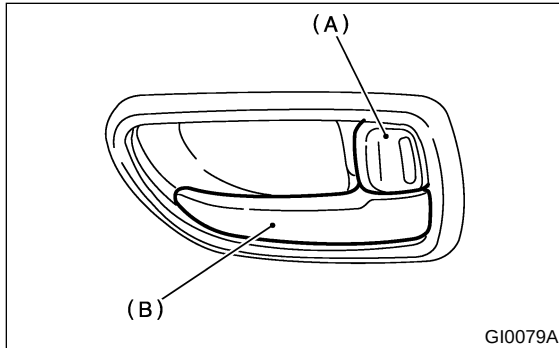
Sit in the driver seat, close the door completely, and move the lock lever to the lock position. Then, pull the inside door handle to ensure the door will not open.

PRE-DELIVERY INSPECTION

Pre-delivery Inspection

● Vehicles with power door locks:

Sit in the driver seat, close the driver's door completely, and place the door lock knob (A) to the lock position. Then pull the all inside door handles (B) to ensure that the all doors will not 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.



6. POWER WINDOW OPERATION CHECK

SA09719G5004

Manipulate the power window switches one by one to check that each of the power windows goes up and down with no abnormal noises.

7. OPERATION CHECK OF TRUNK LOCK RELEASE LEVER

SA09719G5005

Operate the trunk lock release lever and verify that the trunk lid opens.

8. OPERATION CHECK OF REAR GATE LOCK RELEASE LEVER

SA09719G5006

Operate the rear gate lock release lever and verify that the rear gate is unlocked and opened smoothly.

9. OPERATION CHECK OF FUEL LID OPENER LOCK RELEASE LEVER

SA09719G5007

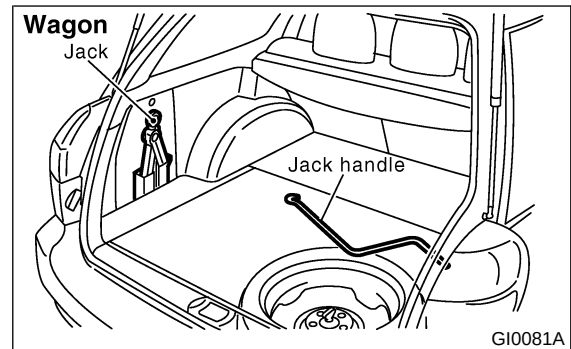
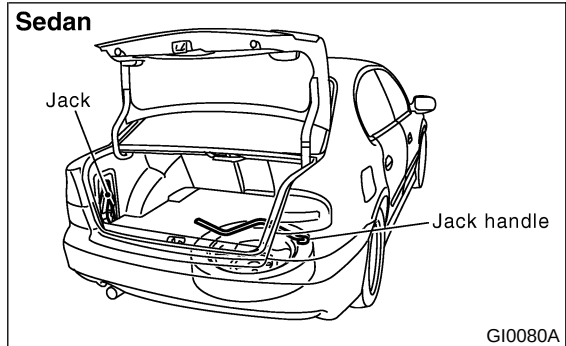
Operate the fuel lid opener and verify that the fuel lid opens normally. Check that the filler cap is securely closed.

10. ACCESSORY CHECK

SA09719G5008

Check that the following accessories are provided in the luggage compartment or cargo area.

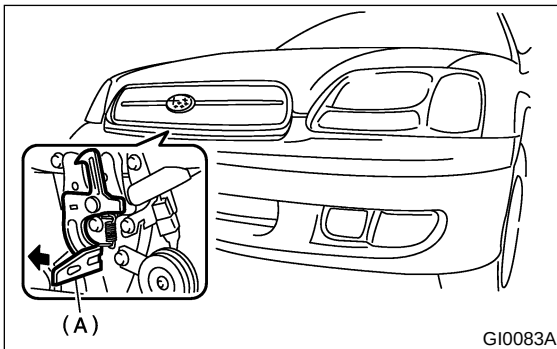
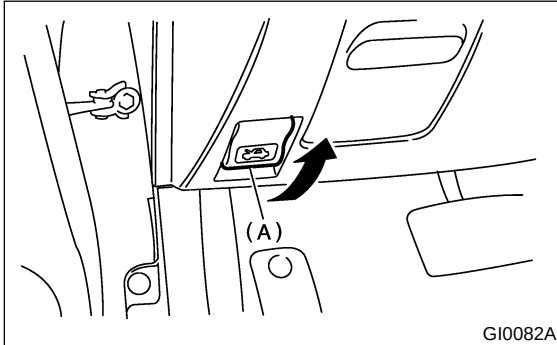
- Owner's manual
- Warranty booklet
- Service booklet
- Spare key
- Jack
- Tool set
- Spare tire



11. OPERATION CHECK OF HOOD LOCK RELEASE SYSTEM

SA09719G5009

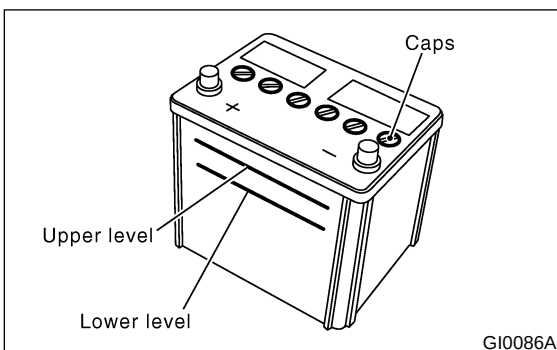
Unlatch and open the hood while checking that no abnormal conditions are found. Then, support the hood with the hood stay.



12. BATTERY

SA09719G5012

Check the battery terminals to make sure that no rust or corruptions due to fluid leaks are found. Check that the battery tent is securely tightened.



13. BRAKE FLUID

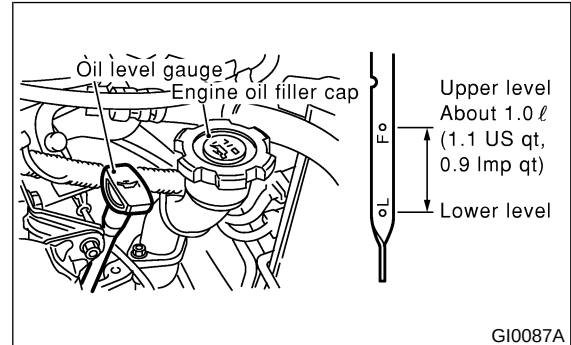
SA09719G5013

Check the brake fluid amount. If the amount is insufficient, carry out a brake line test to identify brake fluid leaks and check the brake operation. After that, refill the brake fluid tank with the specified type of fluid.

14. ENGINE OIL

SA09719G5014

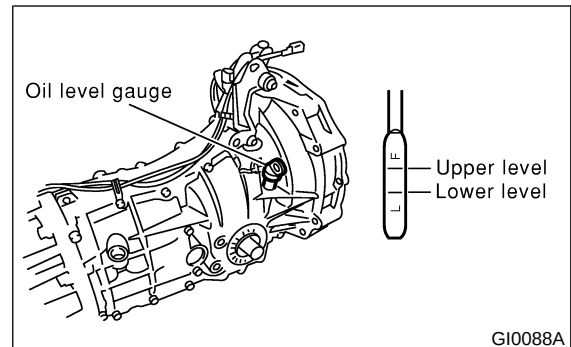
Check the engine oil amount. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of the specified engine oil.



15. TRANSMISSION FLUID

SA09719G5015

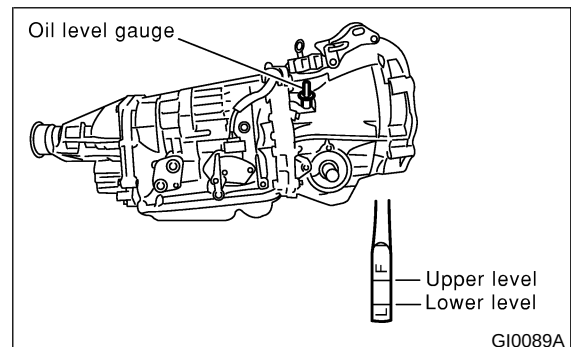
Check the transmission fluid amount. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of the specified fluid.



16. AT FRONT DIFFERENTIAL OIL

SA09719G5016

Check the AT front differential oil amount. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of the specified AT front differential oil.



PRE-DELIVERY INSPECTION

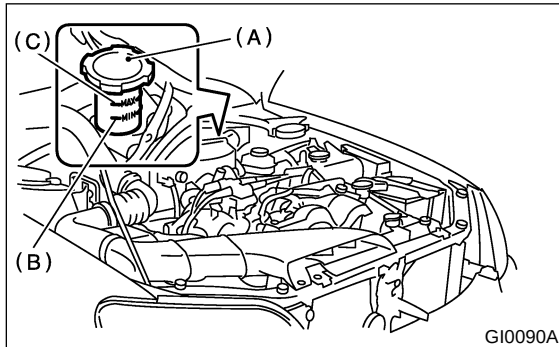
Pre-delivery Inspection

17. COOLANT SA09719G5017

Check the coolant amount on the reservoir. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of coolant with the specified concentration.

18. CLUTCH FLUID SA09719G5018

Check the clutch fluid amount. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of the specified fluid.



19. WINDOW WASHER FLUID SA09719G5019

Check the window washer fluid amount. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of washer fluid commercially available.

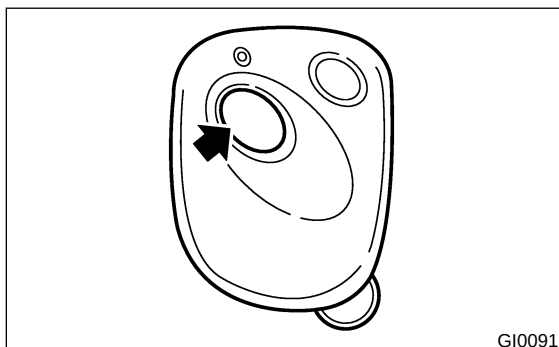
20. HOOD LATCH CHECK SA09719G5020

Retract the hood stay and close the hood. Check that the hood is securely latched.

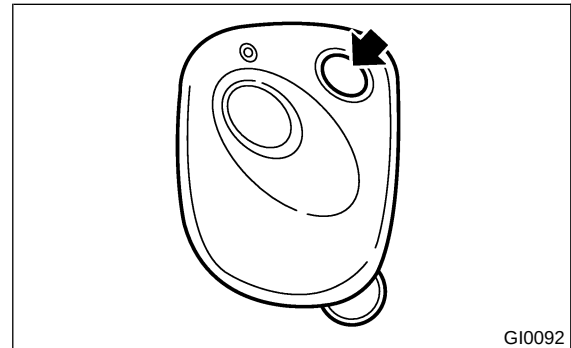
21. KEYLESS ENTRY SYSTEM SA09719G5021

Check the keyless entry system operations as follows.

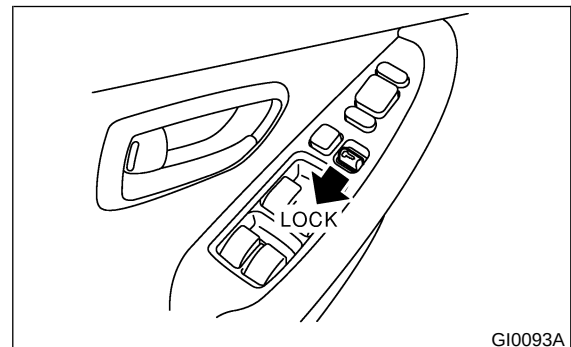
- Open all the door windows fully.
- Remove the key from the ignition switch and close all the doors including rear gate (wagon).
- Press the "LOCK/ARM" button on the transmitter momentarily once and check if all the doors are locked and the horn chirps once.



- Press the "UNLOCK/DISARM" button on the transmitter momentarily once and check if the driver's door is unlocked, the horn chirps twice and the dome light illuminates.



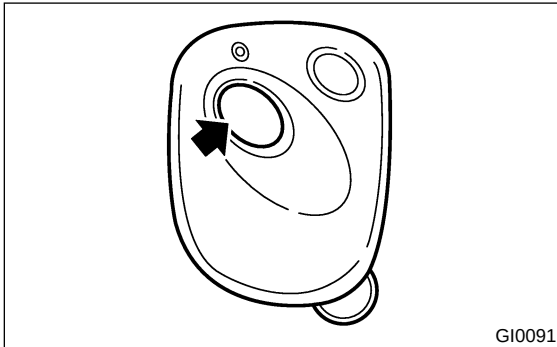
- Press the "UNLOCK/DISARM" button on the transmitter momentarily once again and check if all the doors including the rear gate on wagon are unlocked.
- Press the "LOCK/ARM" button on the transmitter a little bit of time (approx. 1.5 sec.) and check if a panicking condition occurs; the horn sounds continuously. Also, check if that condition lasts for 30 seconds or until any button of the transmitter is pressed.
- Press the "LOCK/ARM" button on the transmitter momentarily once with one of the doors including the rear gate (wagon) open and check if the horn chirps three times to warn of a door ajar. Then, bring all doors including the rear gate (wagon) in closed condition and check if all the doors are locked and the horn chirps once.
- Press the "LOCK" side of the power door locking switch with any one of the doors including the rear gate (wagon) open. Then, bring all the doors including the rear gate (wagon) in the closed condition and check if all the doors are locked and the horn chirps once.



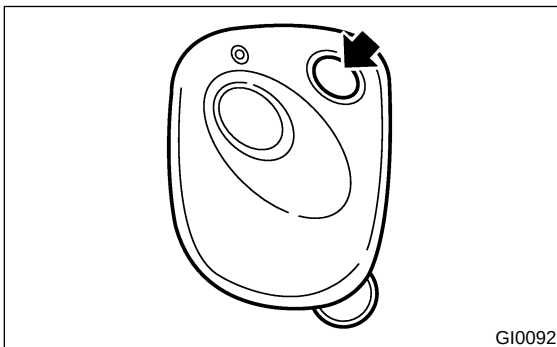
22. SECURITY SYSTEM SA09719G5022

Check the security system operations as follows.

- Open all the door windows fully.
- Remove the key from the ignition switch and close all the doors including rear gate (wagon).
- Press the "LOCK/ARM" button on the transmitter momentarily once and check if all the doors are locked, the horn chirps once, the parking lights flash once and the security indicator light flashes slowly to ensure that the security system has been brought into the arming state.



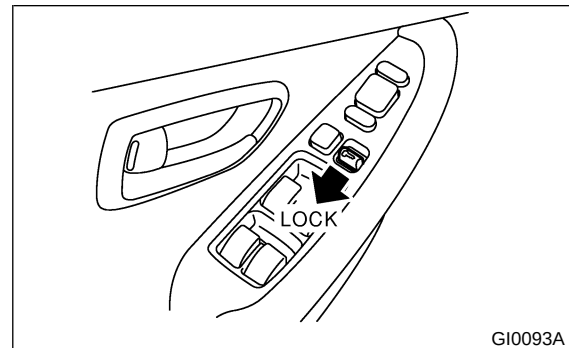
- Press the "UNLOCK/DISARM" button on the transmitter momentarily once and check if the driver's door is unlocked, the horn chirps twice, the parking lights flash twice, the dome light illuminates and the security indicator light goes off to ensure that the system has been brought into the disarming state.



- Press the "UNLOCK/DISARM" button on the transmitter momentarily once again and check if all the doors including the rear gate on wagon are unlocked.
- Press the "LOCK/ARM" button on the transmitter a little bit of time (approx. 1.5 sec.) and check if a panicking condition occurs; the horn sounds continuously, the parking lights flash and the security indicator light flashes rapidly. Also, check if that condition lasts for 30 seconds or until any button of the transmitter is pressed.
- Press the "LOCK/ARM" button on the transmitter momentarily once with one of the doors including the rear gate (wagon) open and check if the horn chirps three times to warn of a door ajar.

Then, bring all doors including the rear gate (wagon) in closed condition and check if the arming condition is brought about; all the doors are locked, the horn chirps once and the parking lights flash once.

- Press the "LOCK" side of the power door locking switch with any one of the doors including the rear gate (wagon) open. Then, bring all the doors including the rear gate (wagon) in the closed condition and check if all the doors are locked, the horn chirps once and the parking lights flash once to ensure that the security system has been brought into the arming state.



- Unlock a door using the inner lock knob or the key and open the door while the security system is in the arming state. Check to ensure that the alarming condition occurs, i.e. the horn sounds continuously, the parking lights flash and the security indicator light flashes rapidly, and that it lasts for 30 seconds or until the "UNLOCK/DISARM" button on the transmitter is pressed. Also, check to ensure that turning the ignition key to the "START" position in the arming state does not cause the starter motor to turn, thus the engine being prevented from starting.
- Apply a shock to the vehicle body with the security system in arming state, and check to ensure that the alarming condition occurs.
- Troubleshoot the security system if any one of the above-mentioned checks does not meet the requirements.

23. SEAT SA09719G5023

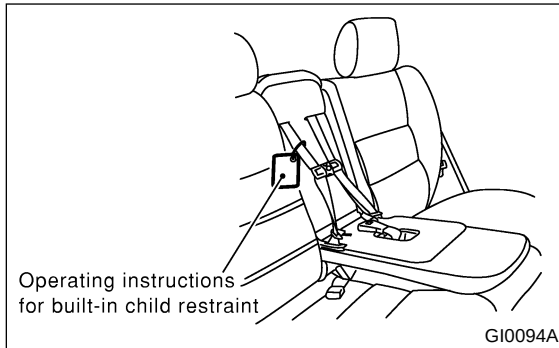
Check that each seat provides full functionality in sliding and reclining. Check all available functions of the rear seat such as a trunk-through center arm rest.

24. SEAT BELT SA09719G5024

Pull out the seat belt and then release it. Check that the belt webbing retracts smoothly.

25. CHILD SEAT SA09719G5025

Check that an instruction tag for handling a child seat is attached to the specified position.

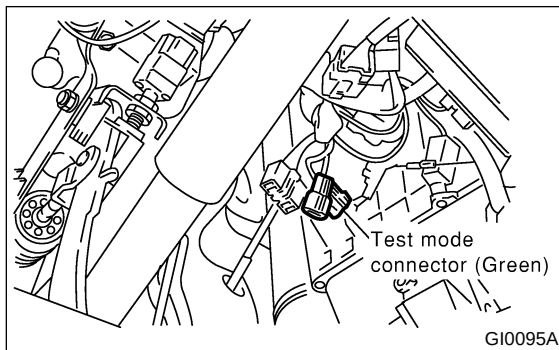


26. WHEEL ALIGNMENT SA09719G5026

Check the wheel alignments. <Ref. to FS-6 Wheel Alignment.> and <Ref. to RS-8 Wheel Alignment.>

27. TEST MODE CONNECTOR SA09719G5027

Turn the ignition switch to ON and check that the check-engine light starts blinking. If the light blinks, return the ignition key to LOCK and disconnect the test mode connector. Then, turn the ignition key to ON again. If the check-engine light blinks at that time in spite of the disconnected test mode connector, carry out an engine diagnosis.



28. OPERATION CHECK OF SHIFT LOCK SYSTEM, KEY INTERLOCK, AND STARTER INTERLOCK SA09719G5028

- For a MT vehicle, check the starter interlock system operations.
- For an AT vehicle, check the shift lock and key interlock system operations.

29. STARTING CONDITION SA09719G5029

Start the engine and check that the engine starts smoothly. If any battery voltage problems are found, recharge or replace the battery. If any abnormal noises are observed, immediately stop the engine and check and repair the necessary components.

30. EXHAUST SYSTEM SA09719G5030

Listen to the exhaust noise to see if no abnormal noises are observed.

31. INDICATOR LIGHT SA09719G5031

Check that all the indicator lights are off.

32. CLOCK SA09719G5032

Check the clock for normal operations and enough accuracy.

33. RADIO SA09719G5033

Check the radio for full functionality and normal noise level. Also check the CD unit operations.

34. CIGARETTE LIGHTER SA09719G5034

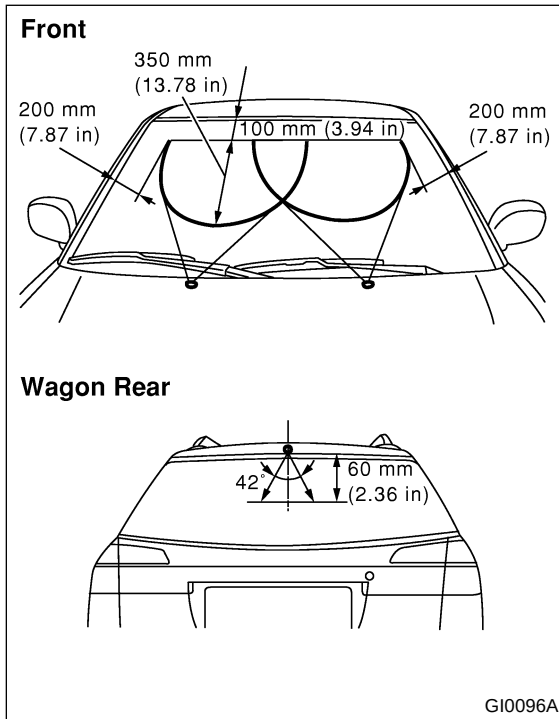
Check that the cigarette lighter operations.

35. LIGHTING SYSTEM SA09719G5035

- Check the headlight operations.
- Check the brake light operations.
- Check the other lights for normal operations.

36. WINDOW WASHER SA09719G5036

Check that the window washer system injects washer fluid to the specified area of the windshield shown in the figure.



37. WIPER SA09719G5037

Check the front and rear wipers for normal operations.

38. BRAKE TEST SA09719G5038

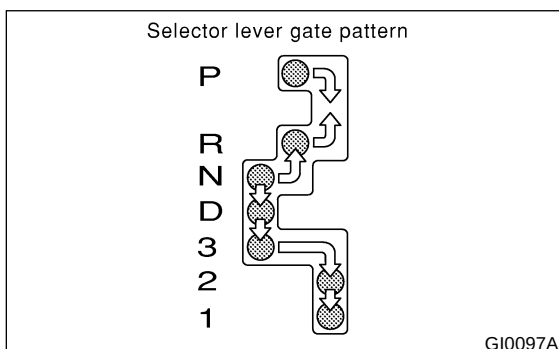
Check the foot brake for normal operations.

39. PARKING BRAKE SA09719G5039

Check the parking brake for normal operations.

40. AT SHIFT CONTROL SA09719G5041

Set the AT select lever to each gear position while checking that the demanded gear position is correctly attained.



Selector Position	Gear Position			
	1st	2nd	3rd	4th
D	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	
2		Yes		
1	Yes			

41. HEATER & VENTILATION SA09719G5042

Operate the heater and ventilation system to check for normal airflow and heating capacity.

42. AIR CONDITIONER SA09719G5043

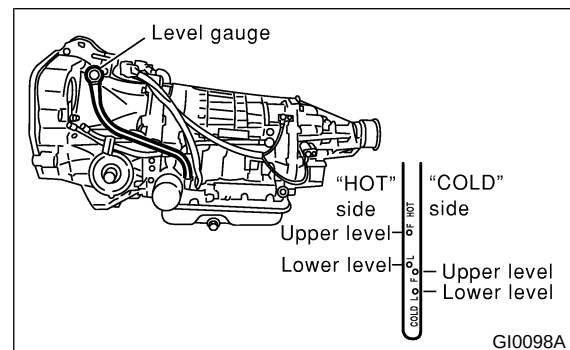
Operate the air conditioner. Check that the A/C compressor operates normally and enough cooling is provided.

43. CRUISE CONTROL SA09719G5044

Operate the cruise control system. Check that the system is activated and deactivated correctly.

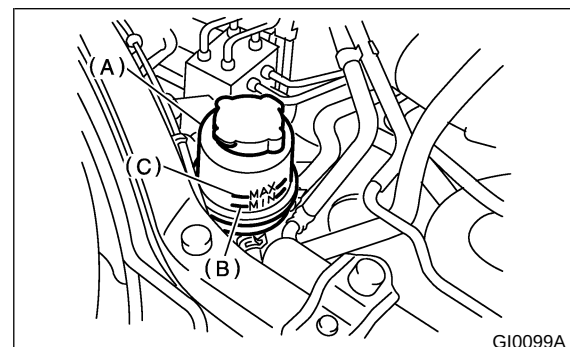
44. ATF LEVEL SA09719G5045

Check that the ATF level is normal. If insufficient, check that no leaks are found. Then add the necessary amount of the specified ATF.



45. POWER STEERING FLUID LEVEL SA09719G5046

Check that the power steering fluid level is normal. If insufficient, check that no leaks are found. Then add the necessary amount of the specified power steering fluid.



46. FLUID LEAK CHECK SA09719G5047

Check the entire areas of the vehicle for any trace of coolant/oil/fluid leaks.

47. WATER LEAK TEST SA09719G5048

Spray the vehicle with water and check that no water enters the passenger compartment.

- Before performing the water leakage test, remove anything that may obstruct the operation or which must be kept dry.
- Close all of the windows completely, and then close all of the doors tightly. Close the hood and trunk lid before starting the test.
- Connect a hose to a tap, and spray water on the vehicle. The rate of water discharge must be approx. 20 to 25 liters (5.3 to 6.6 US gal, 4.4 to 5.5 Imp gal) per minute.

When spraying water on areas adjacent to the floor and wheel house, increase the pressure. When directing water on areas other than the floor portion and wheel house, decrease the pressure. But the force of water must be made strong occasionally by pressing the end of the hose.

NOTE:

Be sure to keep the hose at least 10 cm (3.9 in) from the vehicle.

- Check the following areas:
 - Front window and body framework mating portion
 - Door mating portions
 - Glass mating portions
 - Rear quarter window mating portions
 - Rear window and body framework mating portion
 - Around roof drips
- If any dampness in the compartments is discovered after the water has been applied, carefully check all areas that may have possibly contributed to the leak.

48. APPEARANCE CHECK 2 SA09719G5049

Check the vehicle body paints, plated faces, glass, and lenses for any dirt or damage.

GENERAL DESCRIPTION

Periodic Maintenance Services

1. General Description SA07001

A: GENERAL SA07001G23

Be sure to perform periodic maintenance in order to maintain vehicle performance and find problems before they become serious.

SCHEDULE

Periodic Maintenance Services

2. Schedule SA07682

A: MAINTENANCE SCHEDULE 1 SA07682G24

		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	Remarks
	× 1,000 km	4.8	12	24	36	48	60	72	81.4	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	Engine oil	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
2	Engine oil filter	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
3	Spark plugs					R				R				R				R	For 2.5 L
										R								R	For 3.0 L
4	Drive belt(s)					I				I				I		R			
5	Camshaft Drive belt					I				I				I		R			For 2.5 L Note (1)
6	Valve clearance															I			
8	Fuel line					(I)				(I)				(I)				I	Note (2)
9	Fuel filter					(R)				(R)				(R)				R	Note (2)
10	Air cleaner element					R				R				R				R	Note (3)
11	Cooling system					I				I				I				I	
12	Coolant					R				R				R				R	
13	Clutch system			I		I		I		I		I		I		I		I	
14	Transmission oil					I				I				I				I	
15	ATF					I				I				I				I	Note (4)
16	Front & rear differential oil					I				I				I				I	
17	Brake line			I		I		I		I		I		I		I		I	
18	Brake fluid					R				R				R				R	
19	Disc brake pads & discs					I				I				I				I	
20	Brake linings and drums					I				I				I				I	
21	Parking brake			I		I		I		I		I		I		I		I	
22	Suspension			I		I		I		I		I		I		I		I	
23	Wheel bearing									(I)								(I)	
24	Axle boots & joints			I		I		I		I		I		I		I		I	
25	Tire rotation		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	Note (5)
26	Steering system (Power steering)			I		I		I		I		I		I		I		I	
27	Supplement restraint system																		

Symbols used:

R: Replace

I: Inspection

(R) or (I): Recommended service for safe vehicle operation.

NOTE:

(1) Periodic inspection and replacement of the camshaft drive chains on the 3.0 liter models are not required.

(2) 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.

(3) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.

(4) ATF filter is maintenance free part. ATF filter needs replacement, when it has physically damaged or ATF leaked.

(5) A tire should be replaced when the tread wear indicator appears as a solid band across the tread. The indicators appear when the remaining tread has been worn to 1.6 mm (0.063 in) or less.

SCHEDULE

Periodic Maintenance Services

B: MAINTENANCE SCHEDULE 2 SA07682G25

Item	Every	Repeat short distance drive	Repeat rough/muddy road drive	Extremely cold weather area	Salt or other corrosive used or coastal area	High humidity or mountain area	Repeat towing trailer
Engine oil	3.75 months	R		R			R
	6,000 km						
	3,750 miles						
Engine oil filter	3.75 months	R		R			R
	6,000 km						
	3,750 miles						
Fuel filter	15 months				I		
	24,000 km						
	15,000 miles						
Fuel line	15 months				I		
	24,000 km						
	15,000 miles						
Transmission oil	15 months						R
	24,000 km						
	15,000 miles						
ATF	15 months						R
	24,000 km						
	15,000 miles						
Front & rear differential oil	15 months						R
	24,000 km						
	15,000 miles						
Brake line	15 months	I	I		I		I
	24,000 km						
	15,000 miles						
Brake fluid	15 months					R	
	24,000 km						
	15,000 miles						
Disc brake pads & discs	15 months	I	I		I		I
	24,000 km						
	15,000 miles						
Brake linings and drums	15 months	I	I		I		I
	24,000 km						
	15,000 miles						
Parking brake	15 months	I	I		I		I
	24,000 km						
	15,000 miles						
Suspension	7.5 months		I	I	I		I
	12,000 km						
	7,500 miles						
Axle boots & joints	7.5 months	I	I	I	I		I
	12,000 km						
	7,500 miles						
Steering system (Power steering)	7.5 months	I	I	I	I		I
	12,000 km						
	7,500 miles						

SA07077

SA07077A20

Replace engine oil and engine oil filter at the same time.

- ## 2.5 L model



B2M3884

- ## 2.5 L model



B2M4534A

- 44 N·m (4.5 kgf-m, 33 ft-lb)**

- 4.5 ℓ (4.8 US qt, 4.0 Imp qt)**

GI0015A

- 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.

ENGINE OIL

Periodic Maintenance Services

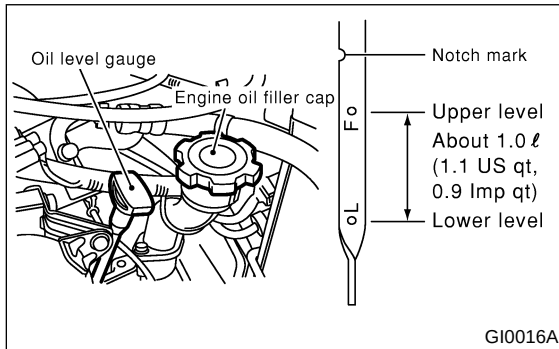
- If vehicle is used in desert areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used:

API classification: SJ or SH

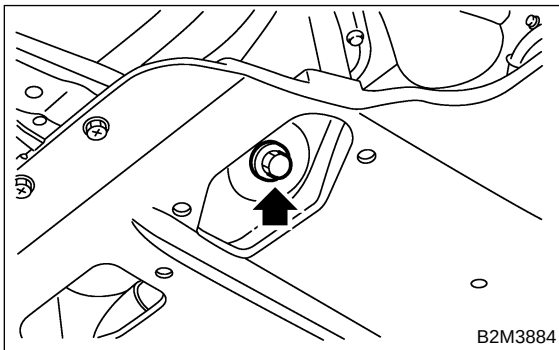
SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20W-50

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

2.5 L model



3.0 L model



B: INSPECTION SA07077A10

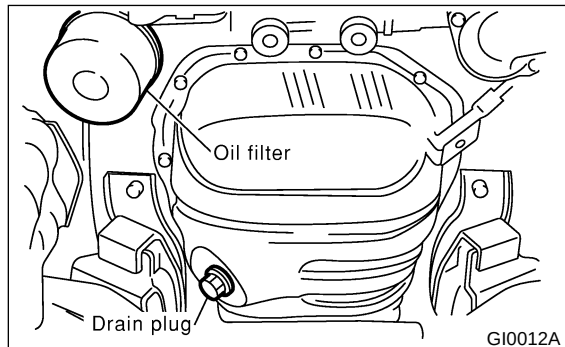
- 1) Park vehicle on a level surface.
- 2) Remove oil level gauge and wipe it clean.
- 3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
- 4) Remove it again and note the reading. If the engine oil level is below the "L" line, add 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.

4. Engine Oil Filter SA07585

A: REPLACEMENT SA07585A20

1. 2.5 L MODEL SA07585A2001

- 1) Remove oil filter with ST.
ST 498547000 OIL FILTER WRENCH



- 2) Get a new oil filter and apply a thin coat of engine oil to the seal rubber.
- 3) Install oil filter by turning it by hand, being careful not to damage seal rubber.
- 4) Tighten more (approximately 2/3 to 3/4 turn) after the seal rubber contacts the oil pump case. Do not tighten excessively, or oil may leak.
- 5) After installing oil filter, run engine and make sure that no oil is leaking around seal rubber.

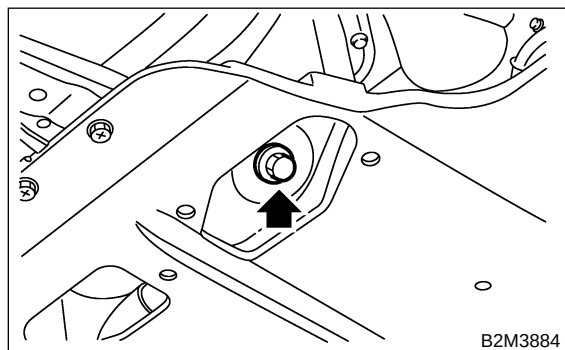
NOTE:

The filter element and filter case are permanently joined; therefore, interior cleaning is not necessary.

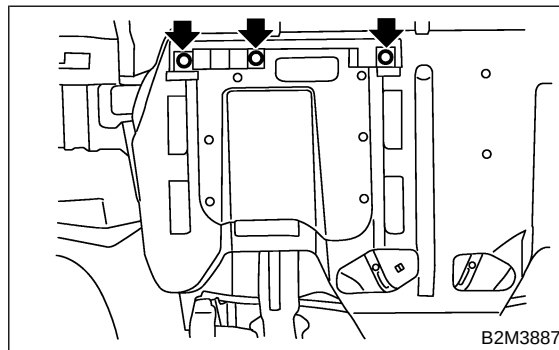
- 6) Check the engine oil level. <Ref. to PI-7 ENGINE OIL, PDI PROCEDURE, Pre-delivery Inspection.>

2. 3.0 L MODEL SA07585A2002

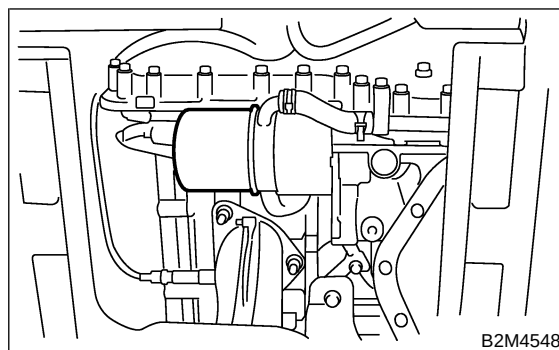
- 1) Drain engine oil by loosening engine oil drain plug.



- 2) Remove access lid.



- 3) Remove oil filter with ST.
ST 498547000 OIL FILTER WRENCH



- 4) Get a new oil filter and apply a thin coat of engine oil to the rubber seal.
- 5) Install oil filter by turning it by hand, being careful not to damage rubber seal.
- 6) Tighten more (approximately 2/3 to 3/4 turn) after the rubber seal contacts the oil pump case. Do not tighten excessively, or oil may leak.
- 7) After installing oil filter, run engine and make sure that no oil is leaking around rubber seal.

NOTE:

The filter element and filter case are permanently joined; therefore, interior cleaning is not necessary.

- 8) Check the engine oil level. <Ref. to LU(H6)-10, INSPECTION, Engine Oil.>

5. Spark Plugs

SA07683

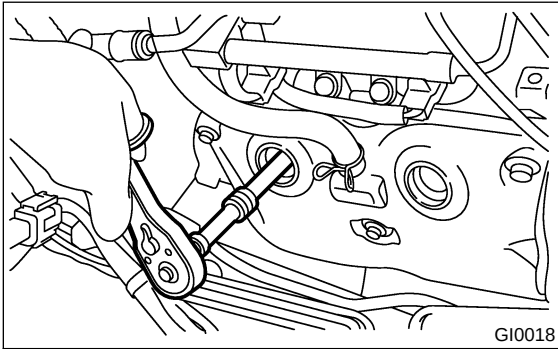
A: REPLACEMENT

SA07683A20

1. 2.5 L MODEL

SA07683A2001

- 1) Disconnect battery ground cable.
- 2) Remove intake duct and intake chamber.
- 3) Remove washer tank and put it aside.
- 4) Disconnect spark plug cord.
- 5) Remove spark plug with a plug-wrench.



- 6) Set new spark plug.

Recommended spark plug:

CHAMPION RC10YC4

CHAMPION RC8YC4

NGK BKR6E-11

NIPPONDENSO K20PR-U11

Spark plug gap

1.0 — 1.1 mm (0.039 — 0.043 in)

- 7) Tighten spark plug lightly with hand, and then secure with a plug-wrench to the specified torque.

Tightening torque:

20.6 N·m (2.10 kgf·m, 15.19 ft·lb)

NOTE:

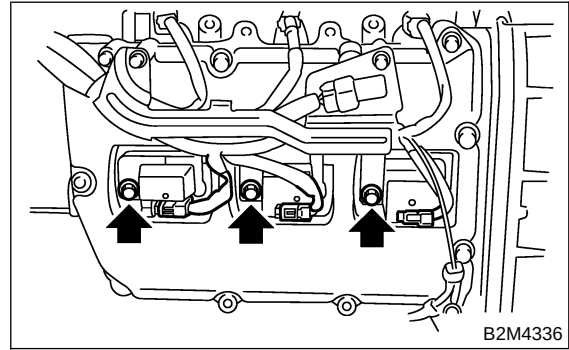
- Be sure to place the gasket between the cylinder head and spark plug.
- If torque wrench is not available, tighten spark plug until gasket contacts cylinder head; then tighten further 1/4 to 1/2 turns.

2. 3.0 L MODEL

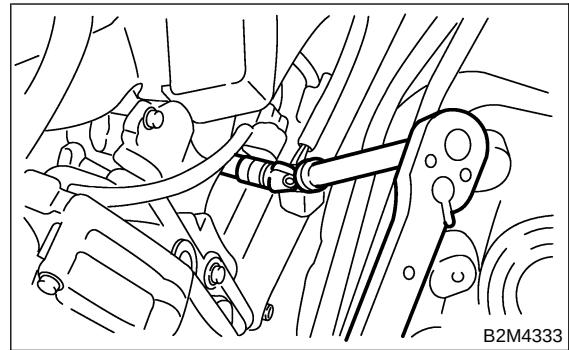
SA07683A2002

- 1) Disconnect battery cables and then remove battery and battery carrier.
- 2) Remove washer tank and put it aside.
- 3) Remove air cleaner lower case.
- 4) Disconnect connector from ignition coil.

- 5) Remove ignition coil.



- 6) Remove spark plug with a spark plug socket.



- 7) Set new spark plug.

Recommended spark plug:

NGK PLFR 6A-11

- 8) Tighten spark plug lightly with hand, and then secure with a plug-wrench to the specified torque.

Tightening torque:

21 N·m (0.21 kgf·m, 1.5 ft·lb)

- 9) Tighten ignition coil.

Tightening torque:

16 N·m (0.16 kgf·m, 1.2 ft·lb)

NOTE:

- Be sure to place the gasket between the cylinder head and spark plug.
- If torque wrench is not available, tighten spark plug until gasket contacts cylinder head; then tighten further 1/4 to 1/2 turn.

6. Drive Belt(s) SA07684

A: INSPECTION SA07684A10

1. 2.5 L MODEL SA07684A1001

- 1) Replace belts, if cracks, fraying or wear is found.
- 2) Check drive belt tension and adjust it if necessary by changing generator installing position and/or idler pulley installing position.

Belt tension

(A)

replaced: 7 — 9 mm (0.276 — 0.354 in)

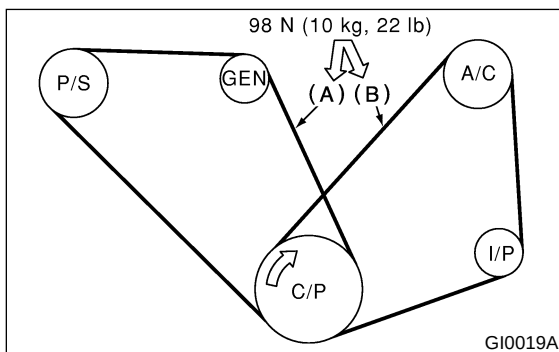
reused: 9.0 — 10.0 mm (0.354 — 0.394 in)

(B)*

replaced: 7.5 — 8.5 mm (0.295 — 0.335 in)

reused: 9.0 — 10.0 mm (0.354 — 0.394 in)

*: There is no belt (B) on models without an air conditioner.



C/P Crankshaft pulley

GEN Generator

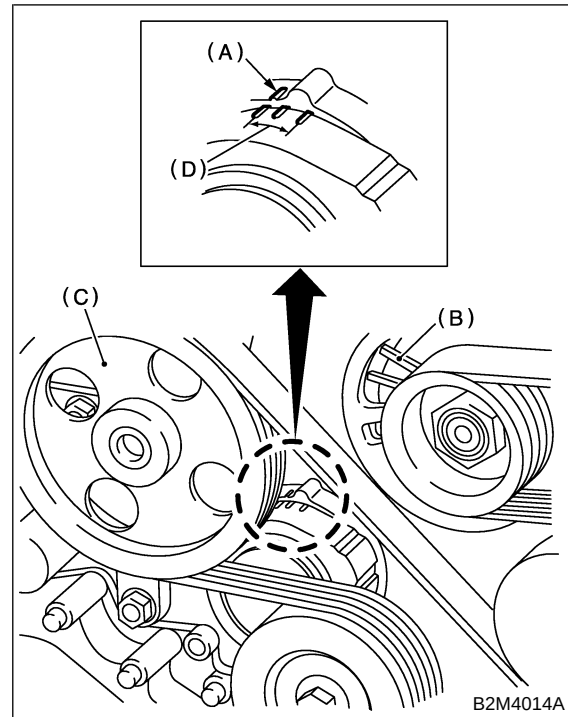
P/S Power steering oil pump pulley

A/C Air conditioning compressor pulley

I/P Idler pulley

2. 3.0 L MODEL SA07684A1002

- 1) Replace belts, if cracks, fraying or wear is found.
- 2) Check that the V-belt automatic tensioner indicator is within the range (D).



(A) Indicator

(B) Generator

(C) Power steering oil pump

(D) Service limit

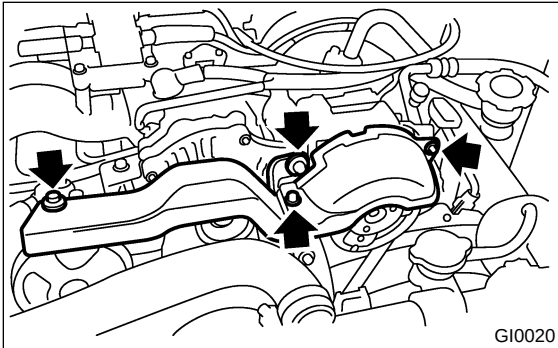
B: REPLACEMENT

SA07684A20

1. 2.5 L MODEL

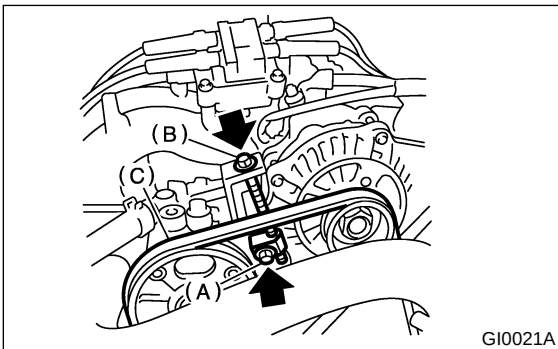
SA07684A2004

- 1) Remove V-belt cover.

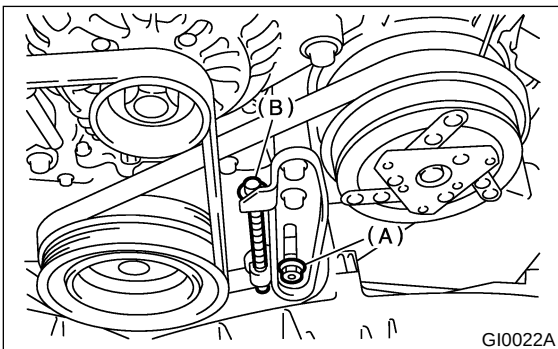
**NOTE:**

Wipe off any oil or water on the belt and pulley.

- 2) Loosen the lock bolt (A).
- 3) Loosen the slider bolt (B).
- 4) Remove the front side belt (C).



- 5) Loosen the lock nut (A).
- 6) Loosen the slider bolt (B).
- 7) Remove the rear side belt.

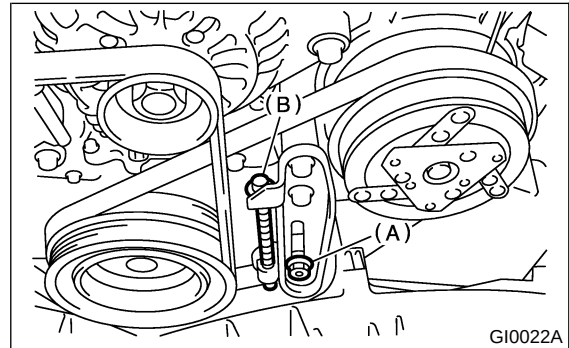


- 8) Install a new belt, and tighten the slider bolt so as to obtain the specified belt tension.
- 9) Tighten the slider bolt (B).

- 10) Tighten the lock nut (A).

Tightening torque:

22.6 N·m (2.3 kgf-m, 16.6 ft-lb)



- 11) Install a new belt, and tighten the slider bolt so as to obtain the specified belt tension.

- 12) Tighten the slider bolt (B).

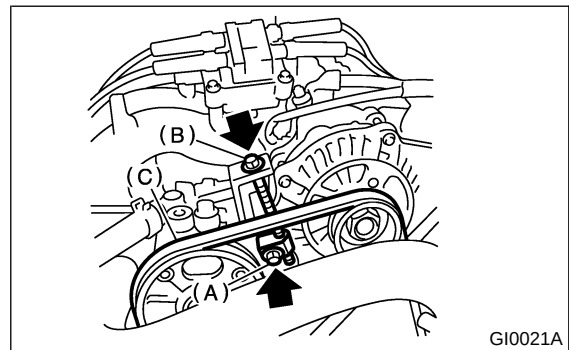
- 13) Tighten the lock bolt (A).

Tightening torque:**Lock bolt, through bolt:**

25 N·m (2.5 kgf-m, 18 ft-lb)

Slider bolt:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

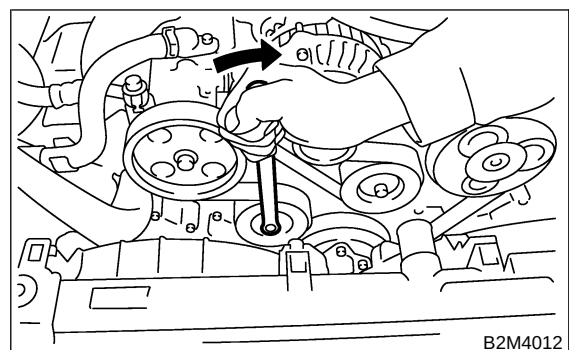


- 14) Install V-belt cover.

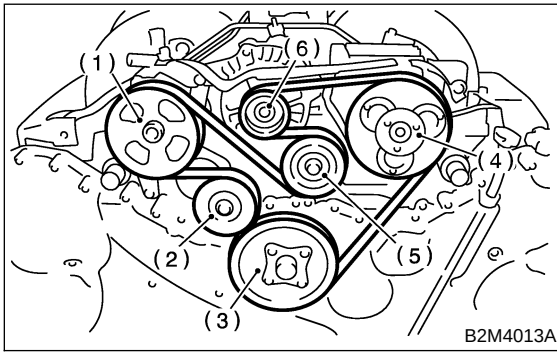
2. 3.0 L MODEL

SA07684A2005

- 1) Fit the tool to the belt tensioner mounting bolt.
- 2) Turn the tool clockwise, and loosen the V-belt to remove.



3) Install in the reverse order of removal.



- (1) Power steering oil pump
- (2) Belt tension adjuster
- (3) Crankshaft pulley
- (4) A/C compressor
- (5) Belt idler
- (6) Generator

CAMSHAFT DRIVE BELT

Periodic Maintenance Services

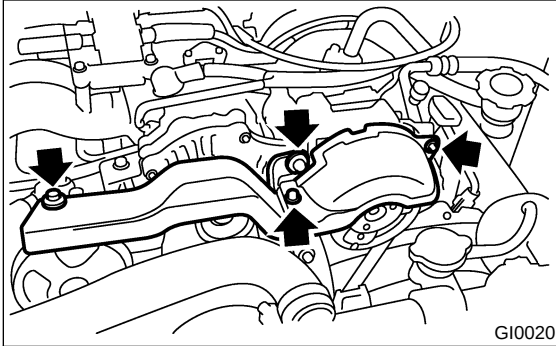
7. Camshaft Drive Belt

SA07685

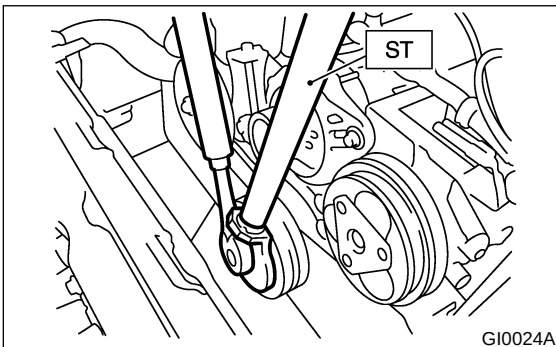
A: REPLACEMENT

SA07685A20

- 1) Remove radiator fan <Ref. to CO(H4)-20 Radiator Main Fan and Fan Motor.> and air conditioner fan <Ref. to CO(H4)-23 Radiator Sub Fan and Fan Motor.>.
- 2) Remove V-belt cover.

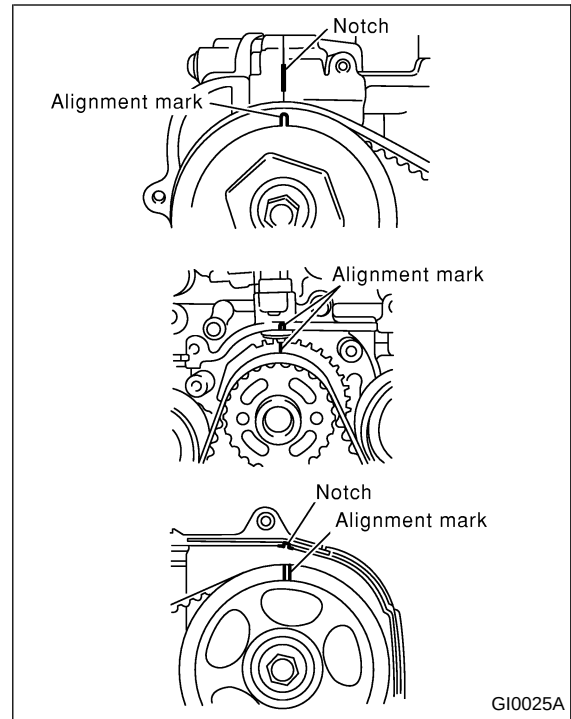


- 3) Remove V-belts. <Ref. to ME(H4)-43 V-belt.>
- 4) Remove air conditioning compressor drive belt tensioner.
- 5) Remove pulley bolt. To lock crankshaft use ST. ST 499977100 CRANKSHAFT PULLEY WRENCH

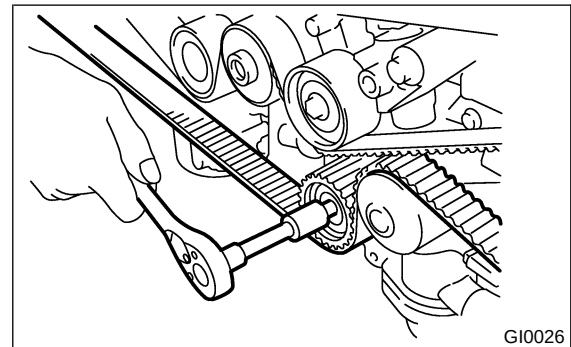


- 6) Remove crankshaft pulley.
- 7) Remove left side belt cover.
- 8) Remove front belt cover.

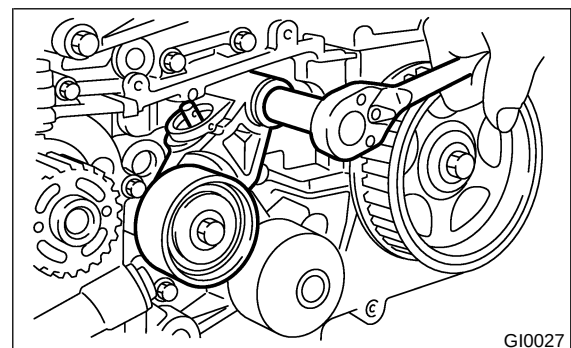
- 9) Turn crankshaft and align alignment marks on crankshaft, and left and right camshaft sprockets with notches of belt cover and cylinder block:
ST 499987500 CRANKSHAFT SOCKET



- 10) Remove belt idler.
- 11) Remove belt idler (No. 2).



- 12) Remove timing belt.
- 13) Remove automatic belt tension adjuster assembly.



B: INSTALLATION SA07685A11

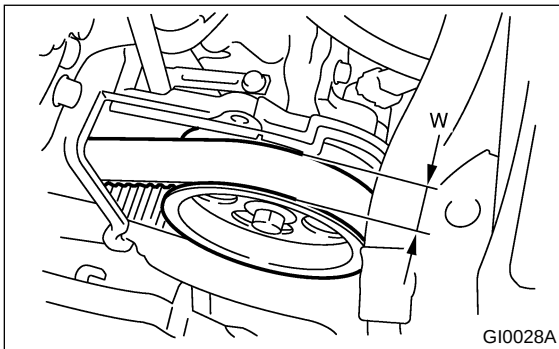
Install in the reverse order of removal.

NOTE:

When installing the timing belt, be sure to align all alignment marks on the belt with corresponding marks on the sprockets. If incorrectly installed, interference between pistons and valves may occur.

C: INSPECTION SA07685A10

- 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.

8. Valve Clearance SA07083

A: INSPECTION SA07083A10

For the inspection procedures of the valve clearance: <Ref. to ME(H4)-53 Valve Rocker Assembly.> or <Ref. to ME(H6)-26, Valve Clearance.>

9. Fuel Line SA07686

A: INSPECTION SA07686A10

The fuel line is located mostly internally, so check pipes, areas near pipes, and engine compartment piping for rust, hose damage, loose bands, etc. If faulty parts are found, repair or replace them. <Ref. to FU(H4)-98 Fuel Delivery, Return and Evaporation Lines.> or <Ref. to FU(H6)-77, Fuel Delivery, Return and Evaporation Lines.>

10. Fuel Filter SA07027

A: REPLACEMENT SA07027A20

WARNING:

- Place “No fire” signs near the working area.
- Disconnect ground cable from battery.

CAUTION:

Be careful not to spill fuel on the floor.

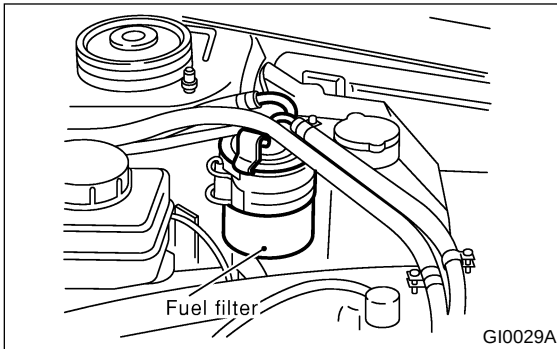
1) Before removing the hose, filter, pump, etc., be sure to release the fuel pressure, as follows:

- Disconnect the wiring connector of the fuel pump.
- Crank the engine for more than five seconds. If the engine starts, let the engine run until it stops.
- After turning IG switch OFF, connect the wiring connector of the fuel pump.
- Disconnect ground cable from battery.

2) Loosen the screw of the hose clamp and pull off the hose from the filter.

3) Remove the filter from the holder.

4) Replace fuel filter with a new one.



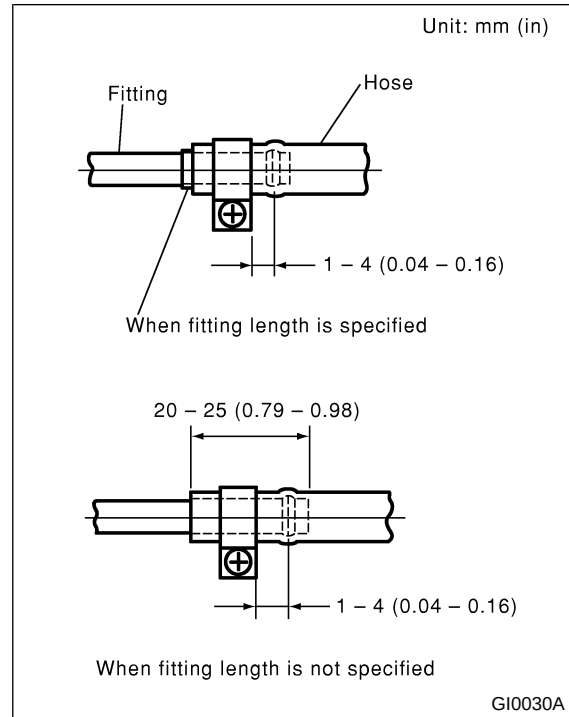
5) Install the hoses as shown in the figure.

Tightening torque:

1.0 — 1.5 N·m (0.1 — 0.15 kgf-m, 0.7 — 1.1 ft-lb)

CAUTION:

- If the hose is damaged at the clamping portion, replace the hose with a new one.
- If the hose clamp is deformed too much, replace with a new one.
- Correct the hose position by removing any twist so that it will not interfere with the filter body or washer tank, before tightening the screw of the hose clamp.



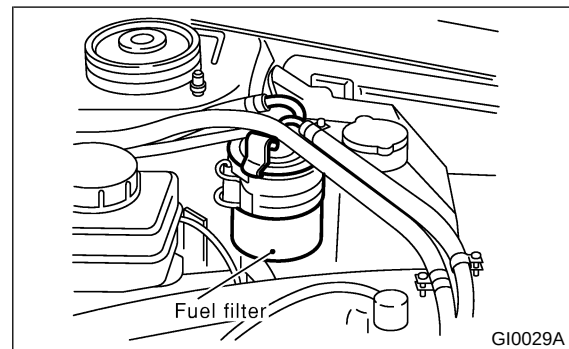
6) Install the fuel filter bracket to the vehicle body. And tighten the bolts to the specified torque.

NOTE:

Make sure that the clamp screw is not loose.

Tightening torque:

7.35 N·m (0.75 kgf-m, 5.45 ft-lb)

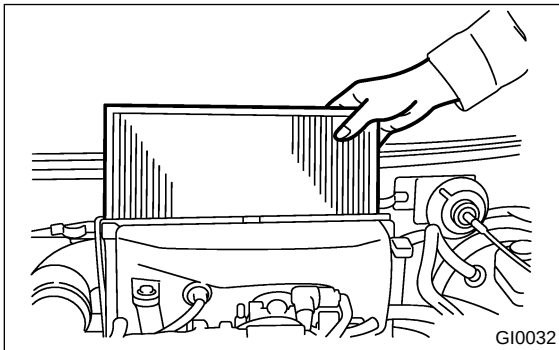


11. Air Cleaner Element SA07687

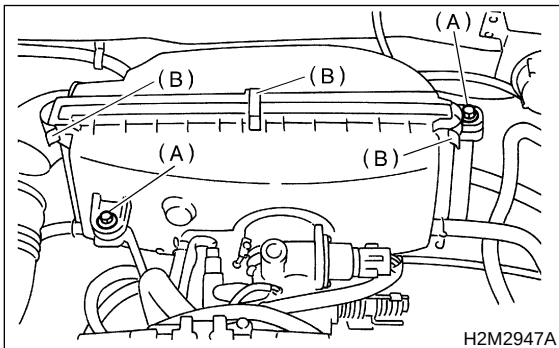
A: REPLACEMENT SA07687A20

1. 4 CYLINDER MODEL SA07687A2003

Do not attempt to clean the air cleaner element. The filter paper of the element is wetted with a special non-inflammable slow-evaporating viscous liquid. It is resistant to cold weather and has a long service life. Dirt adhering to this filter paper forms porous laminations with the viscous liquid, which function as a filtration layer to reduce dust penetration into the filter paper. If this filter paper is cleaned, the filtration layer thus formed will be lost along with the viscous liquid.



- 1) Remove bolts (A) which install air cleaner case to stays.
- 2) Remove the clip (B) above the air cleaner case.



- 3) Remove air cleaner.
- 4) Install in the reverse order of removal.

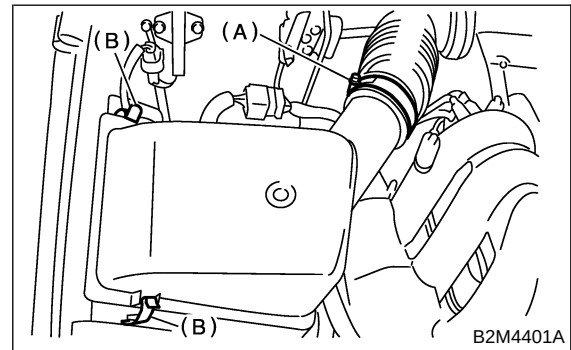
CAUTION:

Fasten with a clip after inserting the lower tab of the case.

2. 6 CYLINDER MODEL SA07687A2004

Do not attempt to clean the air cleaner element. The filter paper of the element is wetted with a special non-inflammable slow-evaporating viscous liquid. It is resistant to cold weather and has a long service life. Dirt adhering to this filter paper forms porous laminations with the viscous liquid, which function as a filtration layer to reduce dust penetration into the filter paper. If this filter paper is cleaned, the filtration layer thus formed will be lost along with the viscous liquid.

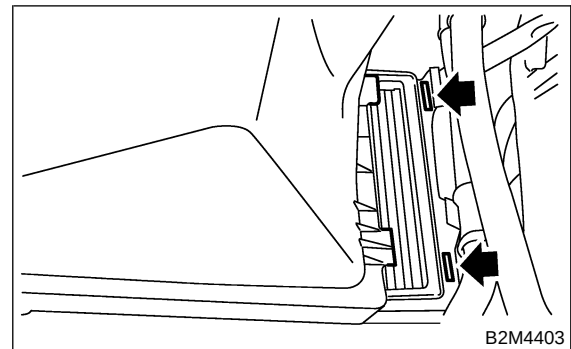
- 1) Loosen clamp (A), and separate air cleaner upper cover and air intake chamber.
- 2) Remove the clip (B) above the air cleaner upper cover.



- 3) Remove air cleaner.
- 4) Install in the reverse order of removal.

NOTE:

Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.



12. Cooling System SA07688

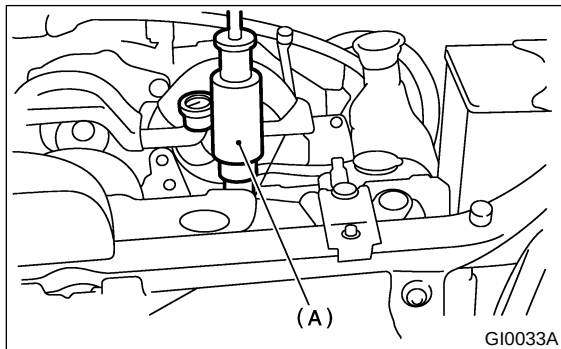
A: INSPECTION SA07688A10

1) Check radiator for leakage, filling it with coolant and attach radiator cap tester (A) to the filler neck. Then apply a pressure of 157 kPa (1.6 kg/cm², 23 psi) and check the following points:

- Each portion of radiator for leakage
- Hose joints and other connections for leakage

NOTE:

- When attaching or detaching tester and when operating tester, use special care not to deform radiator filler neck.



- When performing this check, be sure to keep the engine stationary and fill radiator with coolant.
- Wipe off check points before applying pressure.
- Use care not to spill coolant when detaching tester from radiator.

2) Check the radiator cap valve open pressure using radiator cap tester.

NOTE:

Rust or dirt on cap may prevent valve from functioning normally: be sure to clean cap before testing.

Raise the pressure until the needle of gauge stops and see if the pressure can be retained for five to six seconds. The radiator cap is normal if a pressure above the service limit value has been maintained for this period.

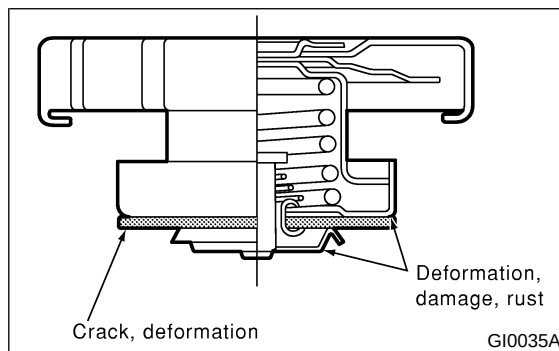
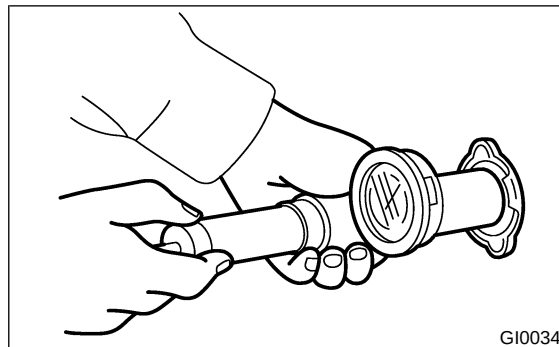
Radiator cap valve open pressure

Standard value:

93 — 123 kPa (0.95 — 1.25 kg/cm², 14 — 18 psi)

Service limit:

83 kPa (0.85 kg/cm², 12 psi)



3) If the coolant temperature exceeds 76.0 to 80.0°C (169 to 176°F) while radiator is not so hot, check thermostat. If thermostat does not open at 76.0 to 80.0°C (169 to 176°F), replace it with a new one.

4) If electric fan does not operate when coolant temperature exceeds 90 to 94°C (194 to 201°F), check thermoswitch or fan motor.

13. Coolant SA07689

A: REPLACEMENT SA07689A20

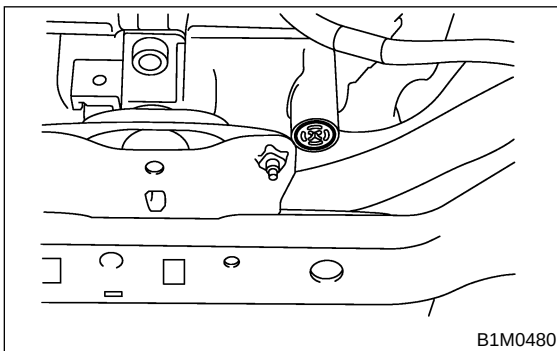
1. REPLACEMENT OF COOLANT SA07689A2001

WARNING:

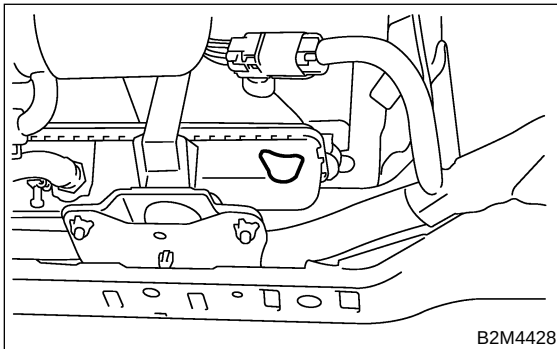
The radiator is of the pressurized type. Do not attempt to open the radiator cap immediately after the engine has been stopped.

- 1) Lift up the vehicle.
- 2) Remove under cover.
- 3) Place a container under drain pipe.
- 4) Loosen and remove drain screw to drain engine coolant into container.

2.5 L model



3.0 L model



- 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 screw securely after draining coolant.

- 8) Slowly pour prepared coolant from radiator filler port to neck of filler, then pour into reservoir tank up to "FULL" level.

Coolant capacity (fill up to "FULL" level)

2.5 L model

MT model:

Approx. 6.8 ℓ (7.2 US qt, 6.0 Imp qt)

AT model:

Approx. 6.7 ℓ (7.1 US qt, 5.9 Imp qt)

3.0 L model

Approx. 7.7 ℓ (8.1 US qt, 6.8 Imp qt)

NOTE:

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

- 9) Securely install radiator cap.
- 10) 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.)
- 11) 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.
- 12) After adding coolant, securely install radiator and reservoir tank caps.

COOLANT

Periodic Maintenance Services

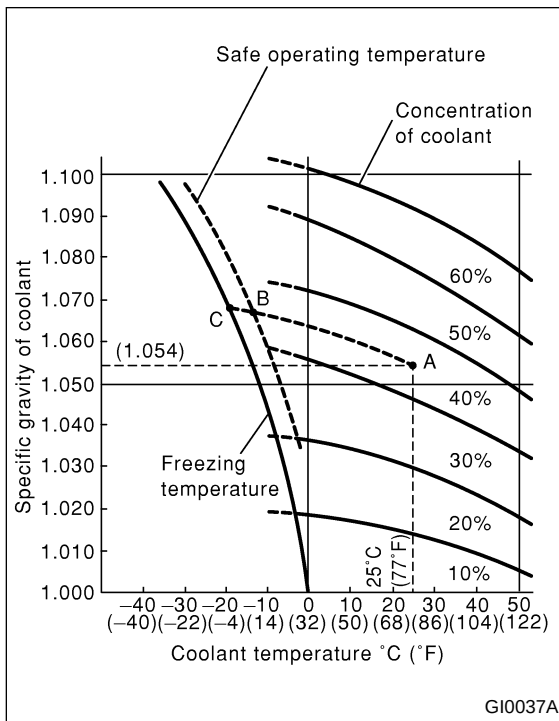
2. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE

SA07689A2002

The concentration and safe operating temperature of the SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.

[Example]

If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054, the concentration is 35% (point A), the safe operating temperature is -14°C (7°F) (point B), and the freezing temperature is -20°C (-4°F) (point C).



3. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

SA07689A2003

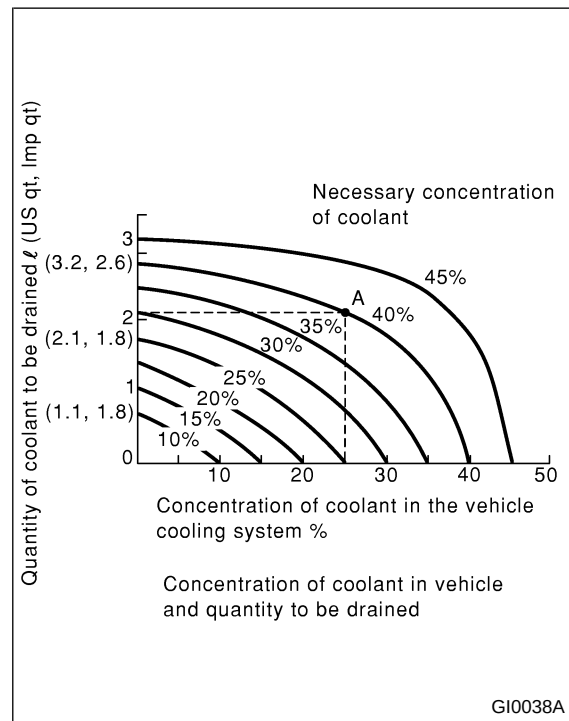
To adjust the concentration of the coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50).

The amount of coolant that should be replaced can be determined using the diagram.

[Example]

Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 liters (2.2 US qt, 1.8 Imp qt). Drain 2.1 liters (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 liters (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.

If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.

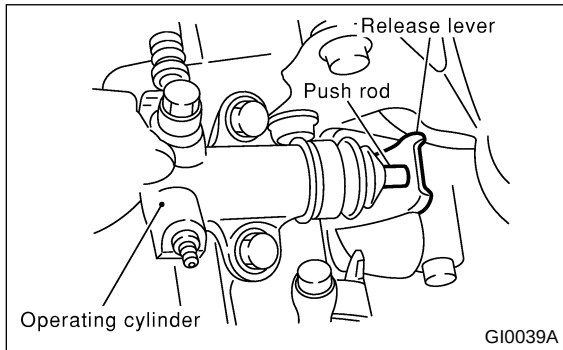


14. Clutch System SA07690

A: INSPECTION AND ADJUSTMENT

SA07690G26

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



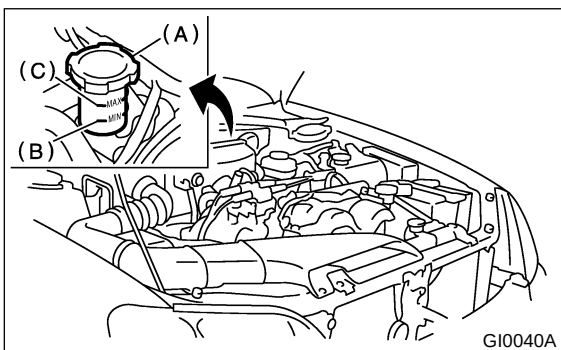
- 2) If the fluid level rises, pedal free play is correct.
- 3) If the fluid level does not rise, or the push rod cannot be retracted, adjust the clutch pedal. <Ref. to CL-21 Clutch Pedal.>
- 4) Inspect the underside of master cylinder, clutch damper and operating cylinder for clutch system, hoses, piping 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 (A). If the level is below "MIN" (B), add clutch fluid to bring it up to "MAX" (C).

Recommended clutch fluid:

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

NOTE:

- Avoid mixing different brands of brake fluid to prevent degradation of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.



15. Transmission Oil SA07691

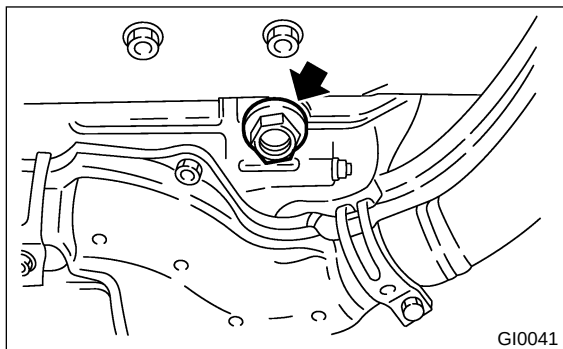
A: REPLACEMENT SA07691A20

1. MANUAL TRANSMISSION SA07691A2001

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

NOTE:

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 N·m (4.5 kgf-m, 32.5 ft-lb)

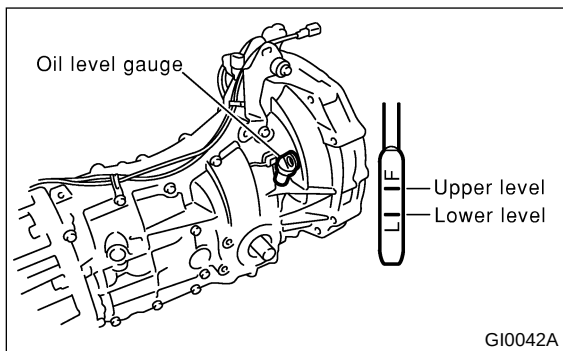
NOTE:

- Be sure to place a gasket between the transmission case and drain plug.
- Replace the gasket with a new one.
- Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.

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

Gear oil capacity:

4.0 l (4.2 US qt, 3.5 Imp qt)



16. ATF

SA07692

A: REPLACEMENT

SA07692A20

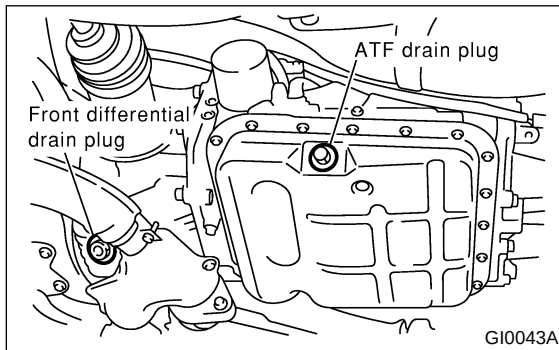
1. AUTOMATIC TRANSMISSION FLUID

SA07692A2001

1) Drain ATF (Automatic Transmission Fluid) by removing drain plug after allowing the engine to cool for 3 to 4 hours.

NOTE:

Before starting work, cool off the engine well.



2) Reinstall drain plug after draining ATF, and tighten it to the specified torque.

Tightening torque:

24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

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

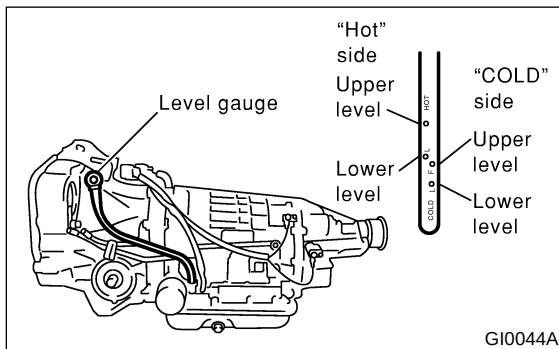
Recommended fluid:

Dexron IIE or III type automatic transmission fluid

Fluid capacity:

$9.3^{+0.3}_{-0}$ l ($9.8^{+0.3}_{-0}$ US qt, $8.2^{+0.3}_{-0}$ 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.



2. ATF FILTER

SA07692A2002

NOTE:

ATF filter is maintenance free part. ATF filter needs replacement, when it has physically damaged or ATF leaked.

For the replacement procedures of the ATF filter:
<Ref. to AT-38 ATF Filter.>

FRONT & REAR DIFFERENTIAL OIL

Periodic Maintenance Services

17. Front & Rear Differential Oil

SA07693

A: REPLACEMENT

SA07693A20

1. FRONT DIFFERENTIAL (MANUAL TRANSMISSION)

SA07693A2001

For M/T vehicle, manual transmission oil works as differential oil to lubricate differential. Refer to "Transmission Oil". <Ref. to PM-22 MANUAL TRANSMISSION, REPLACEMENT, Transmission Oil.>

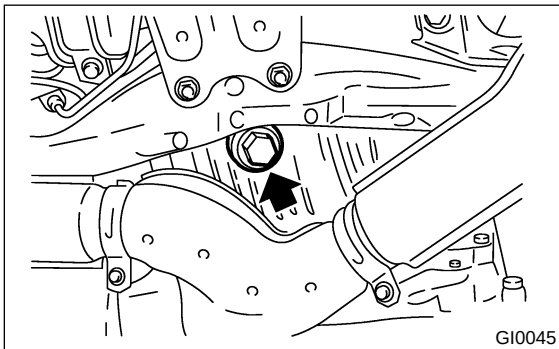
2. FRONT DIFFERENTIAL (AUTOMATIC TRANSMISSION)

SA07693A2002

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

NOTE:

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 N·m (4.5 kgf-m, 32.5 ft-lb)

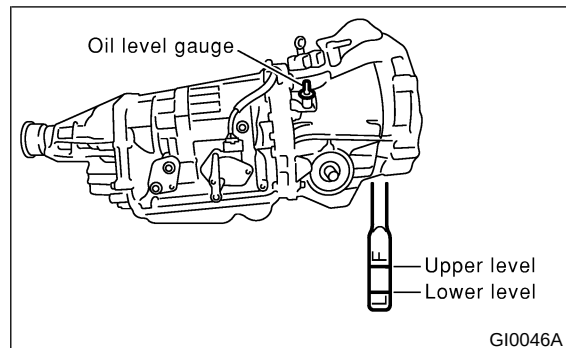
NOTE:

- Be sure to place a gasket between the transmission case and drain plug.
- Replace the gasket with a new one.
- Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.

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)



3. REAR DIFFERENTIAL

SA07693A2003

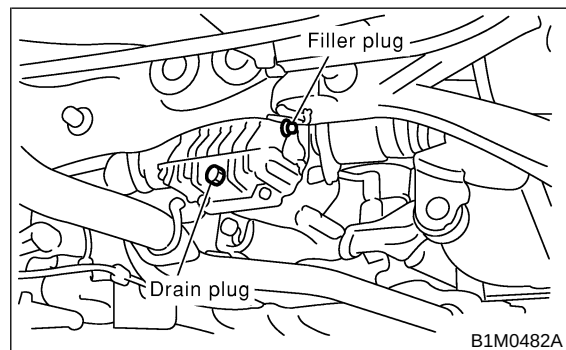
● L and BRIGHTON AT model

- 1) Drain oil by removing drain plug.
- 2) Remove filler plug for quicker draining.
- 3) Replace drain plug gasket with a new one.
- 4) Tighten drain plug to the specified torque.

Tightening torque:

44.1 N·m (4.5 kgf-m, 32.5 ft-lb)

5) After installing drain plug, fill oil fully up to the mouth of filler plug.



Oil capacity:

0.9 ℓ (1.0 US qt, 0.8 Imp qt)

- 6) Replace filler plug gasket with a new one.
- 7) Install filler plug onto rear differential gear case.

Tightening torque:

44.1 N·m (4.5 kgf-m, 32.5 ft-lb)

- **Except L and BRIGHTON AT model**

- 1) Drain oil by removing drain plug.
- 2) Remove filler plug for quicker draining.
- 3) Tighten drain plug after draining oil.

NOTE:

Apply fluid packing to drain plug threads before installation.

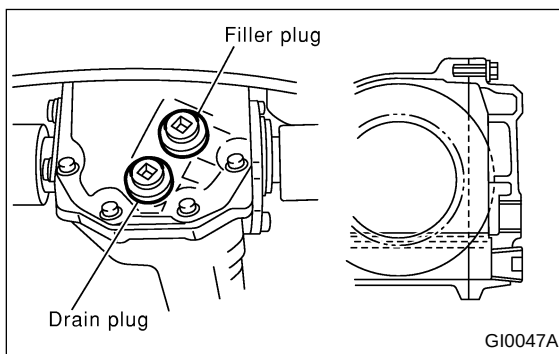
Fluid packing:

Three Bond 1105

Tightening torque:

44.1 N·m (4.5 kgf-m, 32.5 ft-lb)

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



Oil capacity:

0.8 l (0.8 US qt, 0.7 Imp qt)

NOTE:

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

- 5) Install filler plug onto rear differential gear case firmly.

NOTE:

Apply fluid packing to filler plug before installation.

Fluid packing:

Three Bond 1105

Tightening torque:

44.1 N·m (4.5 kgf-m, 32.5 ft-lb)

18. Brake Line

SA07694

A: INSPECTION

SA07694A10

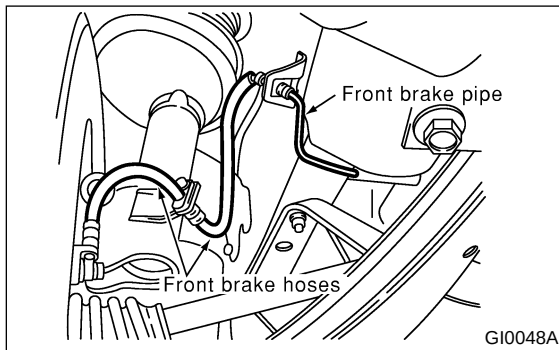
1. BRAKE LINE

SA07694A1001

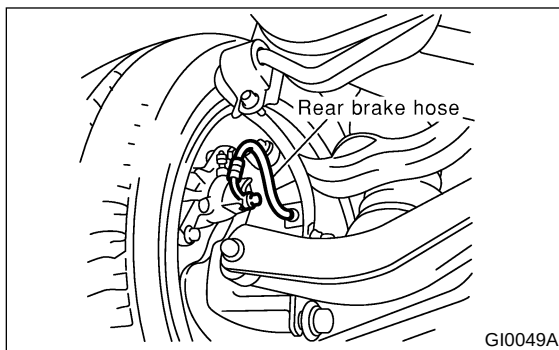
- 1) Check scratches, swelling, corrosion and/or traces of fluid leakage on brake hoses or pipe joints.
- 2) Check the possibility of adjacent parts interfering with brake pipes/hoses during driving, and loose connections/clamps.
- 3) Check any trace of fluid leakage, scratches, etc. on master cylinder, wheel cylinder and pressure control valve.

NOTE:

- When the brake fluid level in the reservoir tank is lower than the specified limit, the brake fluid warning light on the combination meter will come on.
- Visually check brake hose (using a mirror where it is difficult to see) for any damage.



GI0048A



GI0049A

B: CHECKING

SA07694G27

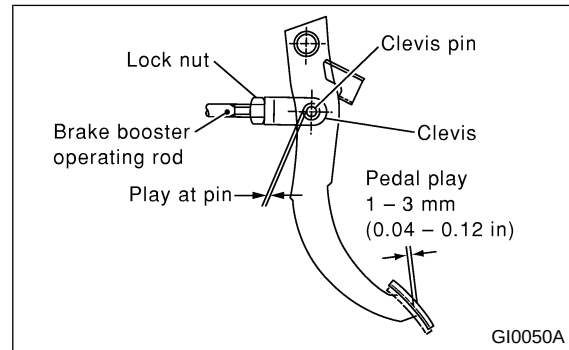
1. SERVICE BRAKE

SA07694G2701

- 1) Check the free play of brake pedal with a force of less than 10 N (1 kgf, 2 lb).

Brake pedal free play:

1 — 3 mm (0.04 — 0.12 in)



GI0050A

- 2) If the free play is out of specifications above, adjust the brake pedal as follows:

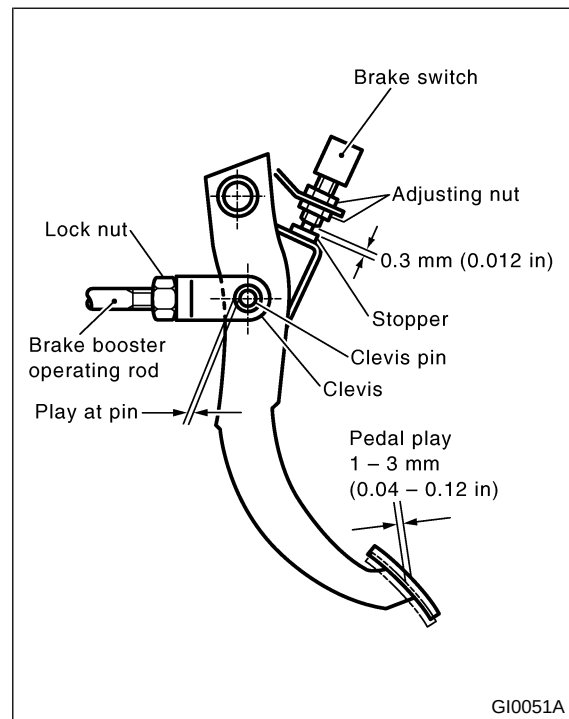
(1) Be sure engine is off. (No vacuum is applied to brake booster.)

(2) There should be play between brake booster clevis and pin at brake pedal installing portion.

[Depress brake pedal pad with a force of less than 10 N (1 kgf, 2 lb) to a stroke of 1 to 3 mm (0.04 to 0.12 in).]

(3) Depress the surface of brake pad by hand.

(4) If there is no free play between clevis pin and clevis, turn brake switch adjusting nut until the clearance between stopper and screw of brake switch becomes 0.3 mm (0.012 in).



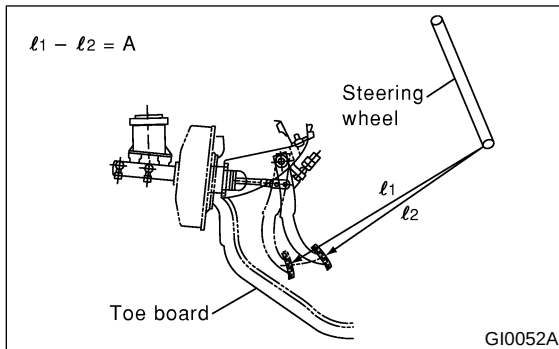
GI0051A

3) Check the pedal stroke.

While the engine is idling, depress the brake pedal with a 490 N (50 kgf, 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 less than 95 mm (3.74 in). If the distance is more than specified, there is a possibility air is in the inside of the hydraulic unit.

Brake pedal reserve distance: A

more than 95 mm (3.74 in)/ 490 N (50 kgf, 110 lb)



4) Check to see if air is in the hydraulic brake line by the feel of pedal operation. If air appears to exist in the line, bleed it from the system.

5) Check for even operation of all brakes, using a brake tester or by driving the vehicle for a short distance on a straight road.

2. BRAKE SERVO SYSTEM SA07694G2702

1) With the engine off, depress the brake pedal several times applying the same pedal force: Make sure the travel distance should not change.

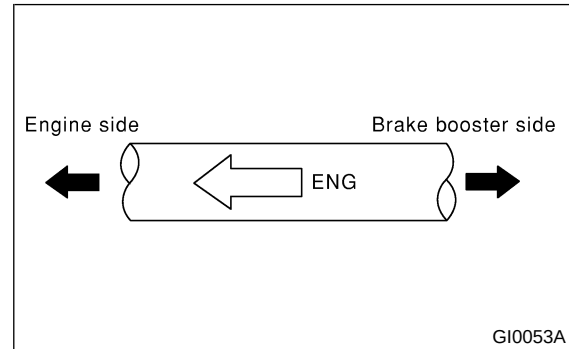
2) With the brake pedal depressed, start the engine: Make sure the pedal should move slightly toward the floor.

3) With the brake pedal depressed, stop the engine and keep the pedal depressed for 30 seconds: Make sure the pedal height should not change.

4) Check valve is built into vacuum hose. Disconnect vacuum hose to inspect function of check valve.

Blow air into vacuum hose from its brake booster side end: Air must flow out of engine side end of hose. Next blow air into hose from engine side: Air should not flow out of hose.

Replace both check valve and vacuum hose if check valve is faulty. Engine side of vacuum hose is indicated by marking "ENGINE" as shown.



5) Check vacuum hose for cracks or other damage.

NOTE:

When installing the vacuum hose on the engine and brake booster, do not use soapy water or lubricating oil on their connections.

6) Check vacuum hose to make sure it is tight and secure.

19. Brake Fluid SA07162

A: REPLACEMENT SA07162A20

- 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 master cylinder with syringe.
- 4) Refill reservoir tank with recommended brake fluid.

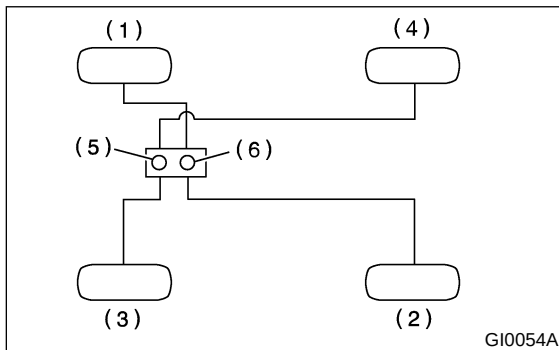
Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

NOTE:

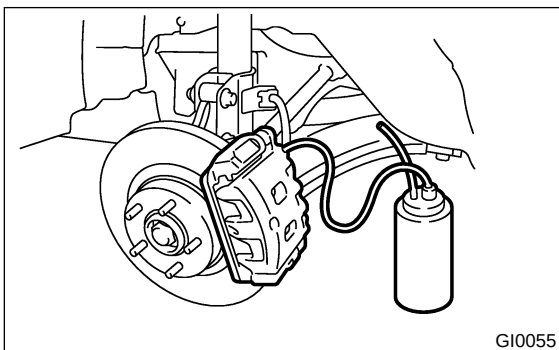
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

Bleeding sequence (1) → (2) → (3) → (4)



- (1) Front right
- (2) Rear left
- (3) Front left
- (4) Rear right
- (5) Secondary
- (6) Primary

- 5) Install one end of a vinyl tube onto the air bleeder and insert the other end of the tube into a container to collect the brake fluid.



NOTE:

- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
- Brake pedal operation 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.

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 steps 6) and 7) above until there are no air bubbles in drained brake fluid and new fluid flows through vinyl tube.

NOTE:

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:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

10) Bleed air from each wheel cylinder by following the previous 5 steps.

11) Depress brake pedal with a force of approximately 294 N (30 kgf, 66 lb) and hold it there for approximately 20 seconds. At this time check pedal to see if it makes 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.

20. Disc Brake Pads and Discs

SA07695

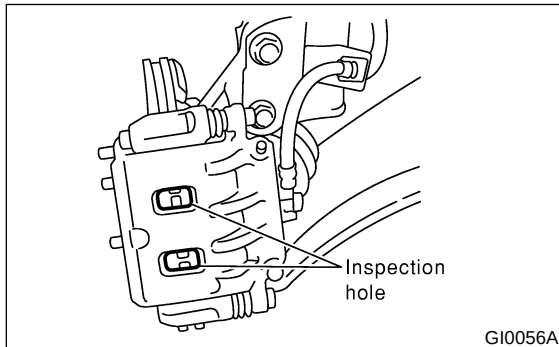
A: INSPECTION

SA07695A10

1. DISC BRAKE PAD AND DISC

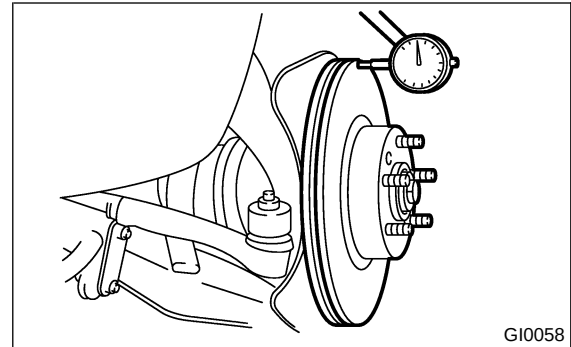
SA07695A1001

- 1) Jack up vehicle and support with rigid racks. Then remove wheels.
- 2) Visually check pad thickness through inspection hole of disc brake assembly. Replace pad if necessary.

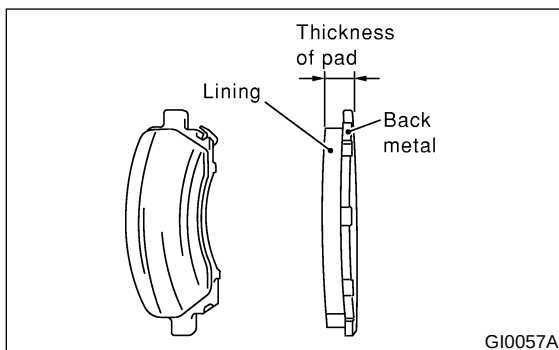


NOTE:

When replacing a pad, 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.



Pad thickness including back metal mm (in)		
	Front	Rear
Standard	17 (0.67)	14 (0.55)
Service limit	7.5 (0.295)	6.5 (0.256)
Service limit (exclusive back metal)	1.5 (0.059)	1.5 (0.059)



- 3) Check the disc rotor, and correct or replace if it is damaged or worn.

Brake disc thickness mm (in)		
	Front	Rear
Standard	24 (0.94)	10 (0.39)
Wear limit	22 (0.87)	8.5 (0.335)

- 4) Measure the disc rotor runout at a point less than 5 mm (0.20 in) from the outer periphery of the rotor.

Disc rotor runout limit:

Front: 0.075 mm (0.0030 in)

Rear: 0.075 mm (0.0030 in)

21. Brake Linings and Drums

SA07696

A: INSPECTION

SA07696A10

1. REAR DRUM BRAKE

SA07696A1001

- 1) Remove brake drum, and check that there is no fluid leakage from wheel cylinder.
If there is fluid leakage from wheel cylinder, replace it. <Ref. to BR-33, Rear Drum Brake Drum.>
- 2) Inspect brake shoes for damage or deformities and check brake linings for wear.

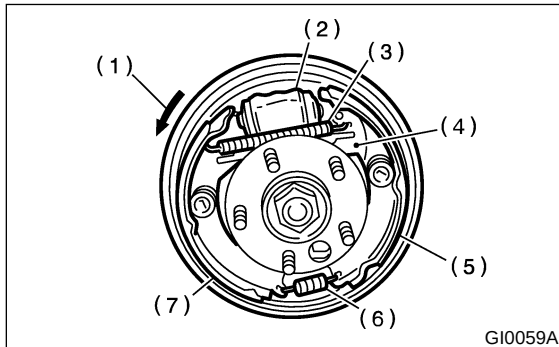
NOTE:

- Always replace both leading and trailing brake shoes for the left and right wheels at the same time.
- When either the left or the right brake assembly is replaced, always replace the leading shoe and trailing shoe of the other.
- The cotter pin, once removed, cannot be reused.

Thickness of lining (except back metal)

Standard value: 4.1 mm (0.161 in)

Service limit: 1.5 mm (0.059 in)



- (1) Rotational direction of drum (Forward)
- (2) Wheel cylinder
- (3) Upper shoe return spring
- (4) Adjusting lever
- (5) Trailing shoe
- (6) Lower shoe return spring
- (7) Leading shoe

To replace trailing shoe, remove cotter pin. Clevis pin should also be replaced if worn.

- 3) Check brake drum for wear, dents or other damage.

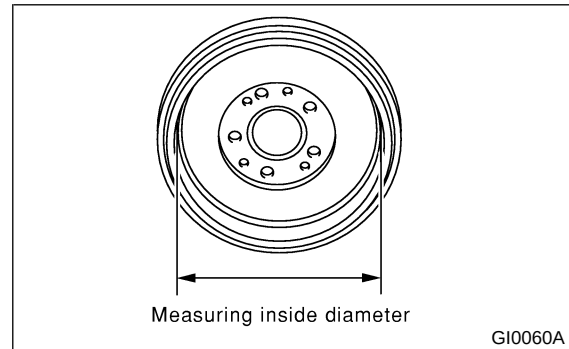
If the inside surface of brake drum is streaked, correct the surface with emery cloth (#200 or more). If it is unevenly worn, tapered, or the outside surface of brake drum is damaged, correct or replace it.

Brake drum inner diameter

Standard value: 228.6 mm (9.000 in)

Service limit: 230.6 mm (9.079 in)

If deformation or wear of back plate, shoe, etc. is noticeable, replace the affected parts.



2. PARKING BRAKE (REAR DISC BRAKE)

SA07696A1002

Inspect brake linings and drums of both sides of the rear brake at the same time by removing brake drums.

- 1) Inspect brake shoes for damage or deformation and check brake linings for wear.

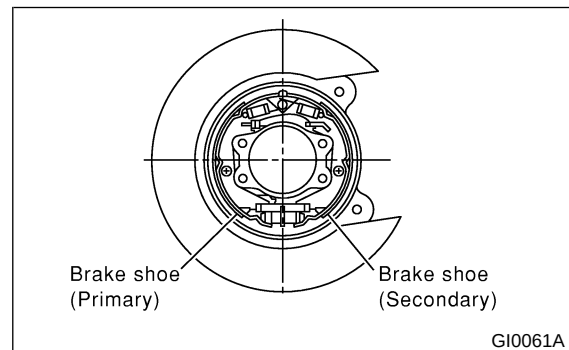
NOTE:

Always replace both primary and secondary brake shoes for the left and right wheels at the same time.

Brake lining thickness excluding back metal

Standard value: 3.2 mm (0.126 in)

Wear limit: 1.5 mm (0.059 in)

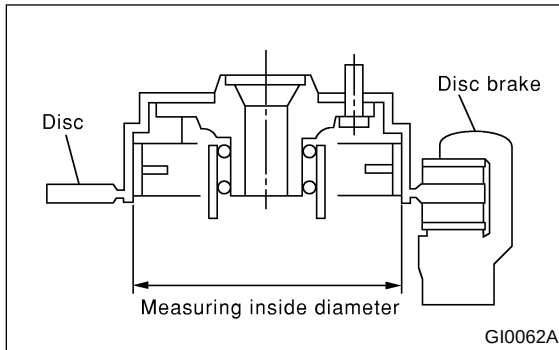


2) Check brake drum for wear, dents or other damage. If the inside surface of brake drum is streaked, correct the surface with emery cloth (#200 or more). If it is unevenly worn, tapered, or the outside surface of brake drum is damaged, correct or replace it.

Brake drum inside diameter

Standard value: 170 mm (6.69 in)

Wear limit: 171 mm (6.73 in)



3) If the deformation or wear of back plate, shoe, etc. is noticeable, replace them.

4) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

B: ADJUSTMENT

SA07696A01

1. REAR DRUM BRAKE

SA07696A0101

The main brake is adjusted automatically, and so there is no need to adjust it.

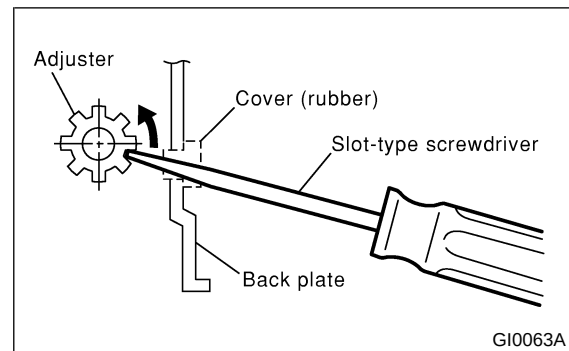
2. PARKING BRAKE (REAR DISC BRAKE)

SA07696A0102

For rear disc brake, adjust parking brake after bleeding the air.

1) Remove rear cover (rubber) installed at back plate.

2) Turn adjuster toward arrow mark (upward) until it is locked slightly, by using slot-type screwdriver as shown in illustration.



3) Turn back (downward) adjuster 3 to 4 notches.

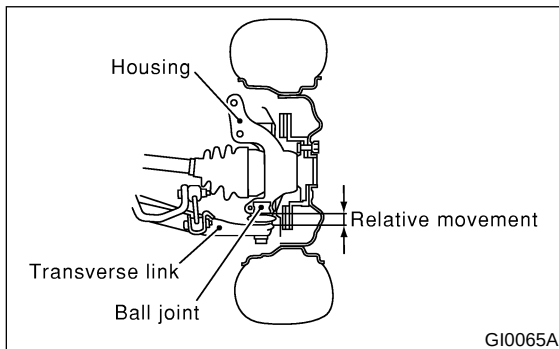
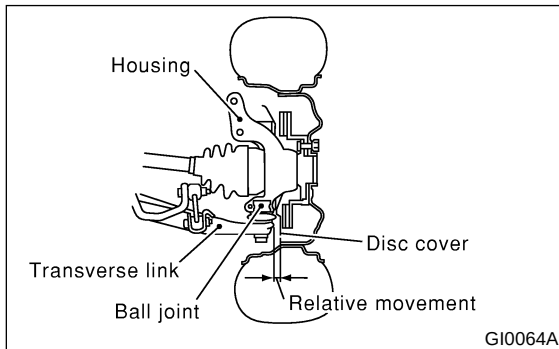
4) Install cover (rubber) at original position correctly.

22. Suspension SA07697

A: INSPECTION SA07697A10

1. SUSPENSION BALL JOINT SA07697A1001

- 1) Jack up vehicle until front wheels are off ground.
- 2) Next, grasp bottom of tire and move it in and out. If relative movement is observed between brake disc cover and end of transverse link, ball joint may be excessively worn.
- 3) Next, grasp end of transverse link and move it up and down. Relative movement between housing and transverse link boss indicates ball joint may be excessively worn.
- 4) If relative movement is observed in the immediately preceding two steps, remove and inspect ball joint. If free play exceeds standard, replace ball joint. <Ref. to FS-14 Front Ball Joint.>



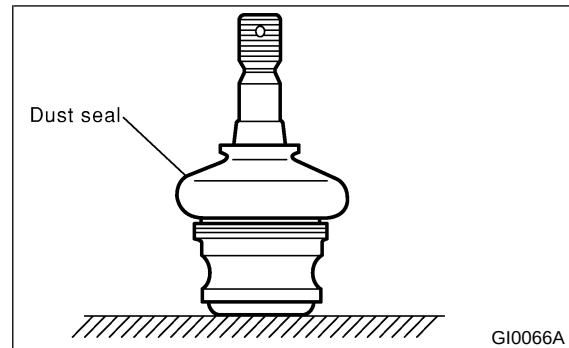
5) Damage of dust seal

Visually inspect ball joint dust seal. If it is damaged, remove transverse link. <Ref. to FS-11 Front Transverse Link.> And measure free play of ball joint. <Ref. to FS-14 Front Ball Joint.>

- (1) When looseness exceeds standard value, replace ball joint.
- (2) If the dust seal is damaged, replace with the new ball joint.

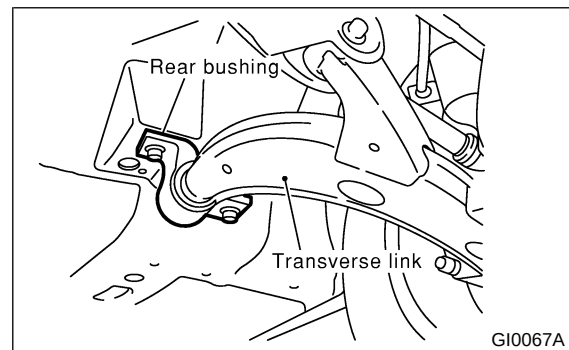
NOTE:

When transverse link ball joint has been removed or replaced, check toe-in of front wheel. If front wheel toe-in is not at specified value, adjust toe-in. <Ref. to FS-6 Wheel Alignment.>



2. TRANSVERSE LINK'S REAR BUSHING SA07697A1002

Check oil leaks at around liquid-filled bushing. If oil leaks, replace bushing.



3. WHEEL ARCH HEIGHT SA07697A1003

- 1) Unload cargoes and set vehicle in curb weight (empty) condition.
- 2) Then, check wheel arch height of front and rear suspensions to ensure that they are within specified values.
- 3) When wheel arch height is out of standard, visually inspect following components and replace deformed parts.
 - Suspension components [Front strut assembly and rear shock absorber assembly]
 - Body parts to which suspensions are installed.
- 4) When no components are deformed, adjust wheel arch height by replacing coil spring in the suspension whose wheel arch height is out of standard. <Ref. to FS-6 Wheel Alignment.> <Ref. to RS-8 Wheel Alignment.>

4. WHEEL ALIGNMENT OF FRONT SUSPENSION

SA07697A1004

1) Check alignment of front suspension to ensure that following items conform to standard values.

- Toe-in
- Camber angle
- Caster angle
- Steering angle

<Ref. to FS-6 Wheel Alignment.>

2) When caster angle does not conform to standard value, visually inspect following components and replace deformed parts.

- Suspension components [Strut assembly, crossmember, transverse link, etc.]

- Body parts to which suspensions are installed.

3) When toe-in and camber are out of standard value, adjust them so that they conform to respective service standard.

4) When right-and-left turning angles of tire are out of standard, adjust to standard value.

5. WHEEL ALIGNMENT OF REAR SUSPENSION

SA07697A1005

1) Check alignment of rear suspension to ensure that following items are within standard values.

- Toe-in
- Camber angle
- Thrust angle

<Ref. to RS-8 Wheel Alignment.>

2) When camber angle does not conform to standard value, visually inspect parts listed below. If deformation is observed, replace damaged parts.

- Suspension components [Shock absorber, link F, link R, link UPR, arm R, sub frame, etc.]

- Body parts to which suspensions are installed.

3) When toe-in and thrust angle are out of standard value, adjust them so that they conform to respective service standard.

6. OIL LEAKAGE OF STRUT AND SHOCK ABSORBER

SA07697A1006

Visually inspect front strut and rear shock absorber for oil leakage as instructed. Replace front strut and rear shock absorber if oil leaks excessively.

7. TIGHTNESS OF BOLTS AND NUTS

SA07697A1007

Check bolts and nuts shown in the figure for looseness. Retighten bolts and nuts to specified torque. If self-lock nuts and bolts are removed, replace them with new ones.

Front suspension: <Ref. to FS-2 General Description.>

Rear suspension: <Ref. to RS-2 General Description.>

8. DAMAGE TO SUSPENSION PARTS

SA07697A1008

1) Check the following parts and the fastening portion of the vehicle body for deformation or excessive rusting which impairs the suspension. If necessary, replace damaged parts with new ones. If minor rust formation, pitting, etc. are noted, remove rust and apply remedial anti-corrosion measures.

- Front suspension
 - Transverse link
 - Crossmember
 - Strut

- Rear suspension
 - Sub frame
 - Link F
 - Link R
 - Link UPR
 - Arm R
 - Shock absorber

- In the district where salt is sprayed to melt snow on a road in winter, check suspension parts for damage caused by rust every 12 months after lapse of 60 months. Take rust prevention measure as required.

23. Wheel Bearing SA07698

A: INSPECTION SA07698A10

1. FRONT WHEEL BEARING SA07698A1001

NOTE:

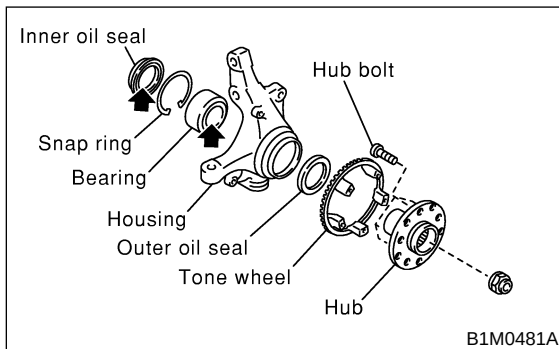
Inspect the condition of front wheel bearing grease.

- 1) Jack up the front of vehicle.
- 2) While holding front wheel by hand, swing it in and out to check bearing free play.
- 3) Loosen wheel nuts and remove front wheel.
- 4) If bearing free play exists in step 2) above, attach a dial gauge to hub and measure axial displacement in axial direction.

Service limit:

***Straight-ahead position within 0.05 mm
(0.0020 in)***

- 5) Remove bolts and self-locking nuts, and extract transverse link from front crossmember.
 - 6) While lightly hammering spring pin which secures SFJ to transmission spindle, remove it.
 - 7) Extract SFJ from transmission spindle. <Ref. to DS-16 Front Axle.>
 - 8) While supporting front drive shaft horizontally with one hand, turn hub with the other to check for noise or binding.
- If hub is noisy or binds, disassemble front axle and check condition of oil seals, bearing, etc.



2. REAR WHEEL BEARING SA07698A1002

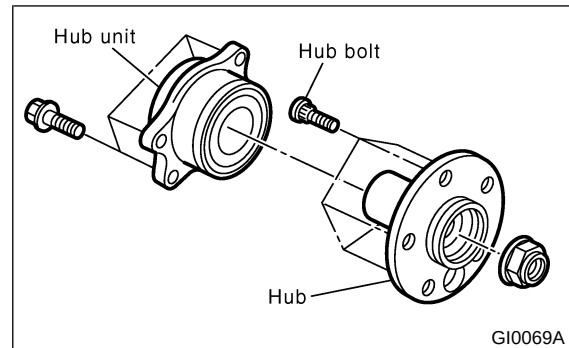
- 1) Jack up the rear of vehicle.
- 2) While holding rear wheel by hand, swing it in and out to check bearing free play.
- 3) Loosen wheel nuts and remove rear wheel.
- 4) If bearing free play exists in step 2) above, attach a dial gauge to hub assembly and measure axial displacement in axial direction.

Service limit:

***Straight-ahead position within 0.05 mm
(0.0020 in)***

- 5) Remove the DOJ of rear drive shaft from rear differential. <Ref. to DS-33 Rear Drive Shaft.>

- 6) While supporting rear drive shaft horizontally with one hand, turn hub assembly with the other to check for noise or binding.
- If hub assembly is noisy or binds, disassemble rear axle and check condition of oil seals, bearings, etc.

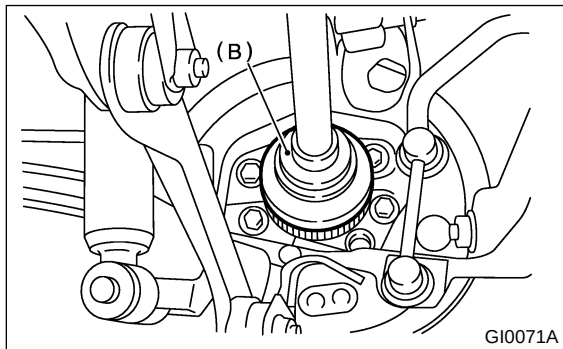
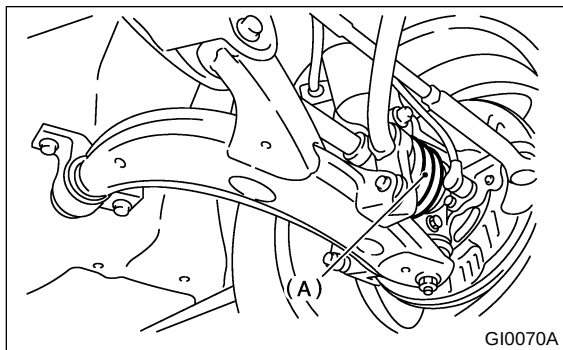


24. Axle Boots & Joints SA07699

A: INSPECTION SA07699A10

1. FRONT AND REAR AXLE BOOTS SA07699A1001

Inspect front axle boots (A) and rear axle boots (B) for deformation, damage or failure. If faulty, replace them with new ones. <Ref. to DS-28 Front Drive Shaft.> <Ref. to DS-33 Rear Drive Shaft.>



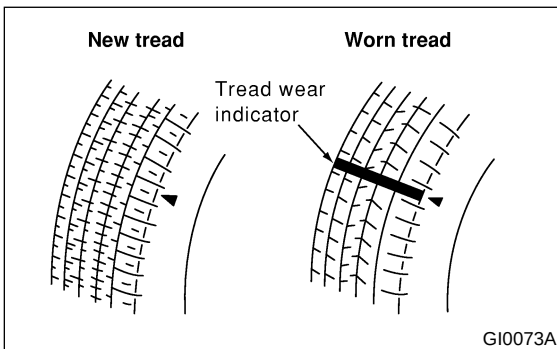
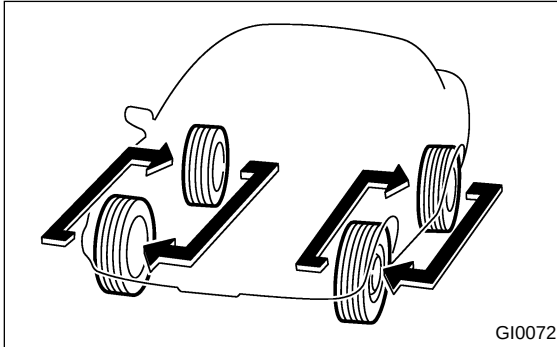
2. PROPELLER SHAFT SA07699A1002

Inspect propeller shaft for damage or failure. If faulty, replace with new one. <Ref. to DS-13 Propeller Shaft.>

25. Tire Rotation SA07700

A: INSPECTION SA07700A10

- 1) Replace the tire if the tread depth is less than 1.6 mm (0.063 in) or if wear indicators appear across the tire tread. (It is recommended that both right and left tires are replaced as a set.)
- 2) Adjust the wheel alignment if abnormally uneven tire wear is found.
- 3) Also, rotate the tires between the front and rear tires as illustrated, in order to ensure uniform tire wear.



26. Steering System (Power Steering)

SA07701

A: INSPECTION

SA07701A10

1. STEERING WHEEL

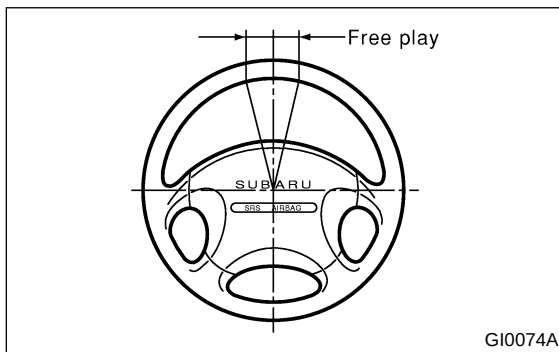
SA07701A1001

- 1) Set steering wheel in a straight-ahead position, and check wheel spokes to make sure they are correctly set in their specified positions.
- 2) Lightly turn steering wheel to the left and right to determine the point where front wheels start to move.

Measure the distance of the movement of steering wheel at the outer periphery of wheel.

Steering wheel free play:

0 — 17 mm (0 — 0.67 in)



Move steering wheel vertically toward the shaft to ascertain if there is play in the direction.

Maximum permissible play:

0.5 mm (0.020 in)

- 3) Drive vehicle and check the following items during operation.

(1) Steering force

The effort required for steering should be smooth and even at all points, and should not vary.

(2) Pull to one side

Steering wheel should not be pulled to either side while driving on a level surface.

(3) Wheel runout

Steering wheel should not show any sign of runout.

(4) Return factor

Steering wheel should return to its original position after it has been turned and then released.

Maximum permissible play:

0.5 mm (0.020 in)

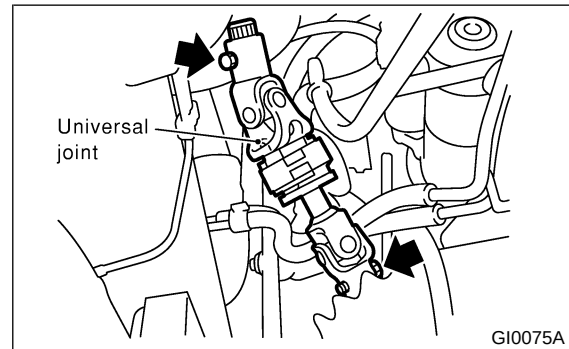
2. STEERING SHAFT JOINT

SA07701A1002

- 1) When steering wheel free play is excessive, disconnect universal joint of steering shaft and check it for any play and yawing torque (at the point of the crossing direction). Also inspect for any damage to sealing or worn serrations. If the joint is loose, retighten the mounting bolts to the specified torque.

Tightening torque:

24 N·m (2.4 kgf-m, 17.4 ft-lb)



3. GEARBOX

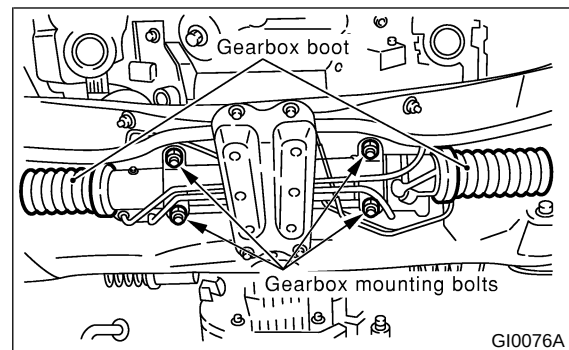
SA07701A1003

- 1) With wheels placed on a level surface, turn steering wheel 90° in both the left and right directions.

While wheel is being rotated, reach under vehicle and check for looseness in gearbox.

Tightening torque:

59 N·m (6.0 kgf-m, 43.4 ft-lb)



- 2) Check boot for damage, cracks or deterioration.

STEERING SYSTEM (POWER STEERING)

Periodic Maintenance Services

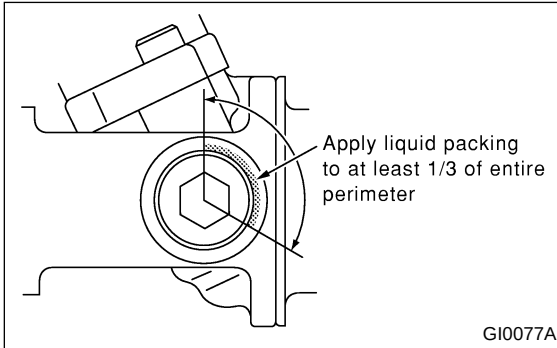
3) With vehicle on a level surface, quickly turn steering wheel to the left and right.

While steering wheel is being rotated, check the gear backlash. If any unusual noise is noticed, adjust the gear backlash in the following manner.

(1) Tighten adjusting screw to 7.4 N·m (0.75 kgf-m, 5.4 ft-lb) and then loosen. Repeat this operation twice.

(2) Retighten adjusting screw to 7.4 N·m (0.75 kgf-m, 5.4 ft-lb) and back off 25°.

(3) Apply liquid packing to at least 1/3 of entire perimeter of adjusting screw thread.



(4) Install lock nut. While holding adjusting screw with a wrench, tighten lock nut using ST 926230000 SPANNER

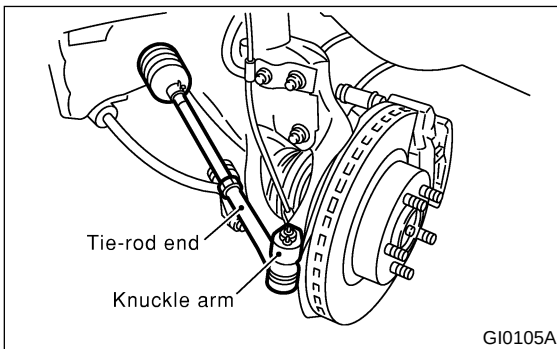
Tightening torque (Lock nut):

39 N·m (4.0 kgf-m, 29 ft-lb)

Hold the adjusting screw with a wrench to prevent it from turning while tightening the lock nut.

4. TIE-ROD SA07701A1004

1) Check tie-rod and tie-rod ends for bends, scratches or other damage.



2) Check connections of knuckle ball joints for play, inspect for damage on dust seals, and check free play of ball studs. If castle nut is loose, retighten it to the specified torque, then tighten further up to 60° until cotter pin hole is aligned.

Tightening torque:

27 N·m (2.75 kgf-m, 19.9 ft-lb)

3) Check lock nut on the tie-rod end for tightness. If it is loose, retighten it to the specified torque.

Tightening torque:

83 N·m (8.5 kgf-m, 61.5 ft-lb)

5. POWER STEERING FLUID LEVEL

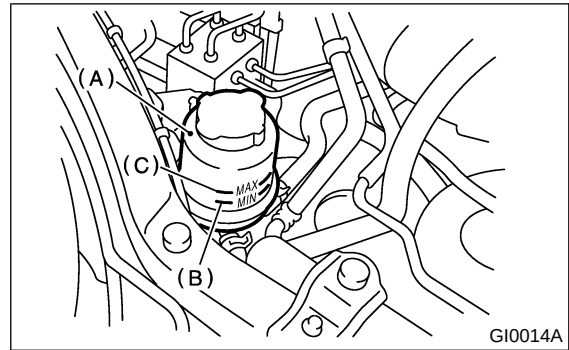
SA07701A1005

NOTE:

The fluid level must be checked when the temperature of the reservoir tank surface is approximately 20°C (68°F).

1) Place vehicle with engine "off" on the flat and level surface.

2) Check the fluid level using the scale on the outside of the reservoir tank (A). If the level is below "MIN" (B), add fluid to bring it up to "MAX" (C).



NOTE:

If fluid level is at MAX level or above, drain fluid to keep the level in the specified range of indicator by using a syringe or the like.

Recommended fluid:

Dexron III

Fluid capacity:

0.7 ℓ (0.7 US qt, 0.6 Imp qt)

6. POWER STEERING FLUID FOR LEAKS

SA07701A1006

Inspect the underside of oil pump and gearbox for power steering system, hoses, piping and their couplings for fluid leaks.

If fluid leaks are found, correct them by retightening their fitting bolts (or nuts) and/or replacing their parts.

NOTE:

- Wipe the leakage fluid off after correcting fluid leaks, or a wrong diagnosis is taken later.

- Also pay attention to clearances between hoses (or pipings) and other parts when inspecting fluid leaks.

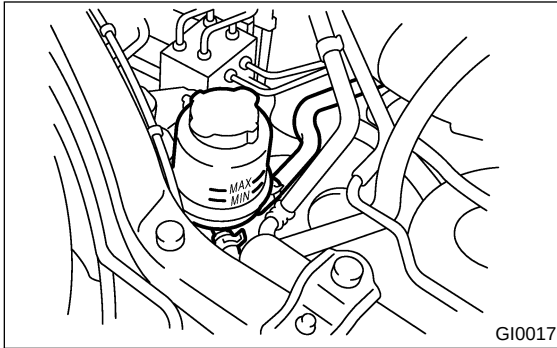
7. HOSES OF OIL PUMP FOR DAMAGES

SA07701A1007

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.



10. FITTING BOLTS AND NUTS

SA07701A1010

Inspect fitting bolts and nuts of oil pump and bracket for looseness, and retighten them if necessary.

Inspect and/or retighten them when engine is cold.

8. POWER STEERING PIPES FOR DAMAGE

SA07701A1008

Check power steering pipes for corrosion and damage.

Replace pipes with new one if necessary.

9. GEARBOX BOOTS

SA07701A1009

Inspect both sides of gearbox boots as follows, and correct the defects if necessary.

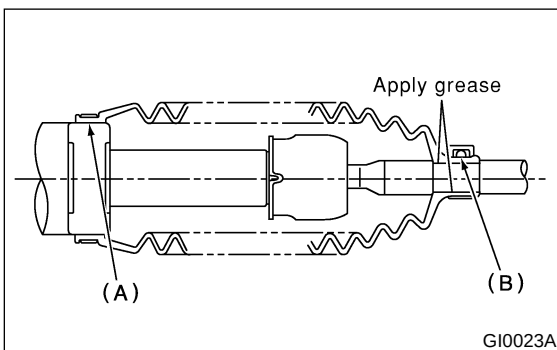
1) (A) and (B) positions of gearbox boot are fitted correspondingly in (A) and (B) grooves of gearbox and the rod.

2) Clips are fitted outside of (A) and (B) positions of boot.

3) Boot does not have crack and hole.

NOTE:

Rotate (B) position of gearbox boot against twist of it produced by adjustment of toe-in, etc.



SUPPLEMENTAL RESTRAINT SYSTEM

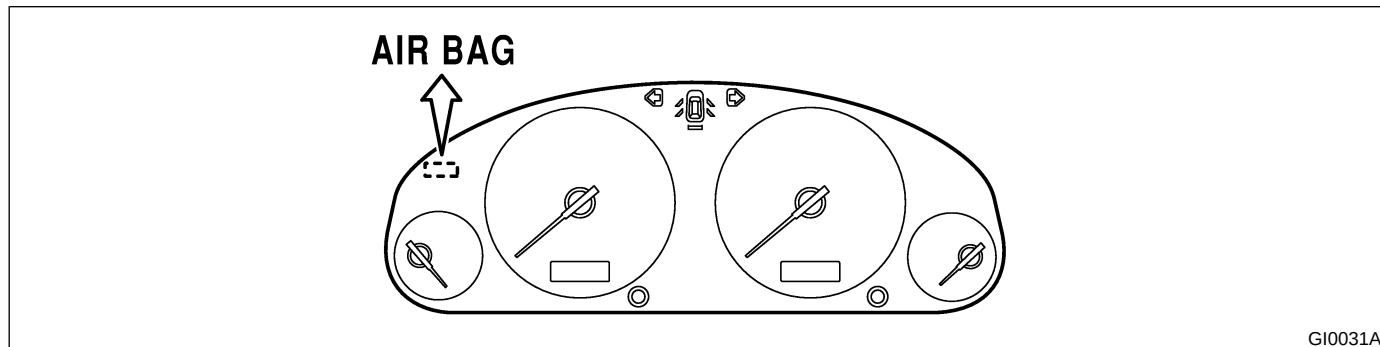
Periodic Maintenance Services

27. Supplemental Restraint System SA07702

A: INSPECTION SA07702A10

Check the airbag system in accordance with the result of the self-diagnosis. <Ref. to AB-2 Basic Diagnostic Procedure.>

1) Ensure that airbag connectors are connected. If not, properly connect (also double lock the connector). When the ignition switch is turned ON with the connector(s) disconnected, the airbag warning light blinks to identify the fault.



2) Turn the ignition switch ON, and connect the airbag diagnosis terminal of the service connector (located below lower cover) to the ground terminal.

3) The warning light blinks to indicate a trouble code (a fault is identified). When the airbag system is in good order (no trouble codes are stored in the memory), the warning light blinks on and off at 0.6 second intervals (as long as the diagnosis terminal is connected to the ground terminal).

4) When the warning light indicates a trouble code, check the airbag system in accordance with the troubleshooting procedure. <Ref. to AB-2 Basic Diagnostic Procedure.>

1. Basic Diagnostics Procedure

S903627

A: BASIC PROCEDURES

S903627E31

1. GENERAL

S903627E3101

The most important purpose of diagnostics is to determine which part is malfunctioning quickly, to save time and labor.

2. IDENTIFICATION OF TROUBLE SYMPTOM

S903627E3102

Determine what the problem is based on the symptom.

3. PROBABLE CAUSE OF TROUBLE

S903627E3103

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

S903627E3104

- 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

S903627E3105

After repairing, ensure that the system operates properly.

B: BASIC INSPECTION

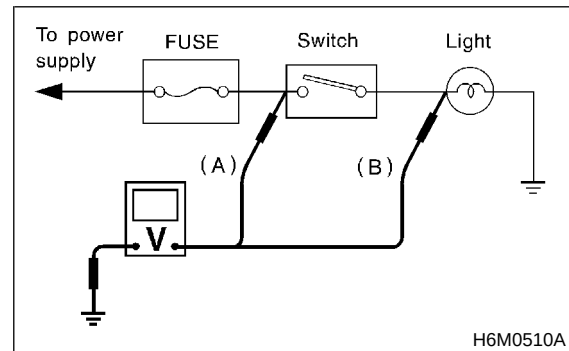
S903627G51

1. VOLTAGE MEASUREMENT

S903627G5101

- 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.

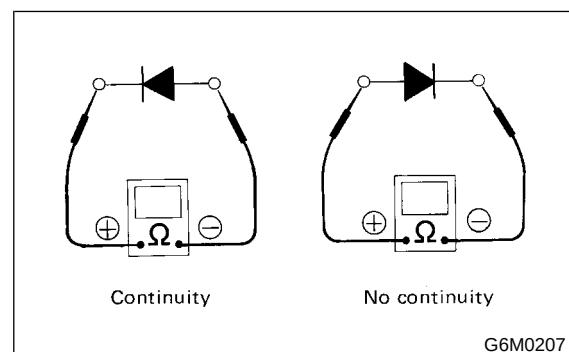


- 4) With test set-up held as it is, turn switch ON. The voltmeter will indicate a voltage and, at the same time, the light will come on.
- 5) The circuit is in good order. If a problem such as a lamp failing to light occurs, use the procedures outlined above to track down the malfunction.

2. CIRCUIT CONTINUITY CHECKS

S903627G5102

- 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.



BASIC DIAGNOSTICS PROCEDURE

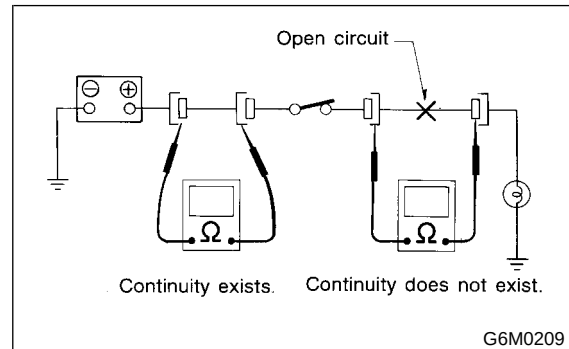
Wiring System

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 below.

Terminal	1	2	3	4	5	6
Switch Position						
OFF						
1	○—○				○—○	
2	○—○			○—○		○—○
3	○—○		○—○			○—○
4	○—○	○—○				○—○

B6M0749

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.

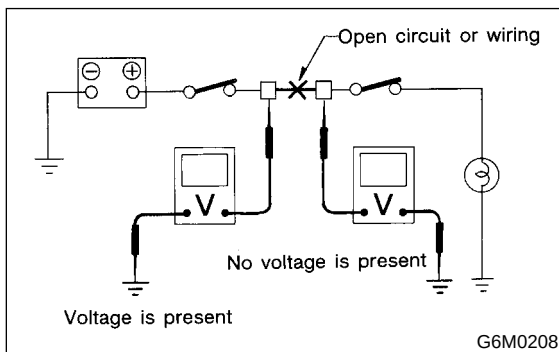


3. HOW TO DETERMINE AN OPEN CIRCUIT

S903627G5103

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.

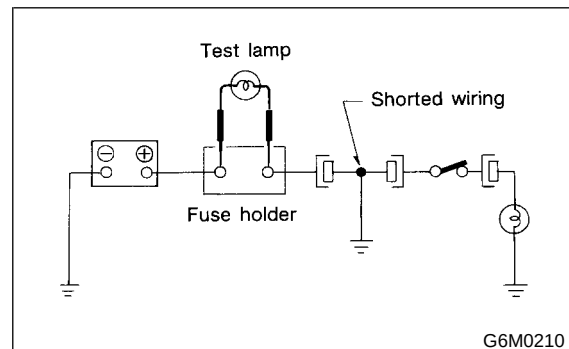


4. HOW TO DETERMINE A SHORT CIRCUIT

S903627G5104

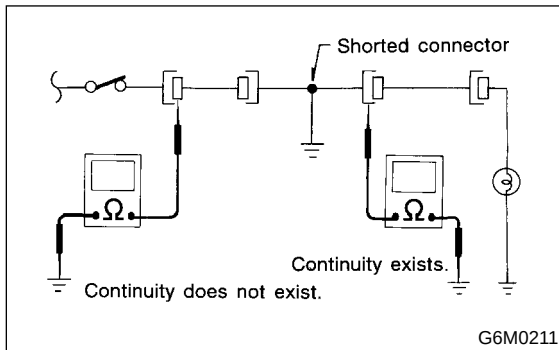
1) Test lamp method:

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.



C: HOW TO READ WIRING DIAGRAMS

S903627G52

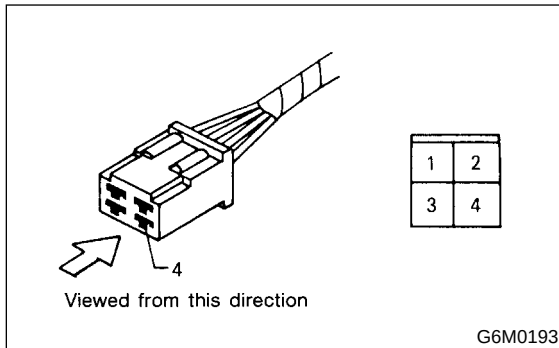
1. WIRING DIAGRAM

S903627G5201

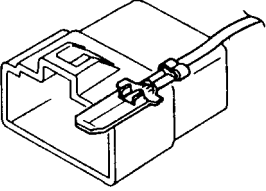
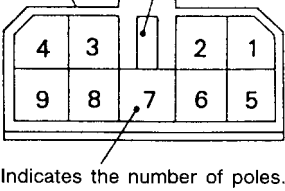
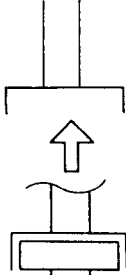
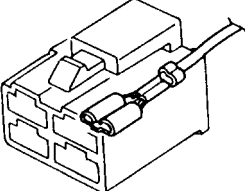
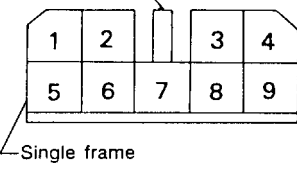
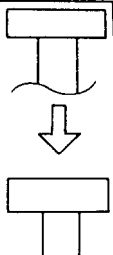
The wiring diagram of each system is illustrated so that you can understand the path through which the electric current flows from the battery.

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.

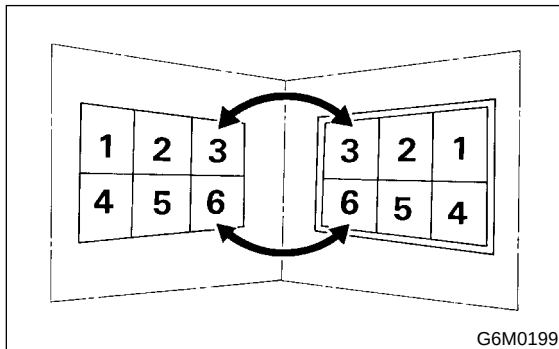


- The number of poles or pins, presence of a lock, and pin number of each terminal are indicated in the sketch of each connector. In the sketch, the highest pole number refers to the number of poles which the connector has. For example, the sketch of the connector shown in figure indicates the connector has 9 poles.

Connector used in vehicle	Connector shown in wiring diagram		
	Sketch	Symbol	Number of poles
 G6M0194	 G6M0196		Numbered in order from upper right to lower left.
 G6M0195	 G6M0197		Numbered in order from upper left to lower right.

G6M0198

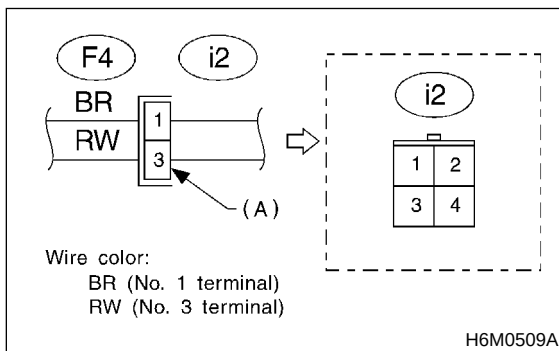
- When one set of connectors is viewed from the front side, the pole numbers of one connector are symmetrical to those of the other. When these two connectors are connected as a unit, the poles which have the same number are joined.



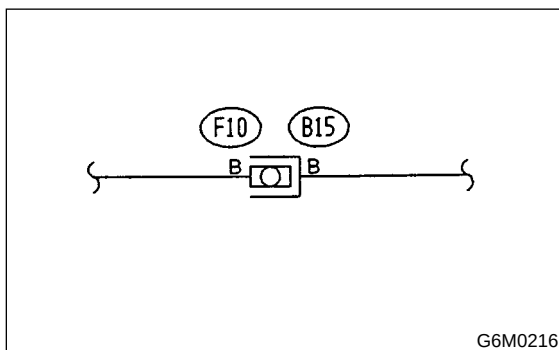
- Electrical wiring harness:**
The connectors are numbered along with the number of poles, external colors, and mating connections in the accompanying list.
- The sketch of each connector in the wiring diagram usually shows the (A) side of the connector. The relationship between the wire color, terminal 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.

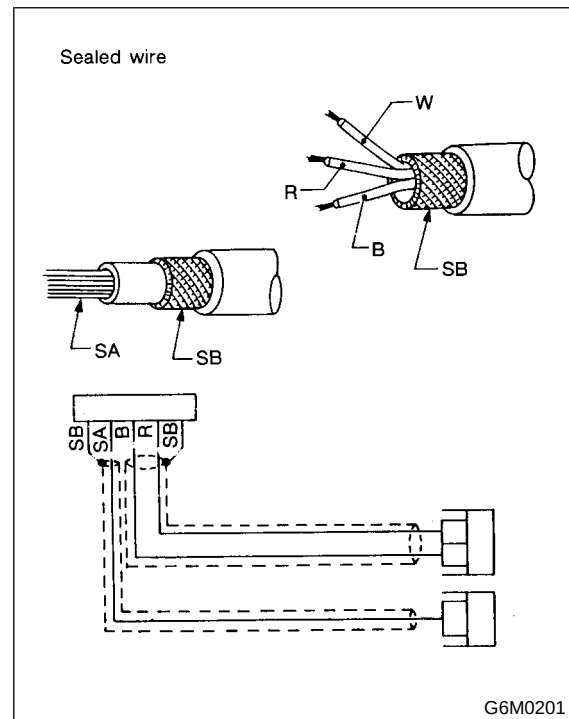


- In wiring diagram, connectors which have no terminal number refer to one-pole types. Sketches of these connectors are omitted intentionally.



- The following color codes are used to indicate the colors of the wires used.

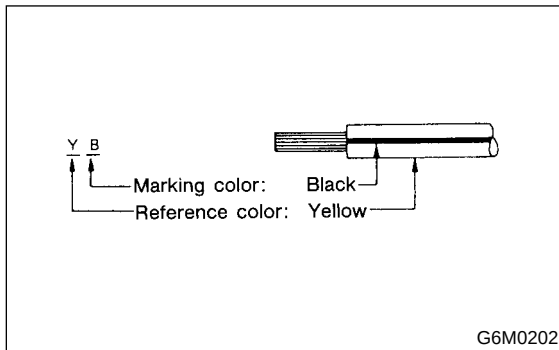
Color code	Color
L	Blue
B	Black
Y	Yellow
G	Green
R	Red
W	White
Br	Brown
Lg	Light green
Gr	Gray
P	Pink
Or	Orange
Lb	Light Blue
V	Violet
SA	Sealed (Inner)
SB	Sealed (Outer)



BASIC DIAGNOSTICS PROCEDURE

Wiring System

- 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.

CAUTION:

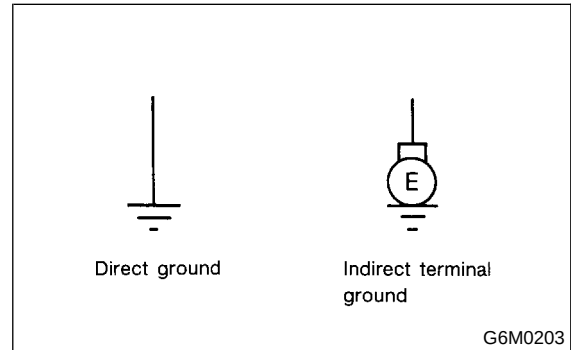
When replacing or repairing a wire, be sure to use the same size and type of the wire which was originally used.

NOTE:

- The allowable current in the 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.

Nominal sectional area mm ²	No. of strands/ strand diameter	Outside diameter of finished wiring mm	Allowable current Amps/ 40°C (104°F)
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

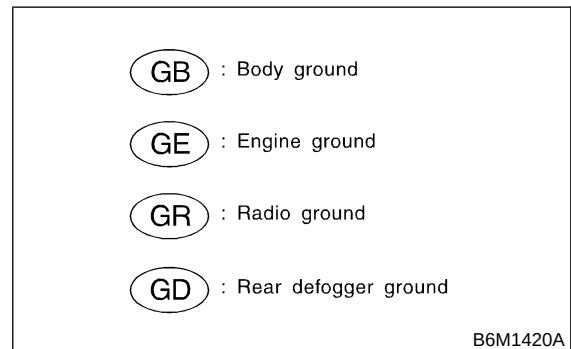
- Each unit is directly grounded to the body or indirectly grounds through a harness ground terminal. Different symbols are used in the wiring diagram to identify the two grounding systems.



- The ground points shown in the wiring diagram refer to the following:

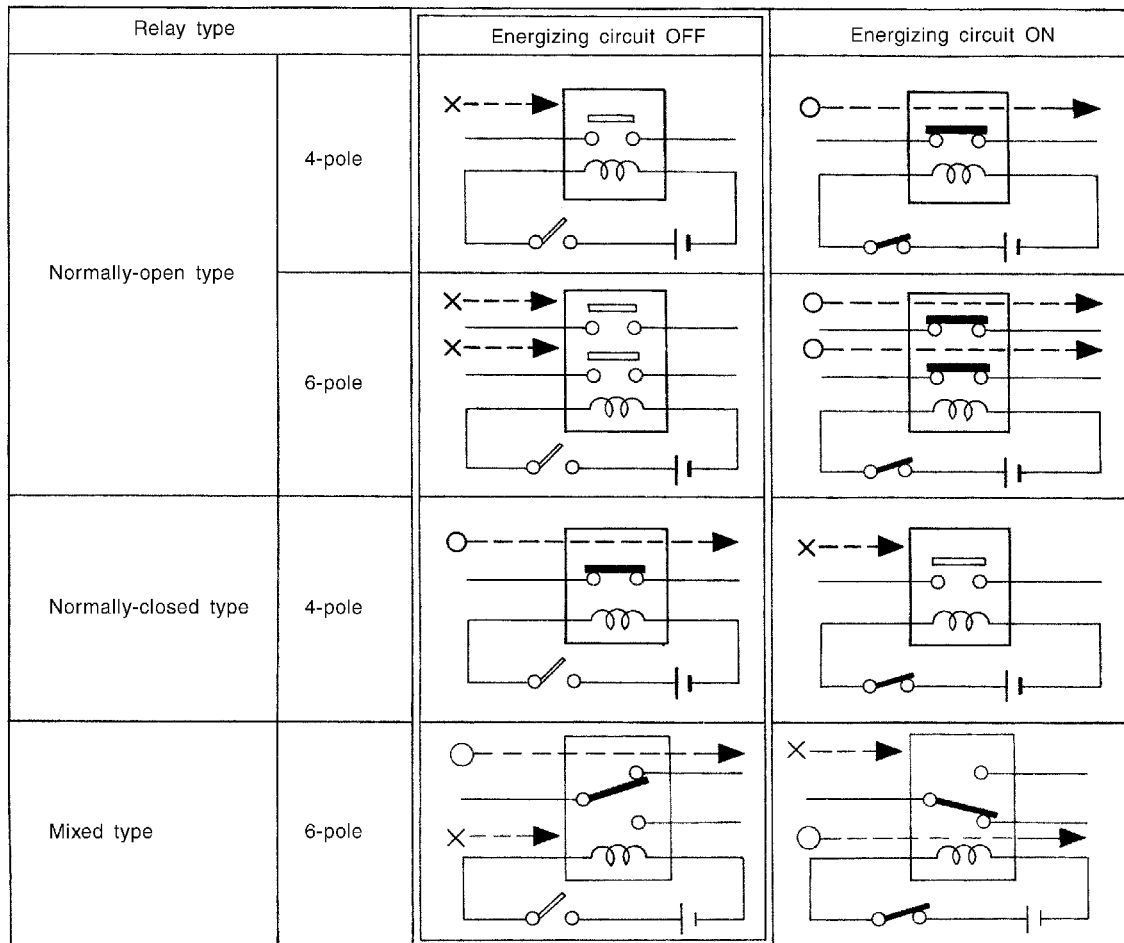
NOTE:

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.



Key to symbols:

- —▶ : Current flows.
 × —▶ : Current does not flow.

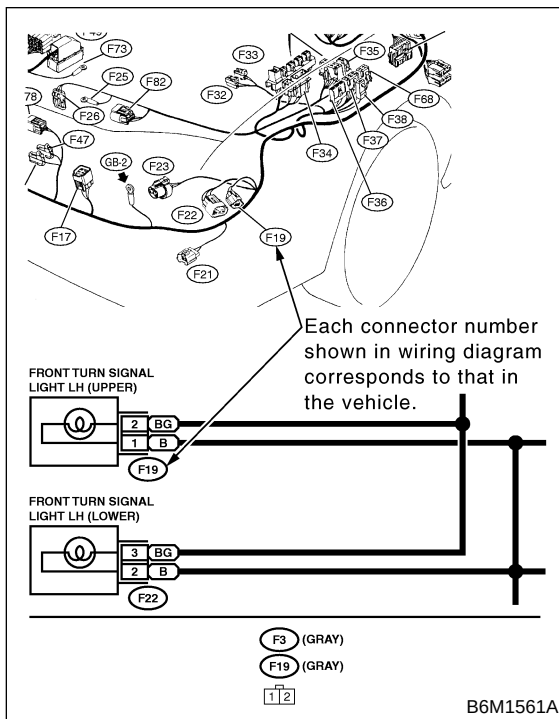
B6M0748

BASIC DIAGNOSTICS PROCEDURE

Wiring System

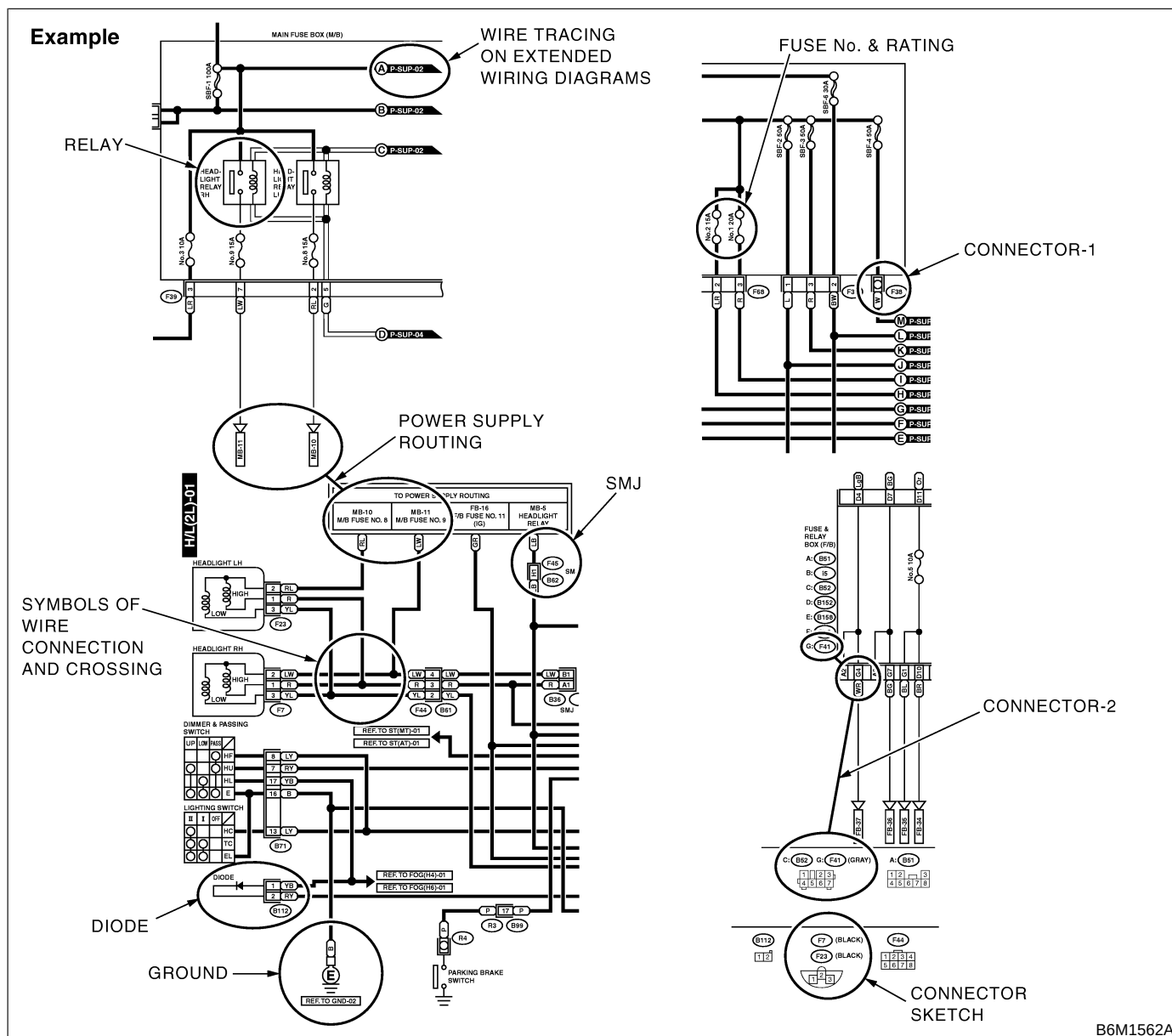
- Each connector number shown in the wiring diagram corresponds to that in the wiring harness. The location of each connector in the actual vehicle is determined by reading the first character of the connector (for example, a "F" for F8, "i" for i16, etc.) and the type of wiring harness. The first character 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, Rear oxygen sensor cord
D	Door cord LH & RH, Rear door cord LH & RH, Rear gate cord
i	Instrument panel wiring harness
R	Rear wiring harness, Fuel tank cord, Roof cord, ORVR cord



D: SYMBOLS IN WIRING DIAGRAMS S903627G53

A number of symbols are used in each wiring diagram to easily identify parts or circuits.



B6M1562A

1. RELAY S903627G5301

A symbol used to indicate a relay.

2. CONNECTOR-1 S903627G5302

The sketch of the connector indicates the one-pole types.

3. WIRING CONNECTION S903627G5303

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).

4. FUSE No. & RATING G903627G5304

The "FUSE No. & RATING" corresponds with that used in the fuse box (main fuse box, fuse and joint box).

5. CONNECTOR-2 S903627G5305

- 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.

BASIC DIAGNOSTICS PROCEDURE

Wiring System

6. CONNECTOR SKETCH S903627G5306

- 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.

7. GROUND S903627G5307

Each grounding point can be located easily by referring to the corresponding wiring harness.

8. DIODE S903627G5308

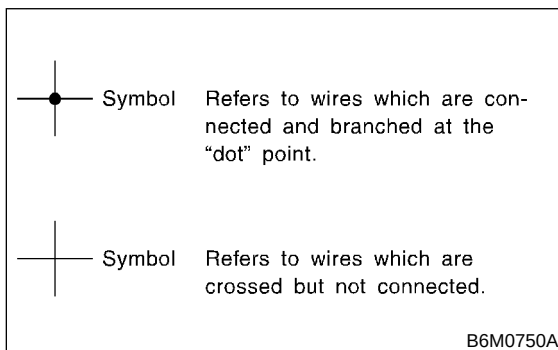
A symbol is used to indicate a diode.

9. WIRE TRACING ON EXTENDED WIRING DIAGRAMS S903627G5309

For a wiring diagram extending over at least two pages, a symbol (consisting of the same characters with arrows), facilitates wire tracing from one page to the next.

A $\longleftrightarrow$ A, B $\longleftrightarrow$ B

10. SYMBOLS OF WIRE CONNECTION AND CROSSING S903627G5310



11. POWER SUPPLY ROUTING S903627G5311

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.

E: ABBREVIATION IN WIRING DIAGRAMS S903627G54

Abbr.	Full name
ABS	Antilock Brake System
ACC	Accessory
A/C	Air Conditioning
AD	Auto Down
A/S	Air suspension
AT	Automatic Transmission
AU	Auto Up
+B	Battery
DN	Down
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
ST	Starter
SW	Switch
UP	Up
WASH	Washer

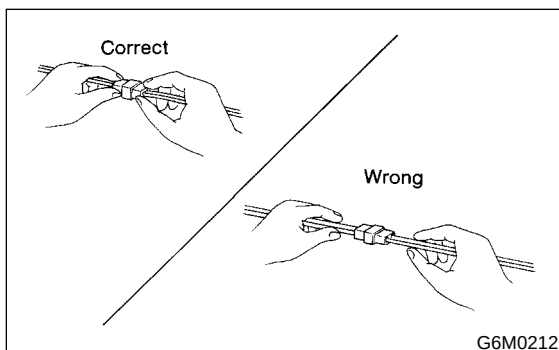
2. Working Precautions S903706

A: PRECAUTIONS WHEN WORKING WITH THE PARTS MOUNTED ON THE VEHICLE S903706G38

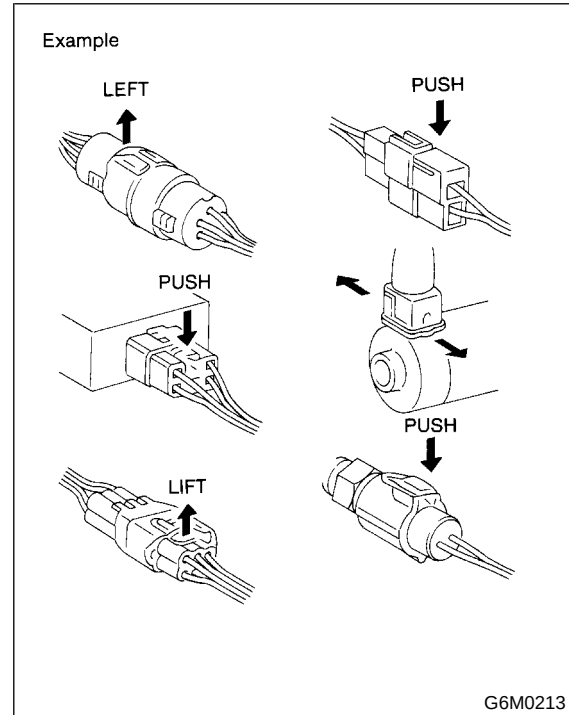
- 1) When working under a vehicle which is jacked-up, always be sure to use safety stands.
- 2) The parking brake must always be applied during working. Also, in automatic transmission vehicles, keep the select lever set to the P (Parking) range.
- 3) Be sure the workshop is properly ventilated when 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 S903706G39

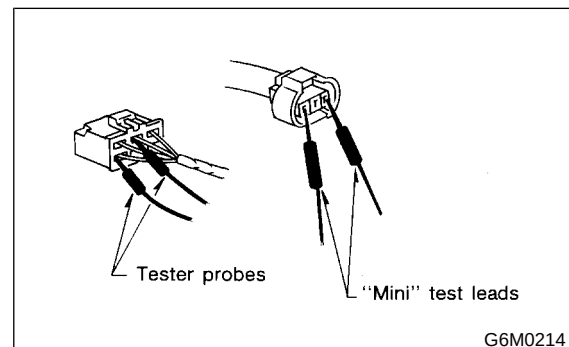
- 1) The battery cable must be disconnected from the battery's (-) terminal, and the ignition switch must be set to the OFF position, unless otherwise required by the diagnostics.
- 2) Securely fasten the wiring harness with clamps and slips so that the harness does not interfere with the body end parts 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.

SUPER MULTIPLE JUNCTION (SMJ)

Wiring System

3. Super Multiple Junction (SMJ) S903464

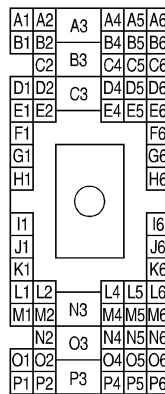
A: HOW TO USE SUPER MULTIPLE JUNCTION (SMJ) S903464G40

The “SMJ” indicated in wiring diagrams is shown in a simplified form.

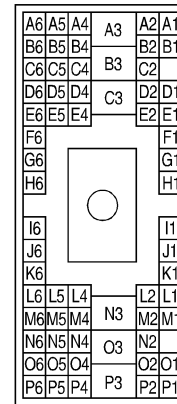
B: TERMINAL ARRANGEMENT S903464G41

Bulkhead Wiring Harness ← → Front Wiring Harness

B62 66 Poles

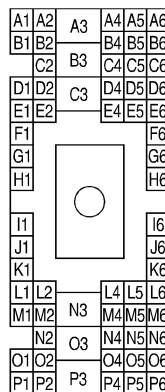


F45 66 Poles

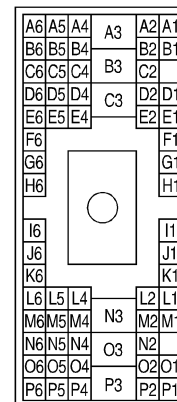


Bulkhead Wiring Harness ← → Instrument Panel Wiring Harness

B36 66 Poles



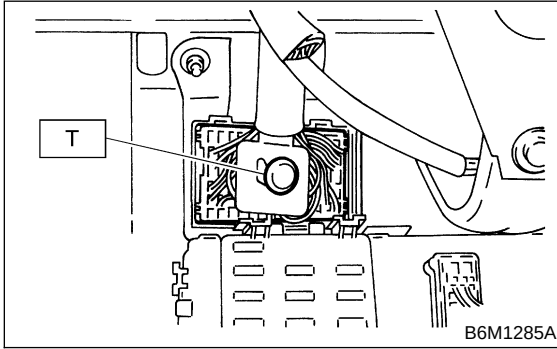
i1 66 Poles



B6M1280A

C: INSTALLATION

S903464A11



Tightening torque:

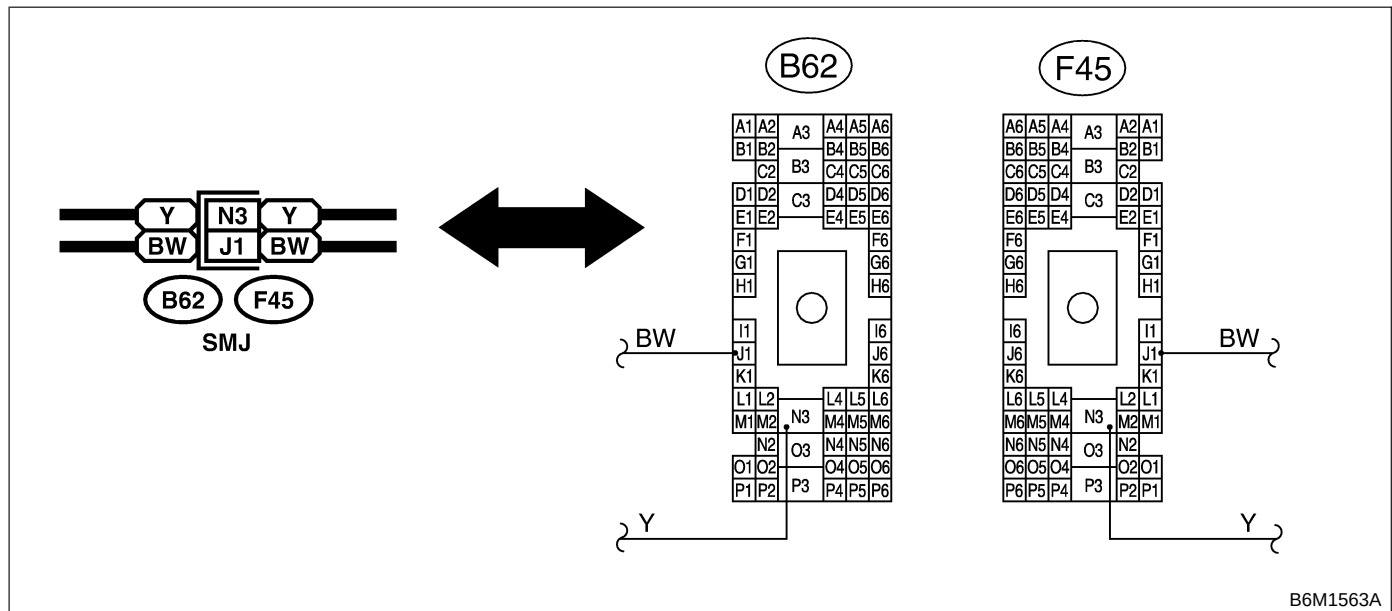
T: 4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

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.

D: EXPLANATION OF SMJ SHOWN IN THE WIRING DIAGRAM

S903464G42



B6M1563A

POWER SUPPLY ROUTING

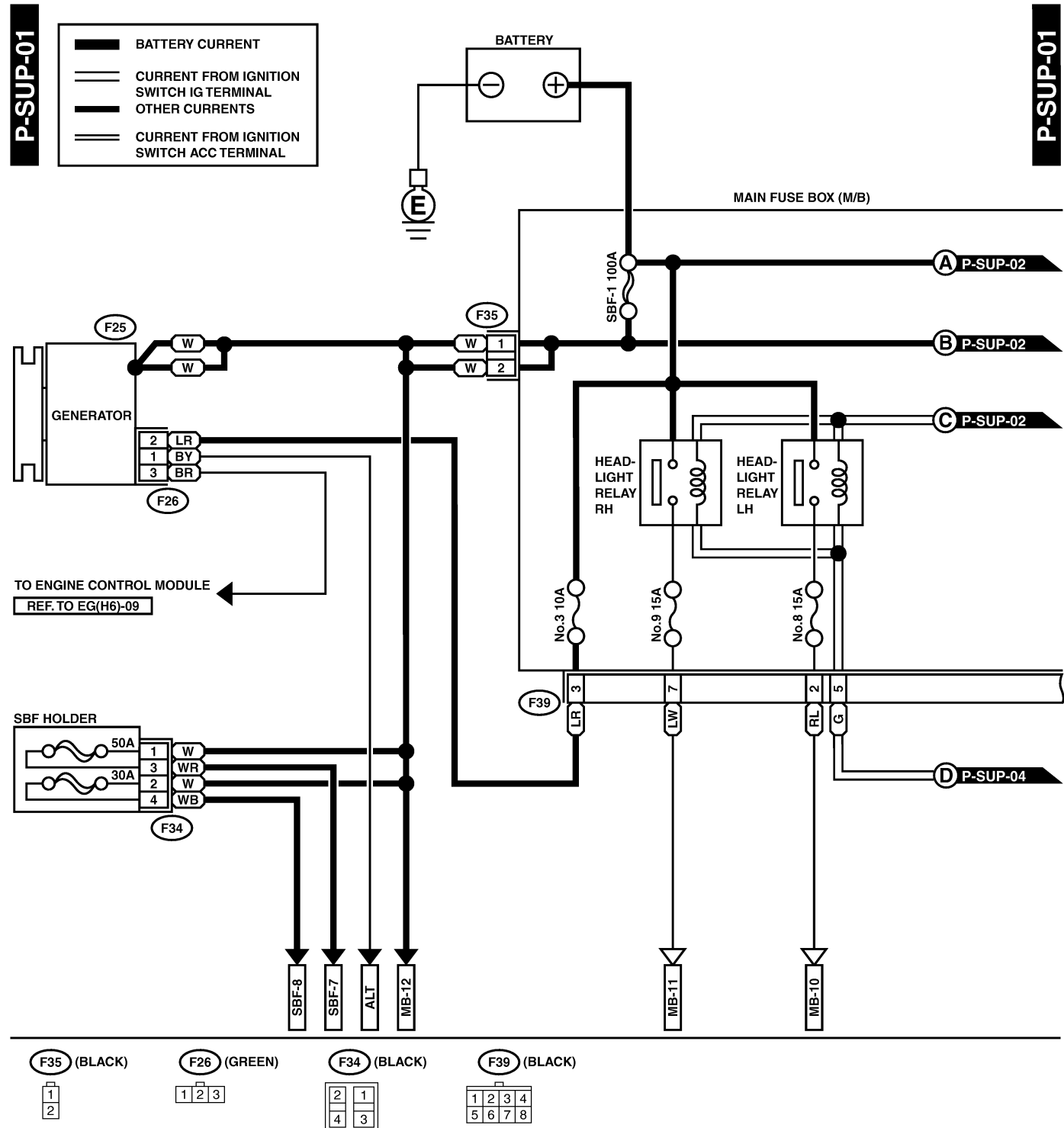
Wiring System

4. Power Supply Routing

S903465

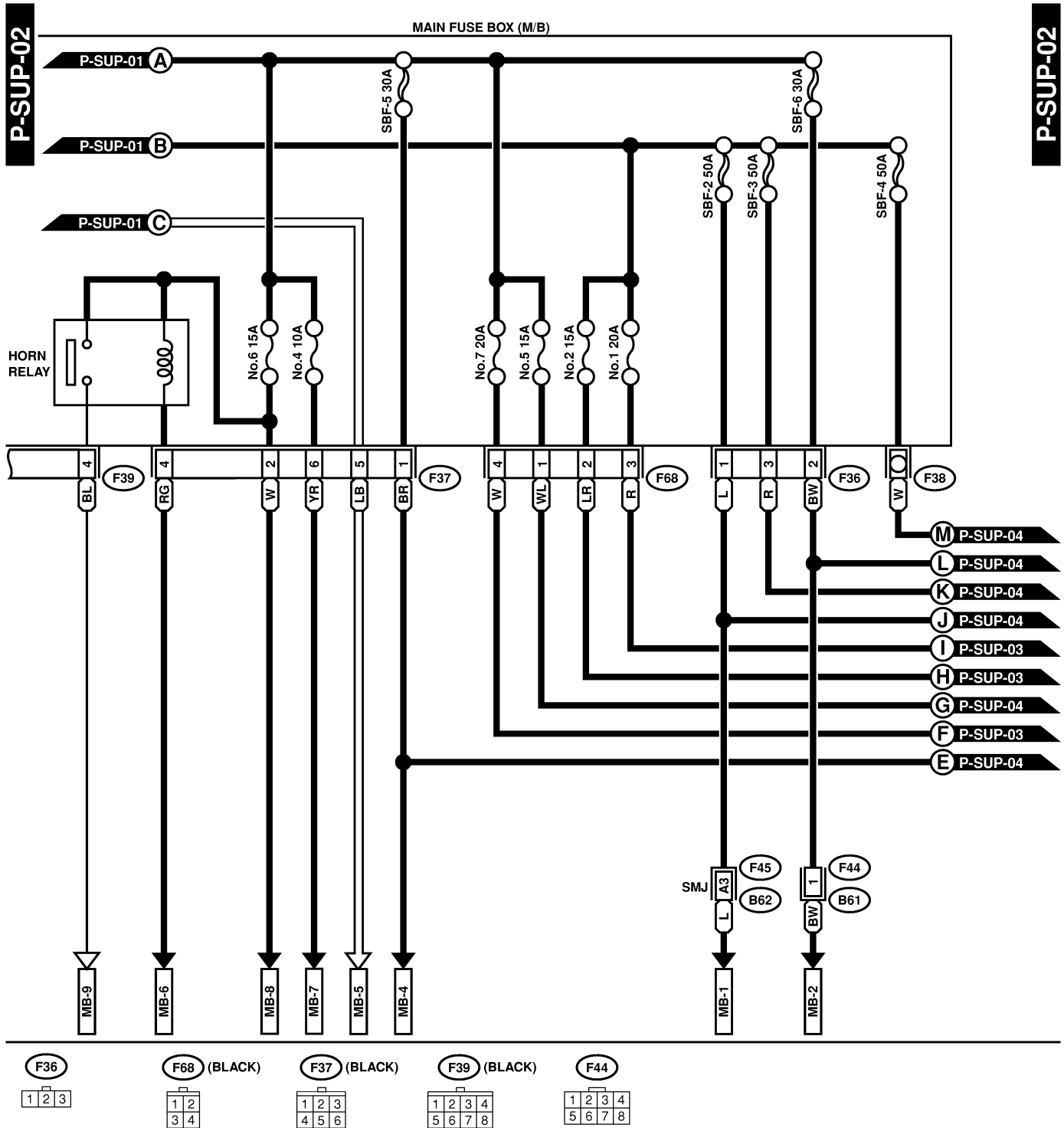
A: SCHEMATIC

S903465A21

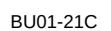


POWER SUPPLY ROUTING

Wiring System

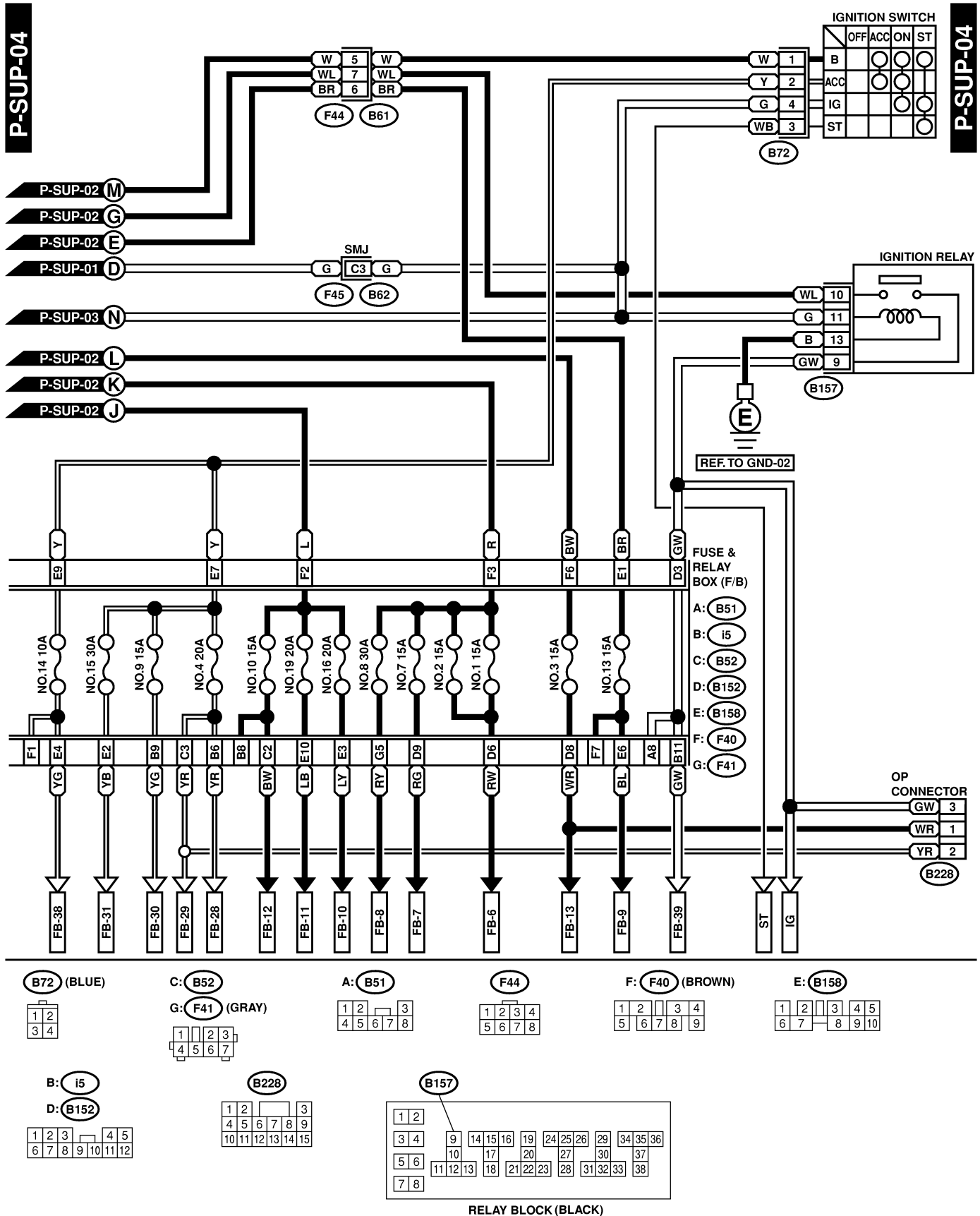


Wiring System



POWER SUPPLY ROUTING

Wiring System



BU01-21D

POWER SUPPLY ROUTING

Wiring System

No.	Load
MB-1	Fuse (Seat heater)
MB-2	Power window circuit breaker
MB-4	Data link connector Engine control module Main relay
MB-5	Daytime running light control module OP connector
MB-6	Cruise control sub switch Horn switch Keyless entry control module Security horn relay
MB-7	Transmission control module
MB-8	AT shift lock control module Hazard switch Key warning switch
MB-9	Horn
MB-10	Headlight LH
MB-11	Combination meter Headlight RH
MB-12	A/C relay holder (Fuse)
SBF-7	ABS control module Relay box (VDC)
SBF-8	Fuse (Mcintosh audio)
ALT	Combination meter
IG	Check connector Keyless entry control module Seat belt timer Security control module Vehicle speed sensor (MT)
ST	Cruise control module (AT) Engine control module Inhibitor switch (AT) Interrupt relay Starter interlock relay (MT)
FB-1	ABS control module Main fan relay (4 cylinder engine model) Main fan relay-1 (6 cylinder engine model) Main fan relay-2 (6 cylinder engine model) VDC control module
FB-2	Parking switch Security control module
FB-3	Parking switch Security control module
FB-4	Combination meter Hazard switch Rear turn signal light LH Trailer connector Turn signal switch
FB-5	Combination meter Hazard switch Rear turn signal light RH Trailer connector Turn signal switch
FB-6	Blower motor relay
FB-7	Front fog light relay
FB-8	ABS control module Relay box (VDC)

No.	Load
FB-9	Fuel pump relay
FB-10	Stop light switch
FB-11	Wiper deicer relay
FB-12	Trailer connector
FB-13	Door lock timer Keyless entry control module
FB-14	Airbag control module
FB-15	Airbag control module
FB-16	Daytime running light control module Daytime running light relay (4-light model) Engine control module Fuel pump relay Ignition coil and ignitor (4-cylinder engine model) Ignition coil No. 1 — 6 (6-cylinder engine model) Transmission control module
FB-17	A/C pressure switch Blower motor relay Fan relay (6-cylinder engine model)
FB-18	A/C relay Sub fan relay (4-cylinder engine model) Sub fan relay-1 (6-cylinder engine model) Sub fan relay-2 (6-cylinder engine model)
FB-19	Auto A/C control module Mode control panel
FB-20	AT shift lock control module Back-up light switch (MT) Cruise control module Inhibitor switch (AT) Power window relay Wiper deicer relay Wiper deicer timer
FB-21	Cruise control main switch
FB-22	Engine control module Rear defogger switch
FB-23	Rear defogger Rear defogger condenser
FB-24	Engine control module Lighting switch OP connector
FB-25	Parking switch
FB-26	Illumination control module Illumination light OP connector
FB-27	Combination meter Illumination light
FB-28	Auto A/C control module Front accessory power supply socket Multiple power socket relay (Option)
FB-29	AT shift lock control module Mirror heater LH Mirror heater RH Remote control rearview mirror switch Seat heater/rear accessory power supply relay Vanity mirror illumination light

POWER SUPPLY ROUTING

Wiring System

No.	Load
FB-30	Radio
FB-31	Front washer motor Front wiper motor Front wiper & washer switch
FB-32	Luggage room light Room light Security control module Security horn relay Spot light Step light Trunk room light
FB-33	Auto A/C control module Combination meter Radio
FB-34	License plate light LH License plate light RH Rear finisher light LH Rear finisher light RH Tail light LH Tail light RH Trailer connector
FB-35	Front clearance light LH Front clearance light RH
FB-36	Front turn signal light LH
FB-37	Front turn signal light RH
FB-38	Rear washer motor Rear wiper intermittent module Rear wiper motor
FB-39	Combination meter Hazard switch

GROUND DISTRIBUTION

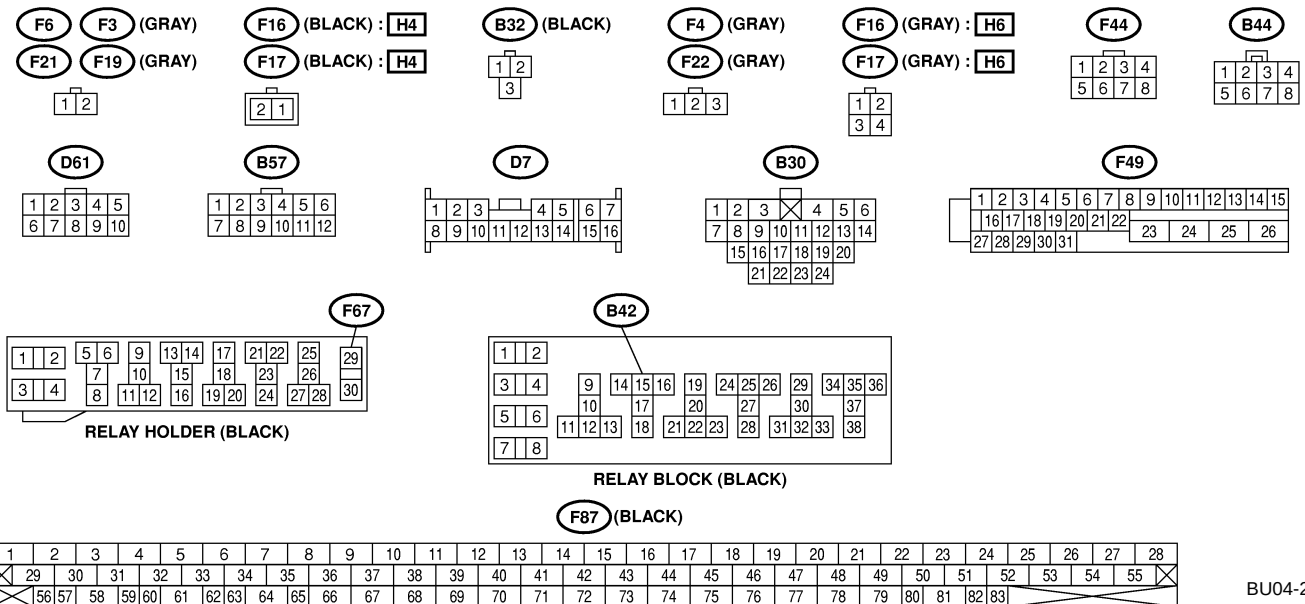
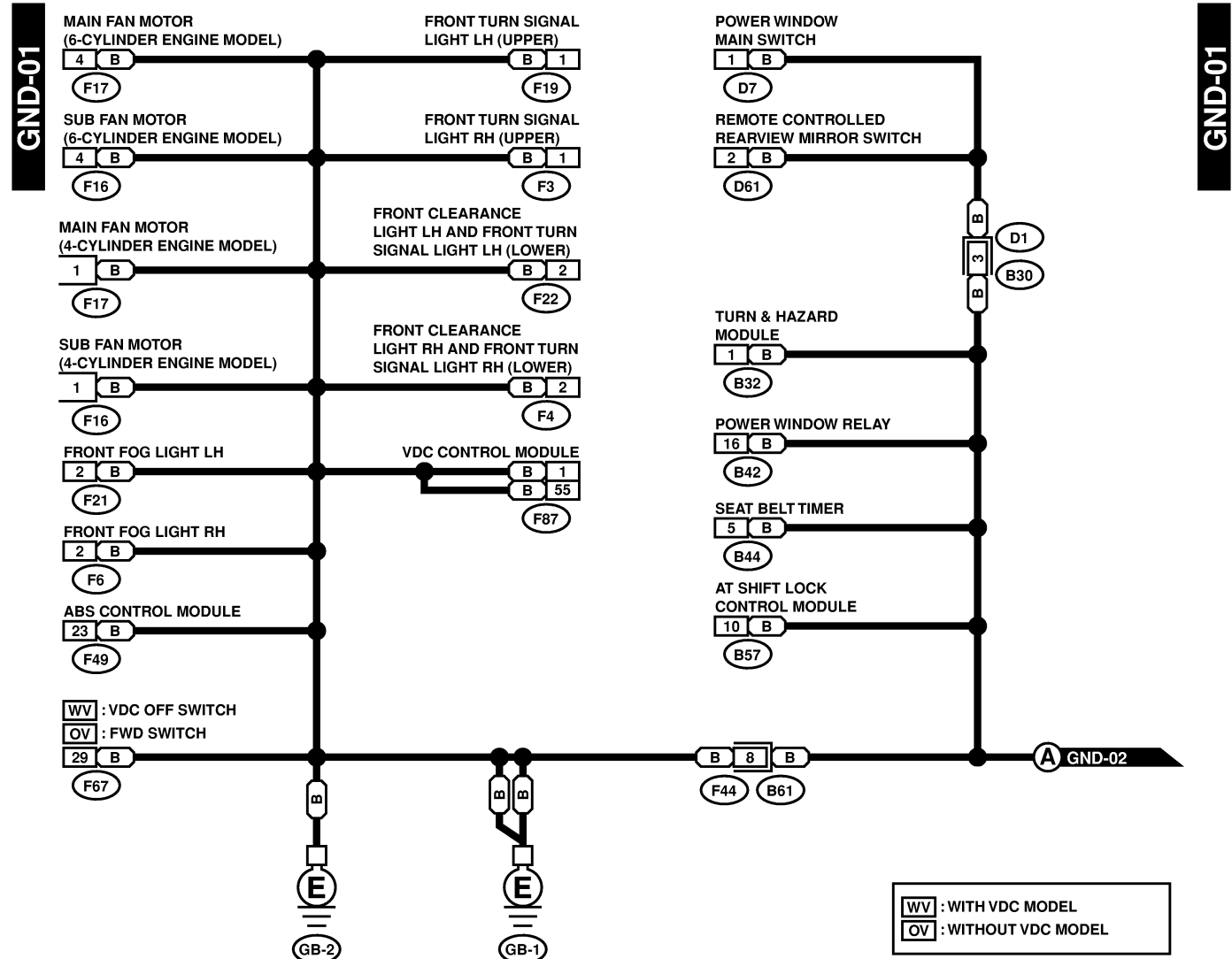
Wiring System

5. Ground Distribution

S903472

A: SCHEMATIC

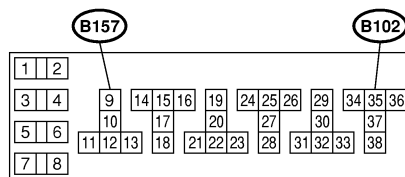
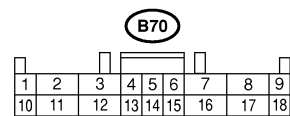
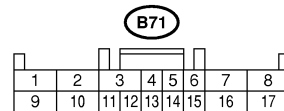
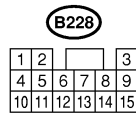
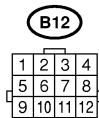
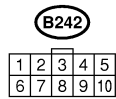
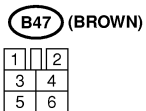
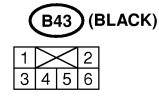
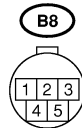
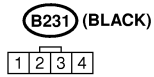
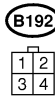
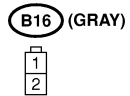
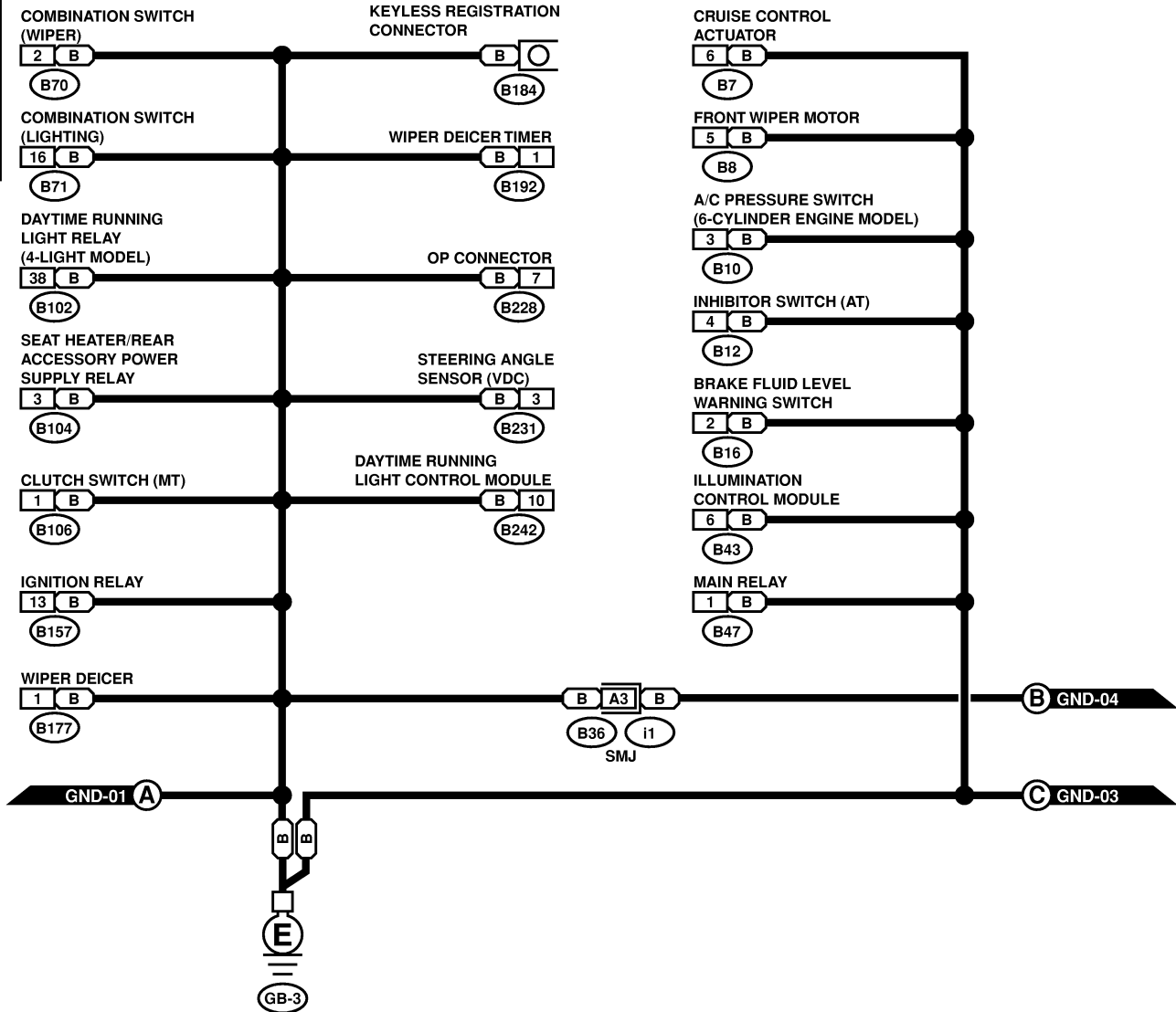
S903472A21



BU04-22A

GND-02

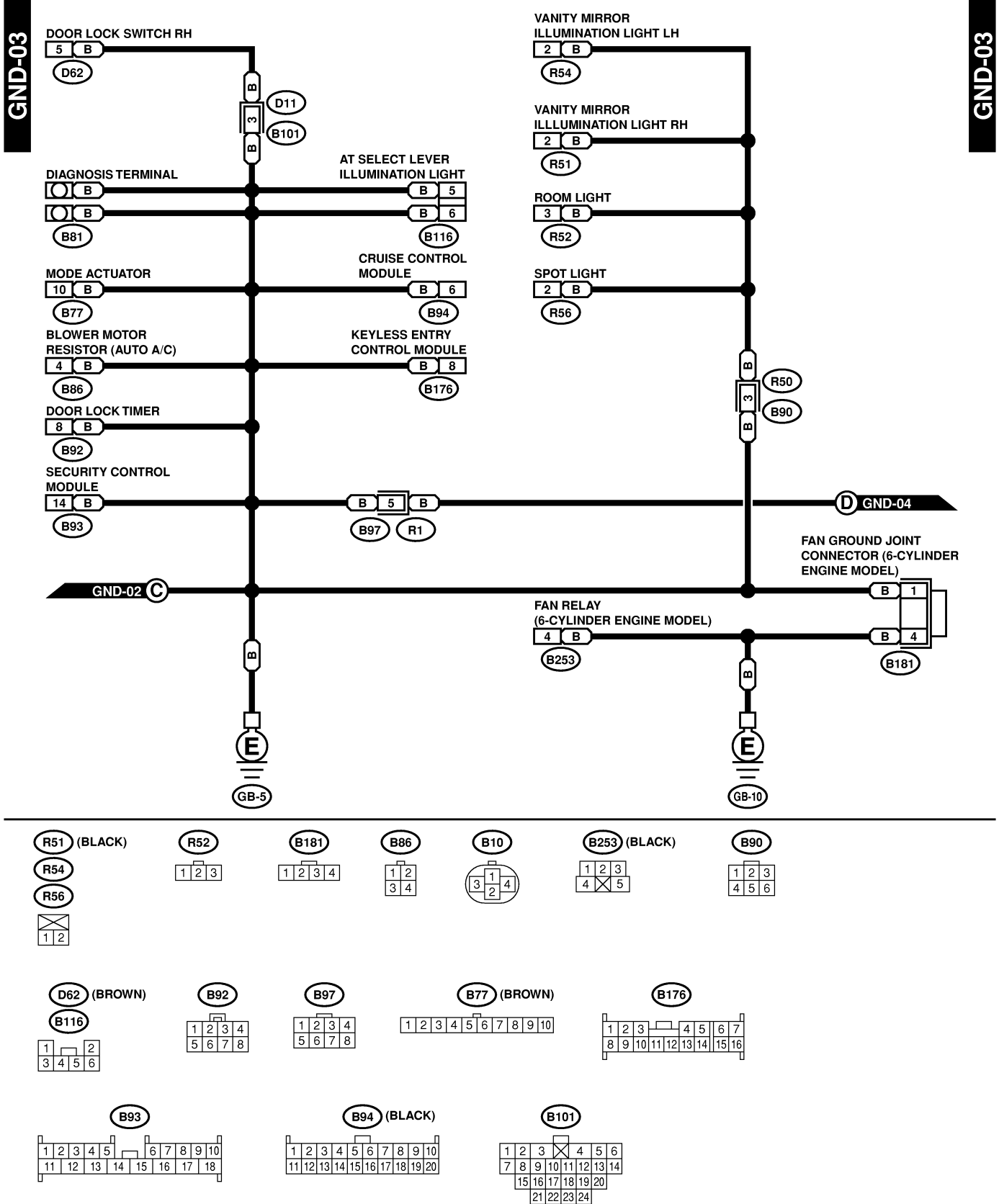
GND-02



RELAY BLOCK (BLACK)

GROUND DISTRIBUTION

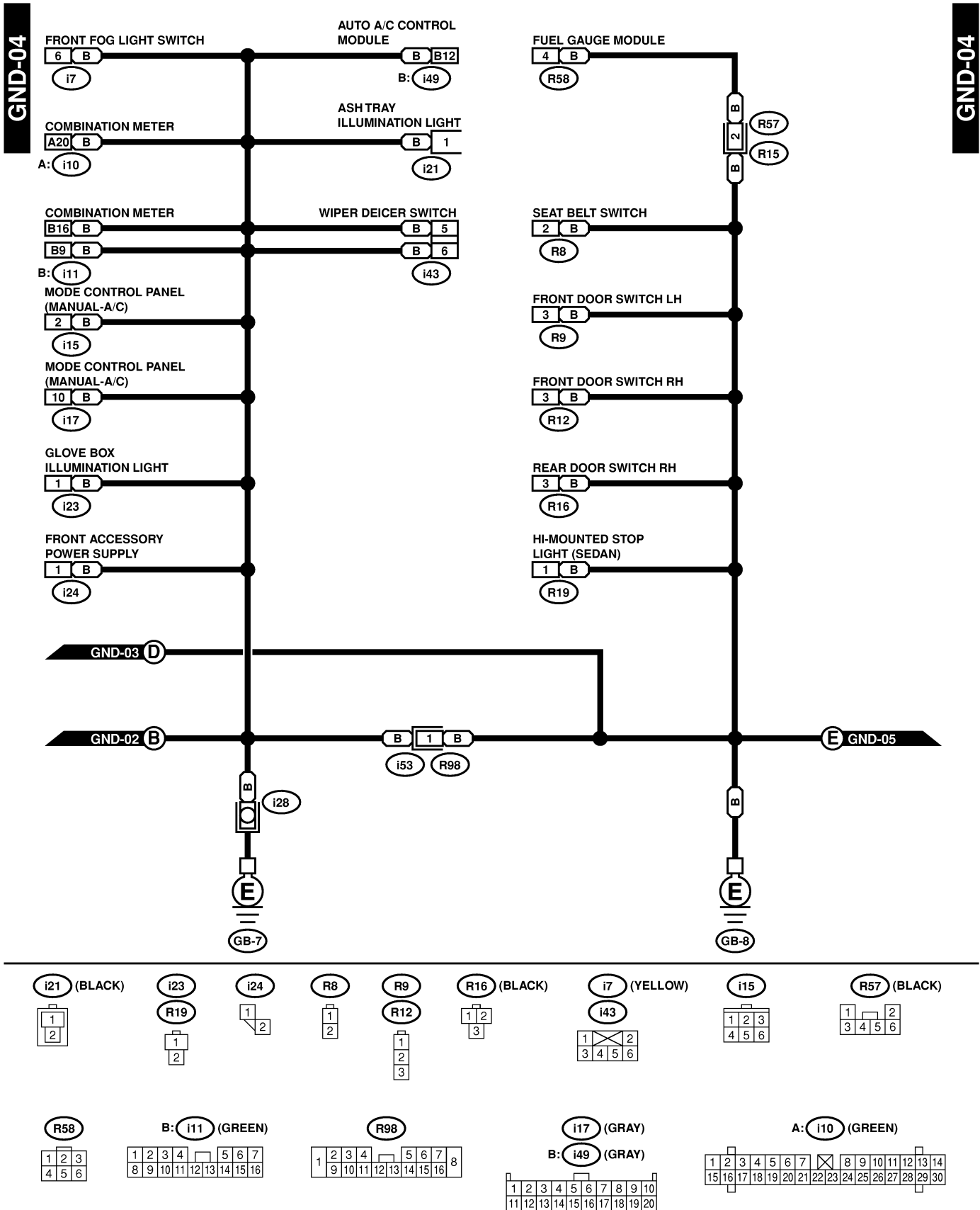
Wiring System



BU04-22C

GROUND DISTRIBUTION

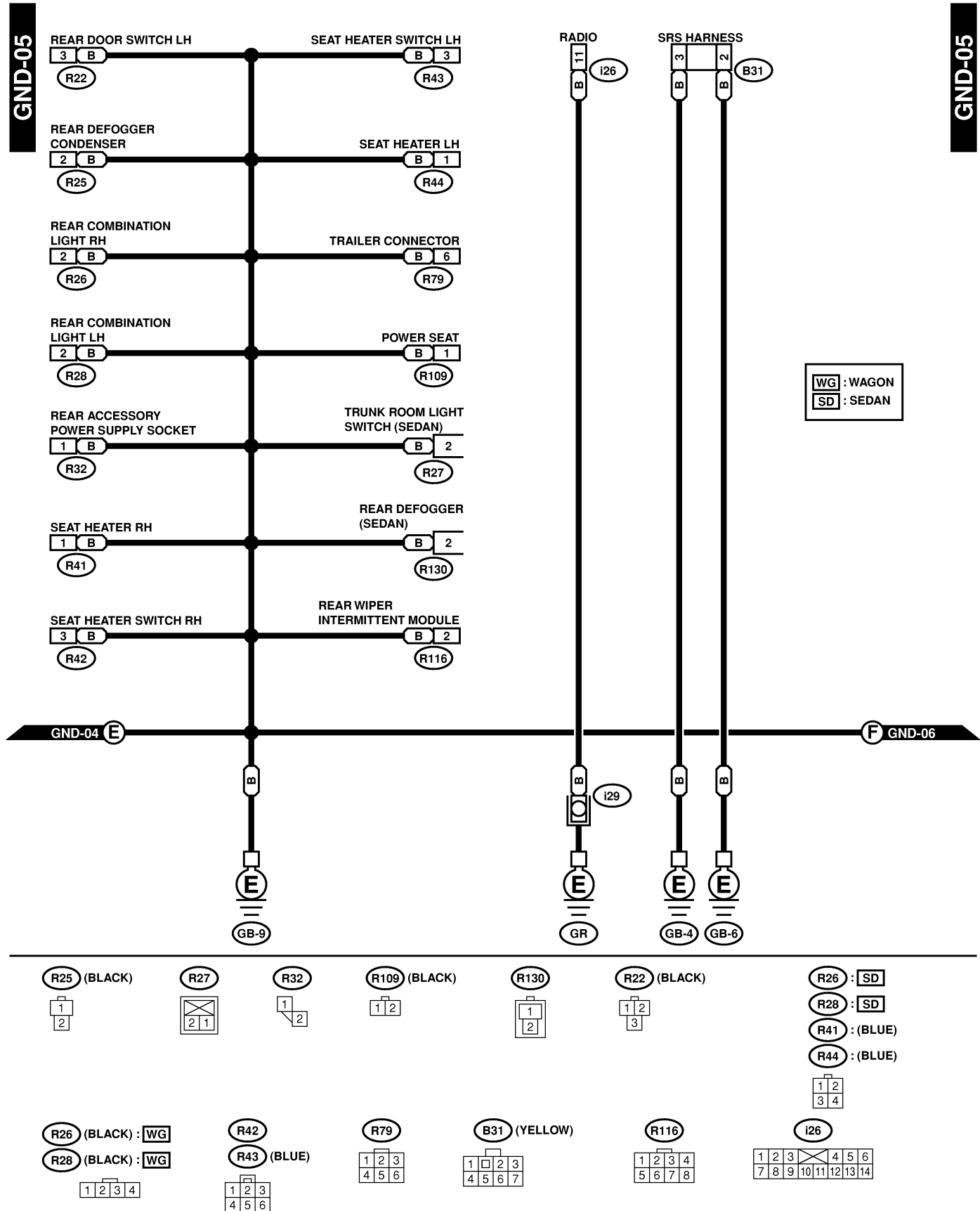
Wiring System



BU04-22D

GROUND DISTRIBUTION

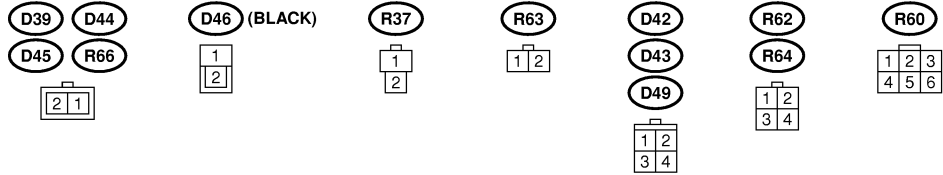
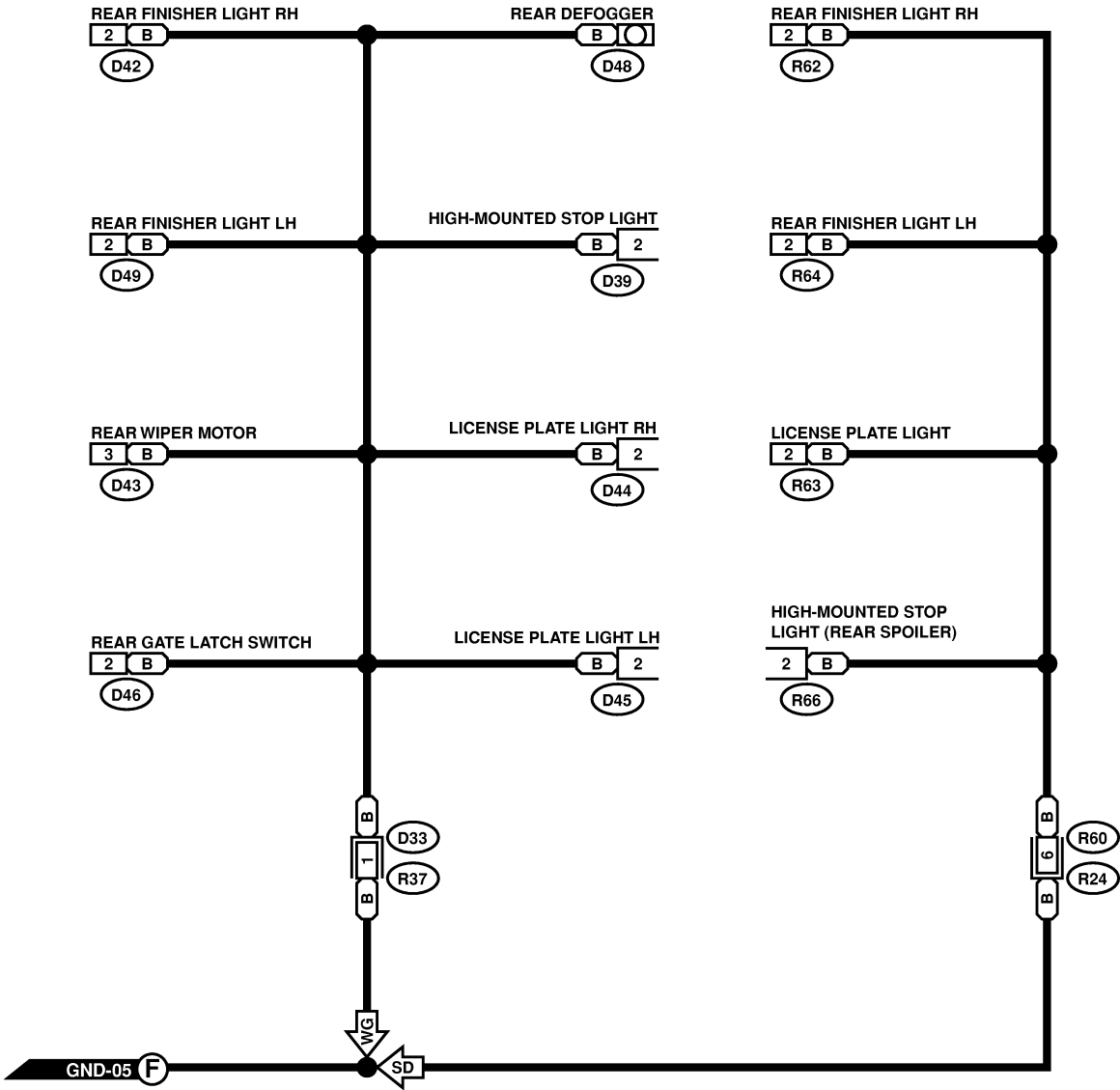
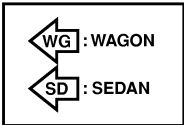
Wiring System



BU04-22E

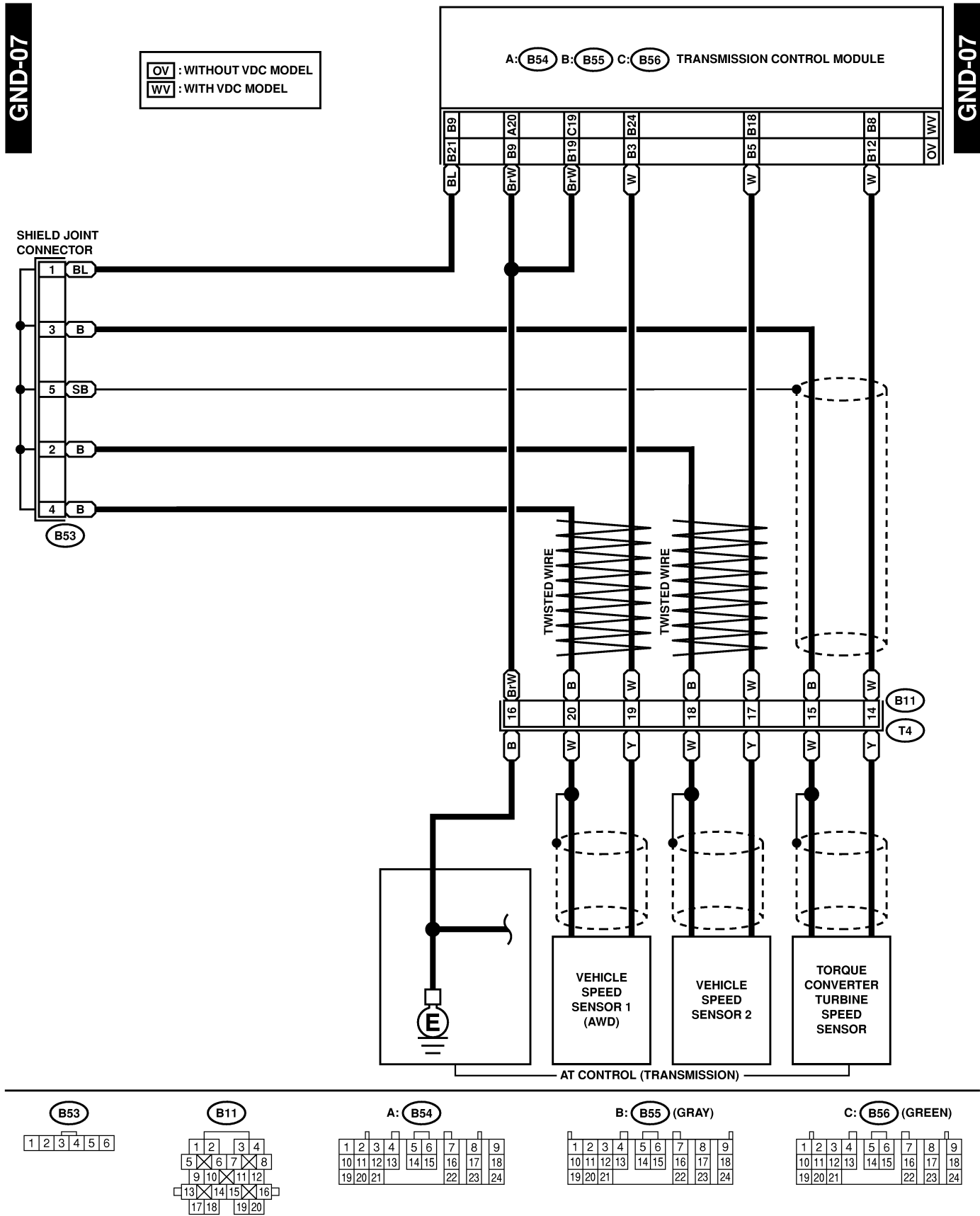
GND-06

GND-06

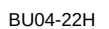


GROUND DISTRIBUTION

Wiring System

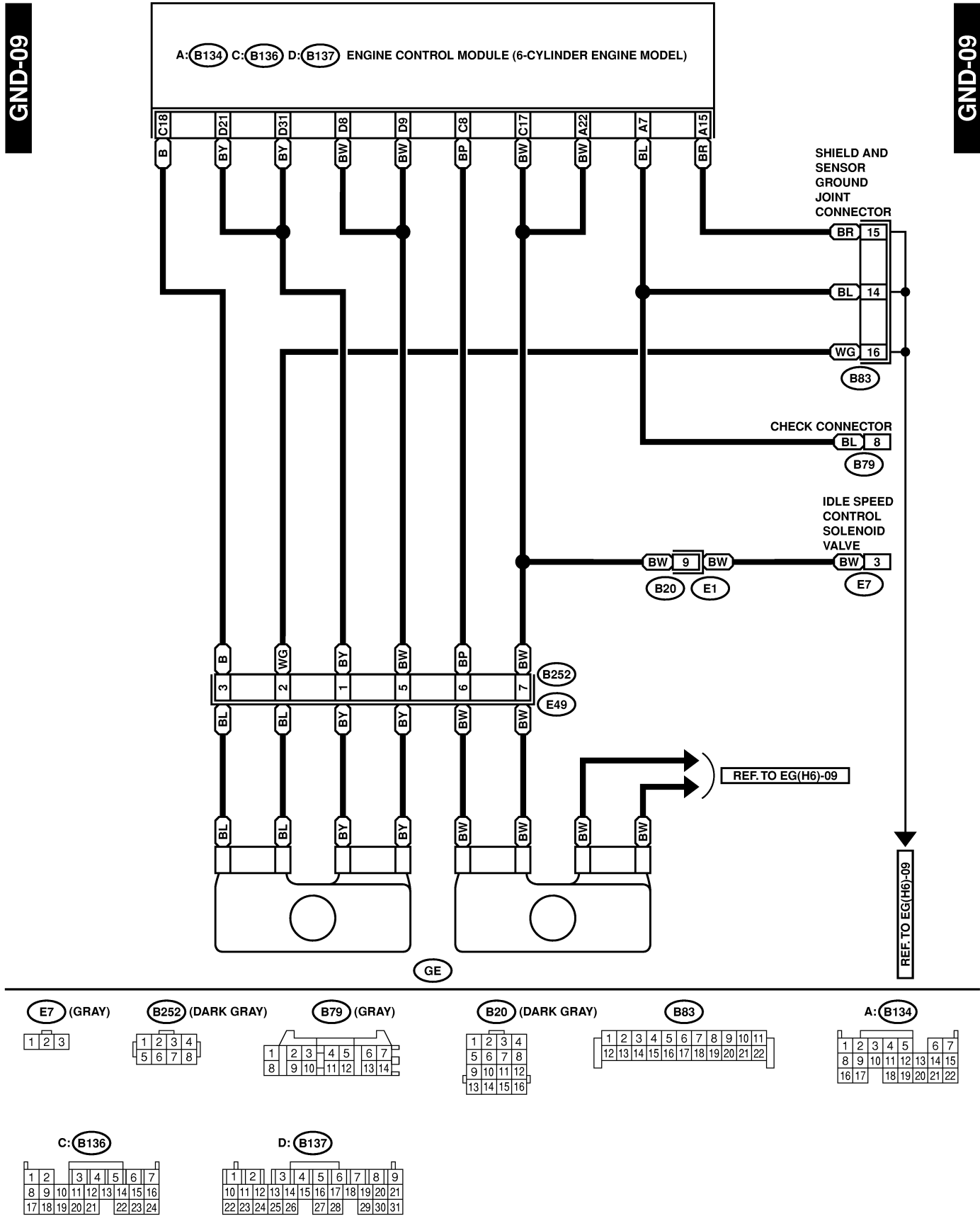


Wiring System



GROUND DISTRIBUTION

Wiring System

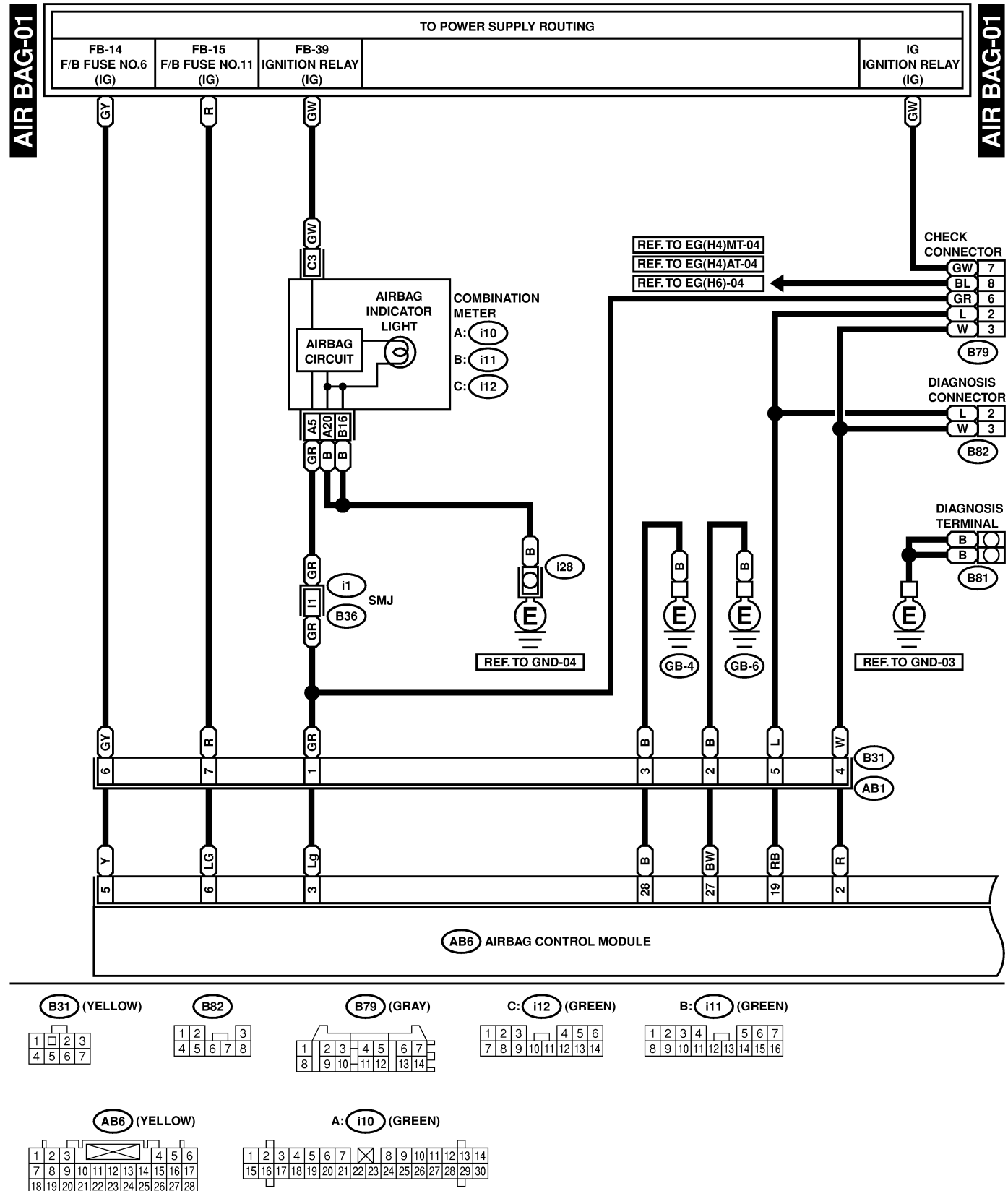


6. Airbag System

S903491

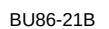
A: SCHEMATIC

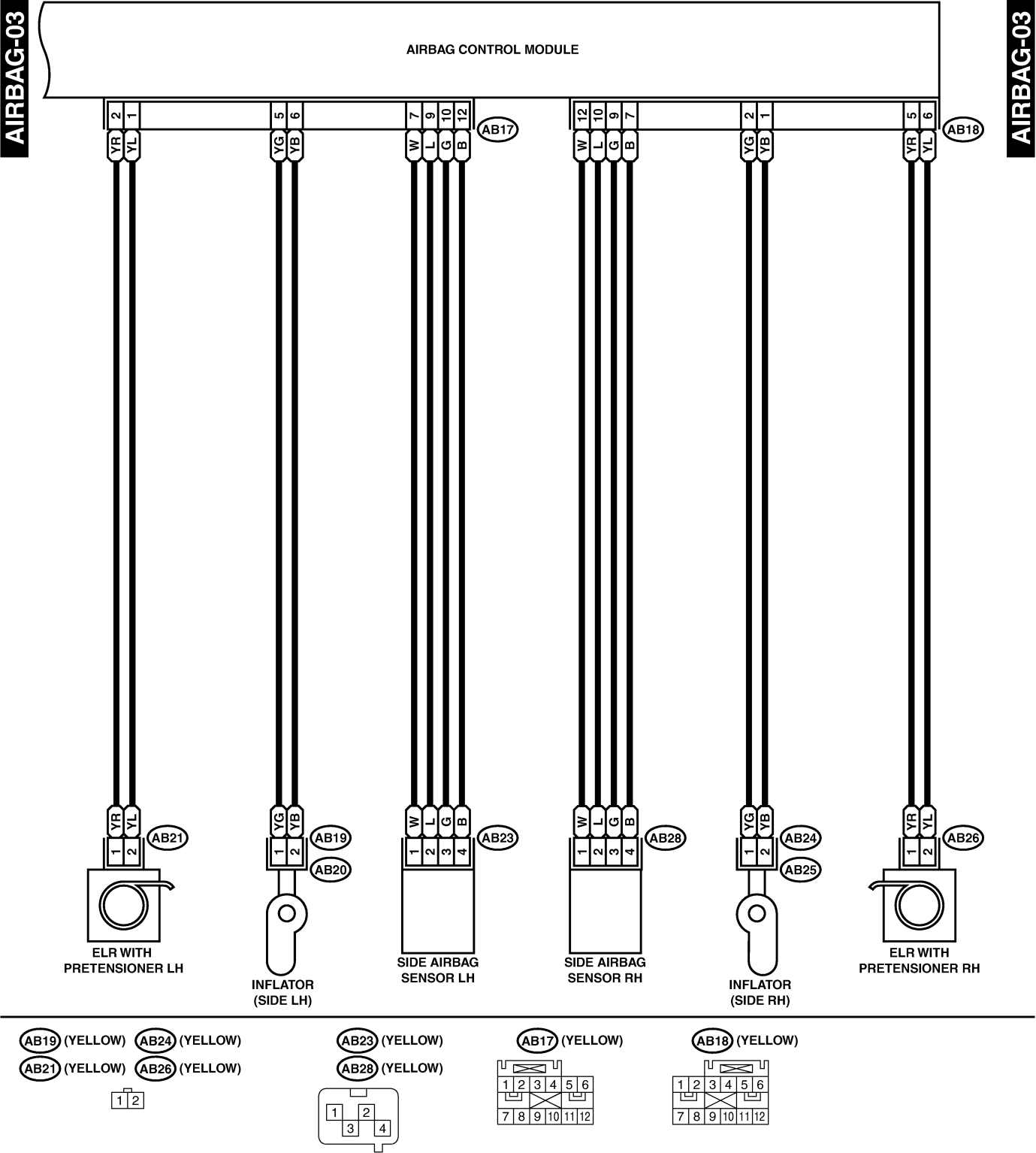
S903491A21



Wiring System

AIR BAG-02

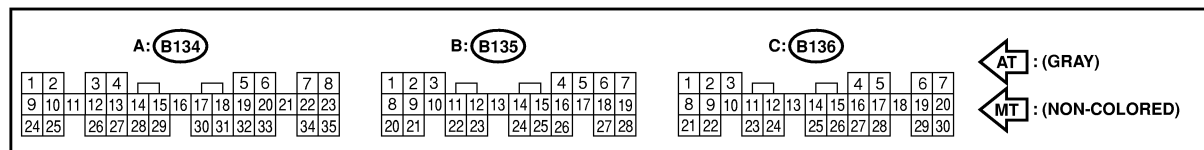
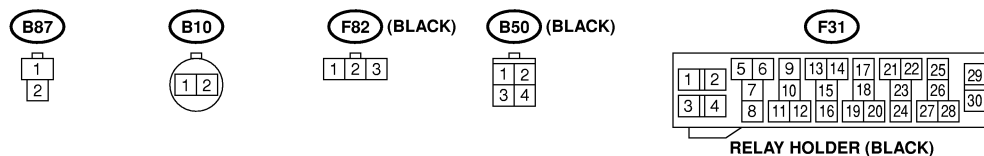
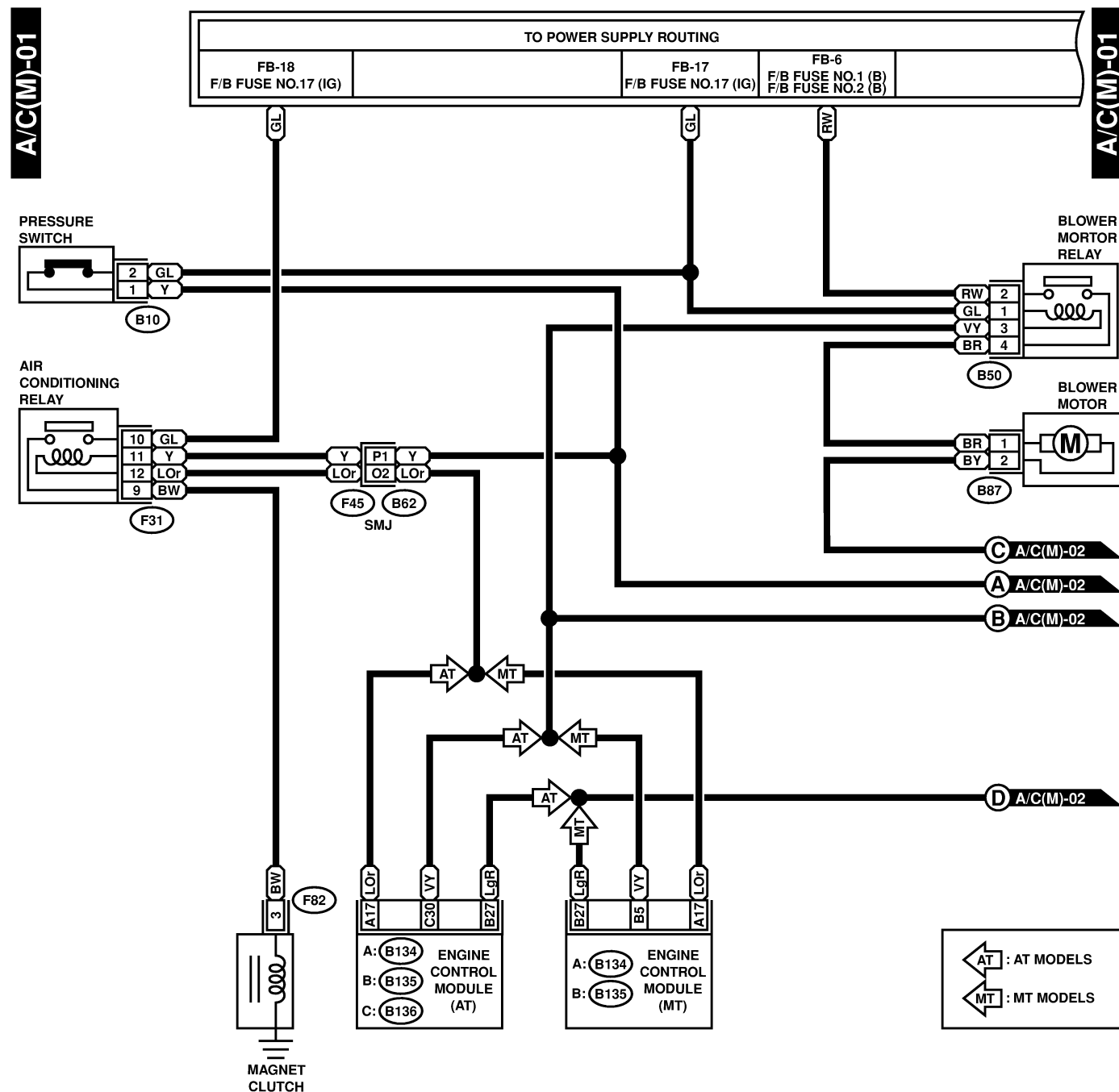




7. Air Conditioning System S903471

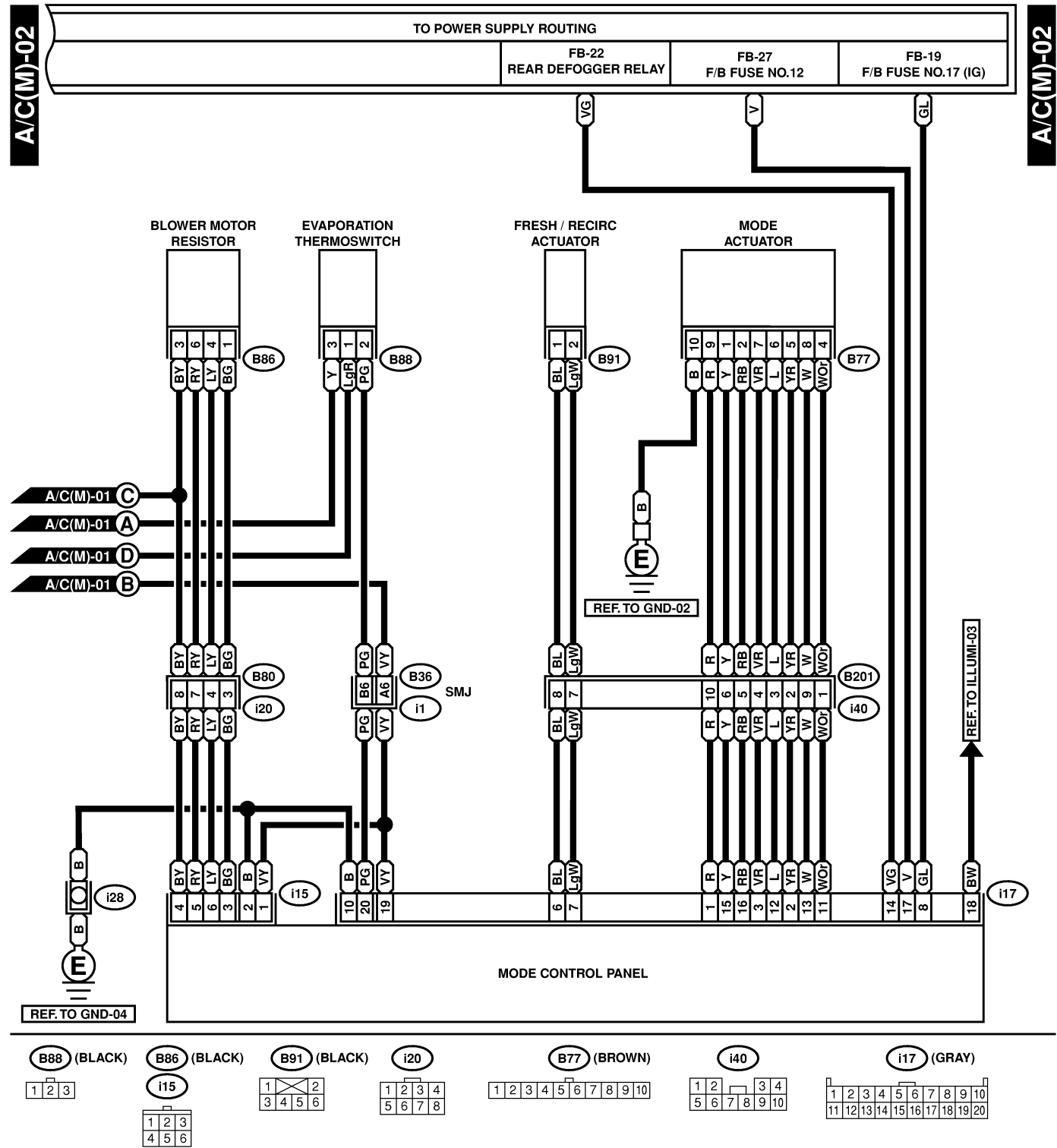
A: SCHEMATIC S903471A21

1. MANUAL A/C MODEL S903471A2105

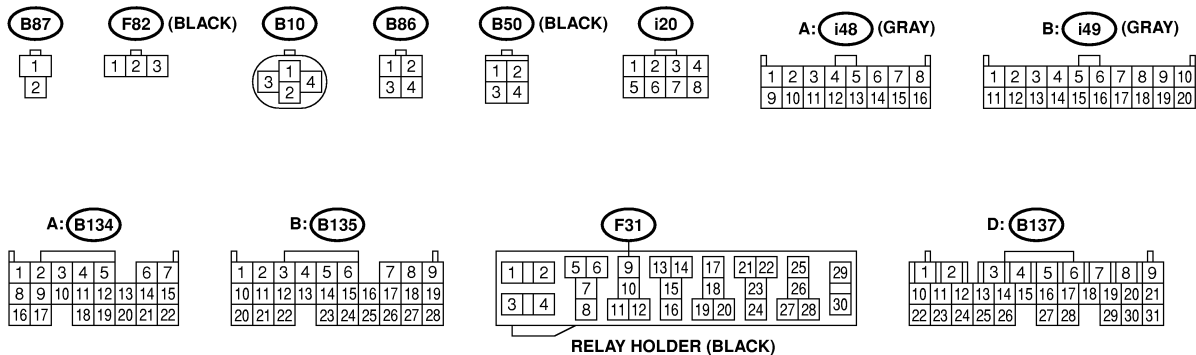
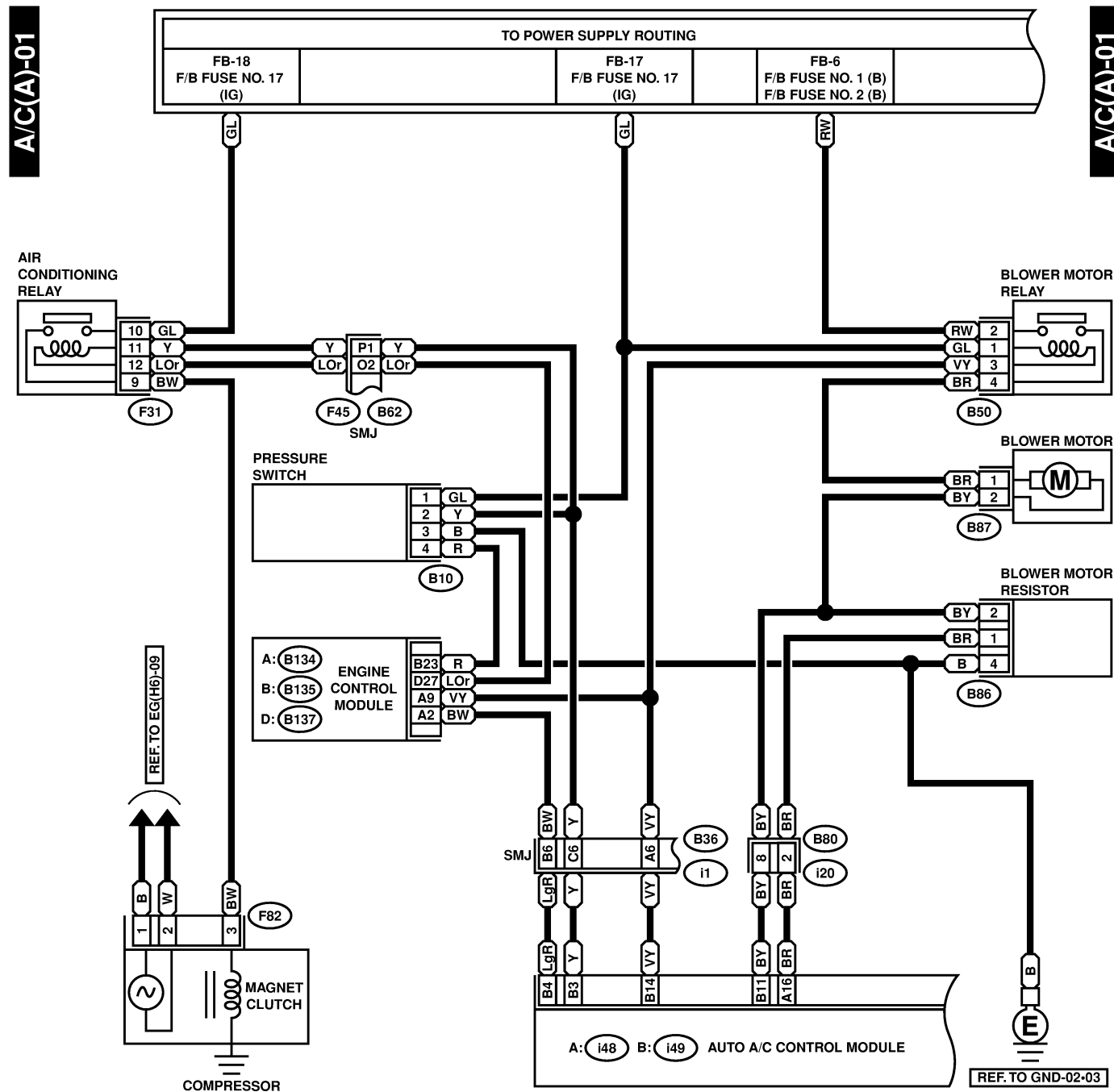


AIR CONDITIONING SYSTEM

Wiring System

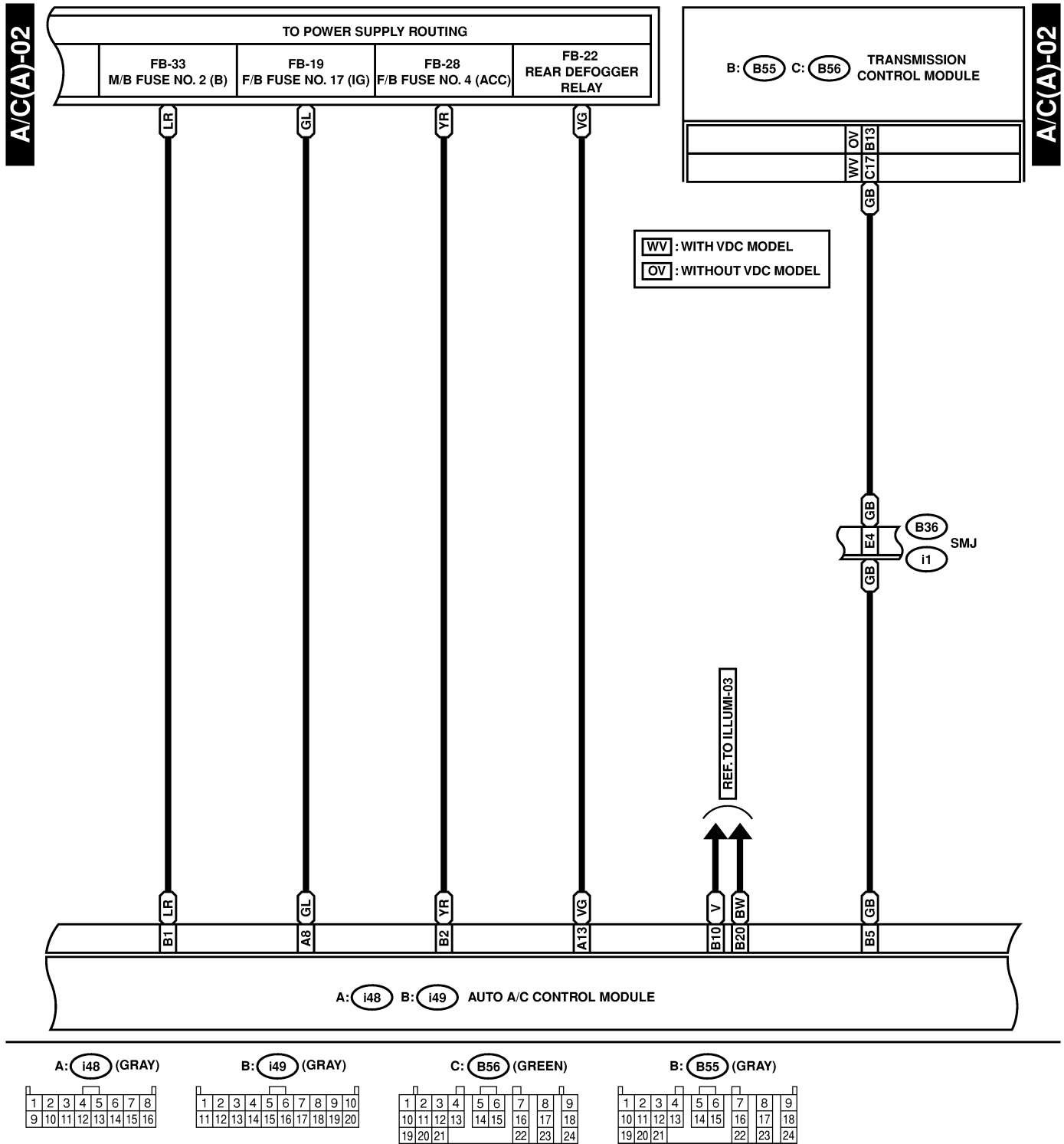


2. AUTO A/C MODEL S903471A2106

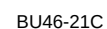


AIR CONDITIONING SYSTEM

Wiring System

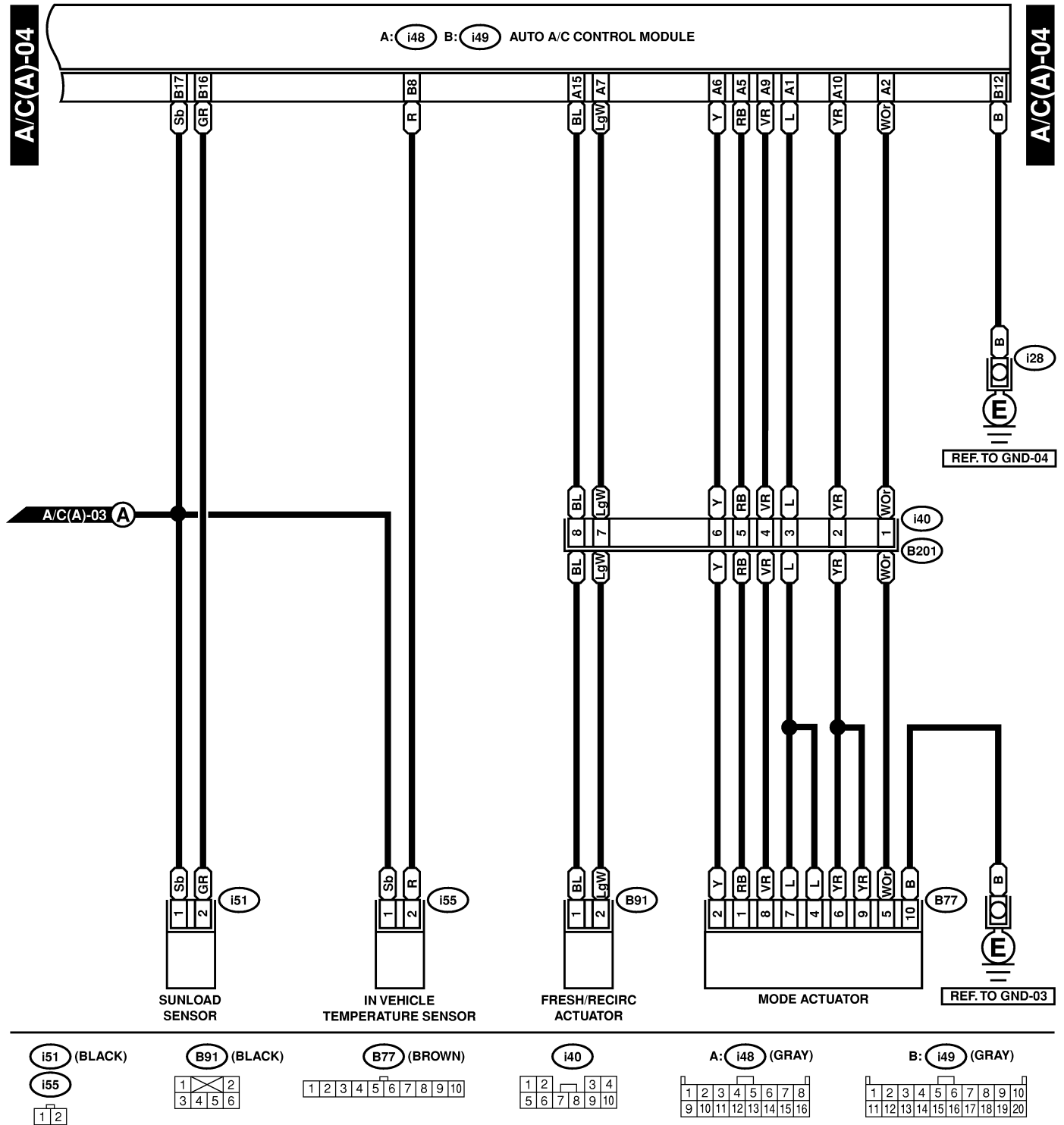


Wiring System



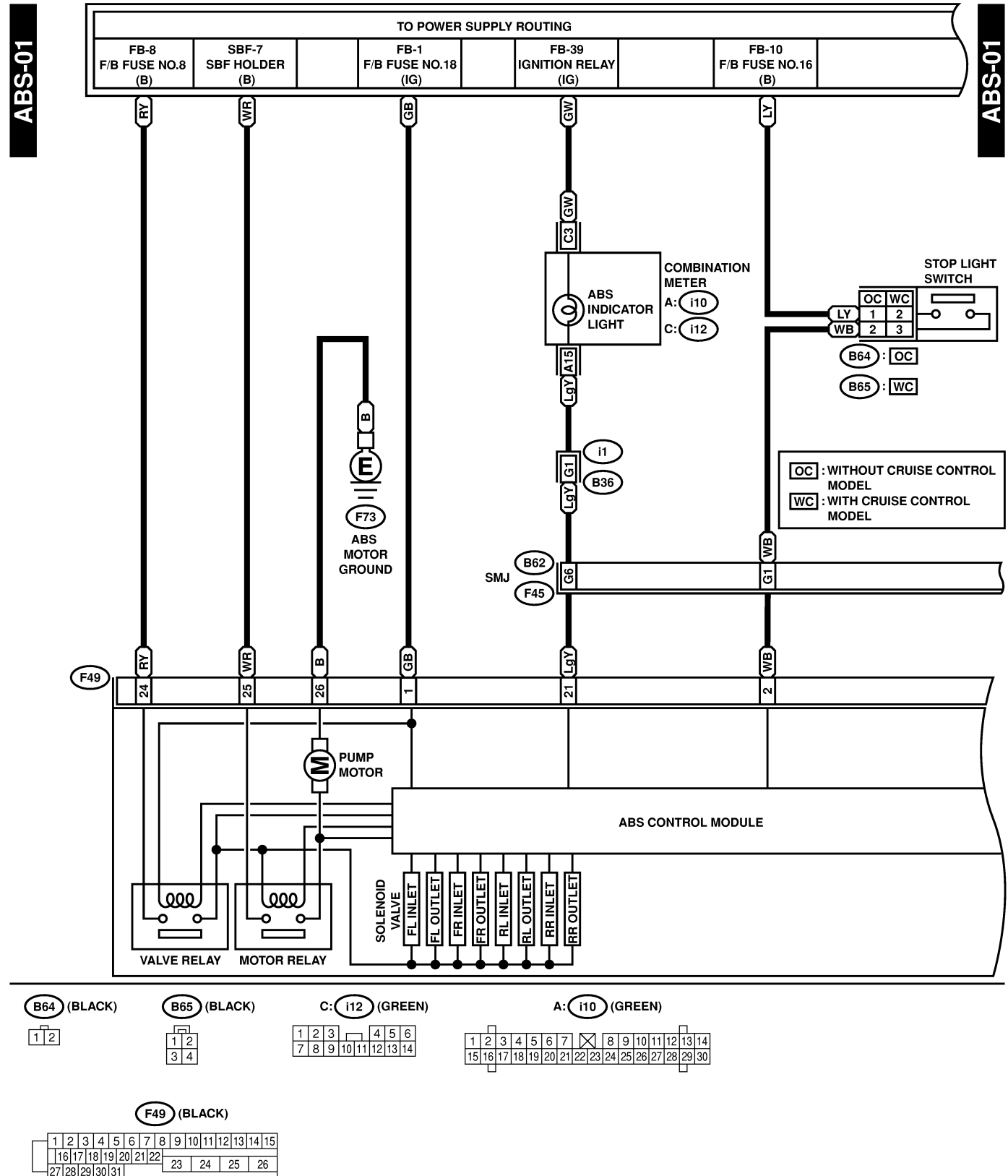
AIR CONDITIONING SYSTEM

Wiring System



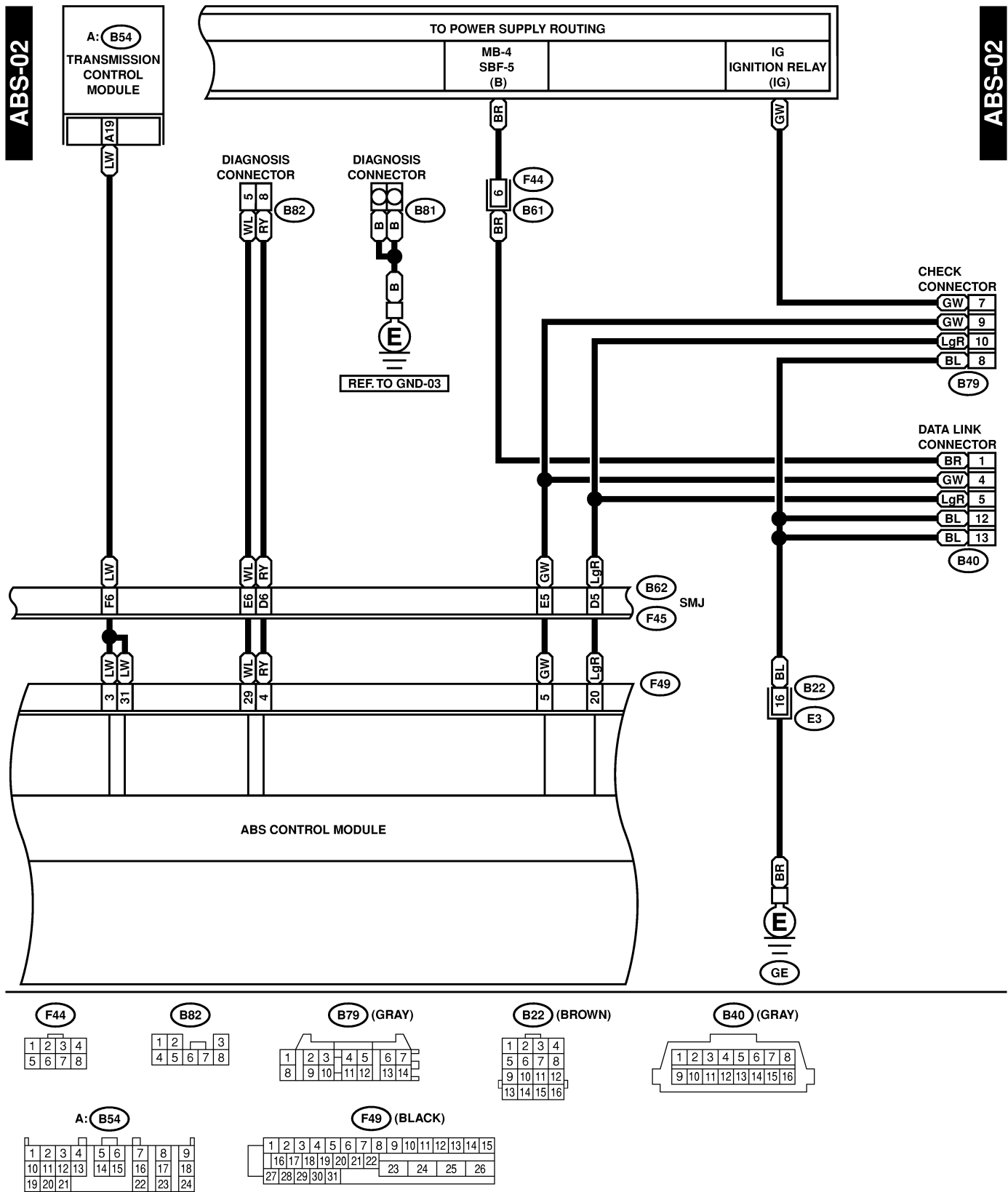
8. Anti-lock Brake System S903484

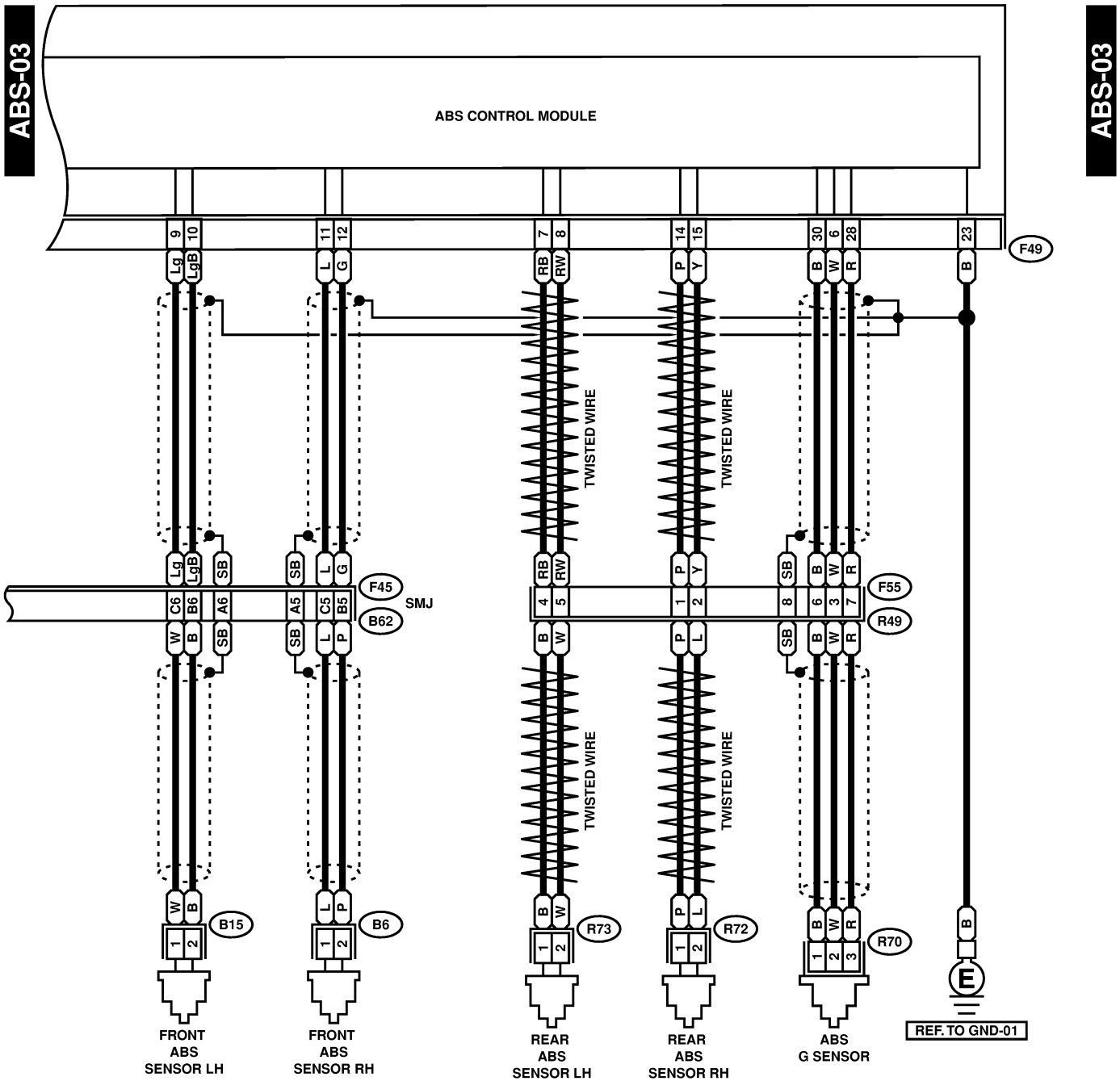
A: SCHEMATIC S903484A21



ANTI-LOCK BRAKE SYSTEM

Wiring System





B6 : *1 R72 (GRAY)

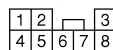
B15 : *1 R73 (GRAY)



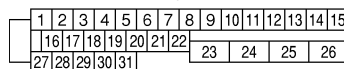
R70 (BLACK)



F55



F49 (BLACK)



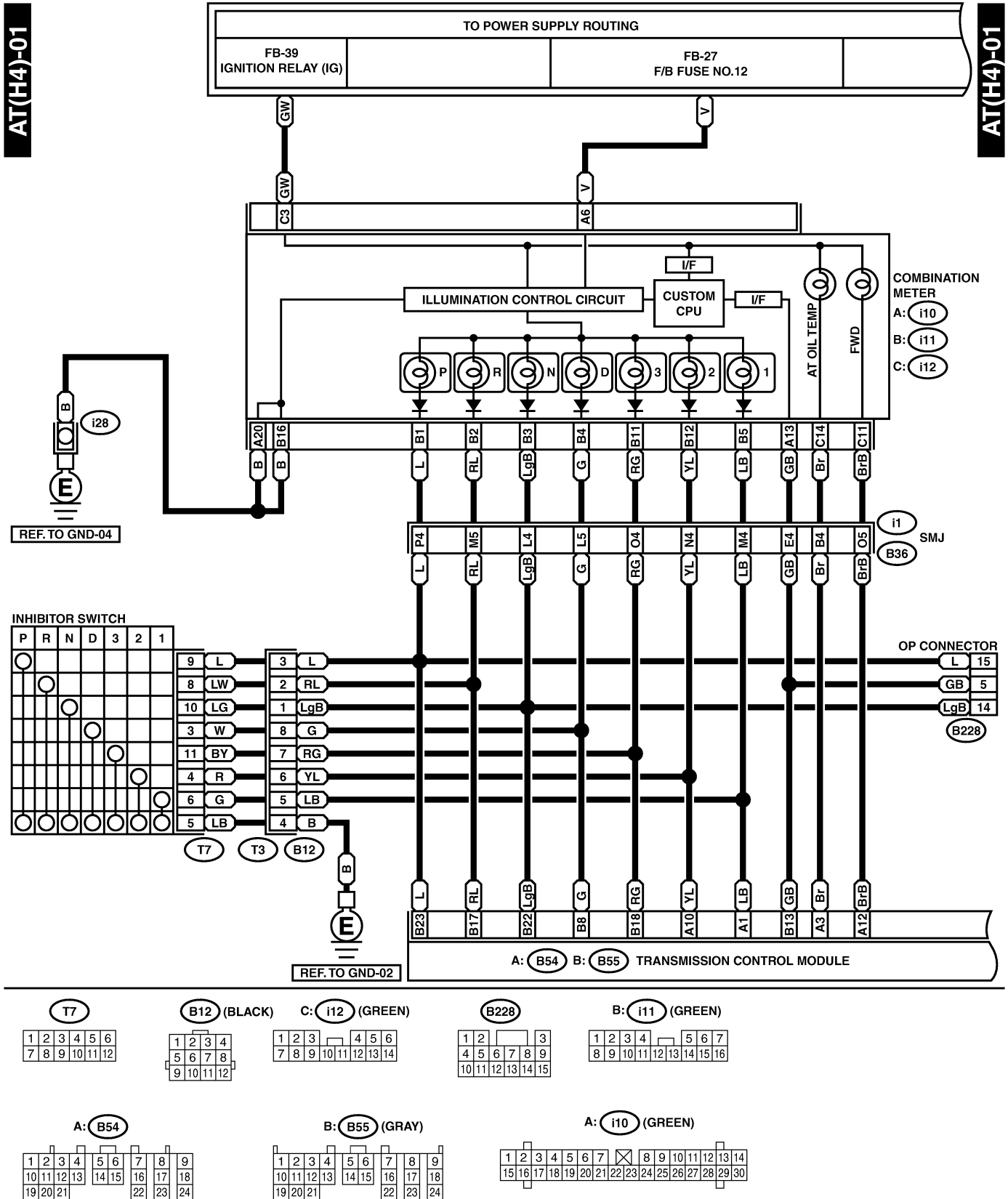
*1 : OUT BACK: (BROWN)
OTHER MODELS: (GRAY)

9. A/T Control System S903485

A: SCHEMATIC S903485A21

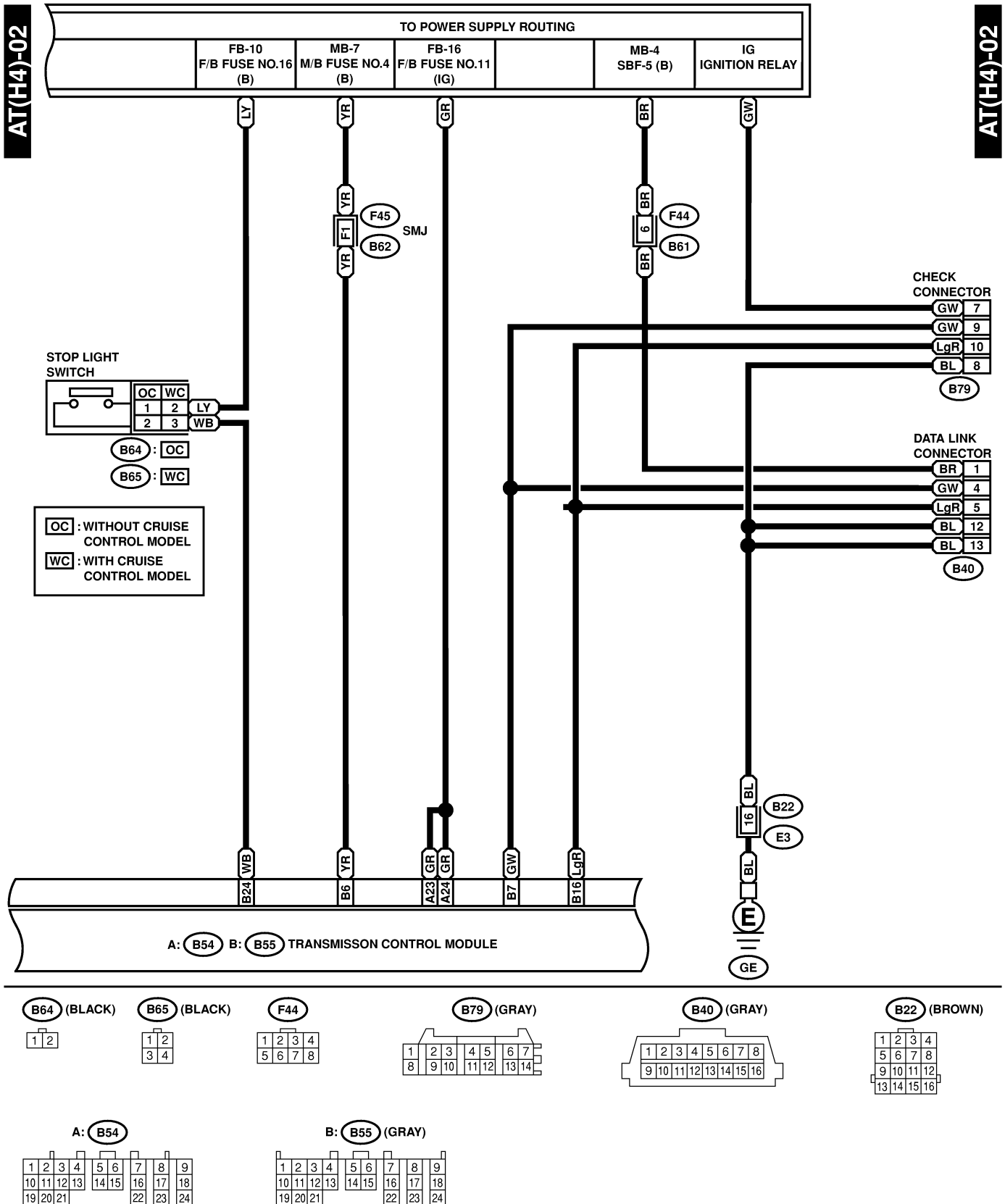
1. 4-CYLINDER ENGINE MODEL

S903485A2103



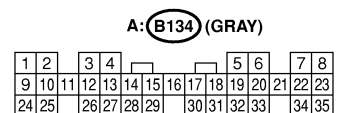
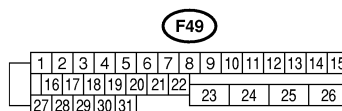
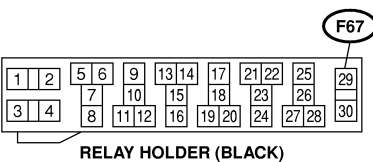
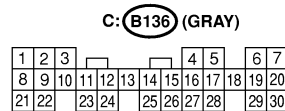
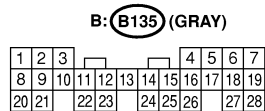
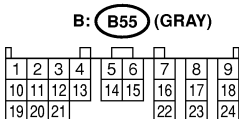
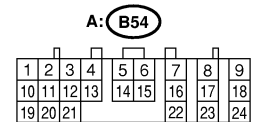
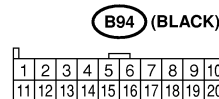
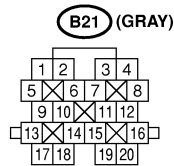
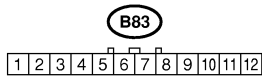
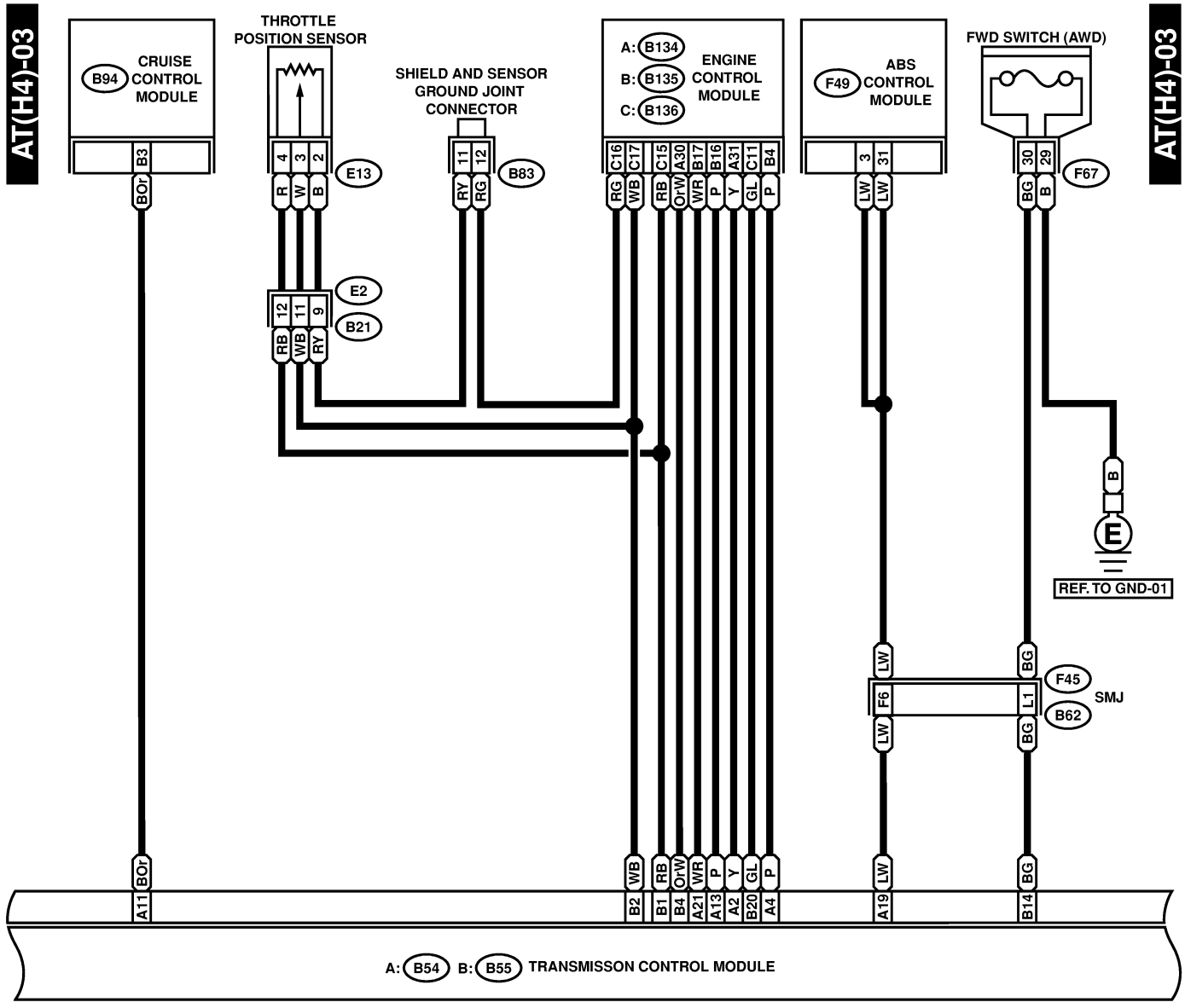
A/T CONTROL SYSTEM

Wiring System



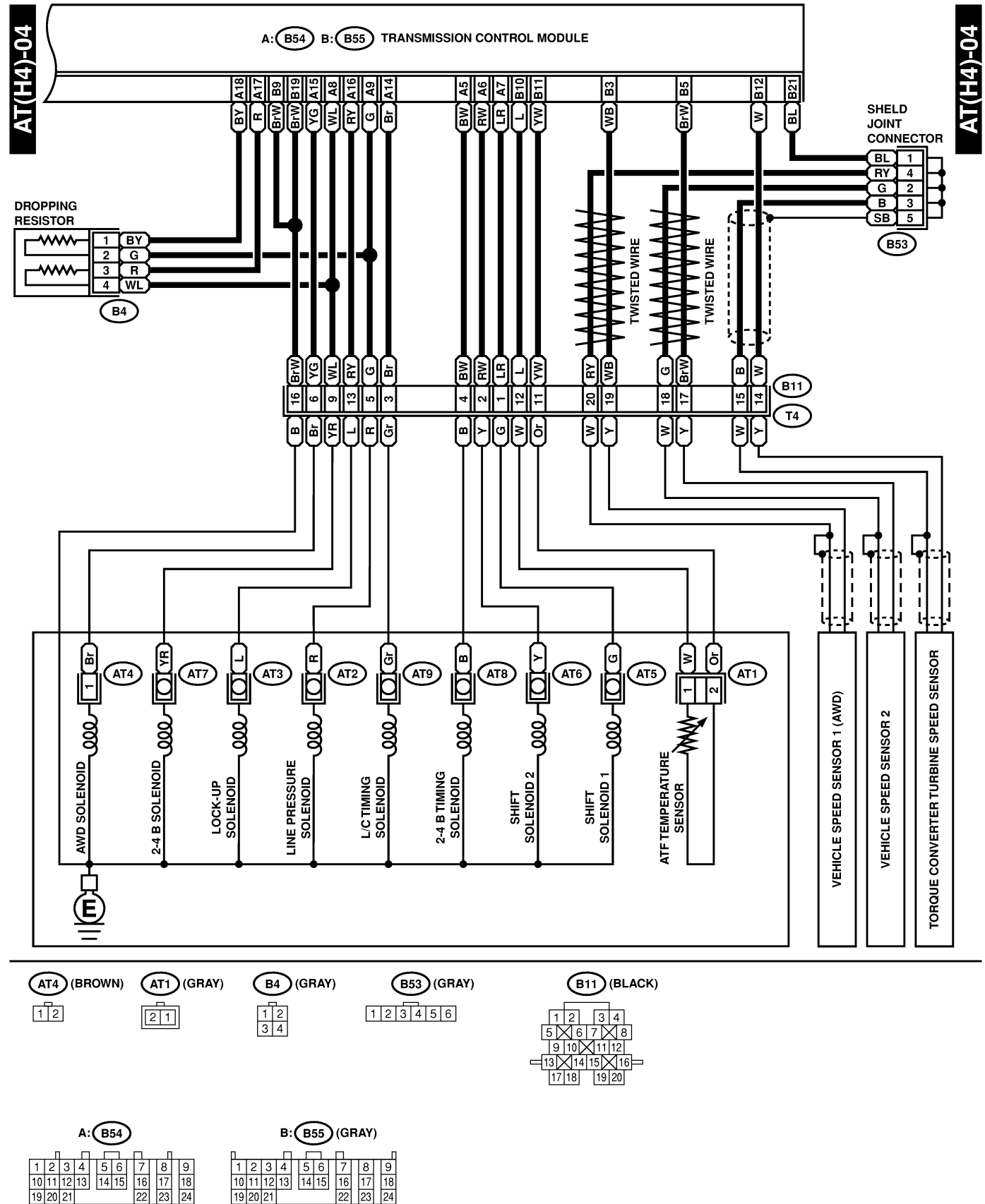
A/T CONTROL SYSTEM

Wiring System



A/T CONTROL SYSTEM

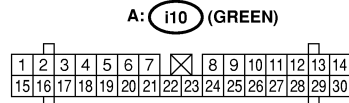
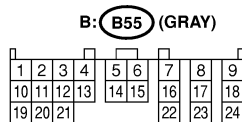
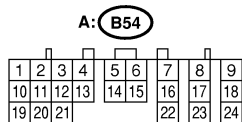
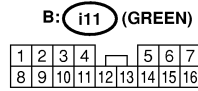
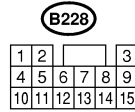
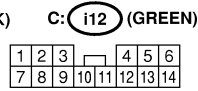
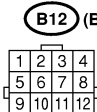
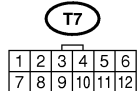
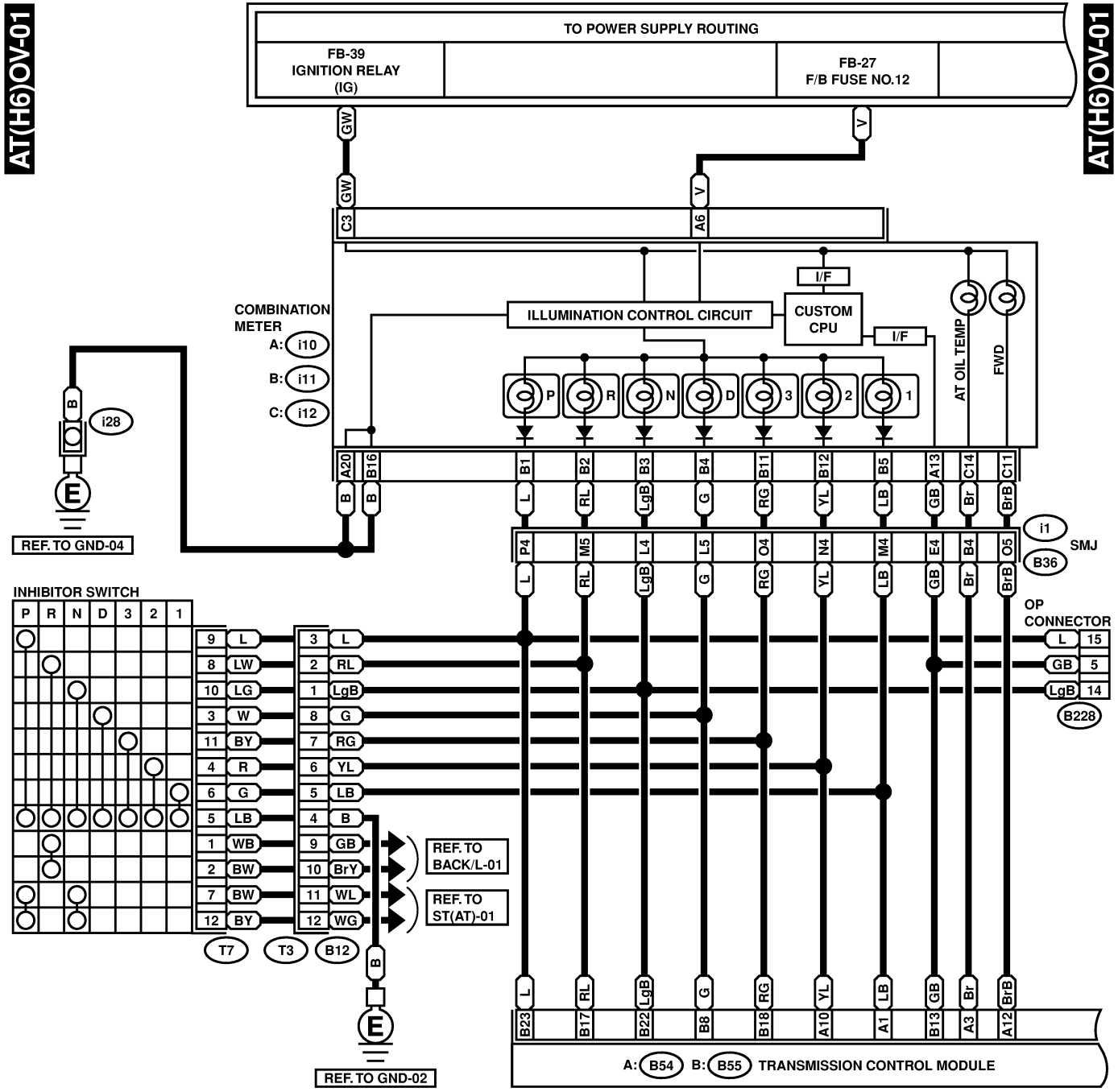
Wiring System



2. 6-CYLINDER ENGINE WITHOUT VDC MODEL S903485A2104

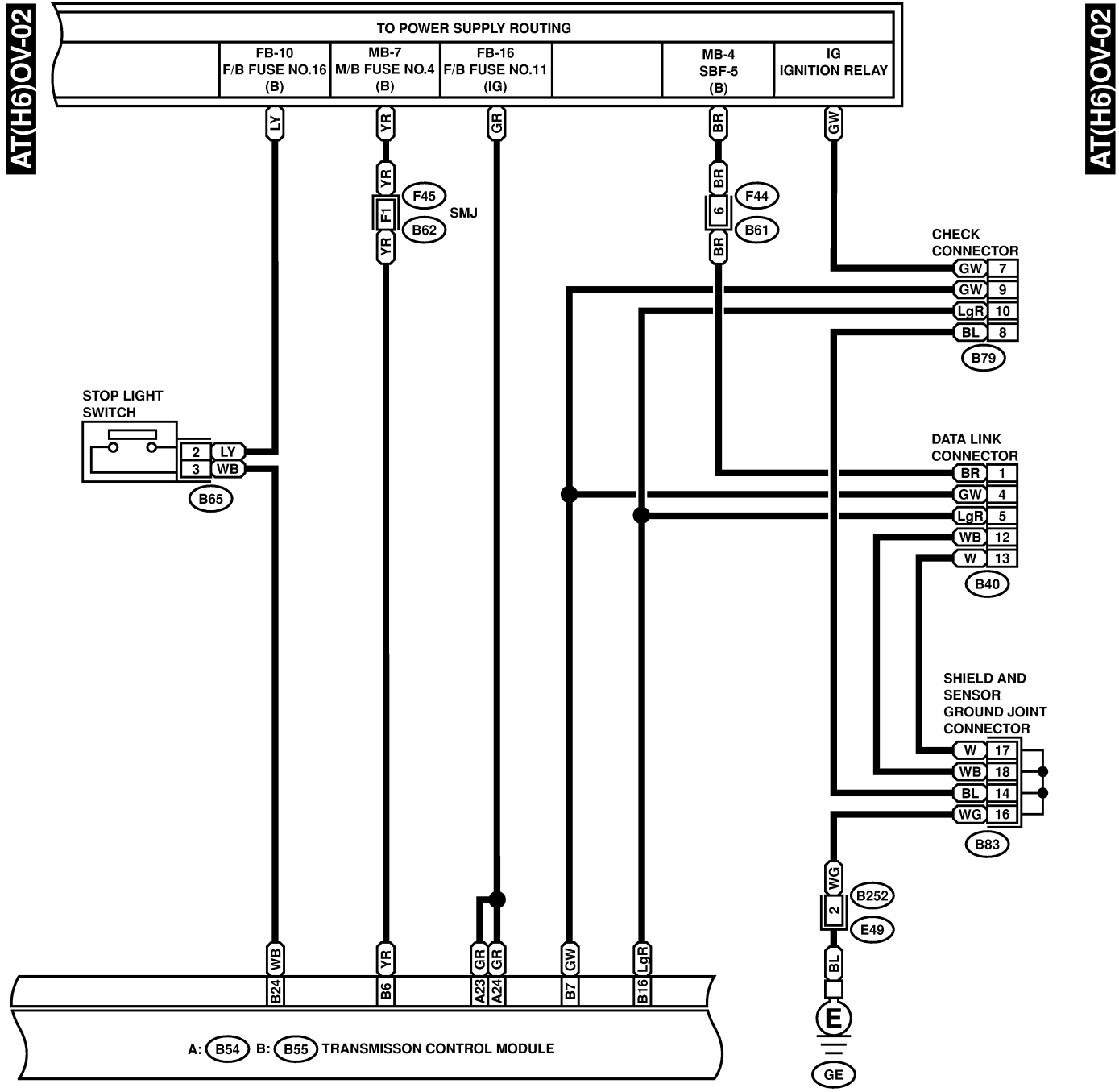
AT(H6)OV-01

AT(H6)OV-01



A/T CONTROL SYSTEM

Wiring System



B65 (BLACK)



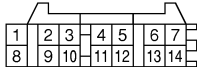
B252 (DARK GRAY)



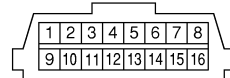
F44



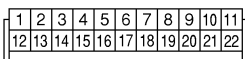
B79 (GRAY)



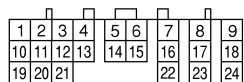
B40 (GRAY)



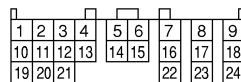
B83



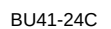
A: B54



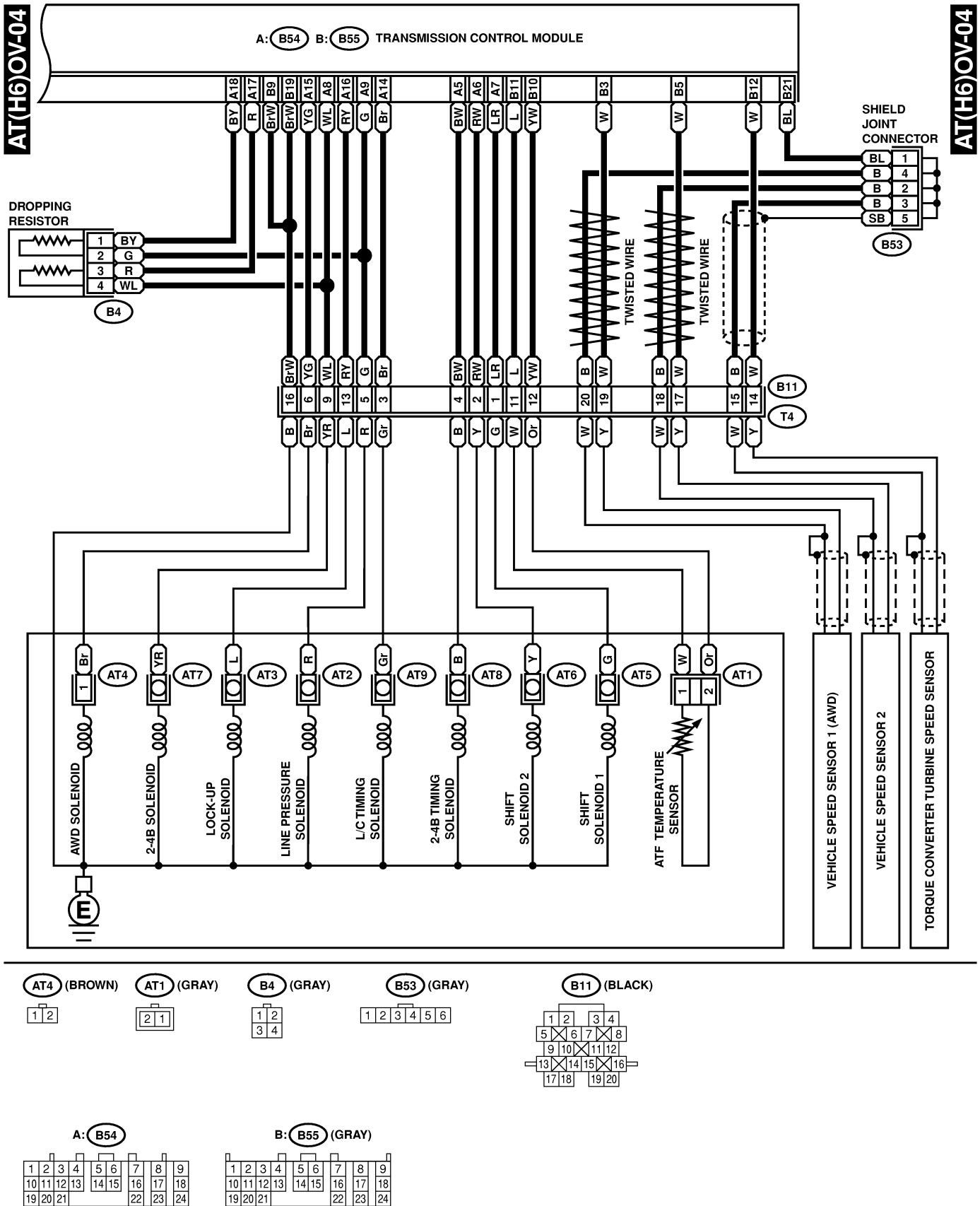
B: B55 (GRAY)



Wiring System



Wiring System

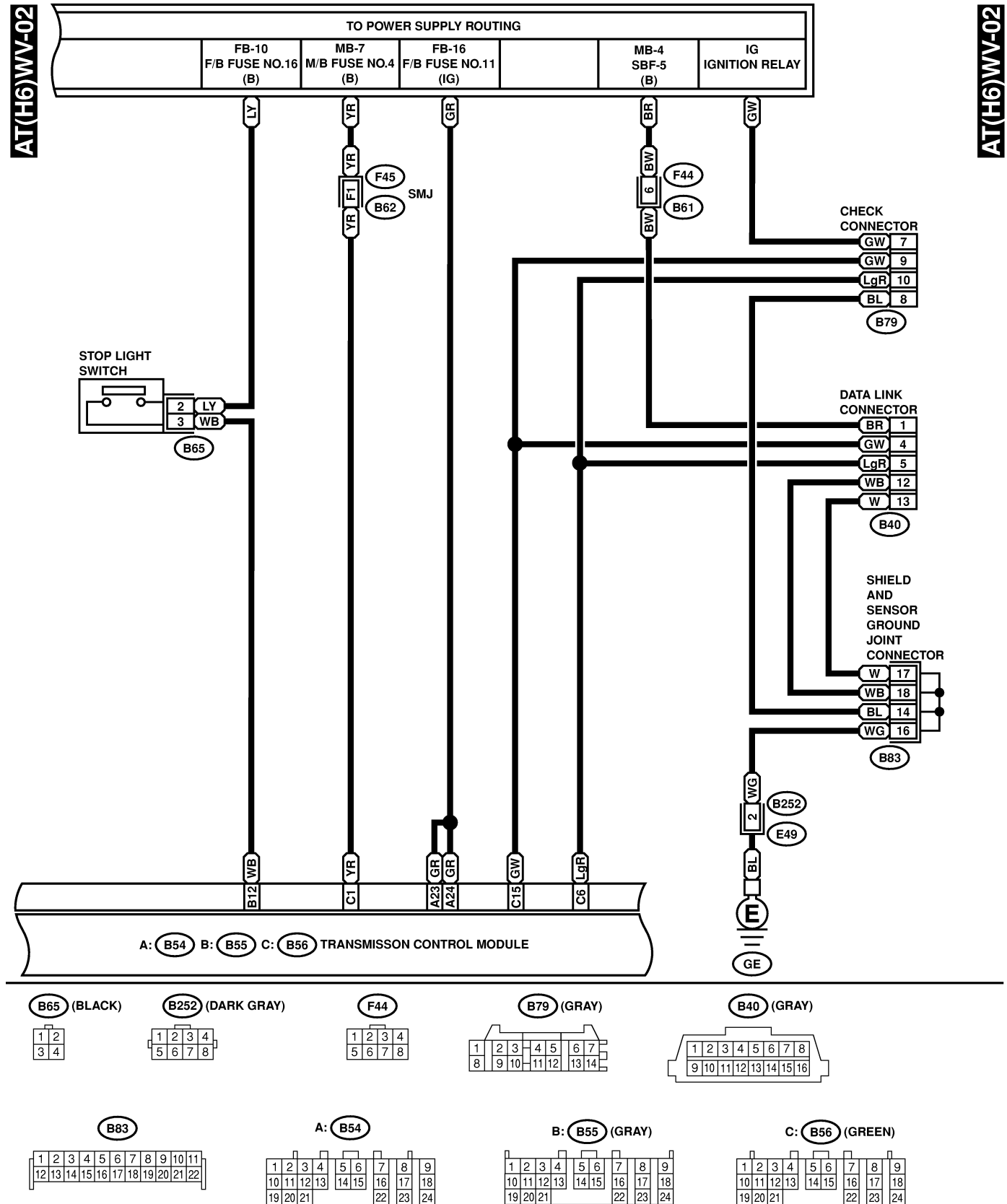


AT(H6)WV-01



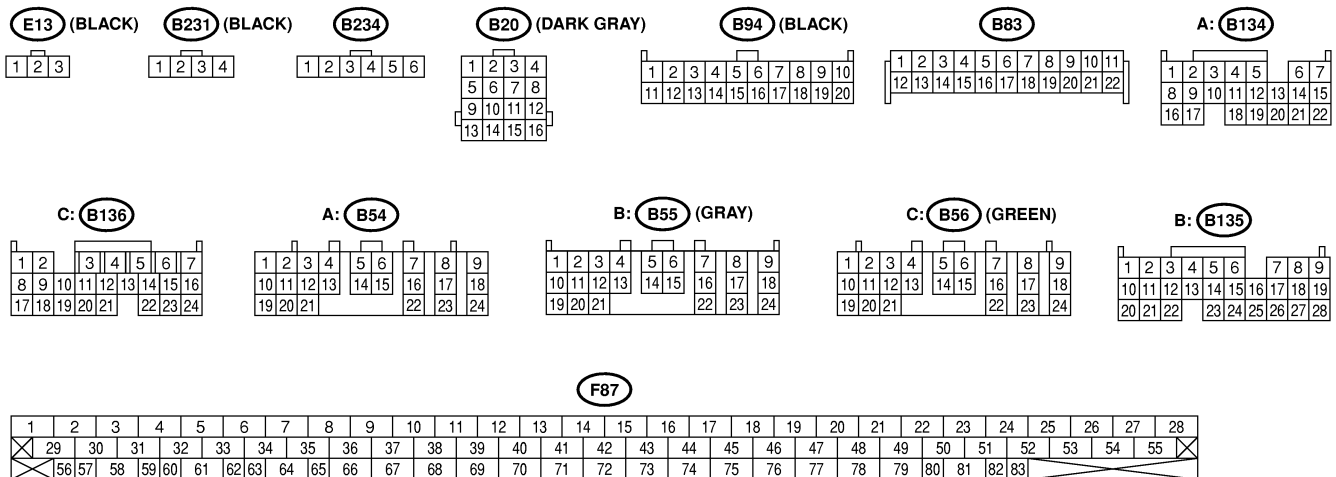
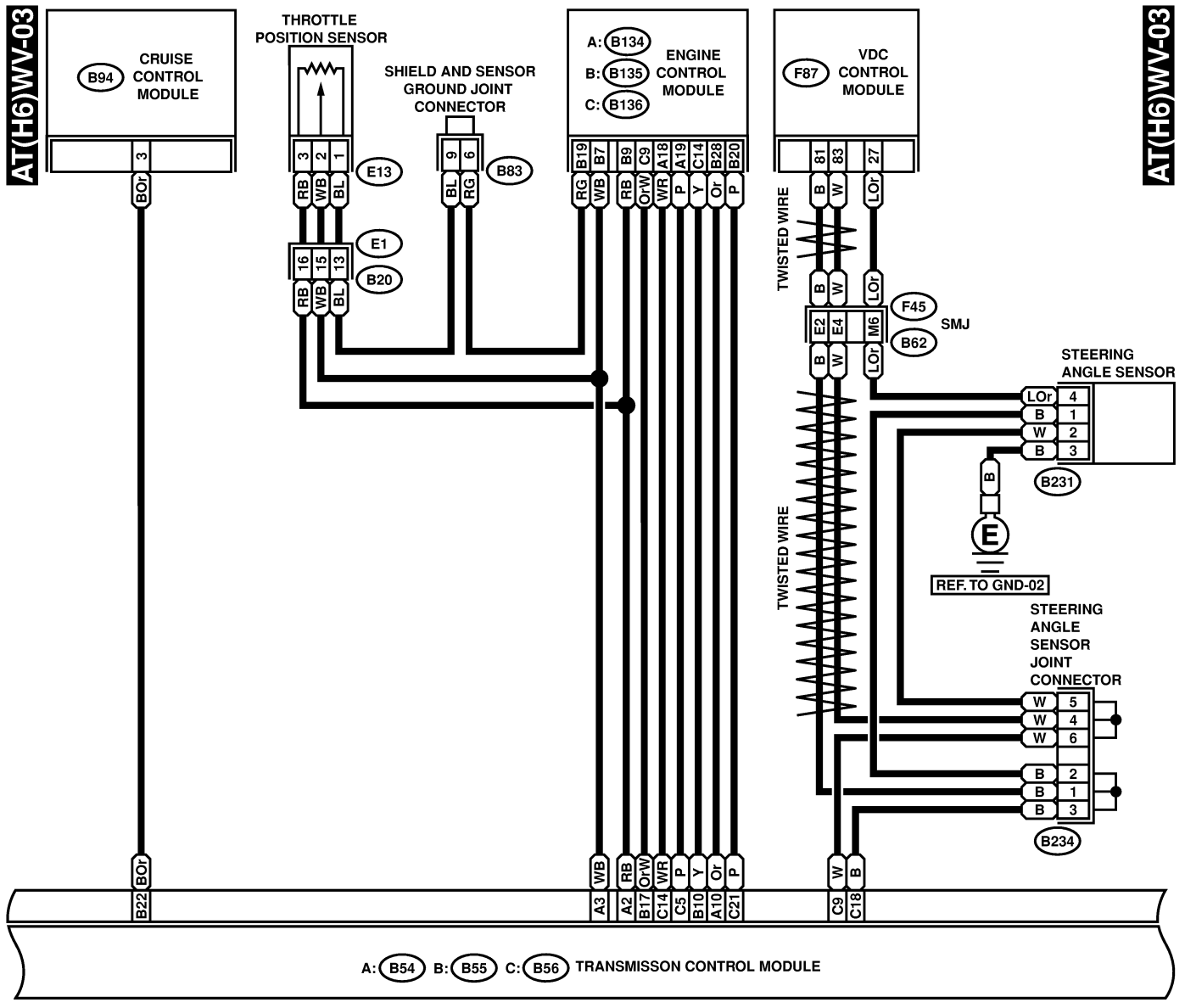
A/T CONTROL SYSTEM

Wiring System



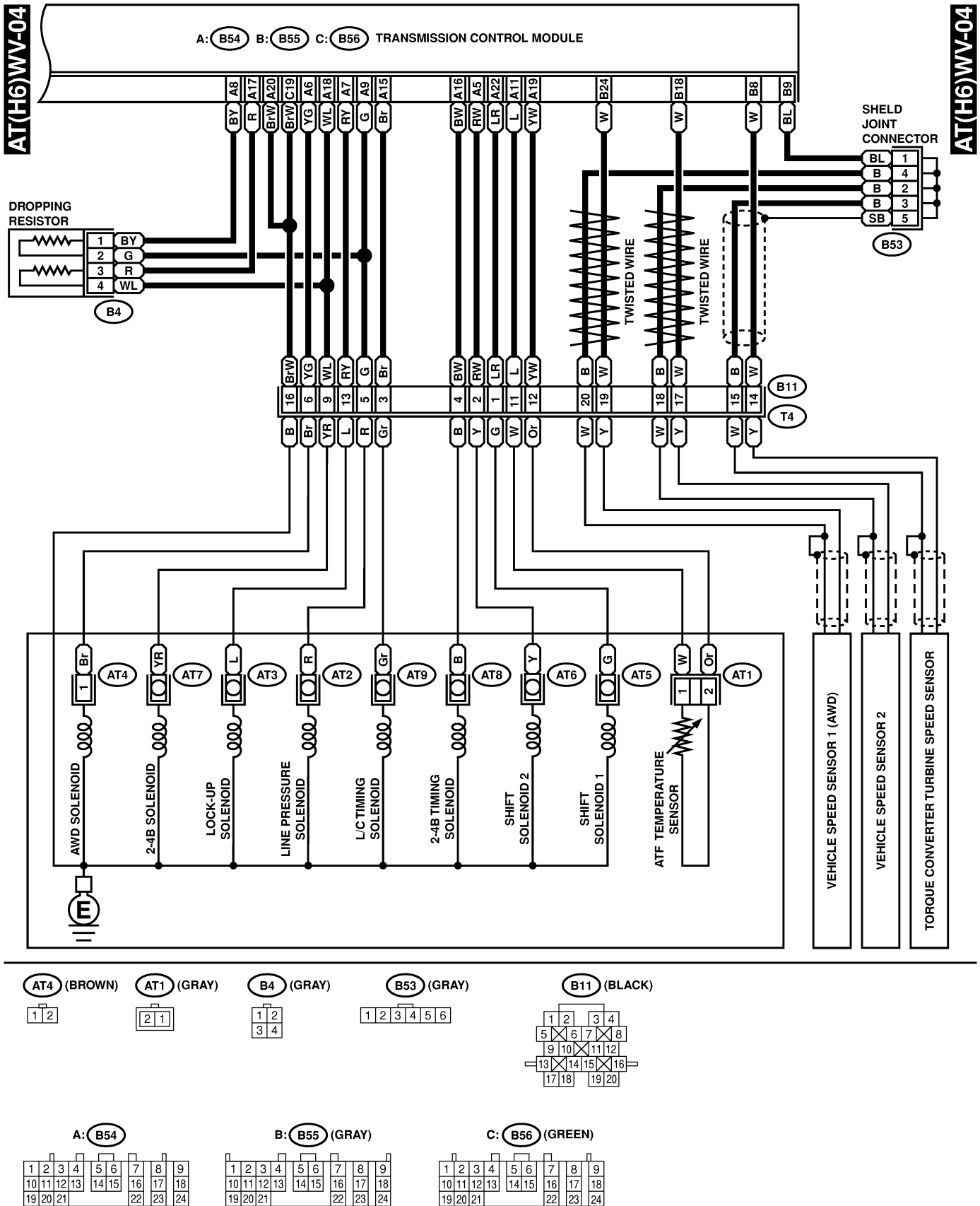
BU41-25B

Wiring System



A/T CONTROL SYSTEM

Wiring System

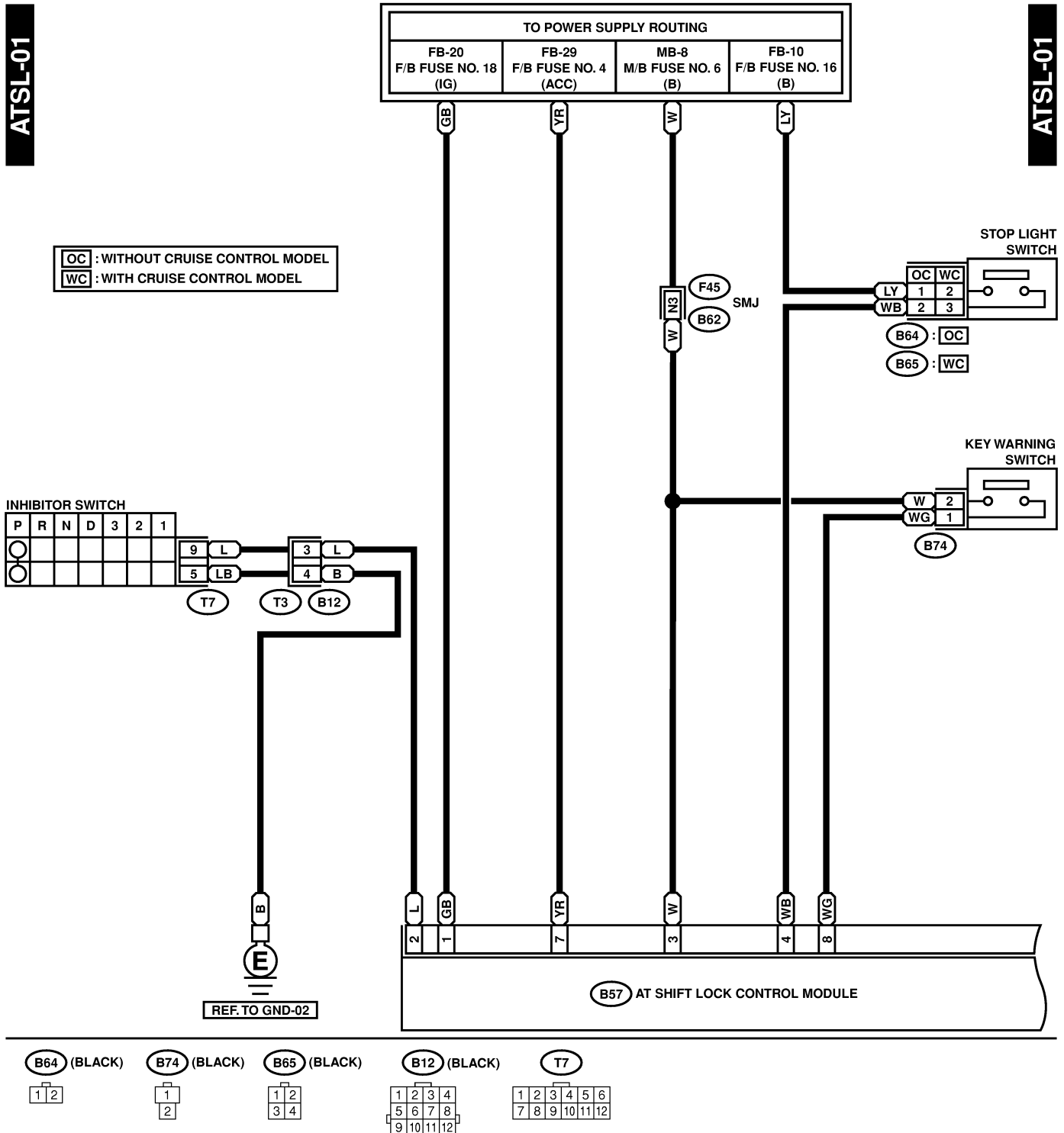


10. A/T Shift Lock Control System

S903662

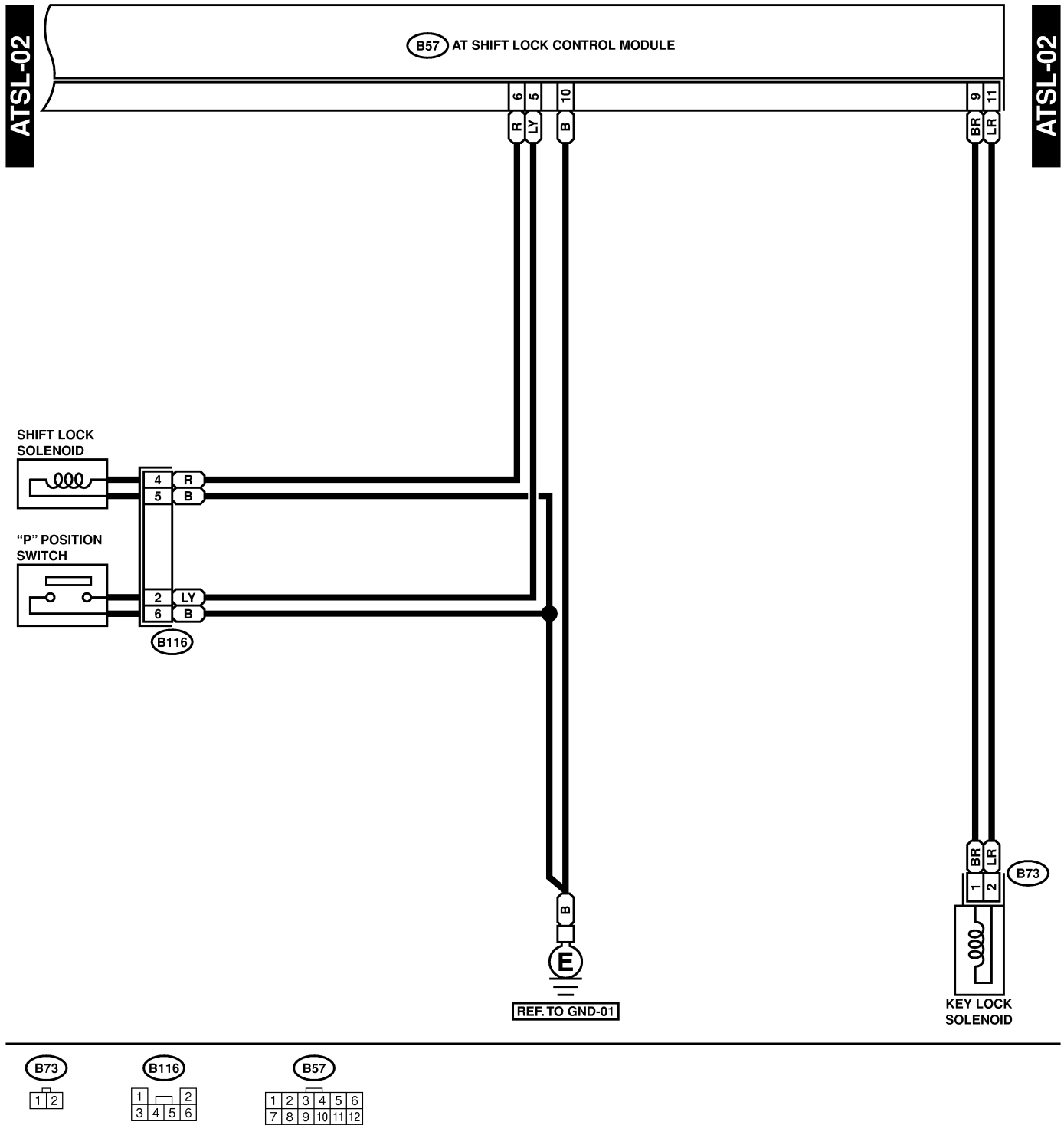
A: SCHEMATIC

S903662A21



A/T SHIFT LOCK CONTROL SYSTEM

Wiring System



11. Audio System S903486

A: SCHEMATIC S903486A21

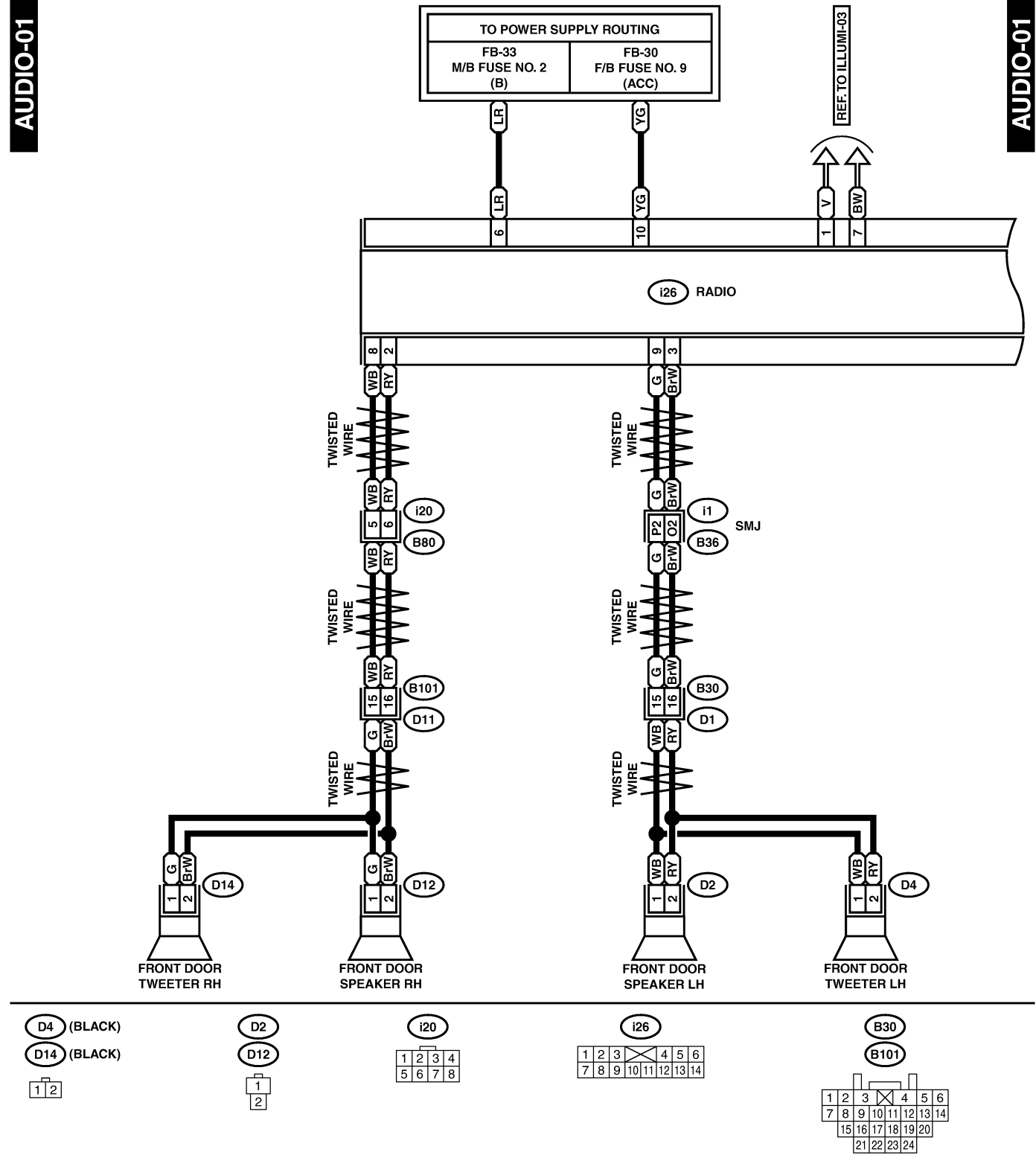
AUDIO SYSTEM

Wiring System

1. EXCEPT MCINTOSH AUDIO MODEL S903486A2103

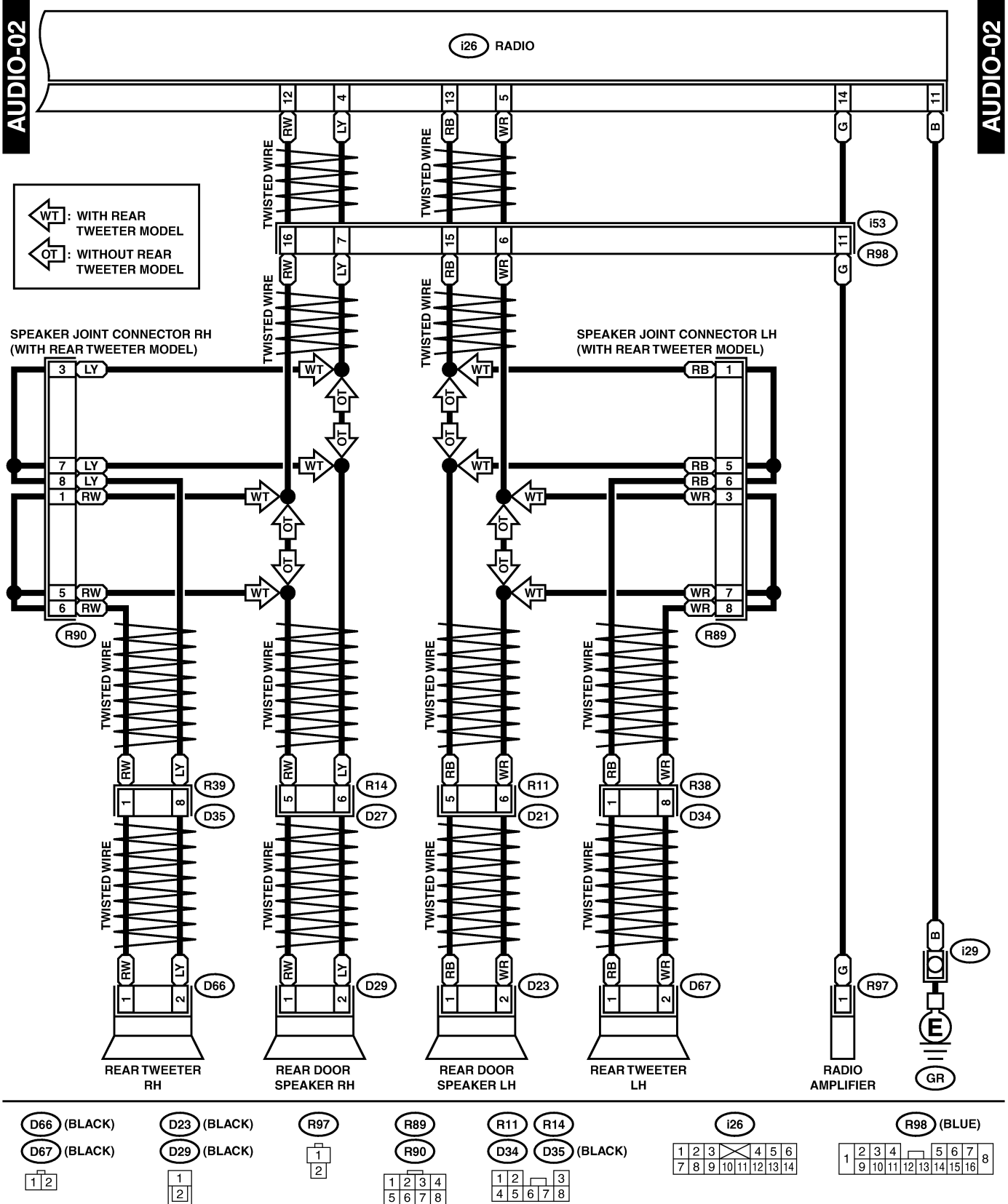
AUDIO-01

AUDIO-01



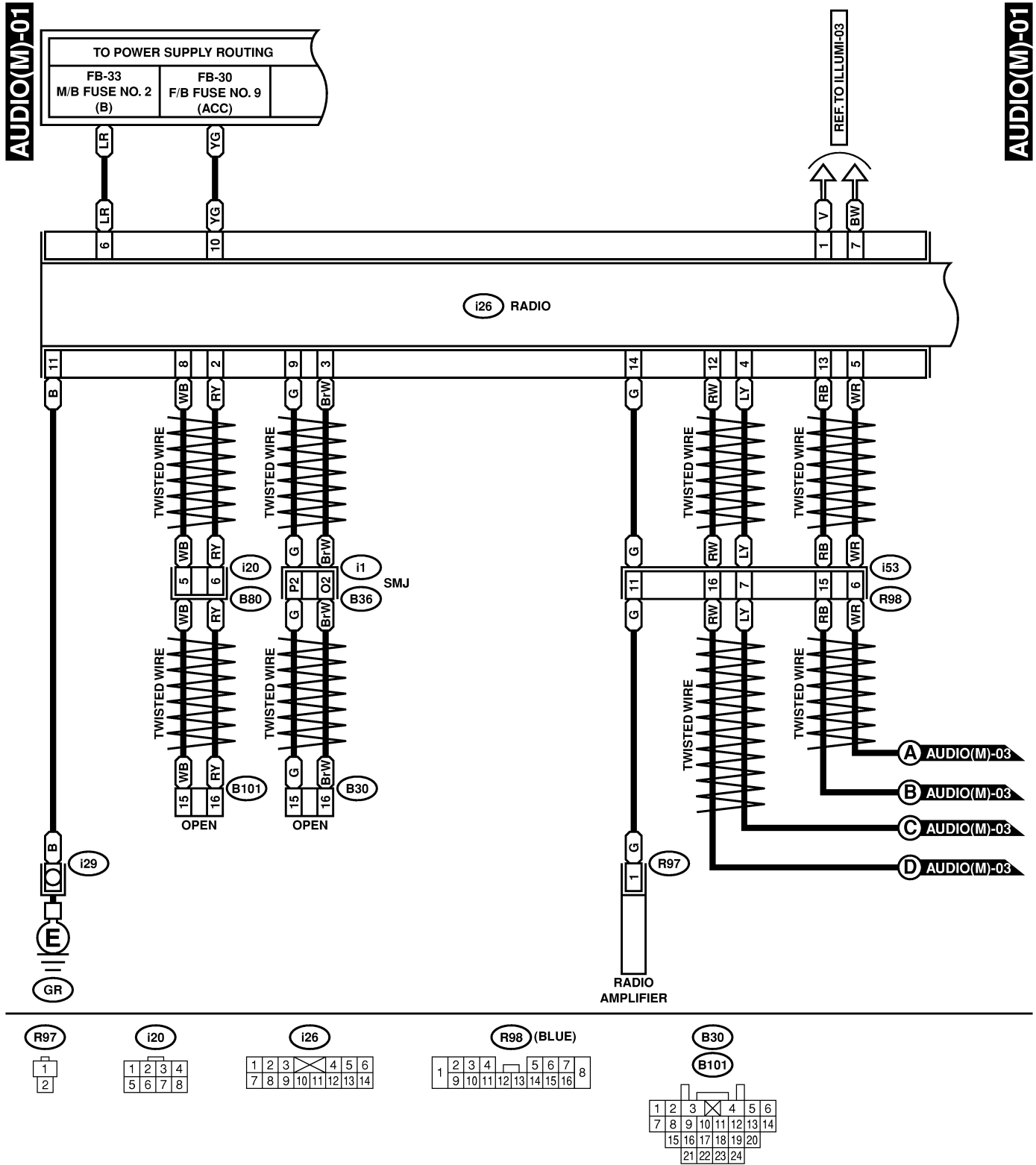
AUDIO SYSTEM

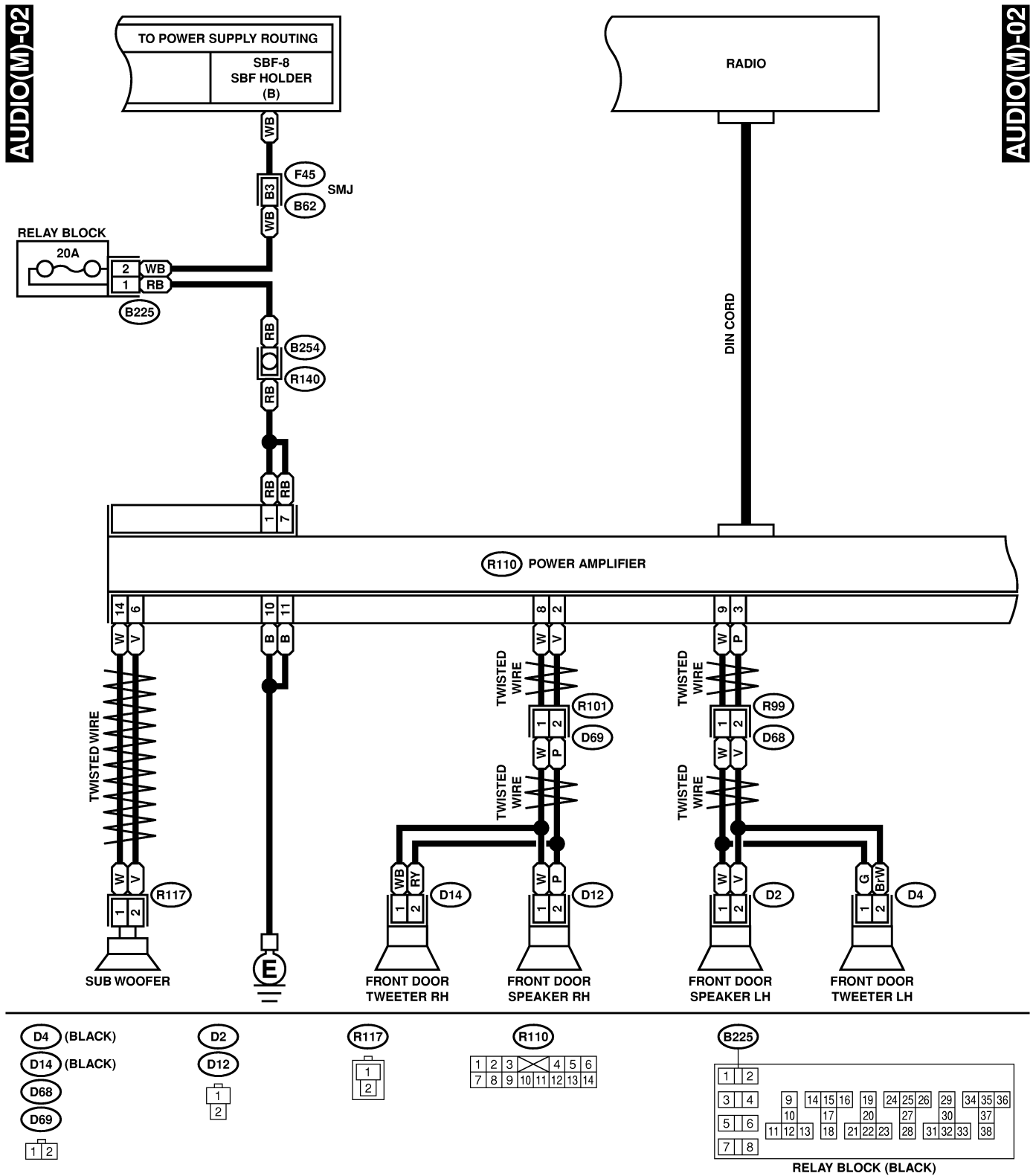
Wiring System



Wiring System

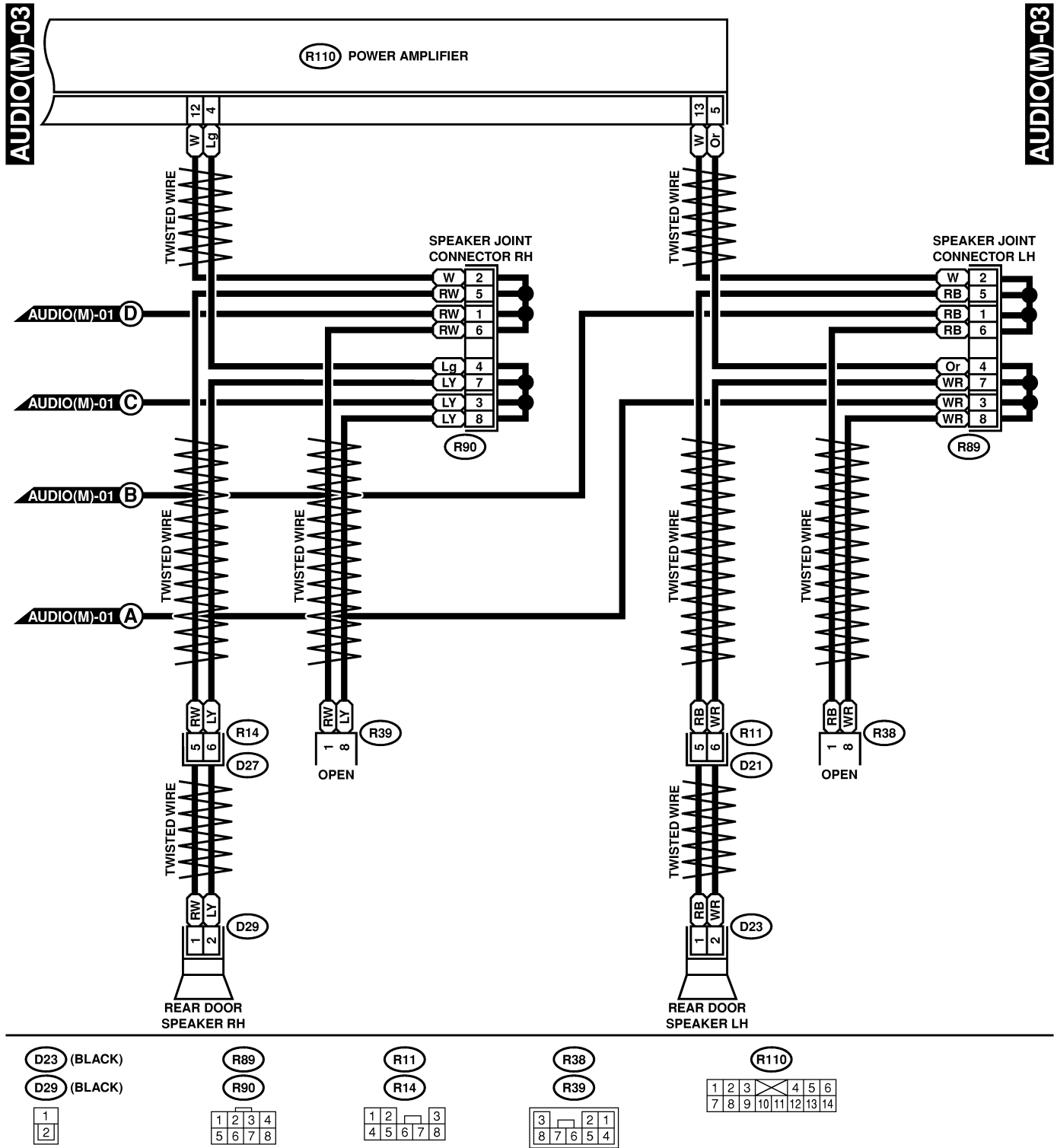
2. MCINTOSH AUDIO MODEL S903486A2104





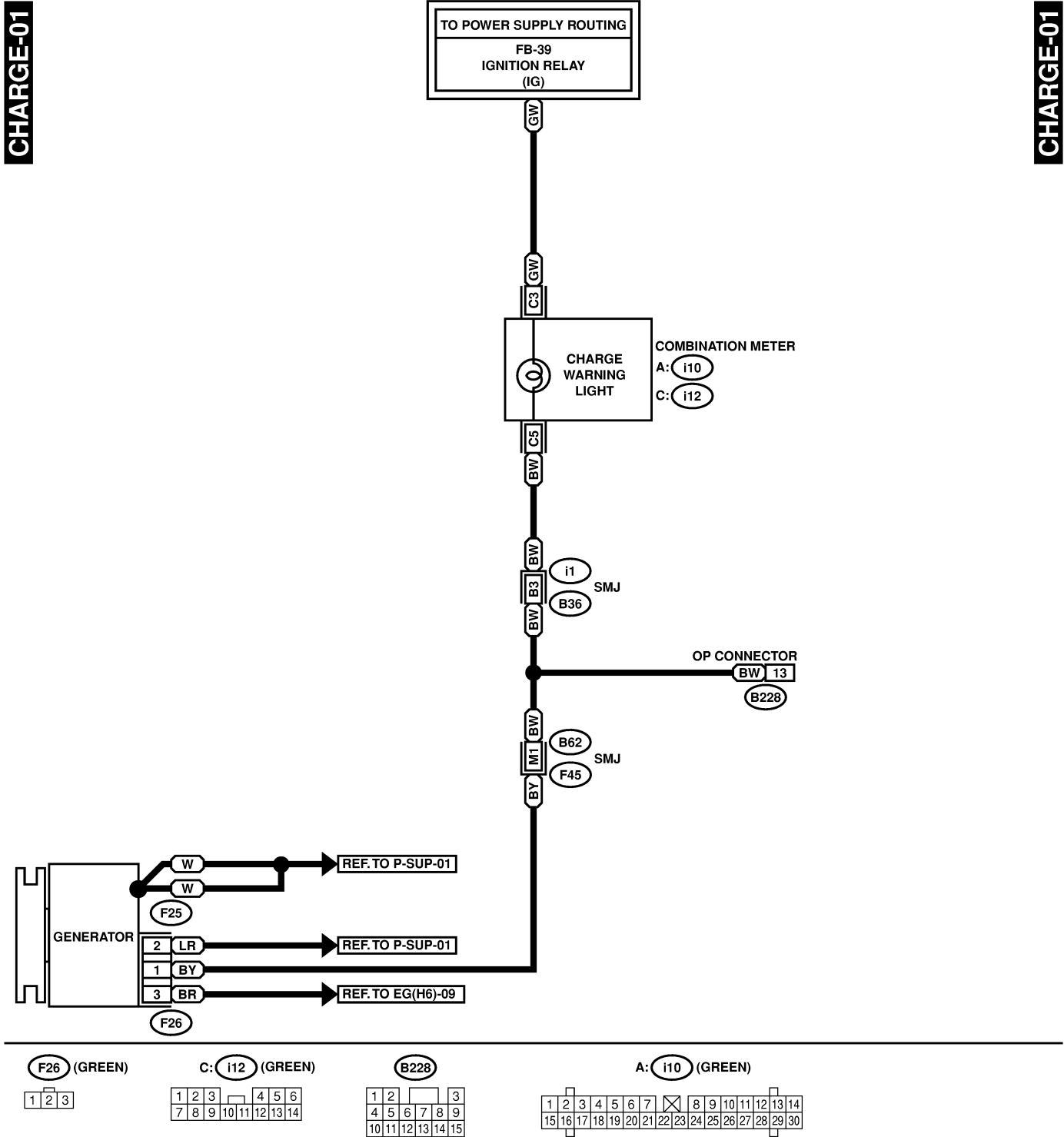
AUDIO SYSTEM

Wiring System



12. Charging System S903487

A: SCHEMATIC S903487A21

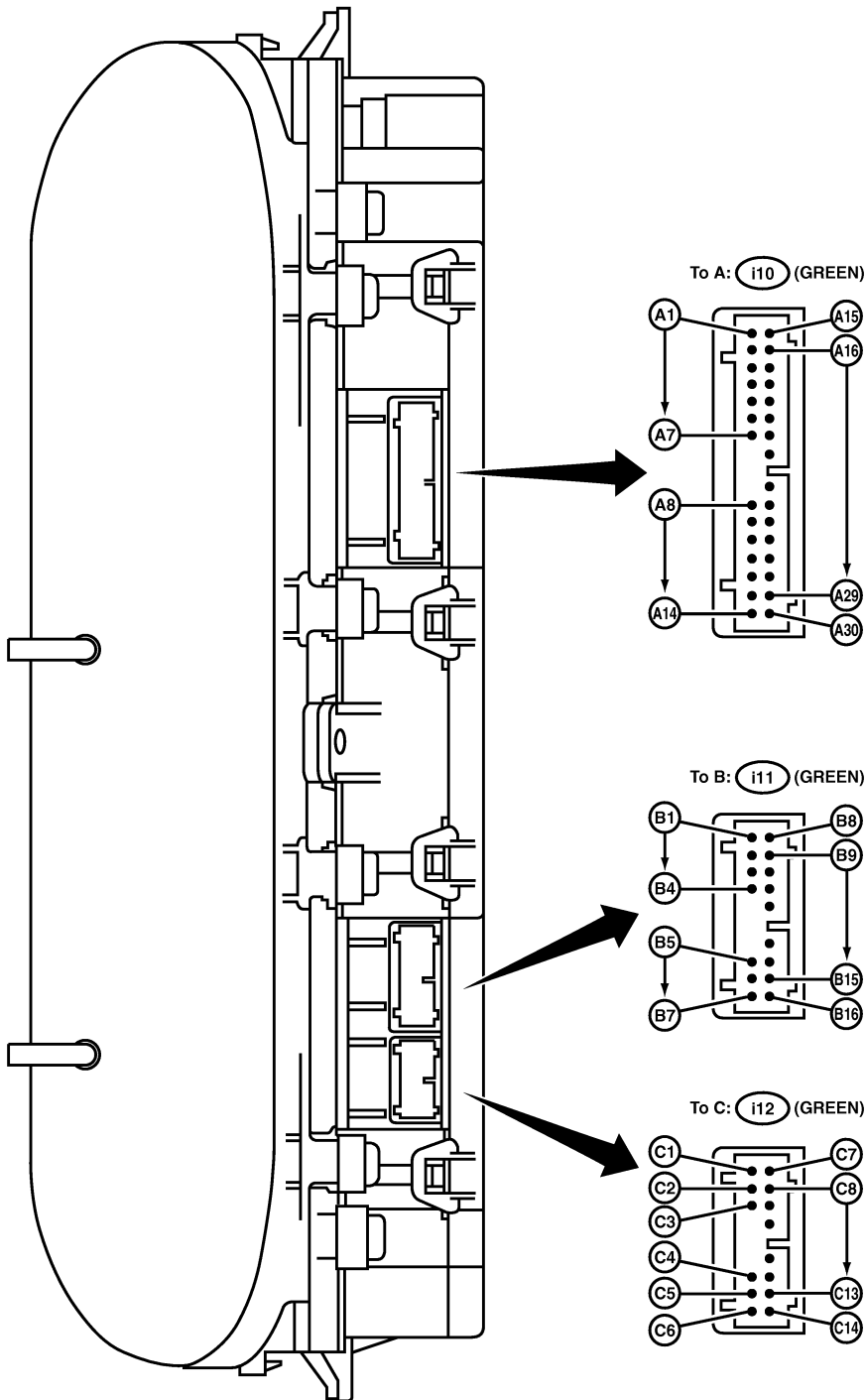


13. Combination Meter

A: SCHEMATIC

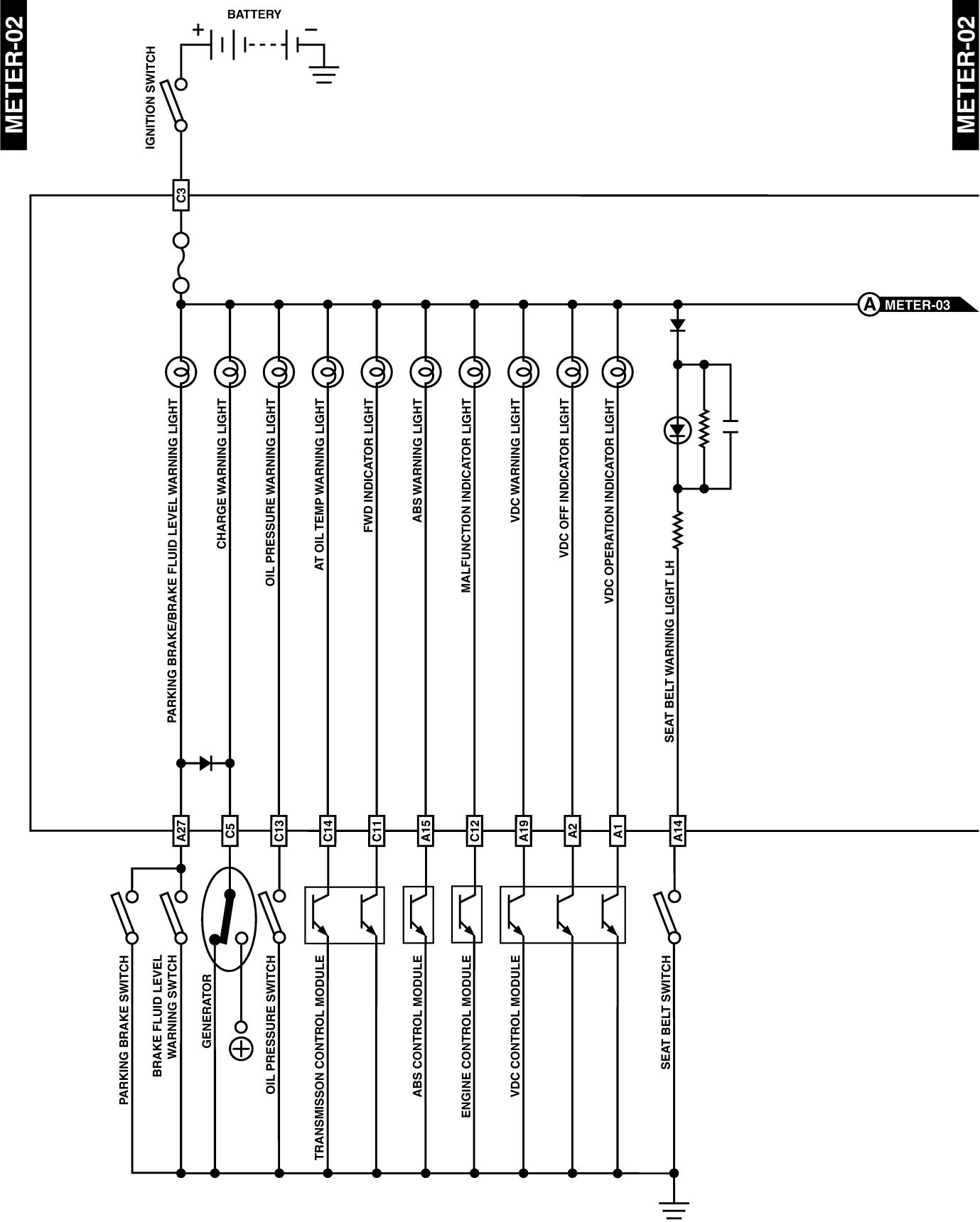
METER-01

METER-01



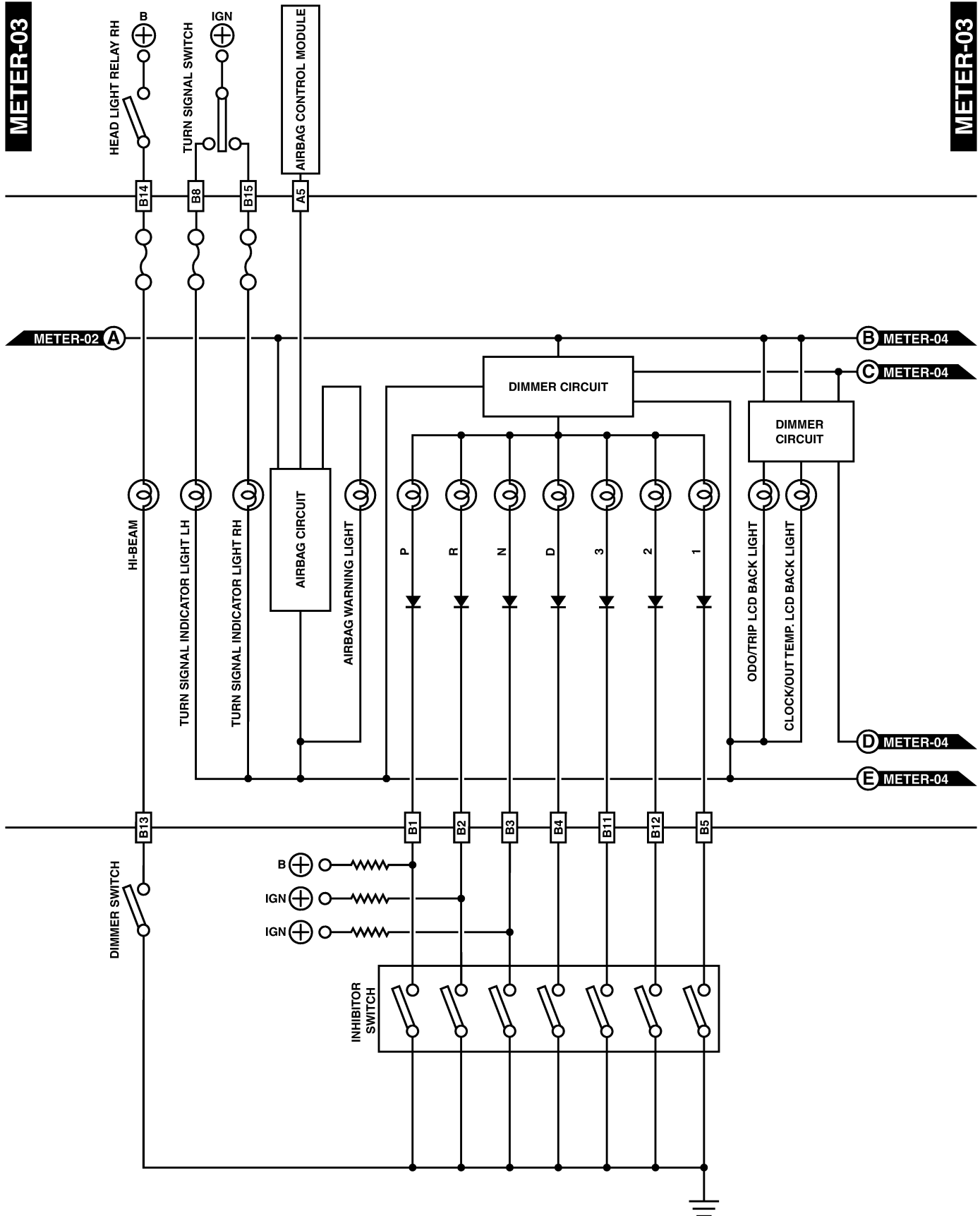
COMBINATION METER

Wiring System



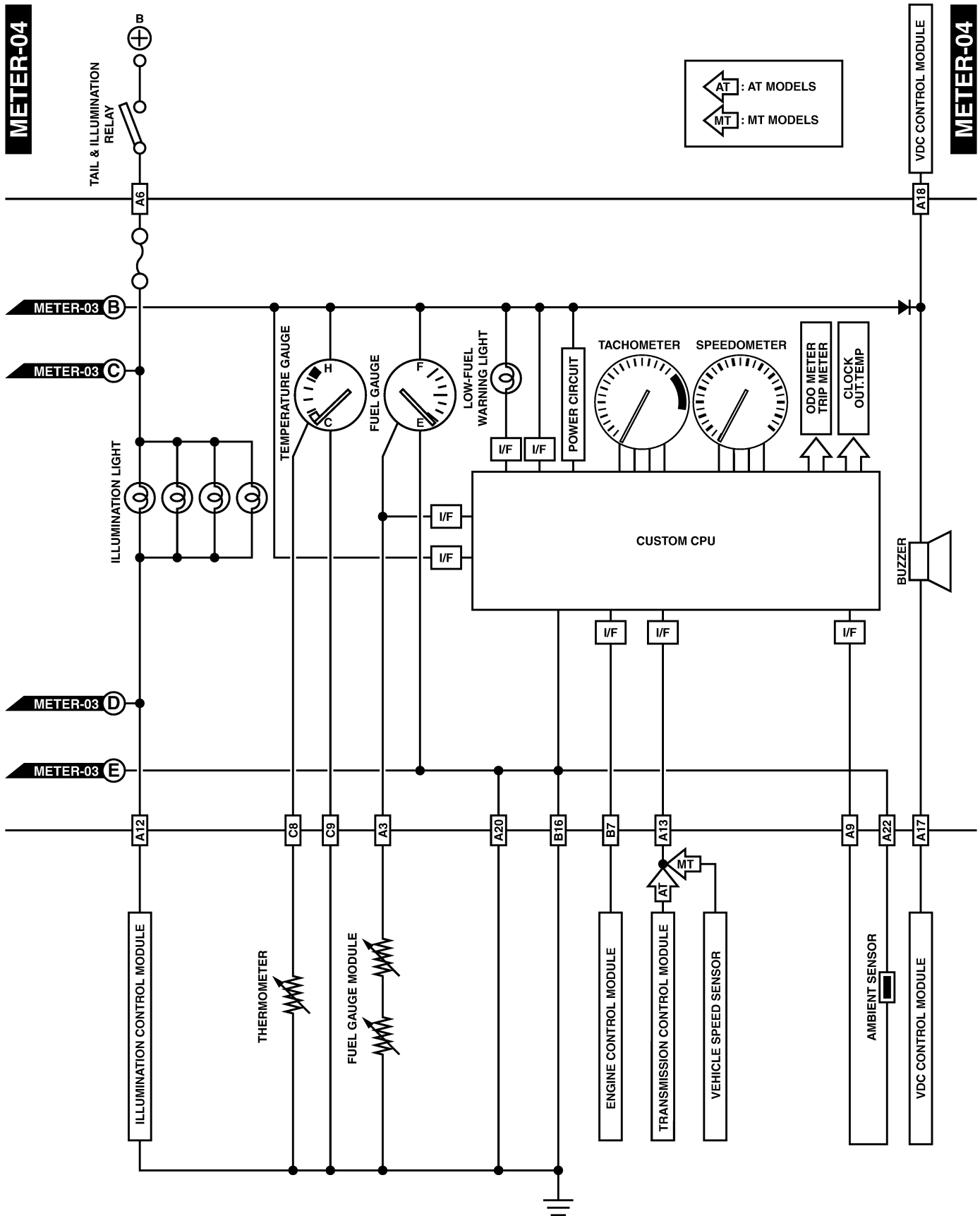
COMBINATION METER

Wiring System



COMBINATION METER

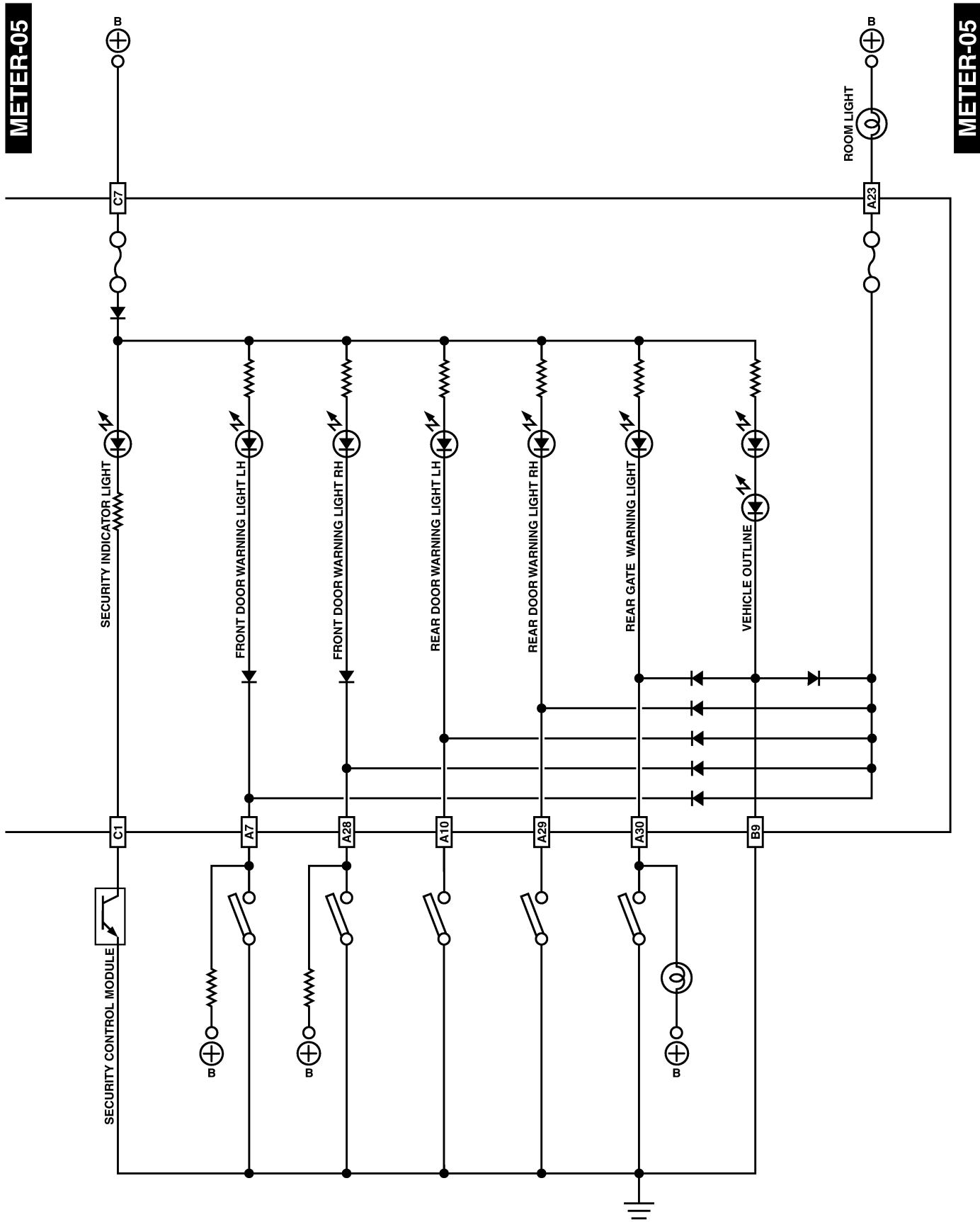
Wiring System



BU64-21D

COMBINATION METER

Wiring System



14. Cruise Control System S903495

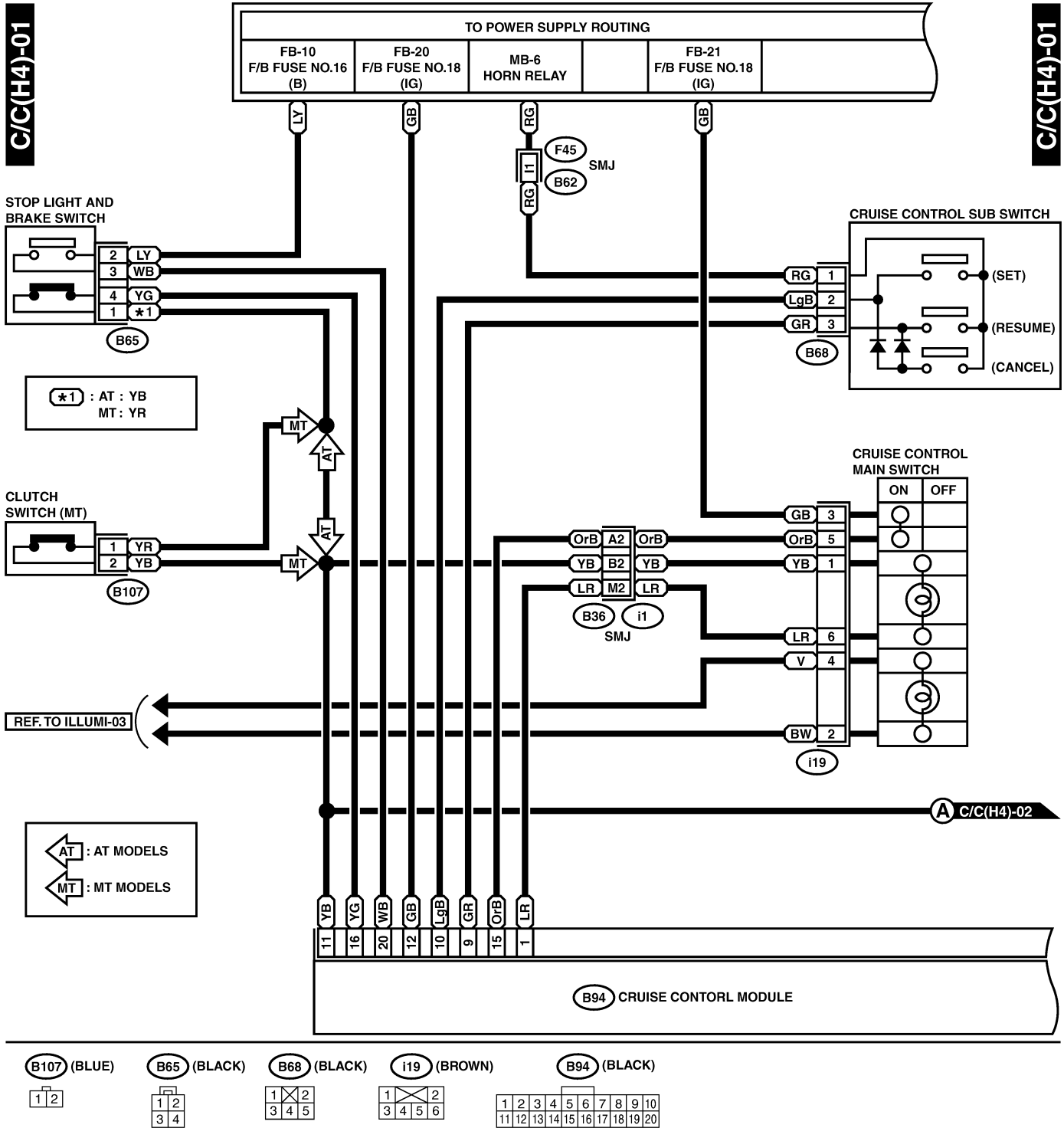
A: SCHEMATIC S903495A21

CRUISE CONTROL SYSTEM

Wiring System

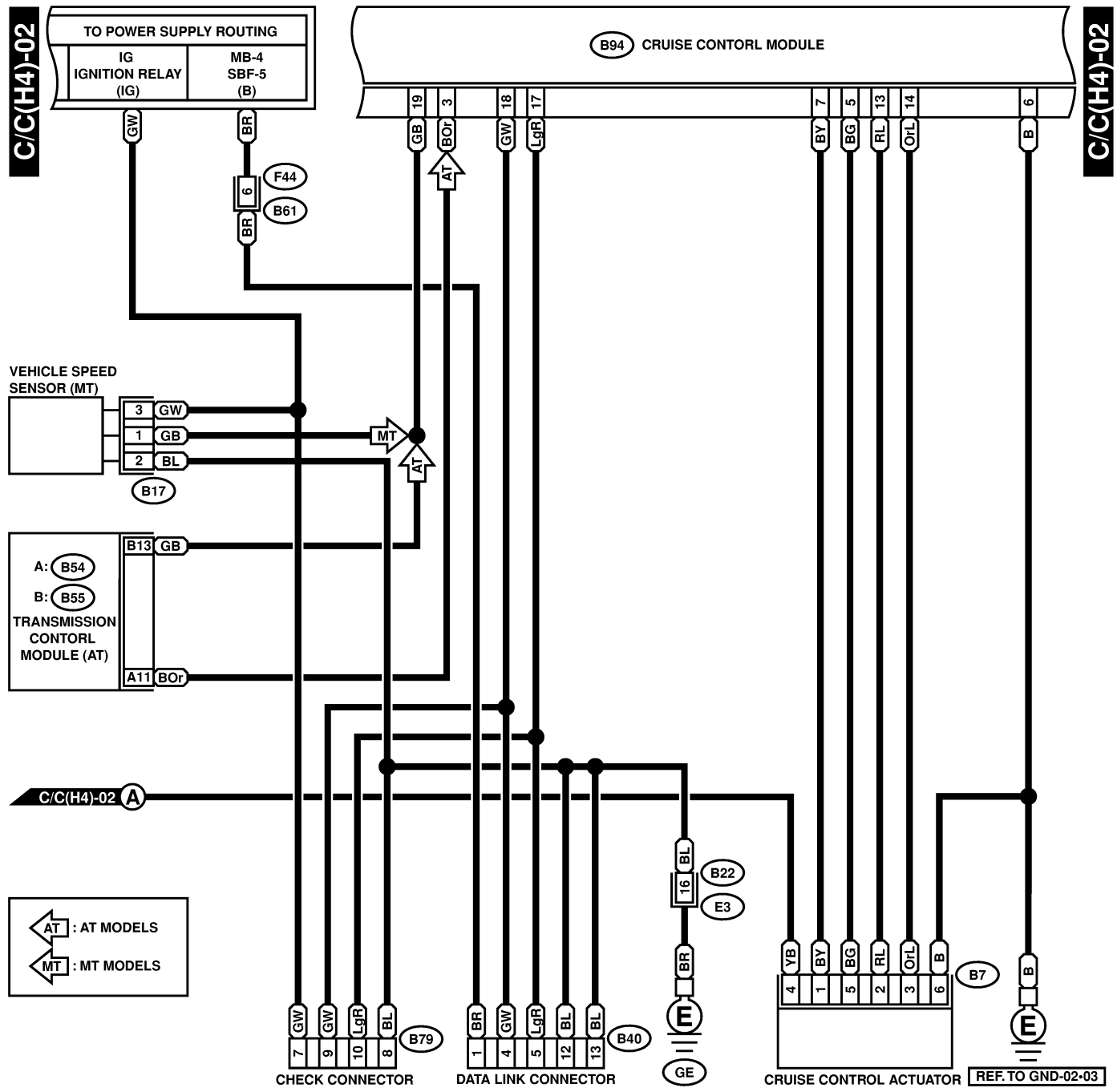
1. 4-CYLINDER ENGINE MODEL

S903495A2103



CRUISE CONTROL SYSTEM

Wiring System



B17 (BLACK)

1	2	3
4	5	6

B7 (BLACK)

1	2	3
4	5	6

F44

1	2	3	4
5	6	7	8

B79 (GRAY)

1	2	3	4	5	6	7
8	9	10	11	12	13	14

B40 (GRAY)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

B22 (BROWN)

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

B94 (BLACK)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

A: B54

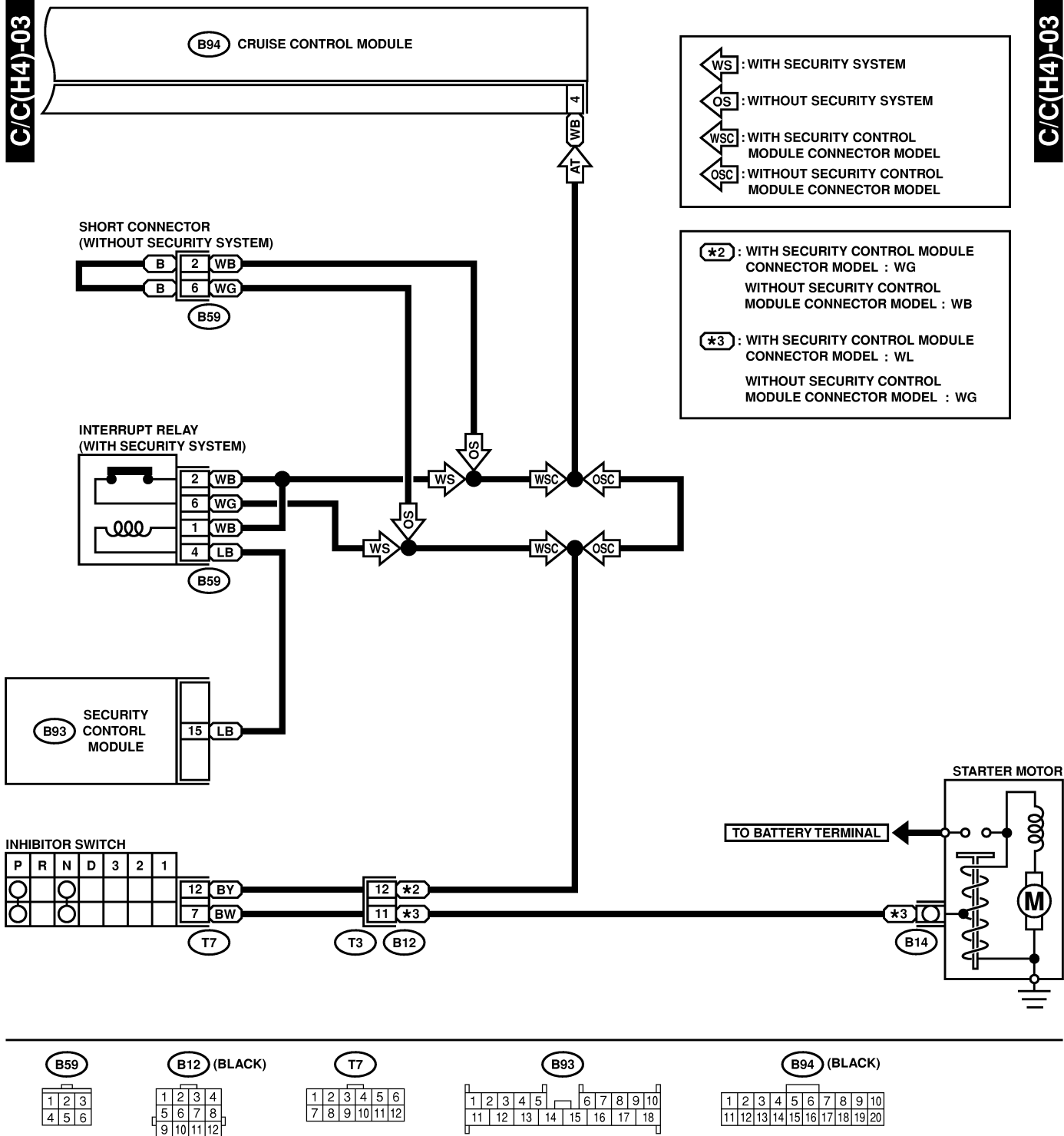
1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

B: B55 (GRAY)

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

CRUISE CONTROL SYSTEM

Wiring System

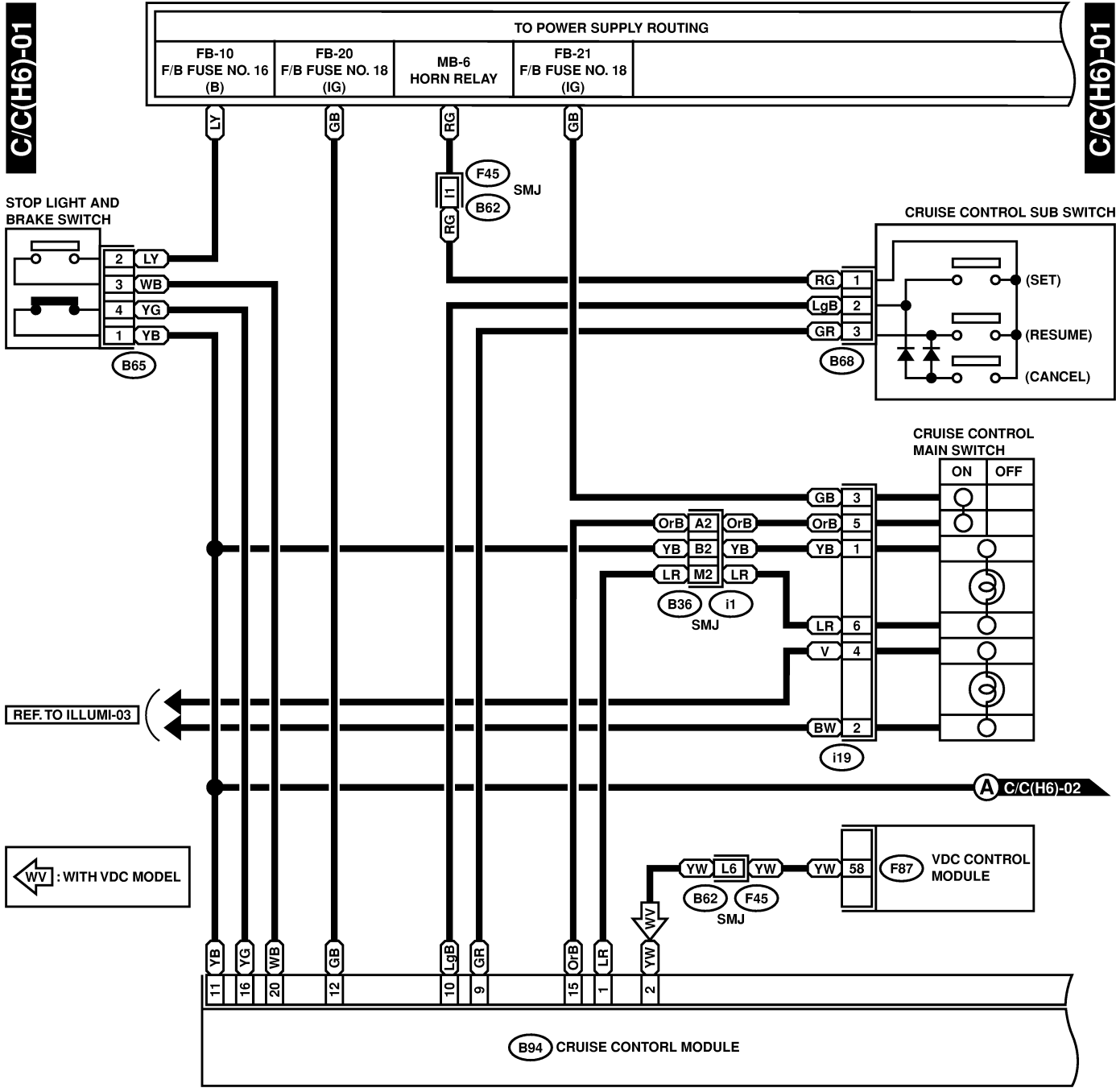


CRUISE CONTROL SYSTEM

Wiring System

2. 6-CYLINDER ENGINE MODEL

S903495A2104



(B65) (BLACK) (B68) (BLACK) (i19) (BROWN) (B94) (BLACK)

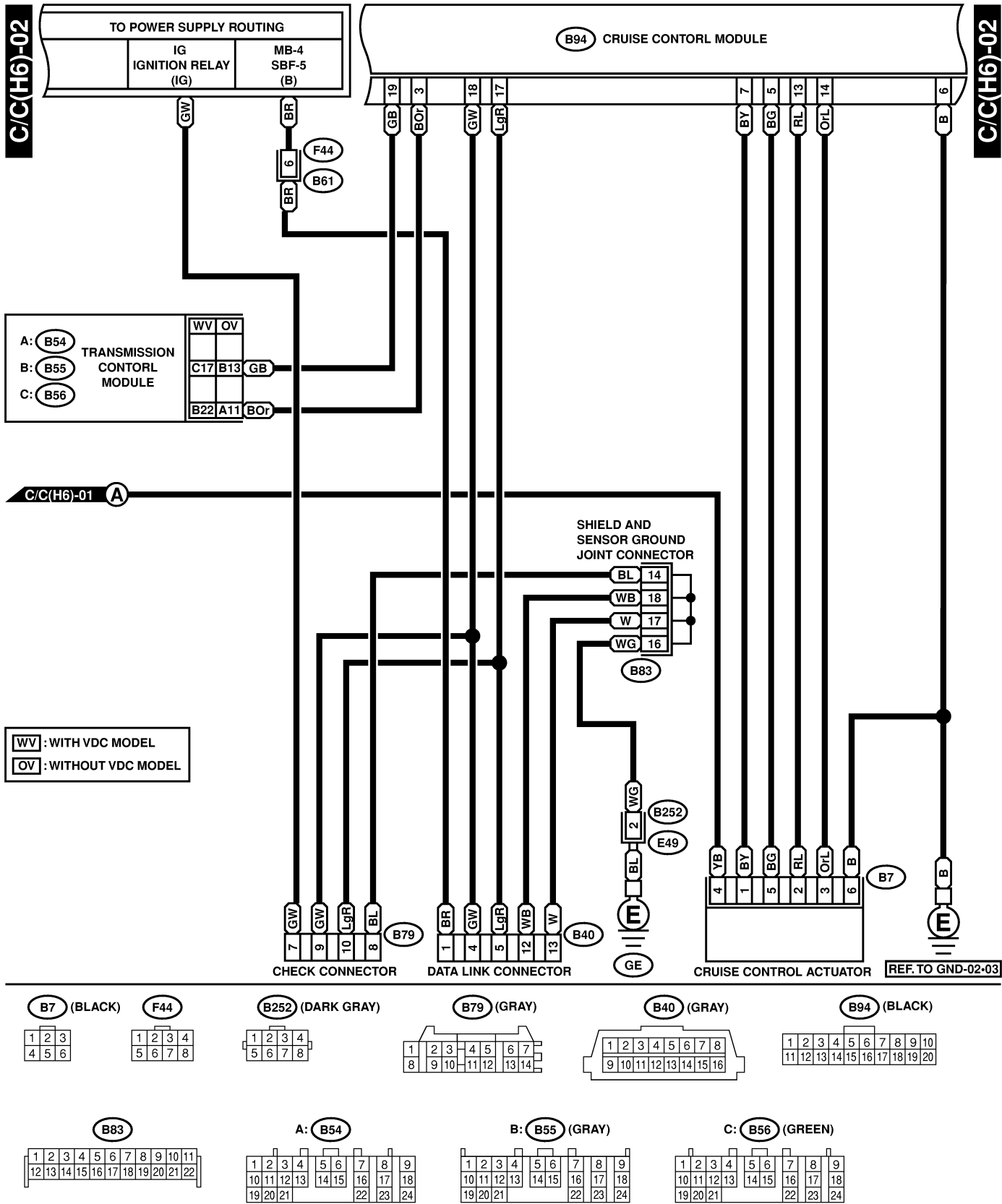
1	2	1	2	1	2	1	2	3	4	5	6	7	8	9	10
3	4	3	4	3	4	3	4	5	6	7	8	9	10	11	12

(F87) (BLACK)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56

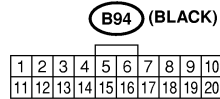
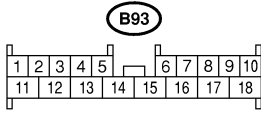
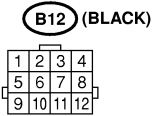
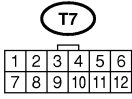
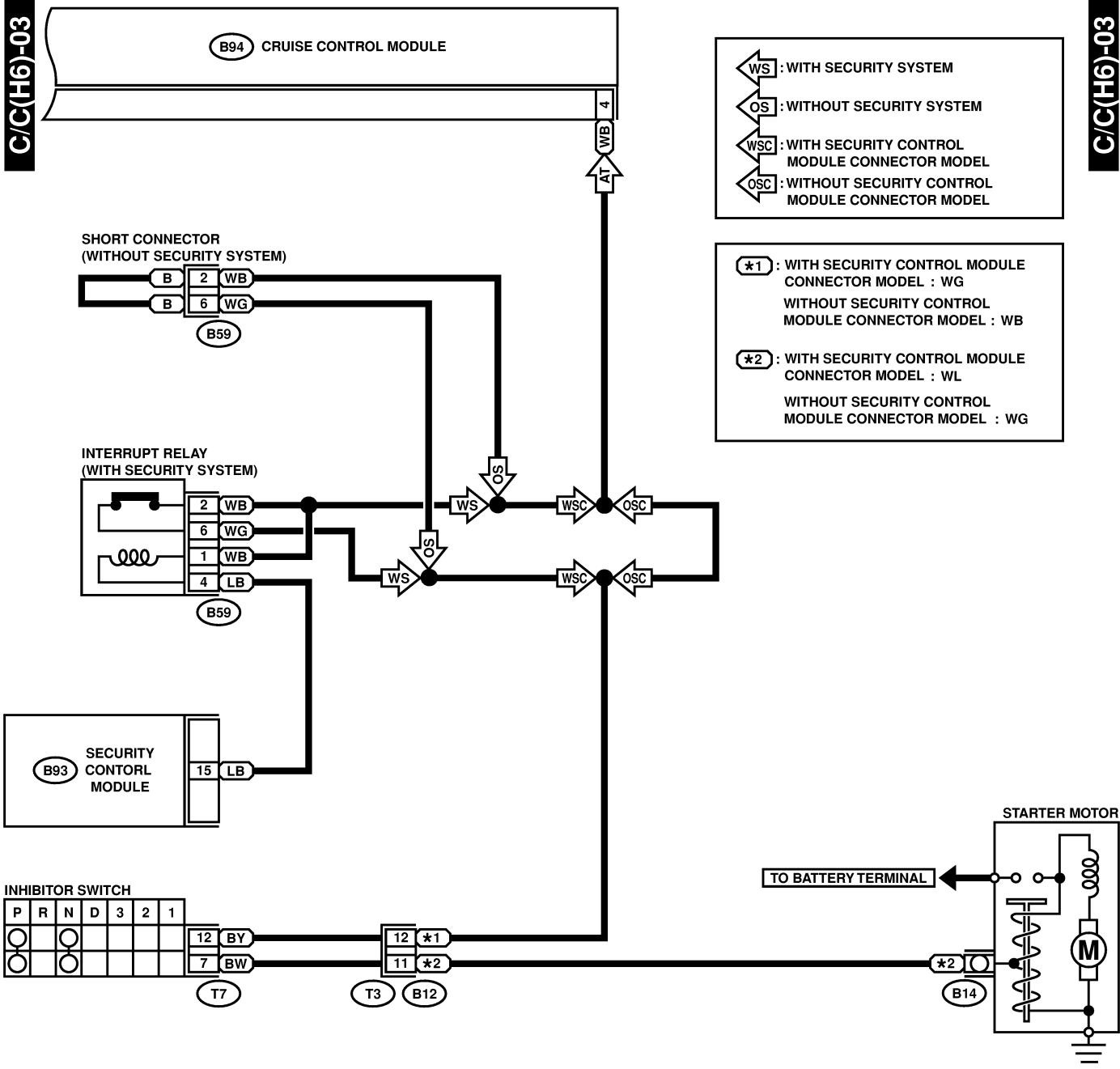
CRUISE CONTROL SYSTEM

Wiring System



CRUISE CONTROL SYSTEM

Wiring System



15. Door Lock System S903490

A: SCHEMATIC S903490A21

DOOR LOCK SYSTEM

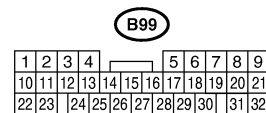
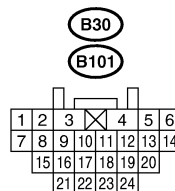
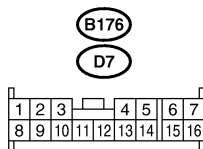
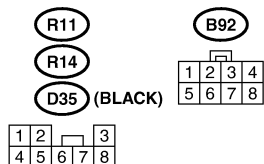
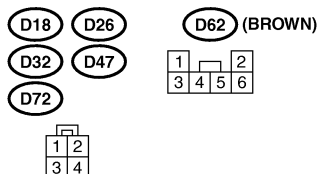
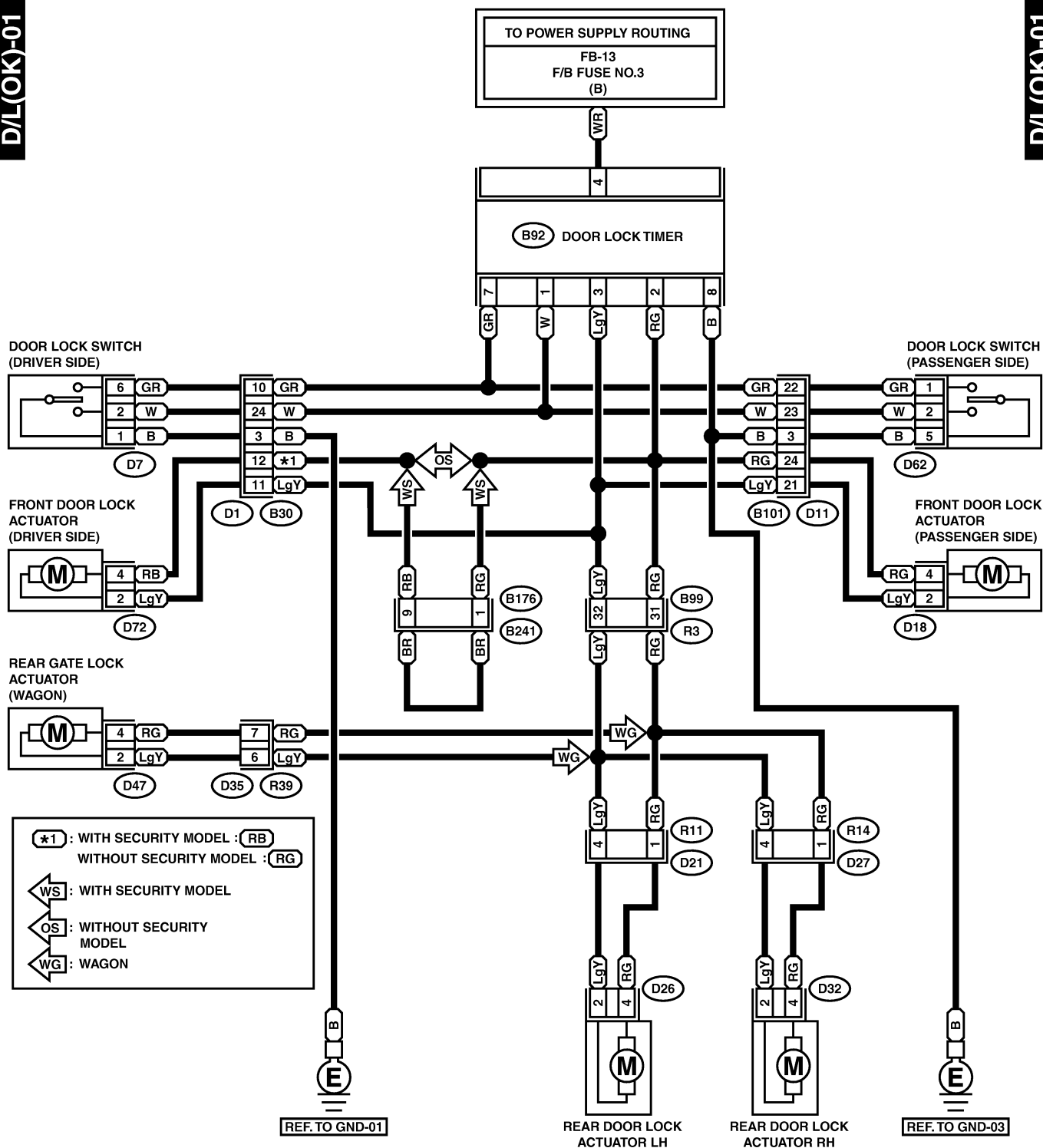
Wiring System

1. WITHOUT KEYLESS ENTRY MODEL

S903490A2103

D/L(OK)-01

D/L(OK)-01



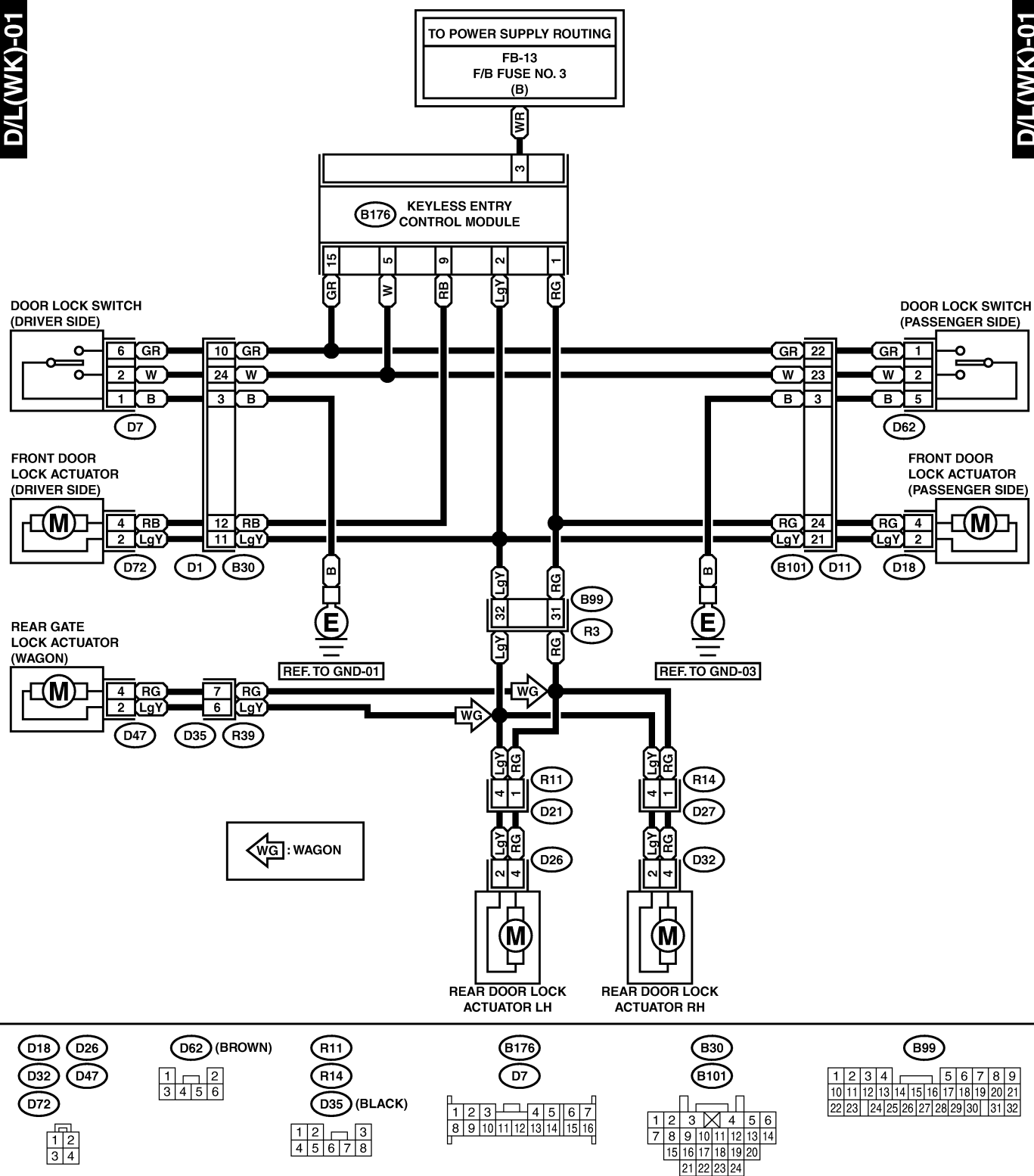
DOOR LOCK SYSTEM

Wiring System

2. WITH KEYLESS ENTRY MODEL S903490A2104

D/L(WK)-01

D/L(WK)-01



16. Engine Coolant Temperature Gauge System

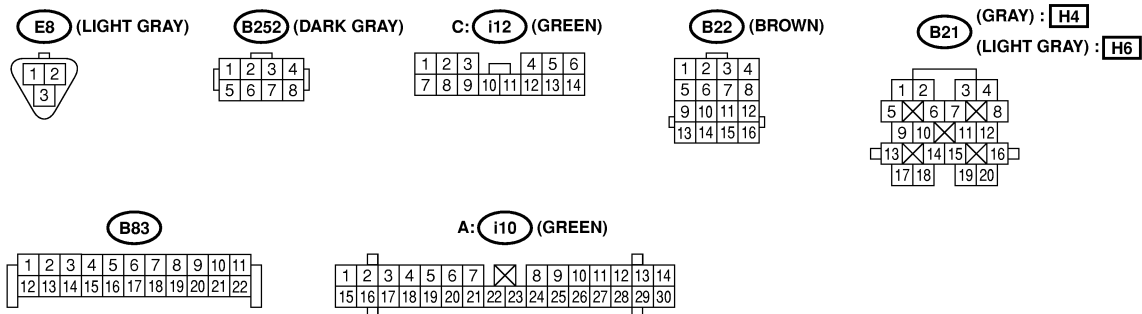
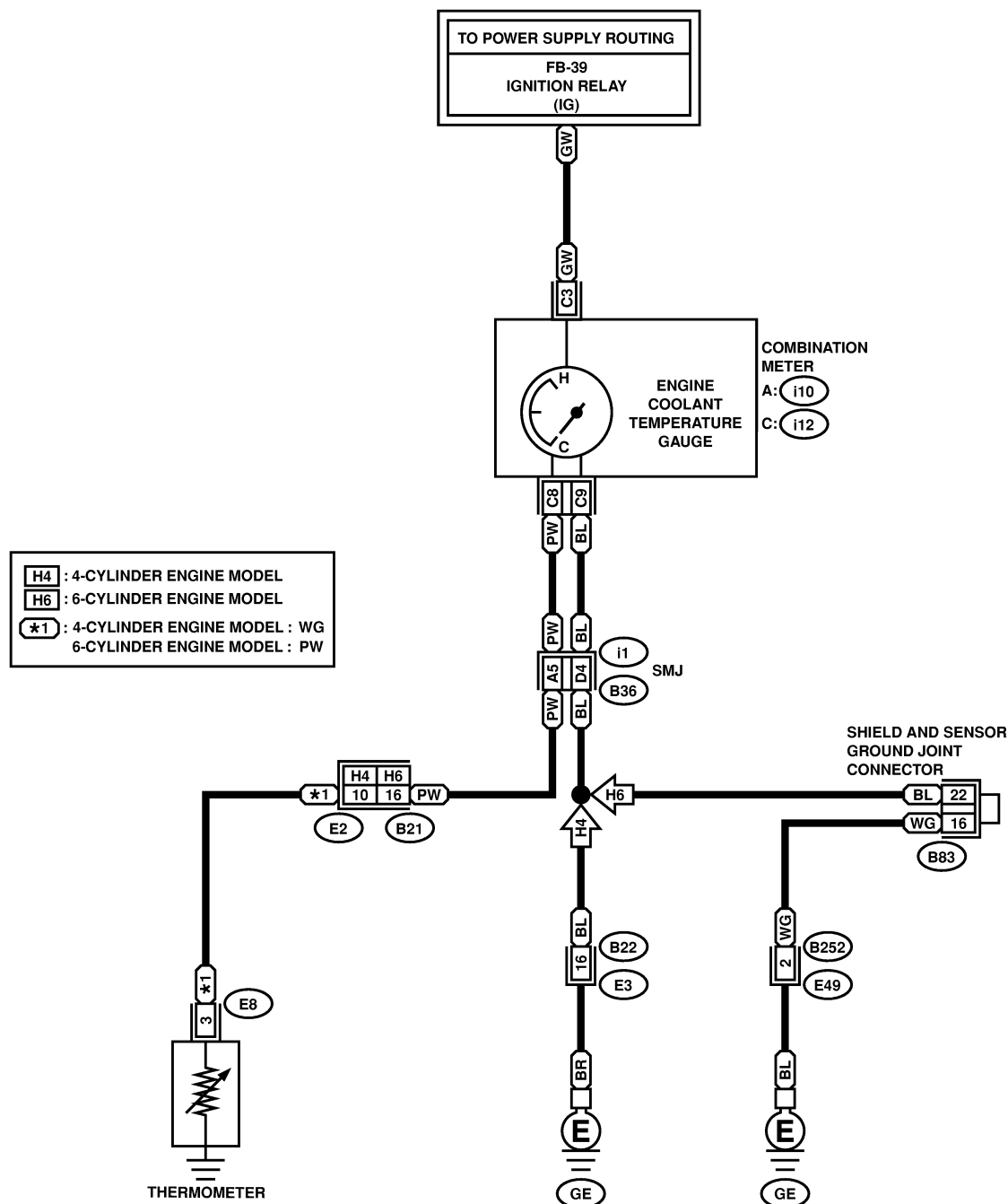
S903663

A: SCHEMATIC

S903663A21

C/TEMP-01

C/TEMP-01



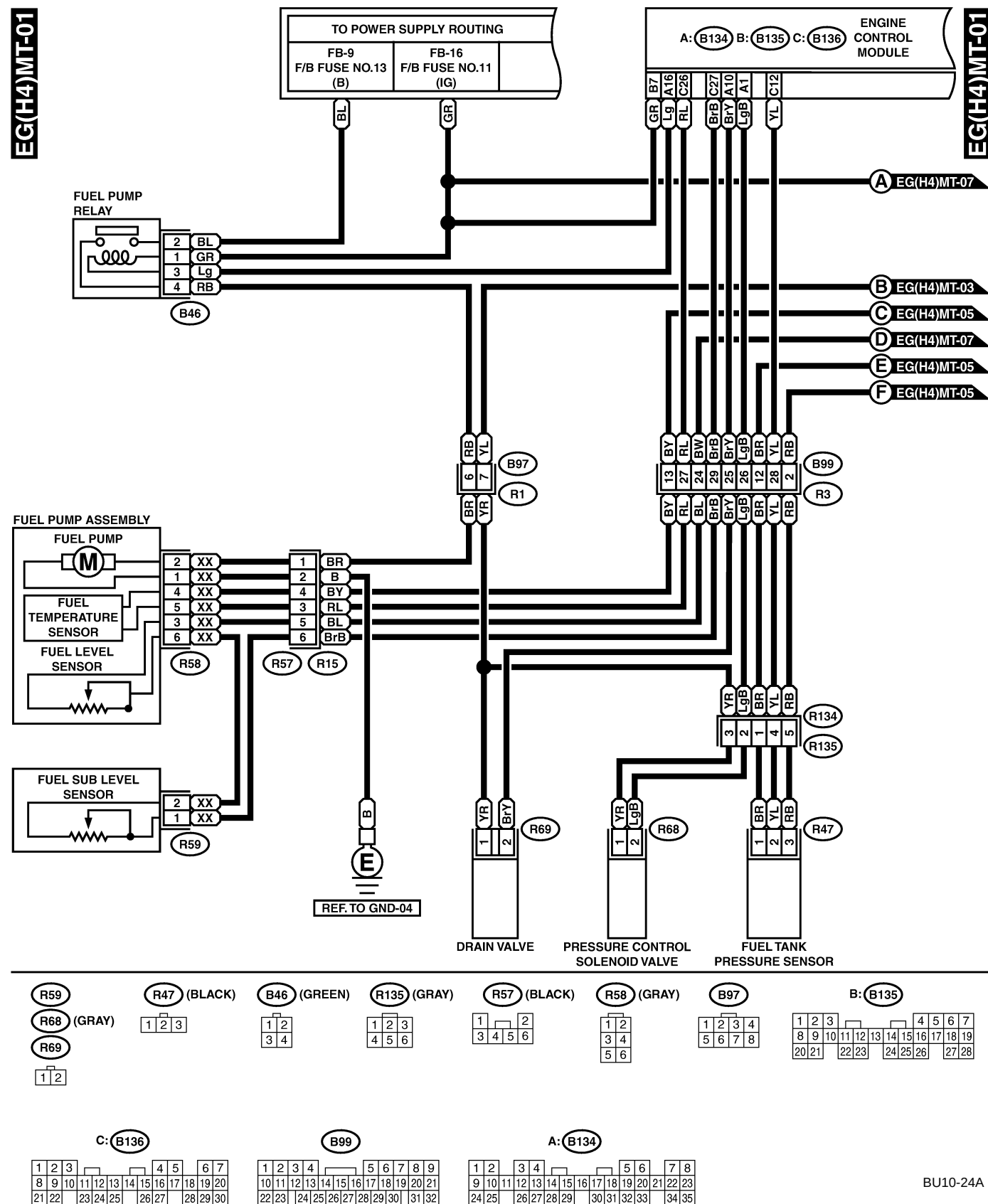
ENGINE ELECTRICAL SYSTEM

Wiring System

17. Engine Electrical System S903482

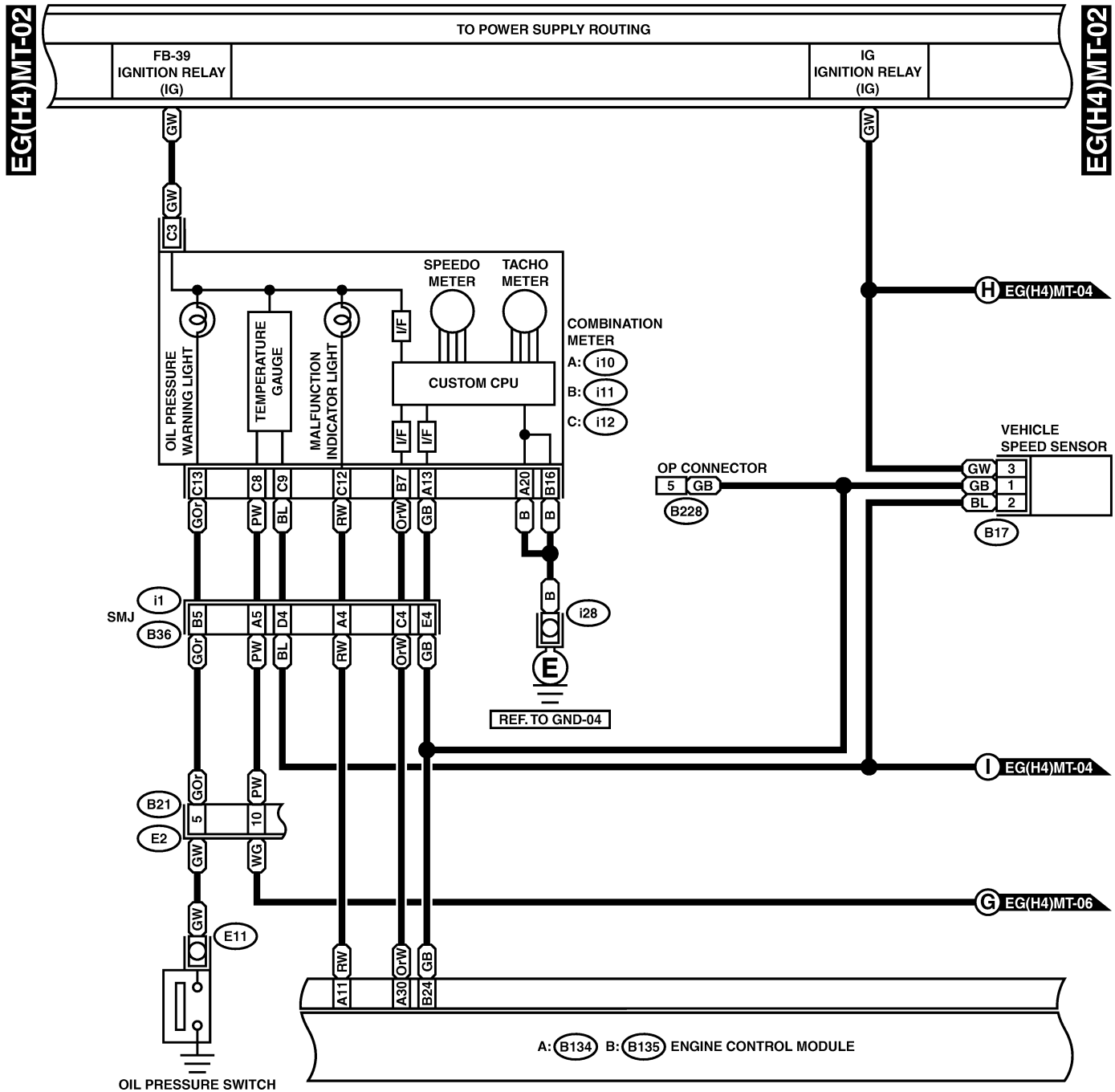
A: SCHEMATIC S903482A21

1. 4-CYLINDER ENGINE MT MODEL S903482A2103



ENGINE ELECTRICAL SYSTEM

Wiring System



B17 (BLACK)

1	2	3

C: i12 (GREEN)

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18

B228

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15

B: i11 (GREEN)

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

B21 (GRAY)

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20

B: (B135)

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

A: i10 (GREEN)

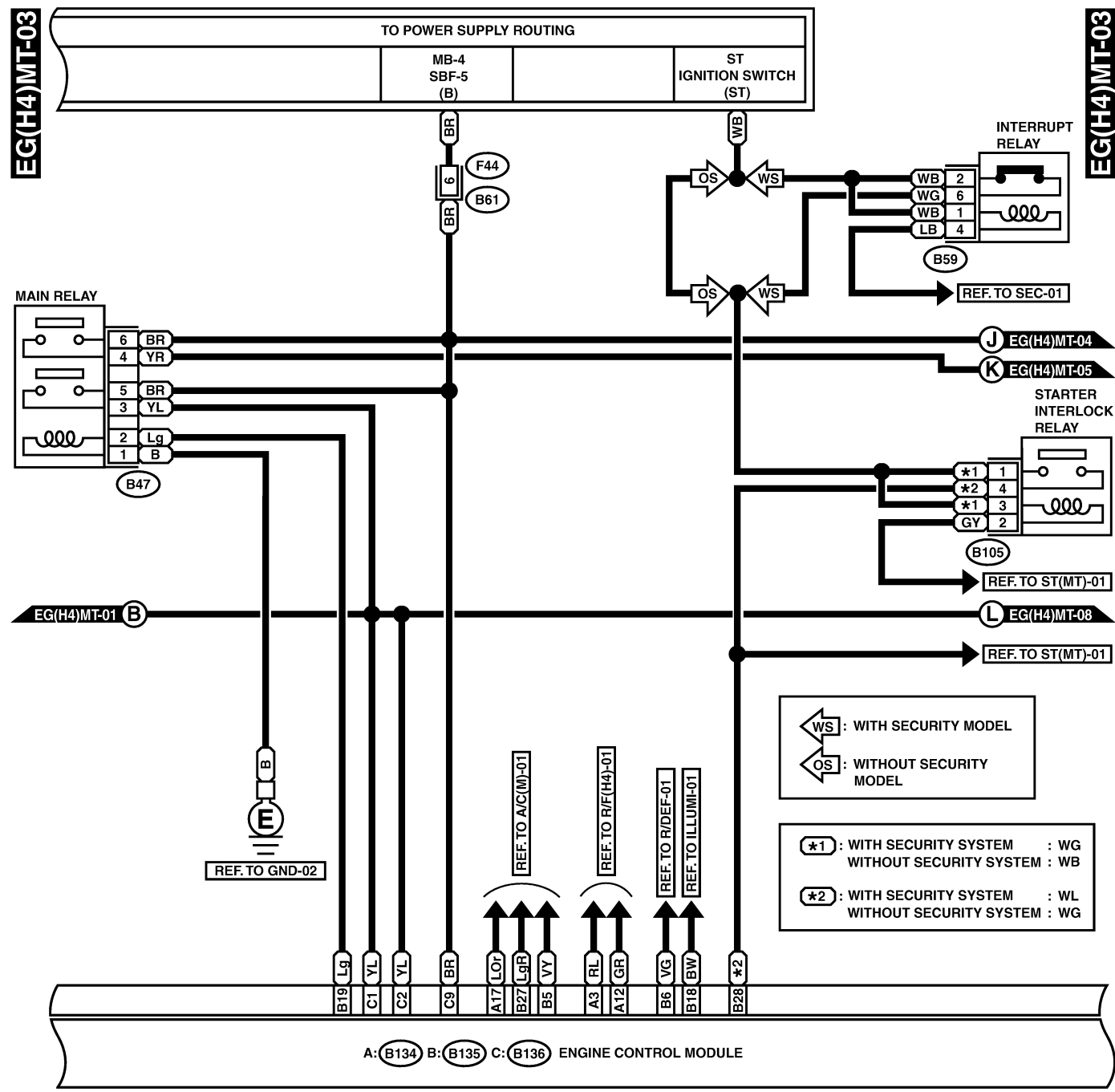
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42

A: (B134)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40

ENGINE ELECTRICAL SYSTEM

Wiring System



B105 (BLUE)

1	2	3
4	5	6

B47 (BROWN)

1	2	3
4	5	6

B59

1	2	3
4	5	6

F44

1	2	3	4
5	6	7	8

B: B135

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

C: B136

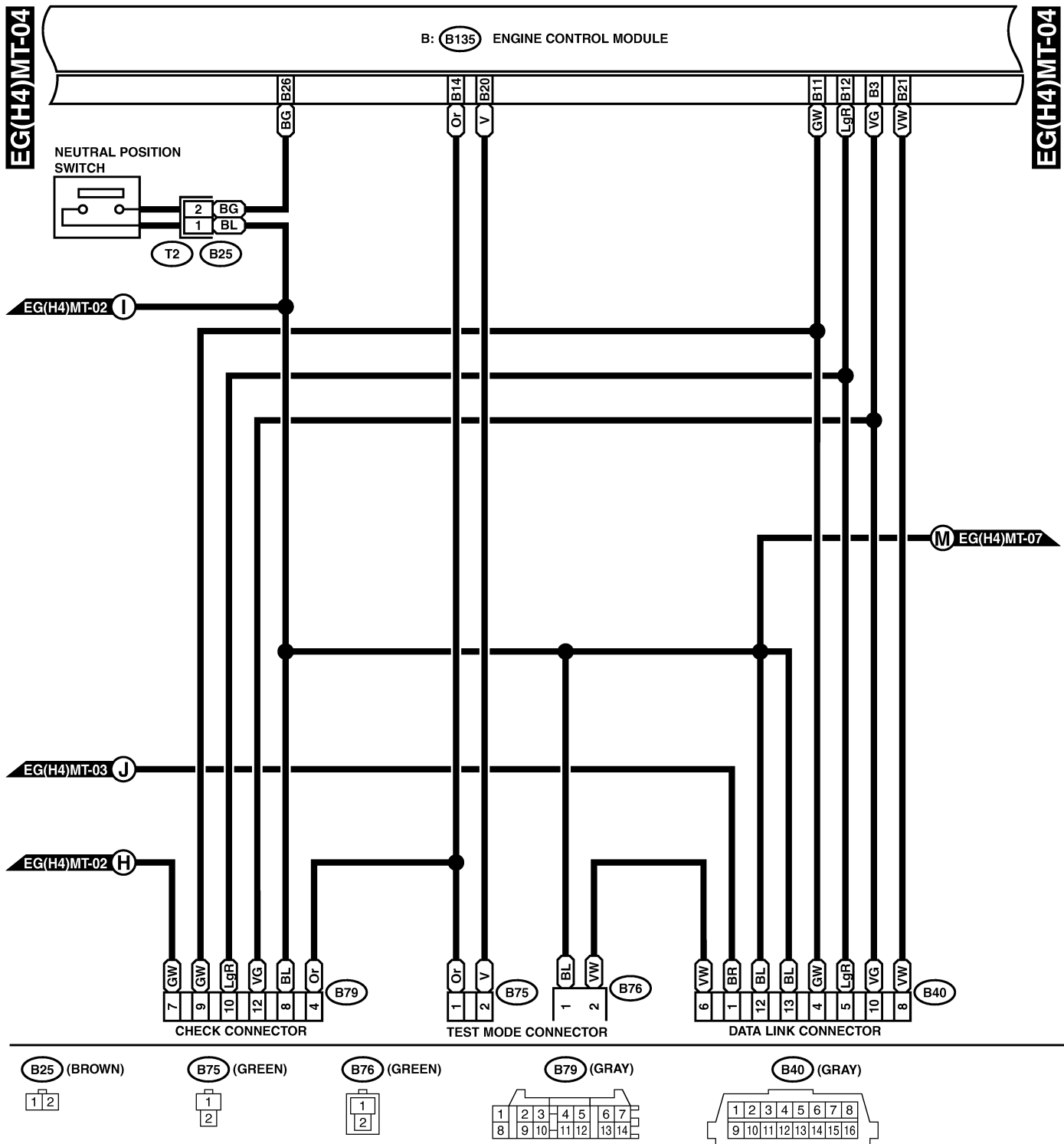
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35

A: B134

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40

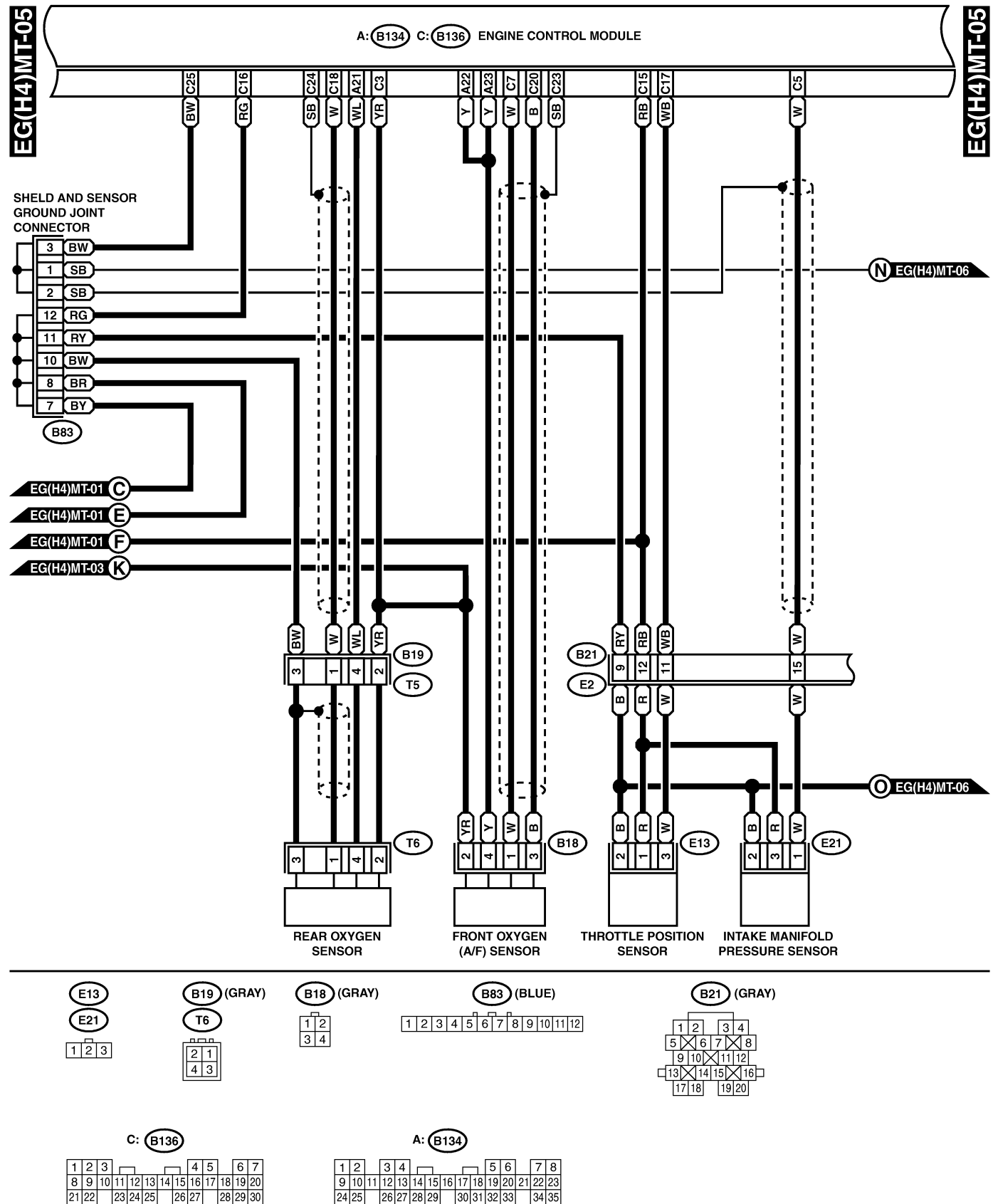
ENGINE ELECTRICAL SYSTEM

Wiring System



ENGINE ELECTRICAL SYSTEM

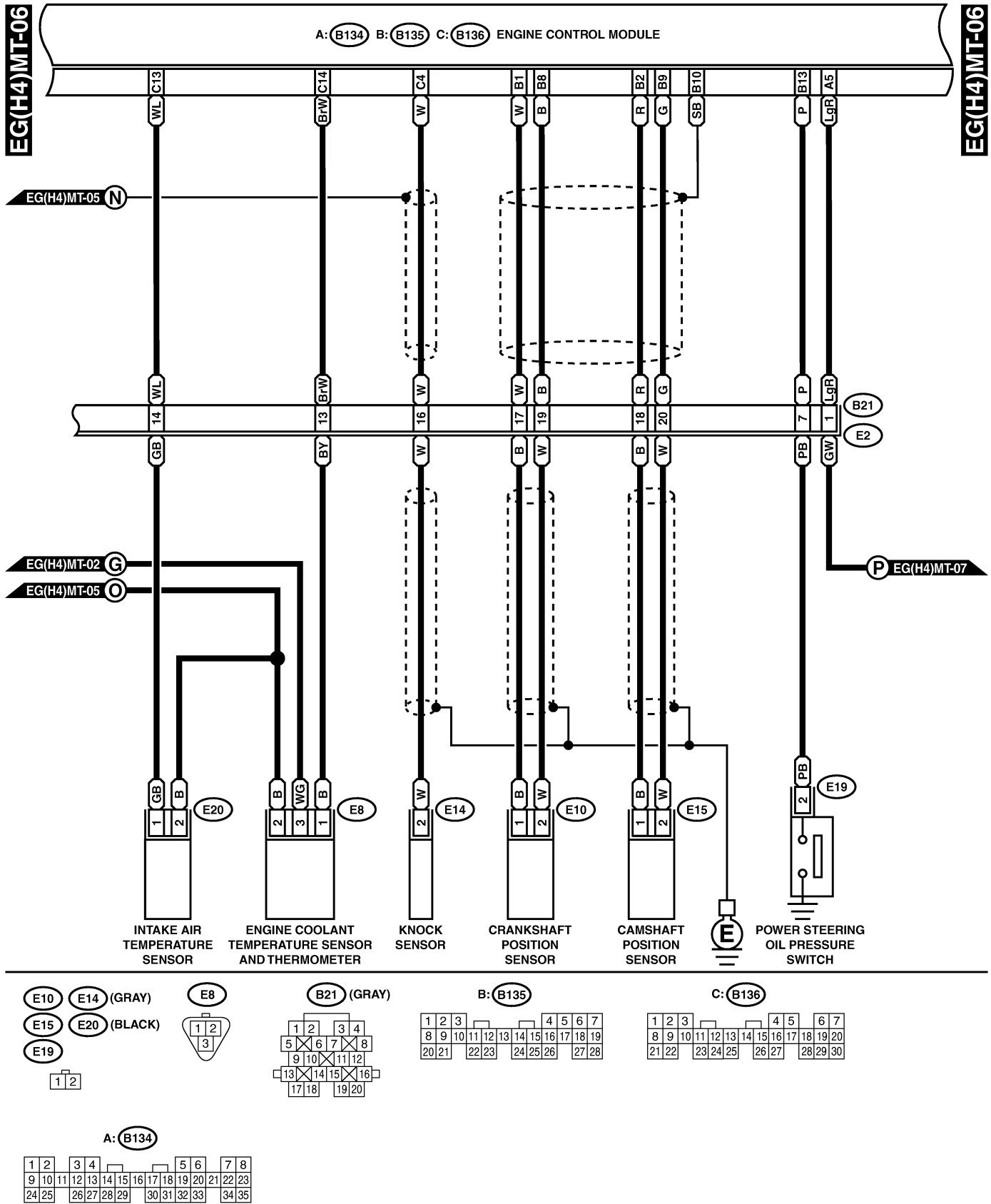
Wiring System



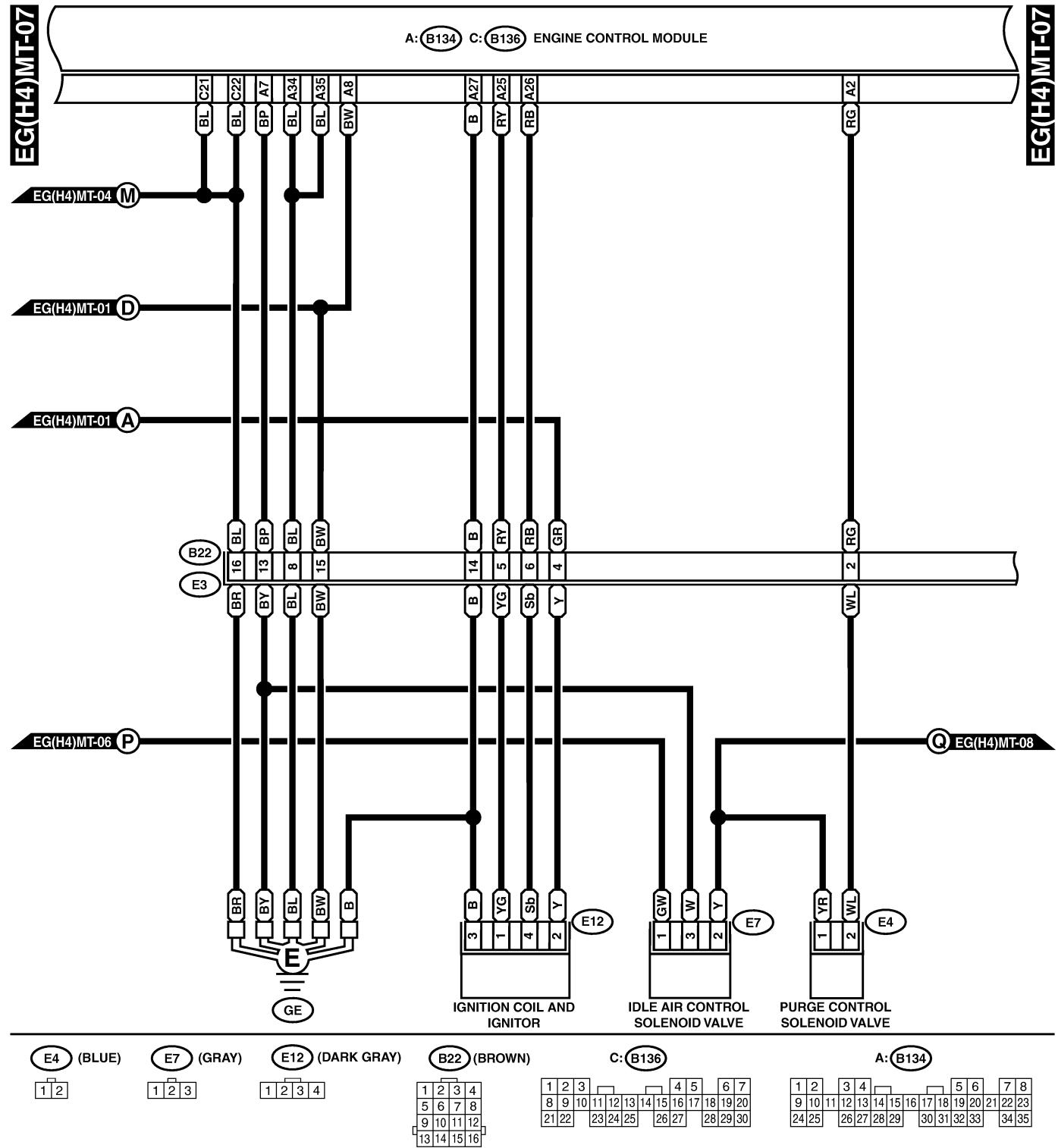
BU10-24E

ENGINE ELECTRICAL SYSTEM

Wiring System

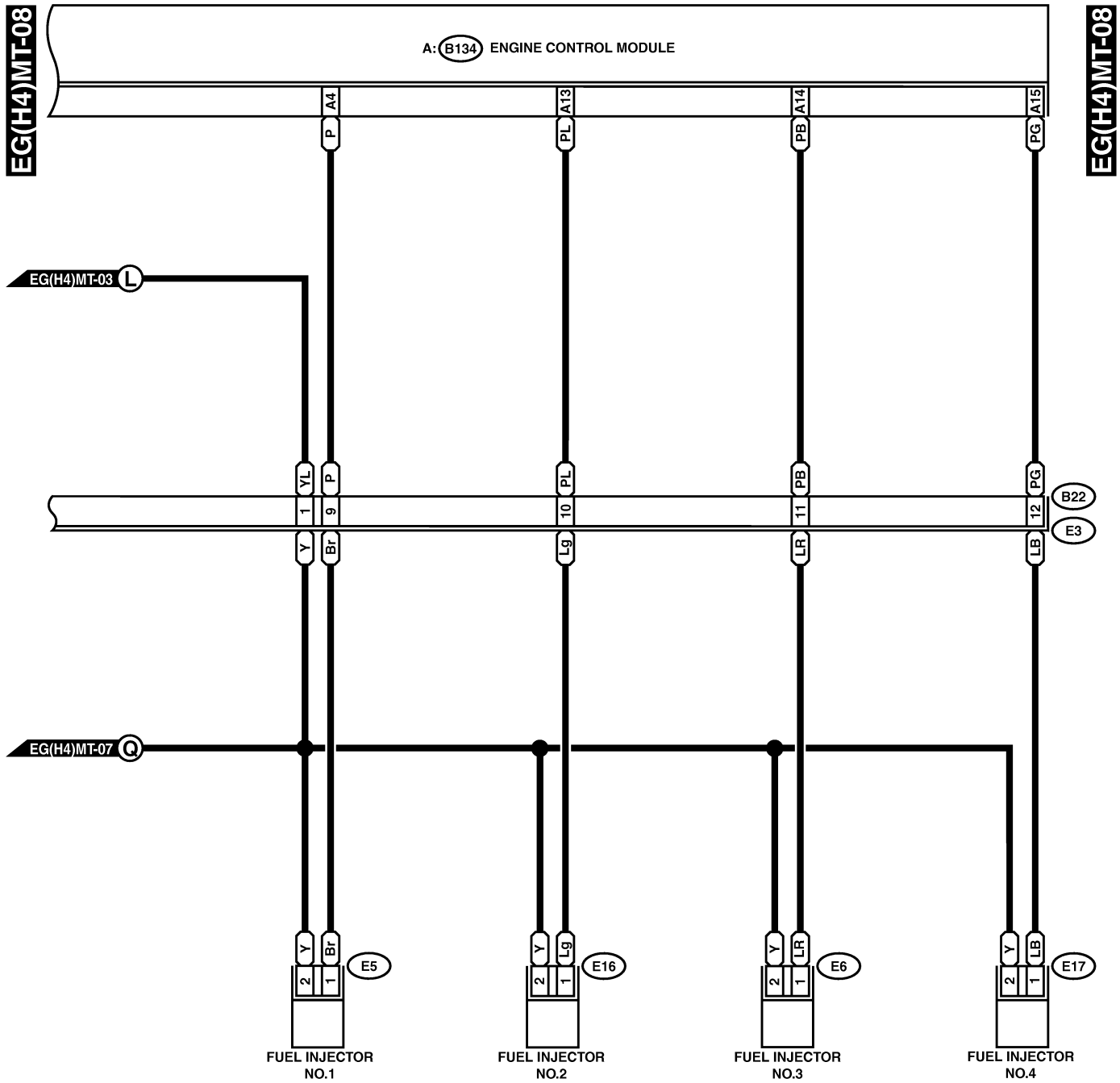


Wiring System



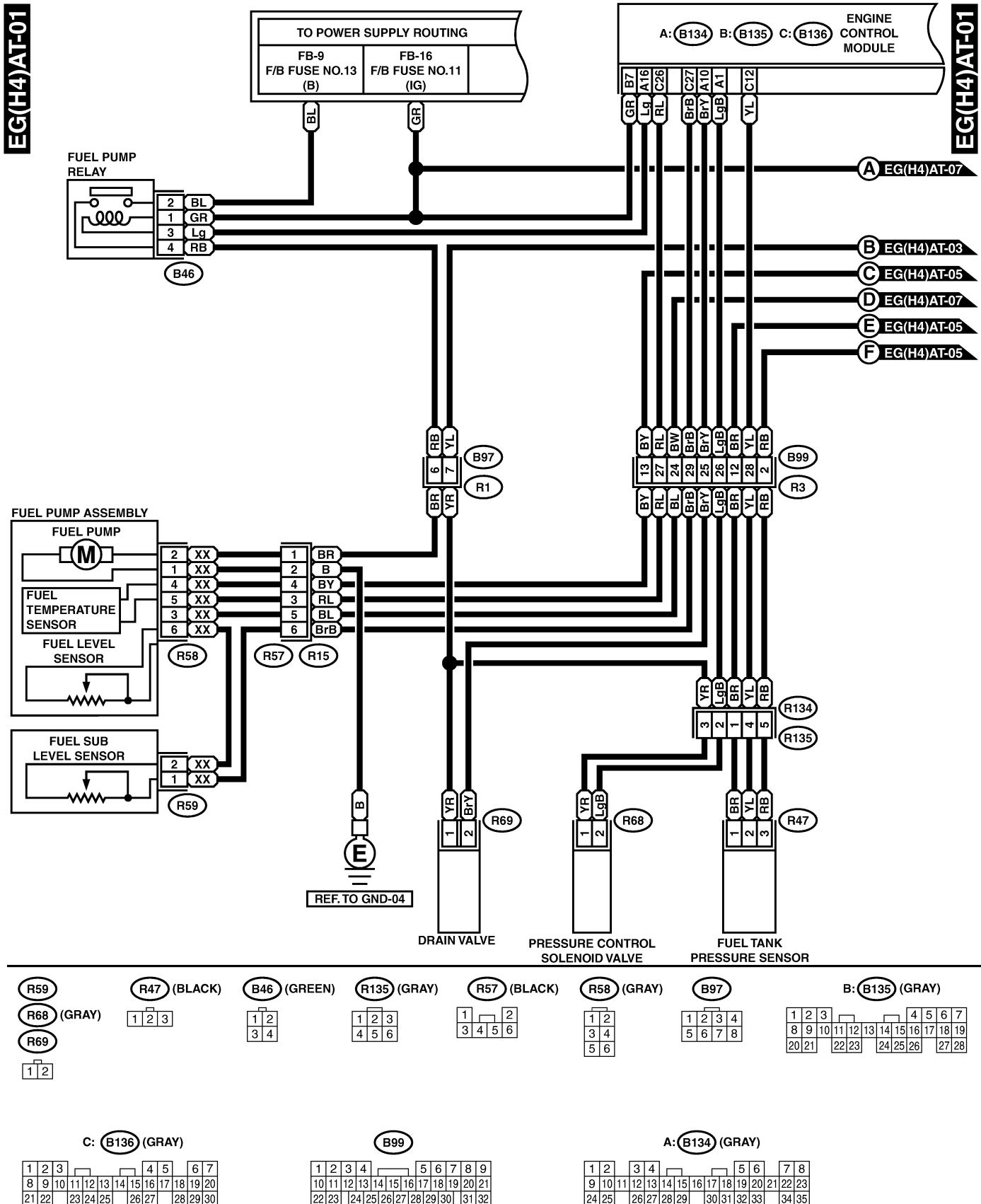
ENGINE ELECTRICAL SYSTEM

Wiring System

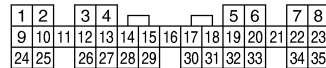


Wiring System

S903482A2104

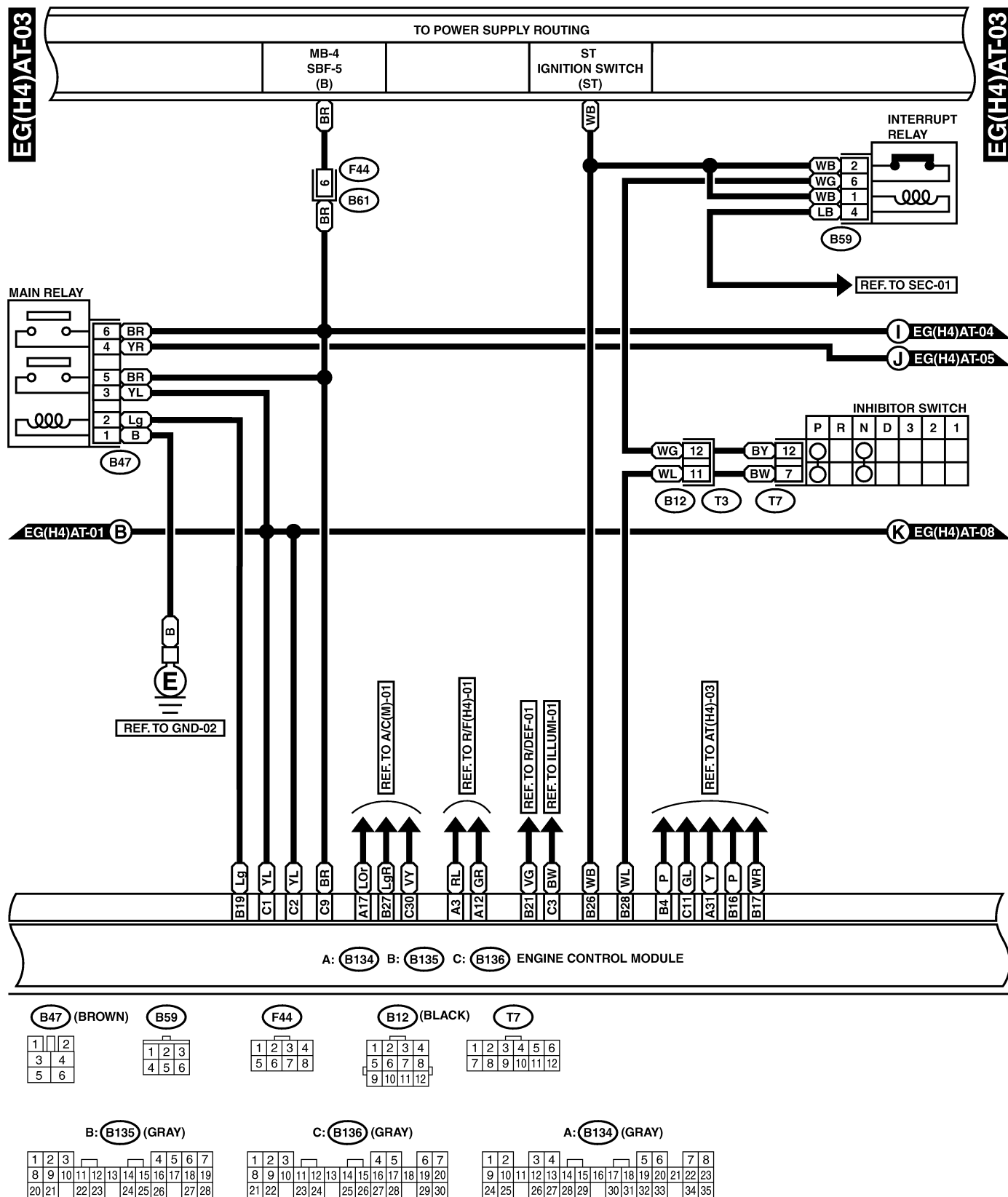


Wiring System



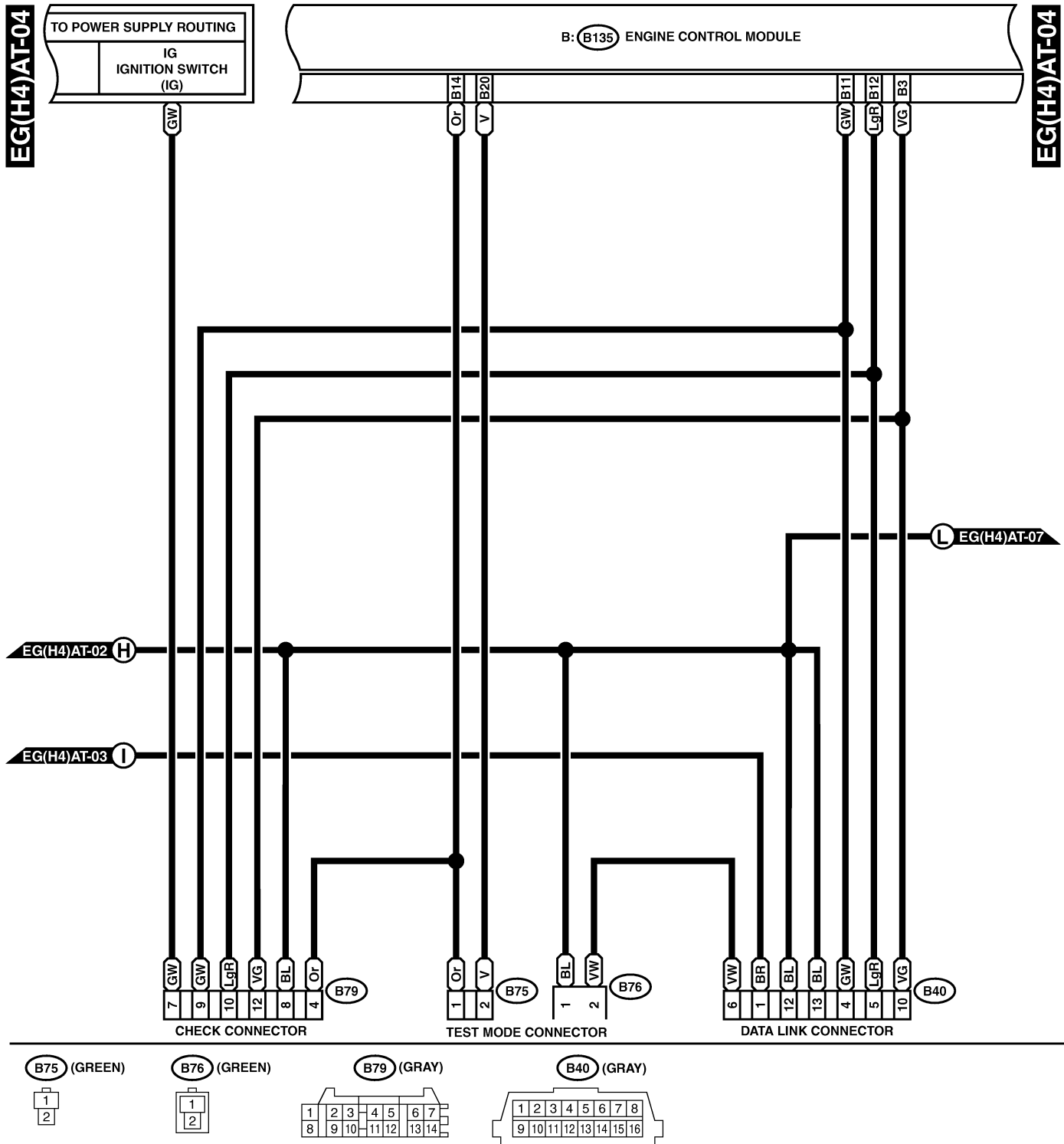
ENGINE ELECTRICAL SYSTEM

Wiring System



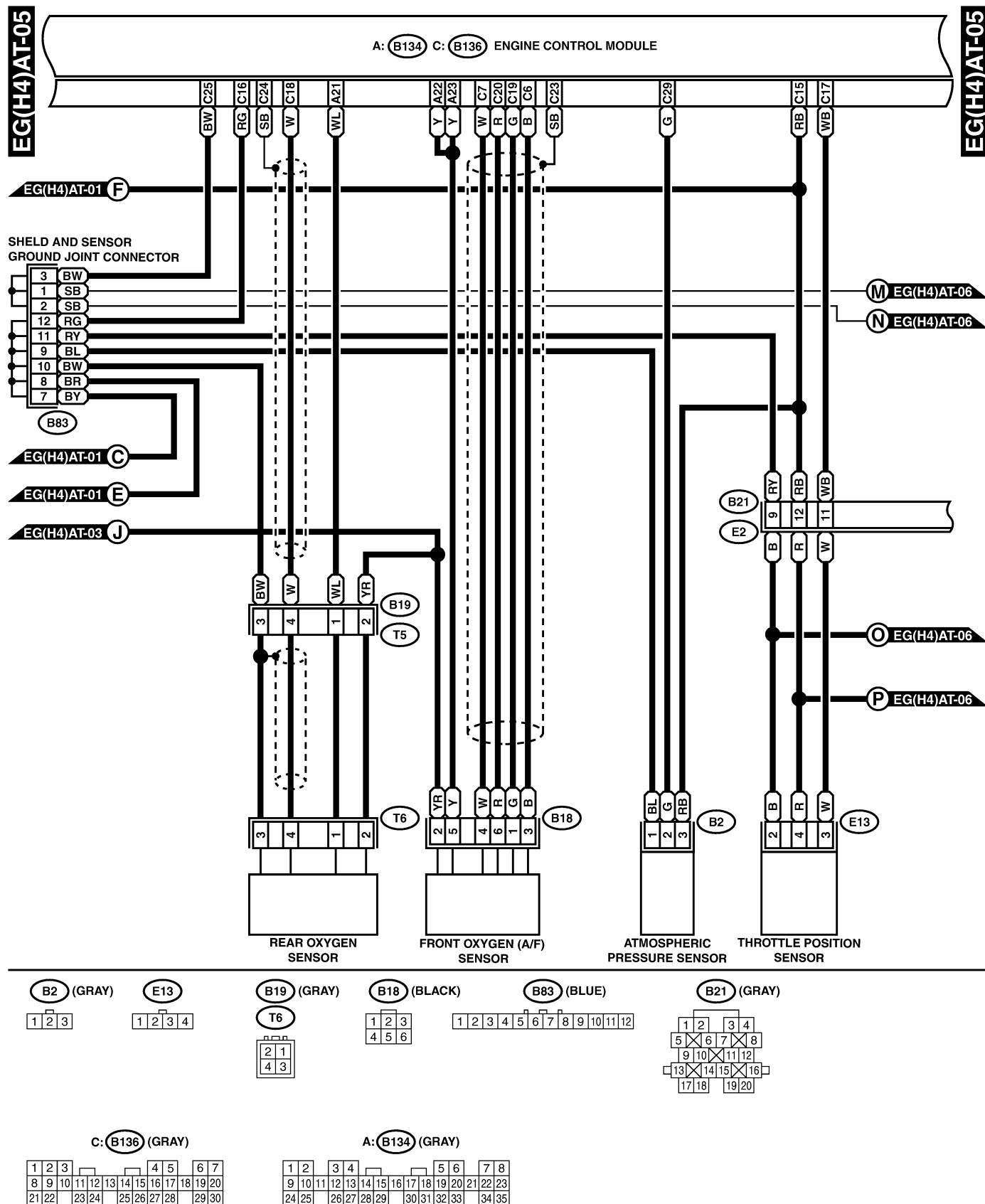
ENGINE ELECTRICAL SYSTEM

Wiring System



ENGINE ELECTRICAL SYSTEM

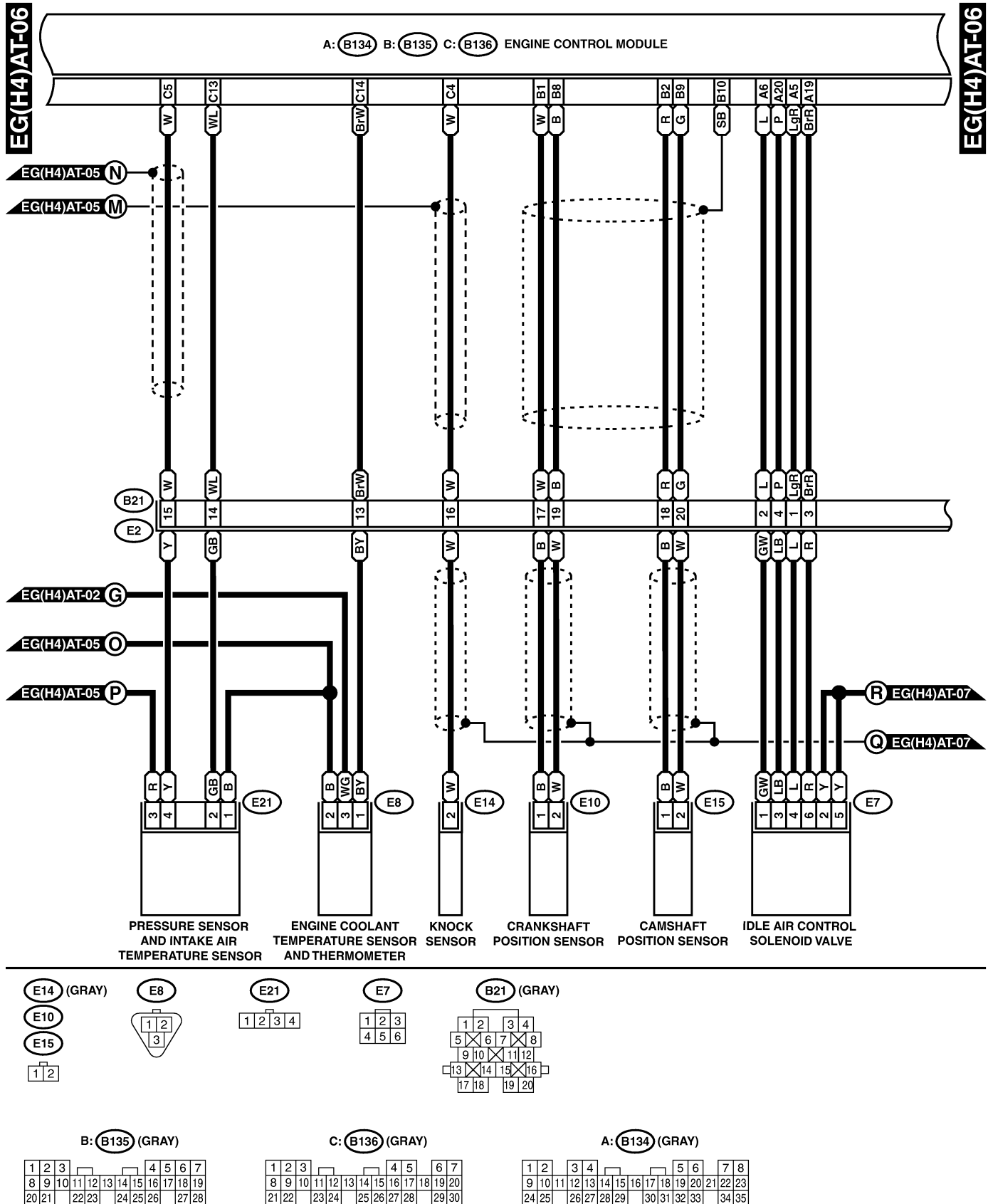
Wiring System



BU10-22E

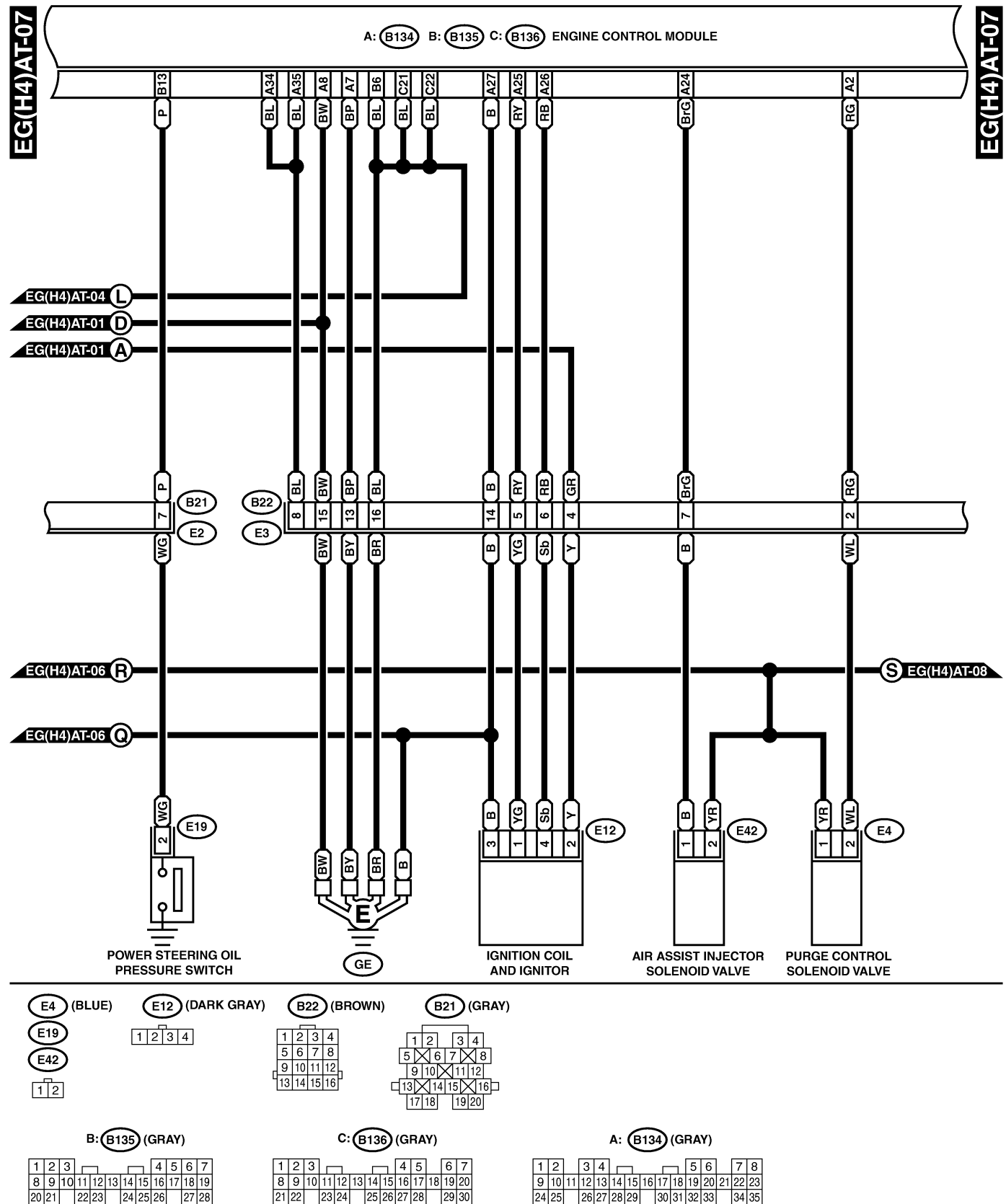
ENGINE ELECTRICAL SYSTEM

Wiring System

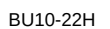


ENGINE ELECTRICAL SYSTEM

Wiring System



Wiring System



Wiring System

EG(H6)-01

TO POWER SUPPLY ROUTING

FB-9 F/B FUSE NO.13 (B) FB-16 F/B FUSE NO.11 (IG)

ENGINE CONTROL MODULE

A: (B134) B: (B135) C: (B136) D: (B137)

FUEL PUMP RELAY

2 BL 1 GR 3 Lg 4 RB (B46)

FUEL PUMP ASSEMBLY

FUEL PUMP FUEL TEMPERATURE SENSOR FUEL LEVEL SENSOR FUEL SUB LEVEL SENSOR

2 1 4 5 3 6 (R58) (R57) (R15) (R59)

DRAIN VALVE

1 YR 2 BRY (R69)

PRESSURE CONTROL SOLENOID VALVE

1 YR 2 LgB (R68)

FUEL TANK PRESSURE SENSOR

1 BR 2 YL 3 RB (R47)

EG(H6)-01

EG(H6)-03

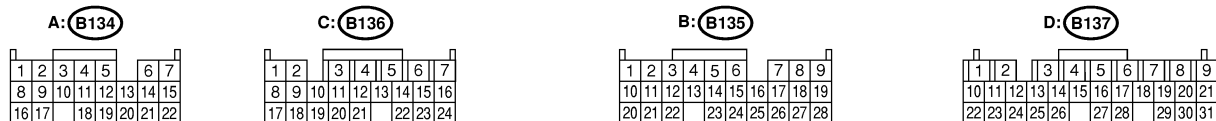
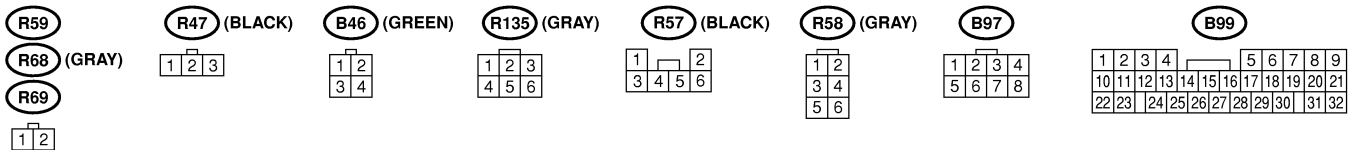
EG(H6)-05

EG(H6)-09

EG(H6)-05

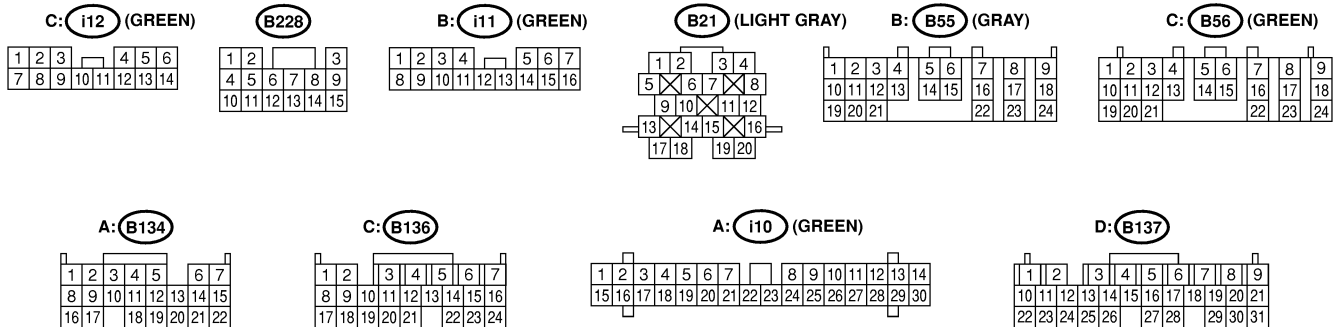
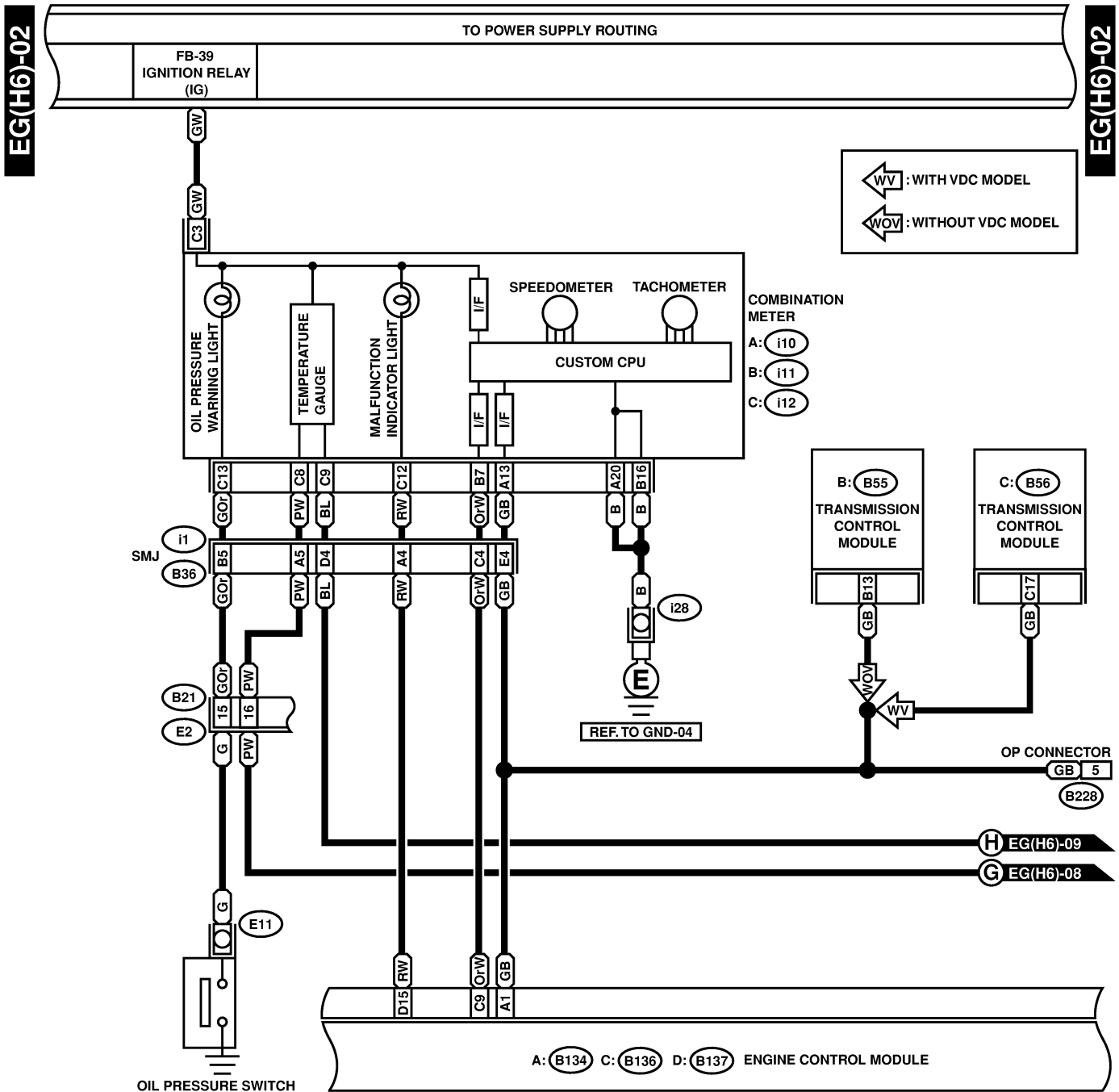
EG(H6)-05

REF. TO GND-04



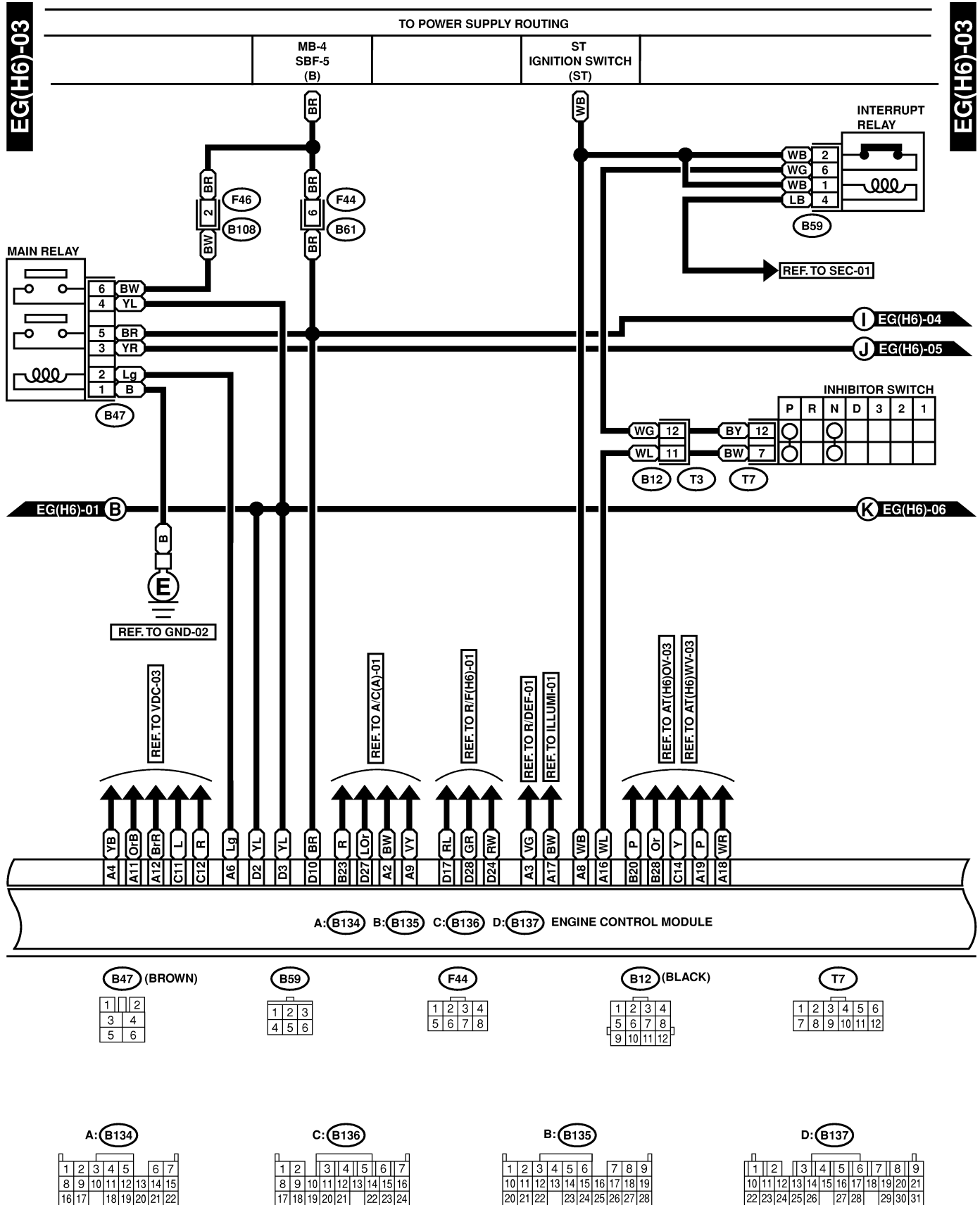
ENGINE ELECTRICAL SYSTEM

Wiring System



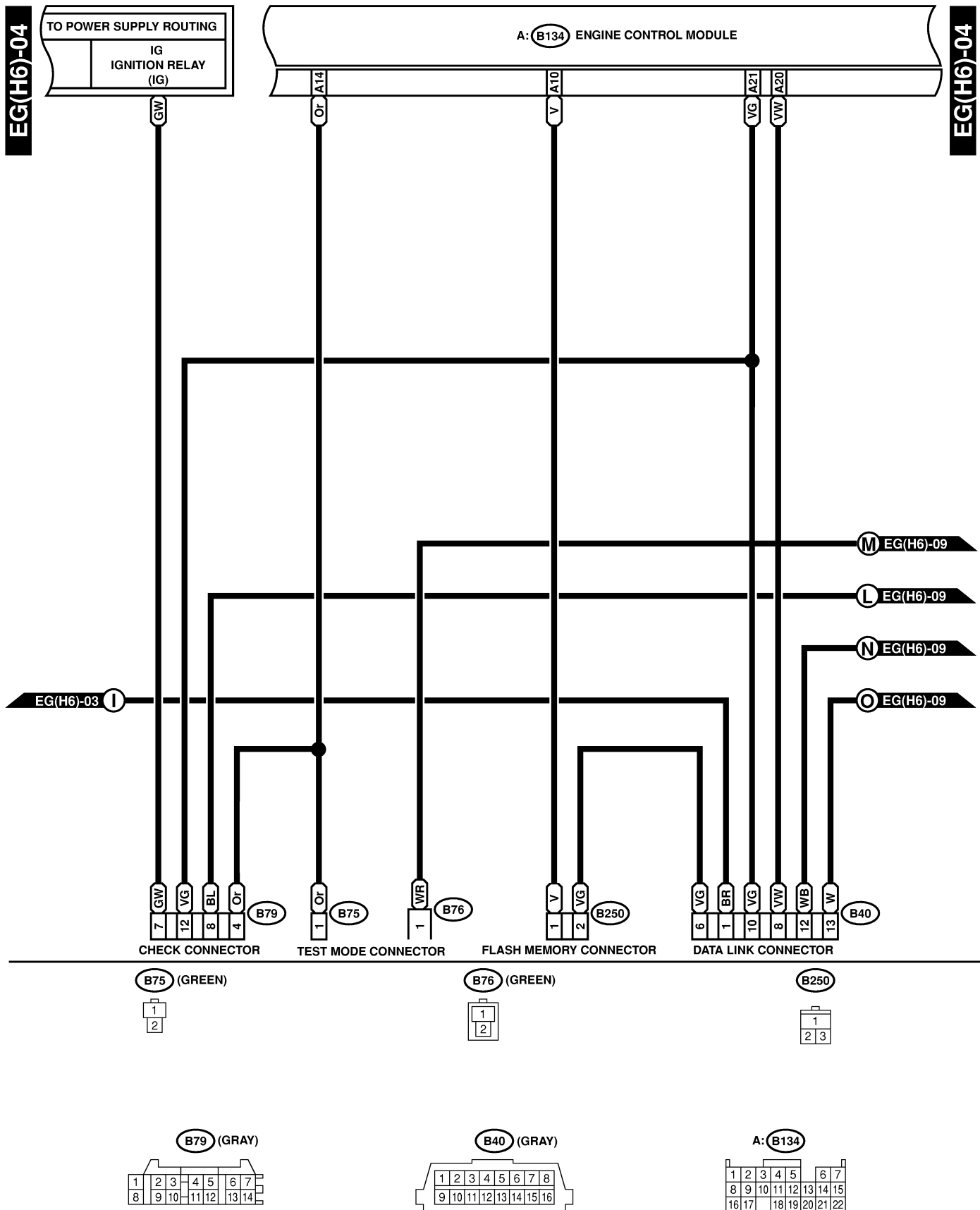
ENGINE ELECTRICAL SYSTEM

Wiring System



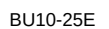
ENGINE ELECTRICAL SYSTEM

Wiring System



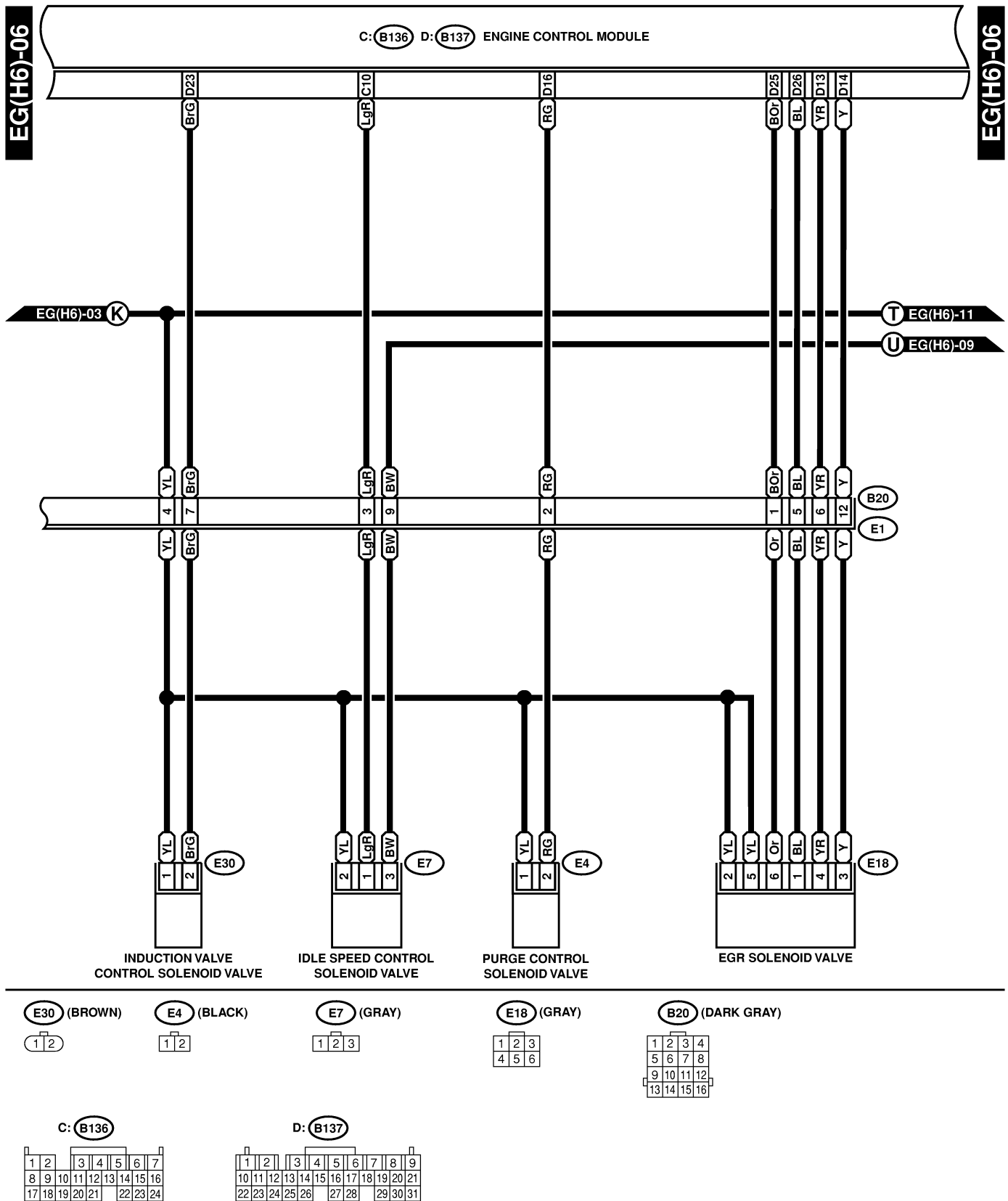
BU10-25D

Wiring System



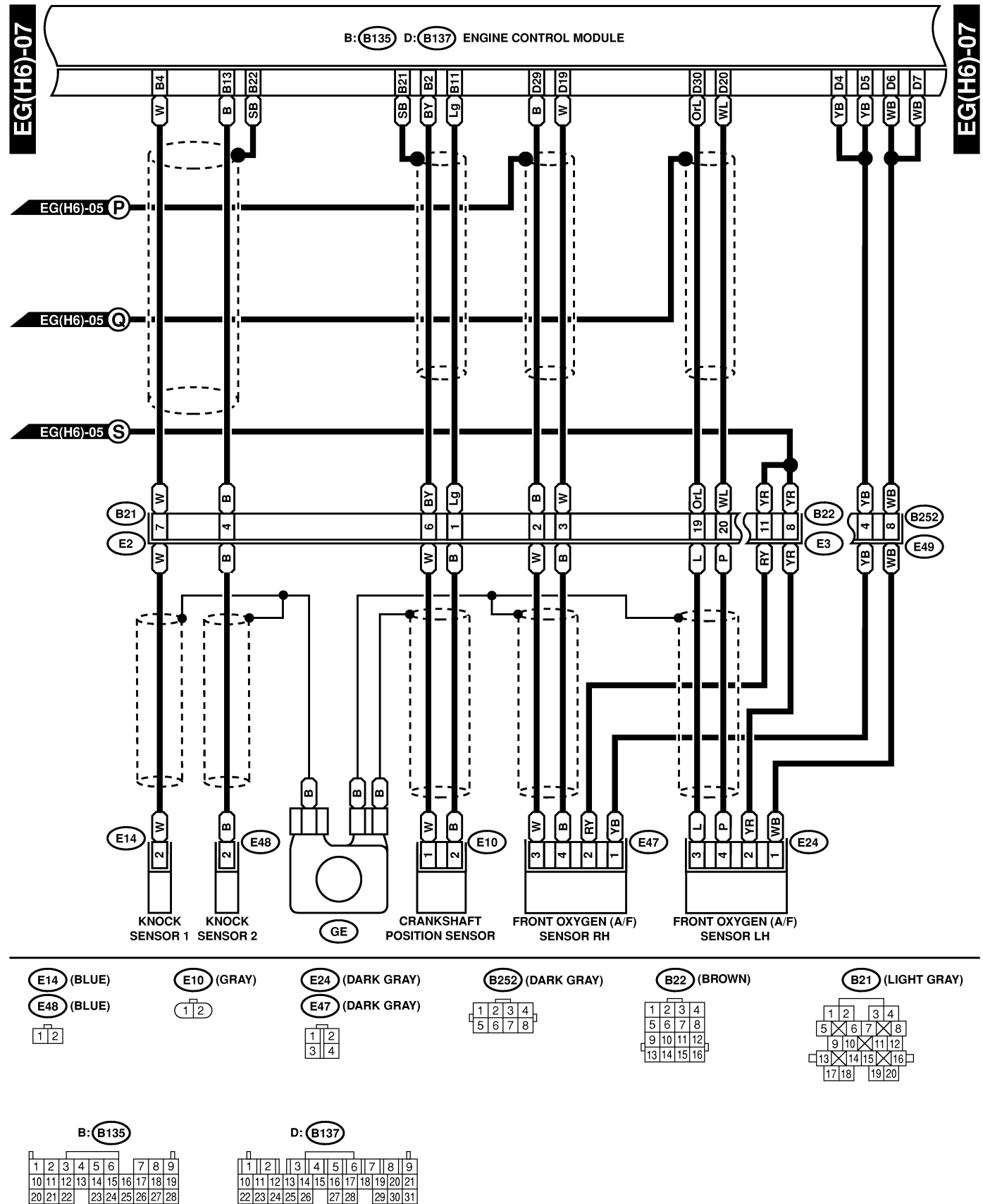
ENGINE ELECTRICAL SYSTEM

Wiring System



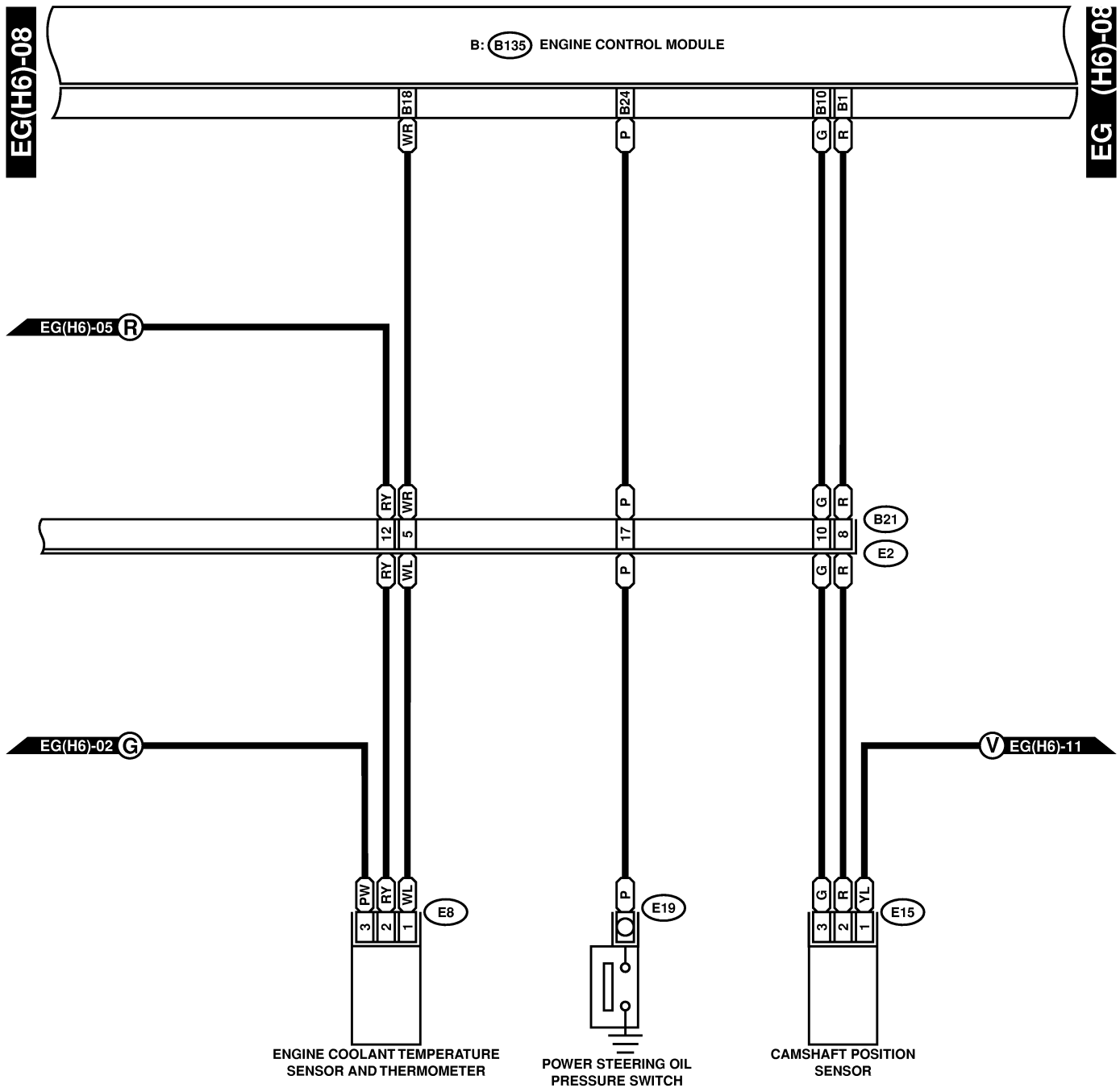
ENGINE ELECTRICAL SYSTEM

Wiring System



ENGINE ELECTRICAL SYSTEM

Wiring System



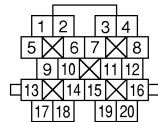
E15 (GRAY)



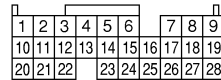
E8 (LIGHT GRAY)



B21 (LIGHT GRAY)

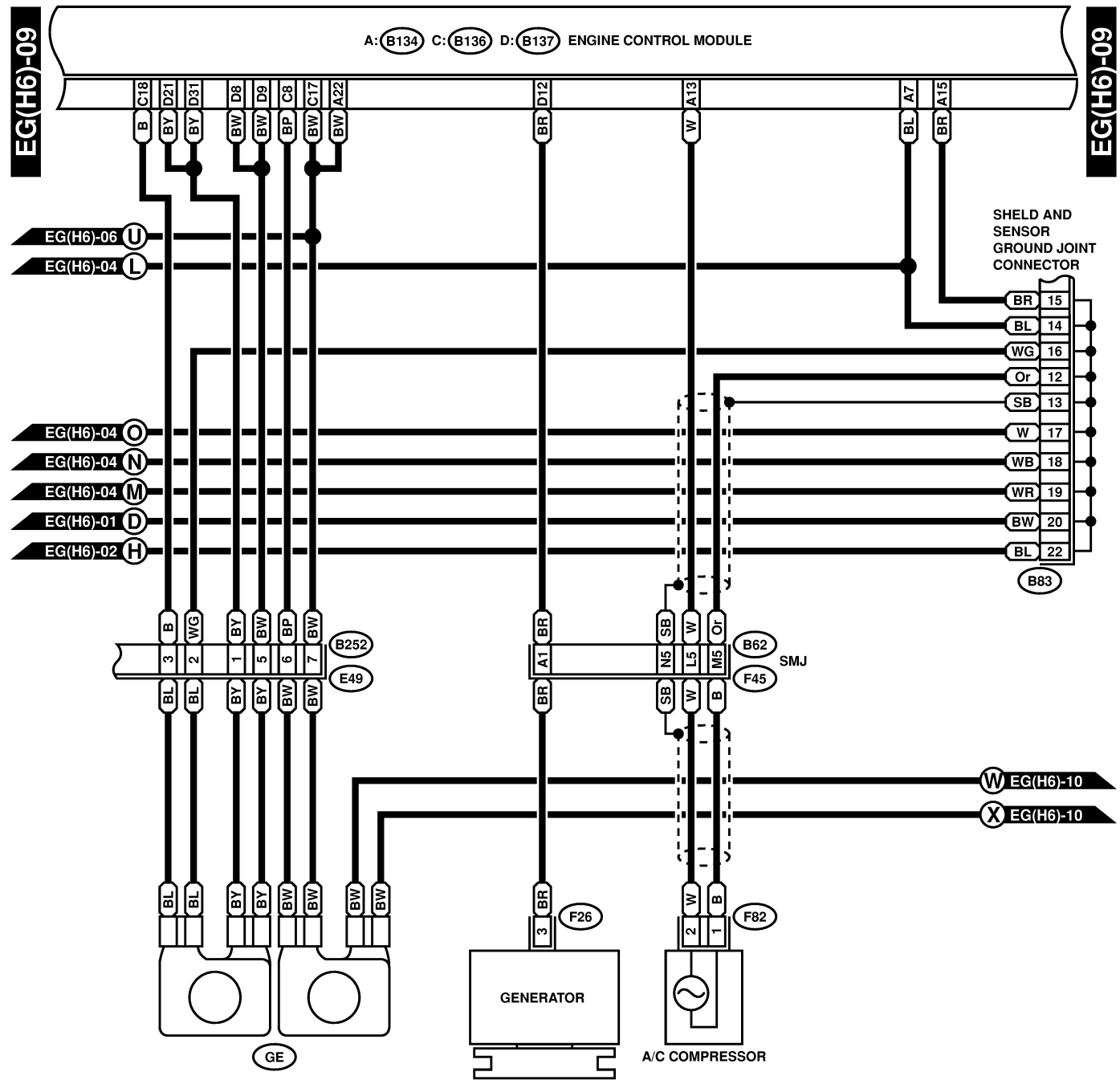


B: B135



ENGINE ELECTRICAL SYSTEM

Wiring System



E26 (GREEN)

F82 (BLACK)

1 2 3

B252 (DARK GRAY)

1 2 3 4
5 6 7 8

B83

1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22

A: (B134)

1 2 3 4 5 6 7
8 9 10 11 12 13 14 15
16 17 18 19 20 21 22

C: (B136)

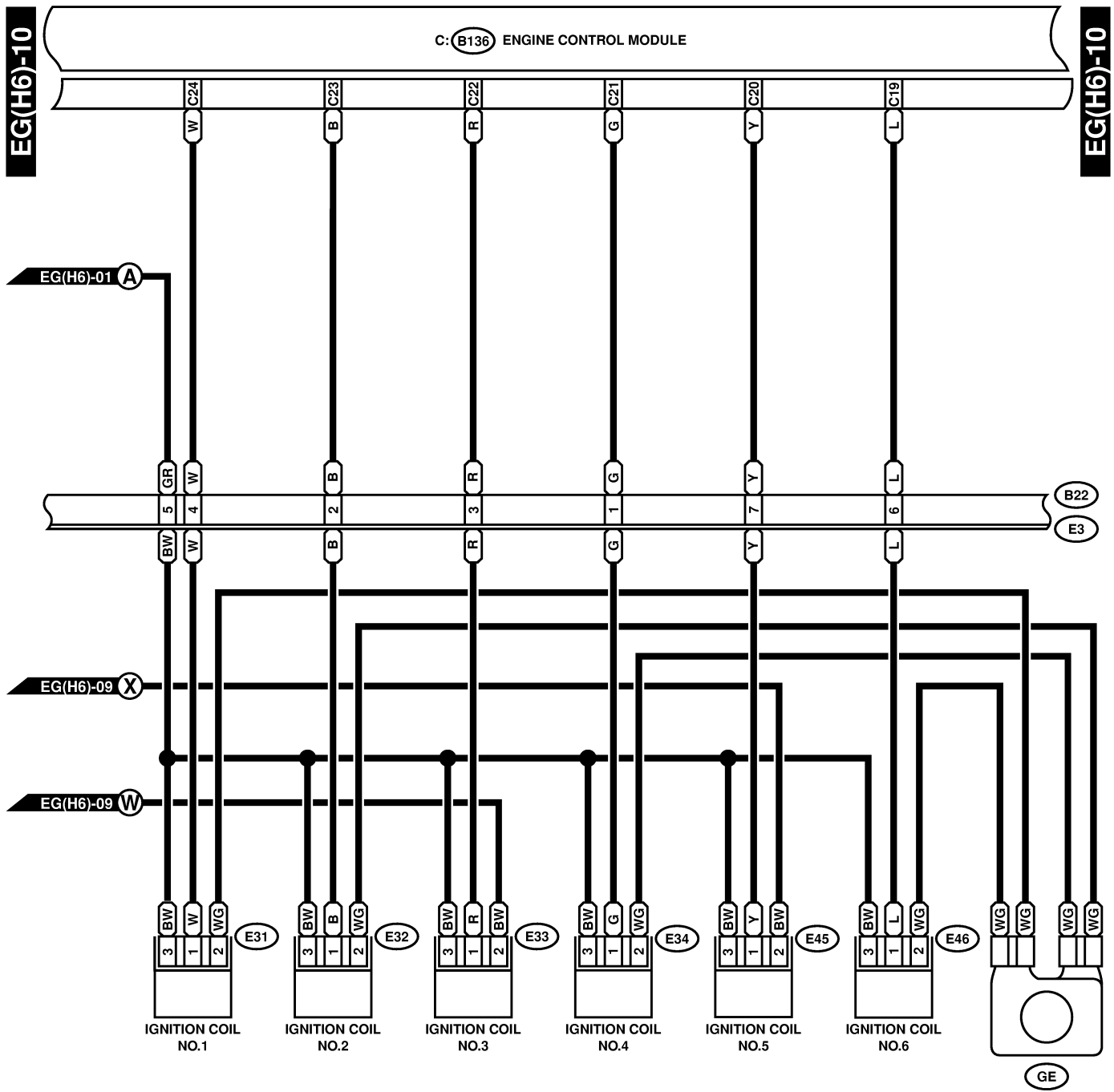
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24

D: (B137)

1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31

ENGINE ELECTRICAL SYSTEM

Wiring System



(BLACK) E31 E34
(BLACK) E32 E45 (BLACK)
E33 E46 (BLACK)

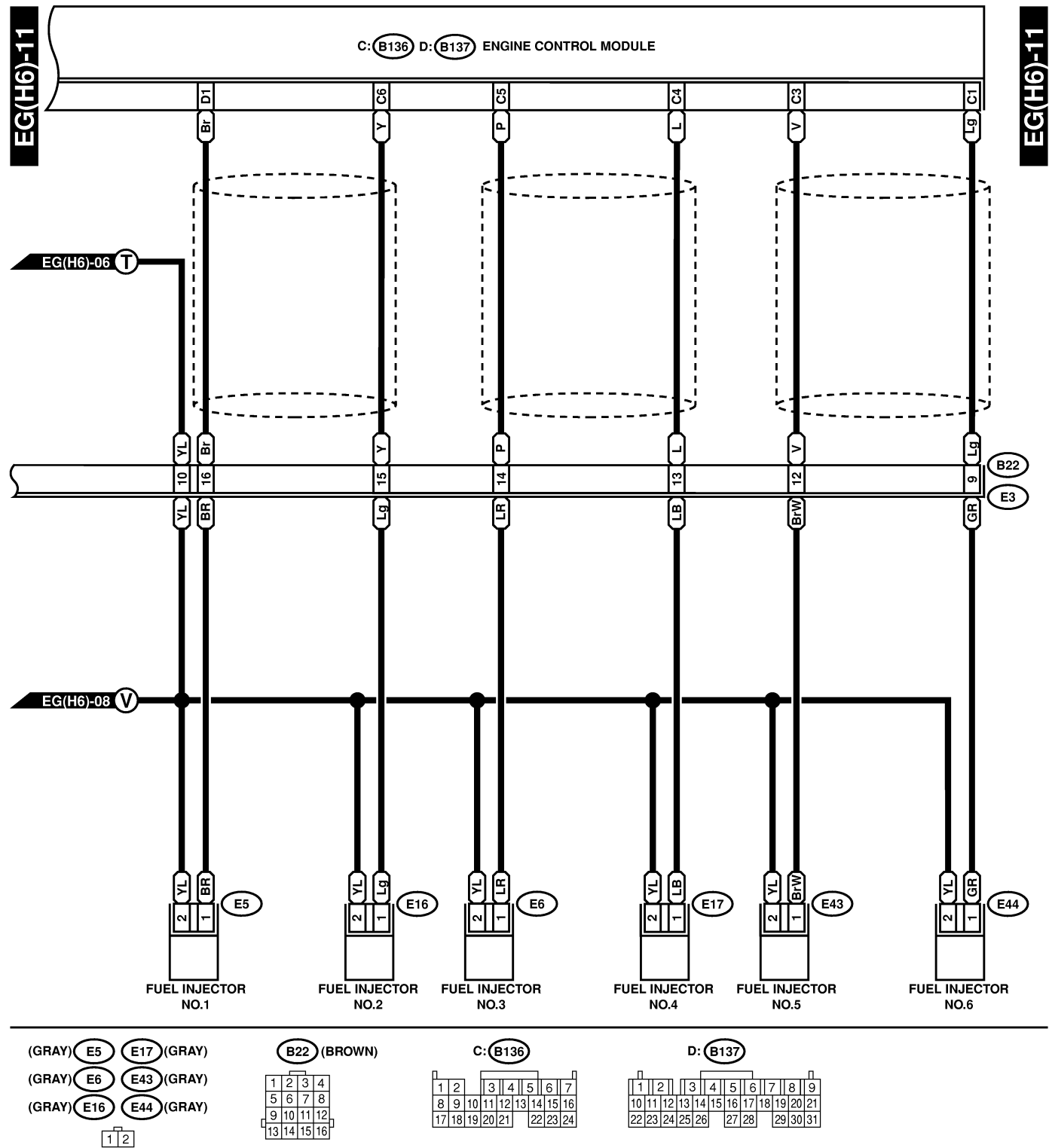
1
2
3

B22 (BROWN)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16

C: B136
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24

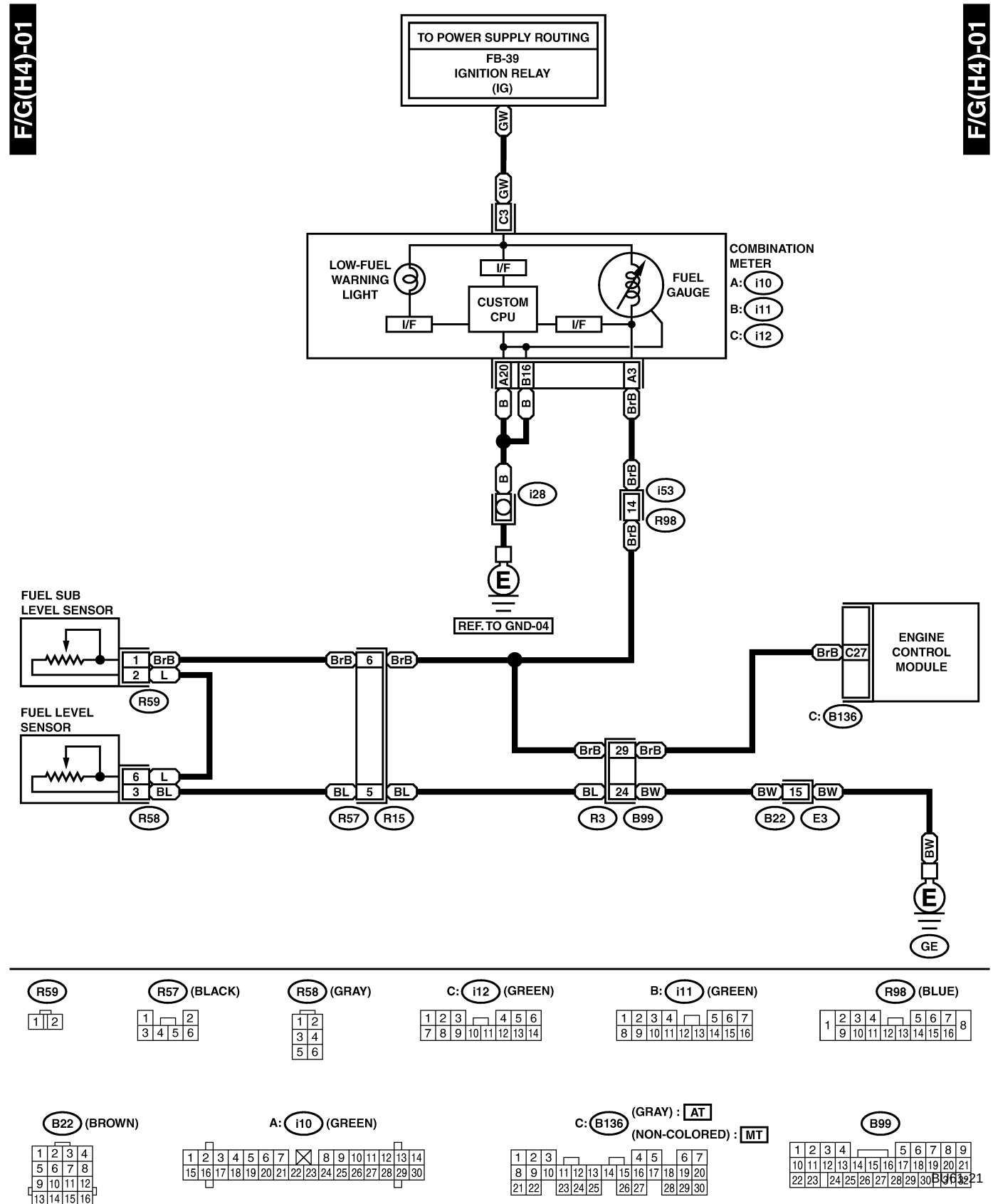
ENGINE ELECTRICAL SYSTEM

Wiring System



A: SCHEMATIC S903046A21

1. 4-CYLINDER ENGINE MODEL S903046A2101



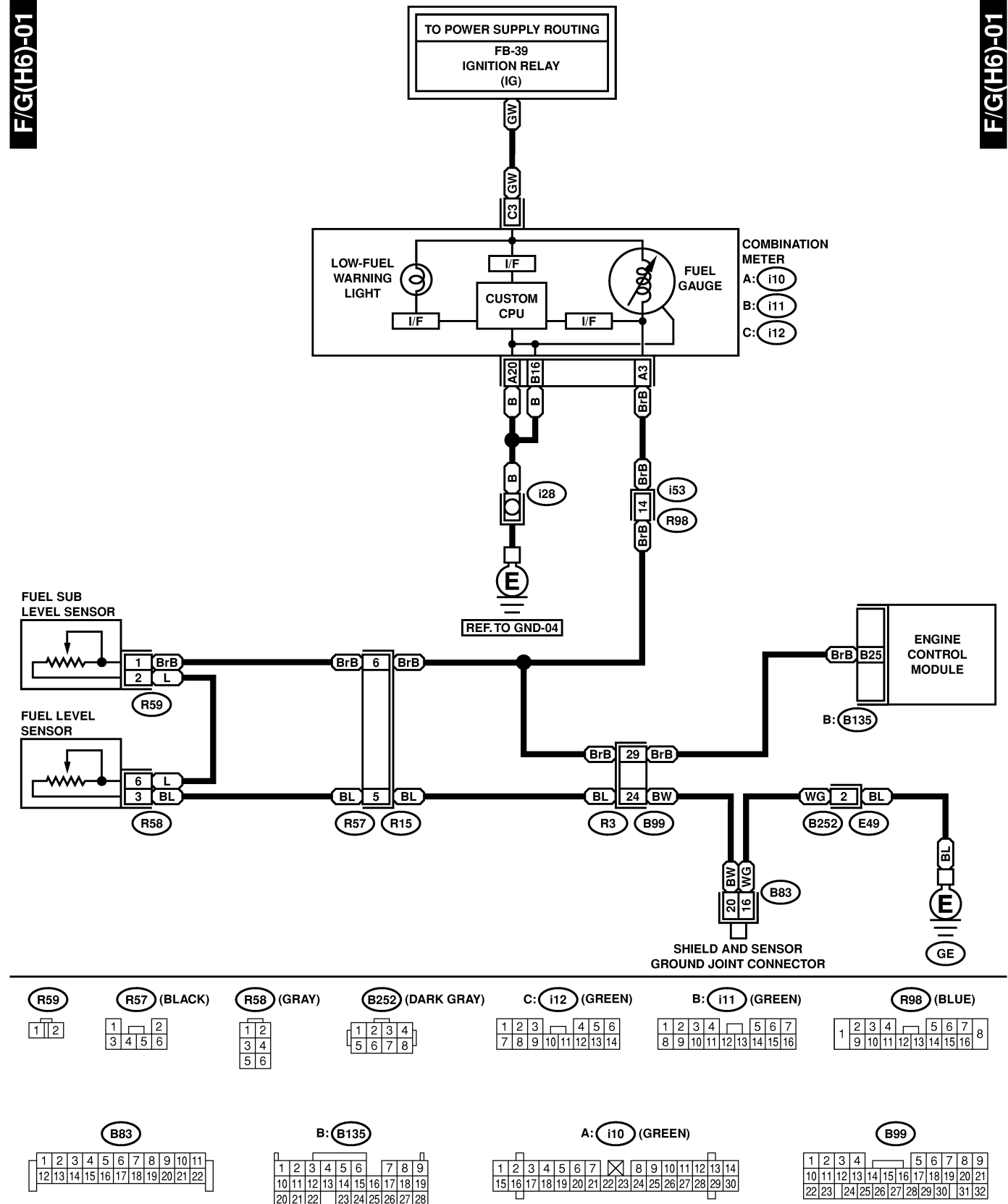
FUEL GAUGE SYSTEM

Wiring System

2. 6-CYLINDER ENGINE MODEL S903046A2102

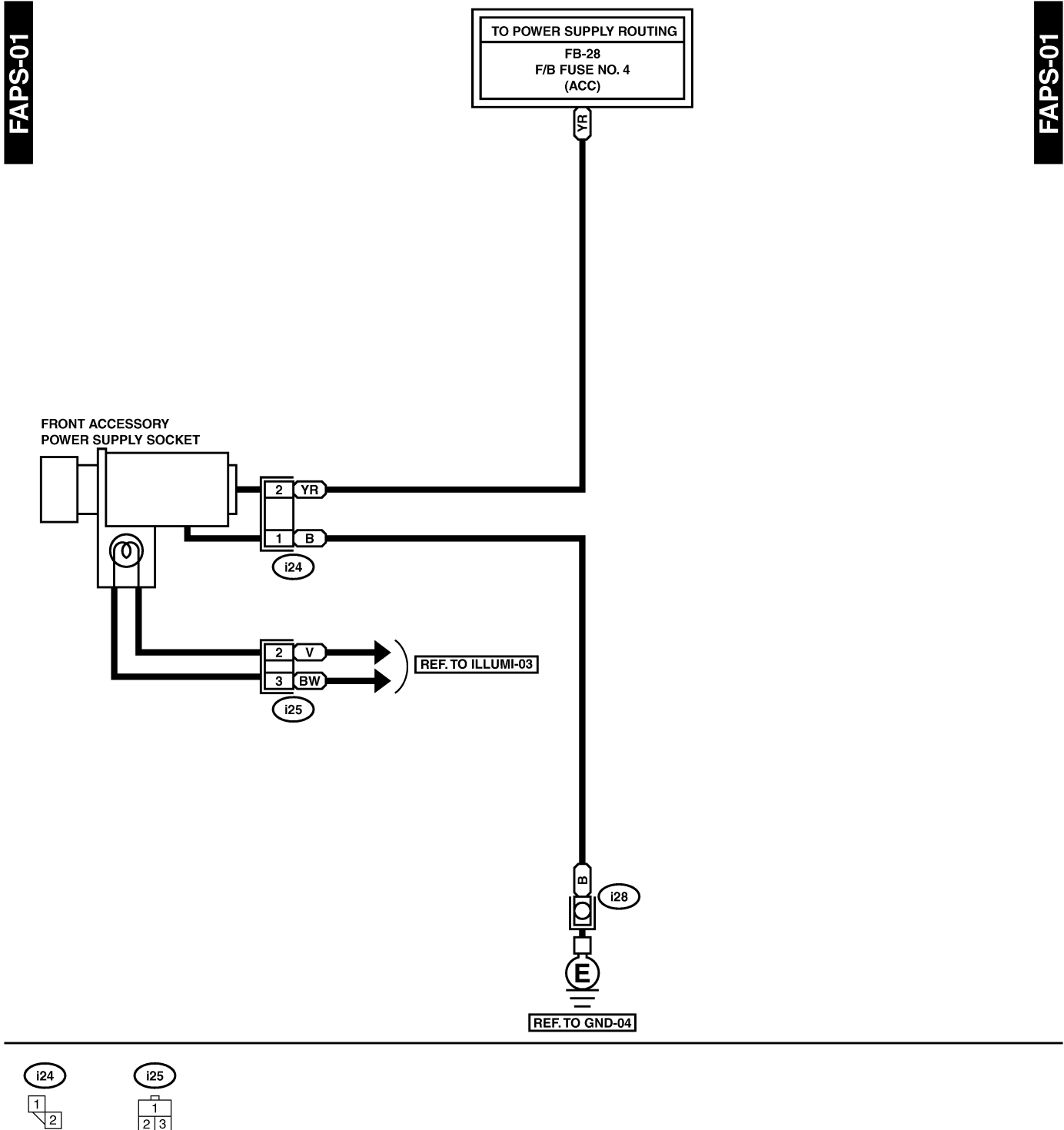
F/G(H6)-01

F/G(H6)-01



19. Front Accessory Power Supply System S903664

A: SCHEMATIC S903664A21

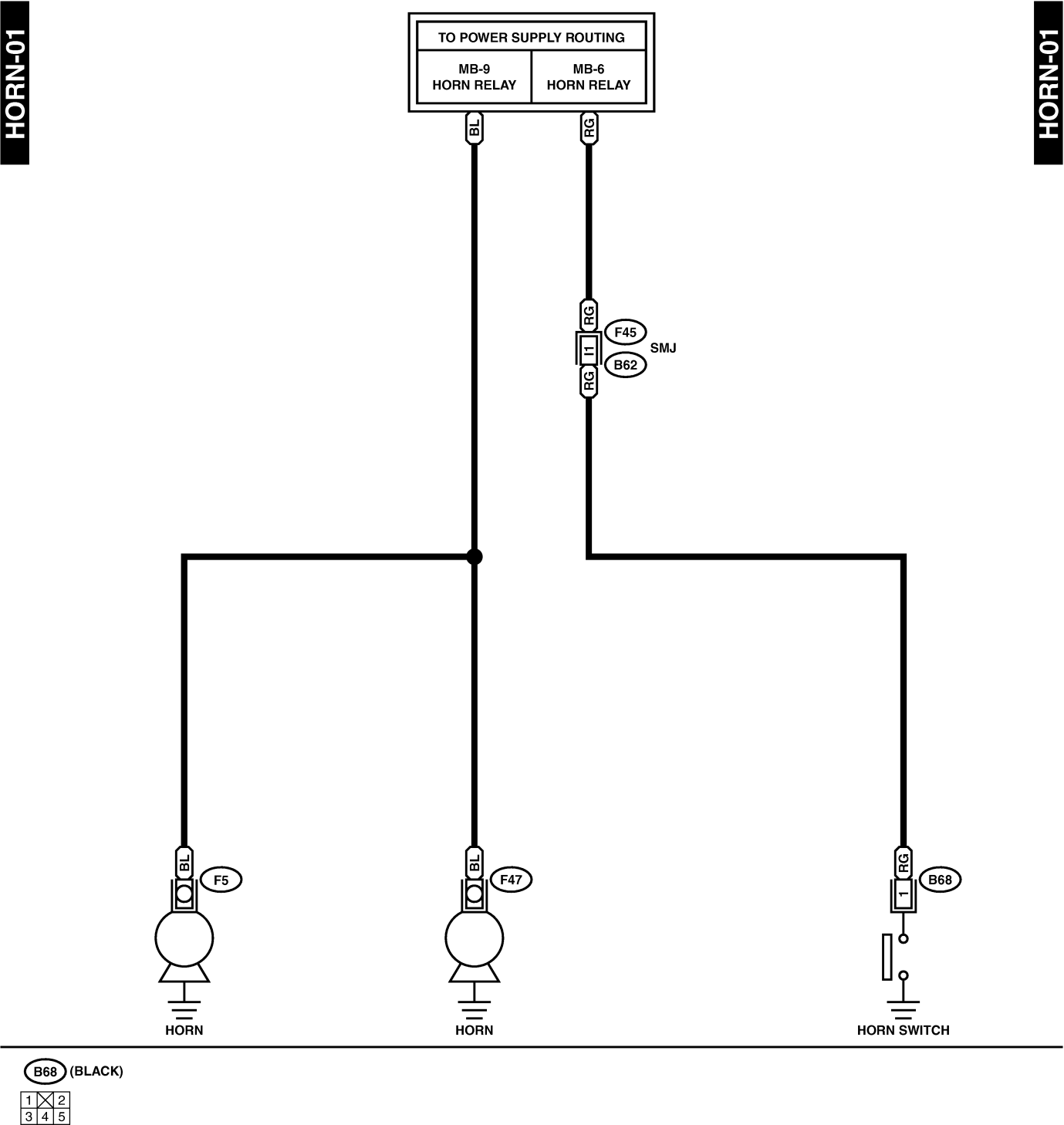


HORN SYSTEM

Wiring System

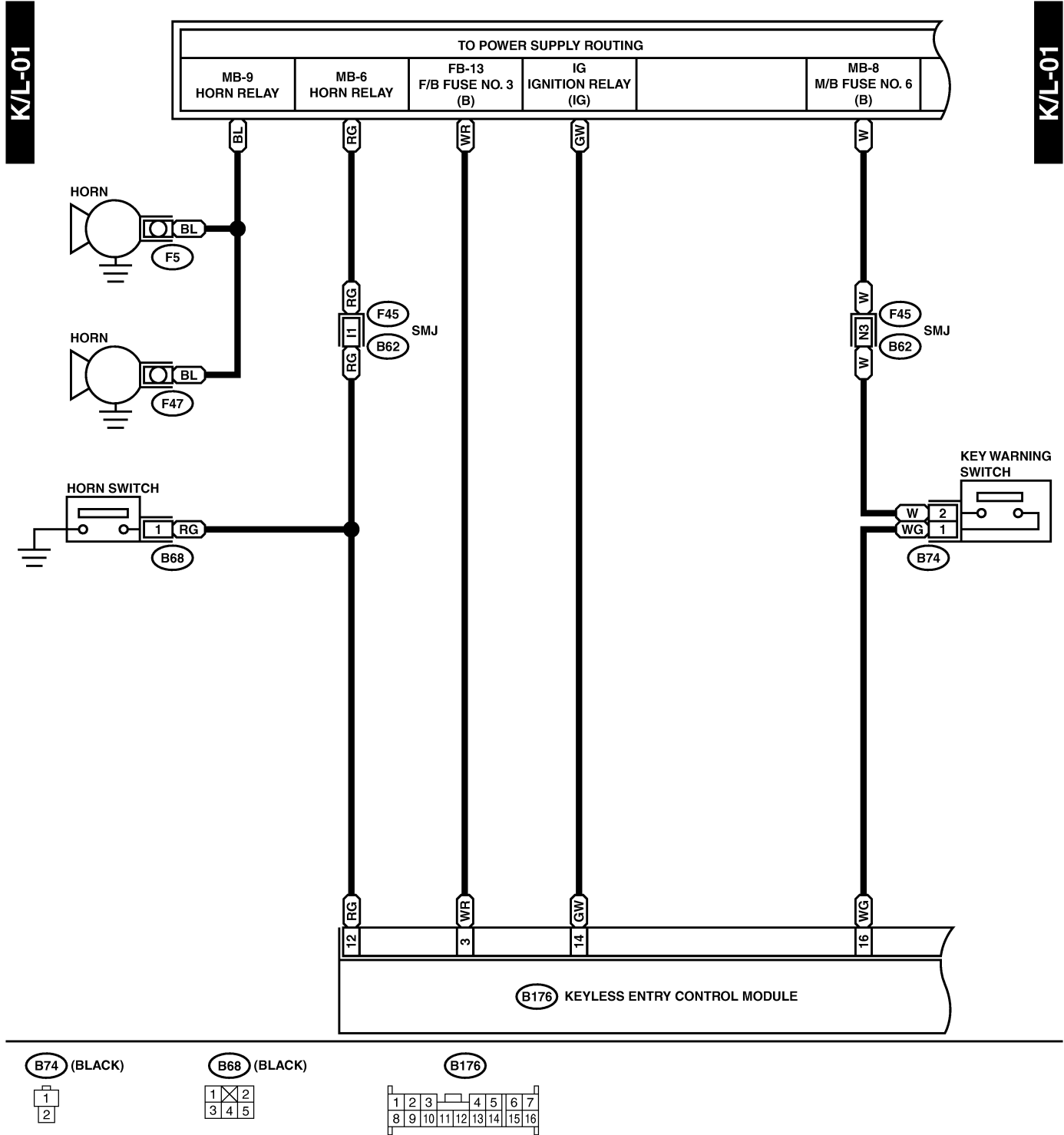
20. Horn System S903436

A: SCHEMATIC S903436A21



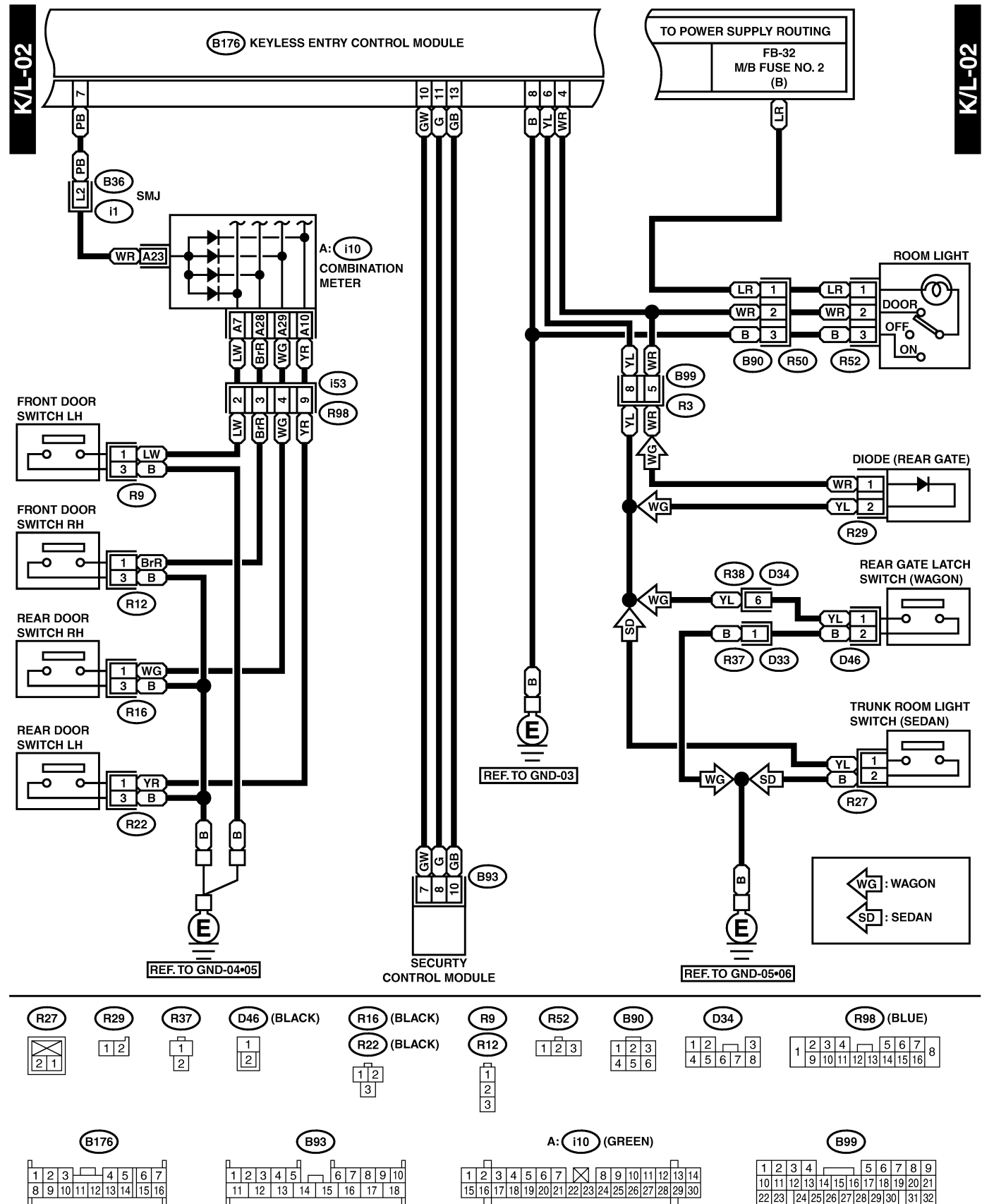
21. Keyless Entry System

A: SCHEMATIC



KEYLESS ENTRY SYSTEM

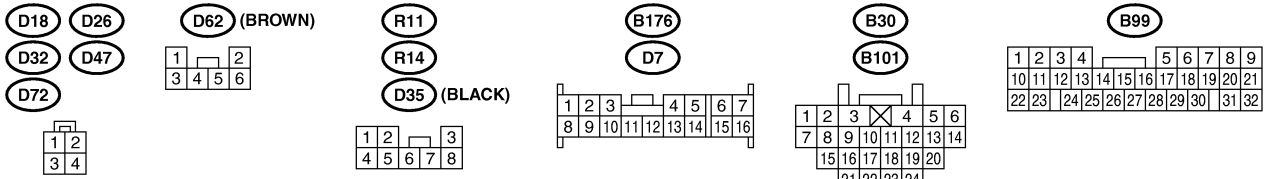
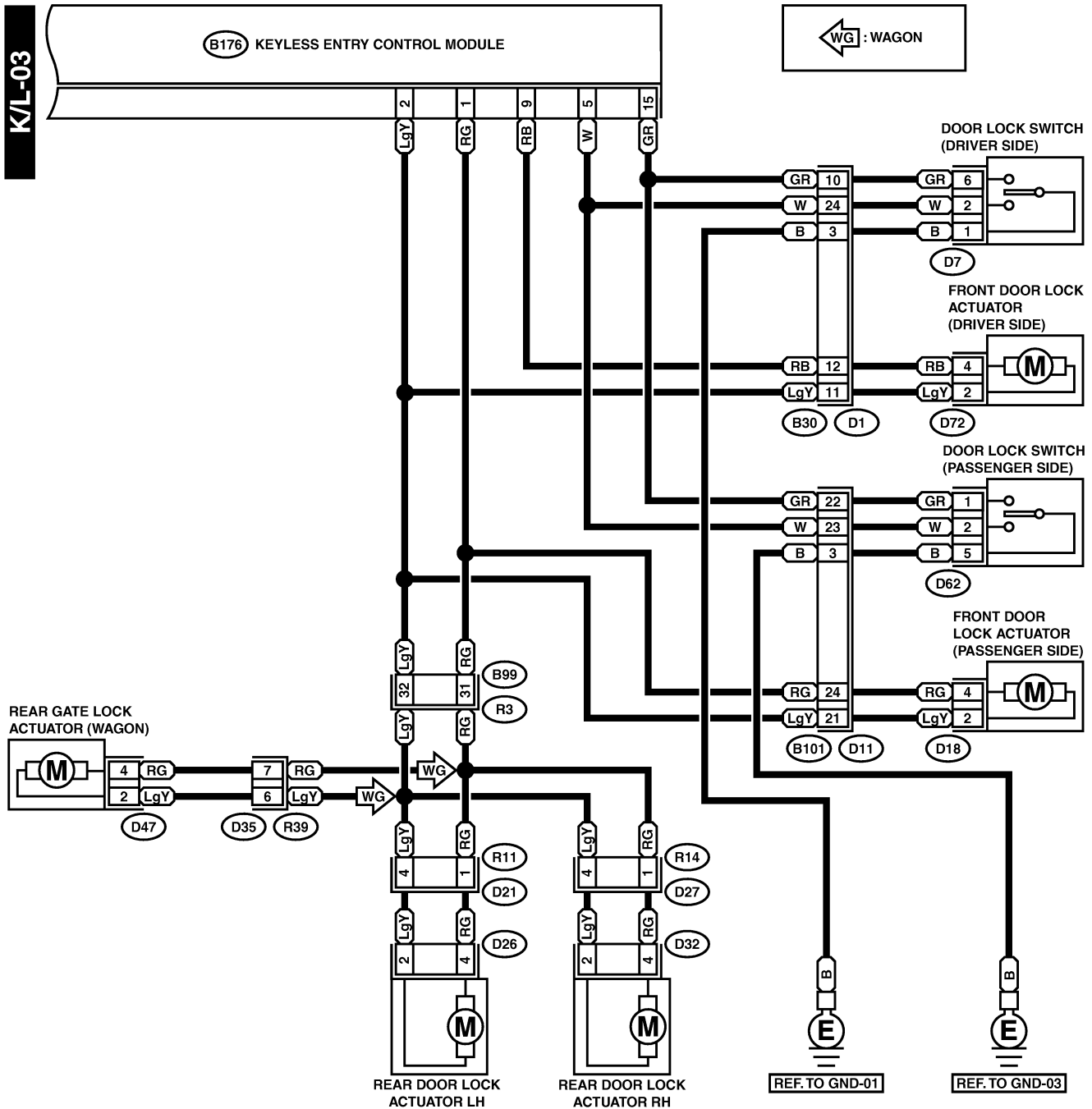
Wiring System



BU77-20B

KEYLESS ENTRY SYSTEM

Wiring System



BACK-UP LIGHT SYSTEM

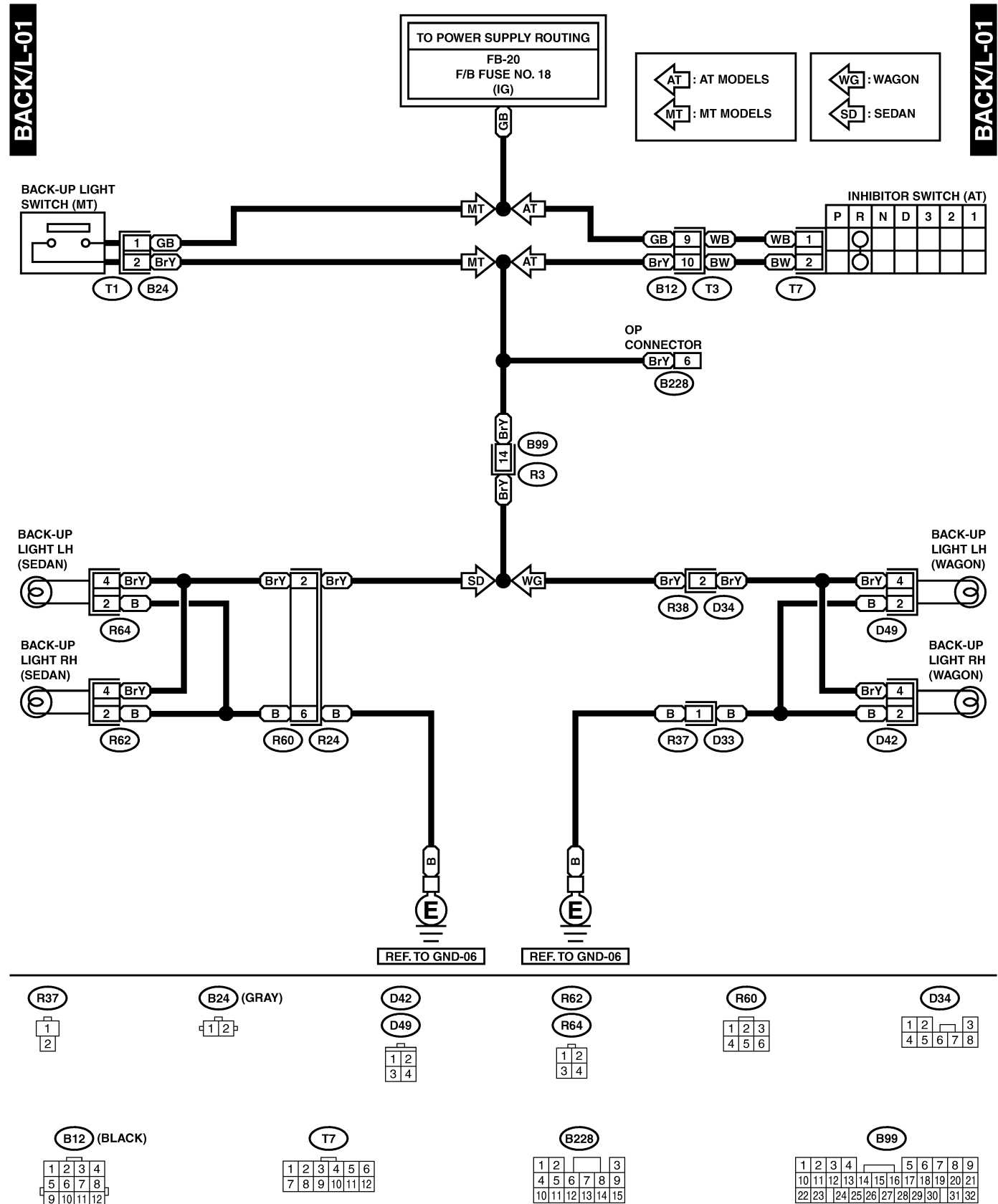
Wiring System

22. Back-up Light System

S903414

A: SCHEMATIC

S903414A21



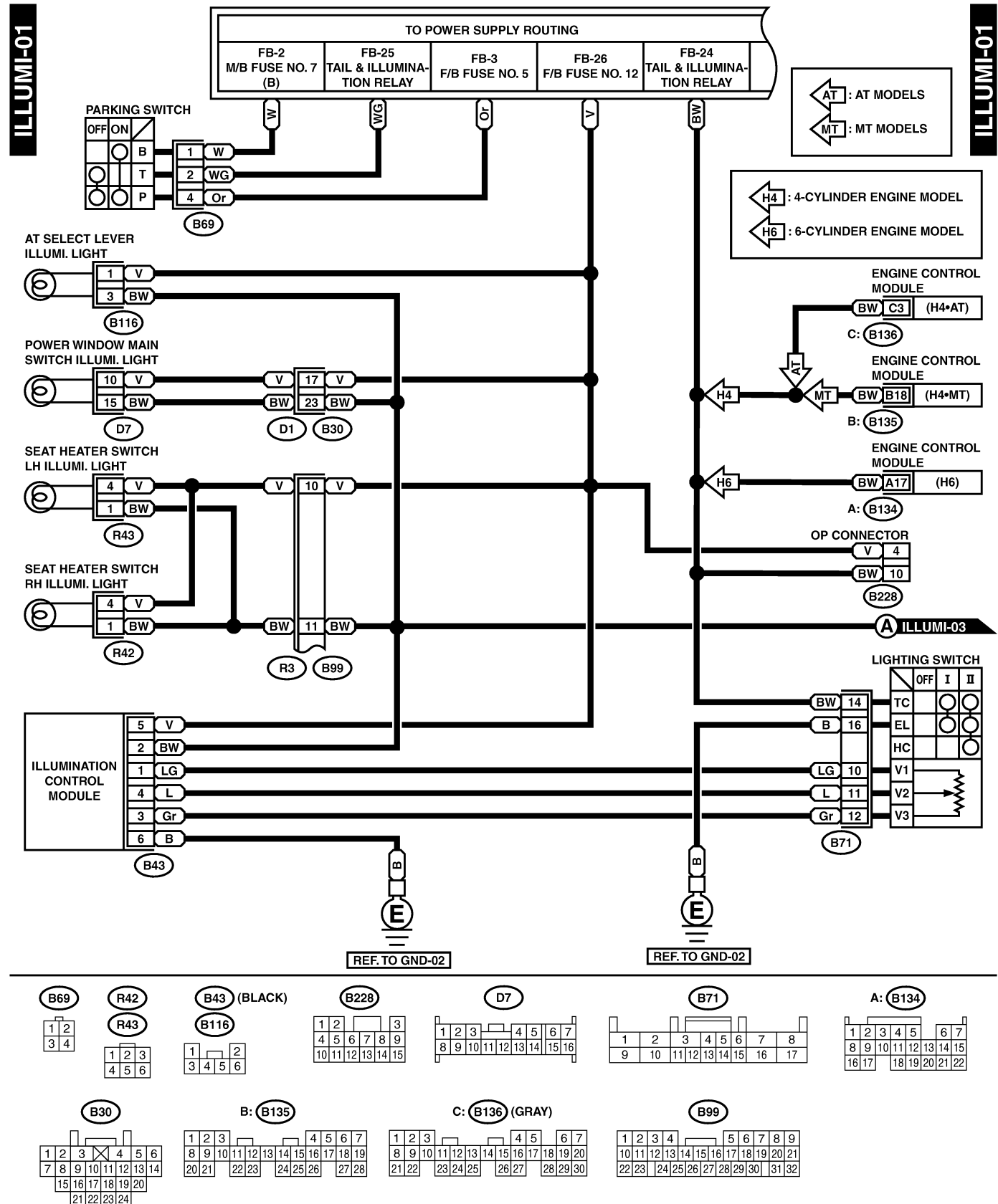
BU29-21

23. Clearance Light and Illumination Light System

S903489

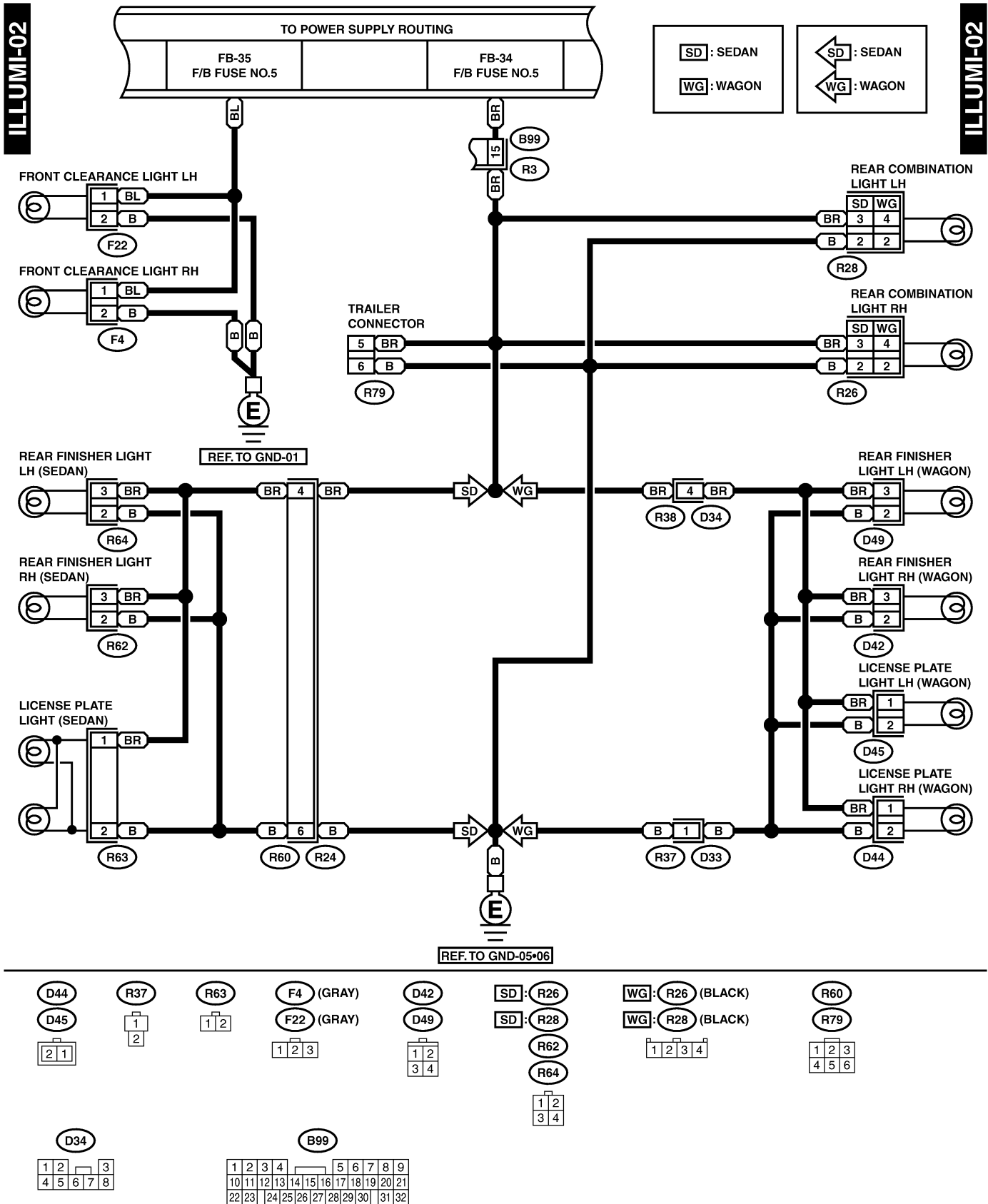
A: SCHEMATIC

S903489A21



CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

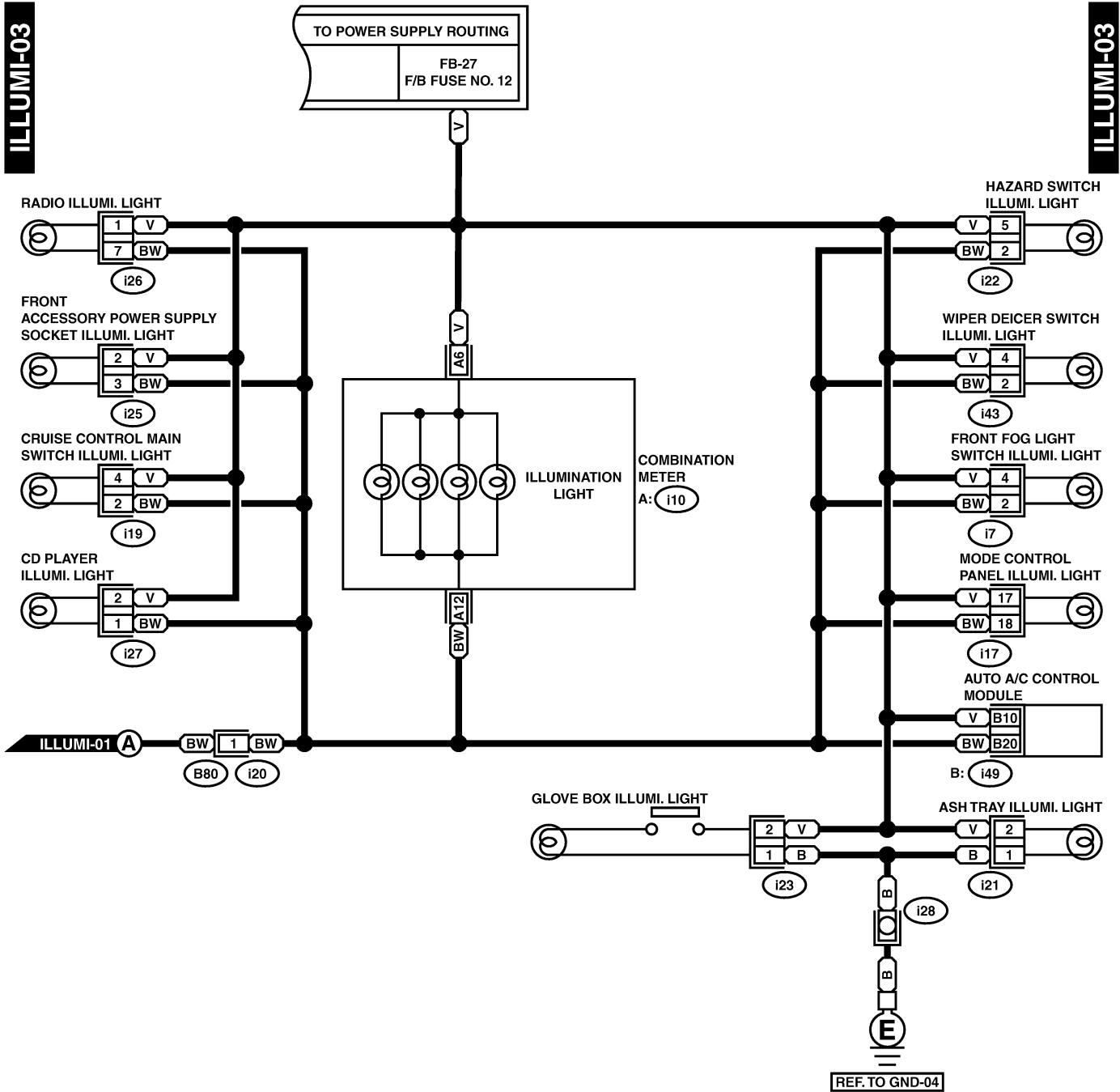
Wiring System



BU21-21B

CLEARANCE LIGHT AND ILLUMINATION LIGHT SYSTEM

Wiring System



i21 (BLACK)



i23



i25



i7 (YELLOW)

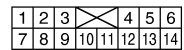
i19 (BROWN)



i20

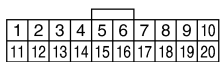


i26

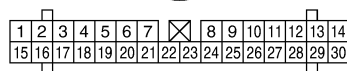


i17 (GRAY)

B: i49 (GRAY)



A: i30 (GREEN)



Wiring System

S903473

S903473A21

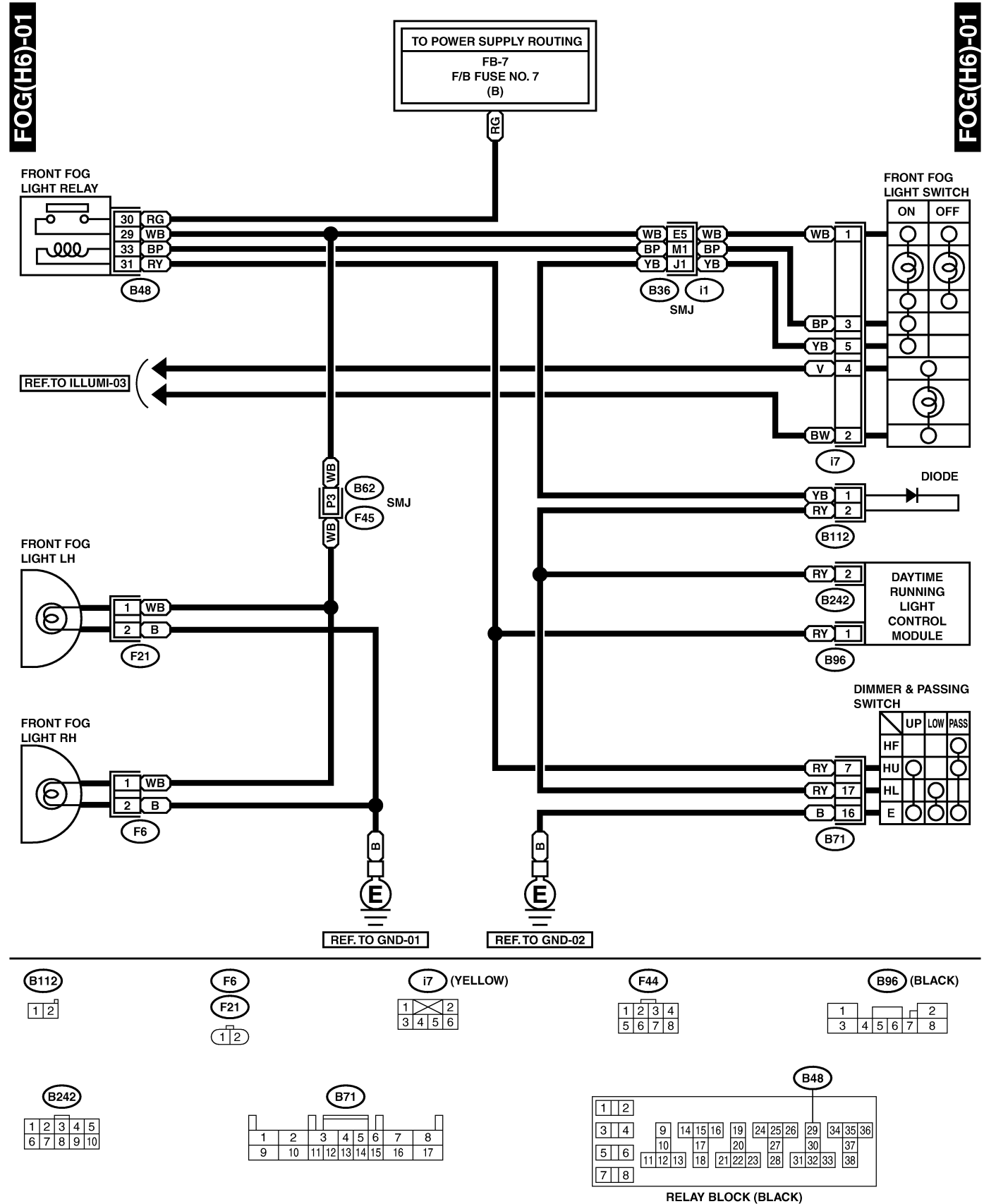
S903473A2103



FRONT FOG LIGHT SYSTEM

Wiring System

2. 6-CYLINDER ENGINE MODEL S903473A2104



BU22-22

HEADLIGHT SYSTEM

Wiring System

25. Headlight System

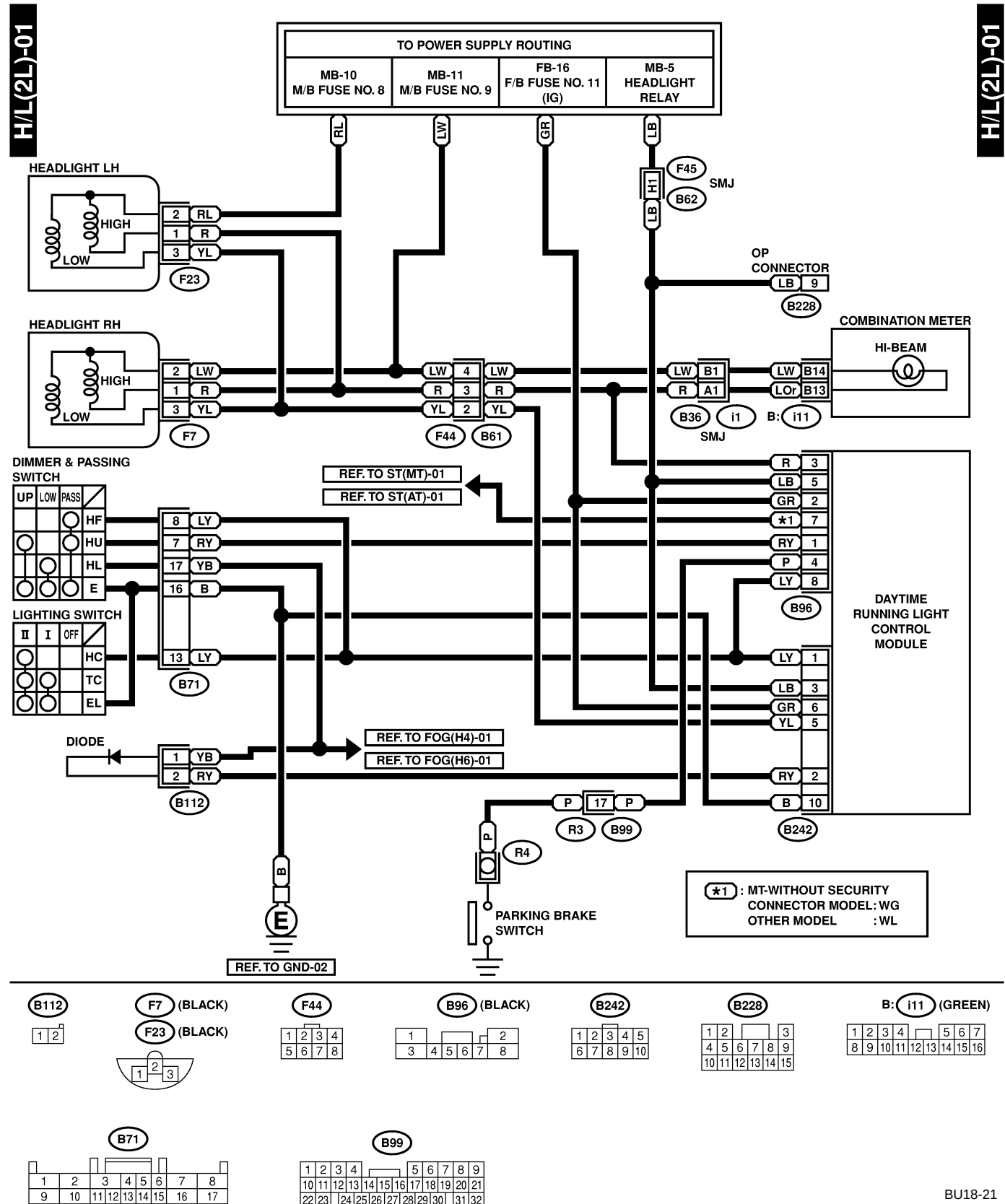
S903474

A: SCHEMATIC

S903474A21

1. 2-LIGHT MODEL

S903474A2103



Wiring System

H/L(4L)-01

TO POWER SUPPLY ROUTING

MB-10 M/B FUSE NO. 8	MB-11 M/B FUSE NO. 9	FB-16 F/B FUSE NO. 11 (IG)	MB-5 HEADLIGHT RELAY

HEADLIGHT LH

HIGH

LOW

HEADLIGHT RH

HIGH

LOW

DIMMER & PASSING SWITCH

UP	LOW	PASS	
			HF
			HU
			HL
			E

LIGHTING SWITCH

II	I	OFF	
			HC
			TC
			EL

DIODE

DAYTIME RUNNING LIGHT RELAY

COMBINATION METER

B: i11

HI-BEAM

DAYTIME RUNNING LIGHT CONTROL MODULE

PARKING BRAKE SWITCH

WIRING DIAGRAM

LEGEND

*1: MT-WITHOUT SECURITY CONNECTOR MODEL : WG
OTHER MODELS : WL



IN COMPARTMENT LIGHT SYSTEM

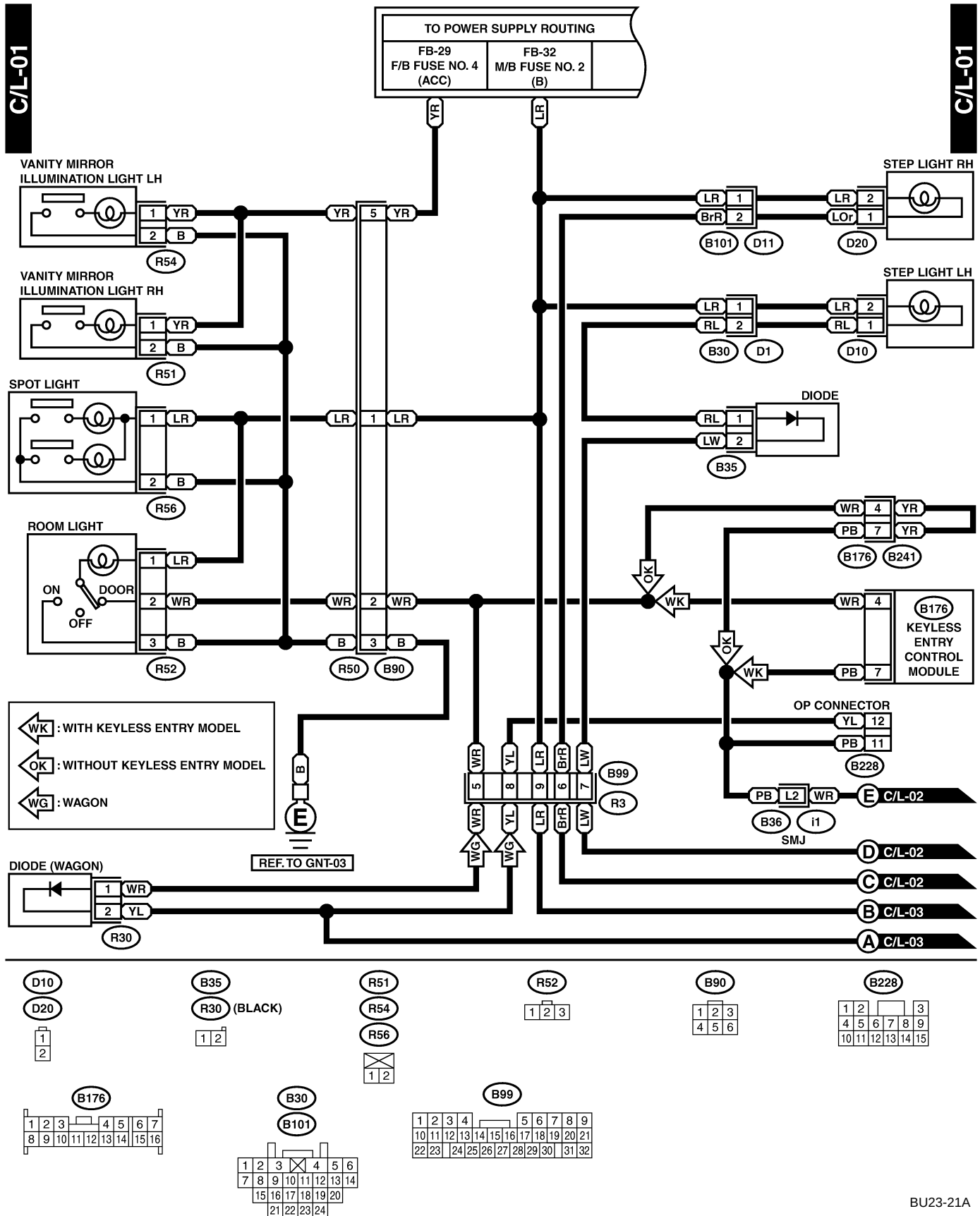
Wiring System

26. In Compartment Light System

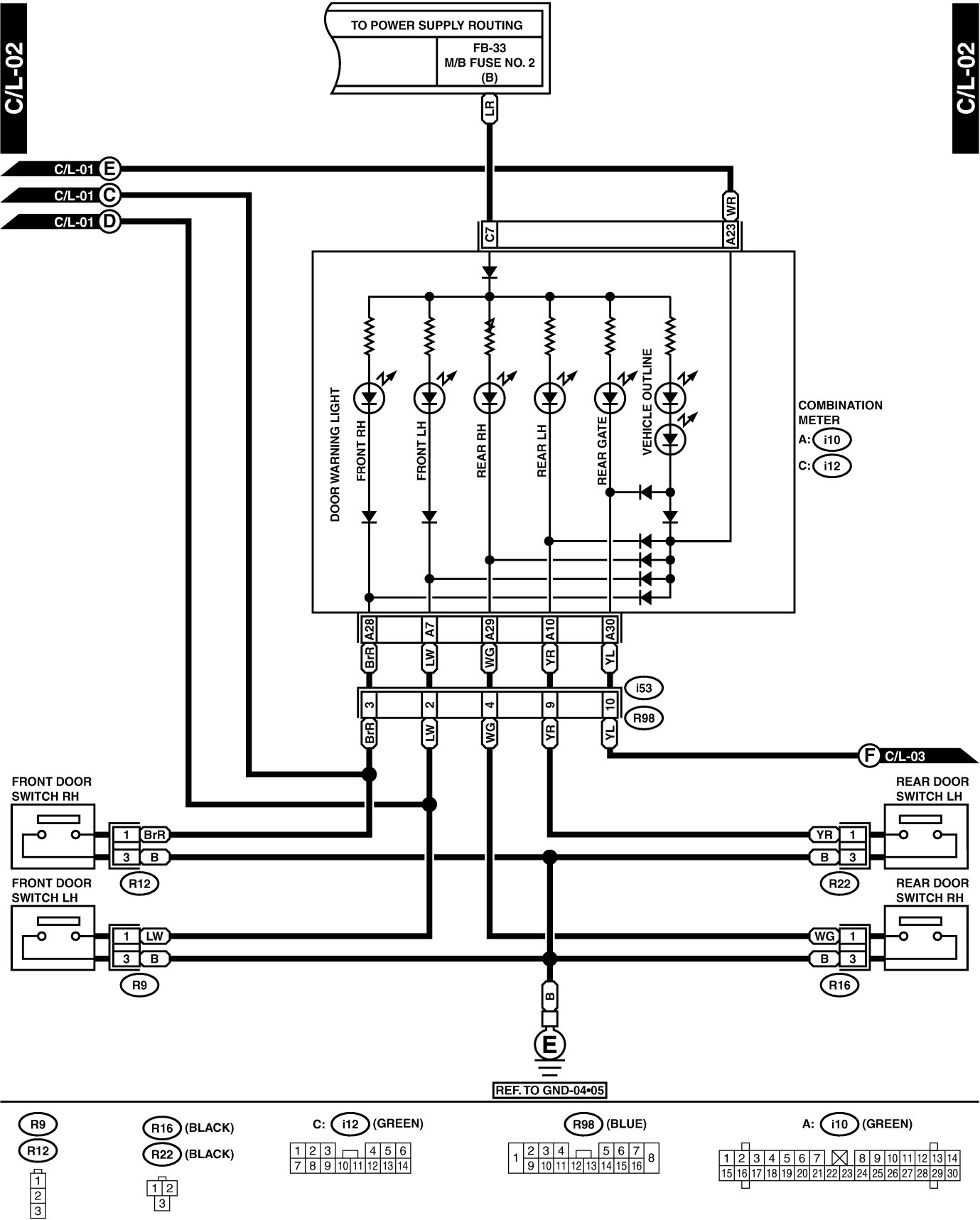
S903665

A: SCHEMATIC

S903665A21

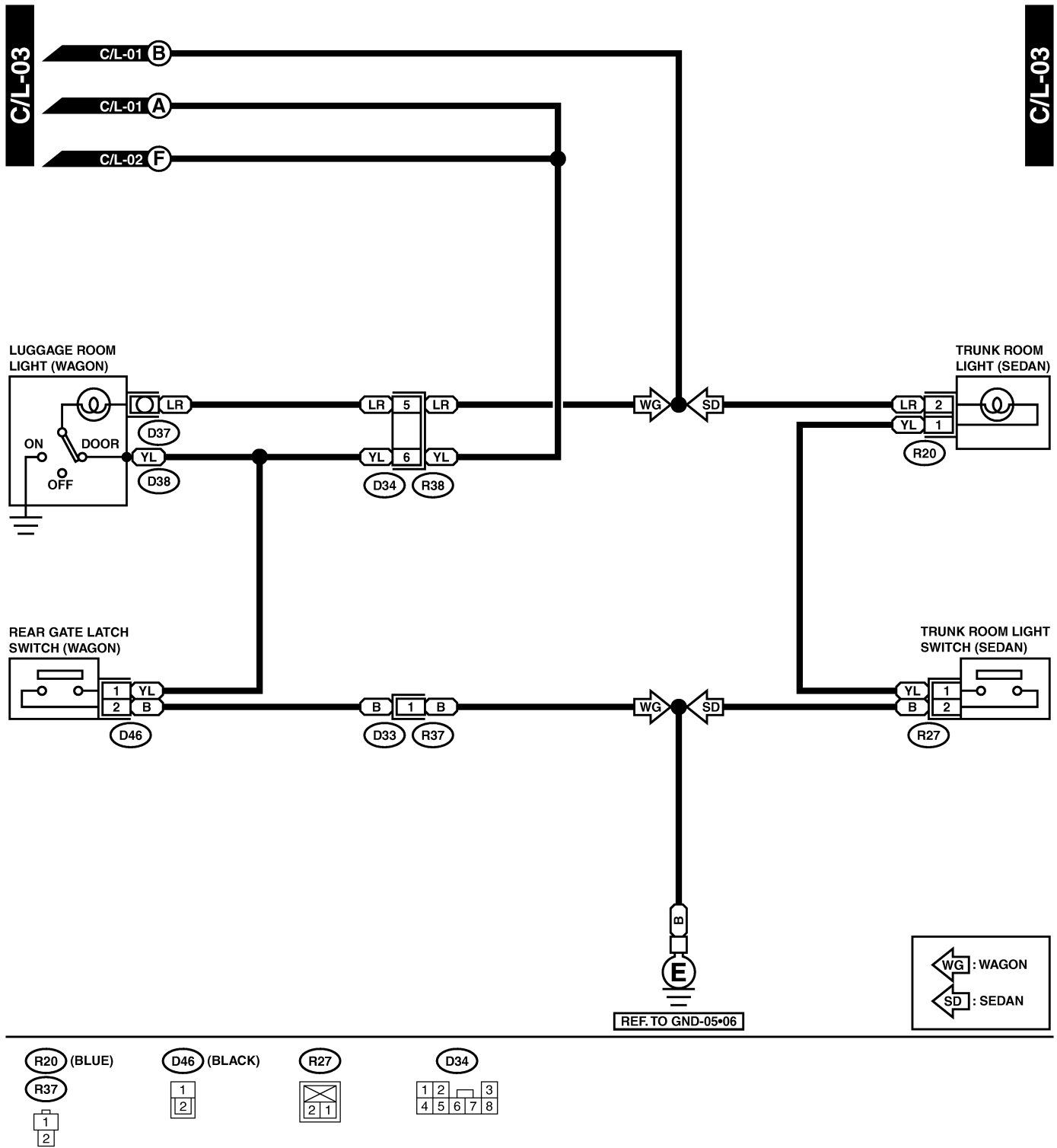


BU23-21A



IN COMPARTMENT LIGHT SYSTEM

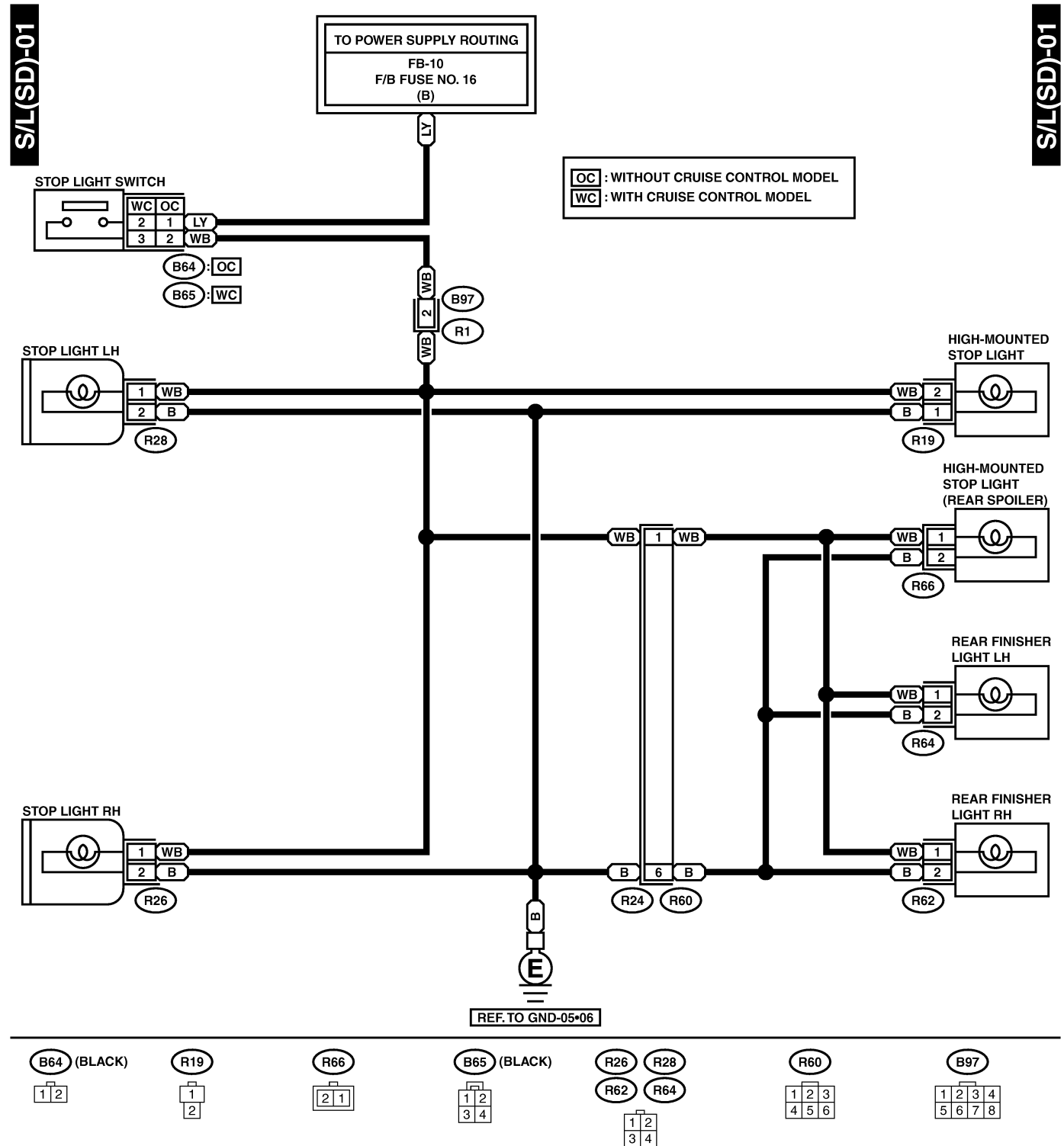
Wiring System



27. Stop Light System S903417

A: SCHEMATIC S903417A21

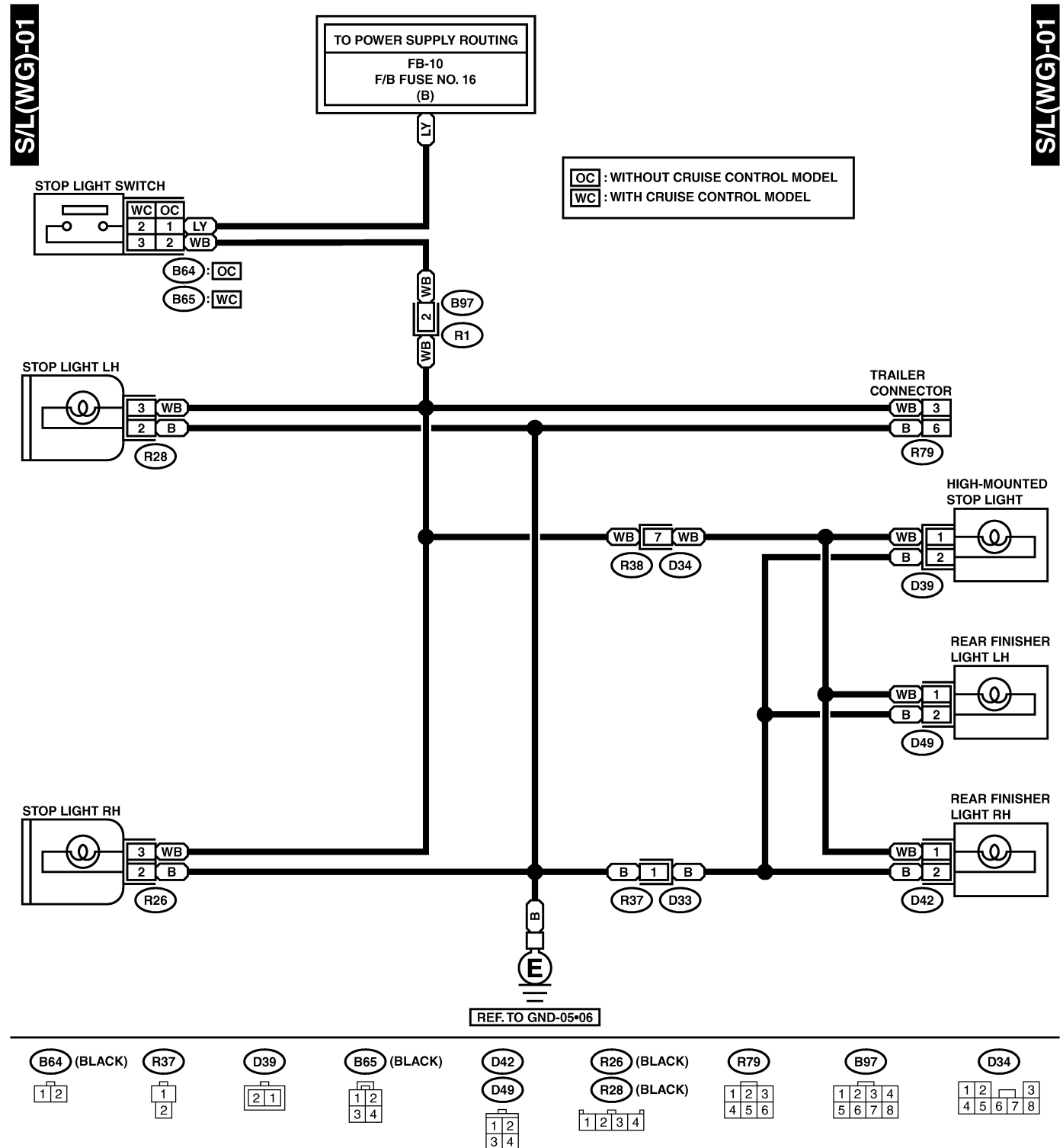
1. SEDAN MODEL S903417A2101



STOP LIGHT SYSTEM

Wiring System

2. WAGON MODEL S903417A2102

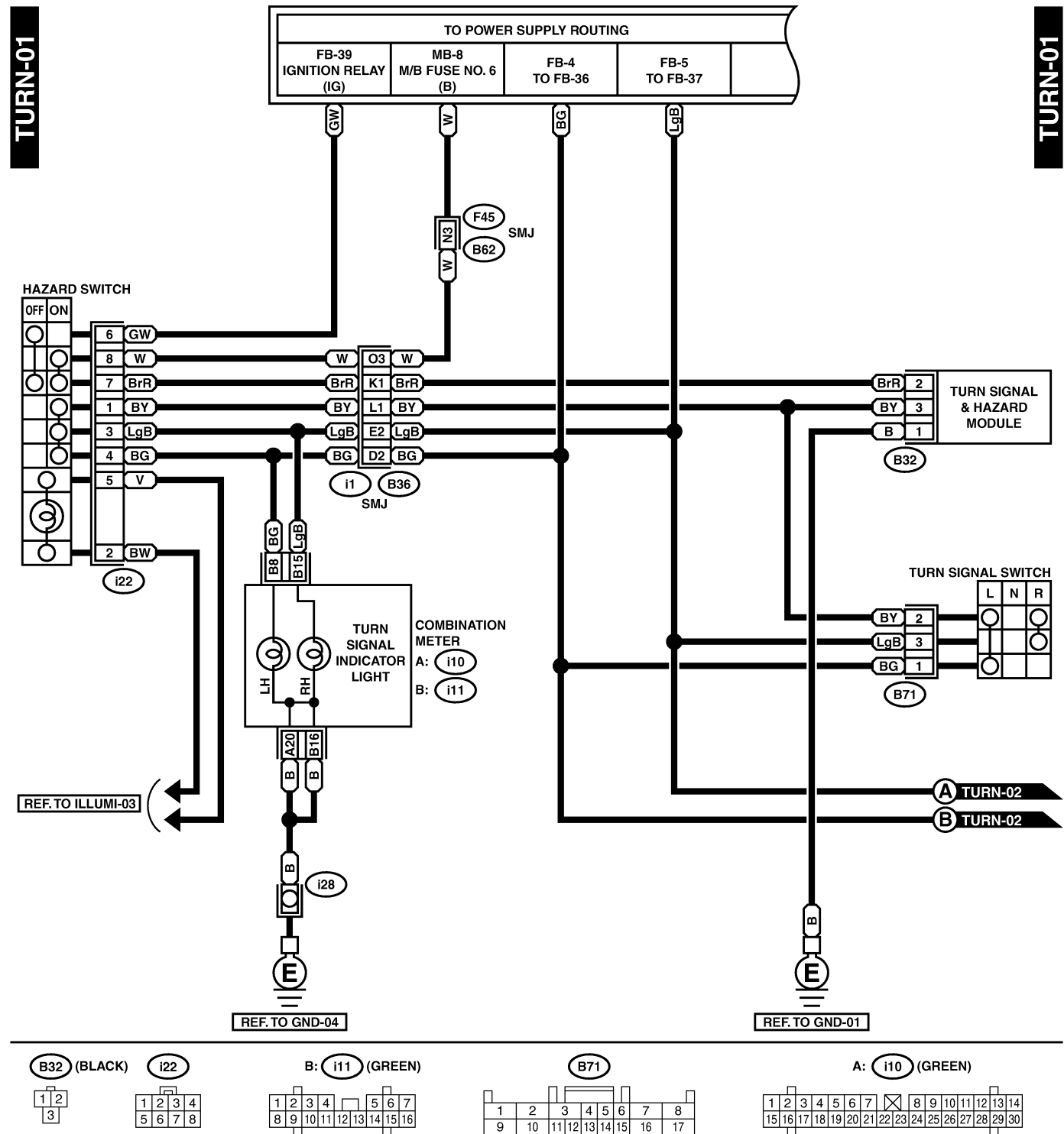


28. Turn Signal Light and Hazard Light System

S903481

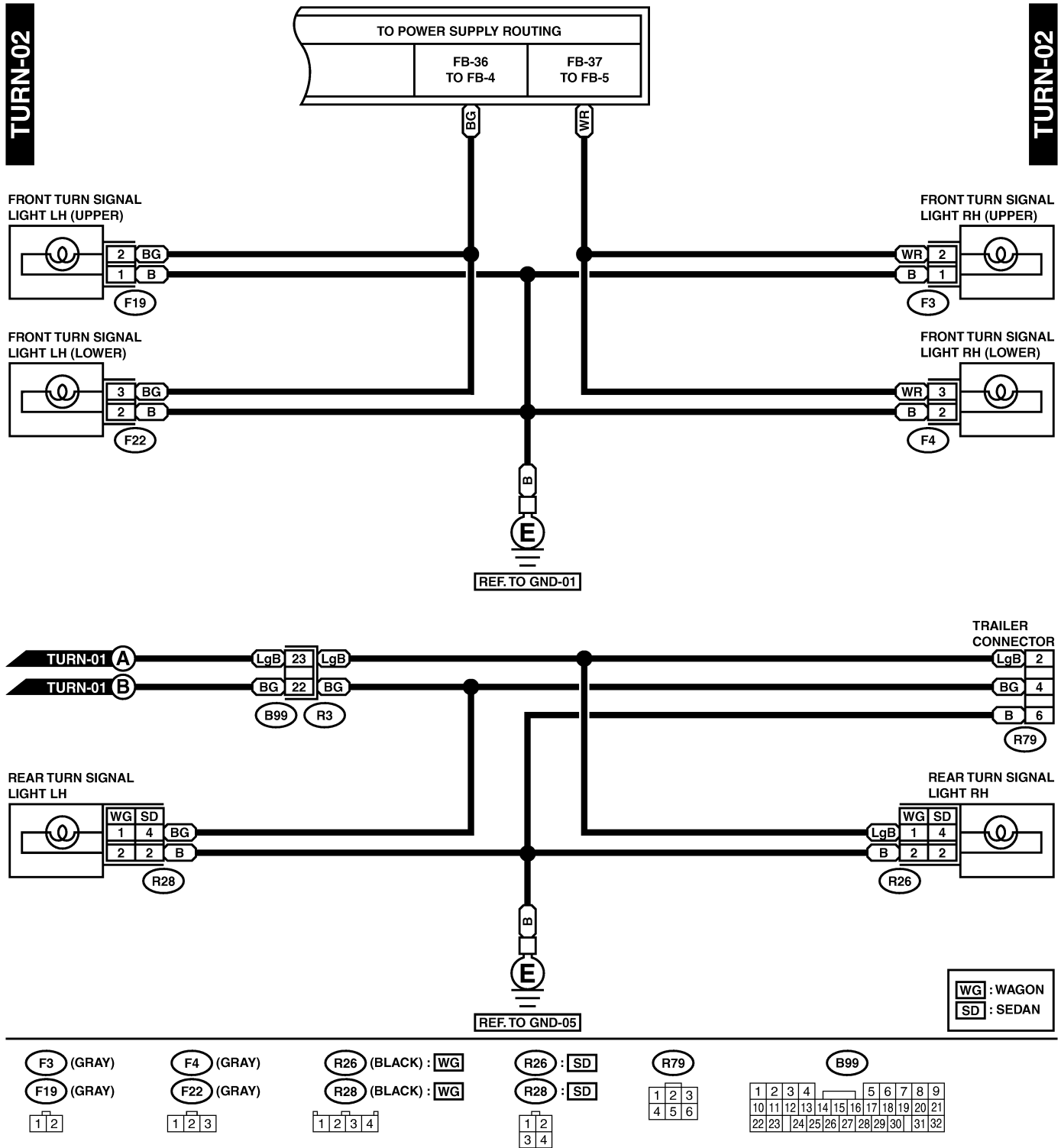
A: SCHEMATIC

S903481A21



TURN SIGNAL LIGHT AND HAZARD LIGHT SYSTEM

Wiring System



S903666

S903666A21



OIL PRESSURE WARNING LIGHT SYSTEM

Wiring System

30. Oil Pressure Warning Light System

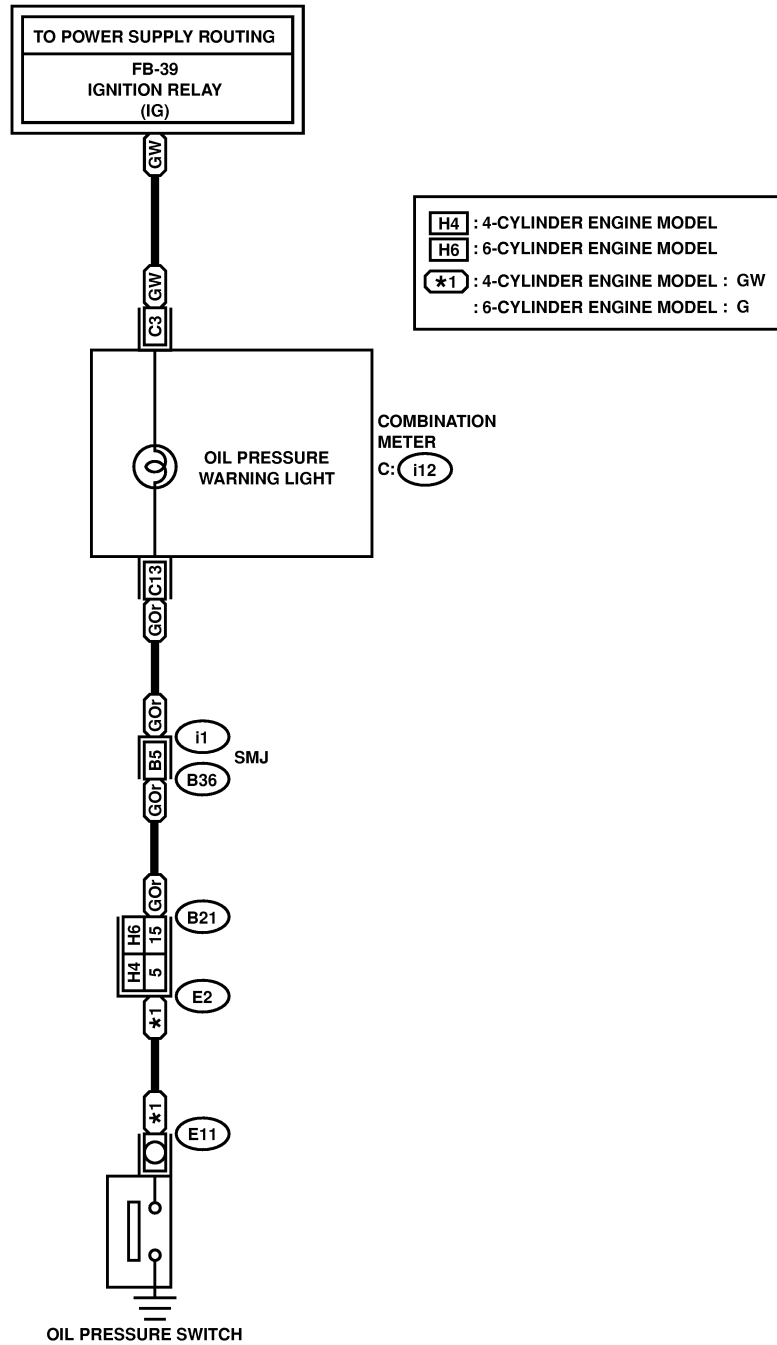
S903667

A: SCHEMATIC

S903667A21

OIL/P-01

OIL/P-01



C: i12 (GREEN)

1	2	3	4	5	6
7	8	9	10	11	12
13	14				

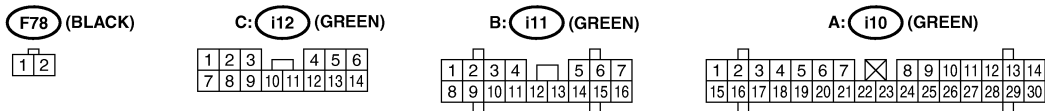
B21 (GRAY) : H4
(LIGHT GRAY) : H6

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20

A: SCHEMATIC S903668A21

O/TEMP-01

O/TEMP-01

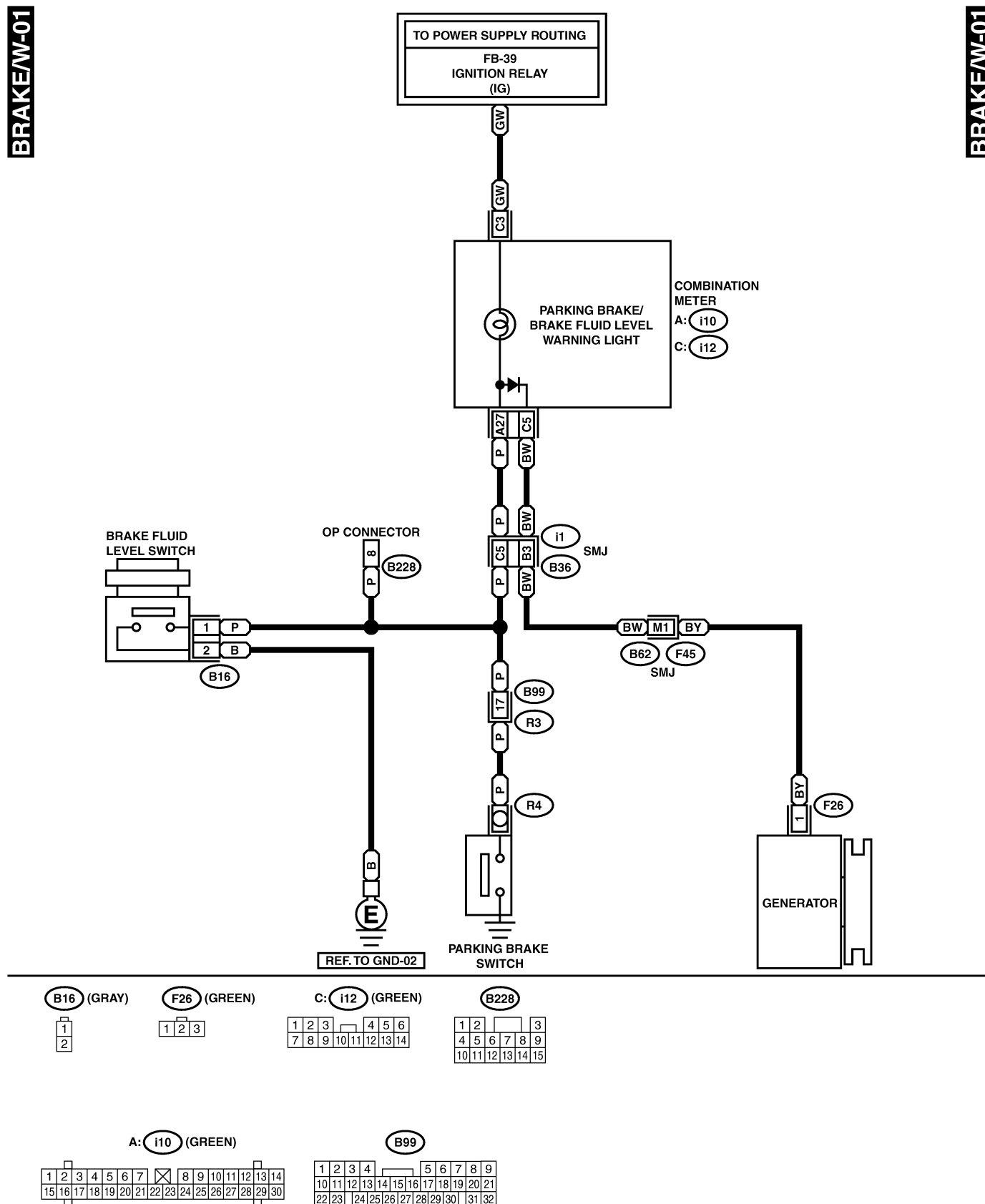


PARKING BRAKE AND BRAKE FLUID LEVEL WARNING SYSTEM

Wiring System

32. Parking Brake and Brake Fluid Level Warning System S903478

A: SCHEMATIC S903478A21

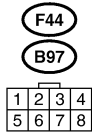
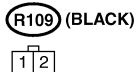
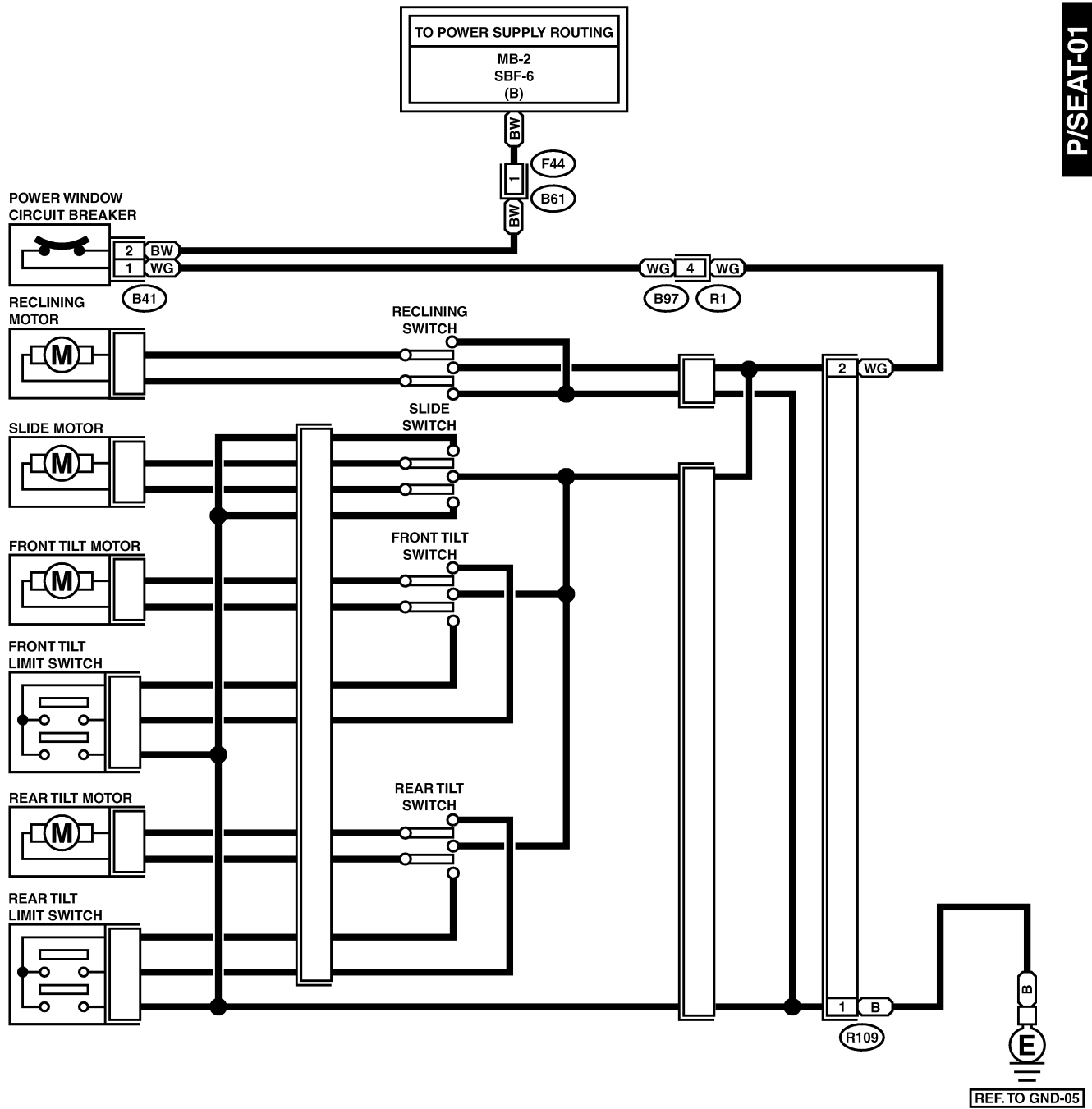


33. Power Seat System S903669

A: SCHEMATIC S903669A21

P/SEAT-01

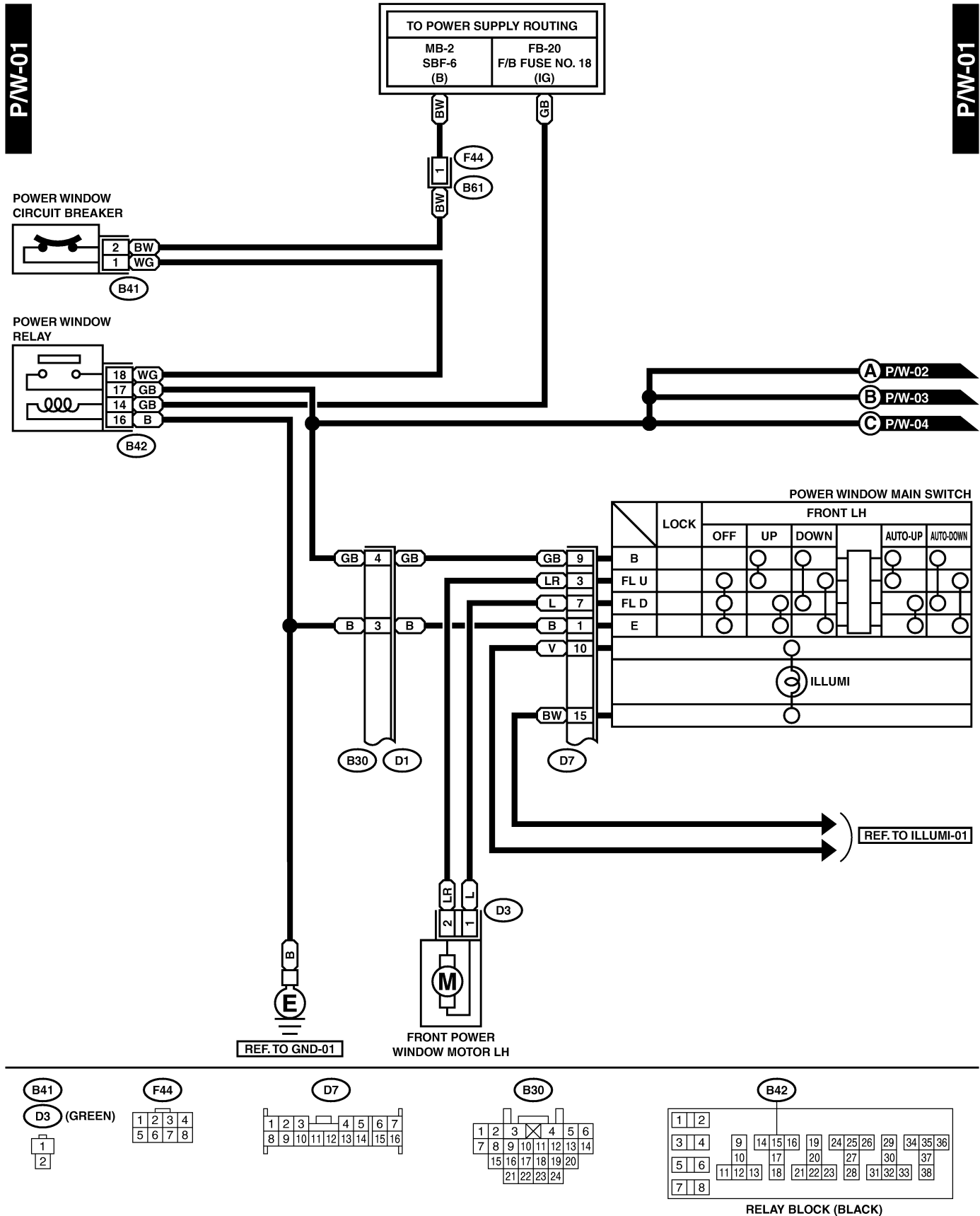
P/SEAT-01



34. Power Window System S903456

A: SCHEMATIC

S903456A21

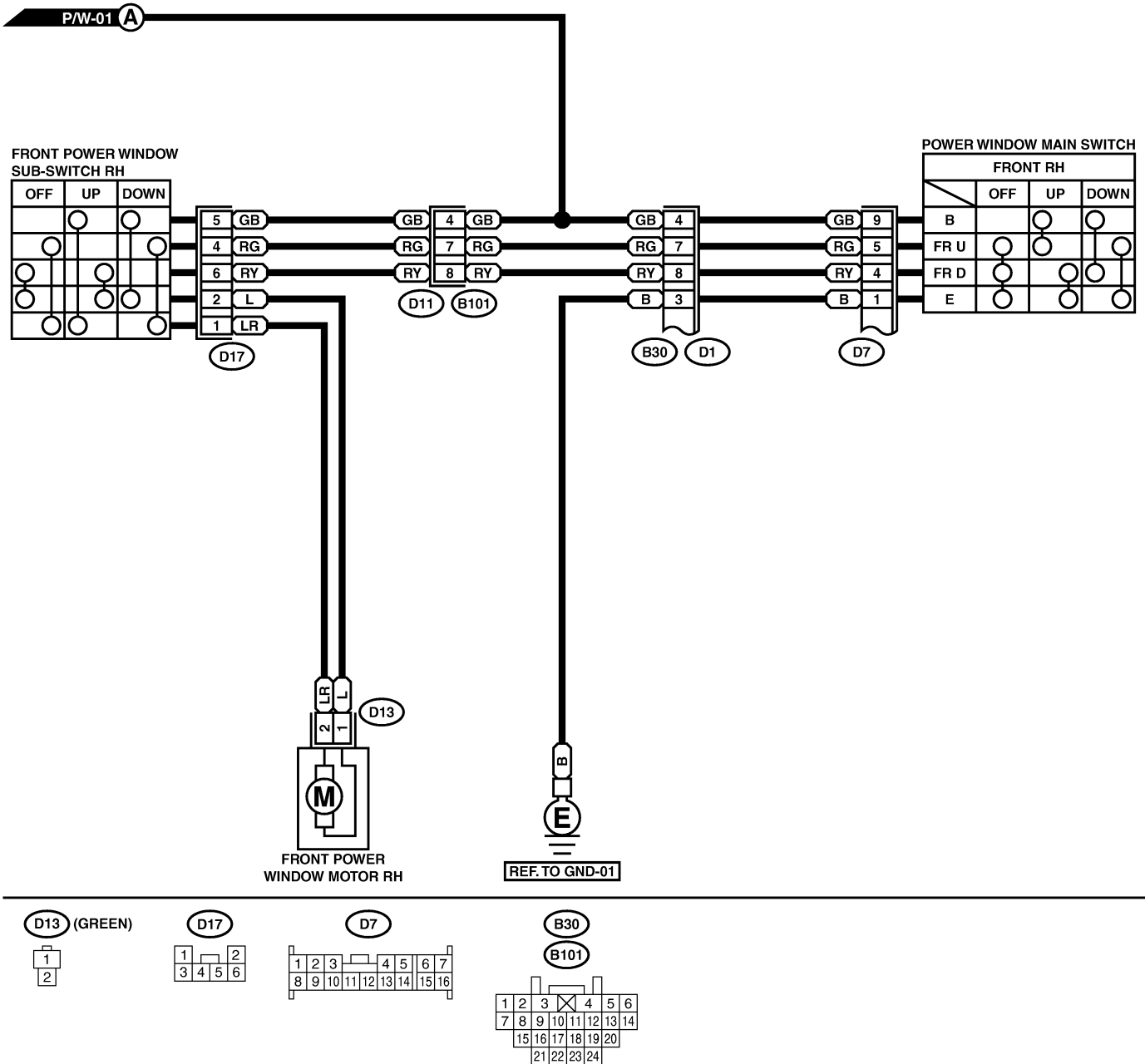


POWER WINDOW SYSTEM

Wiring System

P/W-02

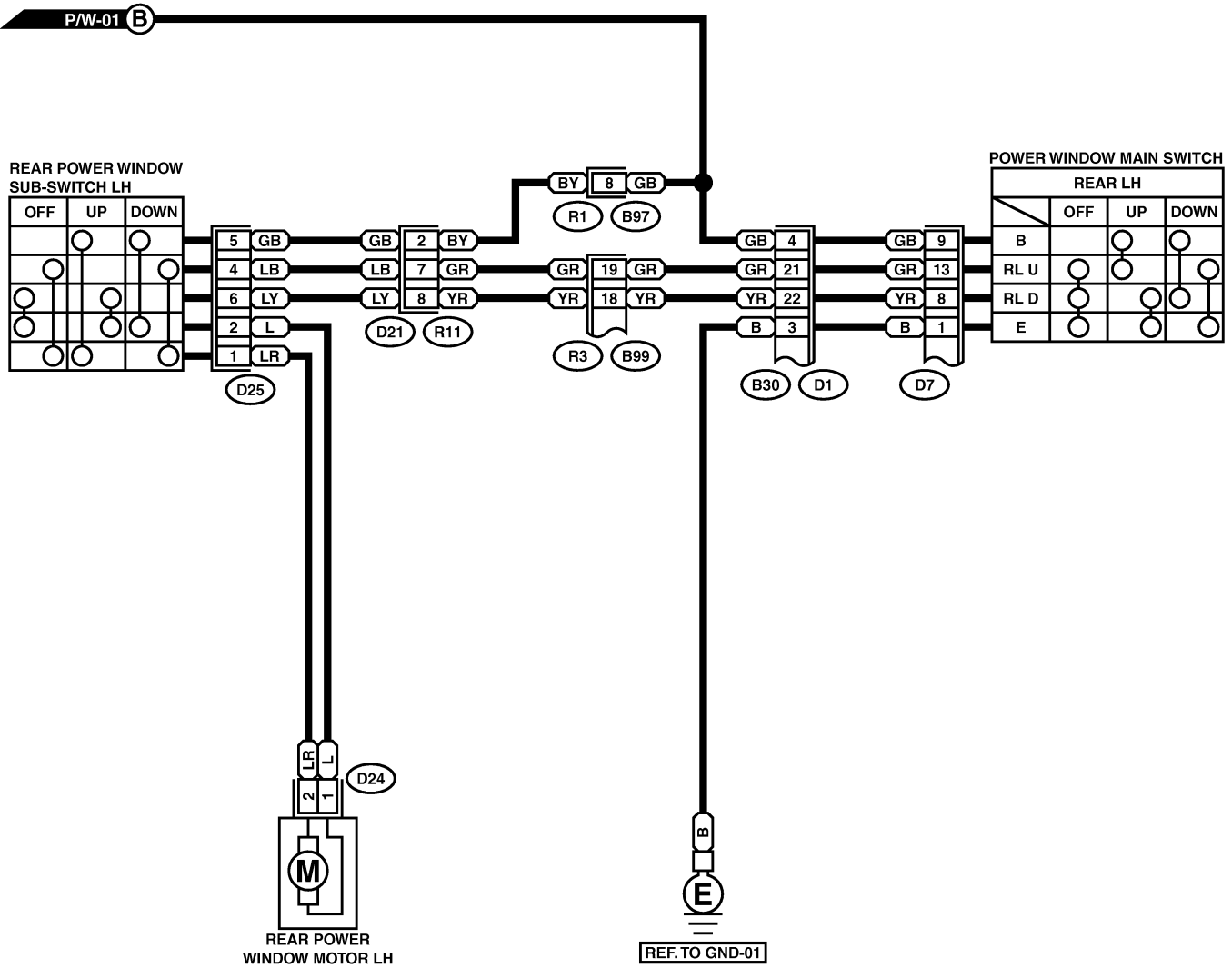
P/W-02



BU70-21B

P/W-03

P/W-03



D24 (GREEN)



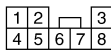
D25



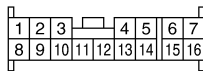
B97



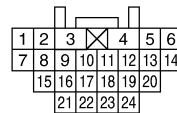
R11



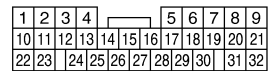
D7



B30



B99

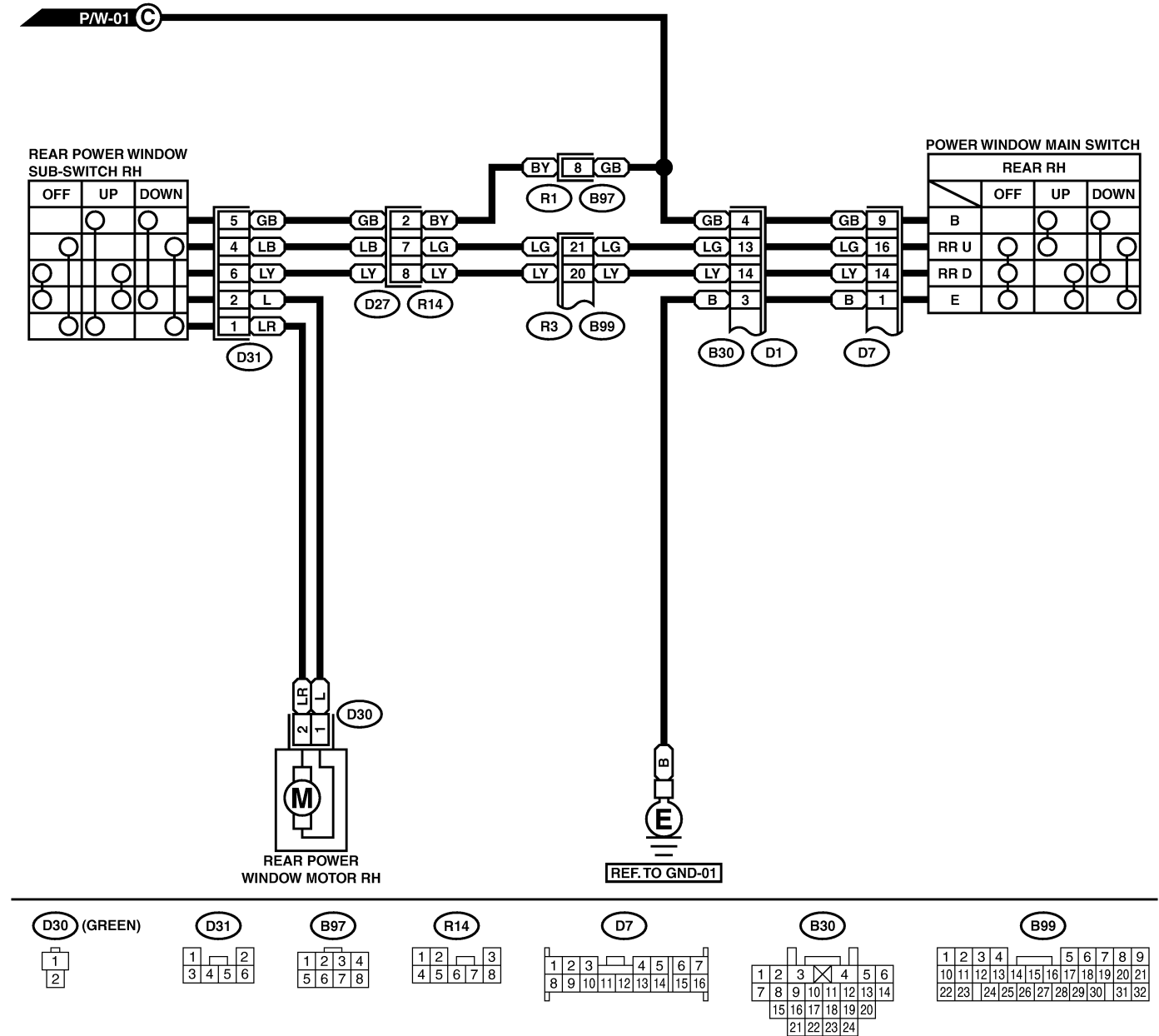


POWER WINDOW SYSTEM

Wiring System

P/W-04

P/W-04

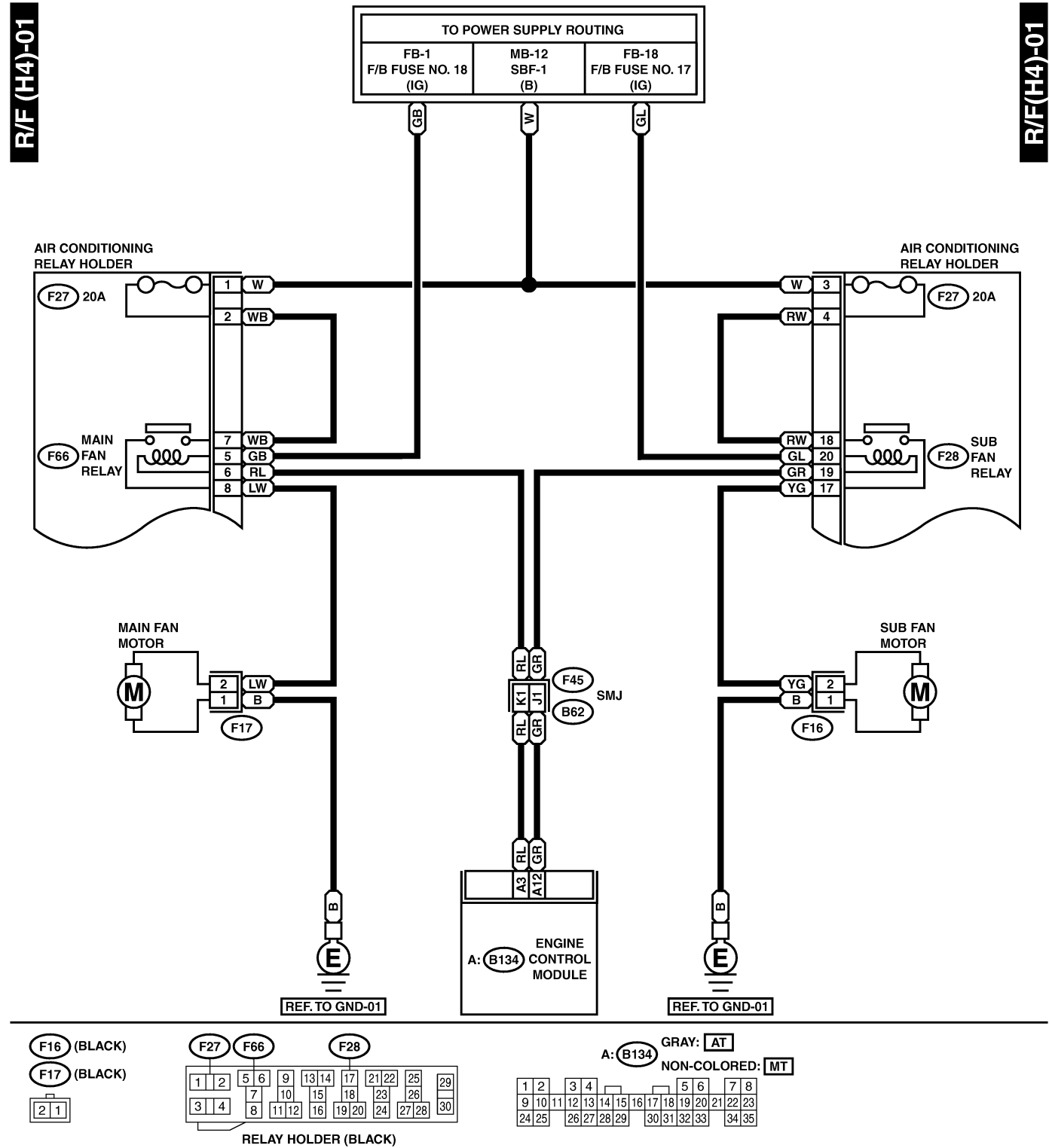


BU70-21D

35. Radiator Fan System S903480

A: SCHEMATIC S903480A21

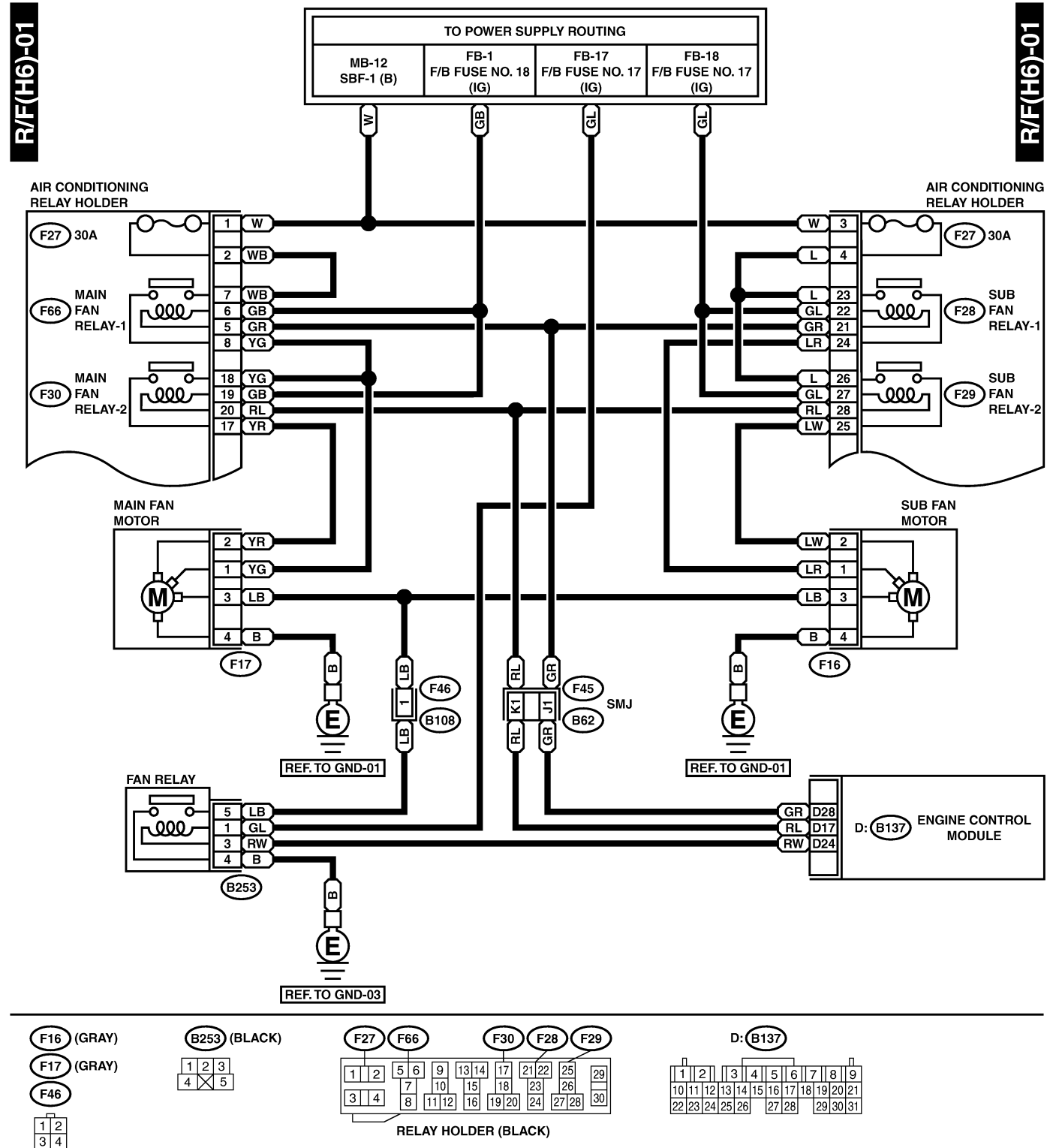
1. 4-CYLINDER ENGINE MODEL S903480A2101



RADIATOR FAN SYSTEM

Wiring System

2. 6-CYLINDER ENGINE MODEL S903480A2102



A: SCHEMATIC S903670A21

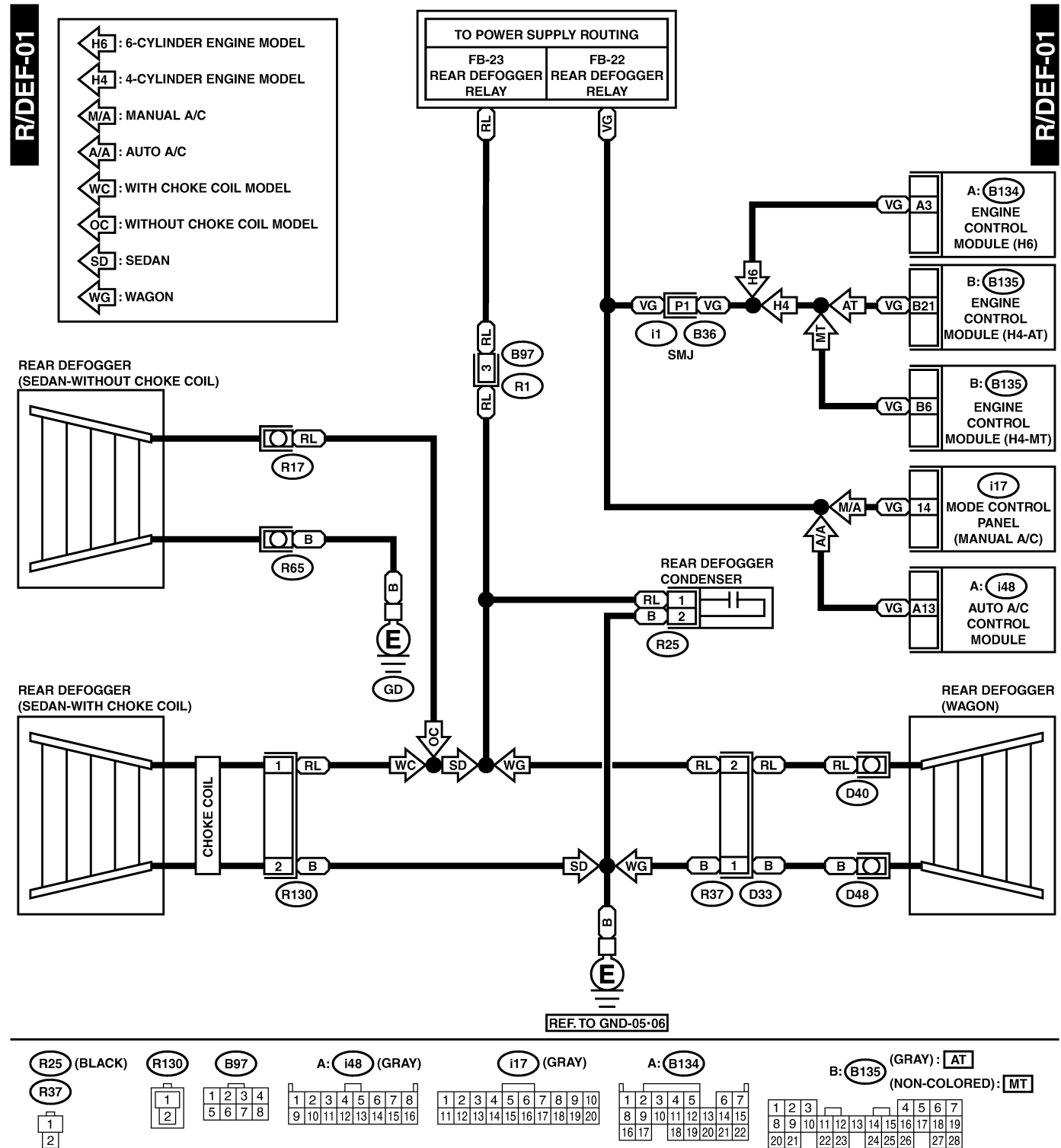


REAR WINDOW DEFOGGER SYSTEM

Wiring System

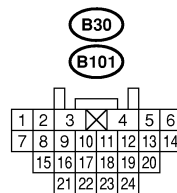
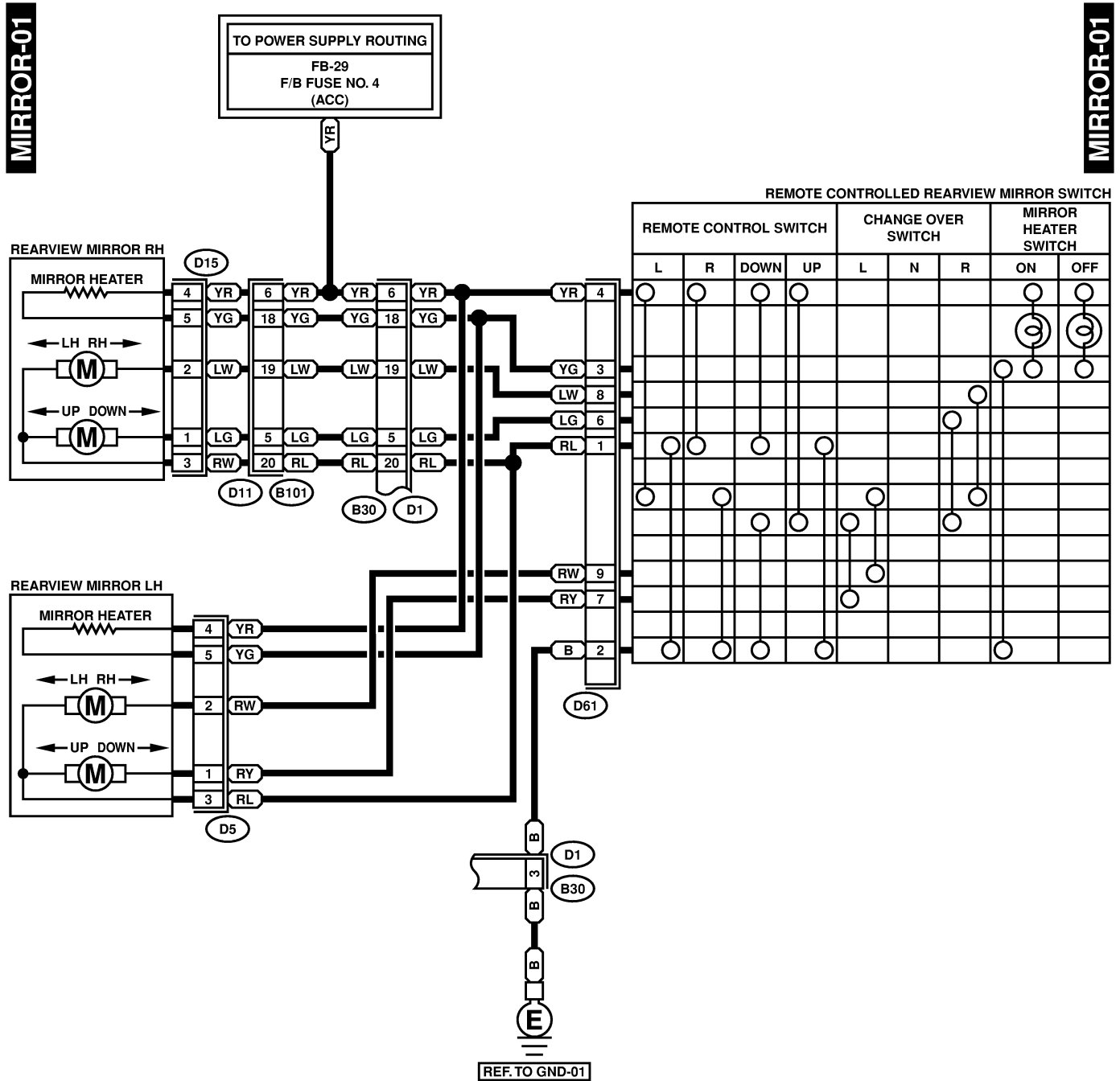
37. Rear Window Defogger System S903455

A: SCHEMATIC S903455A21



S903459

S903459A21

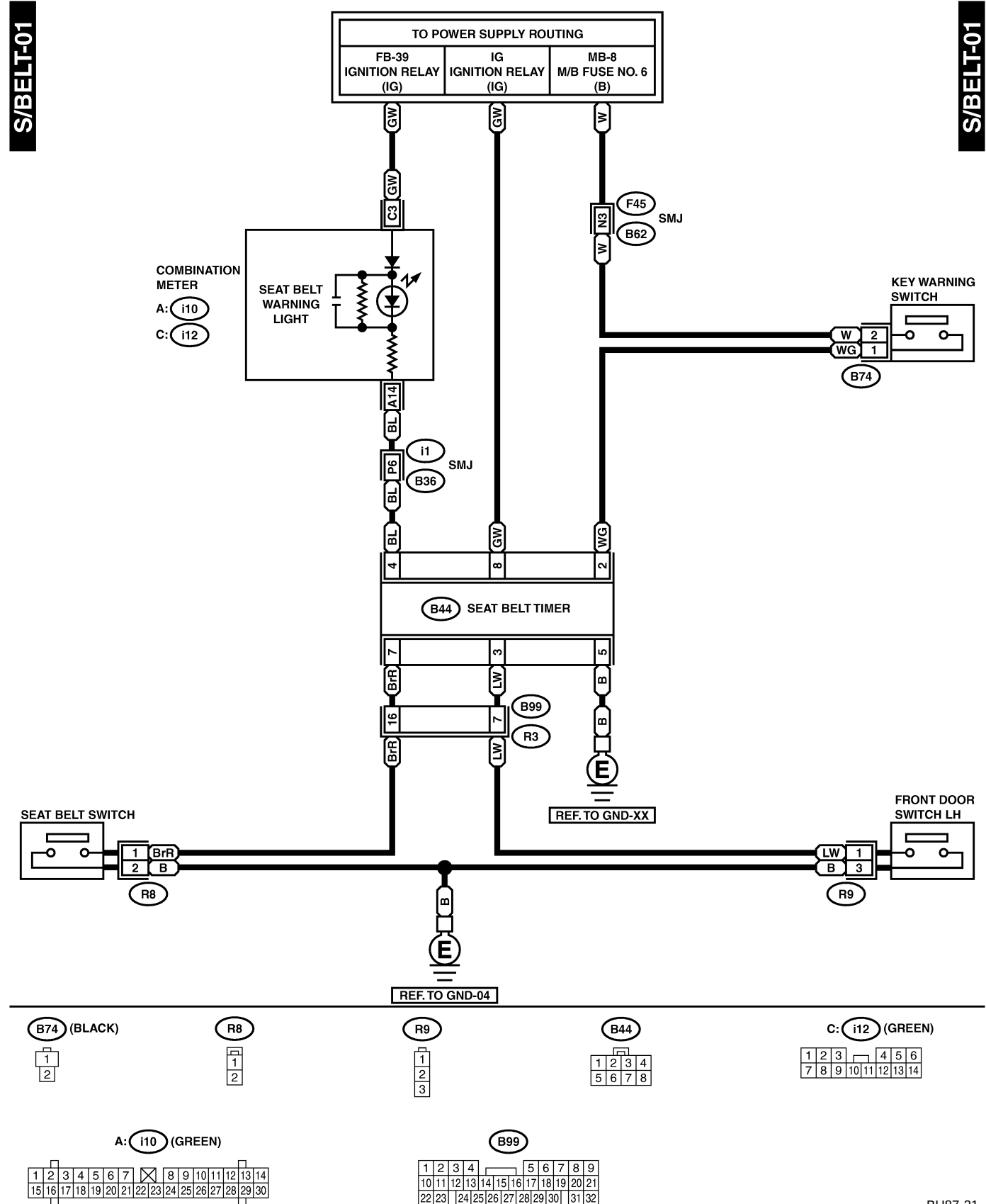


39. Seat Belt Warning System

S903483

A: SCHEMATIC S903483A21

S903483A21

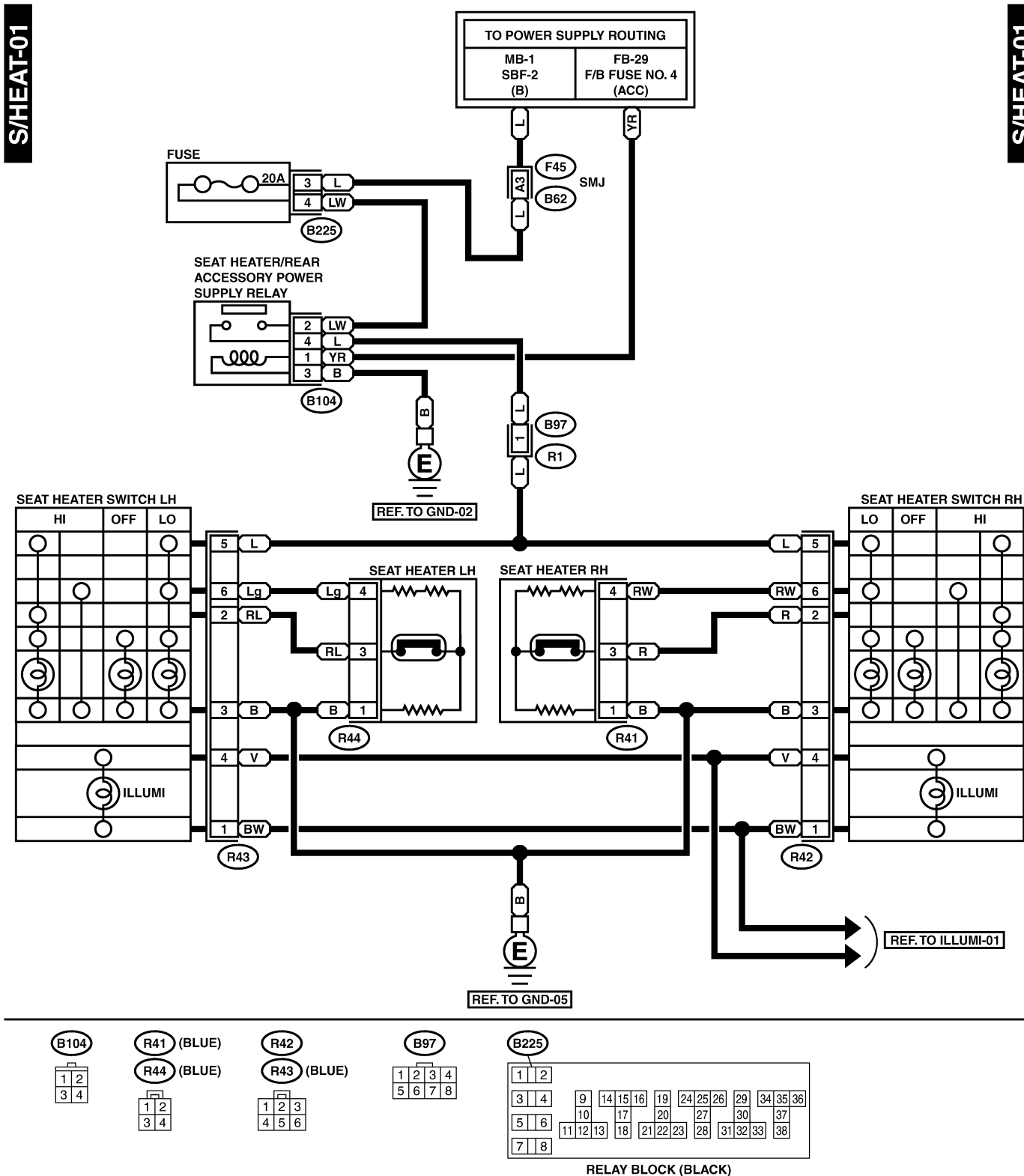


40. Seat Heater System

S903462

A: SCHEMATIC

S903462A21

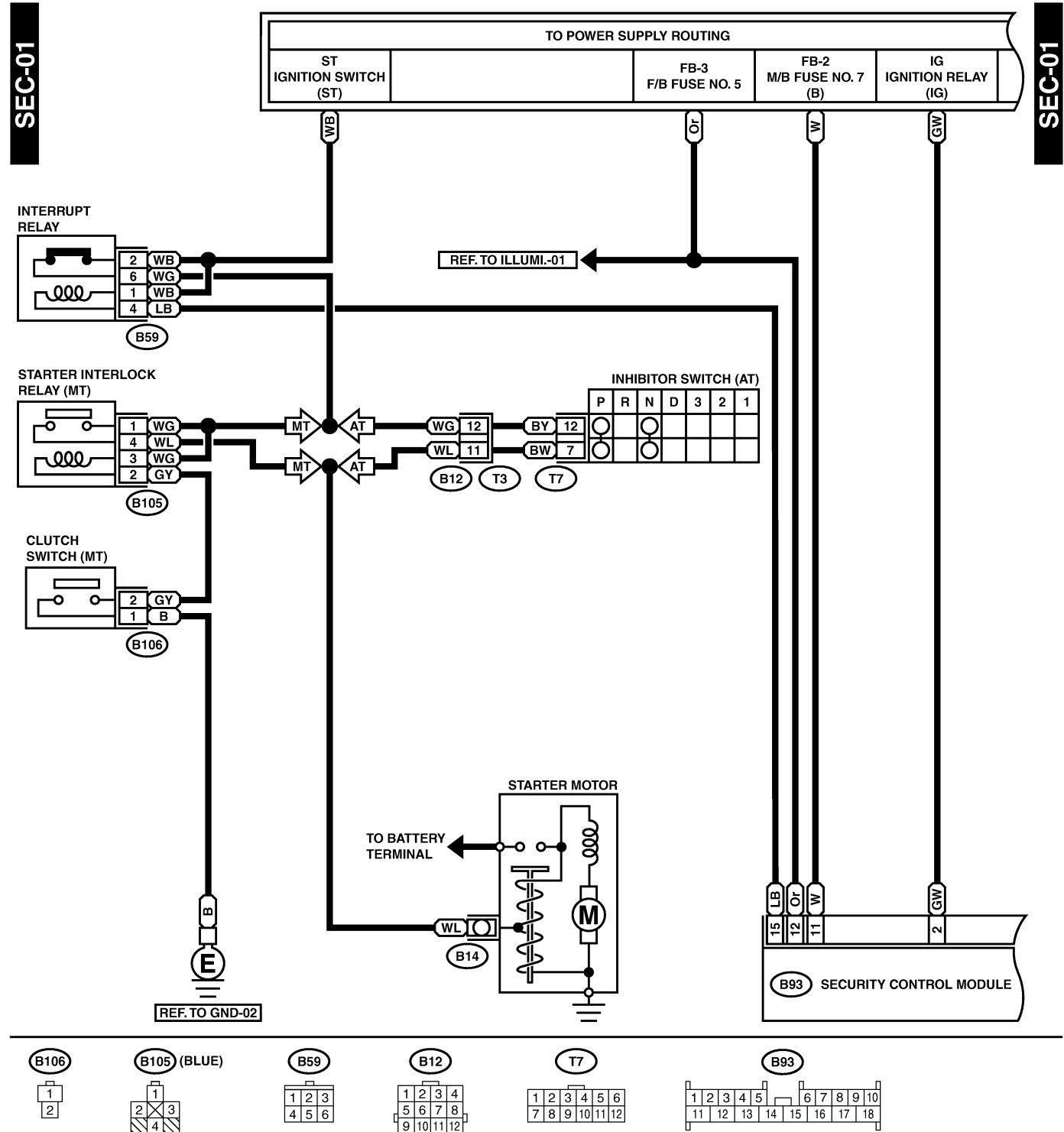


SECURITY SYSTEM

Wiring System

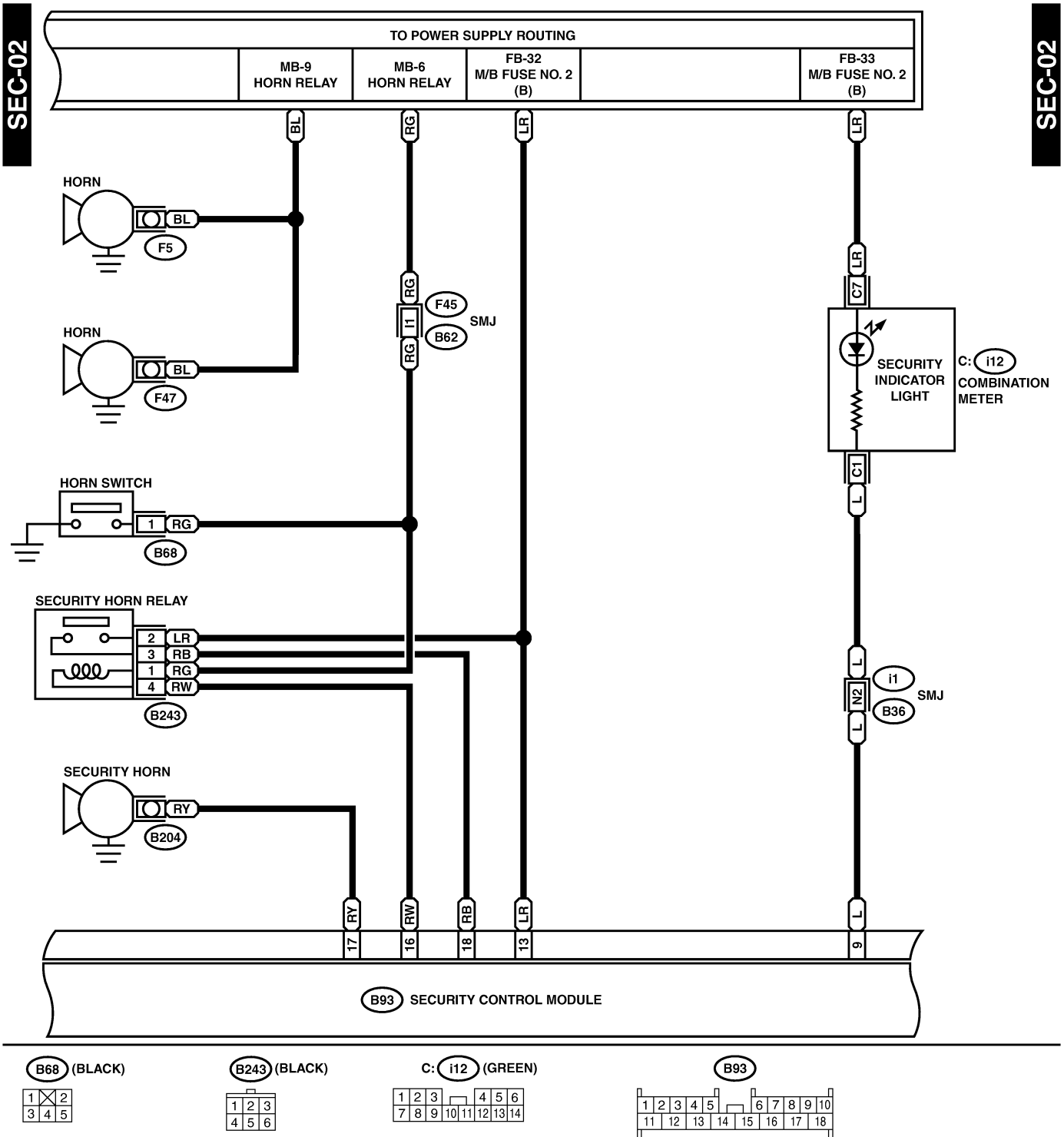
41. Security System S903347

A: SCHEMATIC S903347A21



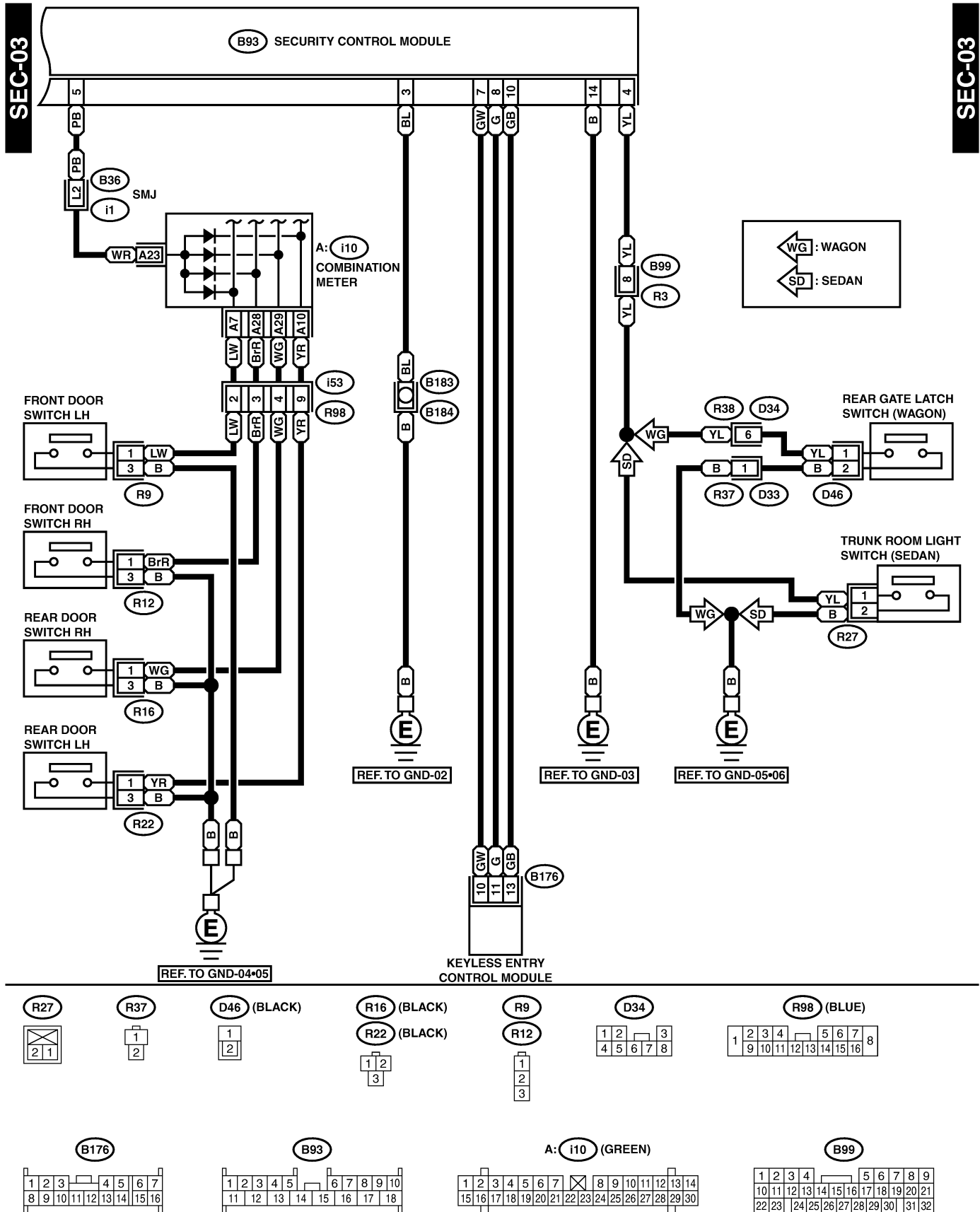
SECURITY SYSTEM

Wiring System



SECURITY SYSTEM

Wiring System

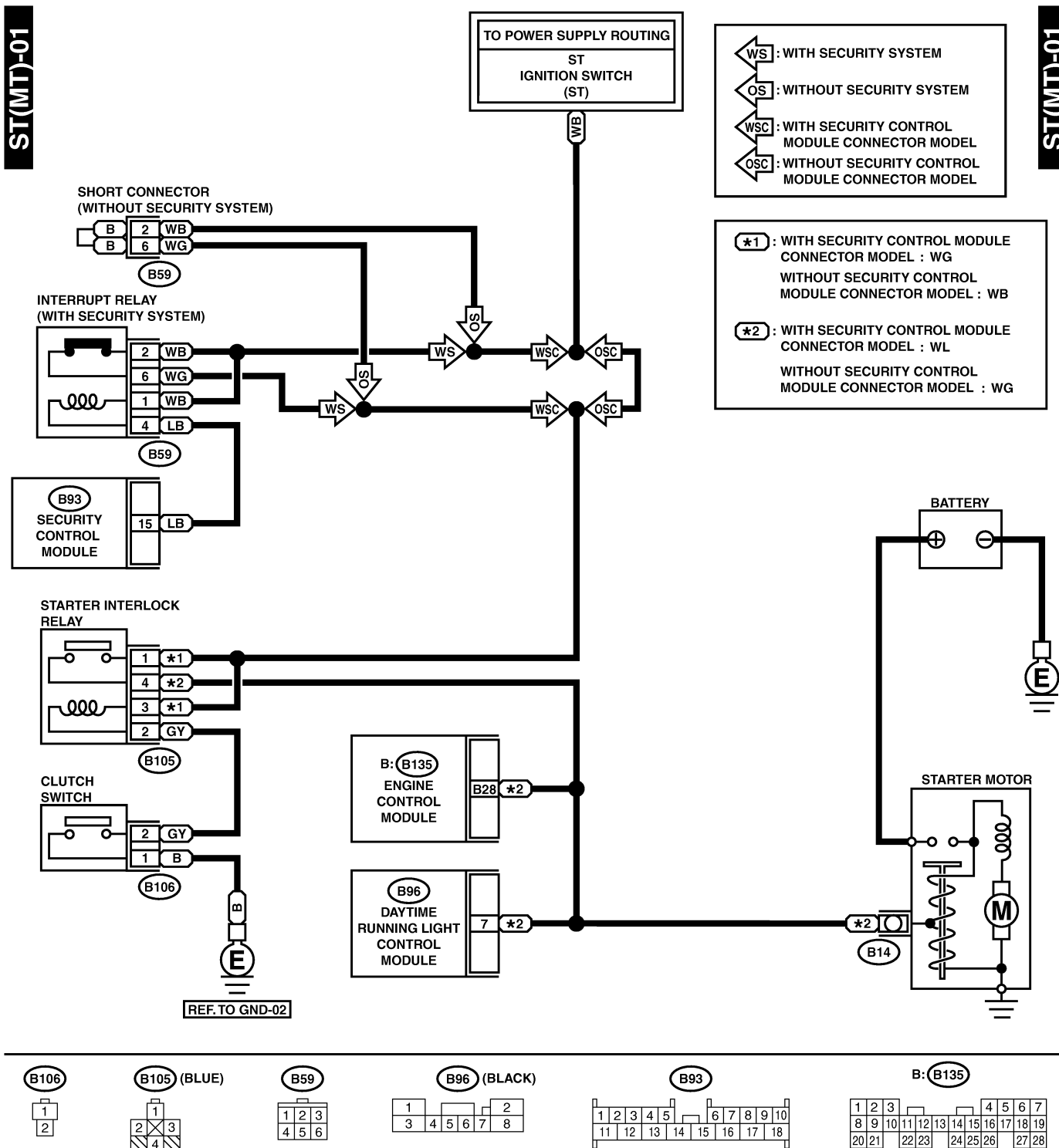


BU94-22C

42. Starter System S903439

A: SCHEMATIC S903439A21

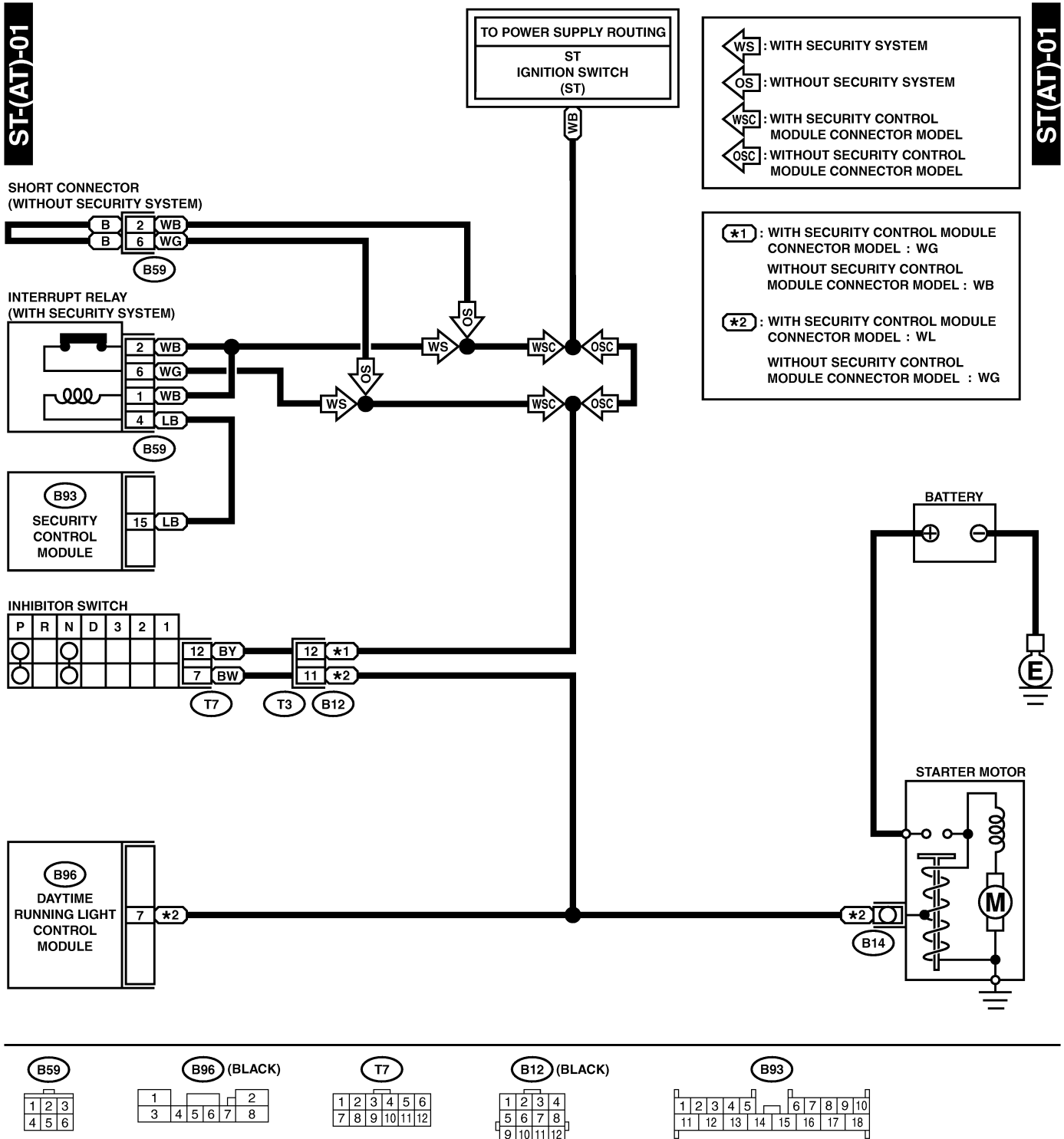
1. MT MODEL S903439A2101



STARTER SYSTEM

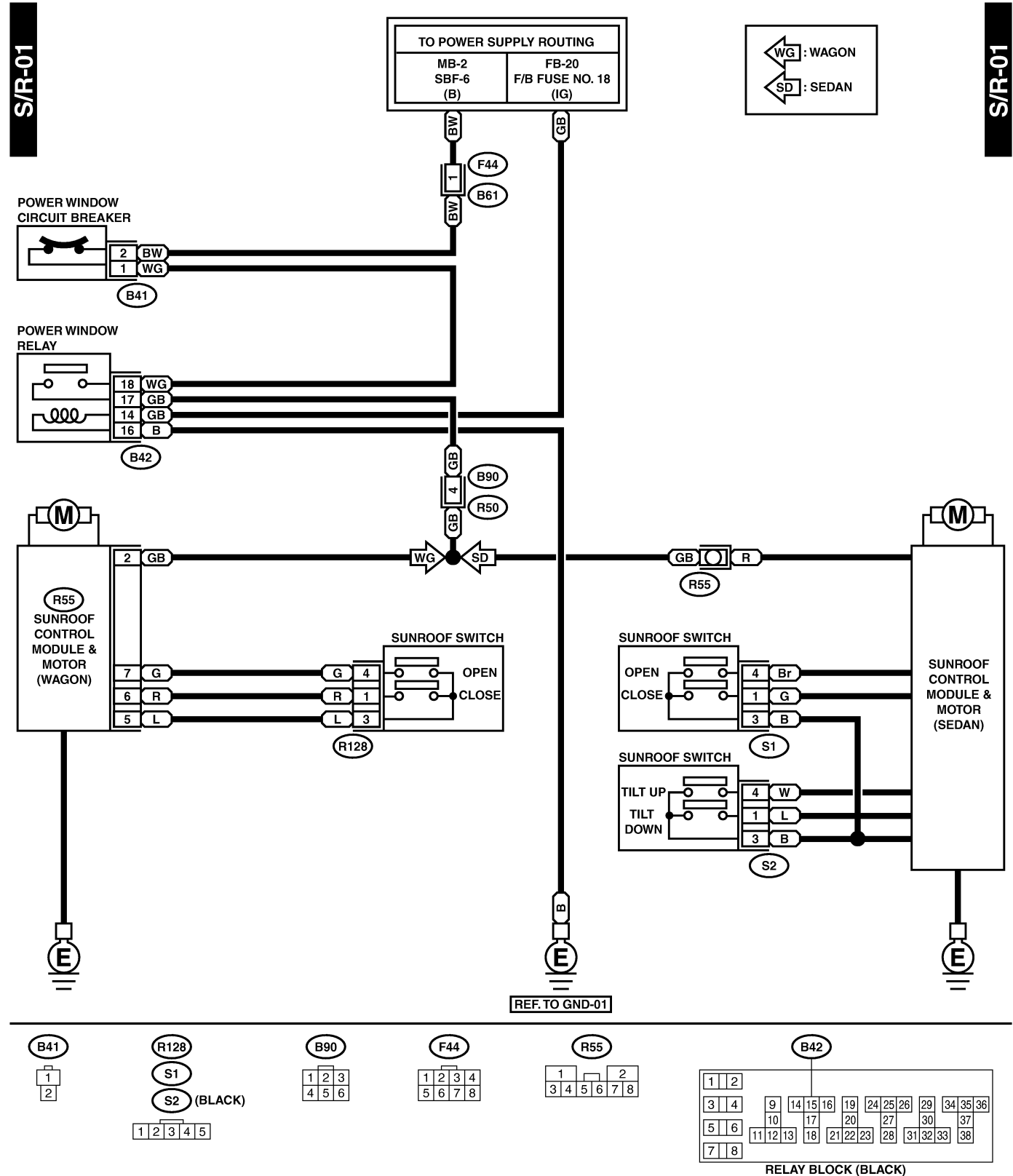
Wiring System

2. AT MODEL S903439A2102



43. Sunroof System S903440

A: SCHEMATIC S903440A21



TRAILER WIRE HARNESS (OPTION)

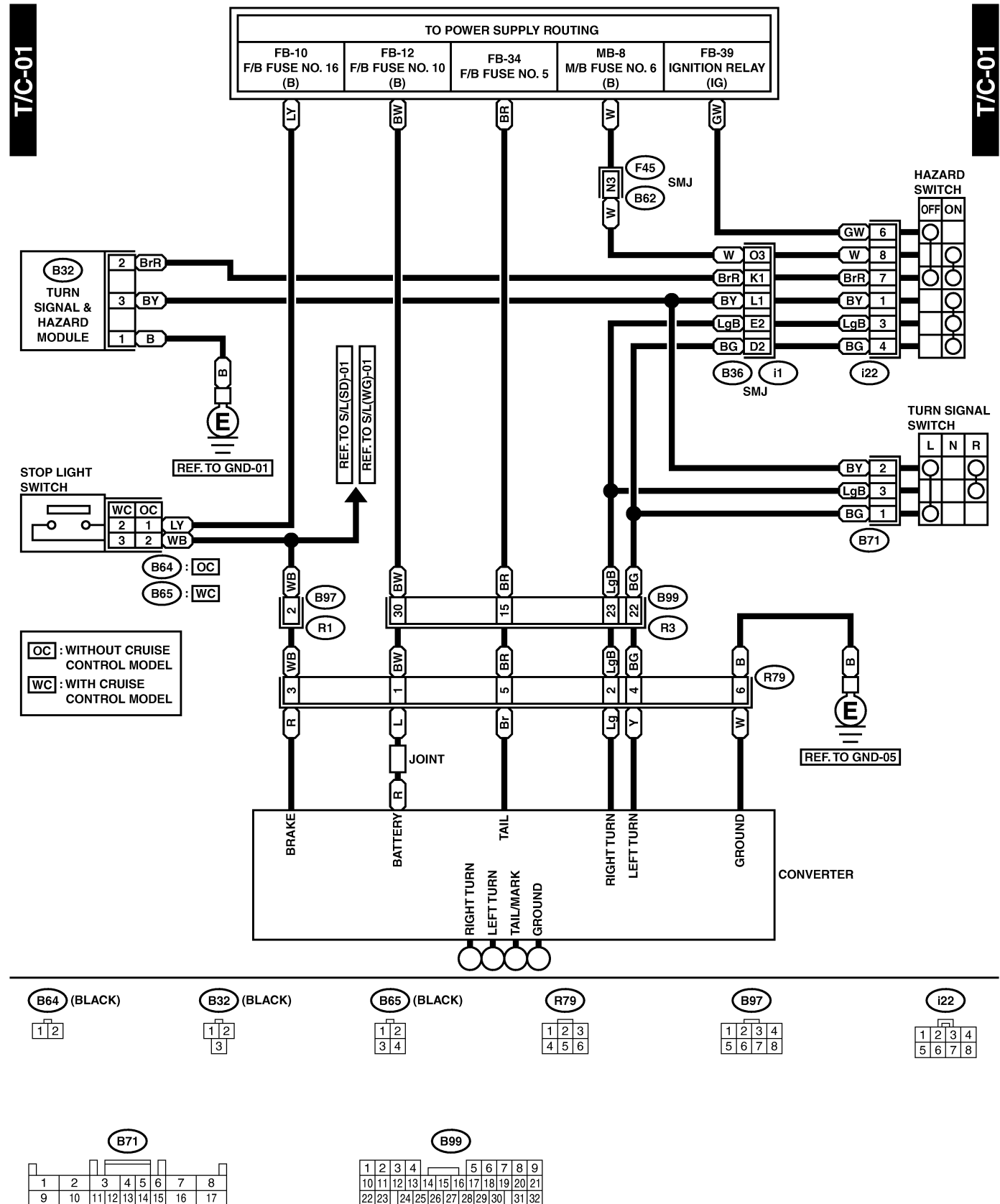
Wiring System

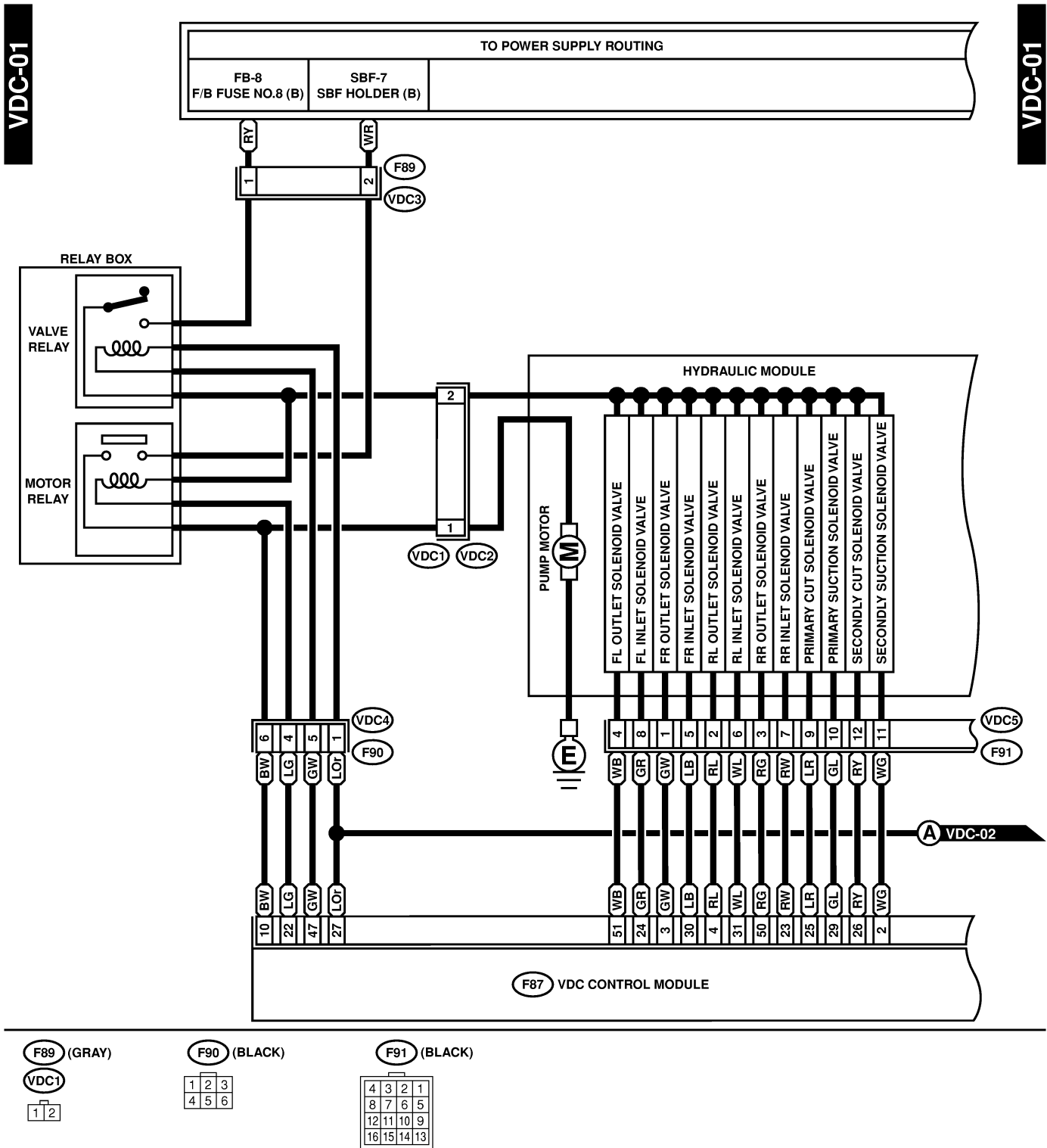
44. Trailer Wire Harness (Option)

S903671

A: SCHEMATIC

S903671A21

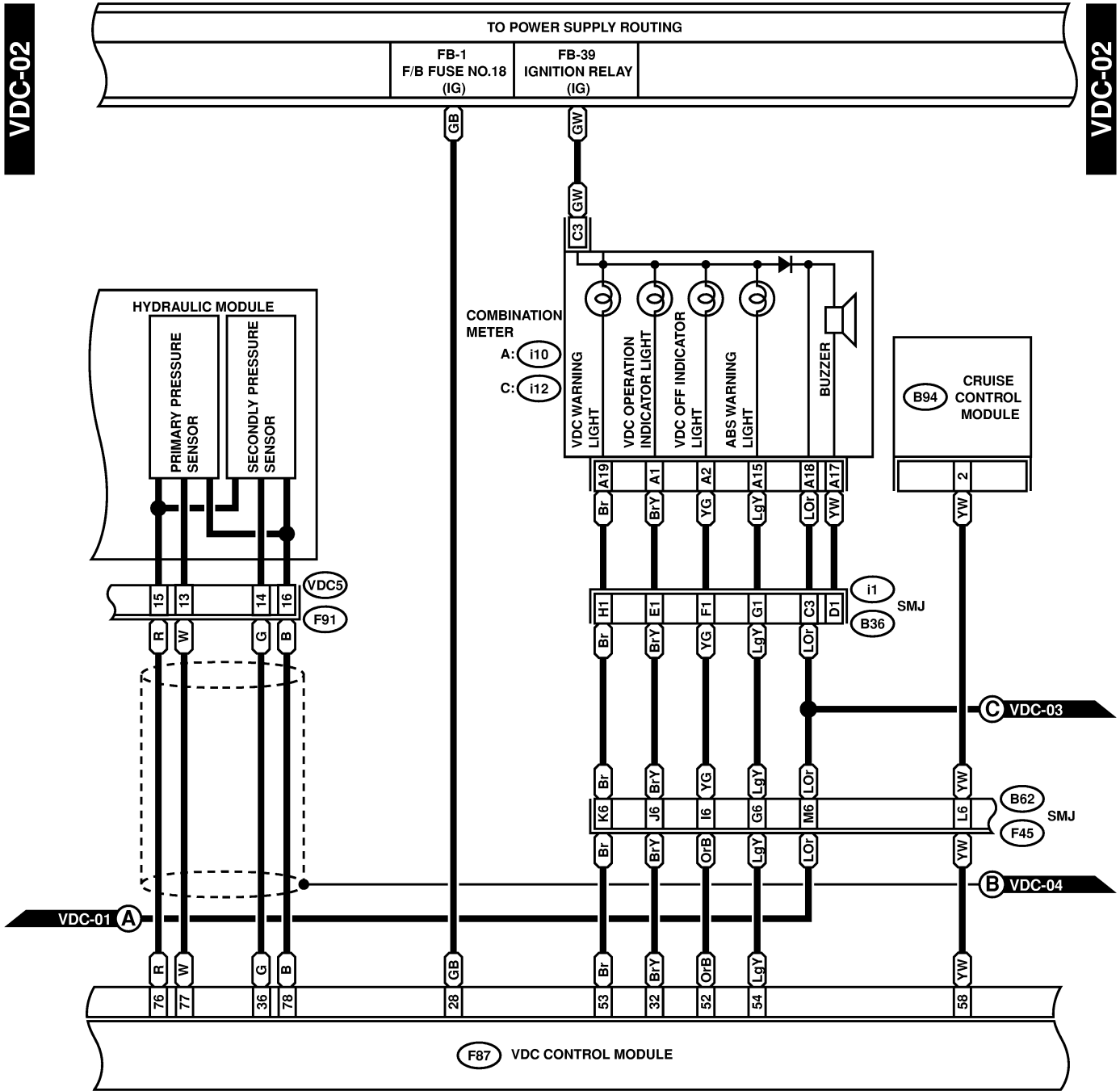


45. Vehicle Dynamic Control System S903441A: SCHEMATIC S903441A21

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	
56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83

VEHICLE DYNAMIC CONTROL SYSTEM

Wiring System



C: i12 (GREEN)

1	2	3	4	5	6
7	8	9	10	11	12
13	14				

F91 (BLACK)

4	3	2	1
8	7	6	5
12	11	10	9
16	15	14	13

B94 (BLACK)

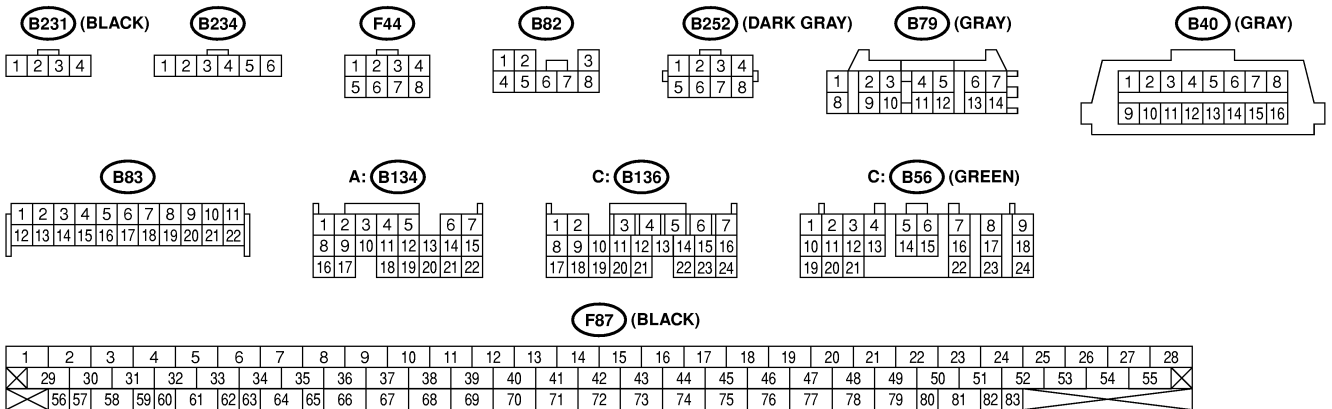
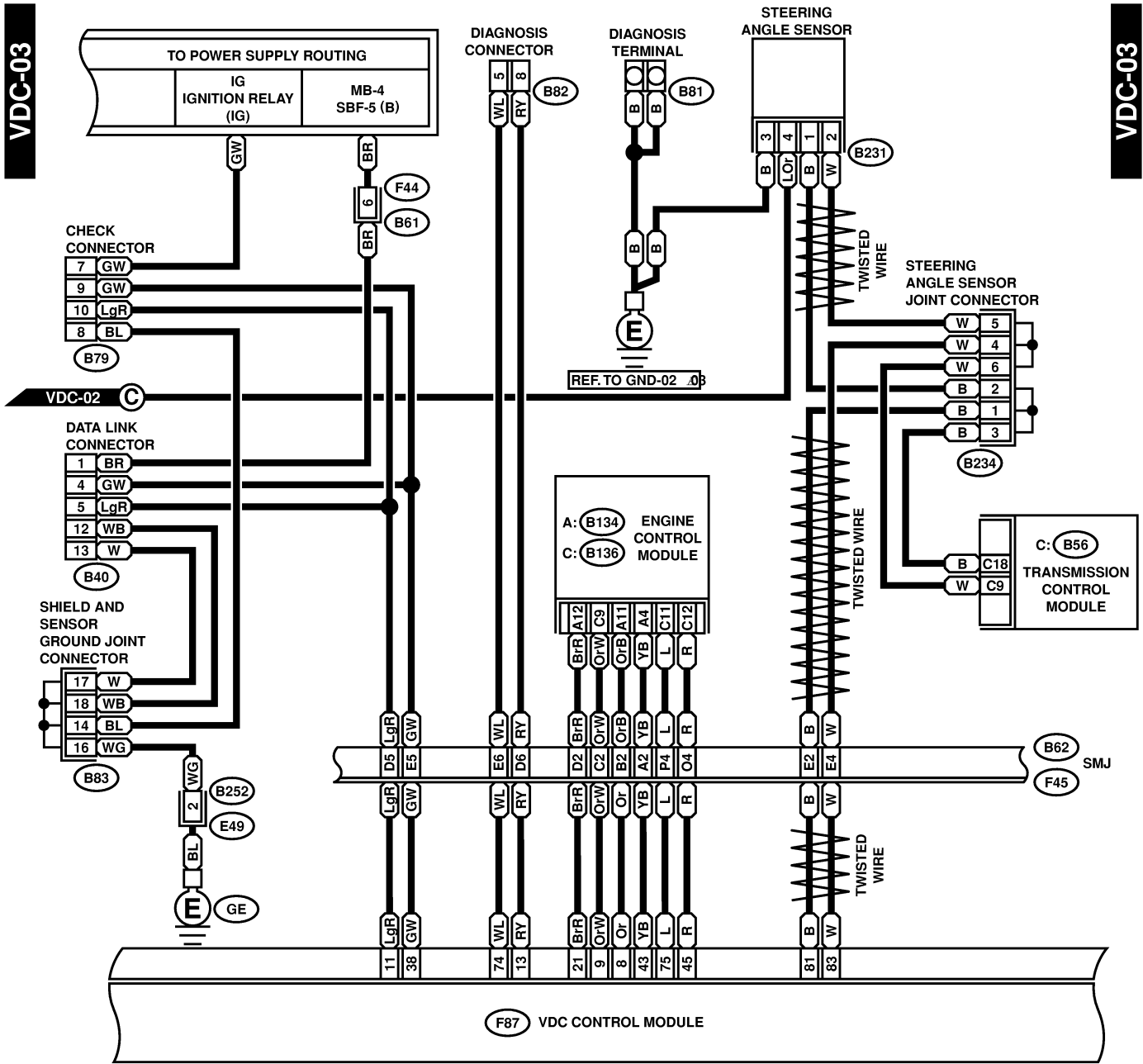
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

A: i10 (GREEN)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30												

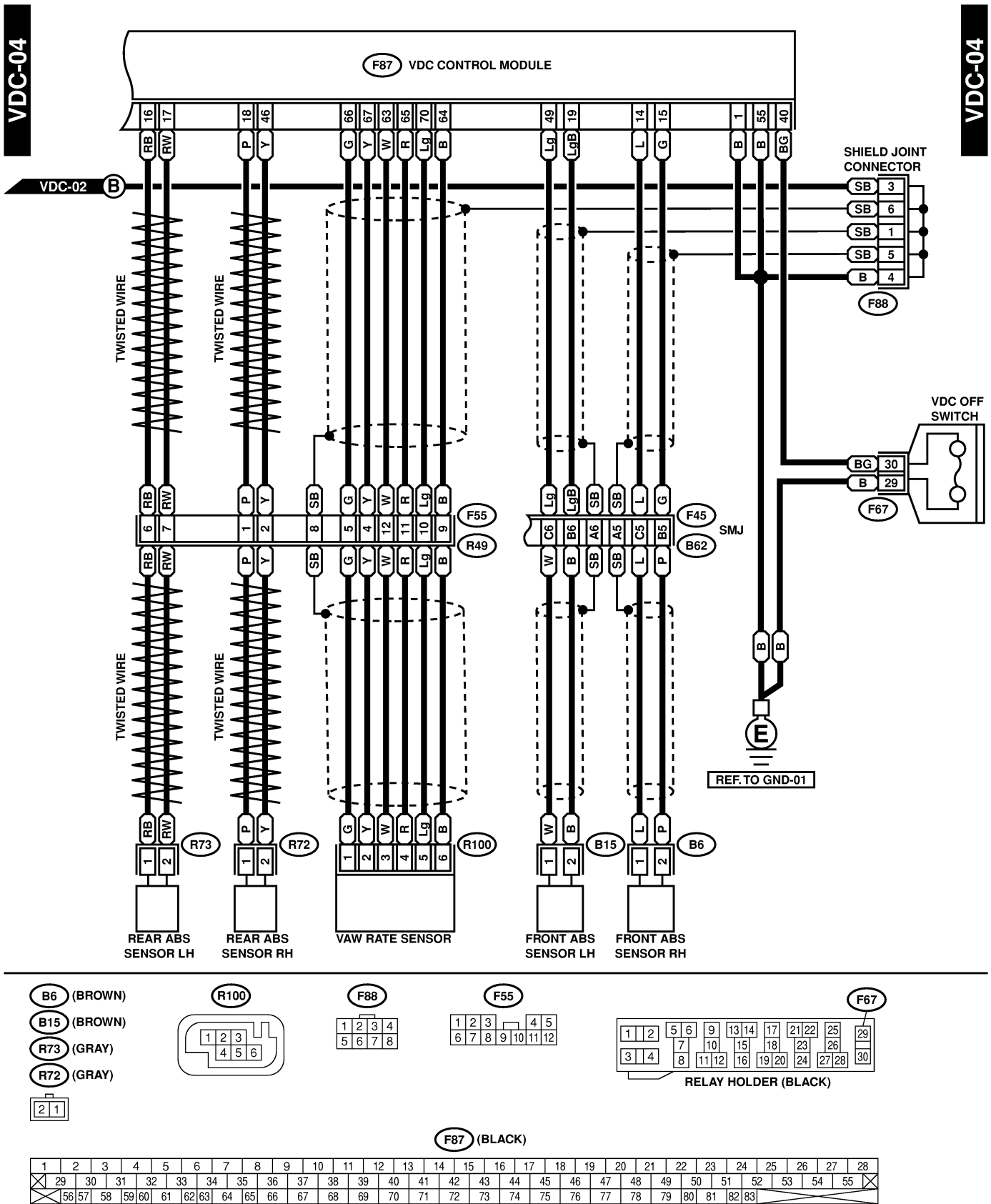
F87 (BLACK)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	
56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83



VEHICLE DYNAMIC CONTROL SYSTEM

Wiring System



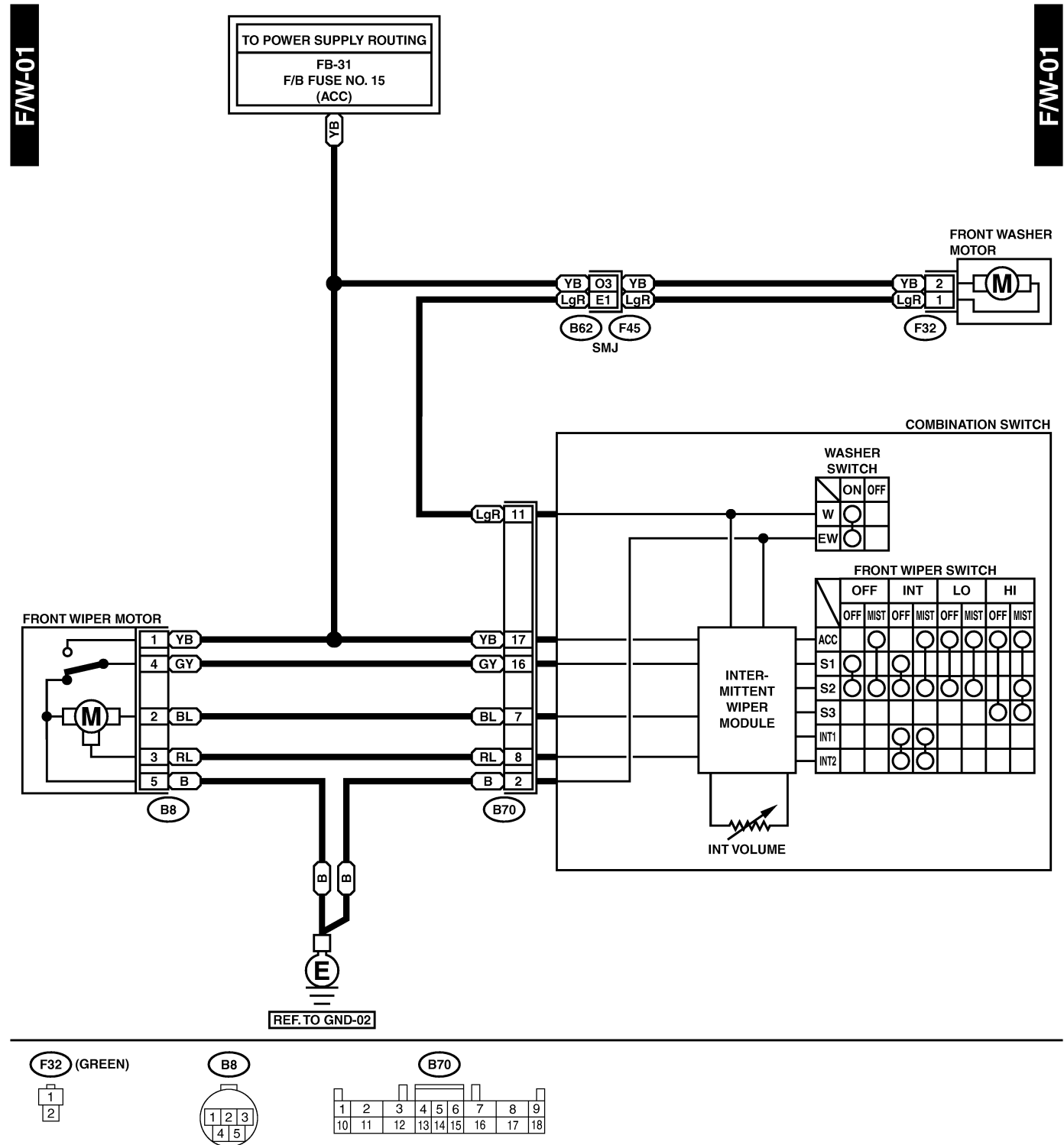
BU95-21D

46. Wiper and Washer System (Front)

S903442

A: SCHEMATIC

S903442A21



WIPER AND WASHER SYSTEM (REAR)

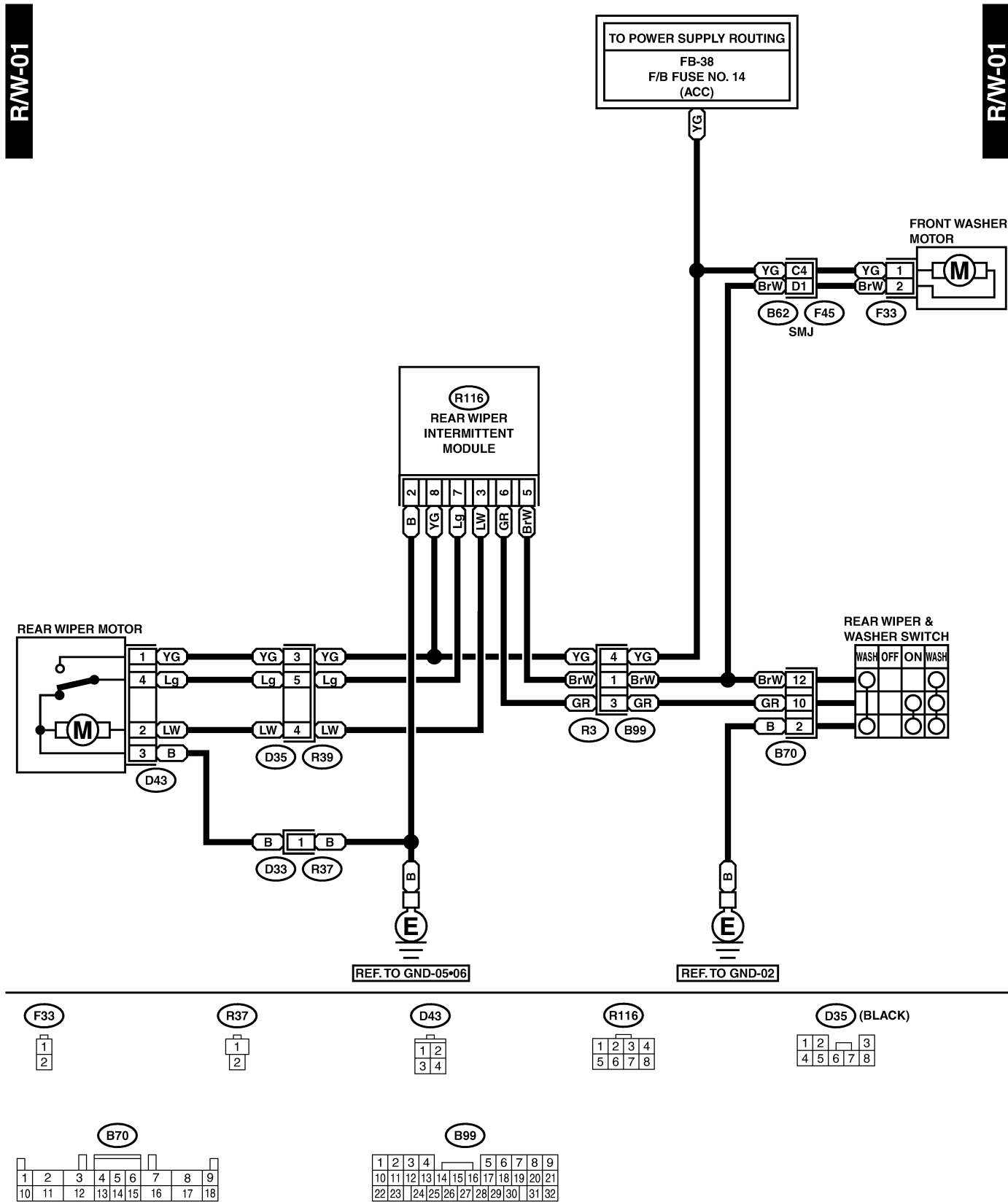
Wiring System

47. Wiper and Washer System (Rear)

S903443

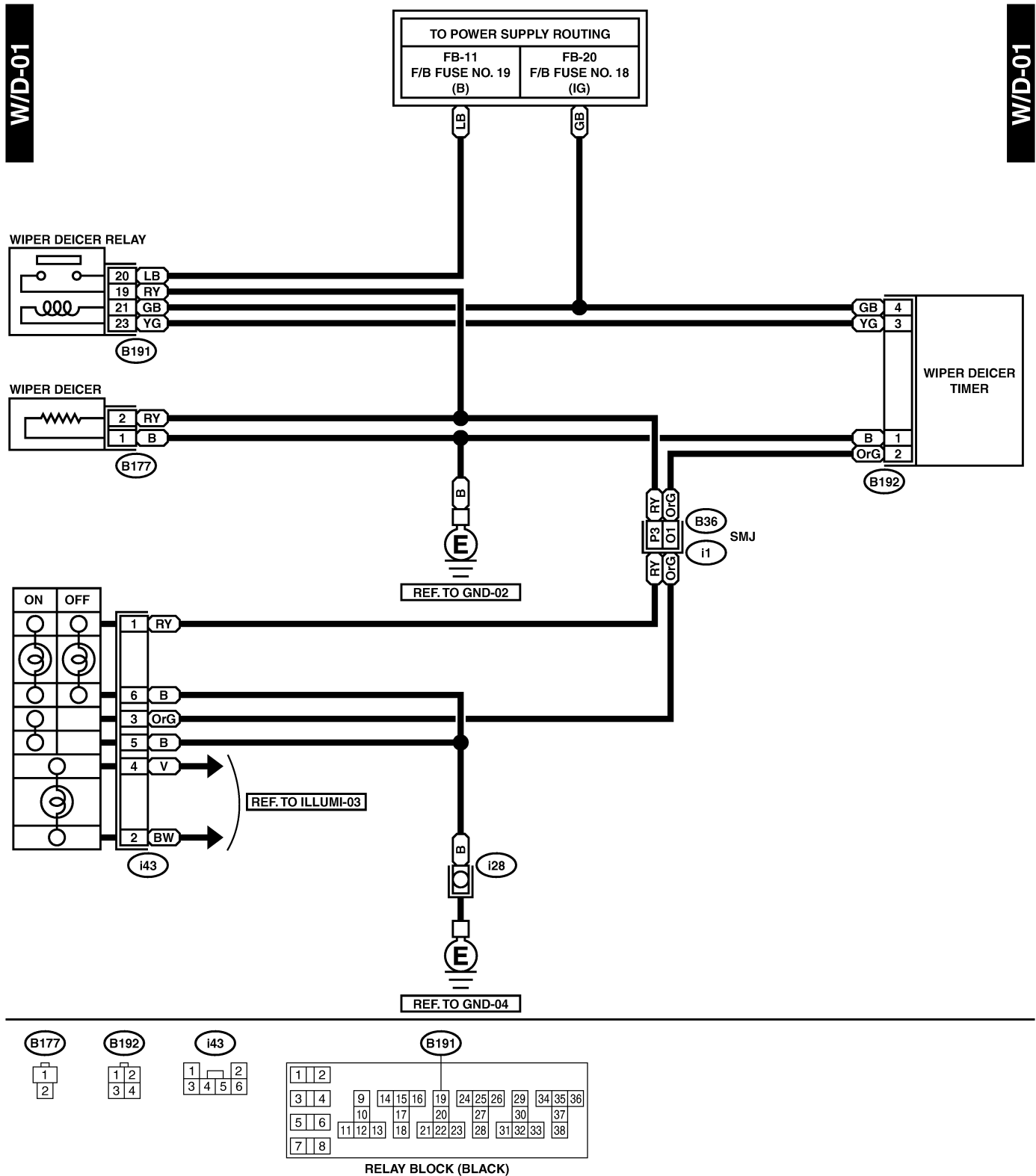
A: SCHEMATIC

S903443A21



48. Wiper Deicer System S903444

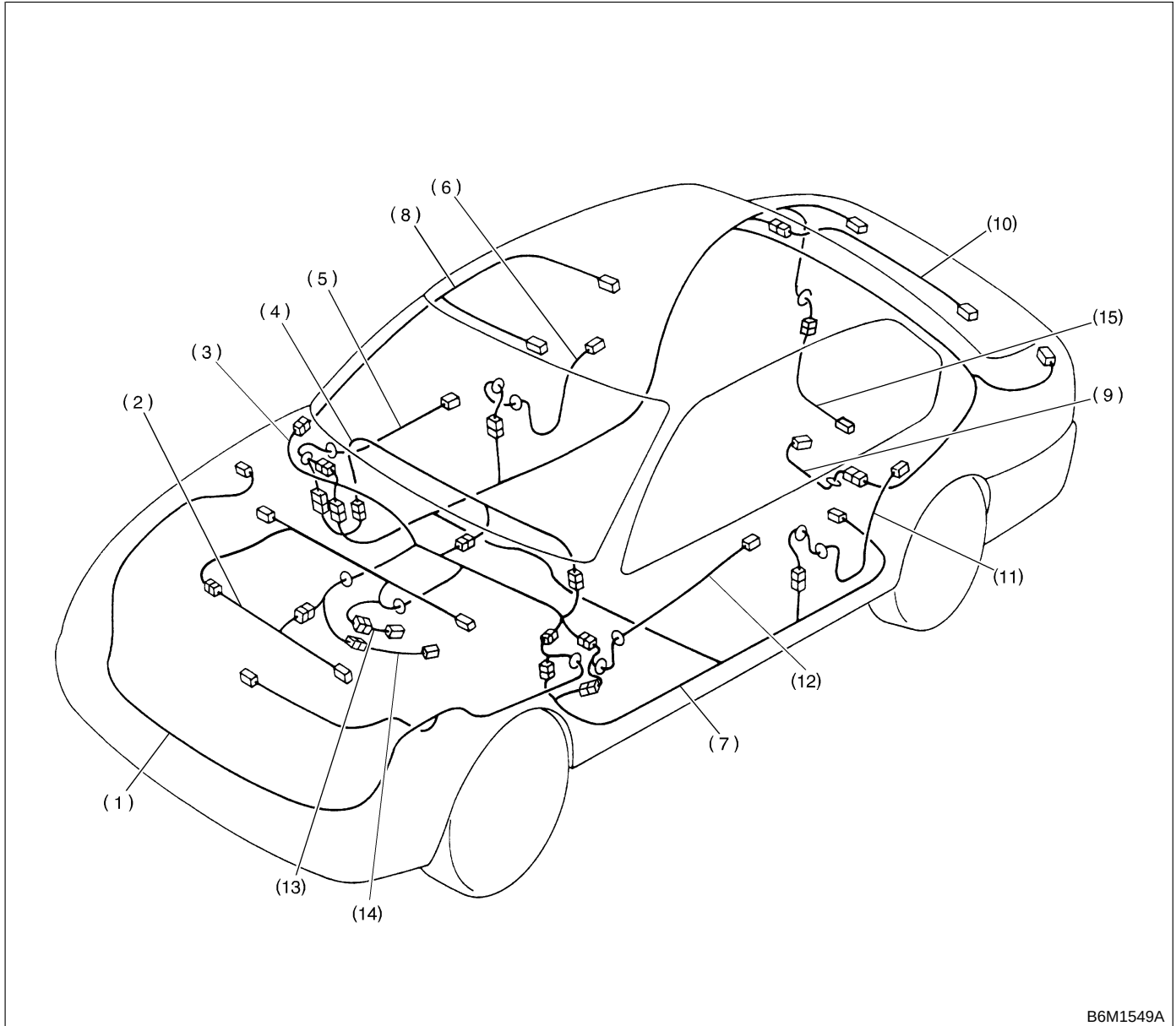
A: SCHEMATIC S903444A21



49. Overall Systems S903672

A: LOCATION S903672A13

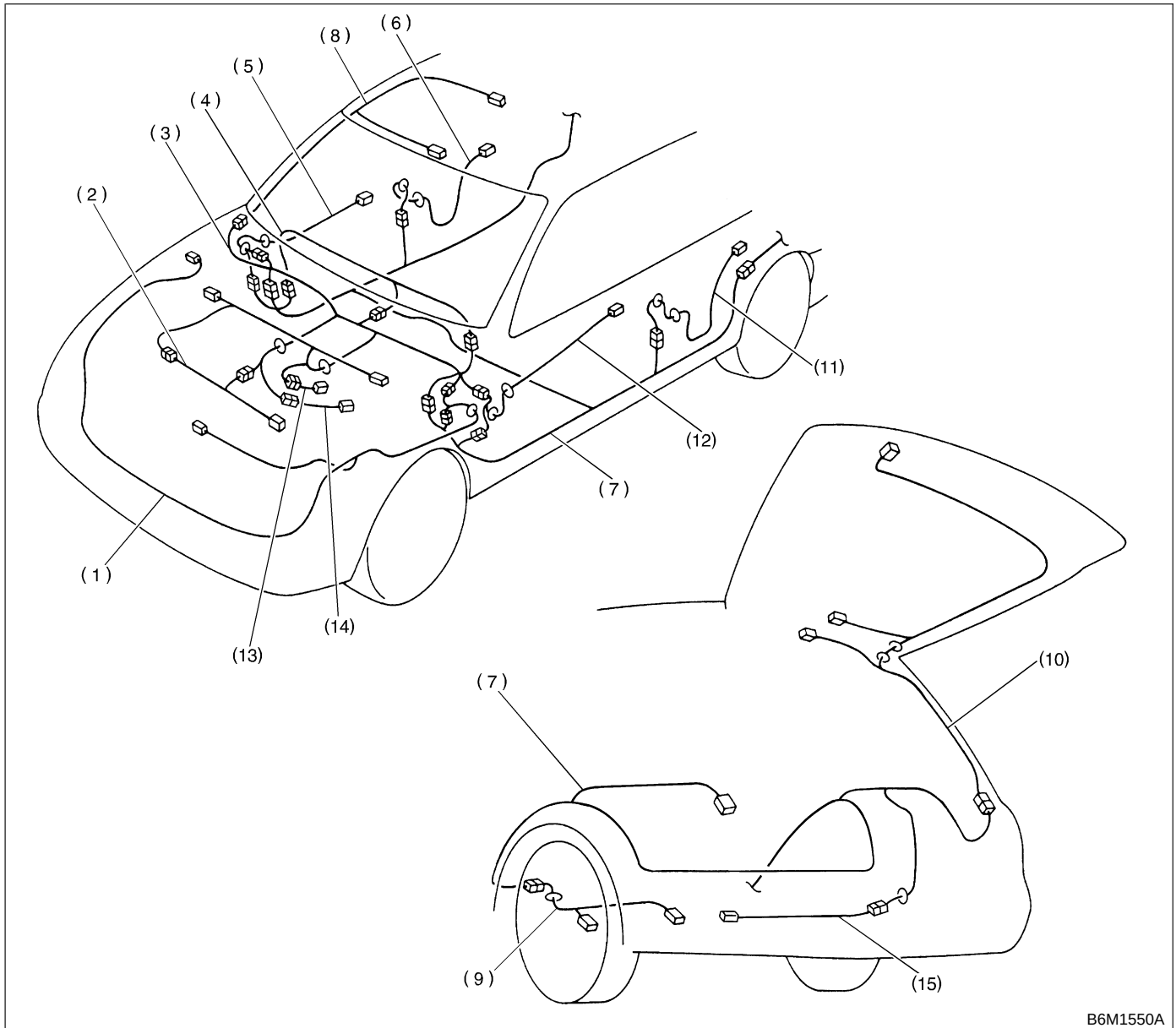
1. SEDAN MODEL S903672A1301



B6M1549A

(1) Front wiring harness	(6) Rear door cord RH	(11) Rear door cord LH
(2) Engine wiring harness	(7) Rear wiring harness	(12) Front door cord LH
(3) Bulkhead wiring harness	(8) Roof cord	(13) Transmission cord
(4) Instrument panel wiring harness	(9) Fuel tank cord	(14) Rear oxygen sensor cord
(5) Front door cord RH	(10) Trunk lid cord	(15) ORVR cord

2. WAGON MODEL S903672A1302



B6M1550A

(1) Front wiring harness	(6) Rear door cord RH	(11) Rear door cord LH
(2) Engine wiring harness	(7) Rear wiring harness	(12) Front door cord LH
(3) Bulkhead wiring harness	(8) Roof cord	(13) Transmission cord
(4) Instrument panel wiring harness	(9) Fuel tank cord	(14) Rear oxygen sensor cord
(5) Front door cord RH	(10) Rear gate cord	(15) ORVR cord

FRONT WIRING HARNESS

Wiring System

50. Front Wiring Harness

S903445

A: LOCATION

S903445A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F3	2	Gray	B-1		Front turn signal light upper RH
F4	3	Gray	B-1		Front clearance light RH and front turn signal light lower RH
F5	1	Black	C-1		Horn
F6	2	★	C-1		Front fog light RH
F7	3	Black	C-1		Headlight RH (2-Lights)
	3	★	C-1		Headlight RH (4-Lights)
F16	2	Black	C-1		Sub fan motor (4-Cylinder engine model)
	4	Gray	C-1		Sub fan motor (6-Cylinder engine model)
F17	2	Black	C-2		Radiator main fan motor (4-Cylinder engine model)
	4	Gray	C-2		Radiator main fan motor (6-Cylinder engine model)
F19	2	Gray	C-3		Front turn signal light upper LH
F21	2	★	D-3		Front fog light LH
F22	3	Gray	C-3		Front clearance light LH and front turn signal light lower LH
F23	3	Black	C-2		Headlight LH (2-Lights)
	3	★	C-2		Headlight LH (4-Lights)
F25	1	★	C-2		Generator
F26	3	Green	C-2		
F27	4	Black	A-3		A/C fuse (Relay holder)
F28	4	Black	A-3		A/C sub fan relay (Relay holder-4-cylinder engine model)
	4	Black	A-4		A/C sub fan relay-1 (Relay holder-6-cylinder engine model)
F29	4	Black	A-4		A/C sub fan relay-2 (Relay holder-6-cylinder engine model)
F30	4	Black	A-3		Radiator main fan relay-2 (Relay holder-6-cylinder engine model)
F31	4	Black	A-3		A/C relay (Relay holder)
F32	2	Green	B-3		Front washer motor
F33	2	★	B-3		Rear washer motor
F34	4	Black	C-3		SBF holder
F35	2	Black	B-4		M/B
F36	3	★	C-4		
F37	6	Black	C-4		
F38	1	★	C-4		
F39	8	Black	B-3		F/B
F40	9	Brown	C-4		
F41	7	Gray	B-4		
F44	8	★	B-4	B61	Bulkhead wiring harness
F45	66	Gray	B-3	B62	Bulkhead wiring harness (SMJ)
F46	4	★	B-3	B108	Bulkhead wiring harness
F47	1	Black	C-2		Horn
F49	31	Black	B-2		ABS control module
F55	8	★	B-4	R49	Rear wiring harness (ABS)
	12	★	B-4	R49	Rear wiring harness (VDC)
F65	4	Black	A-4		Front fog light relay (Relay holder)
F66	4	Black	A-3		Radiator main fan relay (Relay holder-4-cylinder engine model)
	4	Black	A-3		Radiator main fan relay-1 (Relay holder-6-cylinder engine model)
F68	4	Black	C-4		M/B
F73	1	★	B-2		ABS motor ground

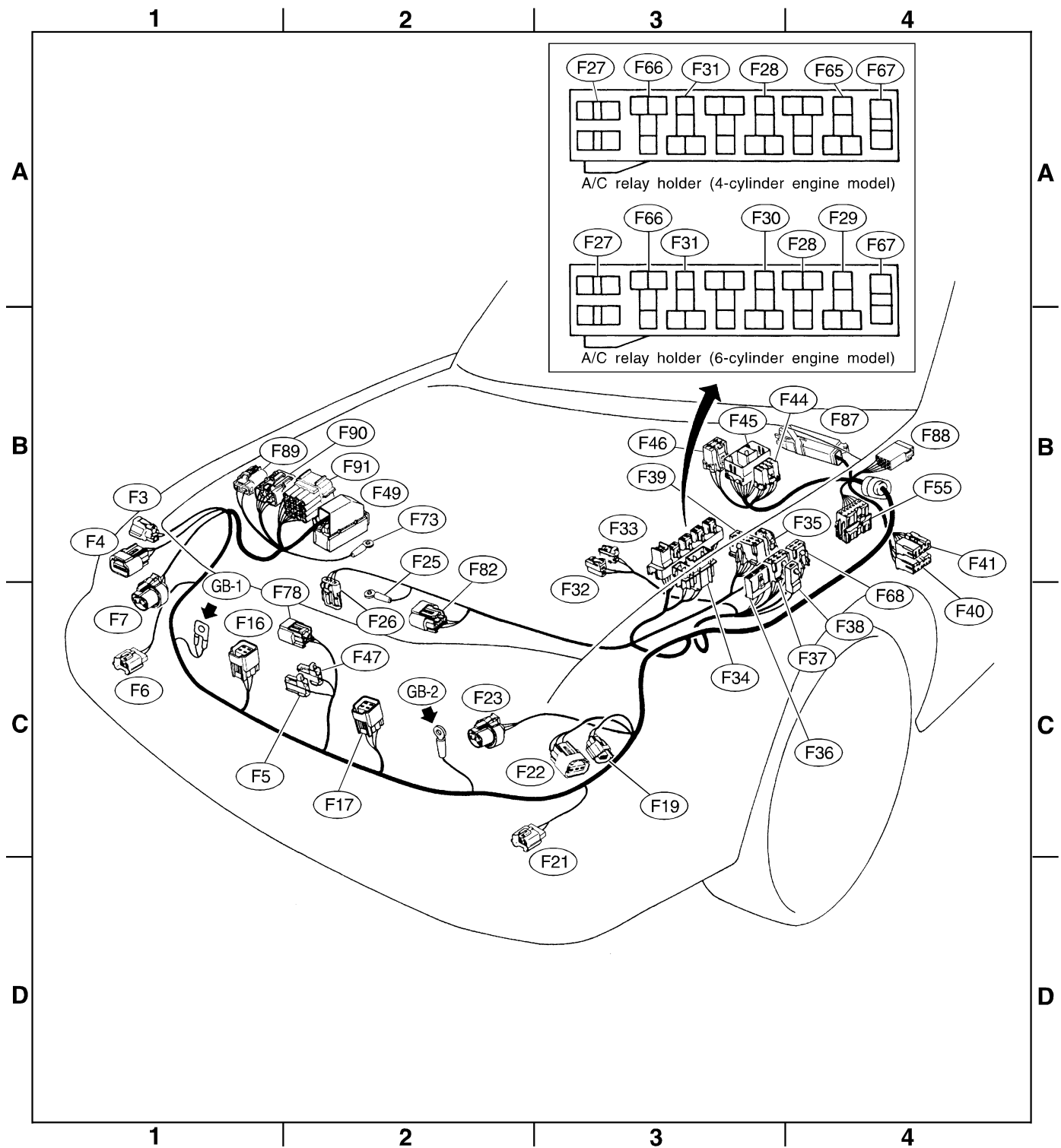
FRONT WIRING HARNESS

Wiring System

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F78	2	Black	C-2		Ambient sensor
F82	3	Black	C-2		A/C compressor
F87	83	Black	B-4		VDC module
F88	8	★	B-4		Shield joint connector (VDC)
F89	2	Gray	B-1		Relay box (VDC)
F90	6	Black	B-2		
F91	16	Black	B-2		Hydraulic module (VDC)
★: Non-colored					

FRONT WIRING HARNESS

Wiring System



B6M1551A

51. Bulkhead Wiring Harness (In Engine Room)

S903438

A: LOCATION

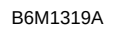
S903438A13

1. 4-CYLINDER ENGINE MODEL

S903438A1302

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B2	3	Gray	B-2		Atmospheric pressure sensor (AT)
B4	4	Gray	B-2		AT dropping resistor
B6	2	Brown	B-2		ABS front sensor RH (Outback model)
	2	Gray	B-2		ABS front sensor RH (Other models)
B7	6	Black	B-2		Cruise control actuator
B8	5	Gray	B-3		Front wiper motor
B10	2	Brown	B-2		A/C pressure switch
B11	20	Black	B-3	T4	Transmission (AT)
B12	12	Black	B-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B15	2	Brown	B-3		ABS front sensor LH (Outback model)
	2	Gray	B-3		ABS front sensor LH (Other models)
B16	2	Gray	B-3		Brake fluid level switch
B17	3	Black	B-2		Vehicle speed sensor (MT)
B18	4	Gray	B-2		Front oxygen (A/F) sensor (MT)
	6	Black	B-2		Front oxygen (A/F) sensor (AT)
B19	4	Gray	B-3	T5	Rear oxygen sensor cord
B21	20	Gray	B-2	E2	Engine wiring harness
B22	16	Brown	B-2	E3	
B24	2	Gray	B-3	T1	Back-up light switch (MT)
B25	2	Brown	B-3	T2	Neutral position switch (MT)
B204	1	Black	B-2		Security horn
★: Non-colored					

Wiring System



BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

Wiring System

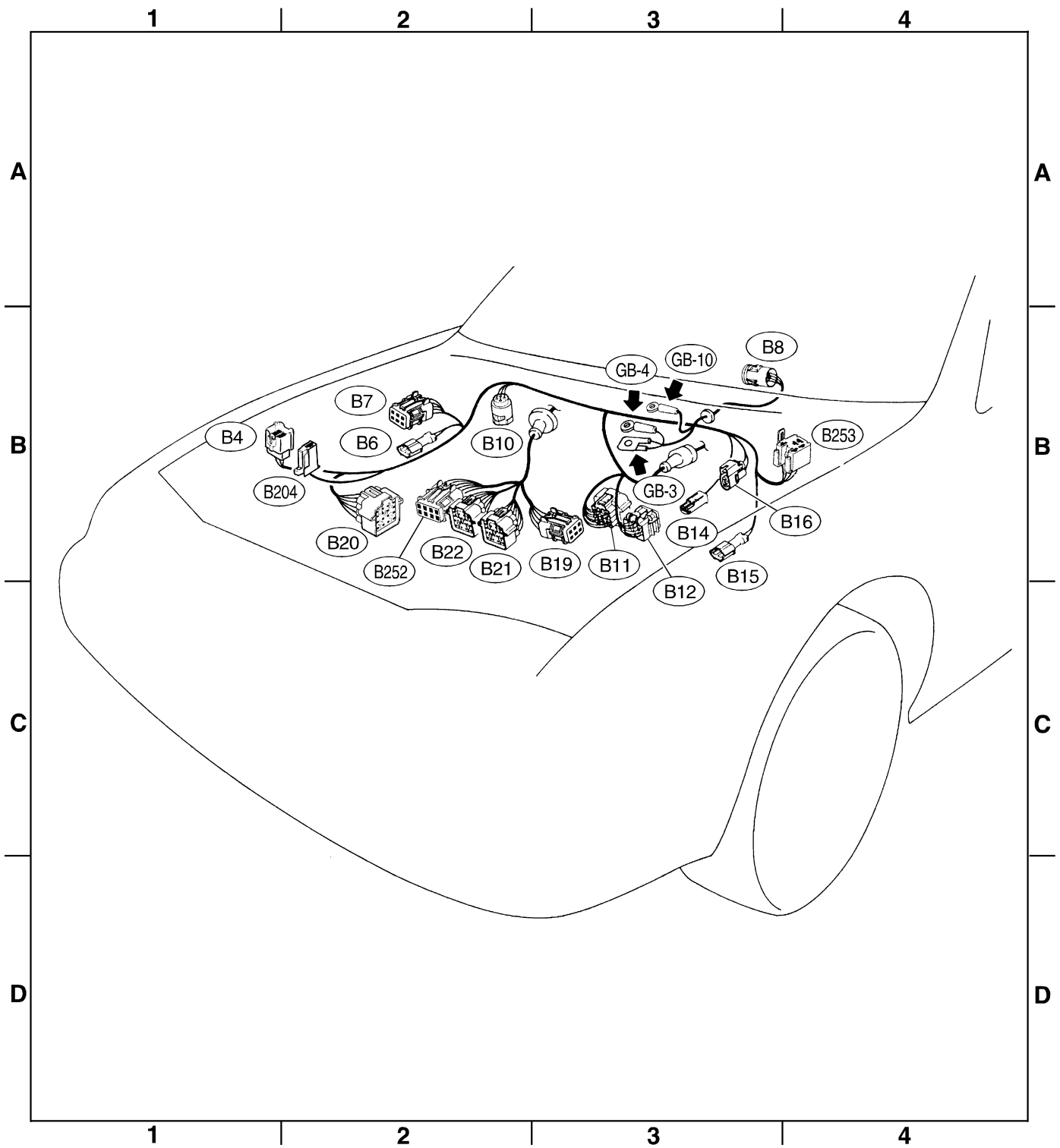
2. 6-CYLINDER ENGINE MODEL S903438A1303

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B4	4	Gray	B-2		AT dropping resistor
B6	2	Brown	B-2		ABS front sensor RH
B7	6	Black	B-2		Cruise control actuator
B8	5	Gray	B-3		Front wiper motor
B10	4	★	B-2		A/C pressure switch
B11	20	Black	B-3	T4	Transmission (AT)
B12	12	Black	B-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B15	2	Brown	B-3		ABS front sensor LH
B16	2	Gray	B-3		Brake fluid level switch
B19	6	★	B-3	T5	Rear oxygen sensor cord
B20	16	Dark gray	B-2	E1	Engine wiring harness
B21	20	Light gray	B-2	E2	
B22	16	Brown	B-2	E3	
B204	1	Black	B-2		Security horn
B252	8	Dark gray	B-2	E49	Engine wiring harness
B253	5	★	B-3		Fan relay

★: Non-colored

BULKHEAD WIRING HARNESS (IN ENGINE ROOM)

Wiring System



B6M1552A

52. Bulkhead Wiring Harness (In Compartment)

S903446

A: LOCATION

S903446A13

1. 4-CYLINDER ENGINE MODEL

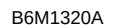
S903446A1302

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	24	★	C-1	D1	Front door cord LH
B31	7	Yellow	D-1	AB1	SRS (Airbag) harness
B32	3	Black	B-2		Turn & hazard module
B35	2	Black	B-4		Diode (Step light)
B36	66	★	B-1	i1	Instrument panel wiring harness (SMJ)
B40	16	★	C-1		Data link connector
B41	2	★	C-1		Power window circuit breaker
B42	5	Black	A-1		Power window relay (Relay block)
B43	6	Black	C-3		Illumination control module
B44	8	★	C-2		Seat belt timer
B46	4	Green	C-1		Fuel pump relay
B47	6	Brown	C-4		Main relay
B50	4	Black	D-1		Blower relay
B51	8	★	C-1		F/B
B52	7	★	B-1		
B53	6	Gray	B-2		Shield joint connector (AT)
B54	24	★	C-2		Transmission control module
B55	24	Gray	C-2		
B57	12	★	C-2		AT shift lock control module
B59	6	★	B-1		Interrupt relay (Security)
B61	8	★	B-2	F44	Front wiring harness
B62	66	★	B-2	F45	Front wiring harness (SMJ)
B64	2	Black	B-2		Stop light switch
B65	4	Black	B-2		Stop & brake switch (With cruise control)
B68	5	Black	C-2		Cruise control sub switch
B69	4	★	D-2		Combination switch
B70	18	★	C-2		
B71	17	★	C-2		
B72	4	Blue	C-2		Ignition switch
B73	2	★	C-2		Key lock solenoid
B74	2	Black	C-2		Key warning switch
B75	2	Green	B-3	B76	Test mode connector
B76	2	Green	B-3	B75	
B77	10	Brown	B-3		Mode actuator
B79	14	Gray	C-3		Check connector
B80	8	★	C-2	i20	Instrument panel wiring harness
B81	1 × 2	★	C-3		Diagnosis terminal (Ground)
B82	8	★	C-3		Diagnosis connector
B83	12	Blue	C-4		Shield & sensor ground joint connector (E/G)
B86	6	Black	B-4		Blower motor resistor

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B87	2	★	C-4		Blower motor
B88	3	Black	B-3		Evaporator thermostat switch
B89	2	★	B-4		Diode (Rear gate)
B90	6	★	B-4	R50	Roof cord
B91	6	Black	C-4		FRESH/RECIRC actuator
B92	8	★	B-4		Door lock timer
B93	18	★	C-2		Security control module
B94	20	Black	B-4		Cruise control module
B96	8	Black	C-2		Daytime running light control module
B97	8	★	C-4	R1	Rear wiring harness
B99	32	★	C-4	R3	
B101	24	★	C-4	D11	Front door cord RH
B102	5	Black	A-2		Daytime running light relay (Relay block)
B104	4	★	B-1		Seat heater/rear accessory power supply relay
B105	4	Blue	C-1		Starter interlock relay (MT)
B106	2	★	B-2		Clutch switch (MT)
B107	2	Blue	B-2		Clutch switch (Cruise control)
B112	2	Black	C-2		Diode (Front fog light)
B116	6	★	C-3		Select lever illumination light (AT)
B134	35	★	C-3		Engine control module (MT)
	35	Gray	C-3		Engine control module (AT)
B135	28	★	C-3		Engine control module (MT)
	28	Gray	C-3		Engine control module (AT)
B136	30	★	C-3		Engine control module (MT)
	30	Gray	C-3		Engine control module (AT)
B152	12	★	B-1		F/B
B157	5	Black	A-1		Ignition relay (Relay block)
B158	10	Gray	C-1		F/B
B176	16	★	B-4		Keyless entry control module
B177	2	★	B-1		Wiper deicer
B183	1	★	C-1	B184	Joint connector (Keyless entry)
B184	1	★	C-1	B183	
B191	5	Black	A-1		Wiper deicer relay (Relay block)
B192	4	★	C-2		Wiper deicer timer
B201	10	★	C-2	i40	Instrument panel wiring harness
B225	8	Black	A-1		Fuse (Relay block)
B228	15	★	B-2		OP connector
B241	16	★	C-4	B176	Short connector (Without keyless entry)
B242	10	★	C-2		Daytime running light control module
B243	6	Black	B-1		Security horn relay

★: Non-colored

Wiring System



BULKHEAD WIRING HARNESS (IN COMPARTMENT)

Wiring System

2. 6-CYLINDER ENGINE MODEL

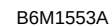
S903446A1303

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	24	★	C-1	D1	Front door cord LH
B31	7	Yellow	D-1	AB1	SRS (Airbag) harness
B32	3	Black	B-2		Turn & hazard module
B35	2	Black	B-4		Diode (Step light)
B36	66	★	B-1	i1	Instrument panel wiring harness (SMJ)
B40	16	★	C-1		Data link connector
B41	2	★	C-1		Power window circuit breaker
B42	5	Black	A-1		Power window relay (Relay block)
B43	6	Black	C-3		Illumination control module
B44	8	★	C-2		Seat belt timer
B46	4	Green	C-1		Fuel pump relay
B47	6	Brown	C-4		Main relay
B48	5	Black	A-2		Front fog light relay (Relay block)
B50	4	Black	D-1		Blower relay
B51	8	★	C-1		F/B
B52	7	★	B-1		
B53	6	Gray	B-2		Shield joint connector (AT)
B54	24	★	C-2		
B55	24	Gray	C-2		Transmission control module
B56	24	Green	C-2		
B57	12	★	C-2		AT shift lock control module
B59	6	★	B-1		Interrupt relay (Security)
B61	8	★	B-2	F44	Front wiring harness
B62	66	★	B-2	F45	Front wiring harness (SMJ)
B65	4	Black	B-2		Stop & brake switch (With cruise control)
B68	5	Black	C-2		Cruise control sub switch
B69	4	★	D-2		
B70	18	★	C-2		Combination switch
B71	17	★	C-2		
B72	4	Blue	C-2		Ignition switch
B73	2	★	C-2		Key lock solenoid
B74	2	Black	C-2		Key warning switch
B75	2	Green	B-3	B76	Test mode connector
B76	2	Green	B-3	B75	
B77	10	Brown	B-3		Mode actuator
B79	14	Gray	C-1		Check connector
B80	8	★	C-2	i20	Instrument panel wiring harness
B81	1 × 2	★	C-3		Diagnosis terminal (Ground)
B82	8	★	C-3		Diagnosis connector
B83	20	★	C-4		Shield & sensor ground joint connector (E/G)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B86	4	★	B-4		Blower motor resistor
B87	2	★	C-4		Blower motor
B88	3	★	B-3		Evaporator thermostat switch
B90	6	★	B-4	R50	Roof cord
B91	6	Black	C-4		FRESH/RECIRC actuator
B93	18	★	C-2		Security control module
B94	20	Black	B-4		Cruise control module
B96	8	Black	C-2		Daytime running light control module
B97	8	★	C-4	R1	Rear wiring harness
B99	32	★	C-4	R3	
B101	24	★	C-4	D11	Front door cord RH
B102	5	Black	A-2		Daytime running light relay (Relay block)
B104	4	★	B-1		Seat heater/rear accessory power supply relay
B108	4	★	B-2	F46	Front wiring harness
B112	2	Black	C-2		Diode (Front fog light)
B116	6	★	C-3		Select lever illumination light (AT)
B134	22	★	C-3		Engine control module
B135	28	★	C-3		
B136	24	★	C-3		
B137	31	★	C-4		
B152	12	★	B-1		F/B
B157	5	Black	A-1		Ignition relay (Relay block)
B158	10	Gray	C-1		F/B
B176	16	★	B-4		Keyless entry control module
B177	2	★	B-1		Wiper deicer
B181	4	★	C-2		Fan ground joint connector
B183	1	★	C-1	B184	Joint connector (Keyless entry)
B184	1	★	C-1	B183	
B191	5	Black	A-1		Wiper deicer relay (Relay block)
B192	4	★	C-2		Wiper deicer timer
B201	10	★	C-2	i40	Instrument panel wiring harness
B225	8	Black	A-1		Fuse (Relay block)
B228	15	★	B-2		OP connector
B231	4	Black	C-2		Steering angle sensor (VDC)
B234	6	★	C-2		Joint connector (VDC)
B235	6	Black	C-3		Air mix actuator
B242	10	★	C-2		Daytime running light control module
B243	6	Black	B-1		Security horn relay
B250	3	★	B-3		Flash memory connector
B254	1	★	C-4	R140	Rear wiring harness

★: Non-colored

Wiring System



53. Engine Wiring Harness and Transmission Cord

S903447

A: LOCATION

S903447A13

1. 4-CYLINDER ENGINE MT MODEL

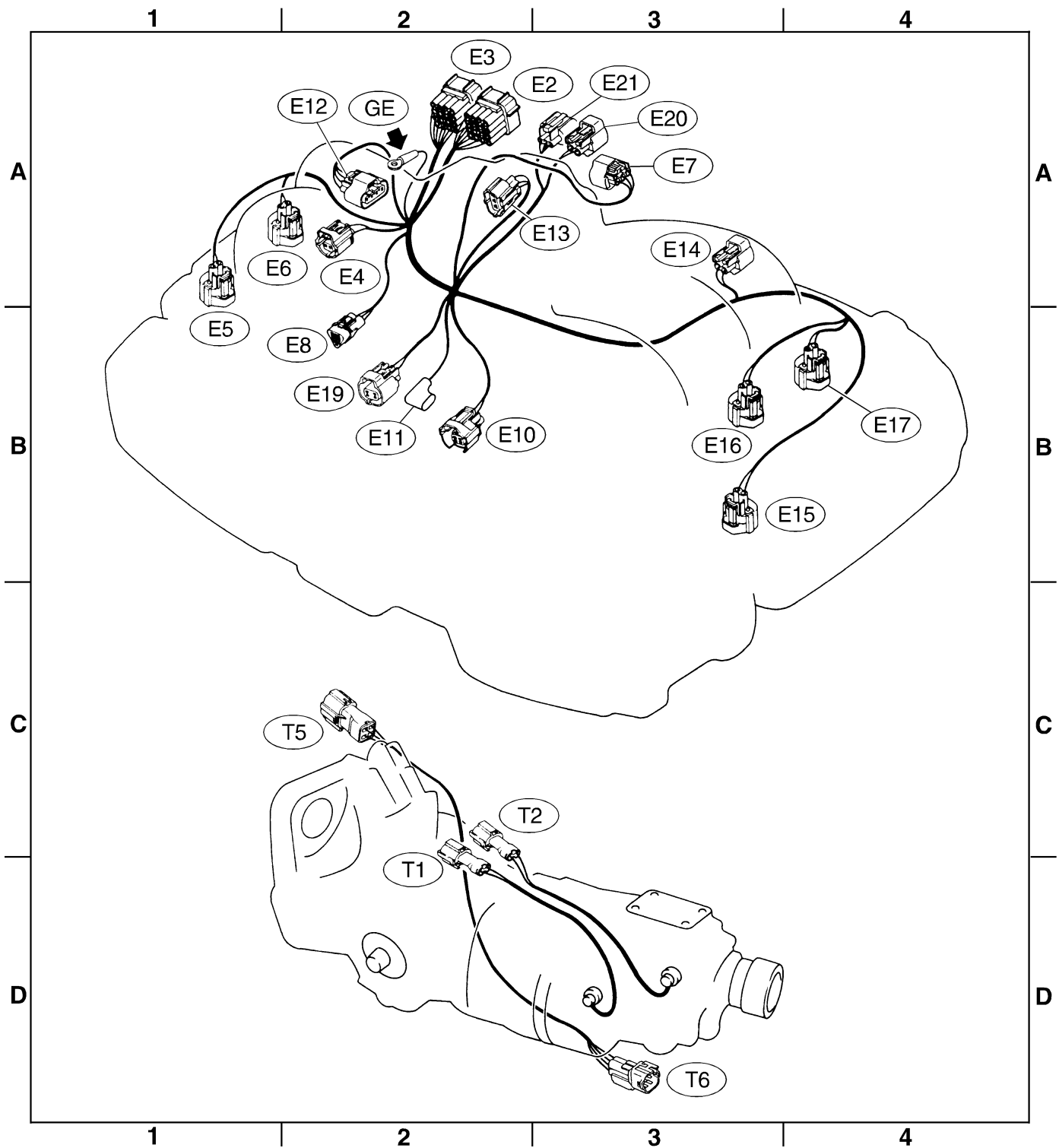
S903447A1301

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E2	20	★	A-2	B21	Bulkhead wiring harness
E3	16	Brown	A-2	B22	Bulkhead wiring harness
E4	2	Blue	A-2		Purge control solenoid valve
E5	2	Gray	B-1		Injector #1
E6	2	Gray	A-2		Injector #3
E7	3	Gray	A-3		Idle air control solenoid valve
E8	3	★	B-2		Engine coolant temperature sensor and thermometer
E10	2	★	B-2		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E12	4	Dark gray	A-2		Ignition coil and ignitor
E13	3	Black	A-3		Throttle position sensor
E14	2	Gray	B-3		Knock sensor
E15	2	★	B-3		Camshaft position sensor
E16	2	Gray	B-3		Injector #2
E17	2	Gray	B-4		Injector #4
E19	2	★	B-2		Power steering oil pressure switch
E20	2	Black	A-3		Intake air temperature sensor
E21	3	★	A-3		Intake manifold pressure sensor
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T1	2	Gray	D-1	B24	Bulkhead wiring harness
T2	2	Brown	D-1	B25	
T5	4	Gray	C-2	B19	Bulkhead wiring harness
T6	4	Gray	D-3		Rear oxygen sensor
★: Non-colored					

ENGINE WIRING HARNESS AND TRANSMISSION CORD

Wiring System



B6M1322A

ENGINE WIRING HARNESS AND TRANSMISSION CORD

Wiring System

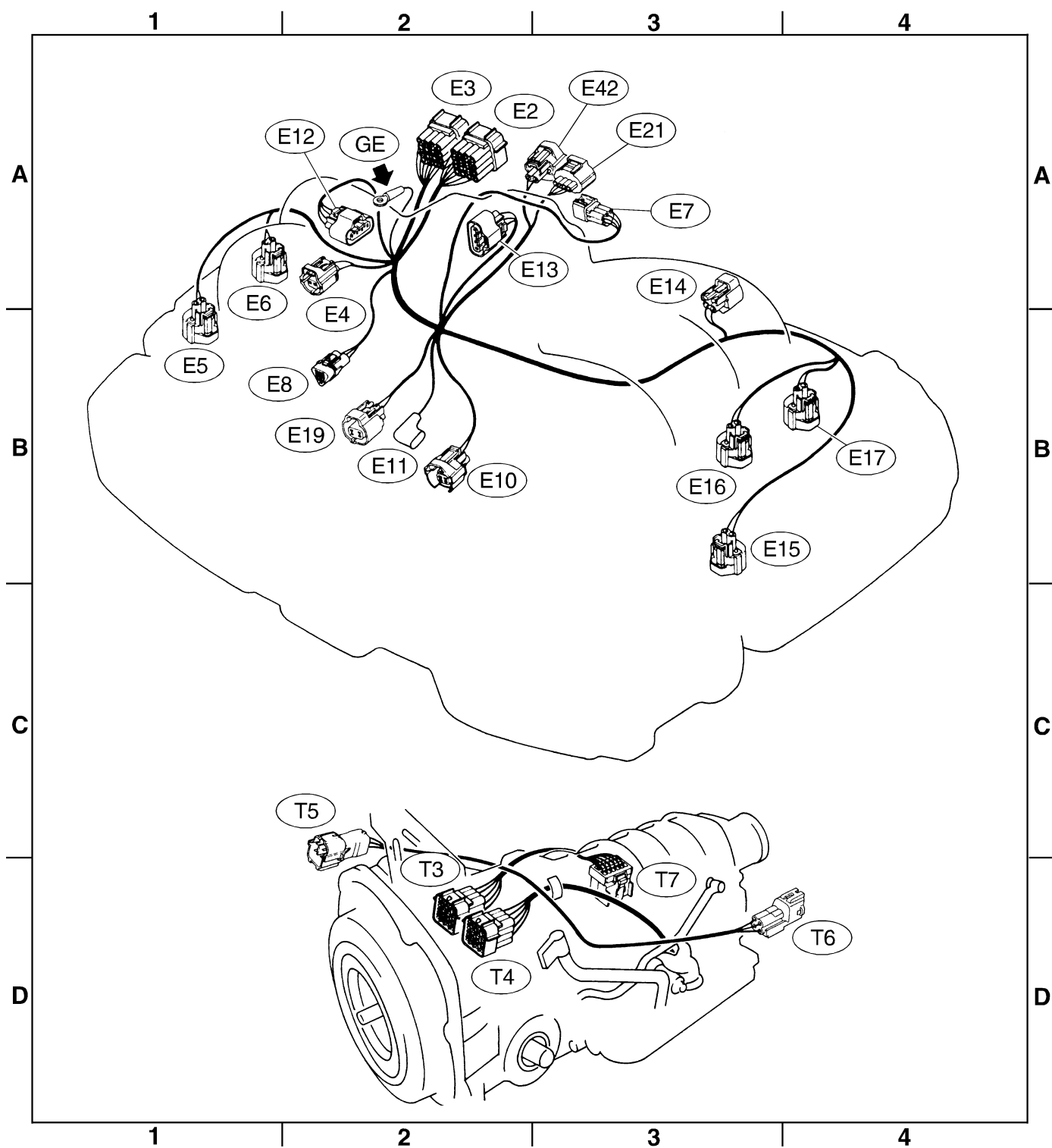
2. 4-CYLINDER ENGINE AT MODEL S903447A1302

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E2	20	★	A-2	B21	Bulkhead wiring harness
E3	16	Brown	A-2	B22	Bulkhead wiring harness
E4	2	Blue	A-2		Purge control solenoid valve
E5	2	Gray	B-1		Injector #1
E6	2	Gray	A-2		Injector #3
E7	6	★	A-3		Idle air control solenoid valve
E8	3	★	B-2		Engine coolant temperature sensor and thermometer
E10	2	★	B-2		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E12	4	Dark gray	A-2		Ignition coil and ignitor
E13	4	★	A-3		Throttle position sensor
E14	2	Gray	B-3		Knock sensor
E15	2	★	B-3		Camshaft position sensor
E16	2	Gray	B-3		Injector #2
E17	2	Gray	B-4		Injector #4
E19	2	★	B-2		Power steering oil pressure switch
E21	4	★	A-3		Pressure sensor and intake air temperature sensor
E42	2	★	A-3		Air assist solenoid valve
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T3	12	★	D-3	B12	Bulkhead wiring harness
T4	20	Black	D-3	B11	
T5	4	Gray	C-2	B19	Bulkhead wiring harness
T6	4	Gray	D-4		Rear oxygen sensor
T7	12	★	C-4		Inhibitor switch
★: Non-colored					

ENGINE WIRING HARNESS AND TRANSMISSION CORD

Wiring System



B6M1321A

ENGINE WIRING HARNESS AND TRANSMISSION CORD

Wiring System

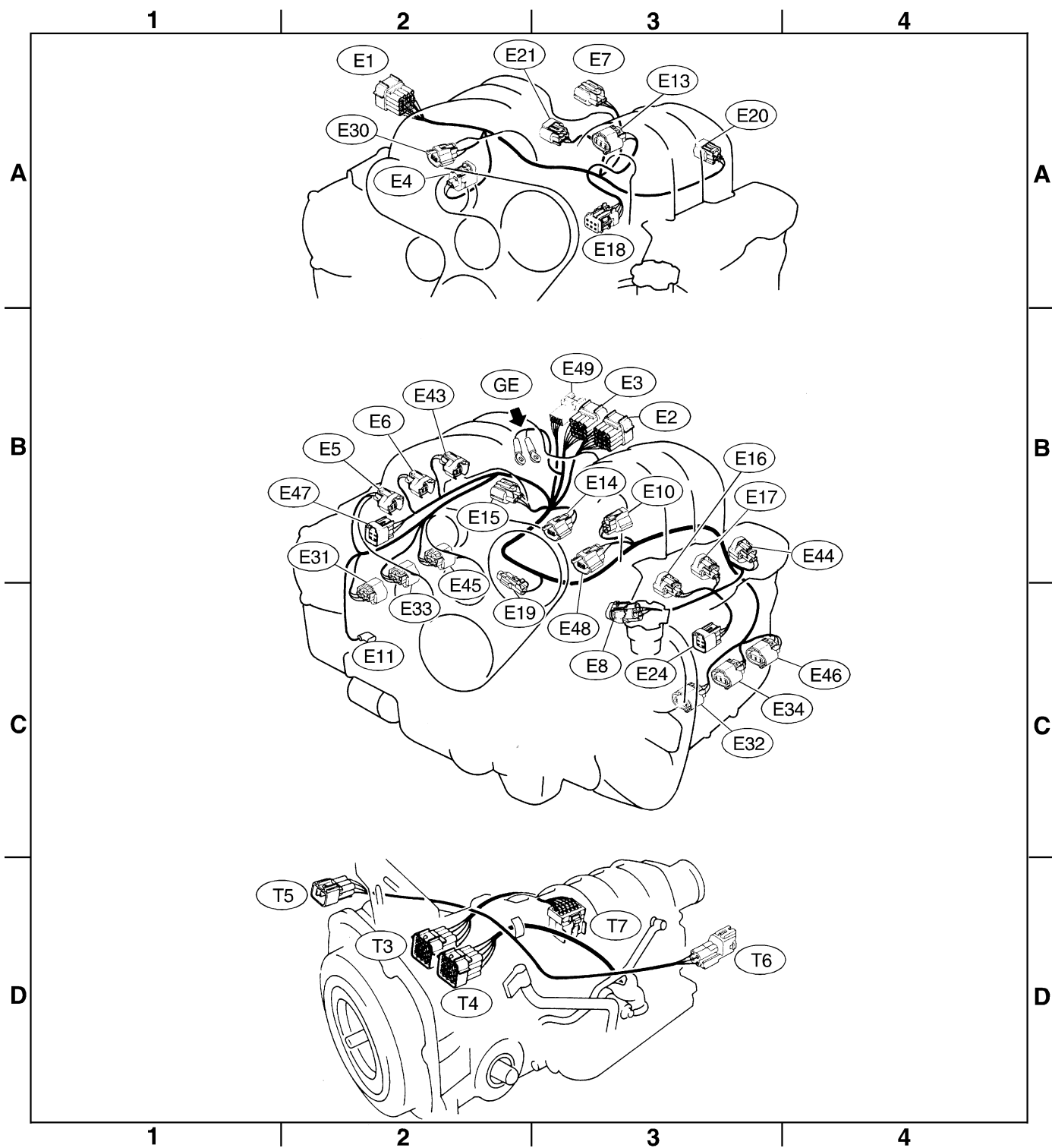
3. 6-CYLINDER ENGINE MODEL S903447A1303

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E1	16	Dark gray	A-2	B20	Bulkhead wiring harness
E2	20	Light gray	B-3	B21	
E3	16	Brown	B-3	B22	
E4	2	Black	A-2		Purge control solenoid valve
E5	2	Gray	B-2		Fuel injector No. 1
E6	2	Gray	B-2		Fuel injector No. 3
E7	3	Gray	A-3		Idle speed control solenoid valve
E8	3	Light gray	C-3		Engine coolant temperature sensor and thermometer
E10	2	Gray	B-3		Crankshaft position sensor
E11	1	★	C-2		Oil pressure switch
E13	3	Black	A-3		Throttle position sensor
E14	2	Blue	B-3		Knock sensor-1
E15	3	Gray	B-2		Camshaft position sensor
E16	2	Gray	B-3		Fuel injector No. 2
E17	2	Gray	B-3		Fuel injector No. 4
E18	6	Gray	A-3		EGR solenoid valve
E19	1	★	C-2		Power steering oil pressure switch
E20	2	Black	A-3		Intake air temperature sensor
E21	3	Black	A-2		Pressure sensor
E24	4	Dark gray	C-3		Front oxygen (A/F) sensor LH
E30	2	Brown	A-2		Induction valve control solenoid
E31	3	Black	B-2		Ignition coil No. 1
E32	3	Black	C-3		Ignition coil No. 2
E33	3	★	C-2		Ignition coil No. 3
E34	3	★	C-4		Ignition coil No. 4
E43	2	Gray	B-2		Fuel injector No. 5
E44	2	Gray	B-4		Fuel injector No. 6
E45	3	Black	B-2		Ignition coil No. 5
E46	3	Black	C-4		Ignition coil No. 6
E47	4	Dark gray	B-2		Front oxygen (A/F) sensor RH
E48	2	Blue	C-3		Knock sensor-2
E49	8	Dark gray	B-3	B252	Bulkhead wiring harness
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T3	12	Black	D-2	B12	Bulkhead wiring harness
T4	20	Black	D-2	B11	
T5	6	★	D-2	B19	Bulkhead wiring harness
T6	4	★	D-3		Rear oxygen sensor
T7	12	★	C-3		Inhibitor switch
★: Non-colored					

ENGINE WIRING HARNESS AND TRANSMISSION CORD

Wiring System



B6M1609

54. Instrument Panel Wiring Harness

S903435

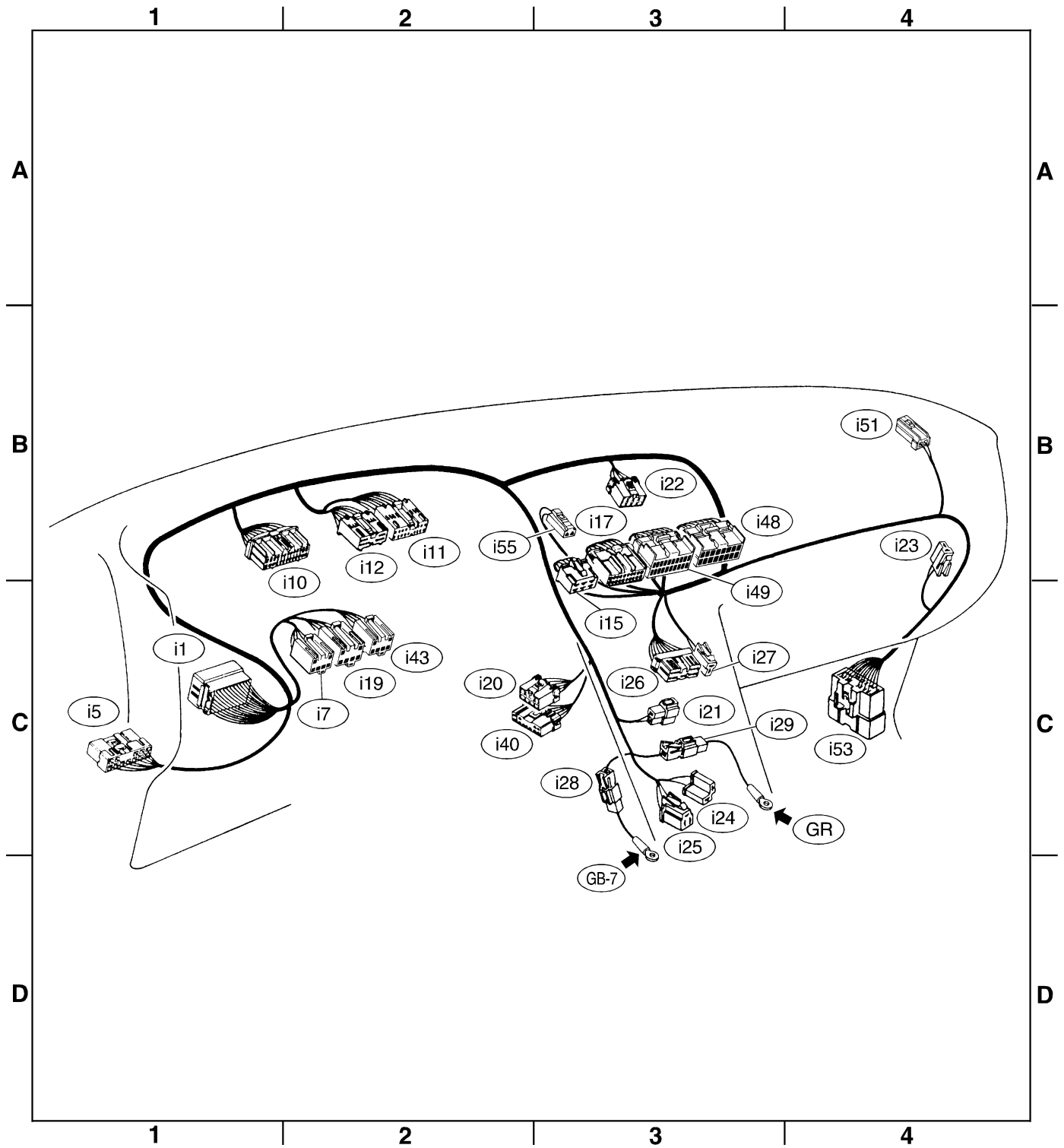
A: LOCATION

S903435A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
i1	66	★	C-1	B36	Bulkhead wiring harness (SMJ)
i5	12	★	C-1		F/B
i7	6	Black	C-2		Front fog light switch
i10	30	Green	B-2		Combination meter
i11	16	Green	B-2		
i12	14	Green	B-2		
i15	6	★	B-3		Mode control panel
i17	20	Gray	B-3		
i19	6	Brown	C-2		Cruise control main switch
i20	8	★	C-2	B80	Bulkhead wiring harness
i21	2	Black	C-3		Ash tray illumination light
i22	8	★	B-3		Hazard switch
i23	2	★	B-4		Glove box illumination light
i24	2	★	C-3		Cigarette lighter
i25	3	★	C-3		Cigarette lighter illumination light
i26	14	★	C-3		Radio
i27	2	★	C-3		CD player illumination light
i28	1	Black	C-3		Body ground
i29	1	Black	C-3		Body ground (Radio)
i40	10	★	C-2	B201	Bulkhead wiring harness
i43	6	★	C-2		Wiper deicer switch
i48	16	Gray	B-3		Auto A/C control module
i49	20	Gray	B-3		
i51	2	Black	B-4		Sunload sensor (Auto A/C)
i53	16	Blue	C-4	R98	Rear wiring harness
i55	2	★	B-3		In-vehicle temperature sensor (Auto A/C)
★: Non-colored					

INSTRUMENT PANEL WIRING HARNESS

Wiring System



B6M1555A

55. Rear Wiring Harness S903431

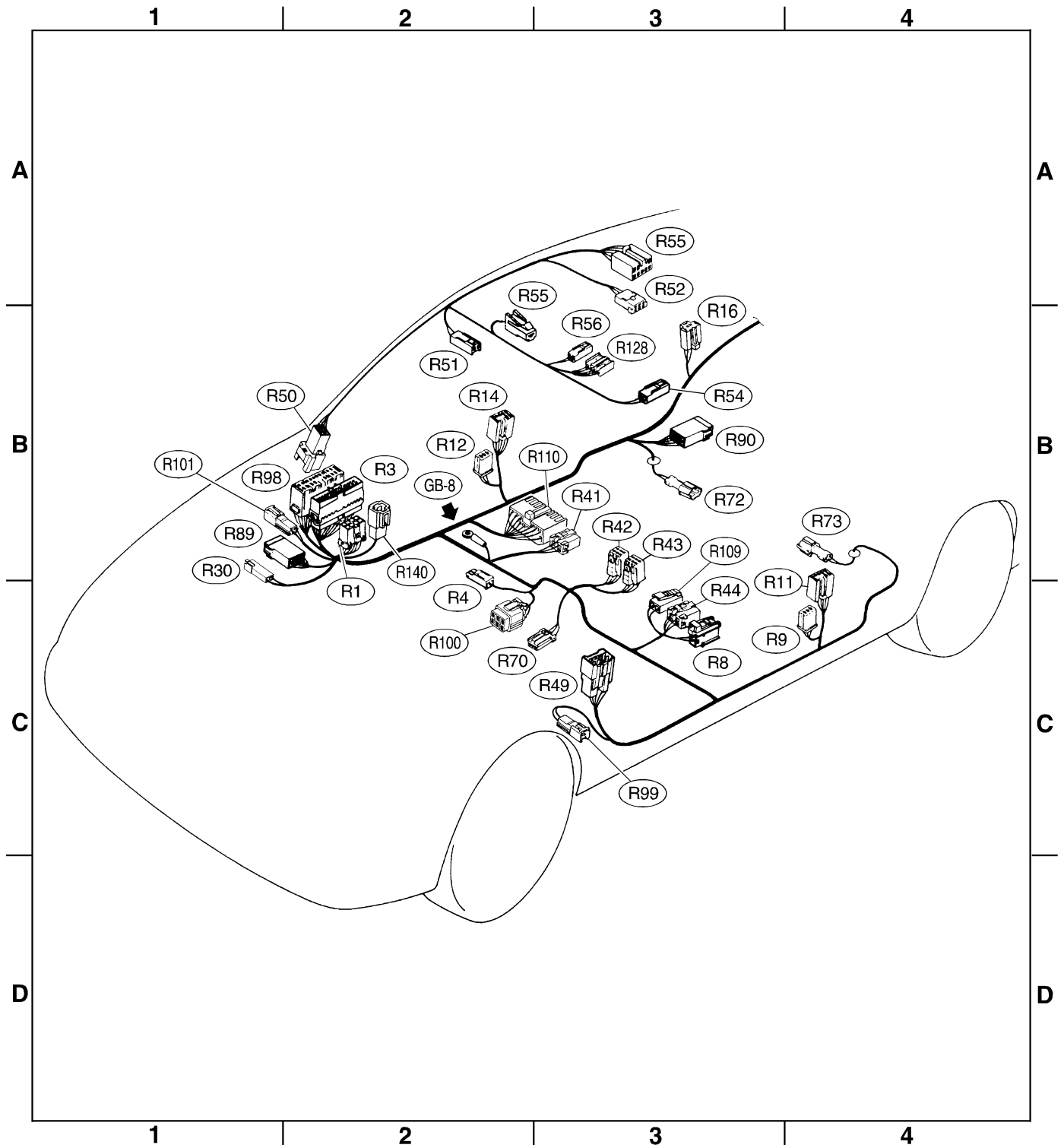
A: LOCATION S903431A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R1	8	★	B-2	B97	Bulkhead wiring harness
R3	32	★	B-2	B99	
R4	1	Black	B-2		
R8	2	★	C-3		Parking brake switch
R9	3	★	C-4		Seat belt switch
R11	8	★	B-4	D21	Front door switch LH
R12	3	★	B-2		Rear door cord LH
R14	8	★	B-2	D27	Front door switch RH
R16	3	Black	B-3		Rear door cord RH
R30	2	Black	B-2		Rear door switch RH
R41	4	Blue	B-3		Diode (Rear gate)
R42	6	★	B-3		Seat heater RH
R43	6	Blue	B-3		Seat heater switch RH
R44	4	Blue	C-3		Seat heater switch LH
R49	8	★	C-3	F55	Seat heater LH
	12	★	C-3	F55	Front wiring harness (ABS)
R50	6	★	B-2	B90	Front wiring harness (VDC)
R51	2	★	B-2		Bulkhead wiring harness
R52	3	★	B-3		Vanity mirror illumination light RH
R54	2	★	B-3		Room light
R55	1	★	B-2		Vanity mirror illumination light LH
	8	★	A-3		Sunroof (Sedan)
R56	2	★	B-3		Sunroof control module (Wagon)
R70	3	Black	C-2		Spot light
R72	2	Gray	B-3		ABS G sensor
R73	2	Gray	B-4		Rear ABS sensor RH
R89	8	★	B-2		Rear ABS sensor LH
R90	8	★	B-3		Speaker joint connector LH (Wagon)
R98	16	Blue	B-2	i53	Speaker joint connector RH (Wagon)
R99	2	★	C-3	D68	Instrument panel wiring harness
R100	6	Black	C-2		Front door cord LH
R101	2	★	B-2	D69	Yaw rate sensor (VDC)
R109	2	Black	C-3		Front door cord RH
R110	14	★	B-2		Power seat
R128	5	★	B-3		Power amplifier (Mcintosh audio)
R140	1	★	B-2		Sunroof switch (Wagon)
					Bulkhead wiring harness

★: Non-colored

REAR WIRING HARNESS

Wiring System



B6M1556A

56. Door Cord S903432

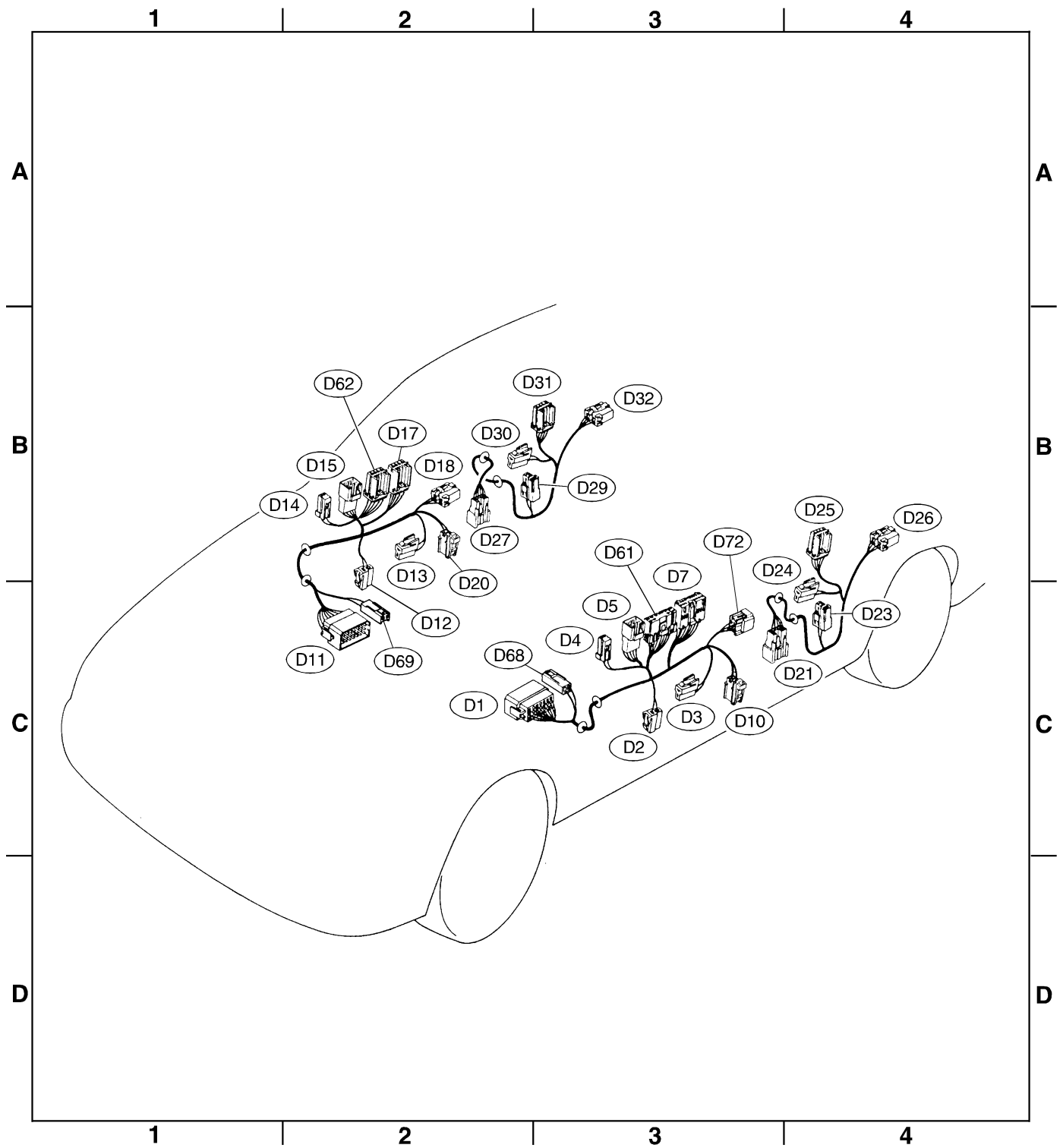
A: LOCATION S903432A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D1	24	★	C-2	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	C-3		Front door tweeter LH
D5	6	★	C-3		Remote control rearview mirror LH
D7	16	★	C-3		Power window main switch
D10	2	★	C-3		Step light LH
D11	24	★	C-2	B101	Bulkhead wiring harness
D12	2	★	C-2		Front door speaker RH
D13	2	Green	B-2		Front power window motor RH
D14	2	Black	B-2		Front door tweeter RH
D15	6	★	B-2		Remote control rearview mirror RH
D17	6	★	B-2		Front power window sub switch RH
D18	4	★	B-2		Front door lock actuator RH
D20	2	★	B-2		Step light RH
D21	8	★	C-3	R11	Rear wiring harness
D23	2	Black	C-4		Rear door speaker LH
D24	2	Green	C-4		Rear power window motor LH
D25	6	★	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-2		Rear door speaker RH
D30	2	Green	B-2		Rear power window motor RH
D31	6	★	B-2		Rear power window sub switch RH
D32	4	★	B-3		Rear door lock actuator RH
D61	10	★	C-3		Remote control rearview mirror switch
D62	6	Brown	B-2		Front door lock switch RH
D68	2	★	C-3	R99	Rear wiring harness
D69	2	★	C-2	R101	Rear wiring harness
D72	4	★	C-3		Front door lock actuator LH

★: Non-colored

DOOR CORD

Wiring System



B6M1557A

57. Rear Wiring Harness and Trunk Lid Cord

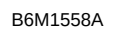
S903673

A: LOCATION

S903673A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R15	6	Black	C-2	R57	Fuel tank cord
R17	1	Black	B-3		Rear defogger (Power) (Without choke coil model)
R19	2	★	B-2		High-mounted stop light
R20	2	Blue	B-3		Trunk room light
R22	3	Black	B-1		Rear door switch LH
R24	6	★	B-4	R60	Trunk lid cord
R25	2	Black	B-3		Rear defogger condenser
R26	4	★	B-4		Rear combination light RH
R27	2	★	C-3		Trunk room light switch
R28	4	★	C-3		Rear combination light LH
R47	3	Black	C-3		Internal pressure sensor
R57	6	Black	C-2	R15	Rear wiring harness
R58	6	Gray	C-2		Fuel gauge module & fuel pump assembly
R59	2	★	C-2		Fuel gauge sub module
R60	6	★	B-4	R24	Rear wiring harness
R62	4	★	C-4		Rear finisher light RH
R63	2	★	C-3		License plate light
R64	4	★	C-3		Rear finisher light LH
R65	1	Black	B-2		Rear defogger (Ground) (Without choke coil model)
R66	2	Black	B-4		High-mounted stop light (Rear spoiler)
R68	2	Gray	C-3		Pressure control solenoid valve
R69	2	★	C-4		Drain valve
R97	2	★	B-2		Antenna amp.
R117	2	★	B-2		Sub woofer (Mcintosh audio)
R130	2	★	B-3		Rear defogger (With choke coil model)
R134	6	Gray	C-4	R135	ORVR cord
R135	6	Gray	C-4	R134	Rear wiring harness
★: Non-colored					

Wiring System



58. Rear Wiring Harness and Rear Gate Cord

S903433

A: LOCATION

S903433A13

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R15	6	Black	D-1	R57	Fuel tank cord
R22	3	Black	C-1		Rear door switch LH
R25	2	Black	C-3		Rear defogger condenser
R26	4	Black	C-4		Rear combination light RH
R28	4	Black	C-2		Rear combination light LH
R32	2	★	C-2		Rear accessory power supply socket
R37	2	★	C-3	D33	Rear gate cord
R38	8	★	C-3	D34	
R39	8	Black	C-4	D35	
R47	3	Black	C-3		Internal pressure sensor
R57	6	Black	D-1	R15	Rear wiring harness
R58	6	Gray	D-2		Fuel gauge module & fuel pump assembly
R59	2	★	D-2		Fuel gauge sub module
R68	2	Gray	C-2		Pressure control solenoid valve
R69	2	★	D-3		Drain valve
R79	6	★	C-2		Trailer connector
R97	2	★	C-1		Antenna amp.
R116	8	★	C-3		Rear wiper intermittent module
R117	2	★	C-3		Sub woofer (Mcintosh audio)
R134	6	Gray	C-3	R135	ORVR cord
R135	6	Gray	C-3	R134	Rear wiring harness

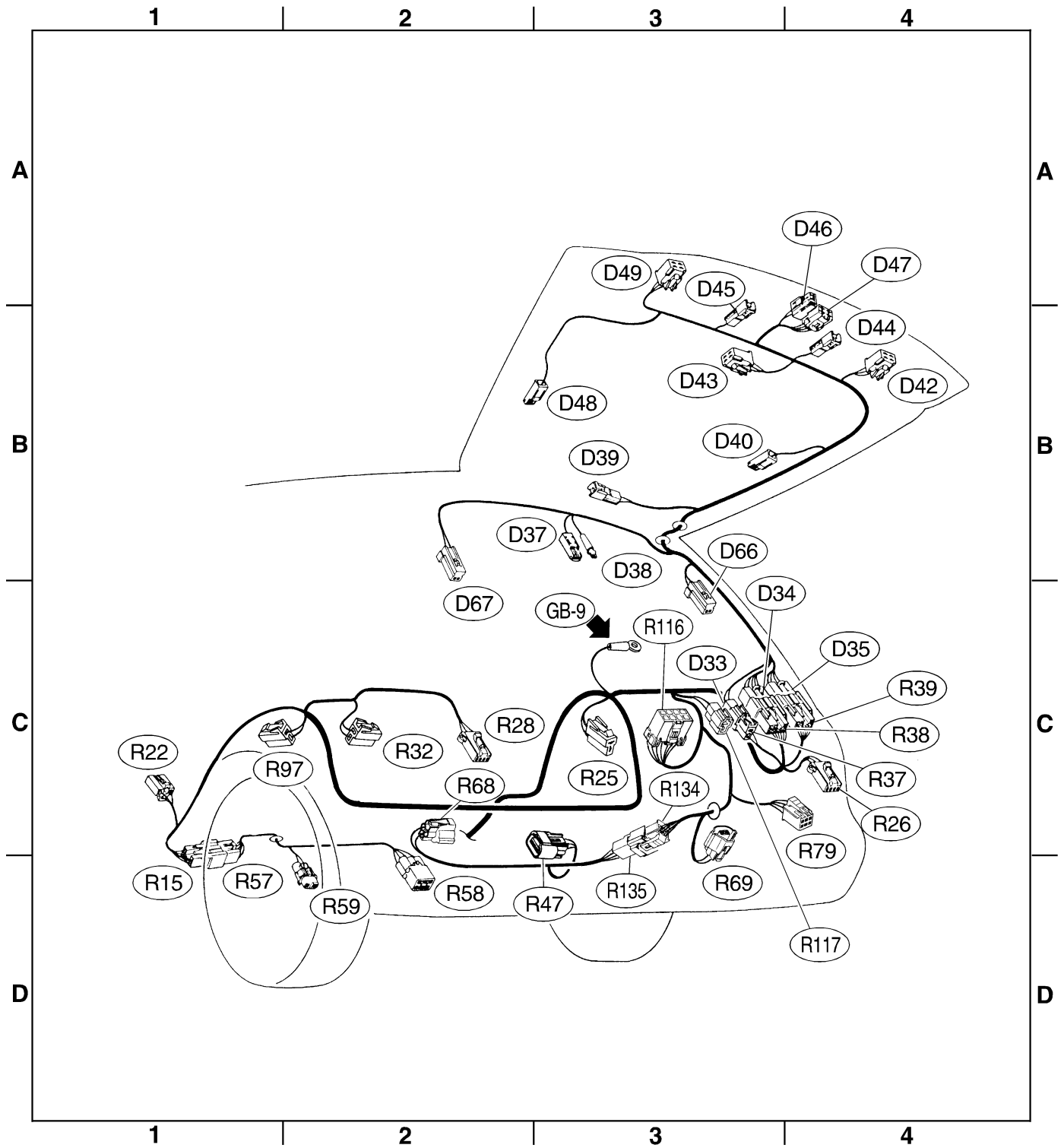
★: Non-colored

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D33	2	★	C-3	R37	Rear wiring harness
D34	8	★	C-3	R38	
D35	8	Black	C-4	R39	
D37	1	Black	B-3		Luggage room light (Power)
D38	1	★	B-3		Luggage room light
D39	2	★	B-3		High-mounted stop light
D40	1	Black	B-3		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	★	B-4		Rear gate lock actuator
D48	1	Black	B-3		Rear defogger (Ground)
D49	4	★	A-3		Rear finisher light LH
D66	2	Black	C-3		Rear tweeter RH
D67	2	Black	B-2		Rear tweeter LH

★: Non-colored

REAR WIRING HARNESS AND REAR GATE CORD

Wiring System



B6M1559A

GENERAL DESCRIPTION

Fuel Injection (Fuel Systems)

1. General Description S145001

A: SPECIFICATIONS S145001E49

Model		
Fuel tank	Capacity	64 ℓ (16.9 US gal, 14.1 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	370 — 677 kPa (3.77 — 6.9 kg/cm ² , 53.6 — 98 psi)
	Discharge flow	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

GENERAL DESCRIPTION

Fuel Injection (Fuel Systems)

MEMO:

GENERAL DESCRIPTION

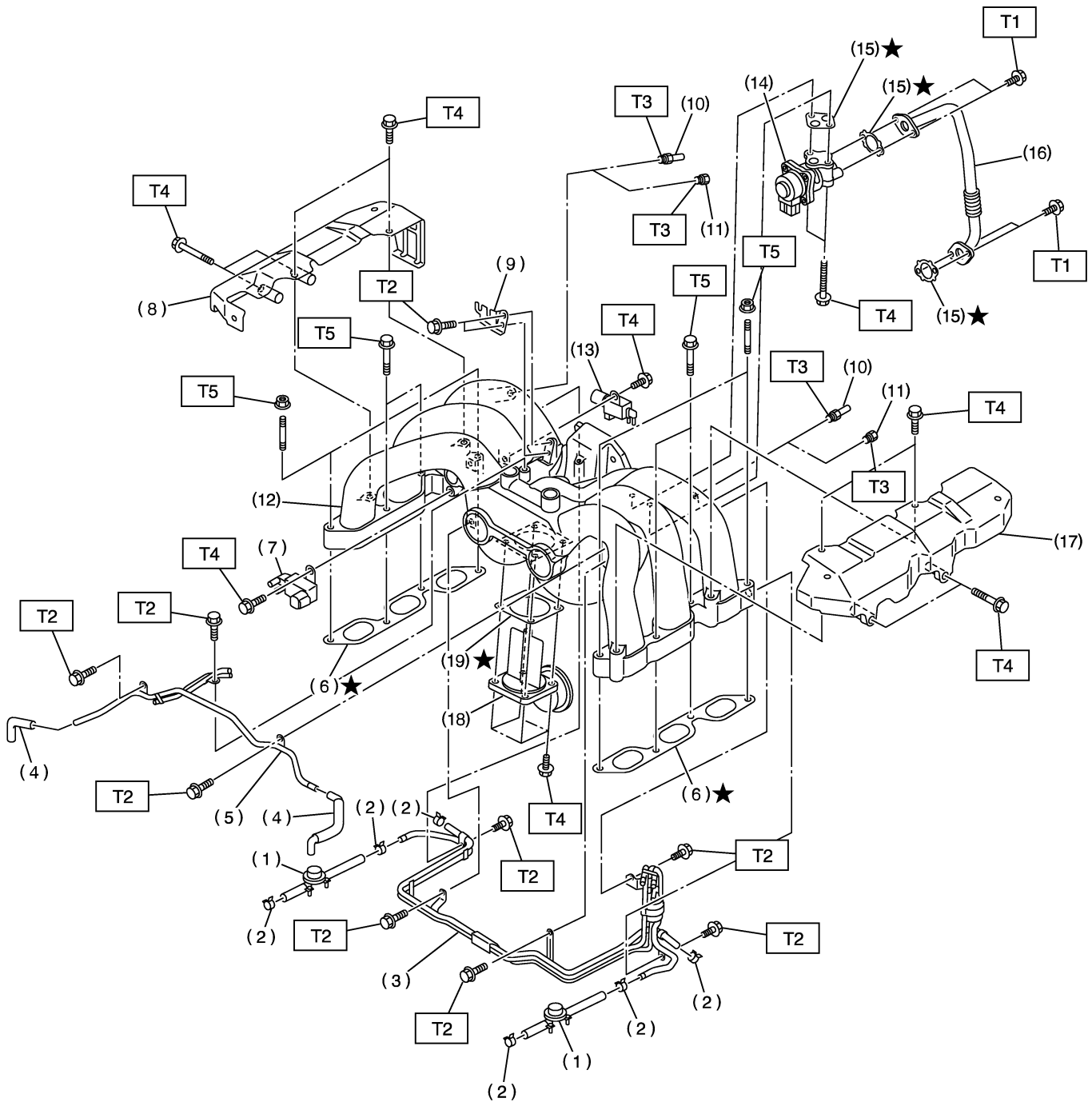
Fuel Injection (Fuel Systems)

B: COMPONENT

S145001A05

1. INTAKE MANIFOLD

S145001A0501



B2M4476A

FU(H6)-4

GENERAL DESCRIPTION

Fuel Injection (Fuel Systems)

- (1) Fuel damper valve
- (2) Clamp
- (3) Fuel pipe ASSY
- (4) Air assist hose
- (5) Air assist and purge pipe ASSY
- (6) Gasket
- (7) Purge control solenoid valve
- (8) Fuel pipe protector RH
- (9) Accelerator cable bracket

- (10) Nipple
- (11) Plug
- (12) Intake manifold
- (13) Induction valve control solenoid
- (14) EGR valve
- (15) Gasket
- (16) EGR pipe
- (17) Fuel pipe protector LH
- (18) Induction valve

- (19) Gasket

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 5.0 (0.51, 3.7)

T3: 17 (1.7, 12)

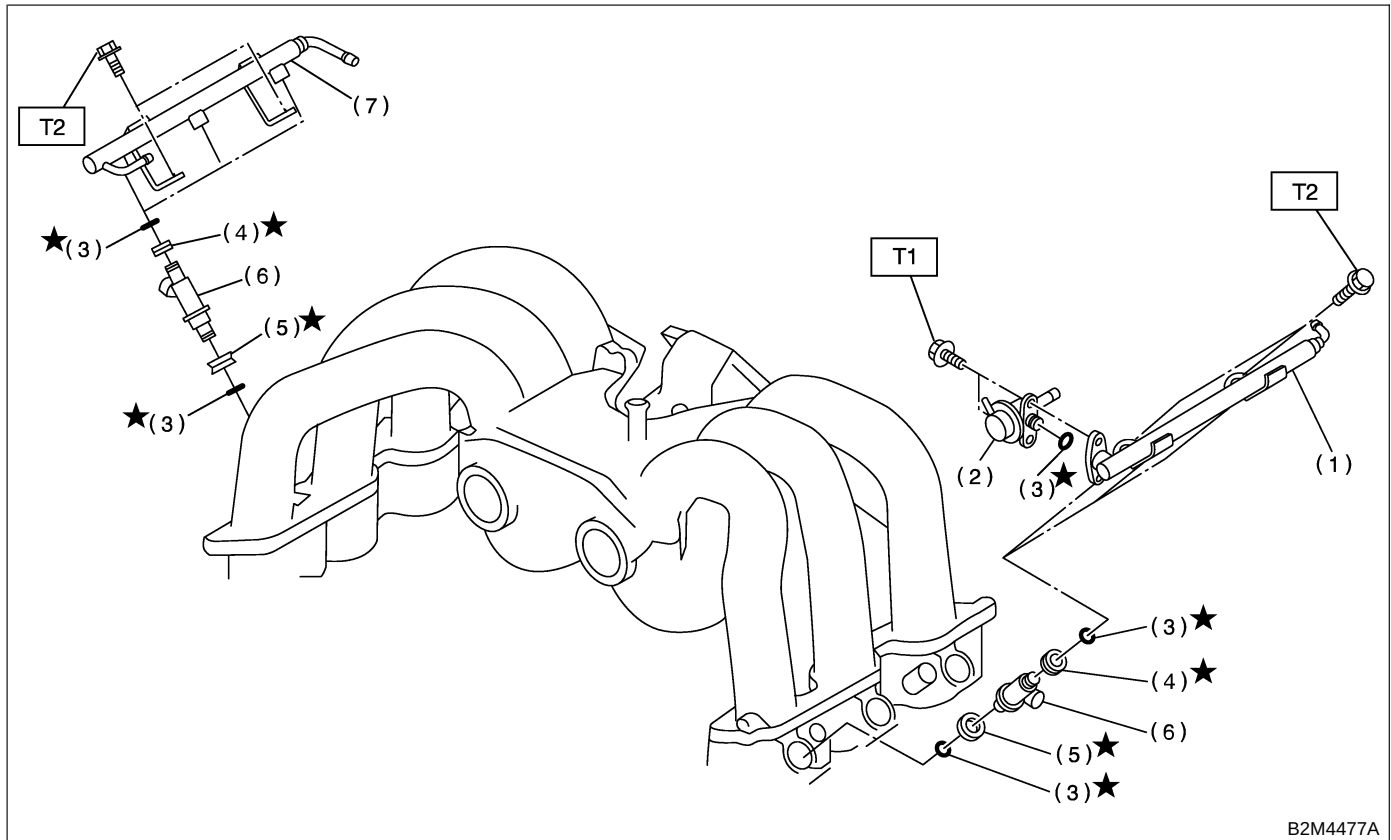
T4: 19 (1.9, 14)

T5: 25 (2.5, 18)

GENERAL DESCRIPTION

Fuel Injection (Fuel Systems)

2. FUEL INJECTOR S145001A0502



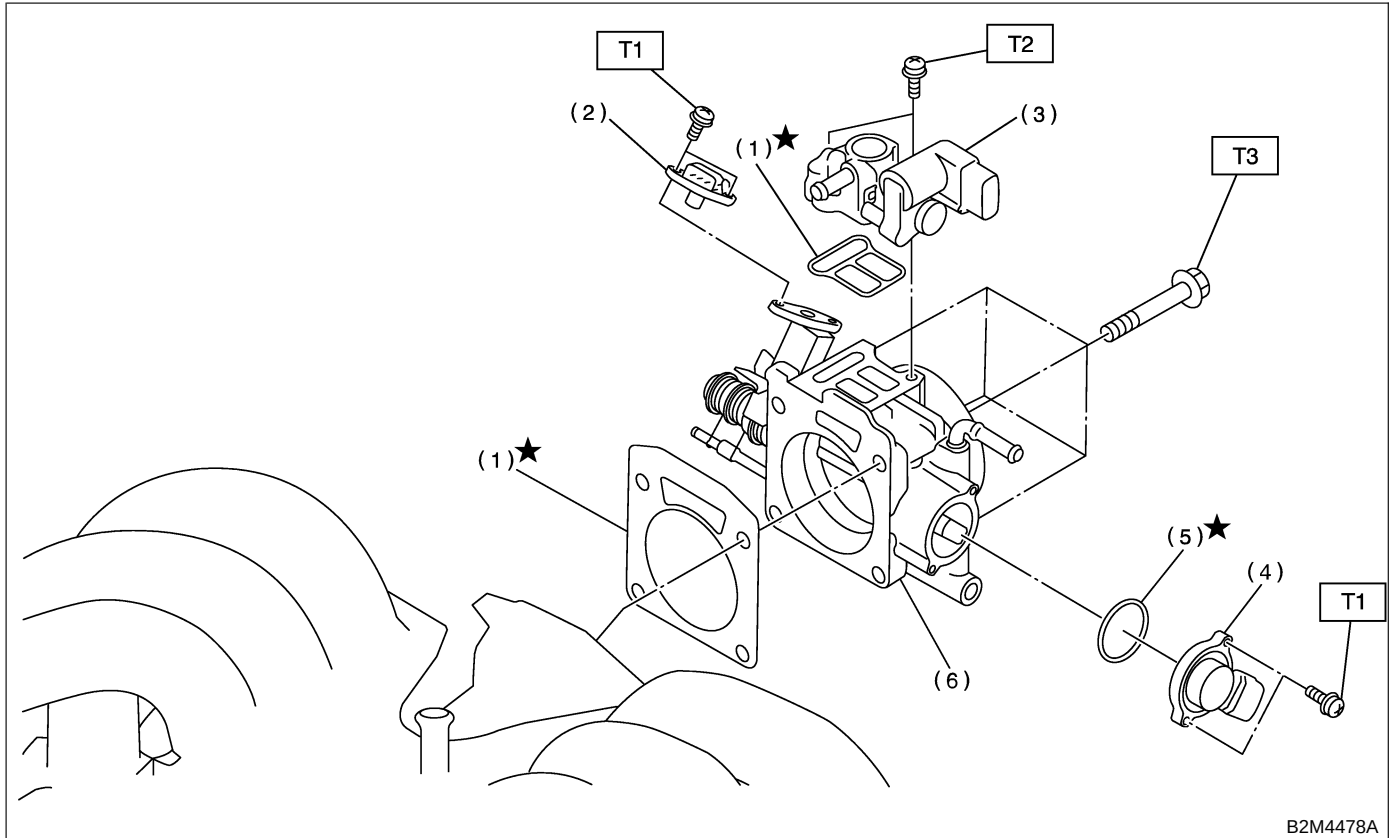
(1) Fuel injector pipe LH	(5) Insulator
(2) Pressure regulator	(6) Fuel injector
(3) O-ring	(7) Fuel injector pipe RH
(4) Injection rubber	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 19 (1.9, 14)

3. AIR INTAKE SYSTEM S145001A0503



- (1) Gasket
- (2) Intake manifold pressure sensor
- (3) Idle air control solenoid valve
- (4) Throttle position sensor

- (5) O-ring
- (6) Throttle body

Tightening torque: N·m (kgf-m, ft-lb)

T1: 1.6 (0.16, 1.2)

T2: 2.8 (0.29, 2.1)

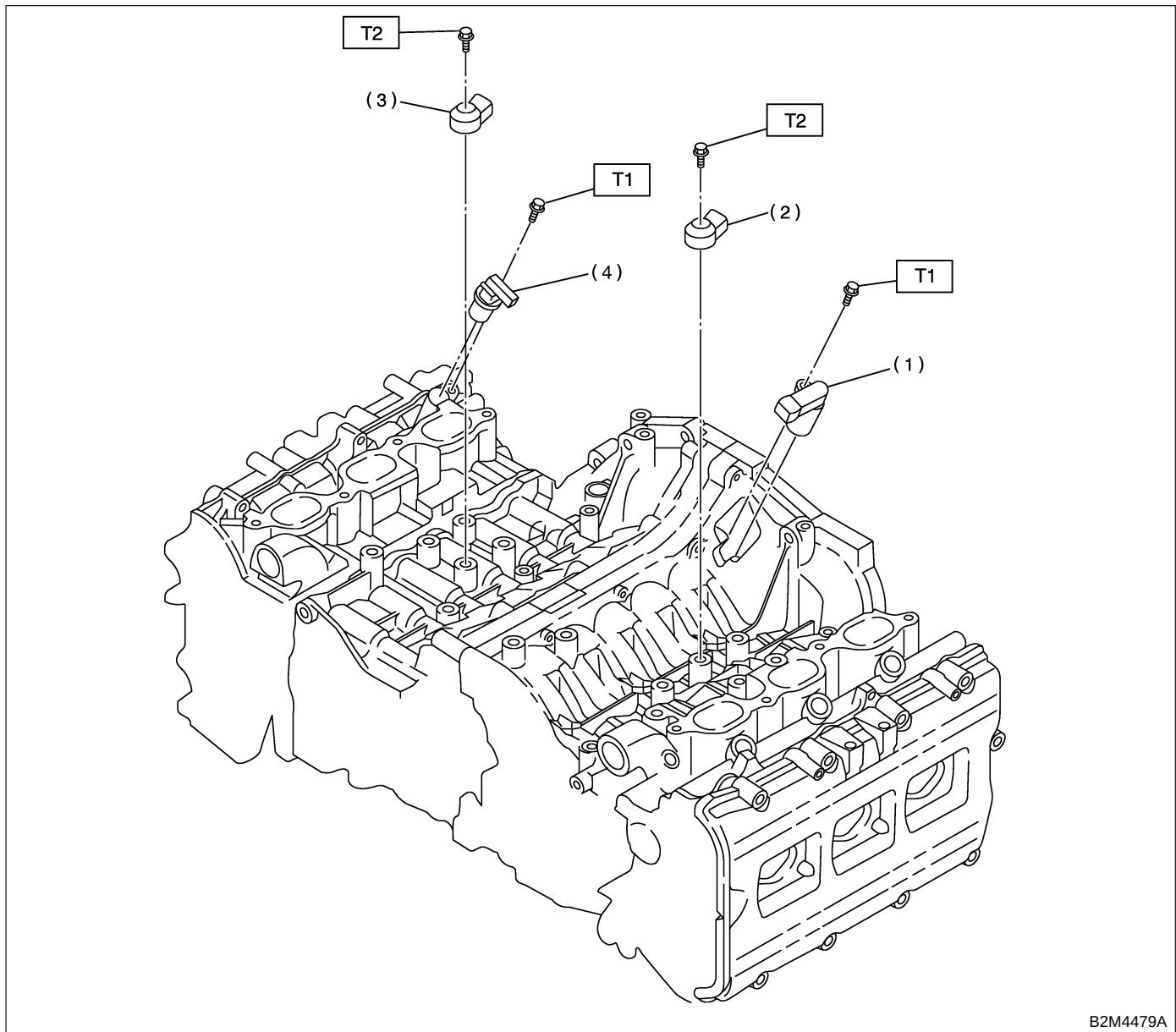
T3: 22 (2.2, 15.9)

GENERAL DESCRIPTION

Fuel Injection (Fuel Systems)

4. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS

S145001A0504



- (1) Crankshaft position sensor
- (2) Knock sensor LH

- (3) Knock sensor RH
- (4) Camshaft position sensor

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 25 (2.5, 18)

GENERAL DESCRIPTION

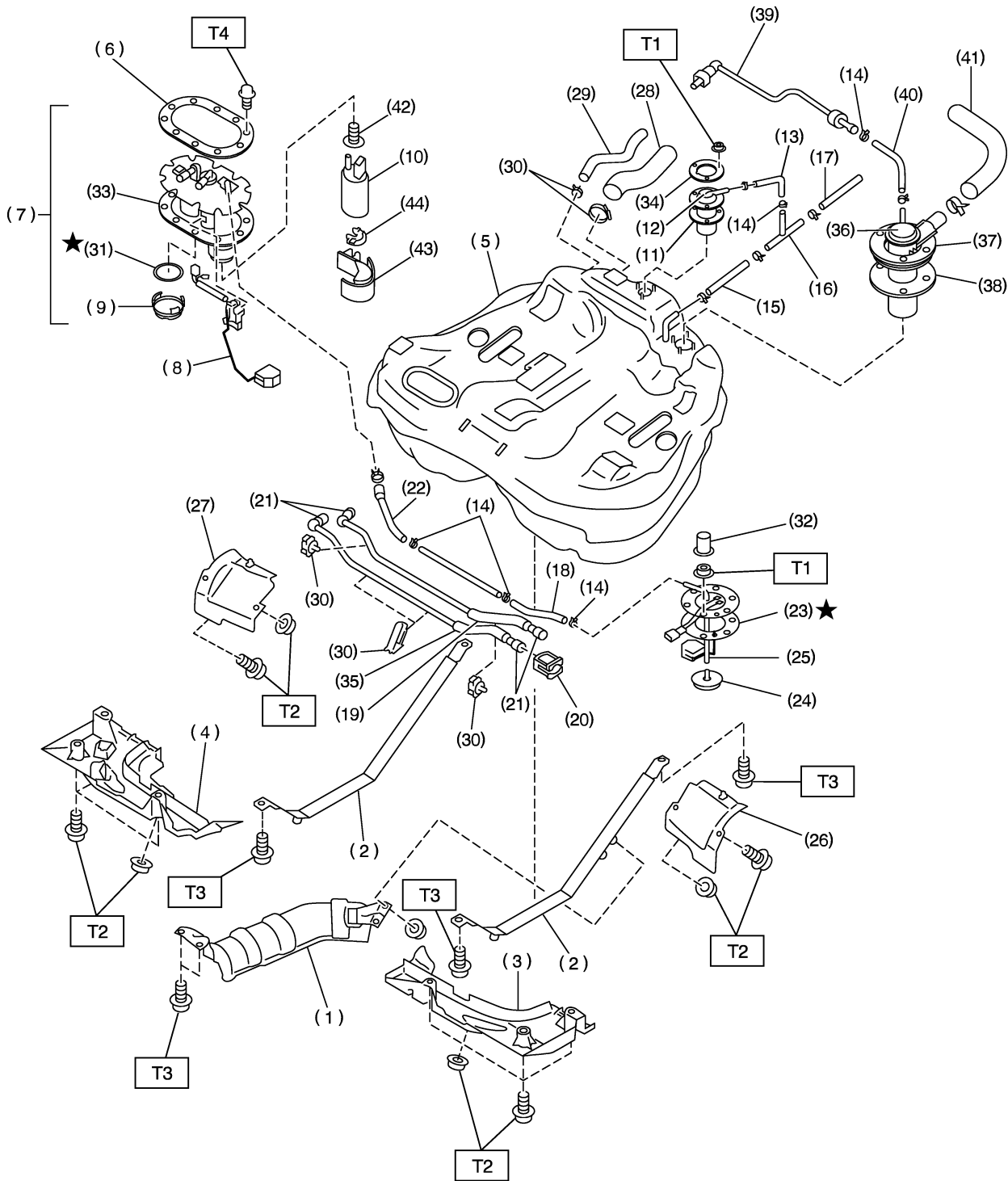
Fuel Injection (Fuel Systems)

MEMO:

GENERAL DESCRIPTION

Fuel Injection (Fuel Systems)

5. FUEL TANK S145001A0505



B2M3662A

GENERAL DESCRIPTION

Fuel Injection (Fuel Systems)

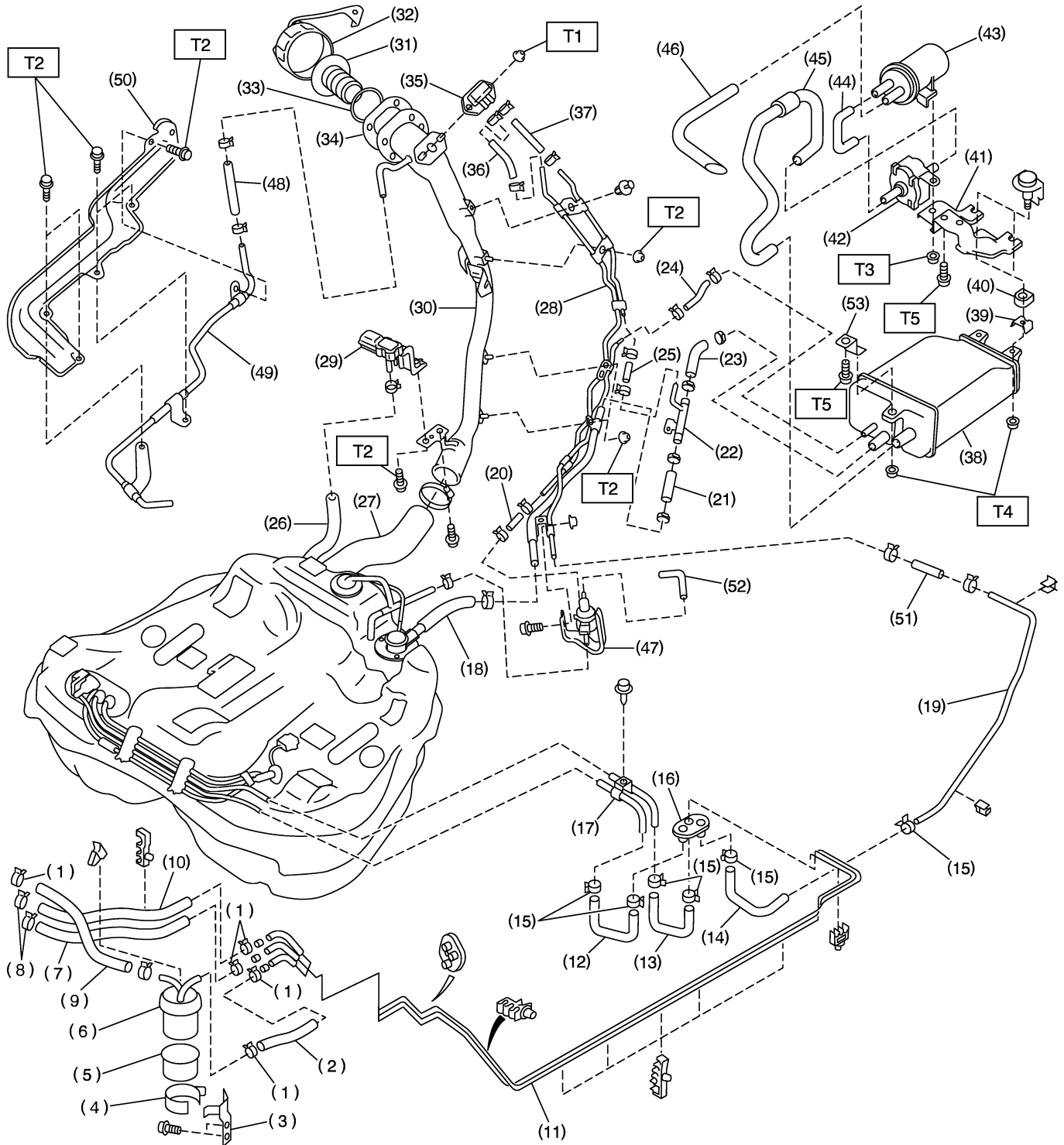
(1) Heat sealed cover	(18) Jet pump hose A	(35) Fuel delivery tube
(2) Fuel tank band	(19) Fuel return tube	(36) Vent valve
(3) Protector LH (Front)	(20) Retainer	(37) Vent valve plate
(4) Protector RH (Front)	(21) Quick connector	(38) Vent valve gasket
(5) Fuel tank	(22) Jet pump hose B	(39) Evaporation tube
(6) Fuel pump plate	(23) Fuel sub level sensor gasket	(40) Evaporation hose D
(7) Fuel pump ASSY	(24) Jet pump filter	(41) Air vent hose
(8) Fuel level sensor	(25) Fuel sub level sensor	(42) Seal
(9) Cap	(26) Protector LH (Rear)	(43) Fuel pump holder
(10) Fuel pump	(27) Protector RH (Rear)	(44) Grommet
(11) Fuel cut valve gasket	(28) Fuel filler hose	
(12) Fuel cut valve	(29) Fuel tank pressure sensor hose	
(13) Evaporation hose A	(30) Clamp	
(14) Clip	(31) Gasket	
(15) Evaporation hose C	(32) Cap	
(16) Joint pipe	(33) Gasket	
(17) Evaporation hose B	(34) Fuel cut valve plate	

Tightening torque: N·m (kgf-m, ft-lb)**T1: 4.4 (0.45, 3.3)****T2: 18 (1.8, 13.0)****T3: 33 (3.4, 25)****T4: 5.9 (0.6, 4.3)**

GENERAL DESCRIPTION

Fuel Injection (Fuel Systems)

6. FUEL LINE S145001A0506



B2M4150A

GENERAL DESCRIPTION

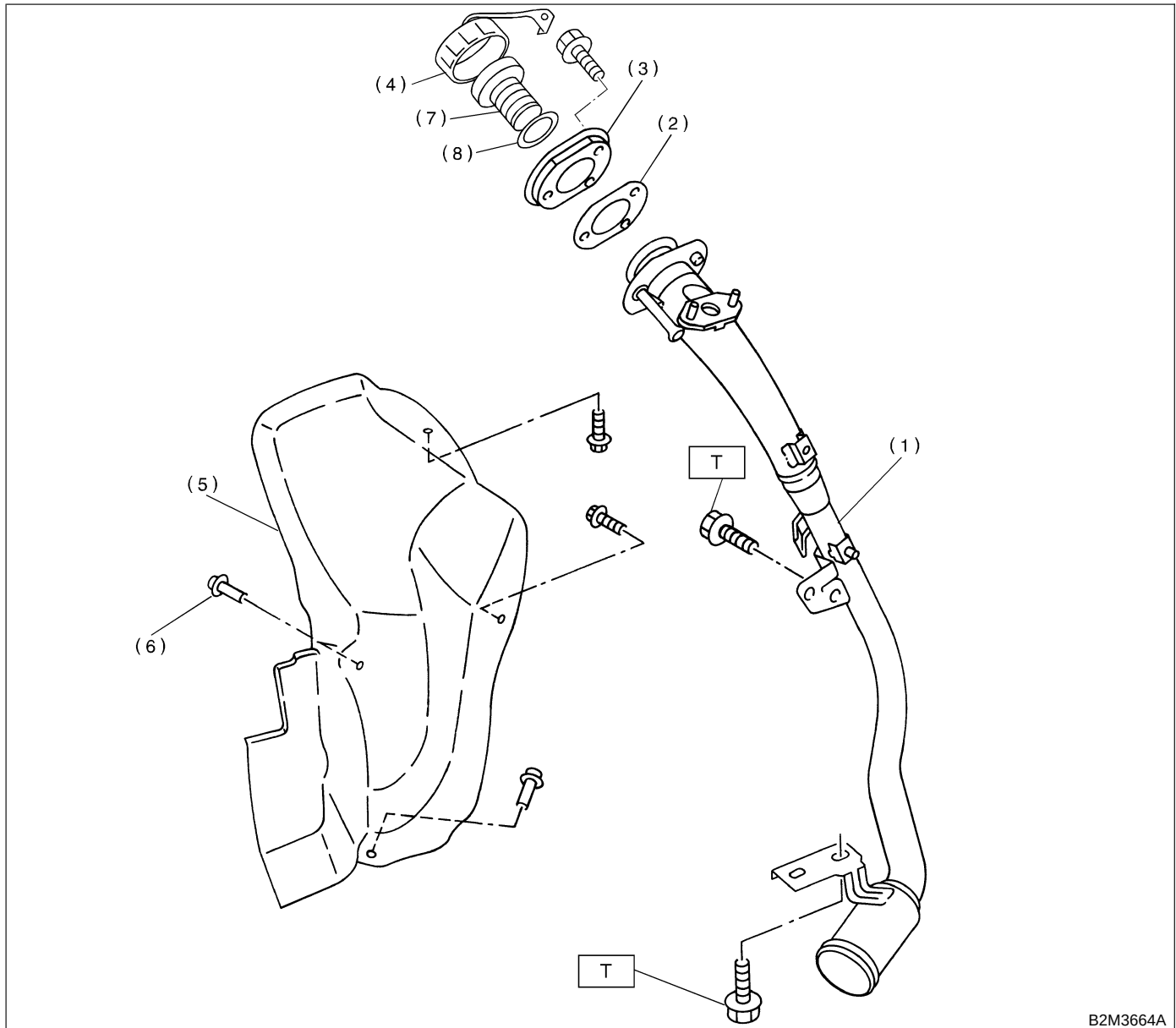
Fuel Injection (Fuel Systems)

(1) Clamp	(22) Air vent pipe	(43) Drain filter
(2) Fuel delivery hose A	(23) Evaporation hose J	(44) Drain filter hose A
(3) Fuel filter bracket	(24) Evaporation hose K	(45) Drain valve hose
(4) Fuel filter holder	(25) Evaporation hose L	(46) Drain filter hose B
(5) Fuel filter cup	(26) Fuel tank pressure sensor hose	(47) Pressure control solenoid valve
(6) Fuel filter	(27) Fuel filler hose	(48) Evaporation hose O
(7) Evaporation hose F	(28) Evaporation pipe B	(49) Evaporation pipe C
(8) Clip	(29) Fuel tank pressure sensor	(50) Pipe protector
(9) Fuel delivery hose B	(30) Fuel filler pipe	(51) Evaporation hose P
(10) Fuel return hose	(31) Ring A	(52) Pressure control solenoid valve hose
(11) Fuel pipe ASSY	(32) Fuel filler cap	(53) Canister front bracket
(12) Fuel delivery hose C	(33) Ring B	
(13) Fuel return hose C	(34) Packing	
(14) Evaporation hose G	(35) Shut valve	<i>Tightening torque: N·m (kgf-m, ft-lb)</i>
(15) Clamp	(36) Evaporation hose M	<i>T1: 4.5 (0.46, 3.3)</i>
(16) Grommet	(37) Evaporation hose N	<i>T2: 7.5 (0.76, 5.5)</i>
(17) Fuel pipe ASSY	(38) Canister	<i>T3: 18 (1.8, 13.0)</i>
(18) Air vent hose A	(39) Canister lower bracket	<i>T4: 23 (2.3, 16.6)</i>
(19) Evaporation hose H	(40) Cushion rubber	<i>T5: 33 (3.4, 25)</i>
(20) Evaporation hose I	(41) Canister upper bracket	
(21) Air vent hose B	(42) Drain valve	

GENERAL DESCRIPTION

Fuel Injection (Fuel Systems)

7. FUEL FILLER PIPE S145001A0507



(1) Fuel filler pipe ASSY	(5) Filler pipe protector
(2) Filler pipe packing	(6) Clip
(3) Filler ring	(7) Ring A
(4) Filler cap	(8) Ring B

Tightening torque: N·m (kgf-m, ft-lb)

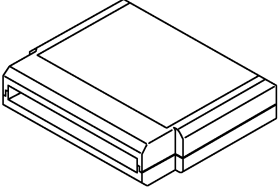
T: 7.5 (0.75, 5.4)

C: CAUTION S145001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.

- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.
- Place "NO FIRE" signs near the working area.
- Be careful not to spill fuel on the floor.

D: PREPARATION TOOL S145001A17

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA150 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 B2M3877	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. ● English: 22771AA030 (Without printer) ● German: 22771AA070 (Without printer) ● French: 22771AA080 (Without printer) ● Spanish: 22771AA090 (Without printer)

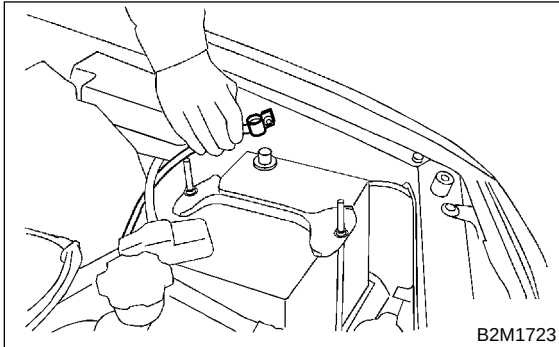
THROTTLE BODY

Fuel Injection (Fuel Systems)

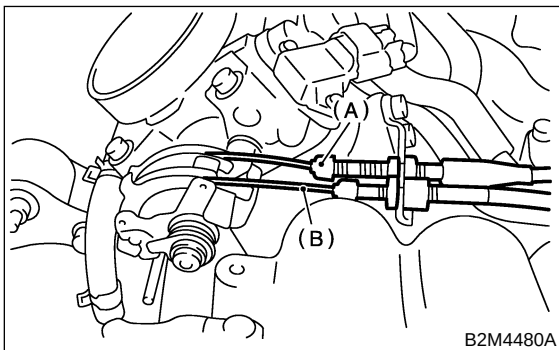
2. Throttle Body S145010

A: REMOVAL S145010A18

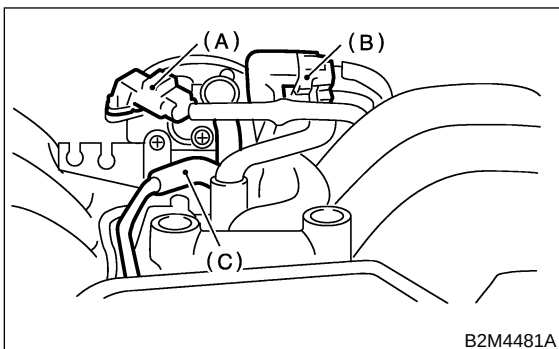
- 1) Disconnect battery ground cable.



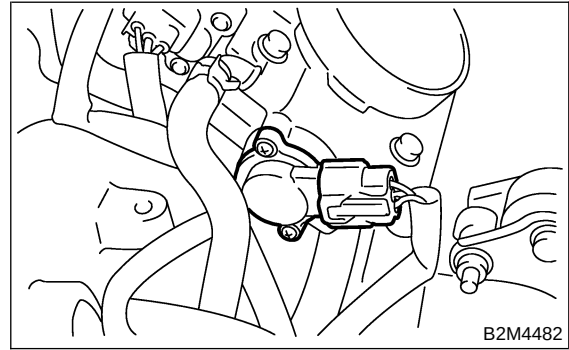
- 2) Remove air intake chamber. <Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>
3) Disconnect accelerator cable (A).
4) Disconnect cruise control cable (B). (With cruise control model)



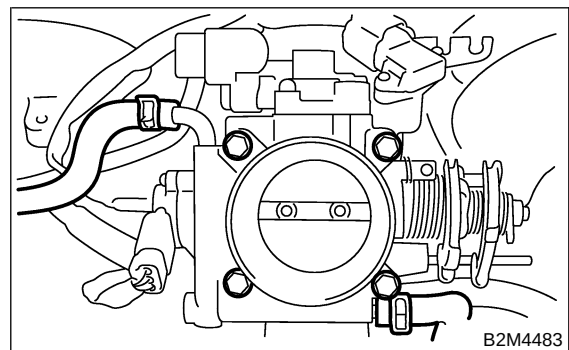
- 5) Disconnect connectors from intake manifold pressure sensor (A) and idle air control solenoid valve (B).
6) Disconnect air by-pass hose (C) from idle air control solenoid valve.



- 7) Disconnect throttle position sensor connector.



- 8) Disconnect engine coolant hoses from throttle body.
9) Remove bolts which secure throttle body to intake manifold.



B: INSTALLATION S145010A11

Install in the reverse order of removal.

CAUTION:

Always use a new gasket.

Tightening torque:

Throttle body;

22 N·m (2.2 kgf-m, 15.9 ft-lb)

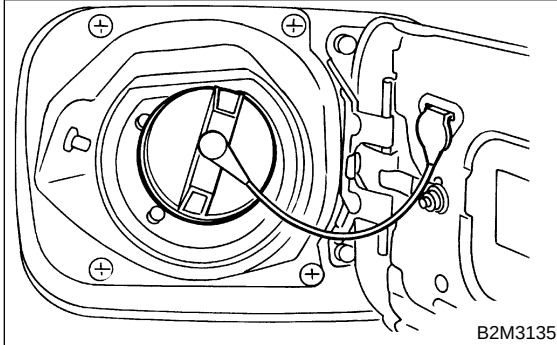
3. Intake Manifold

S145034

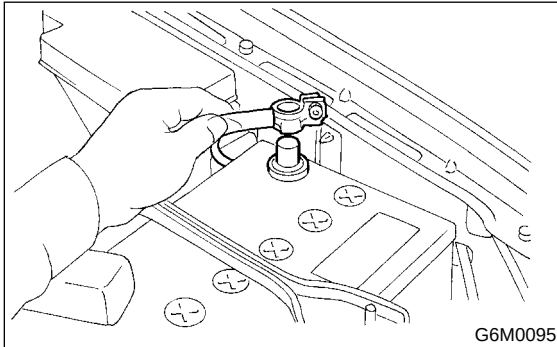
A: REMOVAL

S145034A18

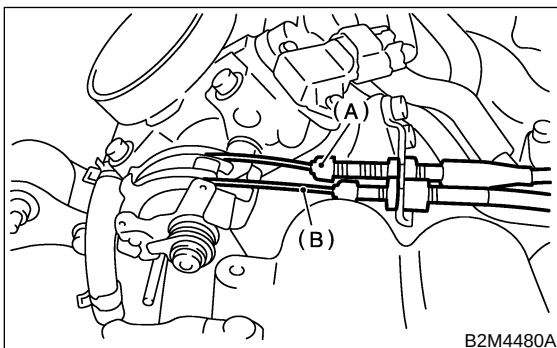
- 1) Release fuel pressure. <Ref. to FU(H6)-49, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
- 2) Open fuel flap lid, and remove fuel filler cap.



- 3) Disconnect battery ground cable.



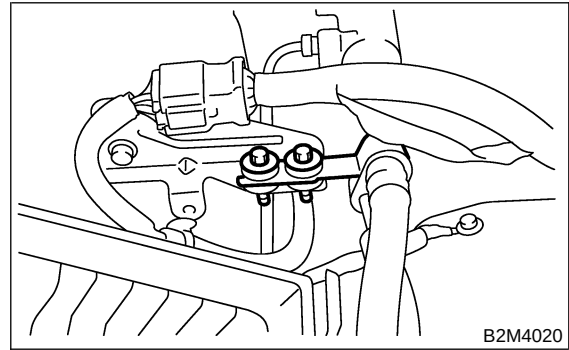
- 4) Remove air intake duct, air cleaner assembly and air intake chamber. <Ref. to IN(H6)-7, REMOVAL, Air Intake Duct.> and <Ref. to IN(H6)-5, REMOVAL, Air Cleaner.> and <Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>
- 5) Disconnect accelerator cable (A).
- 6) Disconnect cruise control cable (B). (With cruise control model)



- 7) Remove power steering pump and tank from brackets.

- (1) Remove V-belt.
<Ref. to ME(H6)-31, REMOVAL, V-belt.>

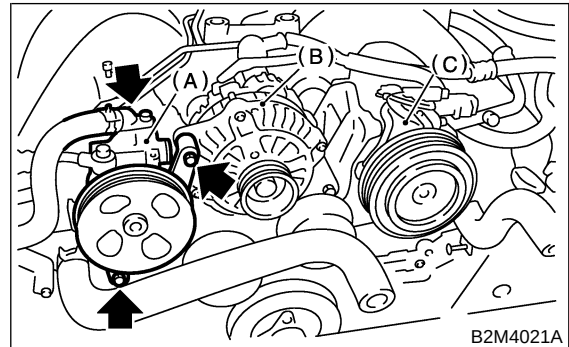
- (2) Remove power steering oil pipe with bracket.



- (3) Remove bolts which install power steering pump bracket.

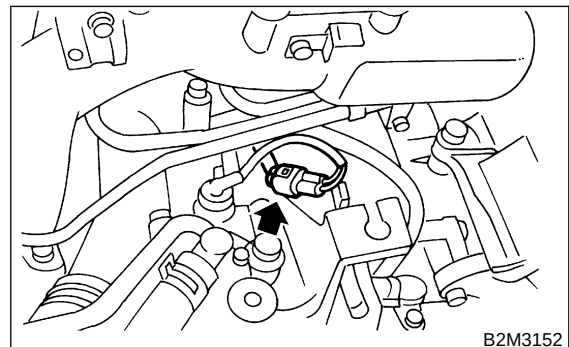
NOTE:

Do not separate hose and pipe from the main pump.



- (A) Power steering pump
- (B) Generator
- (C) A/C compressor

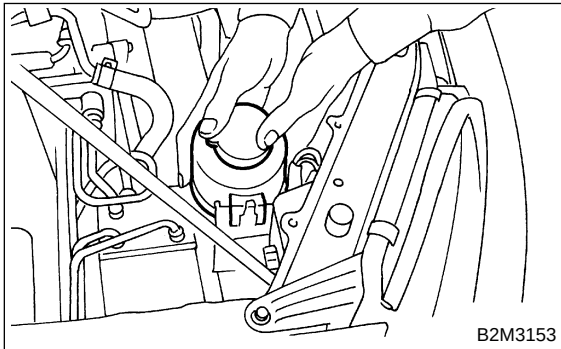
- (4) Disconnect power steering pump switch connector.



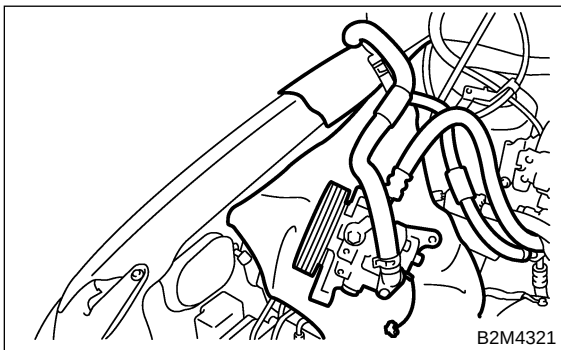
INTAKE MANIFOLD

Fuel Injection (Fuel Systems)

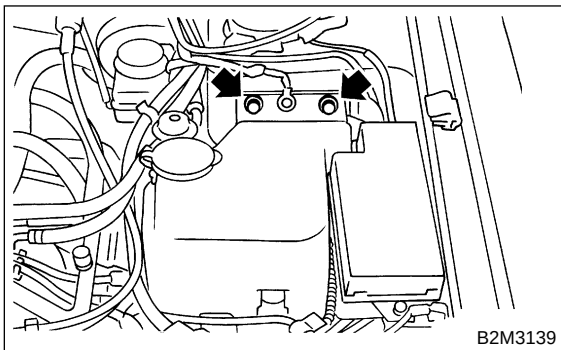
(5) Remove power steering tank from the bracket by pulling it upward.



(6) Place power steering pump on the right side wheel apron.

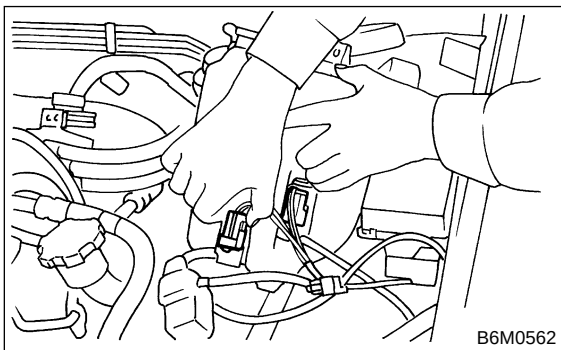


(8) Remove two bolts which install washer tank on body.



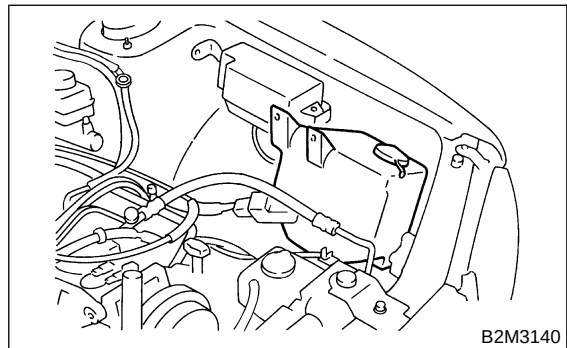
(9) Disconnect connector from front window washer motor.

(10) Disconnect connector from rear gate glass washer motor.

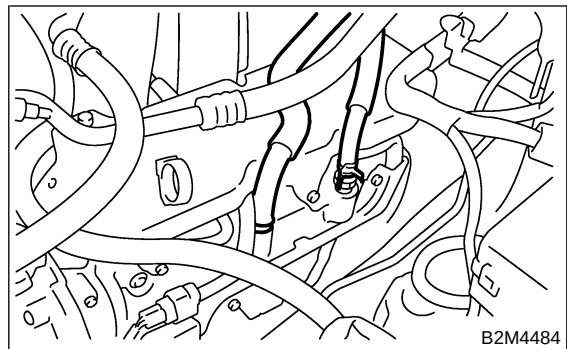


(11) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.

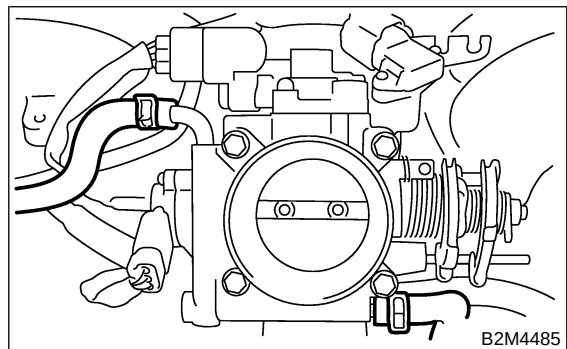
(12) Move washer tank, and secure it away from working area.



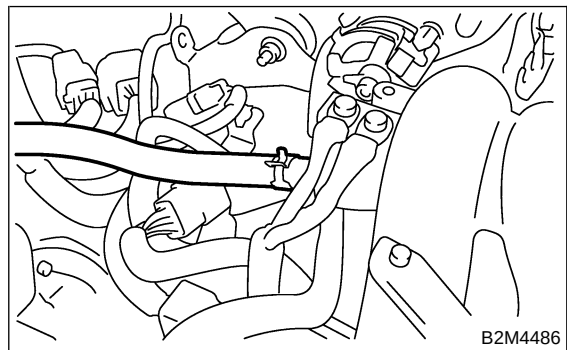
(13) Disconnect PCV hoses from cylinder head cover.



(14) Disconnect engine coolant hose from throttle body.



(15) Disconnect brake booster hose.



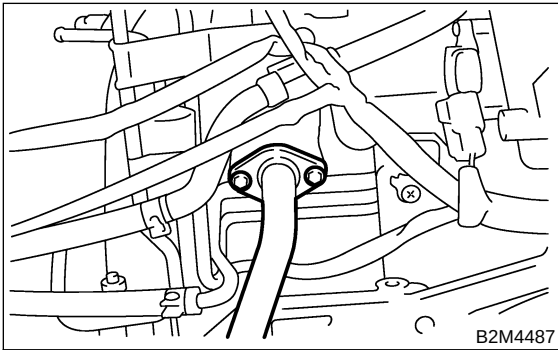
INTAKE MANIFOLD

Fuel Injection (Fuel Systems)

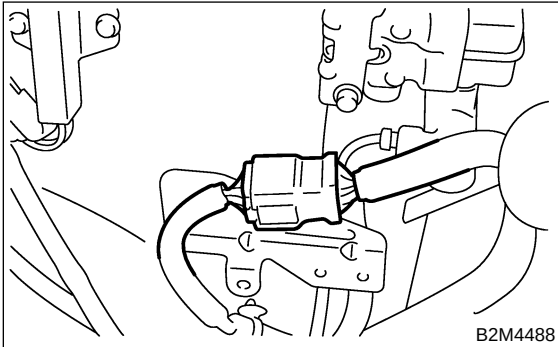
16) Remove EGR pipe from EGR valve.

NOTE:

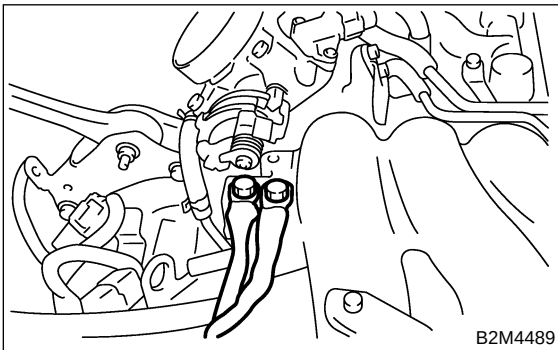
Be careful not to drop gaskets.



17) Disconnect engine harness connectors from bulkhead harness connectors.



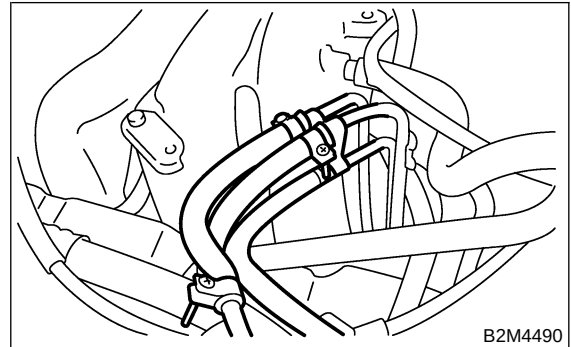
18) Disconnect engine ground terminal from intake manifold.



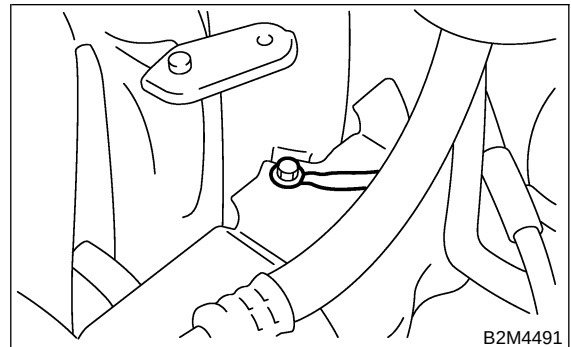
19) Disconnect fuel hoses from fuel pipes.

WARNING:

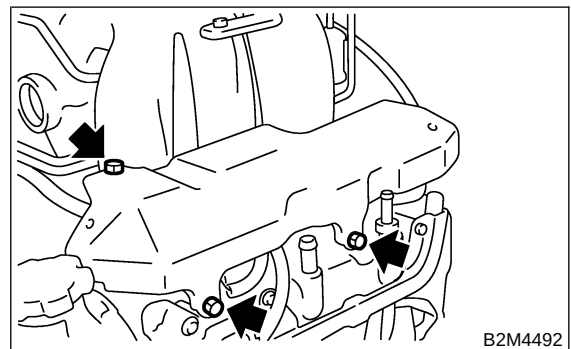
- Do not spill fuel.
- Catch fuel from hoses in a container or cloth.



20) Remove ground cable from fuel pipe protector LH.



21) Remove fuel pipe protector LH.

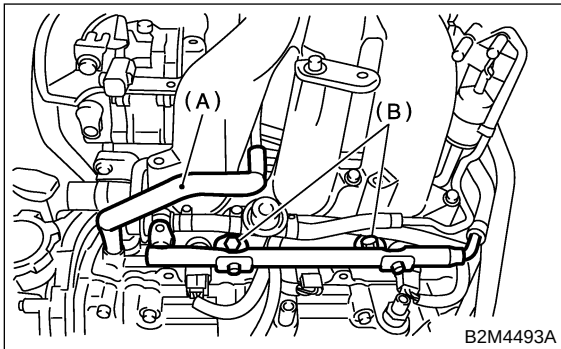


INTAKE MANIFOLD

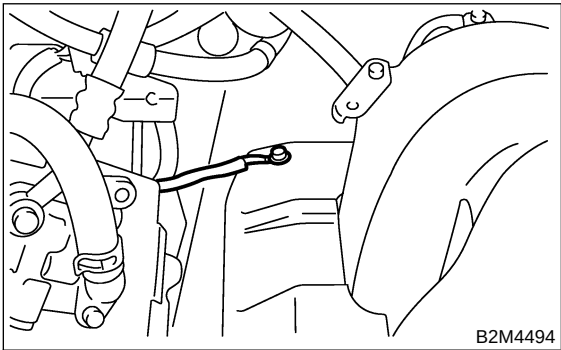
Fuel Injection (Fuel Systems)

22) Disconnect air assist hose (A).

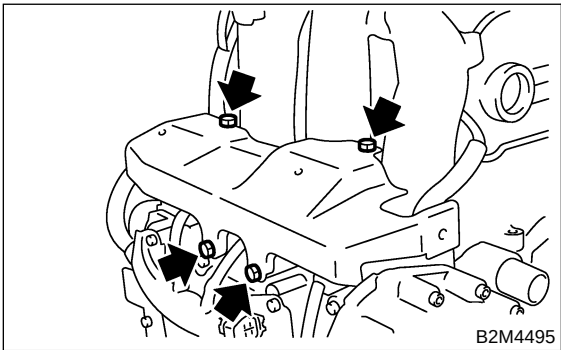
23) Remove the bolt (B), which holds fuel injector pipe LH onto cylinder head.



24) Remove ground cable from fuel pipe protector RH.

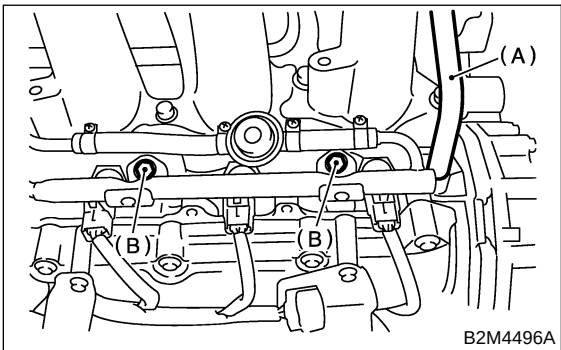


25) Remove fuel pipe protector RH.

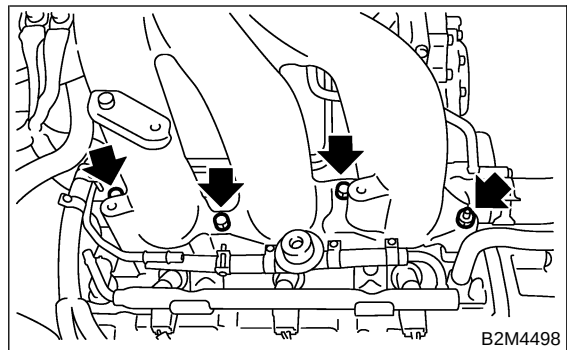
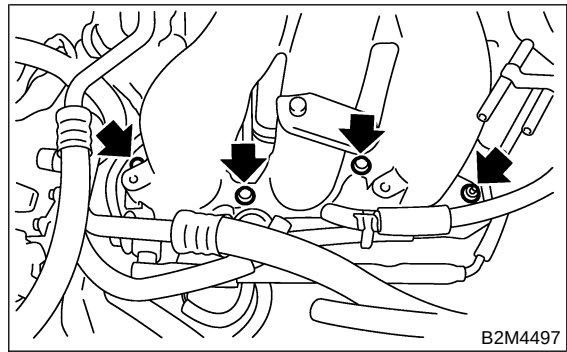


26) Disconnect air assist hose (A).

Remove the bolt (B), which holds fuel injector pipe RH onto cylinder head.



27) Remove bolts which hold intake manifold onto cylinder heads.



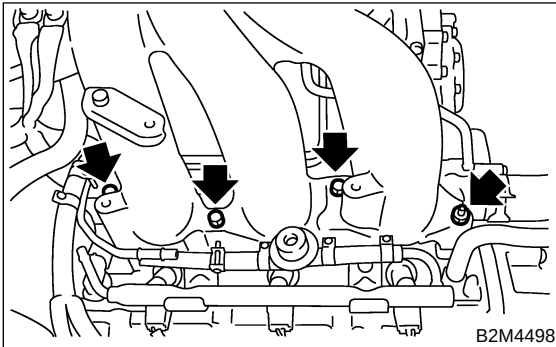
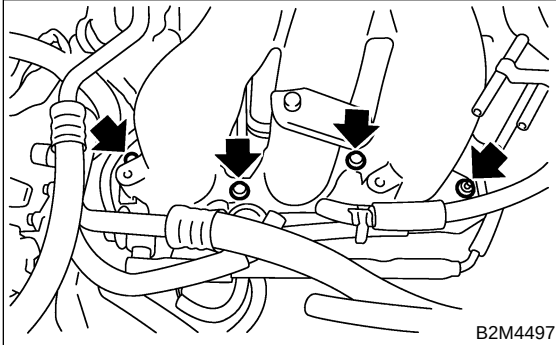
28) Remove intake manifold.

B: INSTALLATION S145034A11

1) Install intake manifold onto cylinder heads.

CAUTION:
Always use new gaskets.

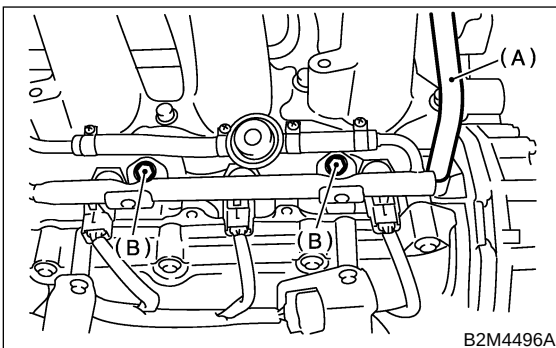
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



2) Install the bolt (B), which holds fuel injector pipe RH onto cylinder head.

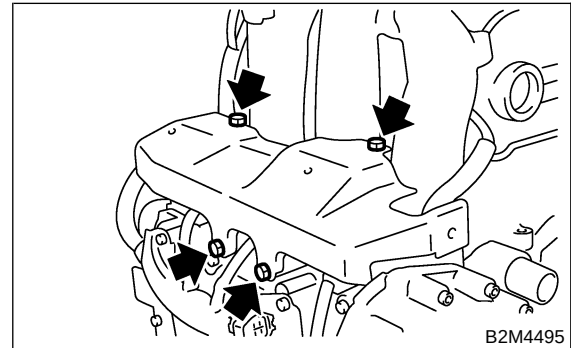
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

3) Connect air assist hose (A).

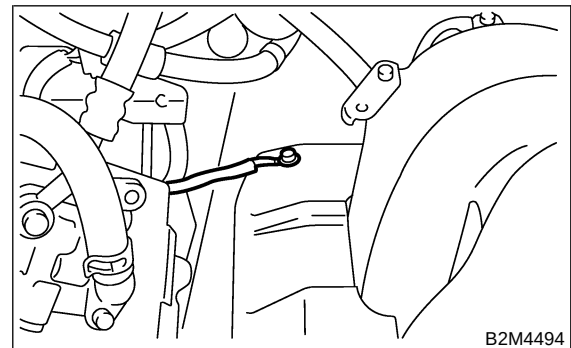


4) Install fuel pipe protector RH.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



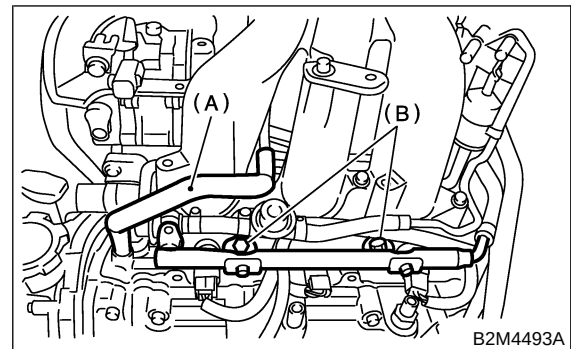
5) Install ground cable to fuel pipe protector RH.



6) Install the bolt (B) which holds fuel injector pipe RH onto cylinder head.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

7) Connect air assist hose (A).



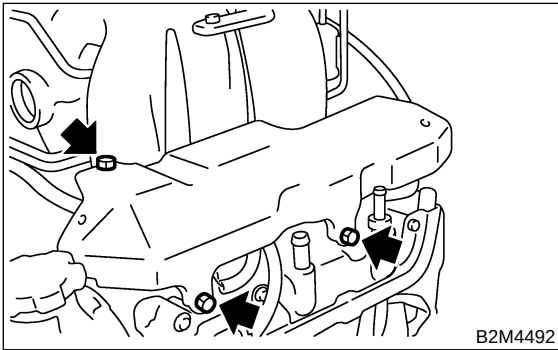
INTAKE MANIFOLD

Fuel Injection (Fuel Systems)

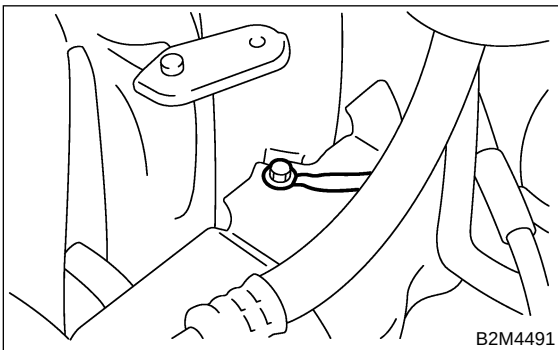
8) Install fuel pipe protector LH.

Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)



9) Install ground cable to fuel pipe protector LH.



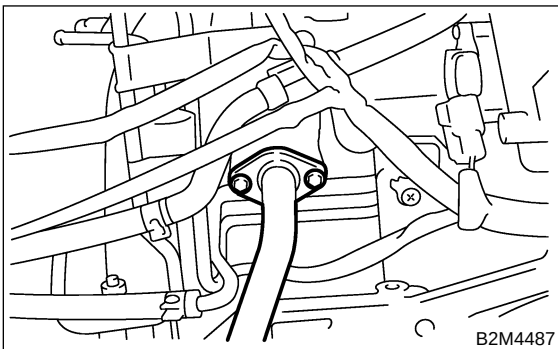
10) Install EGR pipe to EGR valve.

CAUTION:

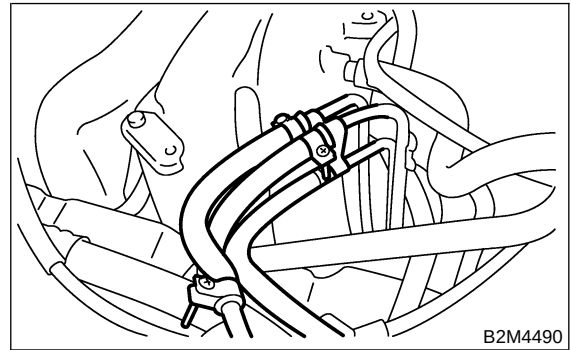
Always use new gasket.

Tightening torque:

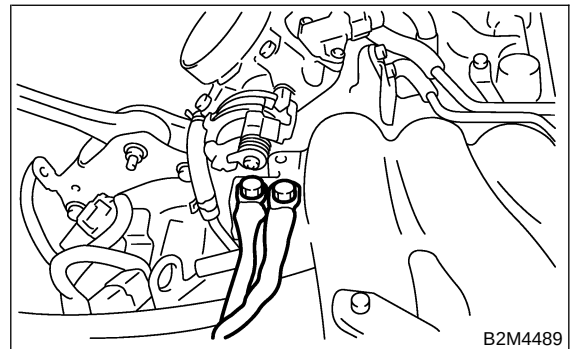
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



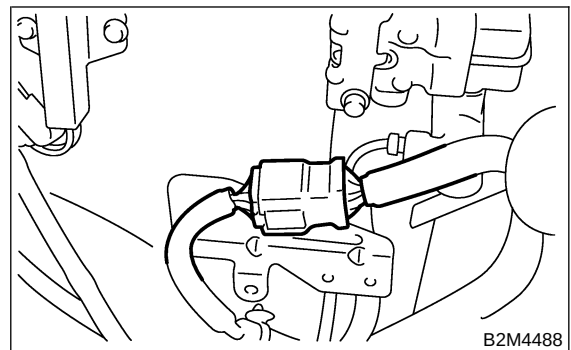
11) Connect fuel hoses.



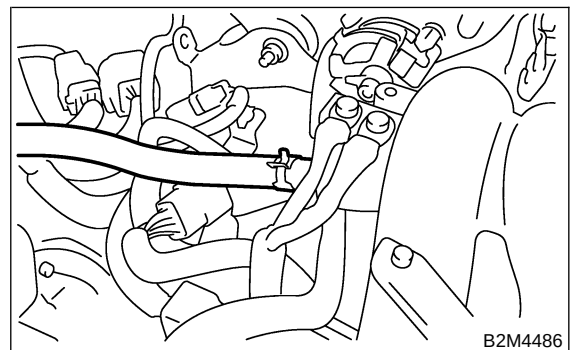
12) Connect engine ground terminal to intake manifold.



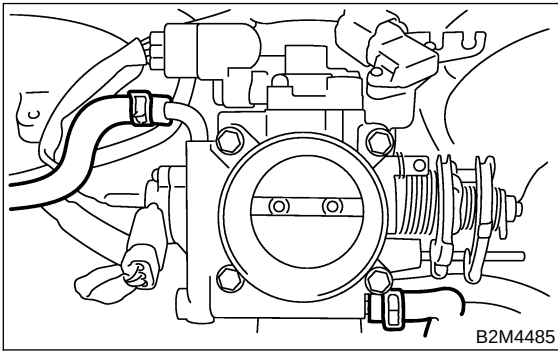
13) Connect engine harness connectors to bulk-head connectors.



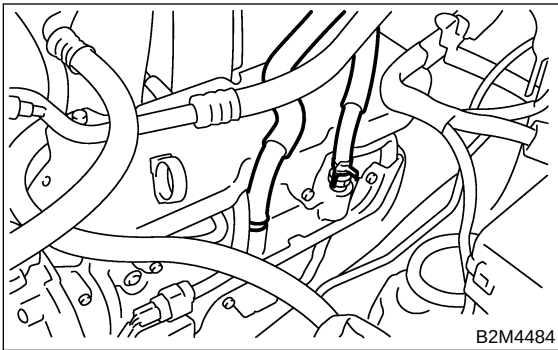
14) Connect brake booster hose.



- 15) Connect engine coolant hose to throttle body.

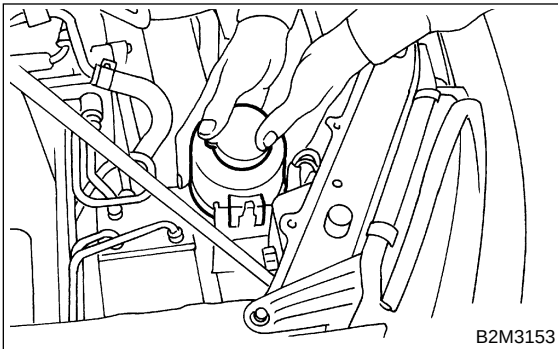


- 16) Connect PCV hose to cylinder head cover.

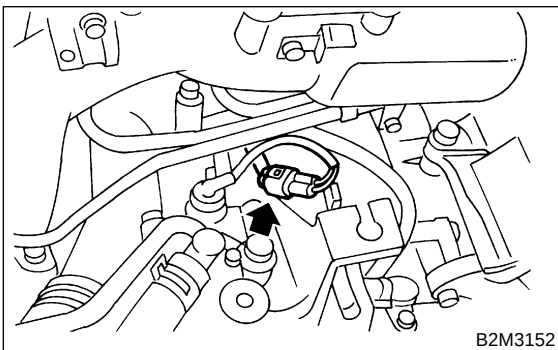


- 17) Install power steering pump and tank on brackets.

- (1) Install power steering tank on bracket.



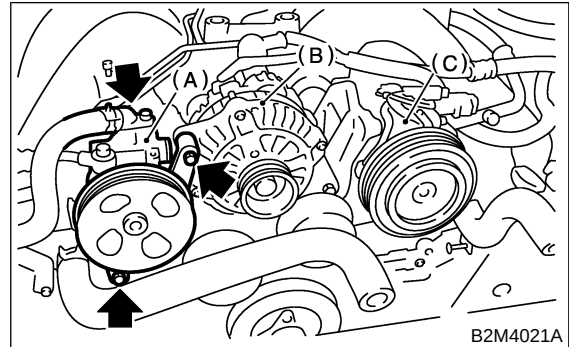
- (2) Connect connector to power steering pump switch.



- (3) Tighten bolts which install power steering pump on bracket.

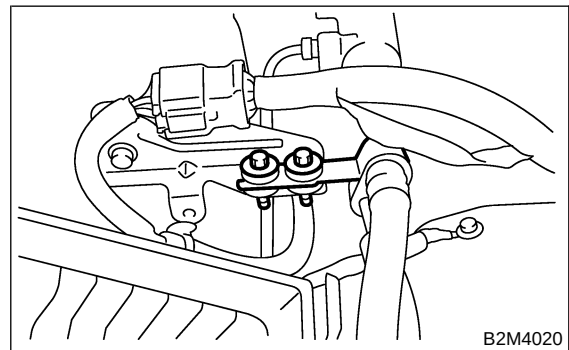
Tightening torque:

20.1 N·m (2.05 kgf-m, 14.8 ft-lb)



- (A) Power steering pump
(B) Generator
(C) A/C compressor

- (4) Install power steering pipes with bracket.

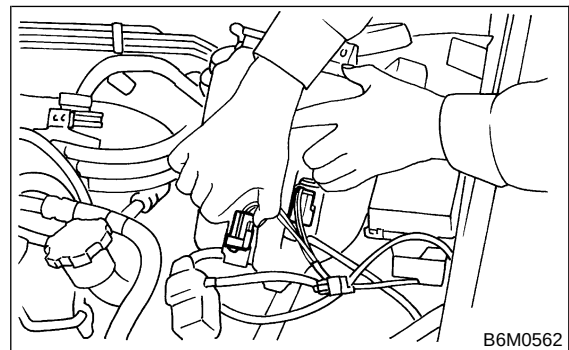


- (5) Install V-belt. <Ref. to ME(H6)-31, INSTALLATION, V-belt.>

- 18) Connect rear window washer hose to washer motor.

- 19) Connect front window washer motor connector.

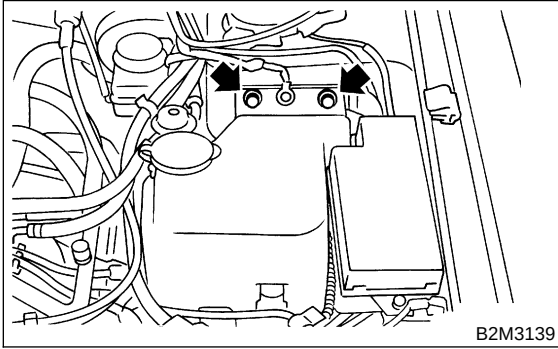
- 20) Connect rear window washer motor connector.



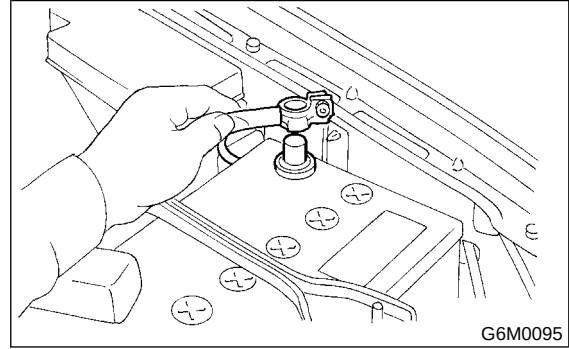
INTAKE MANIFOLD

Fuel Injection (Fuel Systems)

21) Install washer tank on body.

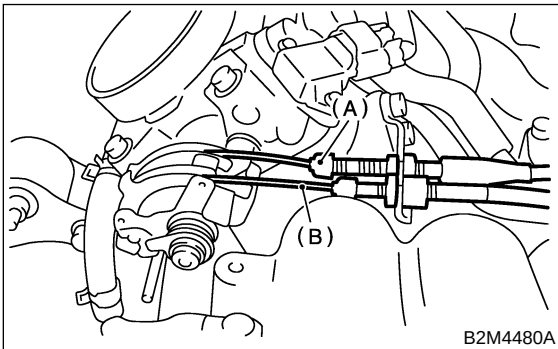


26) Connect battery ground cable.



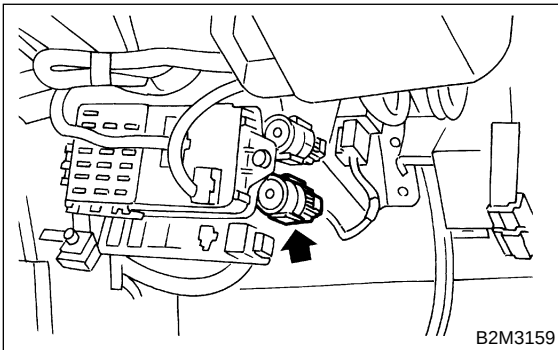
22) Connect accelerator cable (A).

23) Connect cruise control cable (B). (With cruise control models)



24) Install air intake duct, air cleaner and air intake chamber. <Ref. to IN(H6)-7, INSTALLATION, Air Intake Duct.> and <Ref. to IN(H6)-5, INSTALLATION, Air Cleaner.> and <Ref. to IN(H6)-6, INSTALLATION, Air Intake Chamber.>

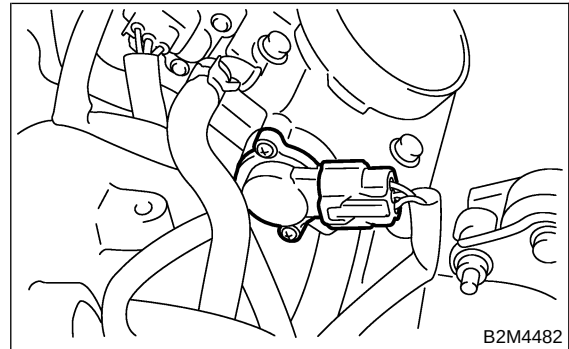
25) Connect connector to fuel pump relay.



C: DISASSEMBLY

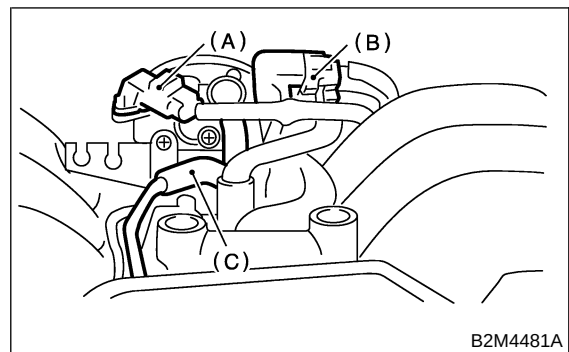
S145034A06

1) Disconnect connectors from throttle position sensor.

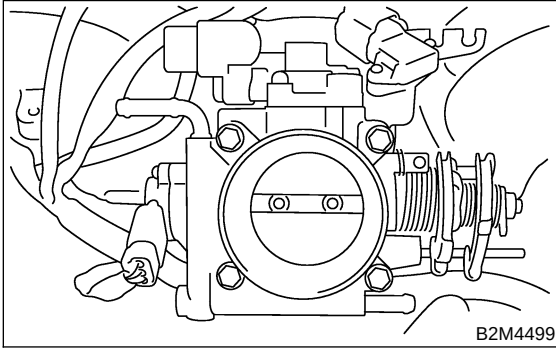


2) Disconnect connectors from intake manifold pressure sensor (B) and idle air control solenoid valve (A).

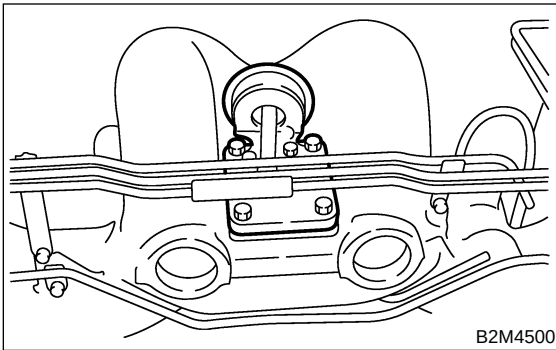
3) Disconnect air by-pass hose (C) from idle air control solenoid valve.



4) Remove throttle body.

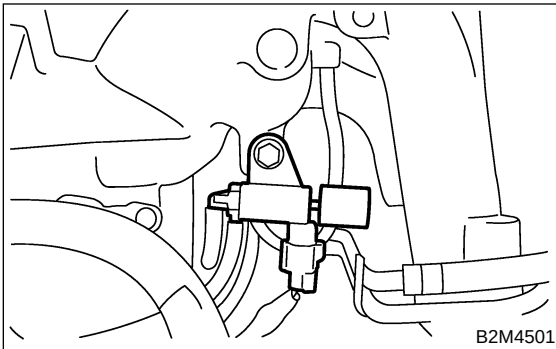


5) Remove induction valve.



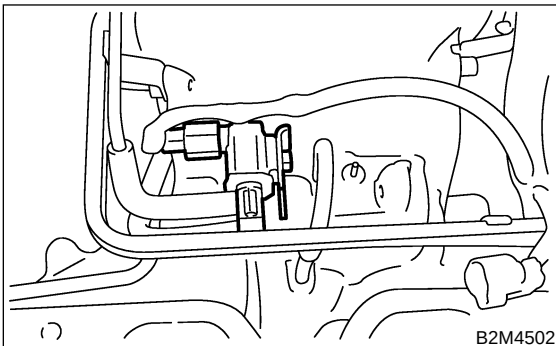
6) Disconnect connector from induction valve control solenoid.

7) Remove induction valve control solenoid.



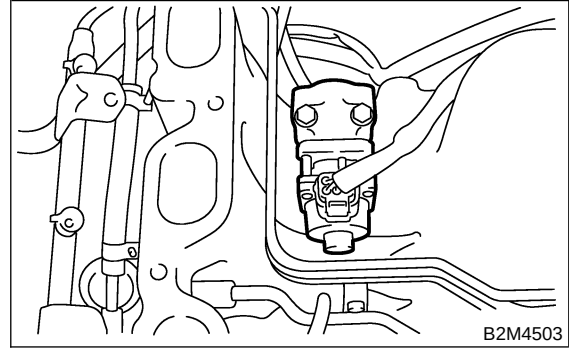
8) Disconnect connector from purge control solenoid valve.

9) Remove purge control solenoid valve.

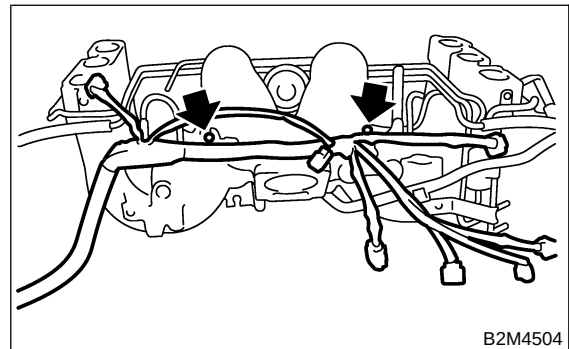


10) Disconnect connector from EGR valve.

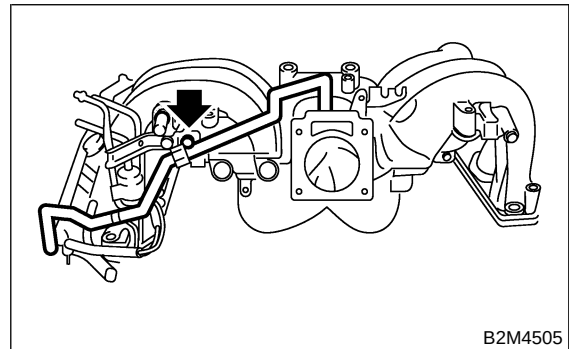
11) Remove EGR valve.



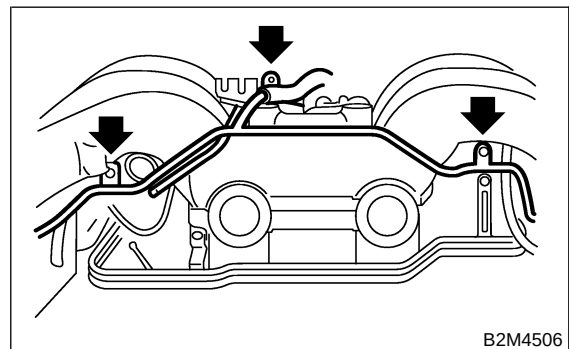
12) Remove engine harness assembly from intake manifold.



13) Remove PCV pipe from intake manifold.



14) Remove air assist and purge pipe assembly.

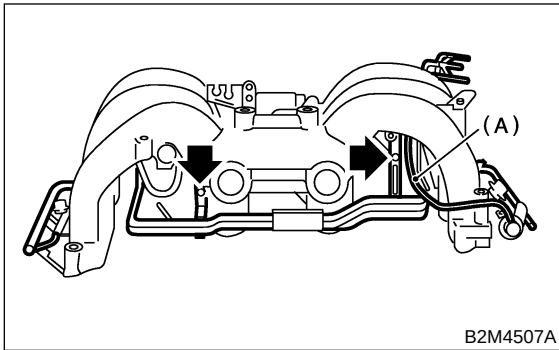


15) Disconnect pressure regulator vacuum hose (A) from intake manifold.

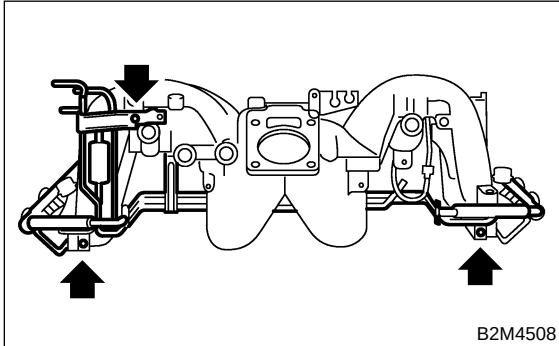
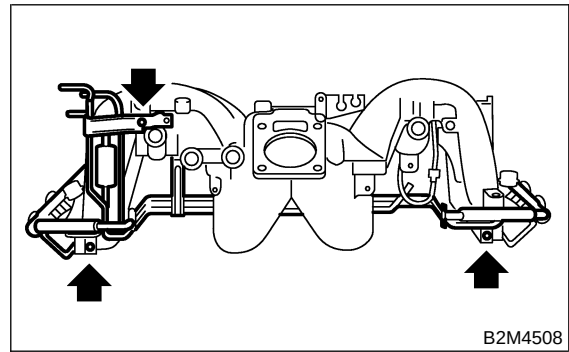
16) Remove fuel pipe and injector pipe assembly.

INTAKE MANIFOLD

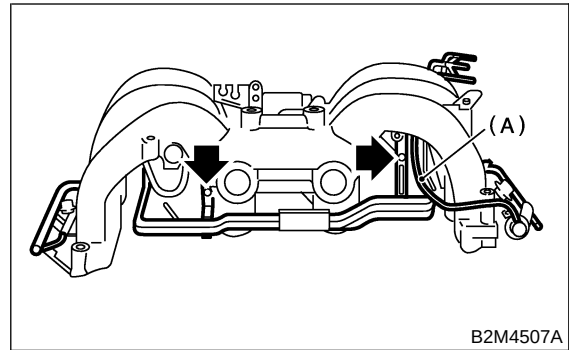
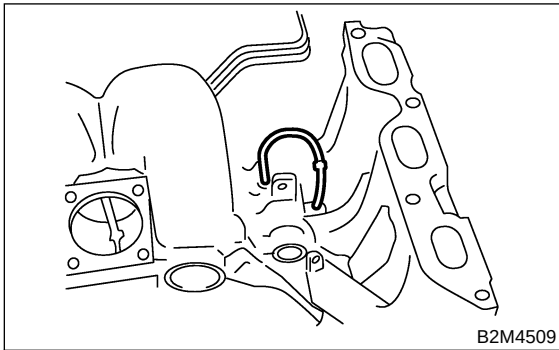
Fuel Injection (Fuel Systems)



- 3) Connect pressure regulator vacuum hose (A) to intake manifold.



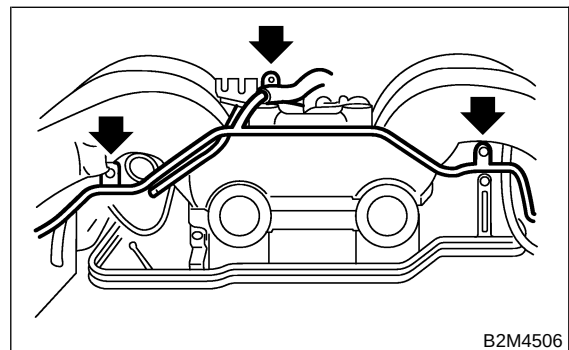
- 17) Remove induction valve vacuum hose from intake manifold.



- 4) Install air assist and purge pipe assembly.

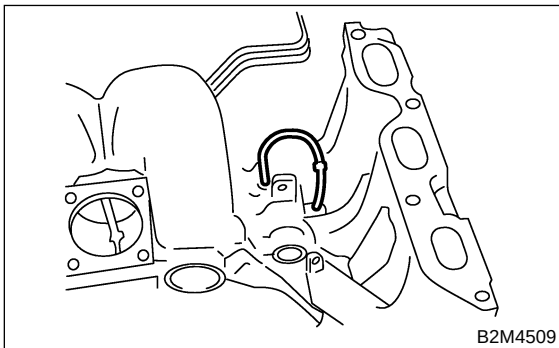
Tightening torque:

5.0 N·m (0.51 kgf-m, 3.7 ft-lb)



D: ASSEMBLY S145034A02

- 1) Intake induction valve vacuum hose to intake manifold.



- 2) Install fuel pipe and injector pipe assembly.

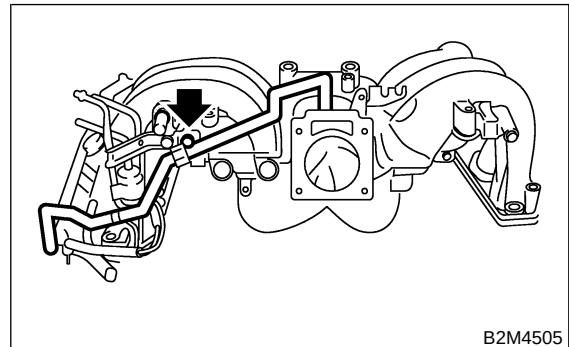
Tightening torque:

5.0 N·m (0.51 kgf-m, 3.7 ft-lb)

- 5) Install PCV pipe to intake manifold.

Tightening torque:

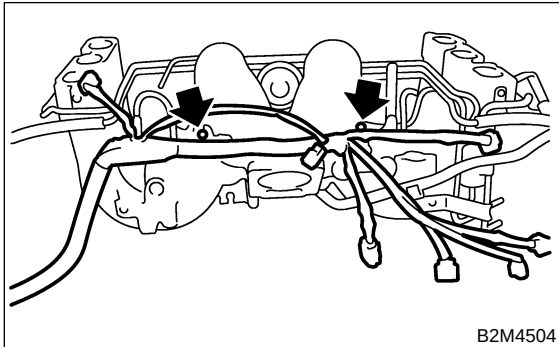
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



6) Install engine harness assembly to intake manifold.

Tightening torque:

5.0 N·m (0.51 kgf-m, 3.7 ft-lb)

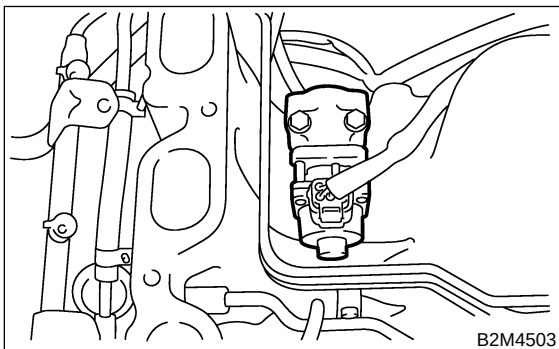


7) Install EGR valve.

Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)

8) Connect connector to EGR valve.

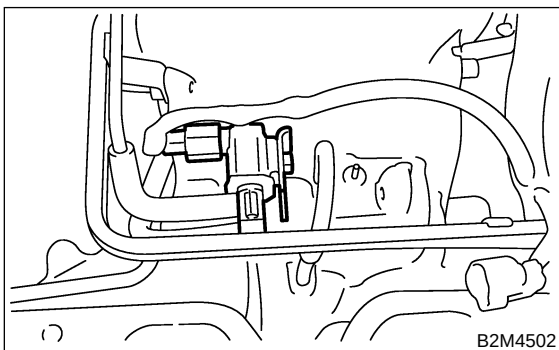


9) Install purge control solenoid valve.

Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)

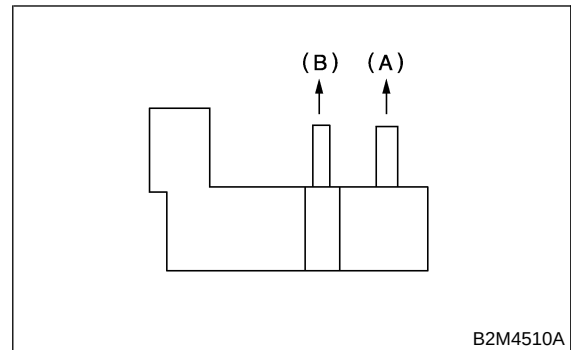
10) Connect connector to purge control solenoid valve.



11) Connect hoses to purge control solenoid valve.

CAUTION:

Carefully connect the evaporation hoses.



(A) To purge pipe

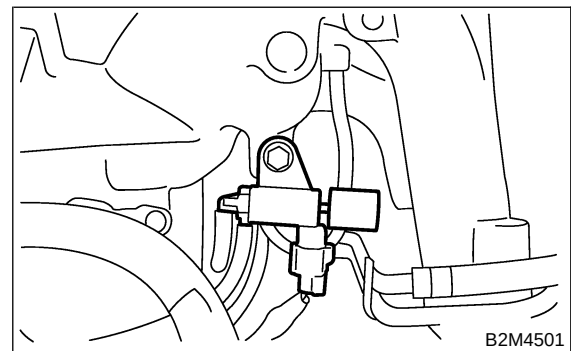
(B) To fuel pipe

12) Install induction valve control solenoid.

Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)

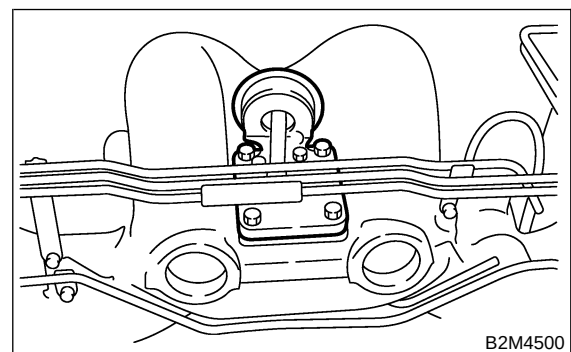
13) Connect connector to induction valve control solenoid.



14) Install induction valve.

Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)



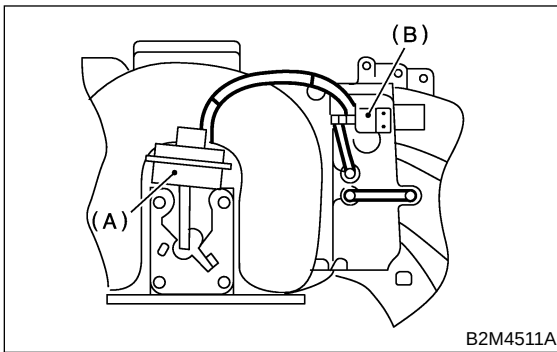
15) Connect hoses to induction valve control solenoid.

CAUTION:

Carefully connect the vacuum hoses.

INTAKE MANIFOLD

Fuel Injection (Fuel Systems)



- (A) Induction valve
- (B) Induction valve control solenoid

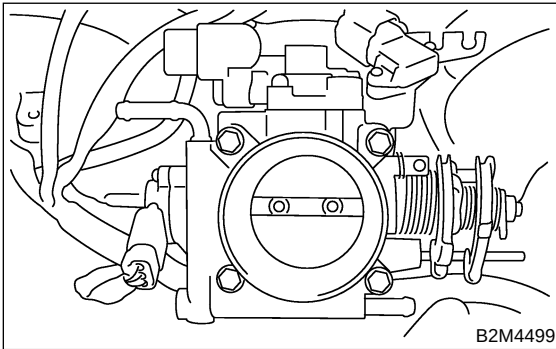
16) Install throttle body to intake manifold.

CAUTION:

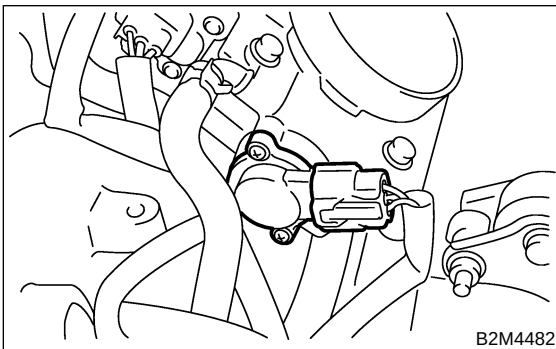
Replace gasket with a new one.

Tightening torque:

22 N·m (2.2 kgf-m, 15.9 ft-lb)

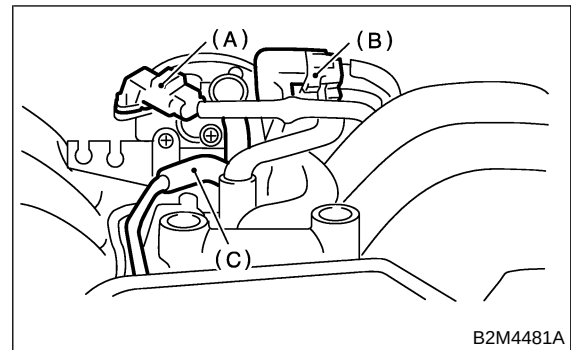


17) Connect connectors to throttle position sensor.



18) Connect connectors to intake manifold pressure sensor (A) and idle air control solenoid valve (B).

19) Connect air by-pass hose (C) to idle air control solenoid valve.



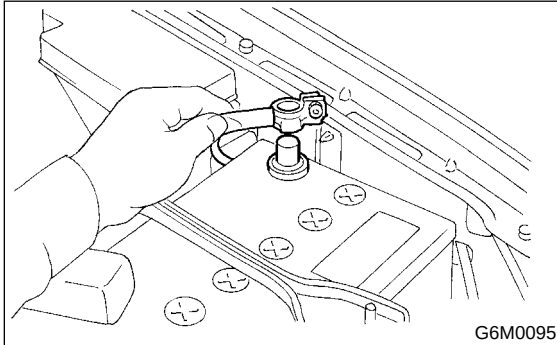
4. Engine Coolant Temperature Sensor

S145047

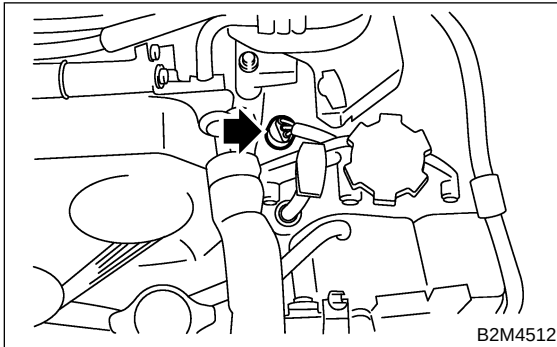
A: REMOVAL

S145047A18

- 1) Disconnect battery ground cable.



- 2) Disconnect connector from engine coolant temperature sensor.
- 3) Remove engine coolant temperature sensor.



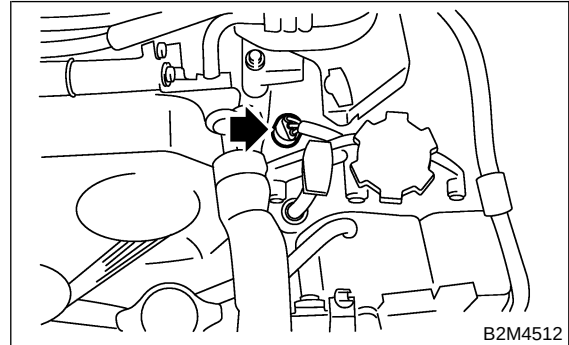
B: INSTALLATION

S145047A11

Install in the reverse order of removal.

Tightening torque:

16 N·m (0.16 kgf-m, 1.2 ft-lb)



CRANKSHAFT POSITION SENSOR

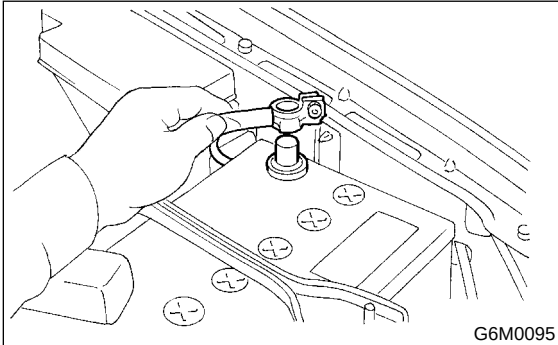
Fuel Injection (Fuel Systems)

5. Crankshaft Position Sensor

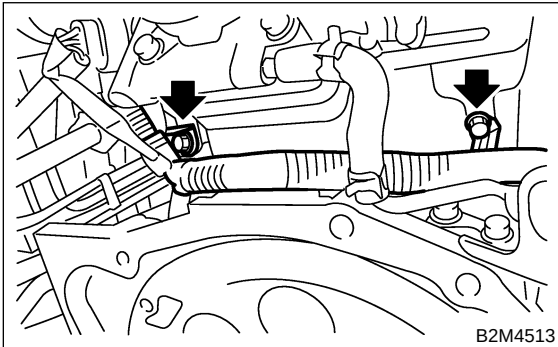
S145043

A: REMOVAL S145043A18

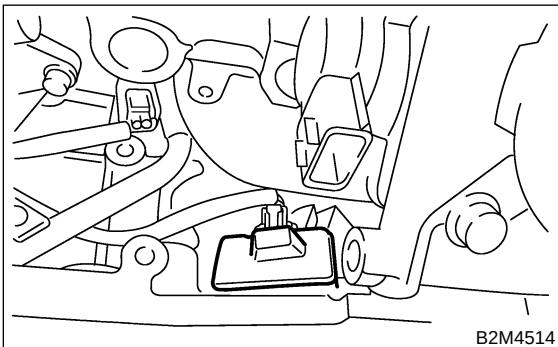
- 1) Disconnect battery ground cable.



- 2) Remove air intake chamber.
<Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>
- 3) Remove engine harness bracket from intake manifold.

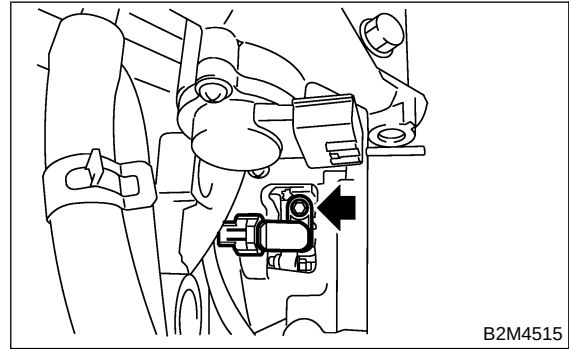


- 4) Remove service hole cover.



- 5) Remove bolt which install crankshaft position sensor to cylinder block.

- 6) Remove crankshaft position sensor, and disconnect connector from it.

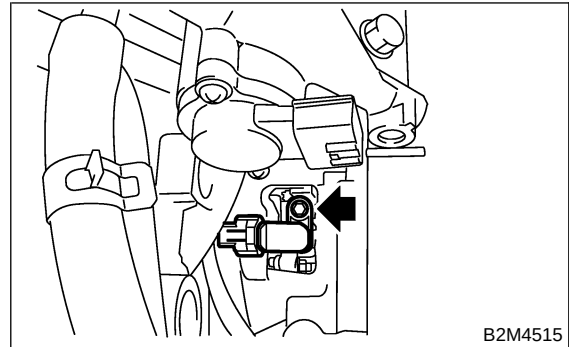


B: INSTALLATION S145043A11

Install in the reverse order of removal.

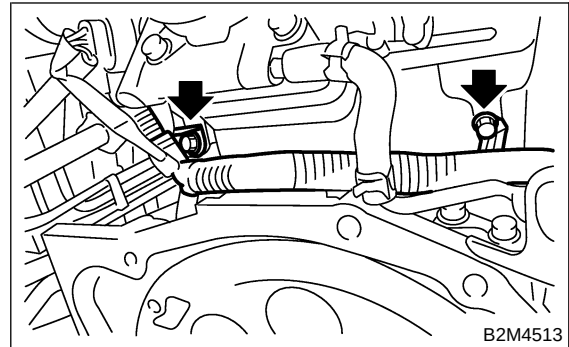
Tightening torque:

T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



Tightening torque:

T: 5.0 N·m (0.51 kgf-m, 3.7 ft-lb)

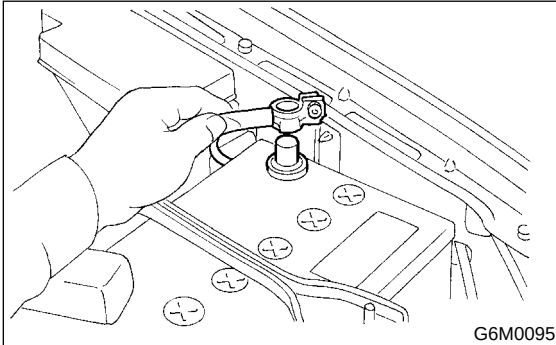


6. Camshaft Position Sensor

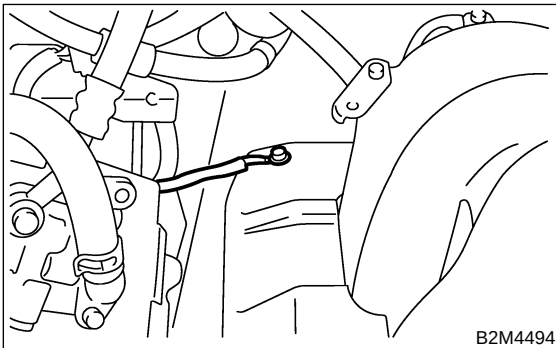
S145041

A: REMOVAL S145041A18

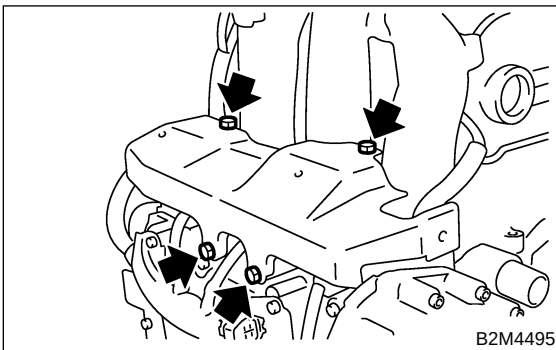
- 1) Disconnect battery ground cable.



- 2) Remove air cleaner.
<Ref. to IN(H6)-5, REMOVAL, Air Cleaner.>
- 3) Remove ground cable from fuel pipe protector RH.

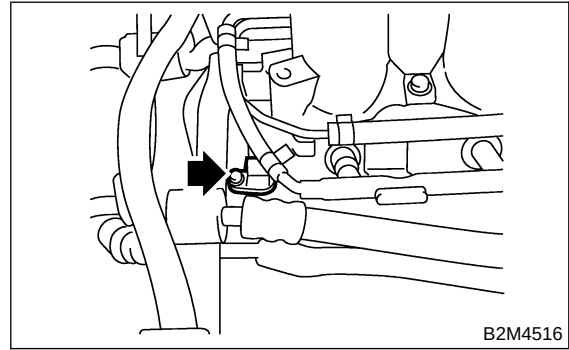


- 4) Remove fuel pipe protector RH.



- 5) Disconnect connector from camshaft position sensor.

- 6) Remove camshaft position sensor.



B: INSTALLATION S145041A11

Install in the reverse order of removal.

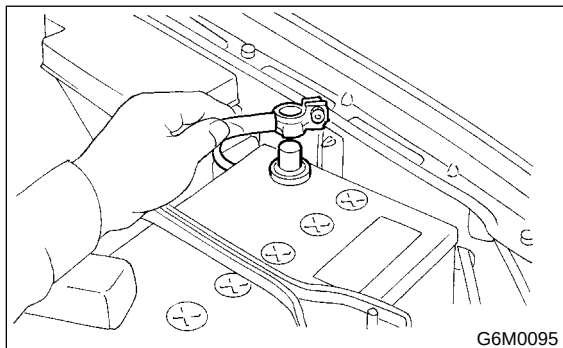
Tightening torque:

- **Camshaft position sensor;**
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
- **Fuel pipe protector RH;**
19 N·m (1.9 kgf-m, 14 ft-lb)

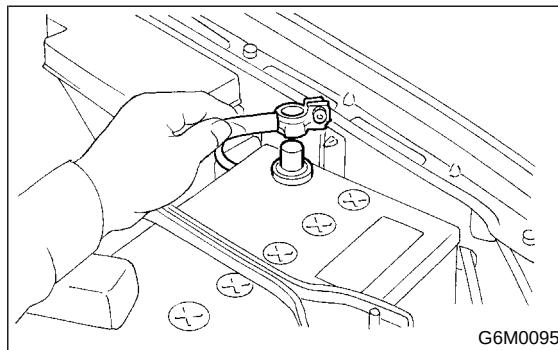
7. Knock Sensor S145042

A: REMOVAL S145042A18

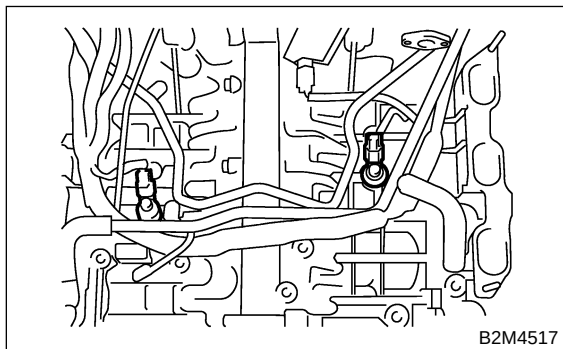
- 1) Disconnect battery ground cable from battery ground terminal.



- 4) Connect battery ground cable.



- 2) Remove intake manifold.
<Ref. to FU(H6)-17, REMOVAL, Intake Manifold.>
- 3) Disconnect knock sensor connector.
- 4) Remove knock sensor from cylinder block.



B: INSTALLATION S145042A11

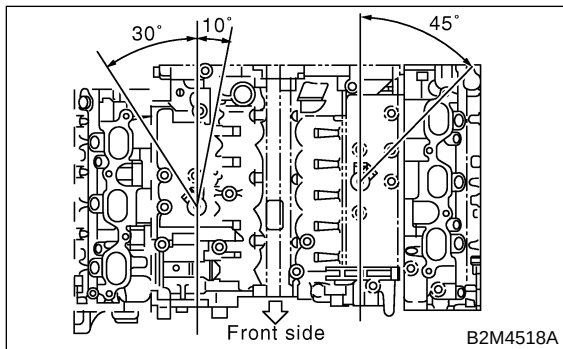
- 1) Install knock sensor to cylinder block.

Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)

NOTE:

For the knock sensor's installation angle, refer to the figure below.

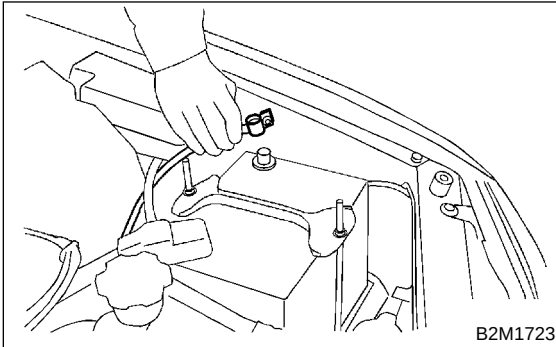


- 2) Connect knock sensor connector.
- 3) Install intake manifold. <Ref. to FU(H6)-21, INSTALLATION, Intake Manifold.>

8. Throttle Position Sensor S145039

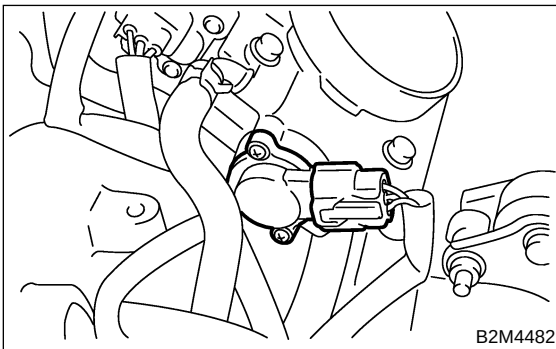
A: REMOVAL S145039A18

- 1) Disconnect battery ground cable.



Remove air intake chamber. <Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>

- 2) Disconnect connector from throttle position sensor.
- 3) Remove throttle position sensor holding screws, and remove throttle position sensor itself.



B: INSTALLATION S145039A11

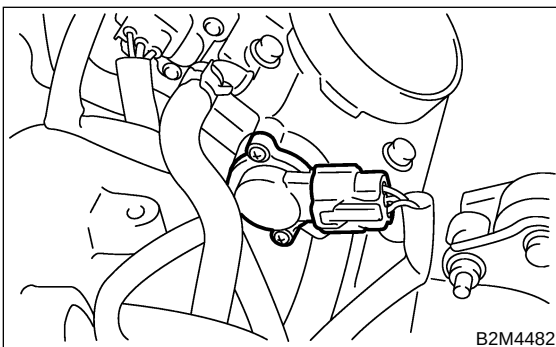
Install in the reverse order of removal.

CAUTION:

When installing throttle position sensor, adjust the position to match with the specified data.

Tightening torque:

1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



INTAKE MANIFOLD PRESSURE SENSOR

Fuel Injection (Fuel Systems)

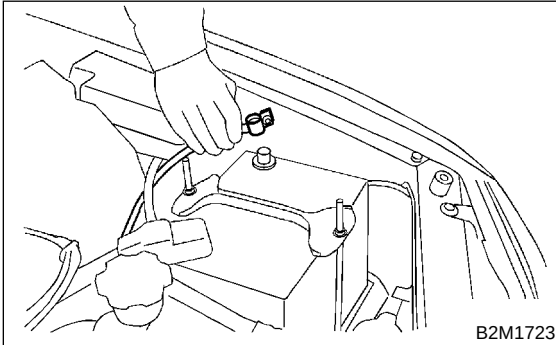
9. Intake Manifold Pressure Sensor

S145568

A: REMOVAL

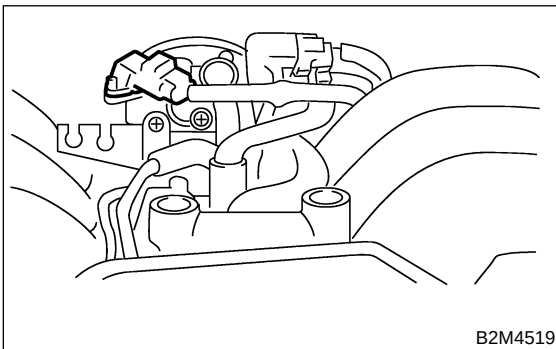
S145568A18

- 1) Disconnect battery ground cable.



- 2) Disconnect connector from intake manifold pressure sensor.

- 3) Remove intake manifold pressure sensor from throttle body.



B: INSTALLATION

S145568A11

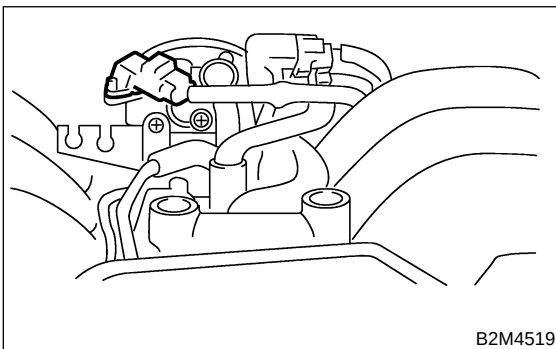
Install in the reverse order of removal.

CAUTION:

Replace gasket with new one.

Tightening torque:

1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



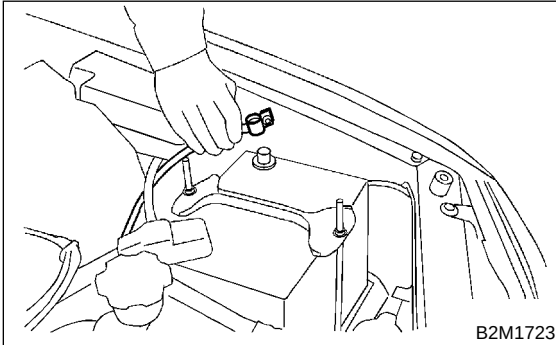
10. Intake Air Temperature Sensor

S145569

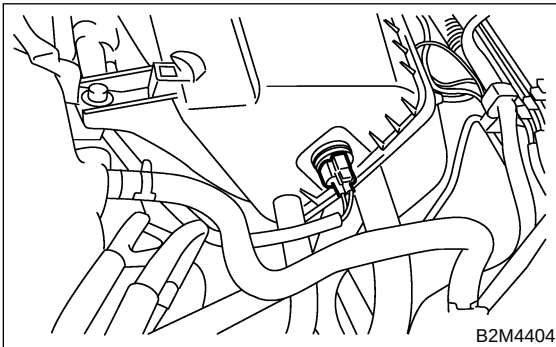
A: REMOVAL

S145569A18

- 1) Disconnect battery ground cable.



- 2) Disconnect connector from intake air temperature sensor.
- 3) Remove intake air temperature sensor from air intake chamber.



B: INSTALLATION

S145569A11

Install in the reverse order of removal.

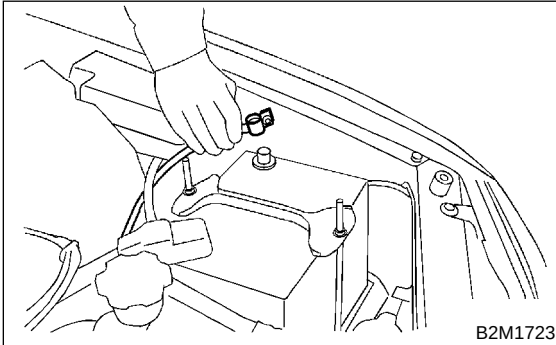
11. Idle Air Control Solenoid Valve

S145056

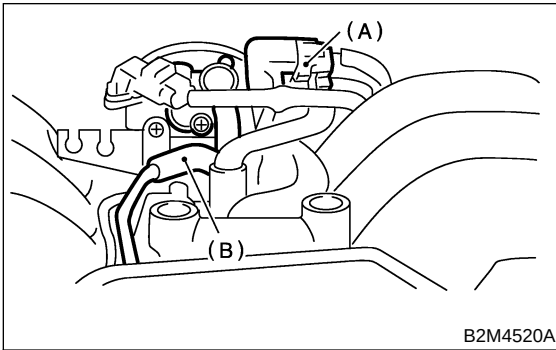
A: REMOVAL

S145056A18

- 1) Disconnect battery ground cable.



- 2) Disconnect connector (A) from idle air control solenoid valve.
- 3) Disconnect air by-pass hose (B) from idle air control solenoid valve.
- 4) Remove idle air control solenoid valve from throttle body.



B: INSTALLATION

S145056A11

Install in the reverse order of removal.

CAUTION:

Replace gasket with a new one.

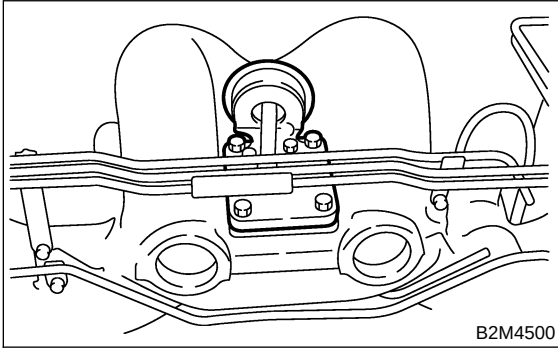
Tightening torque:

2.8 N·m (0.29 kgf-m, 2.1 ft-lb)

12. Induction Valve S145742

A: REMOVAL S145742A18

- 1) Disconnect battery ground cable.
- 2) Remove intake manifold.
<Ref. to FU(H6)-17, REMOVAL, Intake Manifold.>
- 3) Remove induction valve from intake manifold.



B: INSTALLATION S145742A11

Install in the reverse order of removal.

CAUTION:

Always use a new gasket.

Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)

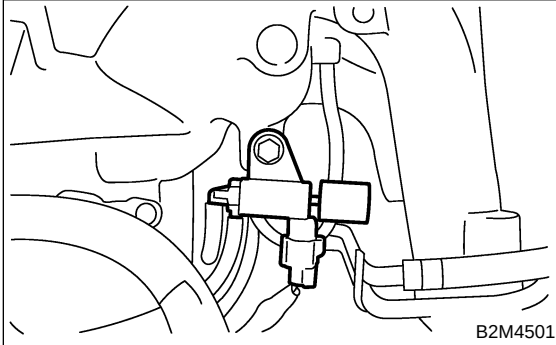
13. Induction Valve Control Solenoid

S145743

A: REMOVAL

S145743A18

- 1) Disconnect battery ground cable.
- 2) Remove intake manifold.
<Ref. to FU(H6)-17, REMOVAL, Intake Manifold.>
- 3) Disconnect connector from induction valve control solenoid.
- 4) Remove induction valve control solenoid from intake manifold.



B: INSTALLATION

S145743A11

Install in the reverse order of removal.

CAUTION:

Always use a new gasket.

Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)

14. Fuel Injector

S145051

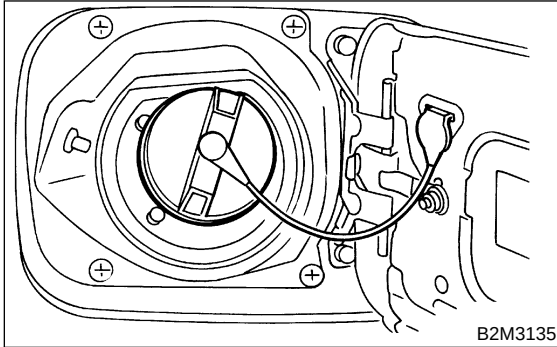
A: REMOVAL

S145051A18

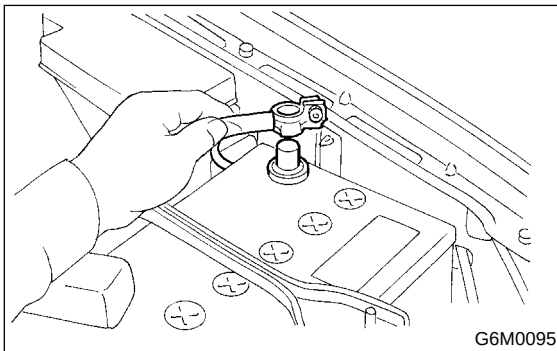
1. RH SIDE

S145051A1801

- 1) Release fuel pressure.
<Ref. to FU(H6)-49, RELEASING OF FUEL PRESSURE, Fuel.>
- 2) Open fuel flap lid, and remove fuel filler cap.

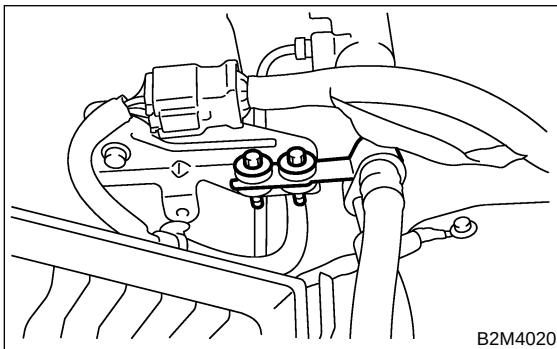


- 3) Disconnect battery ground cable.



- 4) Remove air cleaner lower case. <Ref. to IN(H6)-5, REMOVAL, Air Cleaner.>
- 5) Remove power steering pump and tank from brackets.

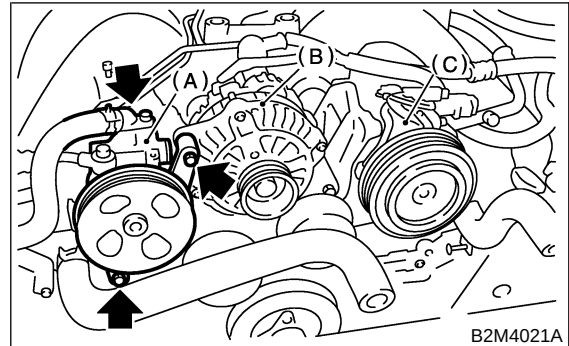
- (1) Remove V-belt.
<Ref. to ME(H6)-31, REMOVAL V-belt.>
- (2) Remove power steering oil pipe with bracket.



- (3) Remove bolts which install power steering pump bracket.

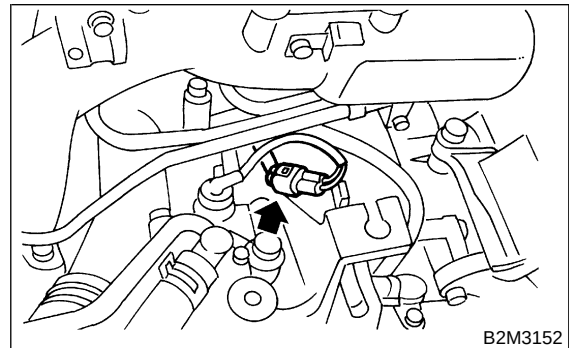
CAUTION:

Do not separate hose and pipe from the main pump.

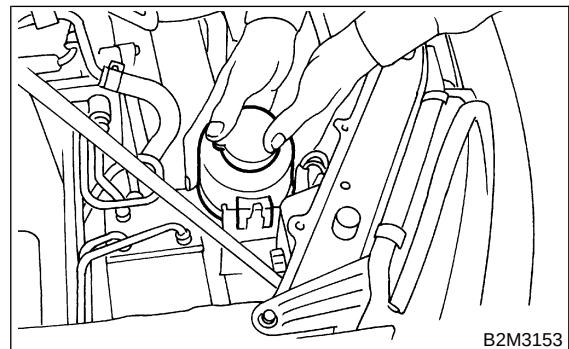


- (A) Power steering pump
(B) Generator
(C) A/C compressor

- (4) Disconnect power steering pump switch connector.



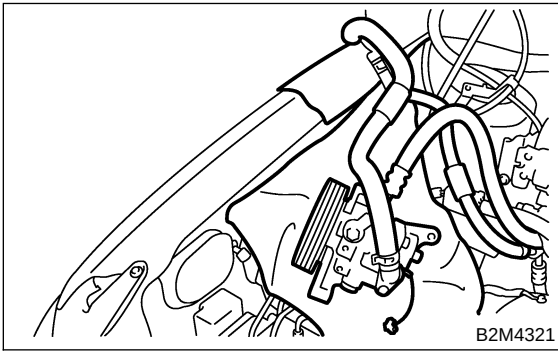
- (5) Remove power steering tank from the bracket by pulling it upward.



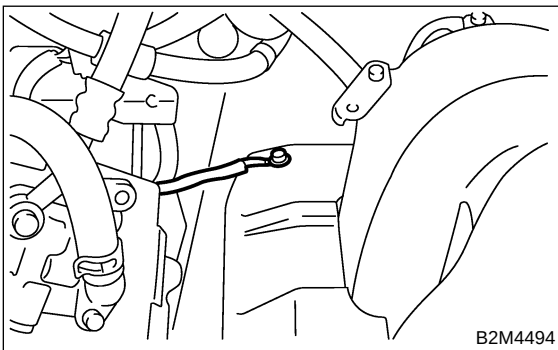
FUEL INJECTOR

Fuel Injection (Fuel Systems)

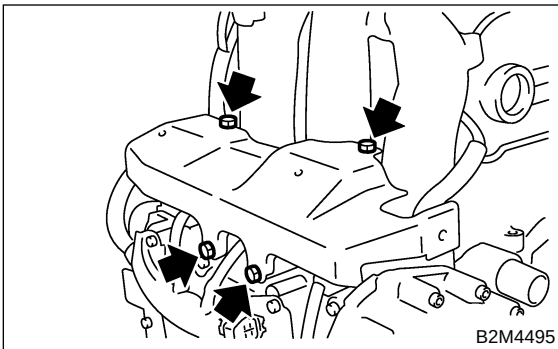
- (6) Place power steering pump on the right side wheel apron.



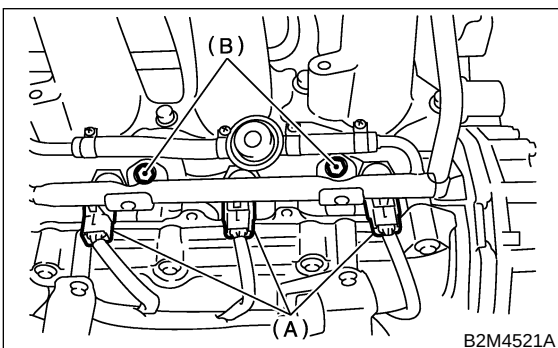
- 6) Remove ground cable from fuel pipe protector RH.



- 7) Remove fuel pipe protector RH.



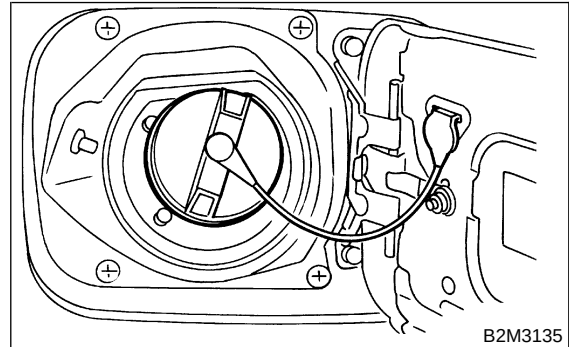
- 8) Disconnect connector (A) from fuel injector.
9) Remove bolt (B) which holds injector pipe onto cylinder head.



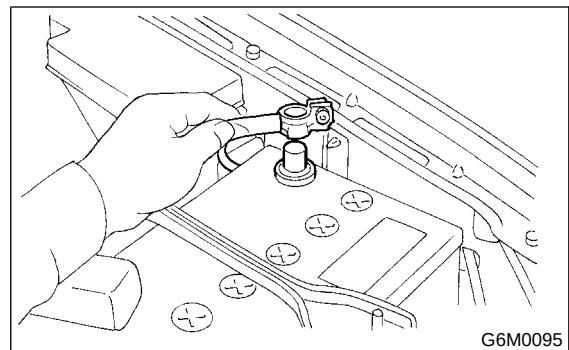
- 10) Remove fuel injector while lifting up fuel injector pipe.

2. LH SIDE SI45051A1802

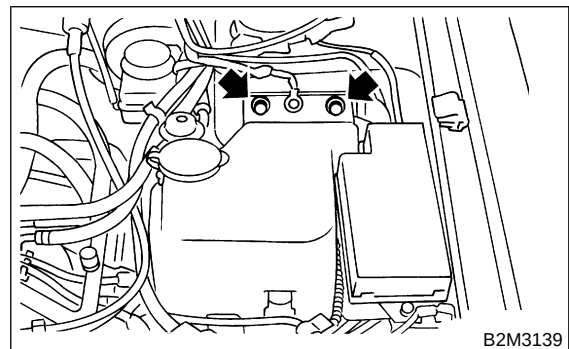
- 1) Release fuel pressure. <Ref. to FU(H6)-49, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open fuel flap lid, and remove fuel filler cap.



- 3) Disconnect battery ground cable.



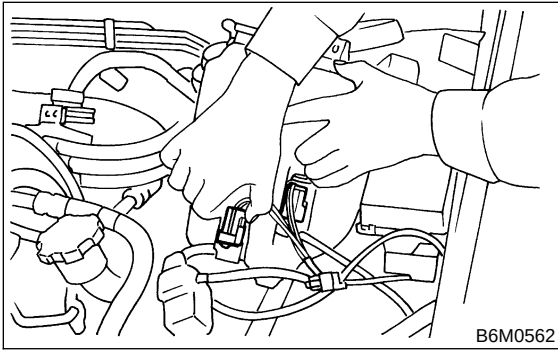
- 4) Remove two bolts which install washer tank on body.



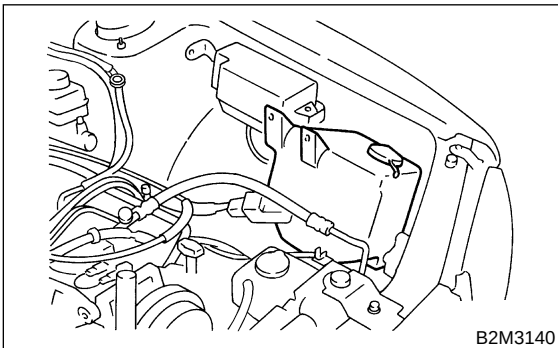
FUEL INJECTOR

Fuel Injection (Fuel Systems)

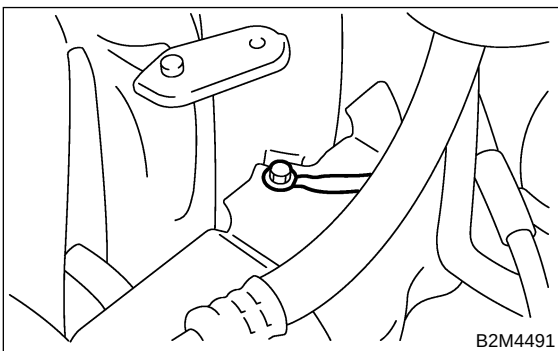
- 5) Disconnect connector from front window washer motor.
- 6) Disconnect connector from rear gate glass washer motor.



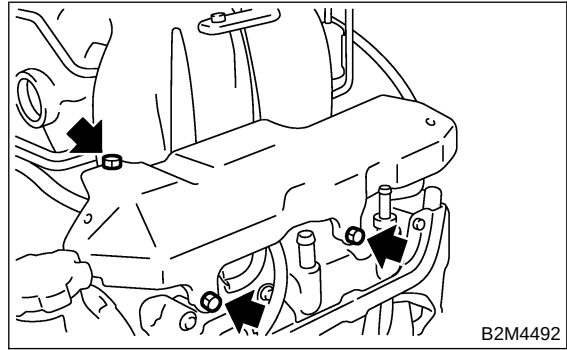
- 7) Disconnect rear window glass washer hose from washer motor, then plug connection with a suitable cap.
- 8) Move washer tank, and secure it away from working area.



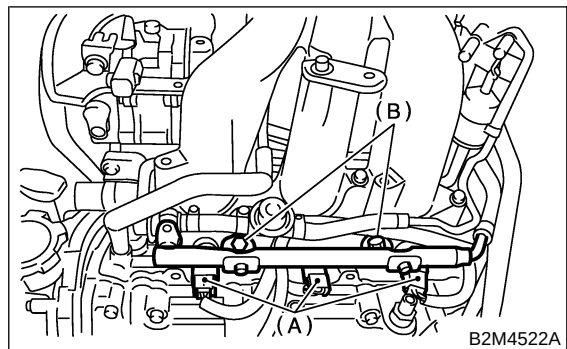
- 9) Remove ground cable from fuel pipe protector LH.



- 10) Remove fuel pipe protector LH.



- 11) Disconnect connector (A) from fuel injector.
- 12) Remove bolt (B) which holds injector pipe onto cylinder head.



- 13) Remove fuel injector while lifting up fuel injector pipe.

FUEL INJECTOR

Fuel Injection (Fuel Systems)

B: INSTALLATION

S145051A11

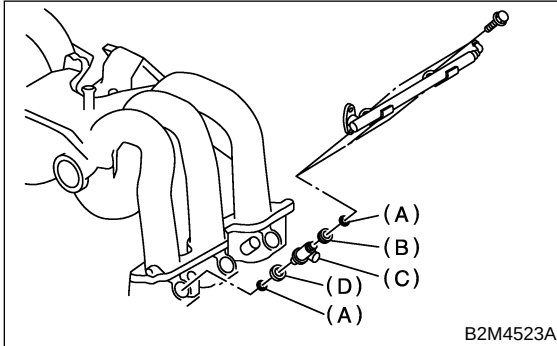
1. RH SIDE

S145051A1101

Install in the reverse order of removal.

CAUTION:

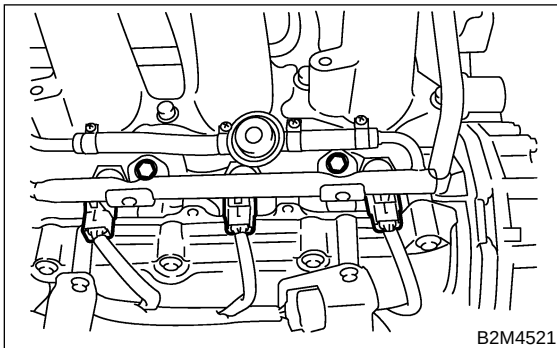
Replace O-rings and insulators with new ones.



- (A) O-ring
- (B) Injection rubber
- (C) Fuel injector
- (D) Insulator

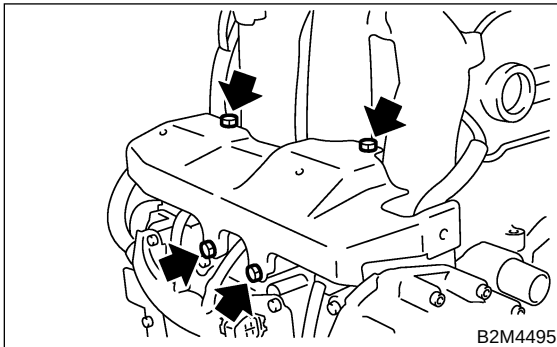
Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)



Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)



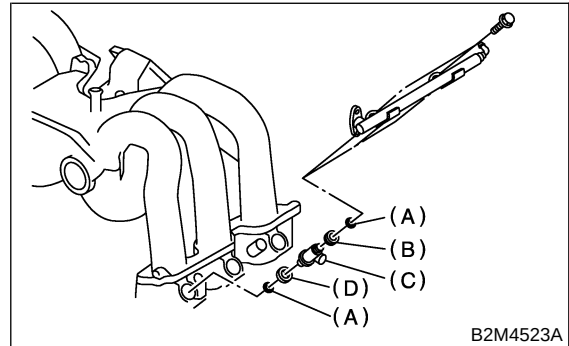
2. LH SIDE

S145051A1102

Install in the reverse order of removal.

CAUTION:

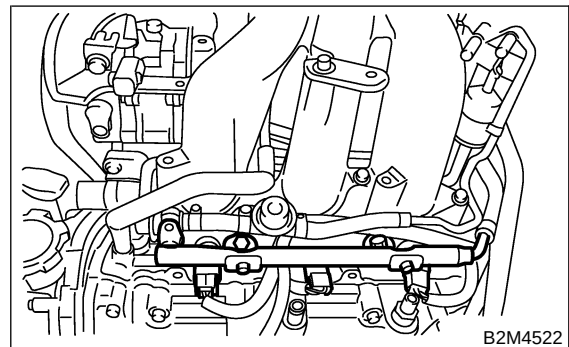
Replace O-rings and insulators with new ones.



- (A) O-ring
- (B) Fuel injector
- (C) Insulator

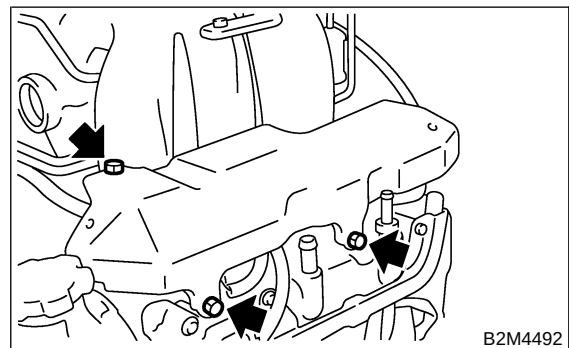
Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)



Tightening torque:

19 N·m (1.9 kgf-m, 14 ft-lb)

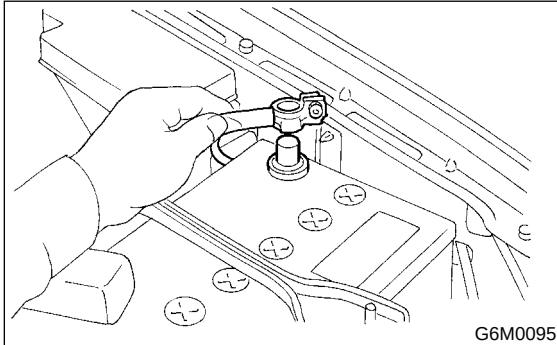


15. Front Oxygen (A/F) Sensor

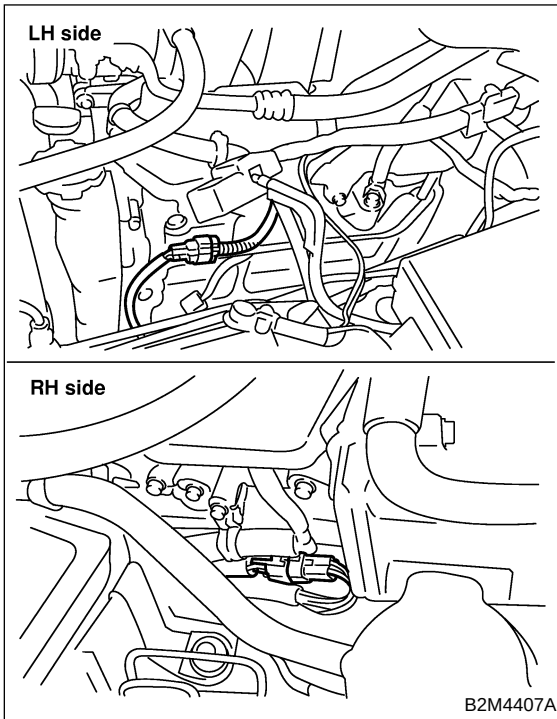
S145642

A: REMOVAL S145642A18

- 1) Disconnect battery ground cable.



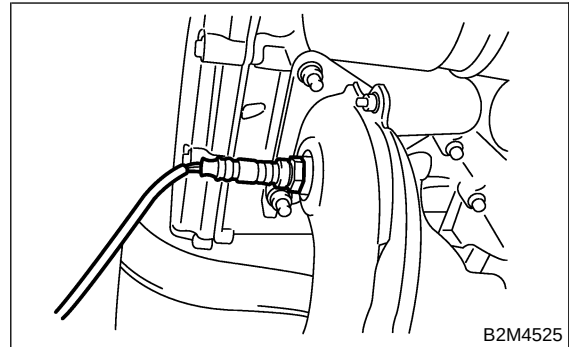
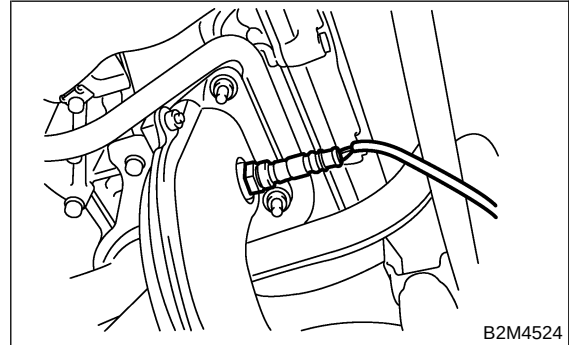
- 2) Disconnect connector from front oxygen (A/F) sensor.



- 6) Remove front oxygen (A/F) sensor.

CAUTION:

When removing front oxygen (A/F) sensor, do not force front oxygen (A/F) sensor especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.



- 3) Lift-up the vehicle.
- 4) Remove under cover.
- 5) Apply SUBARU CRC or its equivalent to threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

FRONT OXYGEN (A/F) SENSOR

Fuel Injection (Fuel Systems)

B: INSTALLATION S145642A11

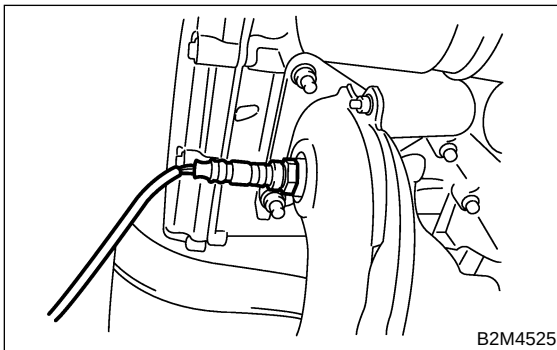
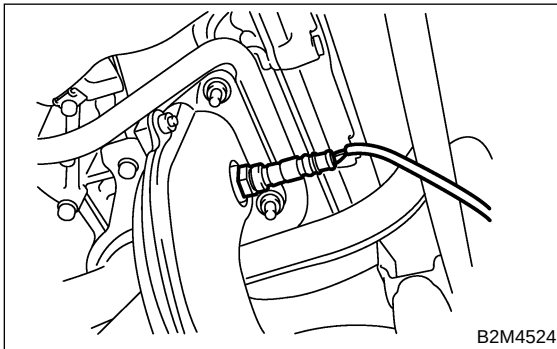
1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to threaded portion of front oxygen (A/F) sensor to make the next removal easier.

Anti-seize compound:
SS-30 by JET LUBE

CAUTION:
Never apply anti-seize compound to protector of front oxygen (A/F) sensor.

2) Install front oxygen (A/F) sensor.

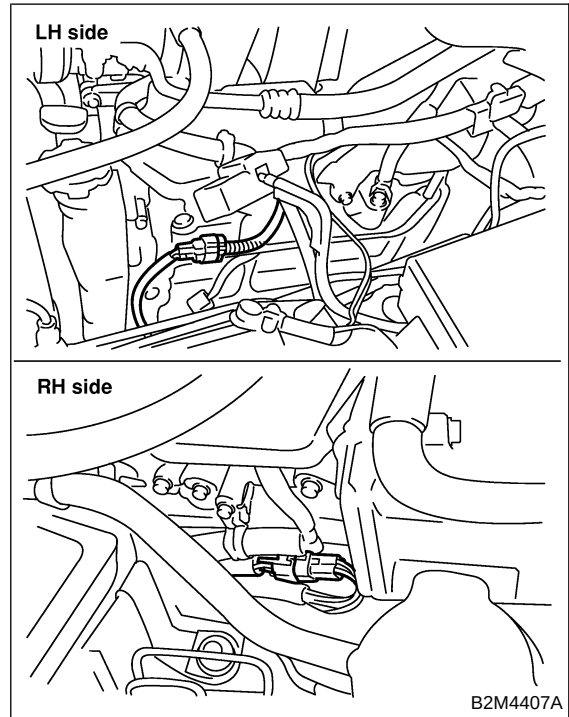
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



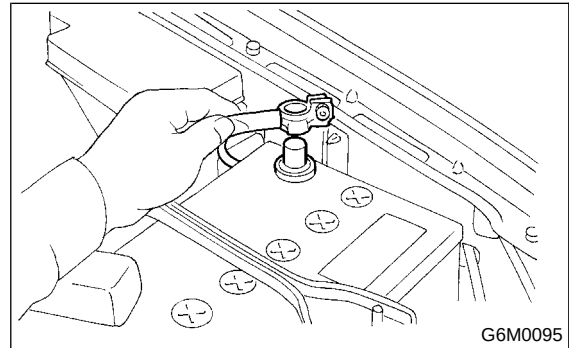
3) Install under cover.

4) Lower the vehicle.

5) Connect connector of front oxygen (A/F) sensor.



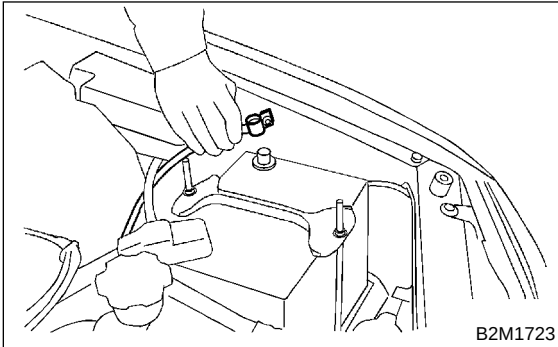
6) Connect battery ground cable.



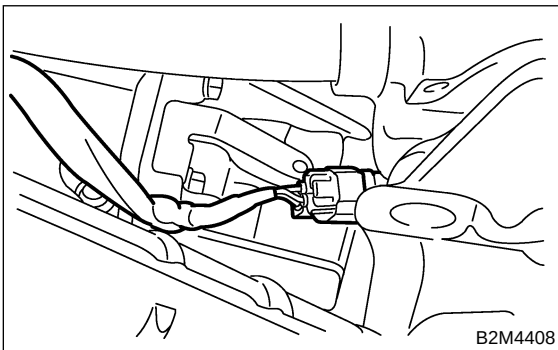
16. Rear Oxygen Sensor S145657

A: REMOVAL S145657A18

- 1) Disconnect battery ground cable.



- 2) Disconnect connector from rear oxygen sensor.



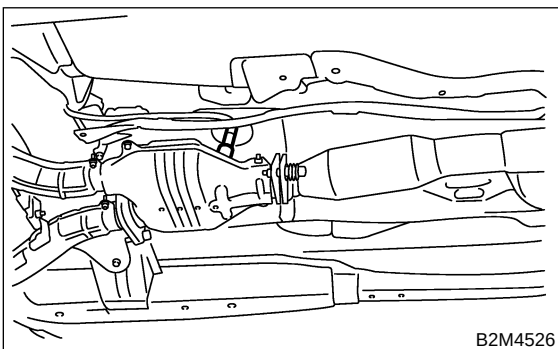
- 3) Lift-up the vehicle.
- 4) Apply SUBARU CRC or its equivalent to threaded portion of rear oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

- 5) Remove rear oxygen sensor.

CAUTION:

When removing, do not force rear oxygen sensor in an unnatural way especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.



B: INSTALLATION S145657A11

- 1) Before installing rear oxygen sensor, apply anti-seize compound only to threaded portion of rear oxygen sensor to make the next removal easier.

CAUTION:

Never apply anti-seize compound to protector of rear oxygen sensor.

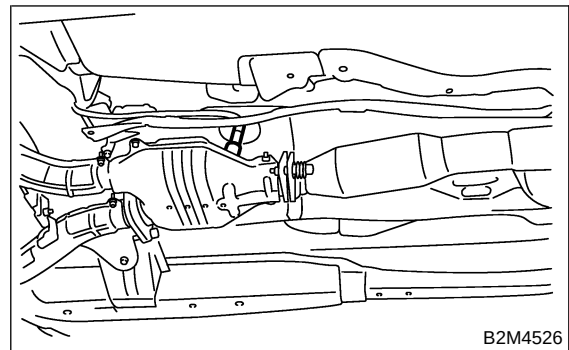
Anti-seize compound:

SS-30 by JET LUBE

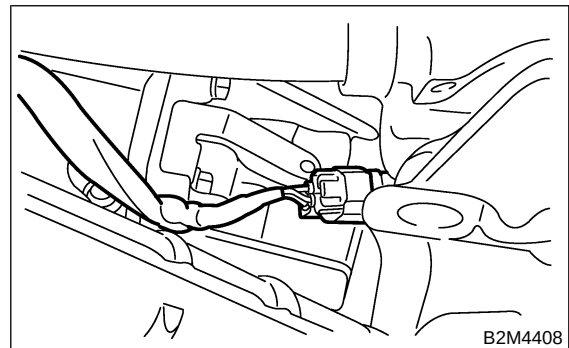
- 2) Install rear oxygen sensor.

Tightening torque:

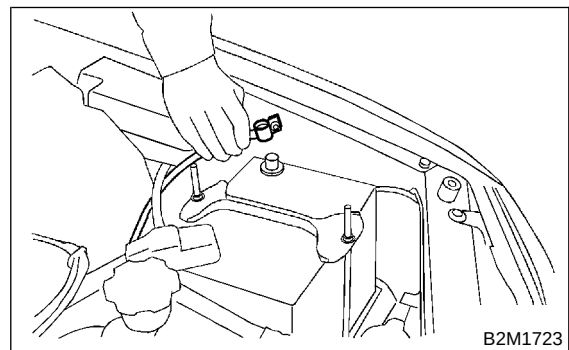
21 N·m (2.1 kgf-m, 15.2 ft-lb)



- 3) Connect connector to rear oxygen sensor.



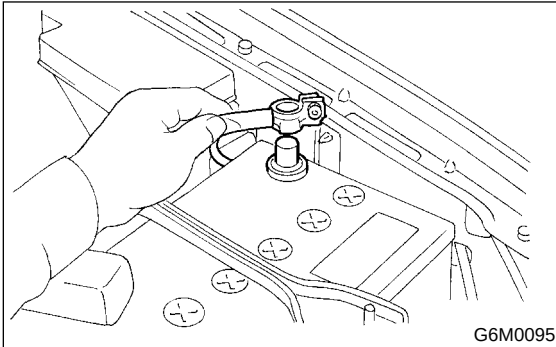
- 4) Lower the vehicle.
- 5) Connect battery ground cable.



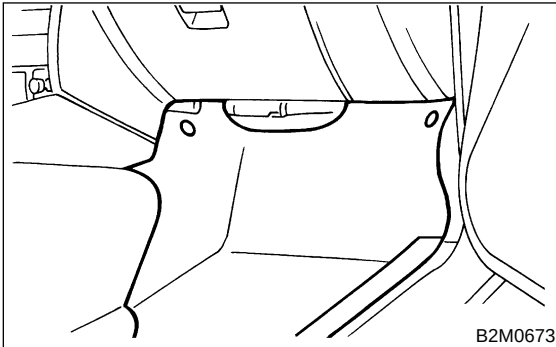
17. Engine Control Module S145049

A: REMOVAL S145049A18

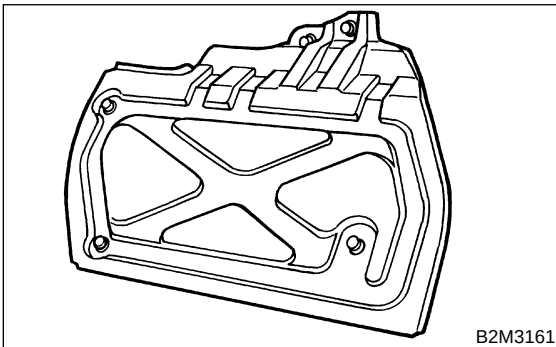
- 1) Disconnect battery ground cable.



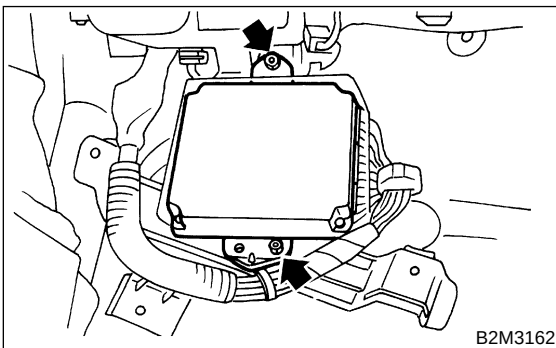
- 2) Remove lower inner trim of passenger side.
<Ref. to EI-43, REMOVAL, Lower Inner Trim.>
3) Detach floor mat of front passenger seat.



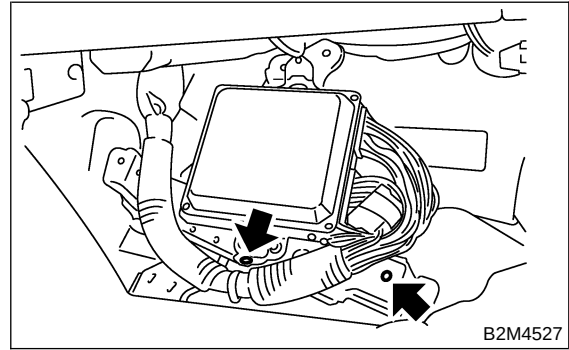
- 4) Remove protect cover.



- 5) Remove nuts which hold ECM to bracket.



- 6) Remove clip from bracket.



- 7) Disconnect ECM connectors and take out ECM.

B: INSTALLATION S145049A11

Install in the reverse order of removal.

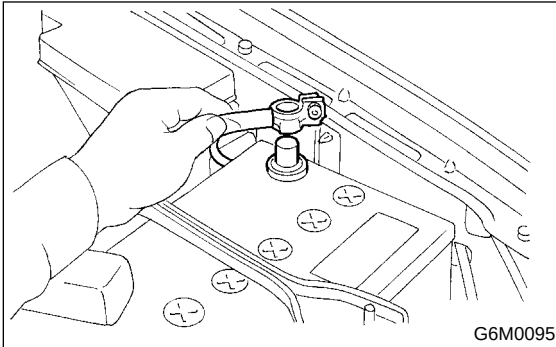
CAUTION:

When replacing ECM, be careful not to use the wrong spec. ECM to avoid any damage to the fuel injection system.

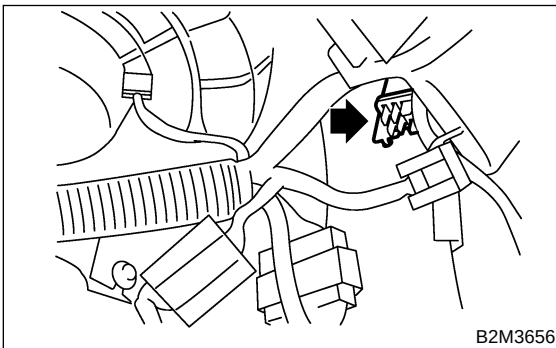
18. Main Relay S145050

A: REMOVAL S145050A18

- 1) Disconnect battery ground cable.



- 2) Remove lower inner trim of passenger side.
<Ref. to EI-43, REMOVAL, Lower Inner Trim.>
- 3) Disconnect connectors from main relay.
- 4) Remove bolt which holds main relay bracket on body.



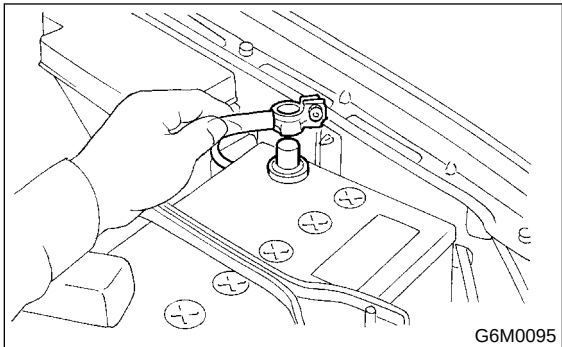
B: INSTALLATION S145050A11

Install in the reverse order of removal.

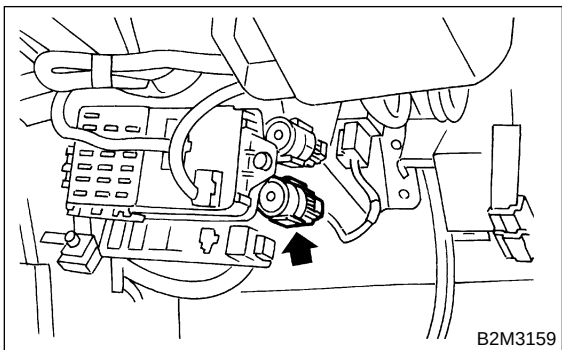
19. Fuel Pump Relay S145048

A: REMOVAL S145048A18

- 1) Disconnect battery ground cable.



- 2) Remove lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Assembly.>
- 3) Disconnect connector from fuel pump relay.



- 4) Remove fuel pump relay from mounting bracket.

B: INSTALLATION S145048A11

Install in the reverse order of removal.

20. Fuel S145052

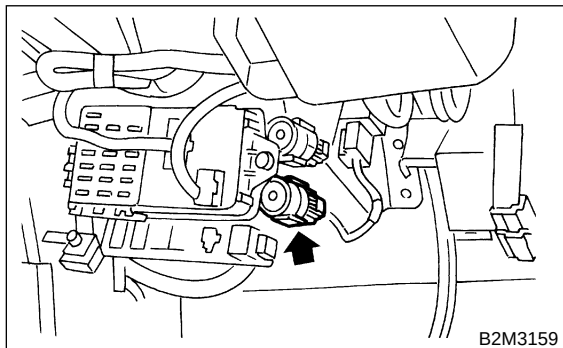
A: OPERATION S145052A16

1. RELEASING OF FUEL PRESSURE S145052A1601

WARNING:

- Place "NO FIRE" signs near the working area.
- Be careful not to spill fuel on the floor.

- 1) Disconnect connector from fuel pump relay.



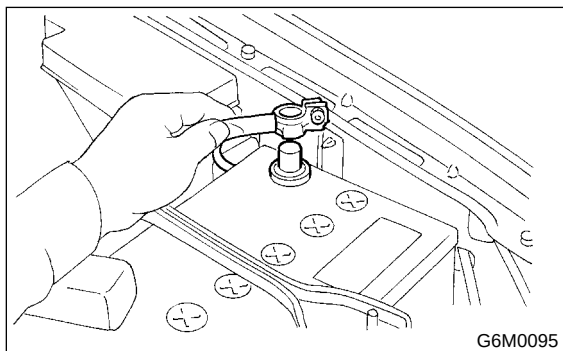
- 2) Start the engine and run it until it stalls.
- 3) After the engine stalls, crank it for five more seconds.
- 4) Turn ignition switch to OFF.

2. DRAINING FUEL S145052A1602

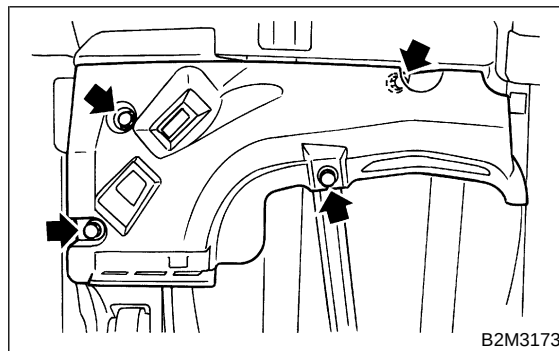
WARNING:

- Place "NO FIRE" signs near the working area.
- Be careful not to spill fuel on the floor.

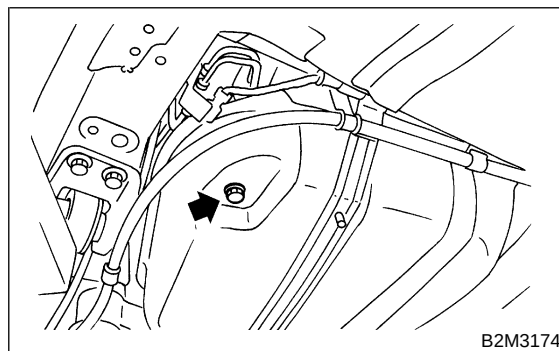
- 1) Set vehicle on the lift.
- 2) Disconnect battery ground cable.



- 3) Lift-up the vehicle.
- 4) Remove front right side fuel tank cover.



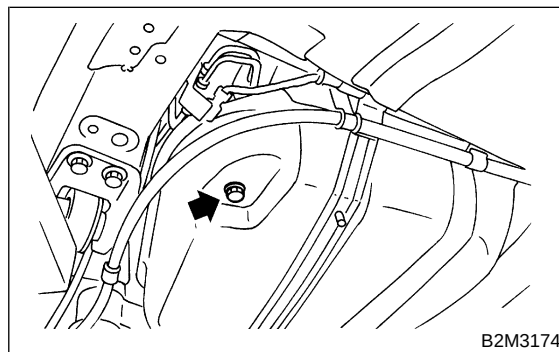
- 5) Drain fuel from fuel tank.
Set a container under the vehicle and remove drain plug from fuel tank.



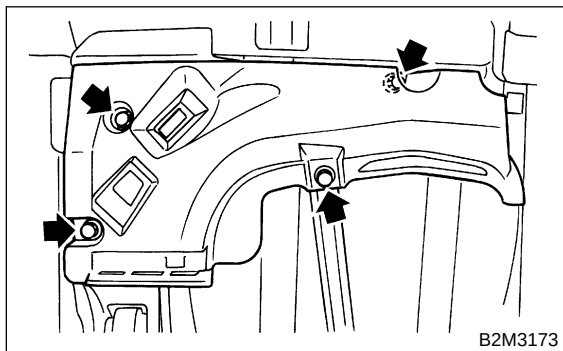
- 6) Tighten fuel drain plug and install front right side tank cover.

Tightening torque:

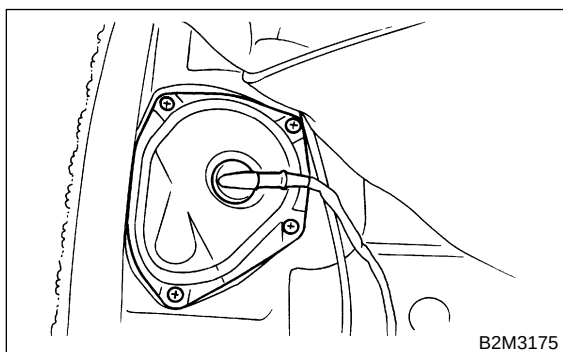
26 N·m (2.65 kgf-m, 19.2 ft-lb)



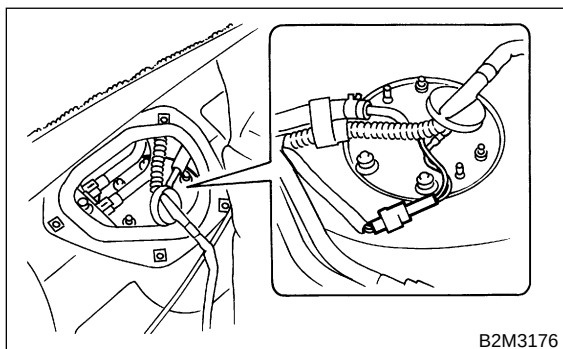
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



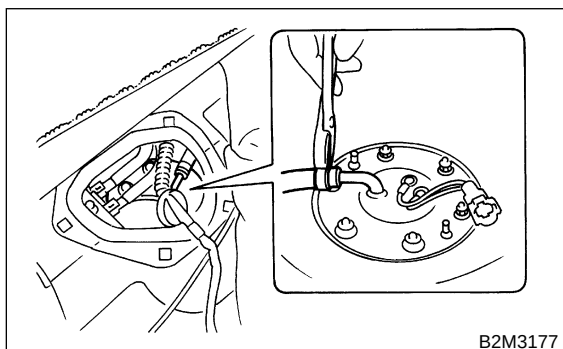
- 7) Lower the vehicle.
- 8) Remove sub service hole cover.



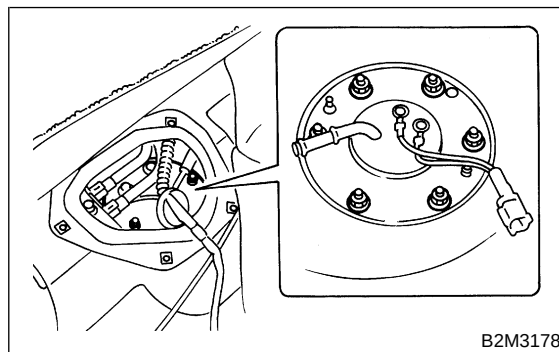
- 9) Disconnect connector from fuel sub level sensor.



- 10) Disconnect fuel jet pump hose.



- 11) Remove fuel sub level sensor.

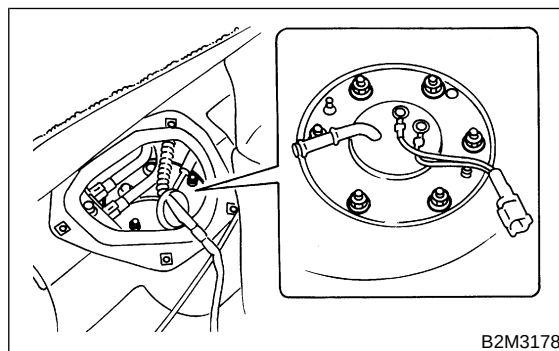


- 12) Drain fuel from fuel tank by using hand pump.

WARNING:
Do not use a motor pump when draining fuel.

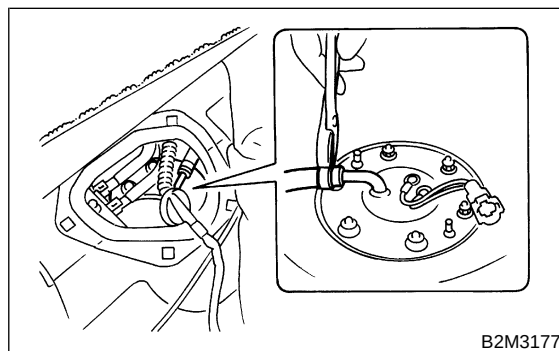
- 13) After draining fuel, reinstall fuel sub level sensor.

Tightening torque:
T: 4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

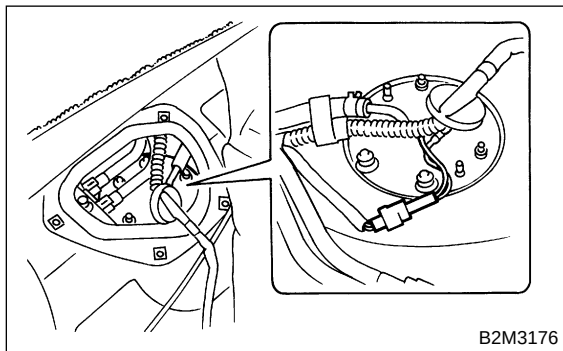


NOTE:
 If you have not removed fuel tank yet, proceed with the procedure below for installation.

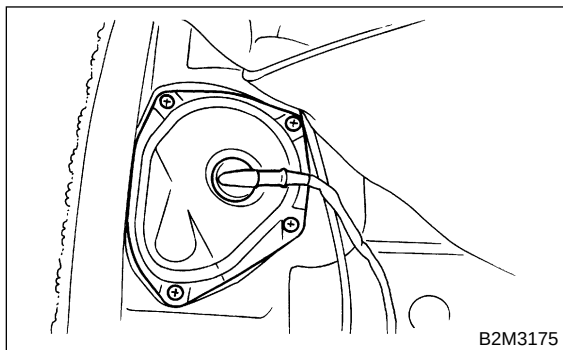
- (1) Connect fuel jet pump hose.



- (2) Connect connector from fuel sub level sensor.



- (3) Install sub service hole cover.

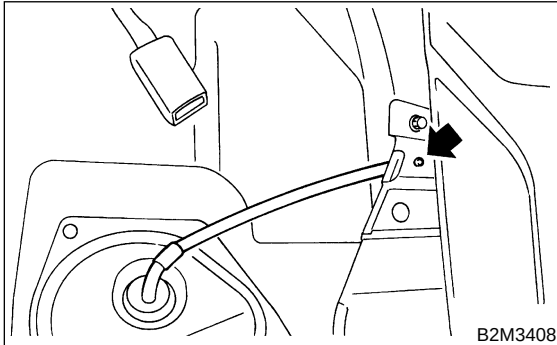


- (4) Set rear seat and floor mat.

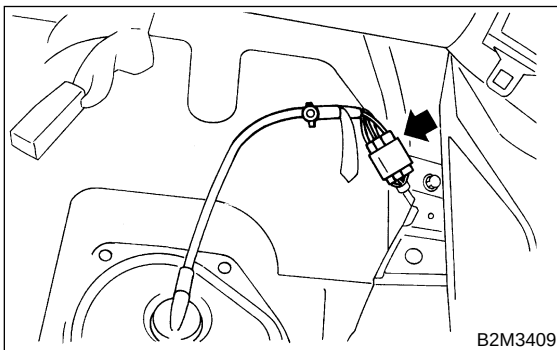
21. Fuel Tank S145053

A: REMOVAL S145053A18

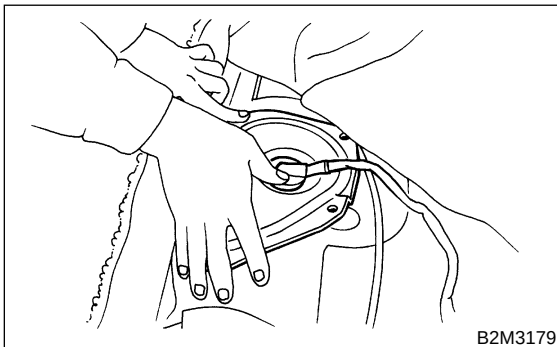
- 1) Set vehicle on the lift.
- 2) Release fuel pressure. <Ref. to FU(H6)-49, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
- 3) Drain fuel from fuel tank. <Ref. to FU(H6)-49, DRAINING FUEL, OPERATION, Fuel.>
- 4) Remove holder clip which secures fuel tank cord on bracket.



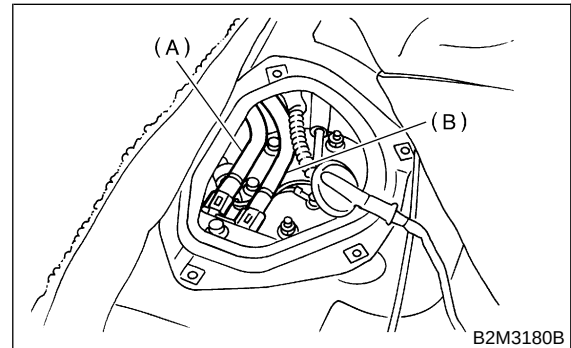
- 5) Disconnect connector of fuel tank cord to rear harness.



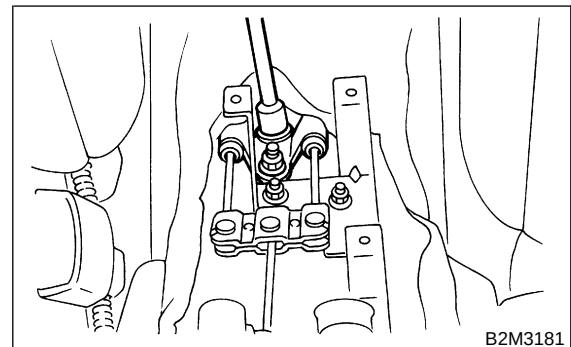
- 6) Push grommet which holds fuel tank cord on service hole cover into body side.



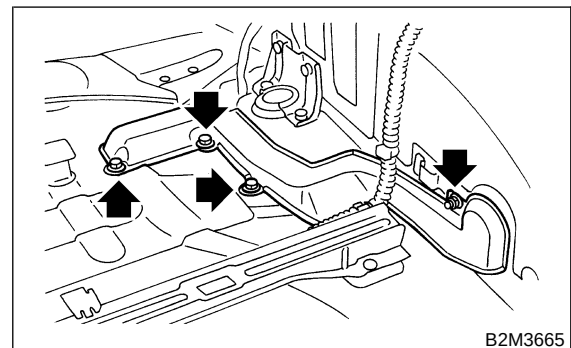
- 7) Separate quick connector of fuel delivery (A) and return hose (B). <Ref. to FU(H6)-77, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



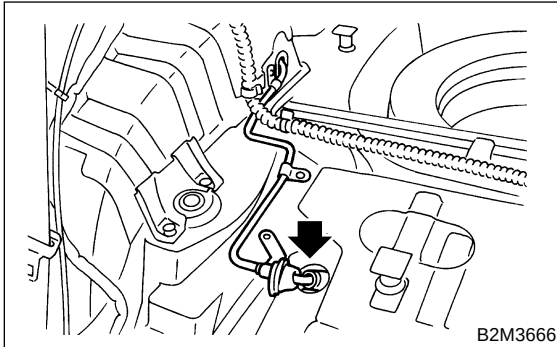
- 8) Remove parking brake cable.
 - (1) Remove console box console. <Ref. to EI-36, REMOVAL, Console Box.>
 - (2) Remove parking brake bracket and disconnect parking brake cable from equalizer. <Ref. to.>



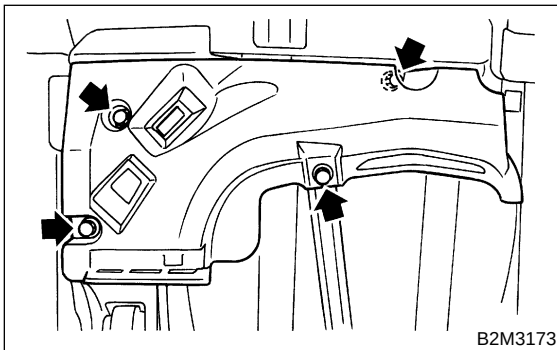
- 9) Remove trunk trim. (Sedan model) <Ref. to EI-51, REMOVAL, Trunk Trim.>
- 10) Remove rear quarter lower trim. (Wagon model) <Ref. to EI-44, WAGON, REMOVAL, Rear Quarter Trim.>
- 11) Remove pipe protector.



12) Separate quick connector of evaporation pipe (A). <Ref. to FU(H6)-77, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



- 13) Remove wheel nuts from rear wheels.
- 14) Lift-up the vehicle.
- 15) Remove rear wheel.
- 16) Remove front side fuel tank cover.



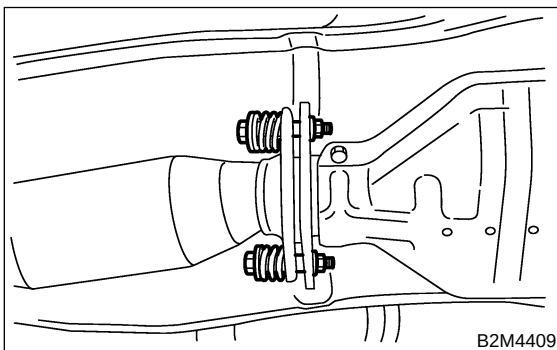
17) Remove rear exhaust pipe and muffler.

NOTE:

To facilitate removal, apply a coat of SUBARU CRC to matching area of rubber cushions in advance.

SUBARU CRC (Part No. 004301003)

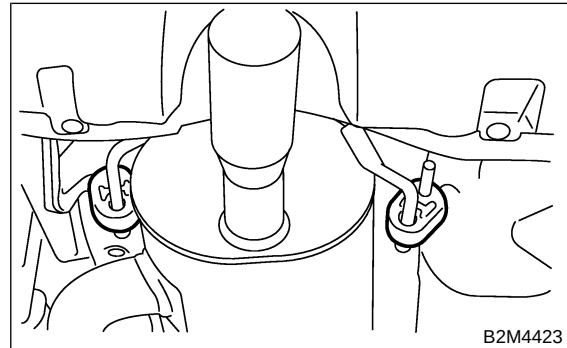
(1) Separate rear exhaust pipe from front exhaust pipe.



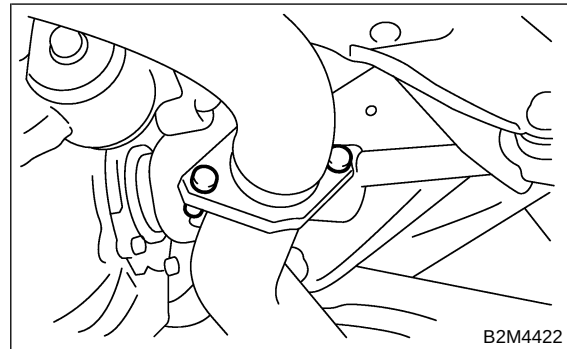
(2) Remove left and right rubber cushions.

CAUTION:

Be careful not to pull down muffler.

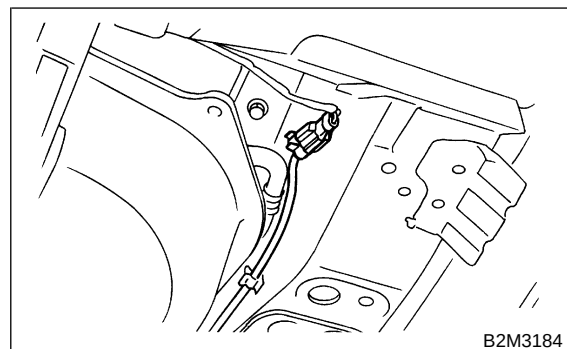


(3) Remove front rubber cushion and detach muffler assembly.



18) Remove propeller shaft. <Ref. to DS-13, REMOVAL, Propeller Shaft.>

19) Disconnect connector from ABS sensor.

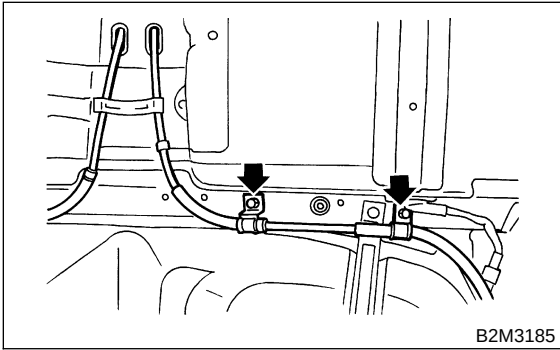


FUEL TANK

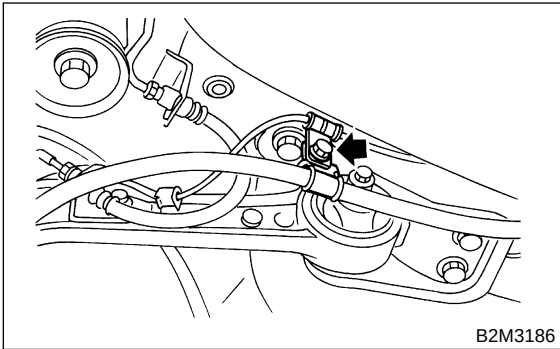
Fuel Injection (Fuel Systems)

20) Remove bolts which hold parking brake cable holding bracket.

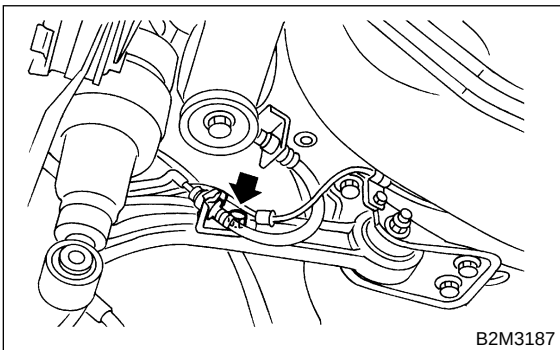
21) Remove parking brake cable from cabin by forcibly pulling it backward.



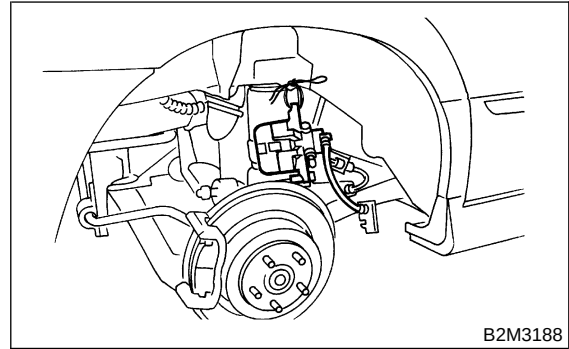
22) Remove bolts which hold parking brake cable holding bracket.



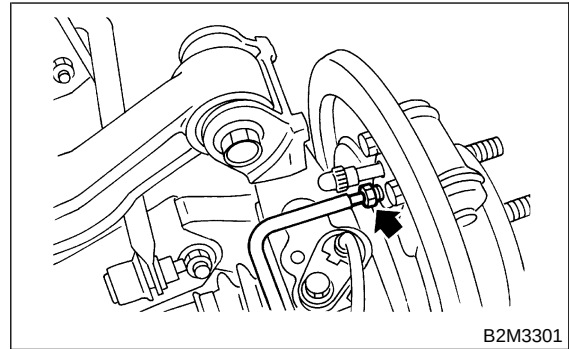
23) Remove bolts which hold rear brake hoses holding bracket.



24) Remove rear brake caliper, then tie it up to the body side of the vehicle as shown in figure. (Rear disk brake model)



25) Disconnect brake pipes from wheel cylinder. (Rear drum brake model) <Ref. to BR-30, REMOVAL, Rear Drum Brake Shoe.>



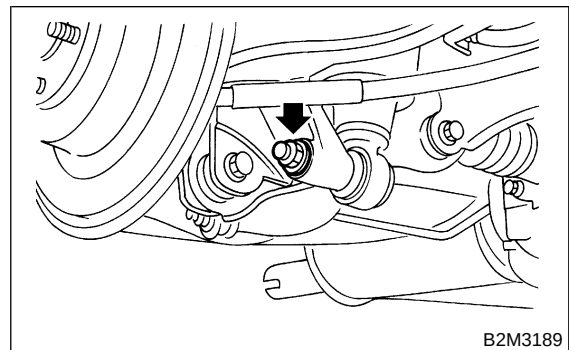
26) Remove rear suspension assembly.

WARNING:

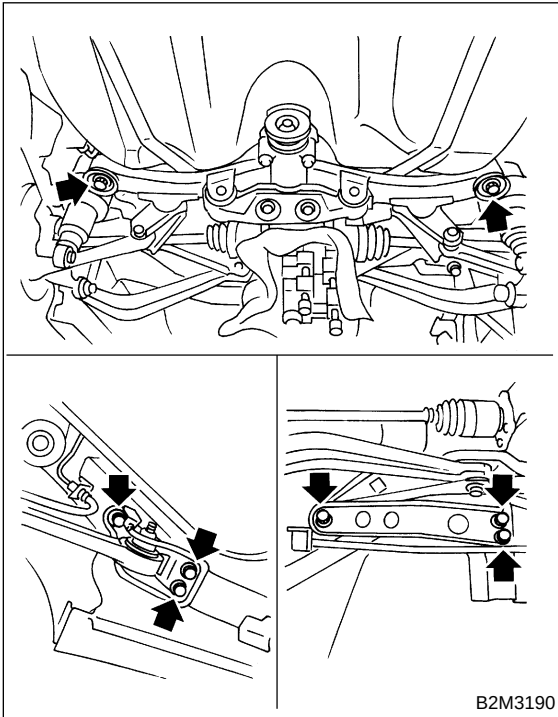
A helper is required to perform this work.

(1) Support rear differential with transmission jack.

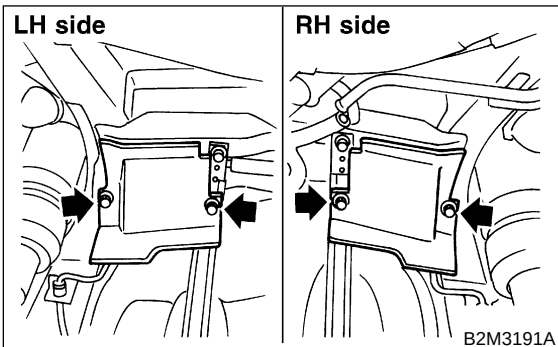
(2) Remove bolt which holds rear shock absorber to rear suspension arm.



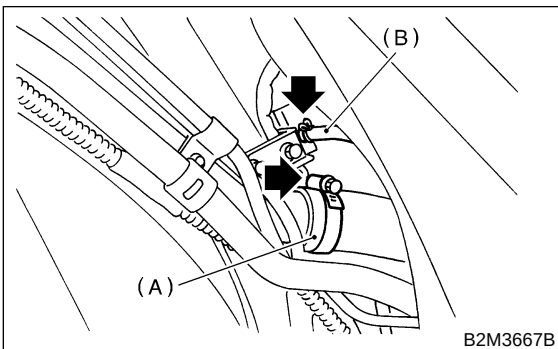
- (3) Remove bolts which secure rear suspension assembly to body.



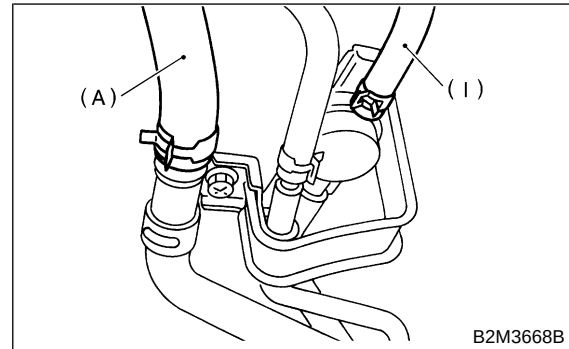
- (4) Remove rear suspension assembly.
27) Remove rear side fuel tank cover.



- 28) Disconnect fuel filler hose (A) and fuel tank pressure sensor (B) hose.

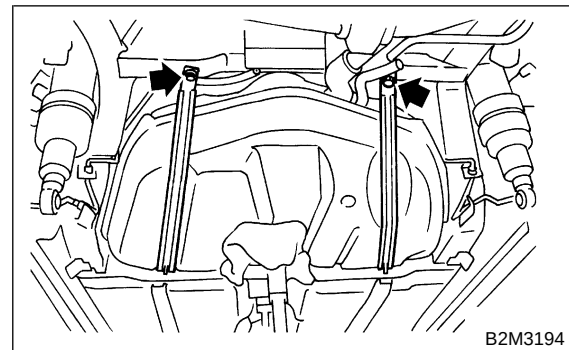


- 29) Disconnect air vent hose (A) from evaporation pipe assembly and disconnect evaporation hose (I) from pressure control solenoid valve.



- 30) Support fuel tank with transmission jack, remove bolts from bands and dismount fuel tank from the vehicle.

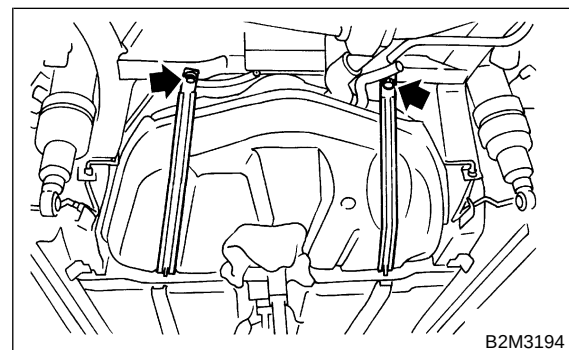
WARNING:
A helper is required to perform this work.



B: INSTALLATION S145053A11

- 1) Support fuel tank with transmission jack and push fuel tank harness into access hole with grommet.
- 2) Set fuel tank and temporarily tighten bolts of fuel tank bands.

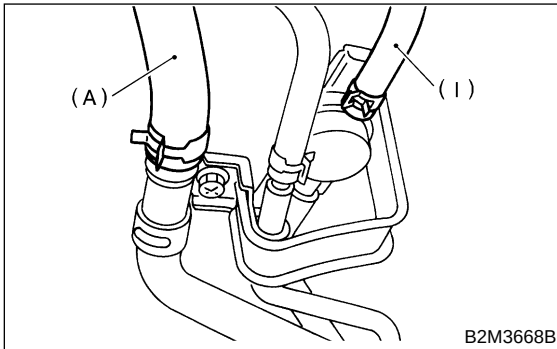
WARNING:
A helper is required to perform this work.



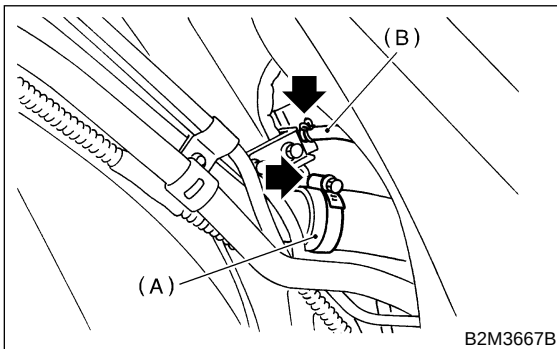
FUEL TANK

Fuel Injection (Fuel Systems)

3) Connect air vent hose (A) to evaporation pipe assembly and connect evaporation hose (I) to pressure control solenoid valve.

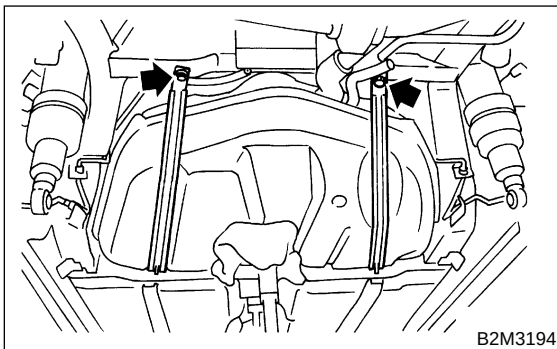


4) Connect fuel filler hose (A) and fuel tank pressure sensor hose (B).



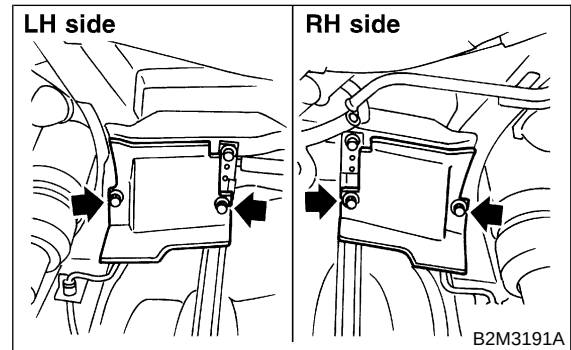
5) Tighten band mounting bolts.

Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)



6) Install rear side fuel tank cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

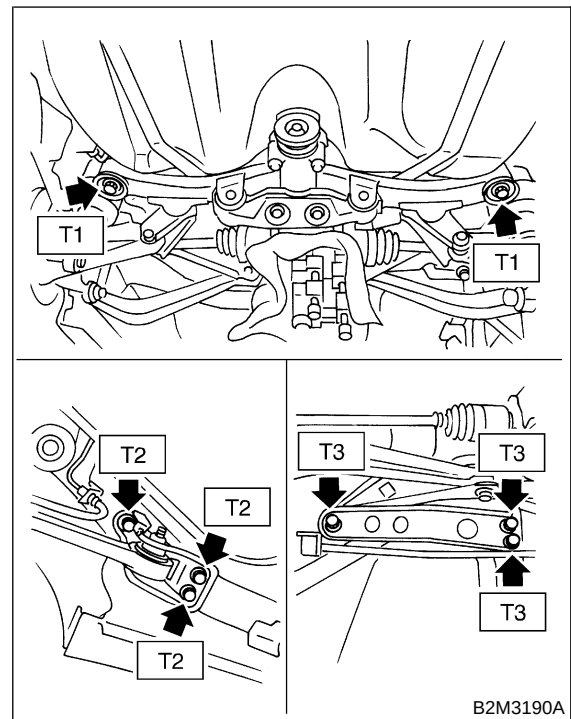


7) Install rear suspension assembly.

WARNING:
A helper is required to perform this work.

(1) Support rear suspension assembly and then tighten bolts which secure rear suspension assembly.

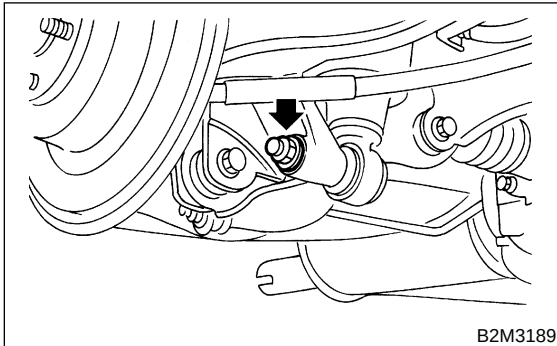
Tightening torque:
T1: 172 N·m (17.5 kgf-m, 127 ft-lb)
T2: 108 N·m (11.0 kgf-m, 80 ft-lb)
T3: 66 N·m (6.7 kgf-m, 48 ft-lb)



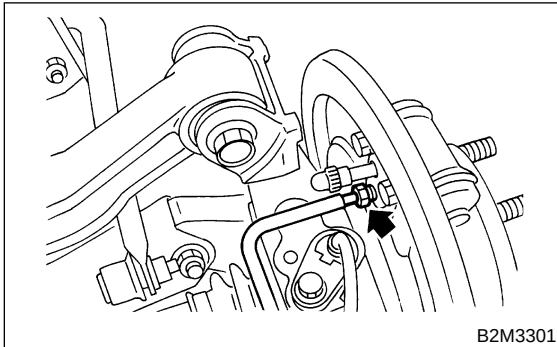
(2) Tighten bolt which holds rear shock absorber to rear suspension arm. <Ref. to RS-19, INSTALLATION, Link Upper.>

Tightening torque:

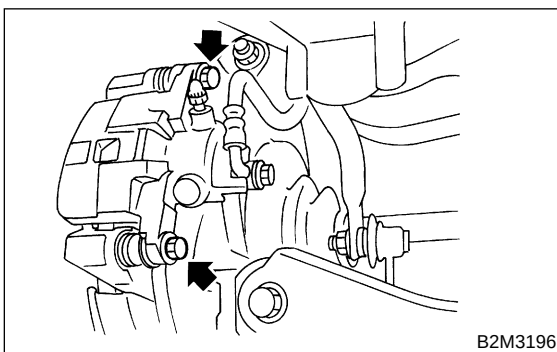
157 N·m (16 kgf-m, 116 ft-lb)



8) Connect brake pipes to wheel cylinder. (Rear drum brake model) <Ref. to BR-36, INSTALLATION, Rear Drum Brake Assembly.>



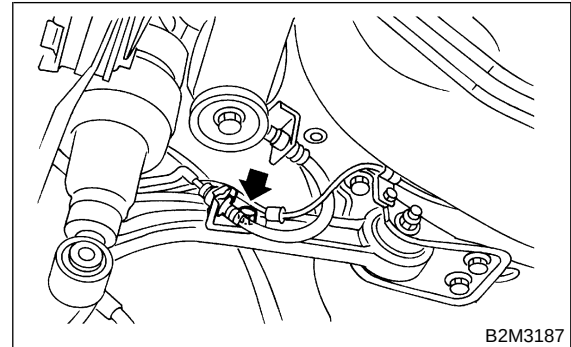
9) Install rear brake caliper. (Rear disk brake model) <Ref. to BR-27, INSTALLATION, Rear Disc Brake Assembly.>



10) Tighten bolt which holds rear brake hoses holding bracket.

Tightening torque:

33 N·m (3.4 kgf-m, 25 ft-lb)

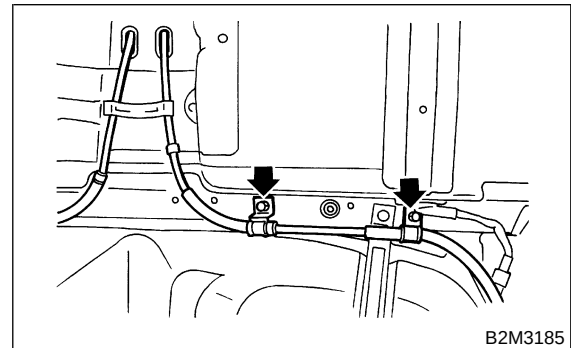


11) Install parking brake cable to cabin by forcibly pushing it forward.

12) Tighten bolts which hold parking brake cable holding bracket.

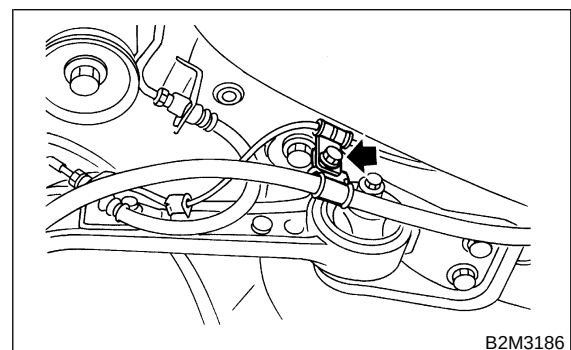
Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



Tightening torque:

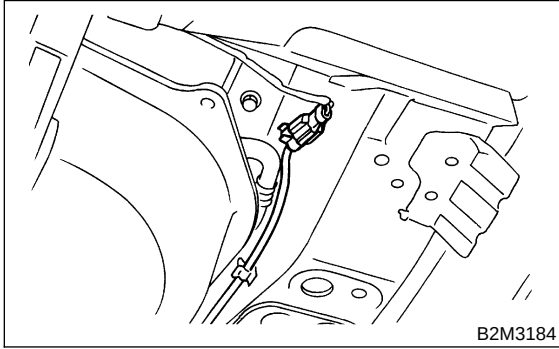
32 N·m (3.3 kgf-m, 23.9 ft-lb)



FUEL TANK

Fuel Injection (Fuel Systems)

- 13) Connect connector to ABS sensor.



- 14) Install propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>

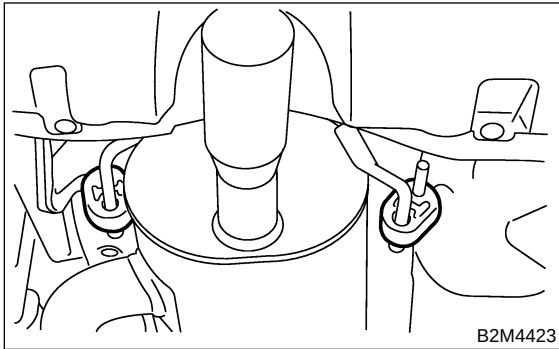
- 15) Install rear exhaust pipe and muffler.

NOTE:

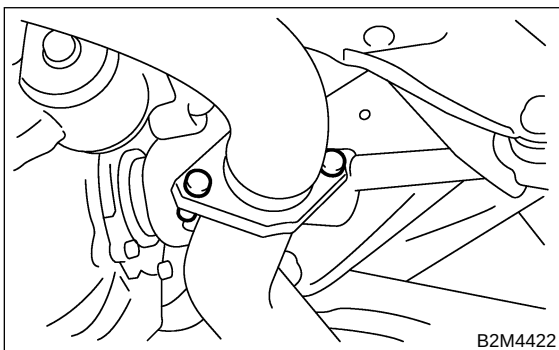
To facilitate the procedure, apply a coat of SUBARU CRC to matching area of rubber cushions in advance.

SUBARU CRC (Part No. 004301003)

- (1) Install left and right rubber cushions.



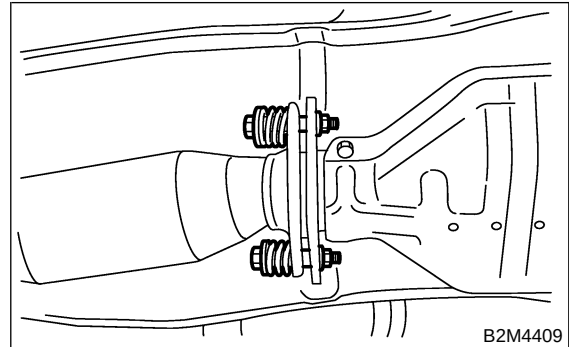
- (2) Install front rubber cushion and attach muffler assembly.



- (3) Install rear exhaust pipe to center exhaust pipe.

Tightening torque:

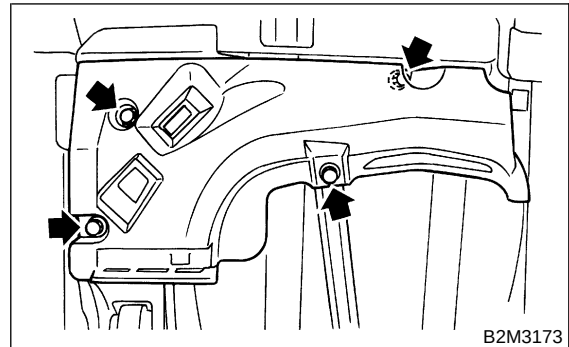
18 N·m (1.8 kgf-m, 13.0 ft-lb)



- 16) Install front side fuel tank cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

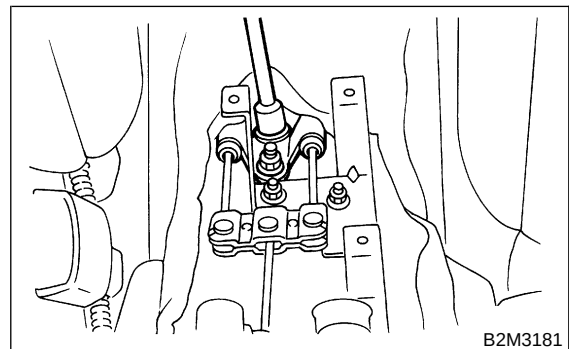


- 17) Install rear wheel.

- 18) Lower the vehicle.

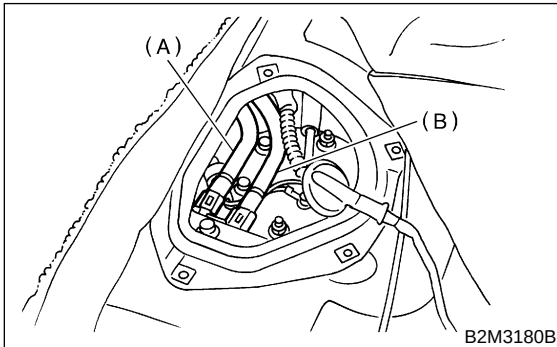
- 19) Tighten wheel nuts to rear wheel.

- 20) Install parking brake cable. <Ref. to PB-6, INSTALLATION, Parking Brake Lever.>



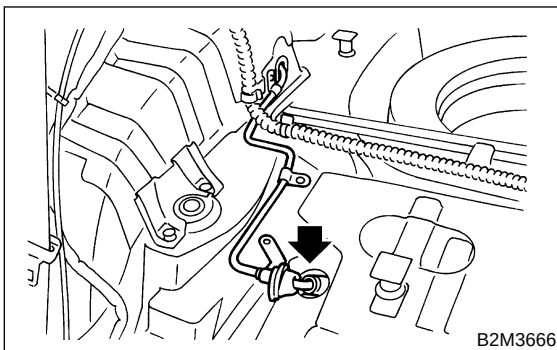
21) Install console box. <Ref. to EI-36, INSTALLATION, Console Box.>

22) Connect fuel hoses and hold them with quick connector. <Ref. to FU(H6)-78, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>

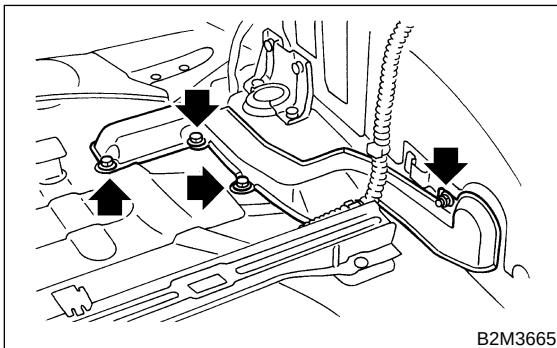


- (A) Delivery hose
- (B) Return hose

23) Connect evaporation pipe (A) and hold it with quick connector. <Ref. to FU(H6)-78, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>



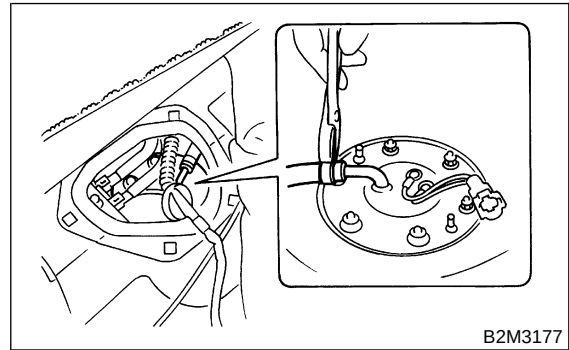
24) Install pipe protector.



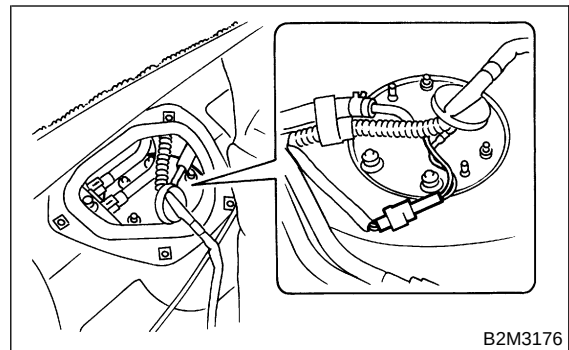
25) Install trunk room trim. (Sedan model)

26) Install luggage room trim. (Wagon model)

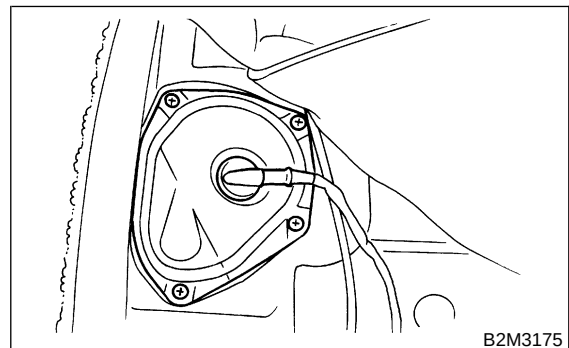
27) Connect fuel jet pump hose.



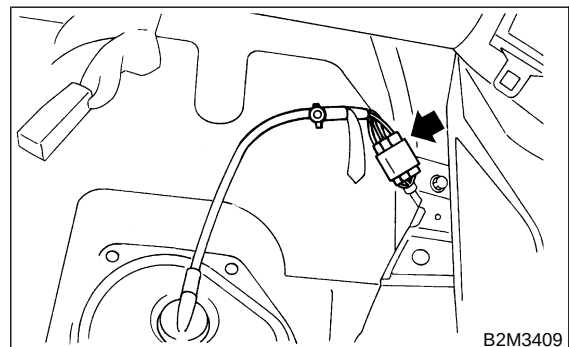
28) Connect connector to fuel sub level sensor.



29) Install sub service hole cover.



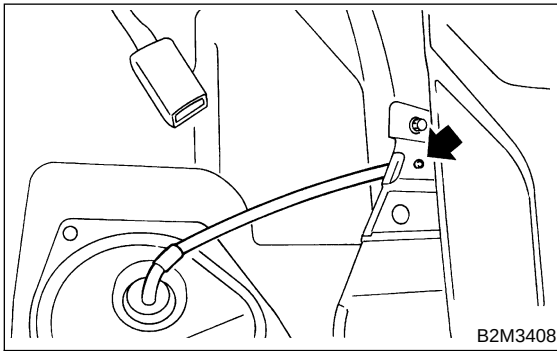
30) Connect connectors to fuel tank cord and plug service hole with grommet.



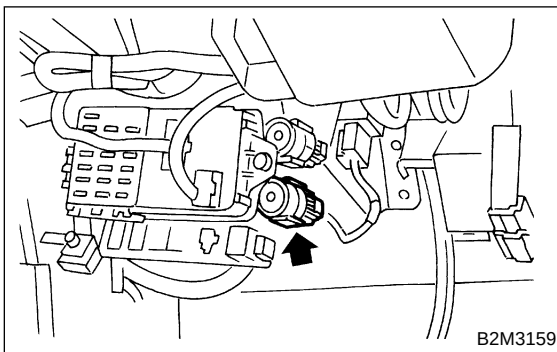
FUEL TANK

Fuel Injection (Fuel Systems)

- 31) Install holder clip which secures fuel tank cord on bracket.



- 32) Set rear seat and floor mat.
33) Connect connector to fuel pump relay.



- 34) Bleed air from brake system. (Rear drum brake model only) <Ref. to BR-53, BRAKE LINE, PROCEDURE, Air Bleeding.>
35) Adjust parking brake lever stroke. <Ref. to PB-11, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>
36) Check wheel alignment and adjust if necessary. <Ref. to FS-6, INSPECTION, Wheel Alignment.>

C: INSPECTION S145053A10

- 1) Make sure there are no cracks, holes, or other damage on the fuel tank.
2) Make sure that the fuel hoses and fuel pipes are not cracked and that connections are tight.

22. Fuel Filler Pipe

S145022

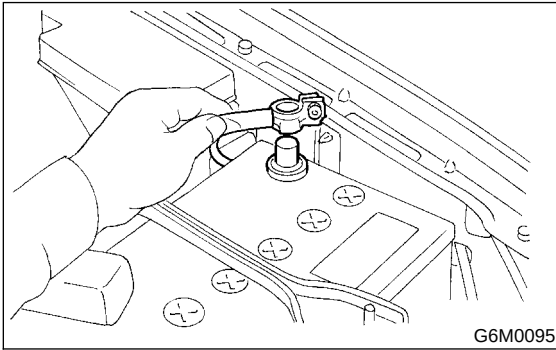
A: REMOVAL

S145022A18

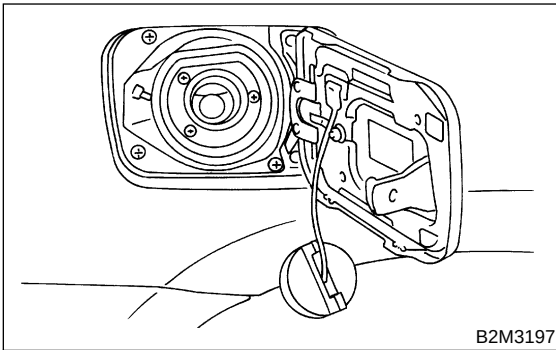
WARNING:

- Place "NO FIRE" signs near the working area.
- Be careful not to spill fuel on the floor.

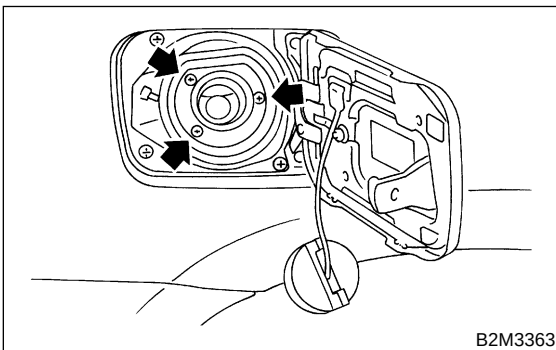
- 1) Set the vehicle on the lift.
- 2) Disconnect battery ground cable.



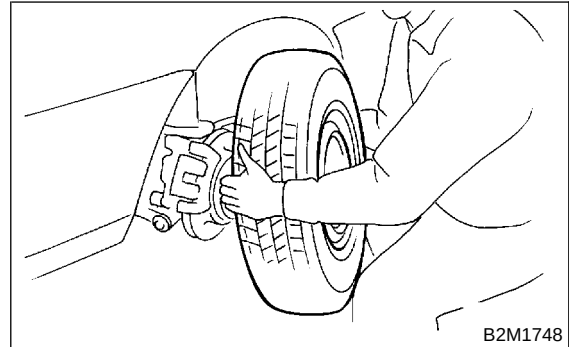
- 3) Open fuel filler flap lid and remove filler cap.



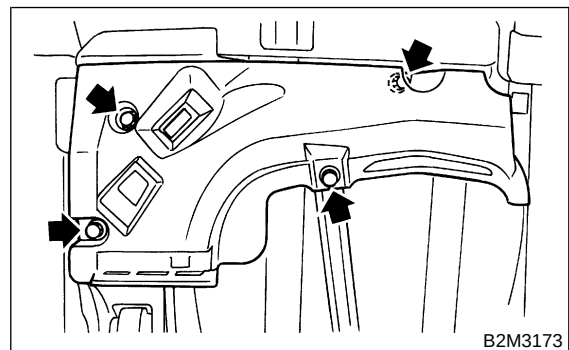
- 4) Remove screws holding packing in place.



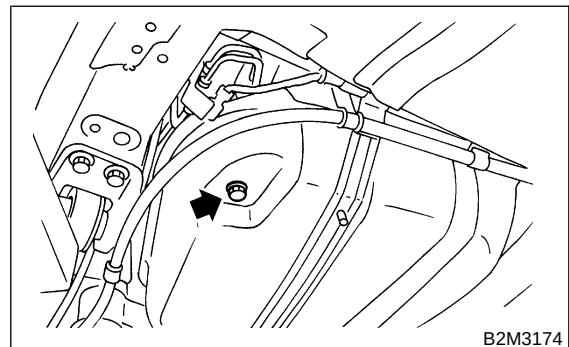
- 5) Lift-up the vehicle.
- 6) Remove rear wheel nuts.
- 7) Remove rear wheel.



- 8) Remove front right side fuel tank cover.



- 9) Drain fuel from fuel tank. Set a container under the vehicle and remove drain plug from fuel tank.



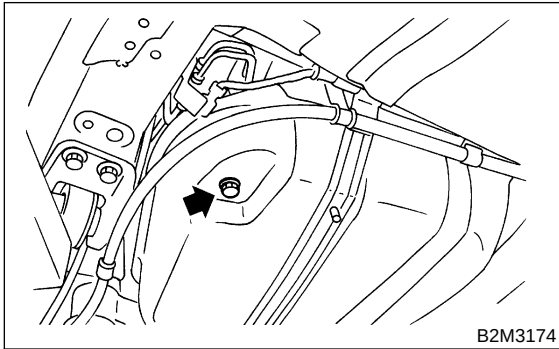
FUEL FILLER PIPE

Fuel Injection (Fuel Systems)

10) Tighten fuel drain plug and then install front right side tank cover.

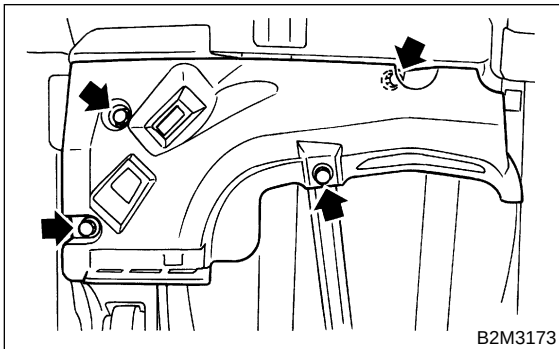
Tightening torque:

26 N·m (2.65 kgf-m, 19.2 ft-lb)



Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



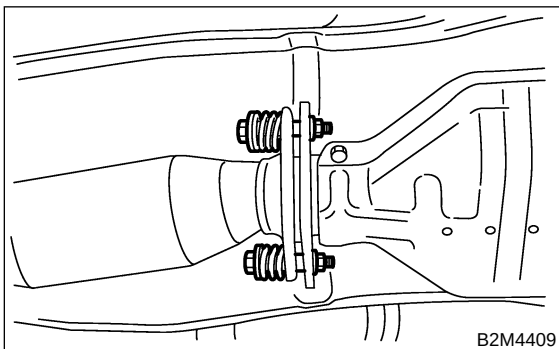
11) Remove rear exhaust pipe and muffler.

NOTE:

To facilitate removal, apply a coat of SUBARU CRC to matching area of rubber cushions in advance.

SUBARU CRC (Part No. 004301003)

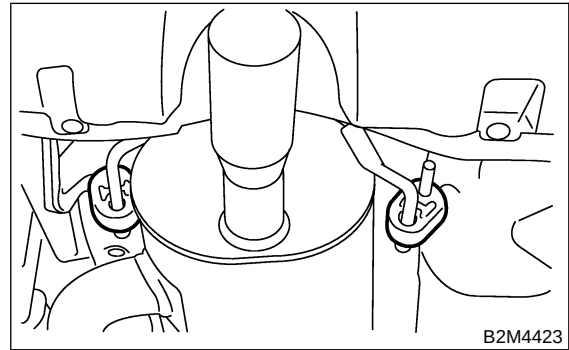
(1) Separate rear exhaust pipe from center exhaust pipe.



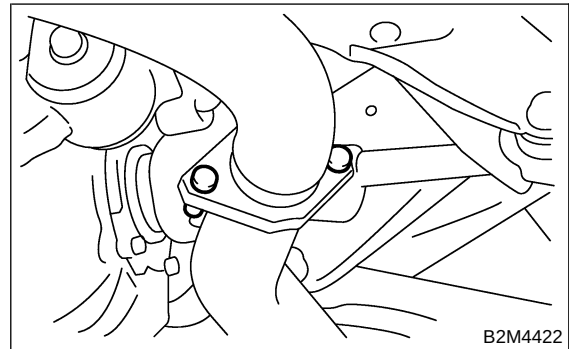
(2) Remove left and right rubber cushions.

CAUTION:

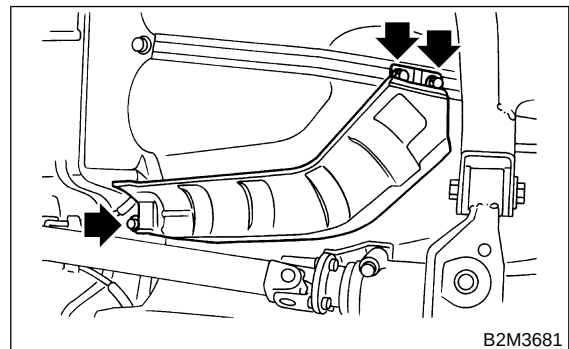
Be careful not to pull down muffler.



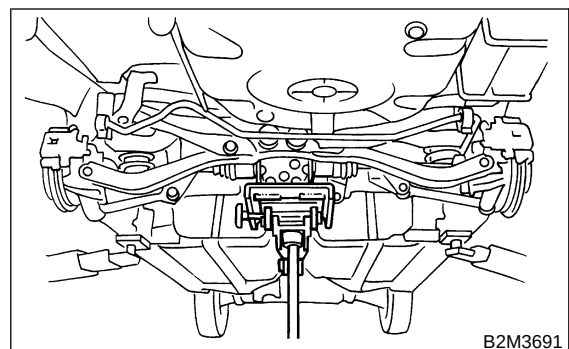
(3) Remove front rubber cushion and detach muffler assembly.



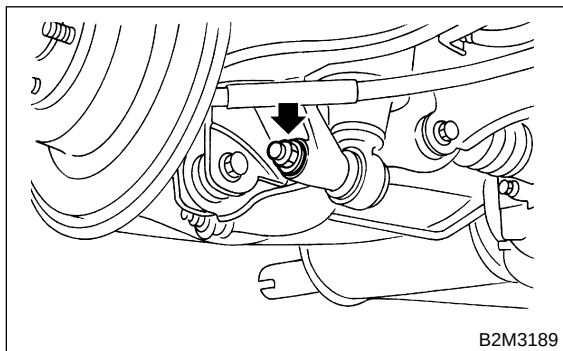
12) Remove heat sealed cover.



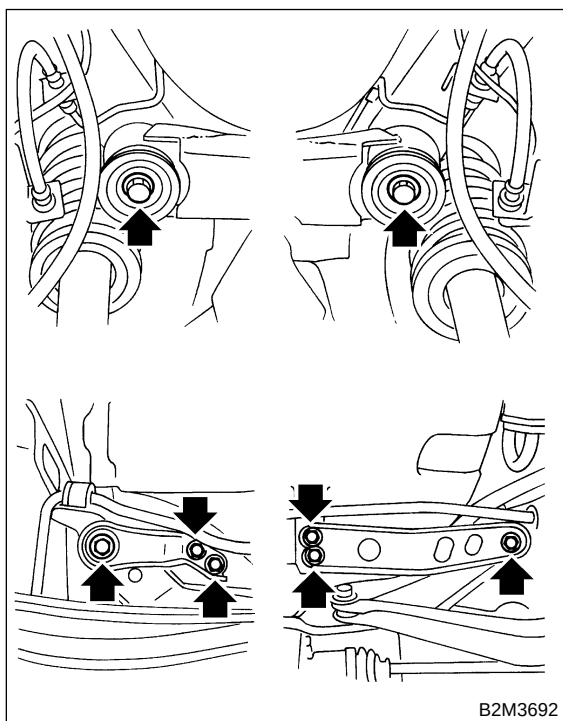
13) Place transmission jack under sub frame.



- 14) Remove bolt which holds rear shock absorber to rear suspension arm.



- 15) Remove bolts which hold rear sub frame on body.

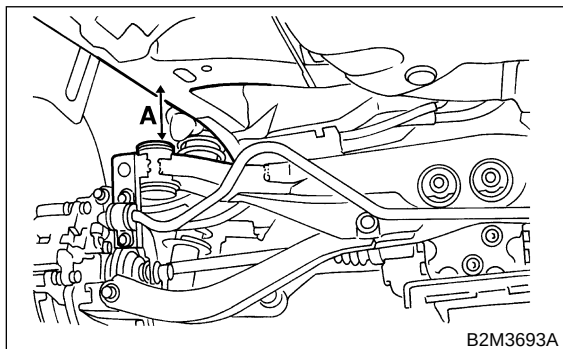


- 16) Lower the rear sub frame.

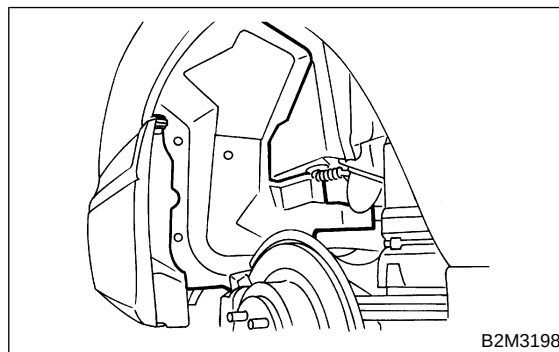
CAUTION:

Be sure to lower sub frame slowly.

A = 150 mm (5.91 in)

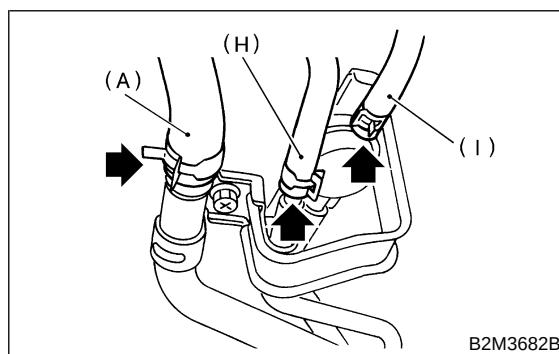


- 17) Remove fuel filler pipe protector.

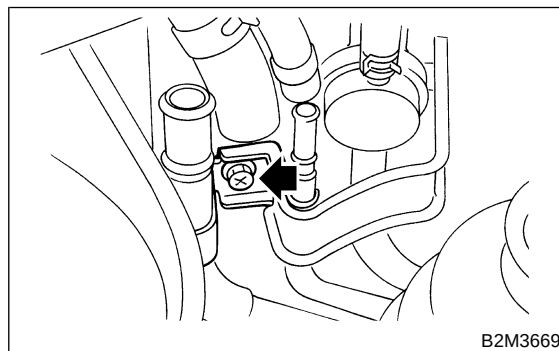


- 18) Disconnect air vent hose (A) and evaporation hose (H) from evaporation pipe assembly.

- 19) Disconnect evaporation hose (I) from pressure control solenoid valve.



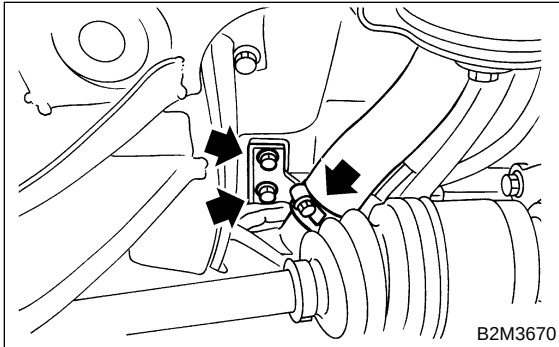
- 20) Remove bolt which holds evaporation pipe assembly on body.



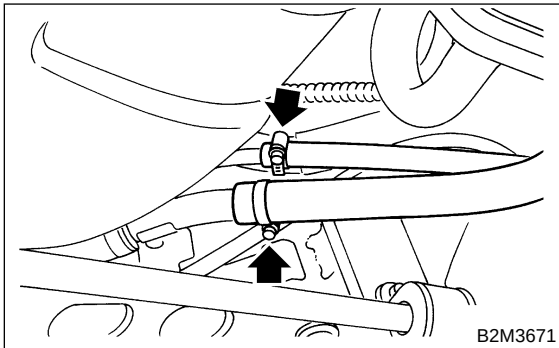
FUEL FILLER PIPE

Fuel Injection (Fuel Systems)

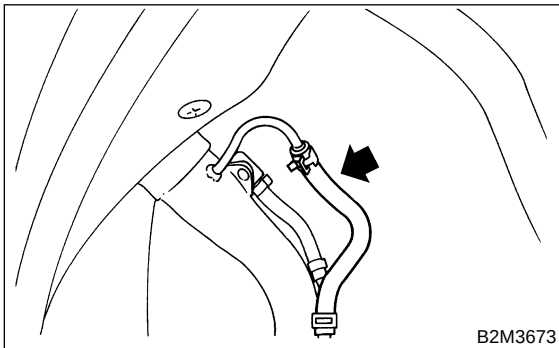
- 21) Disconnect fuel filler hose.
- 22) Remove bolt which holds fuel pressure sensor on fuel filler pipe and remove bolt which holds fuel filler pipe on body.



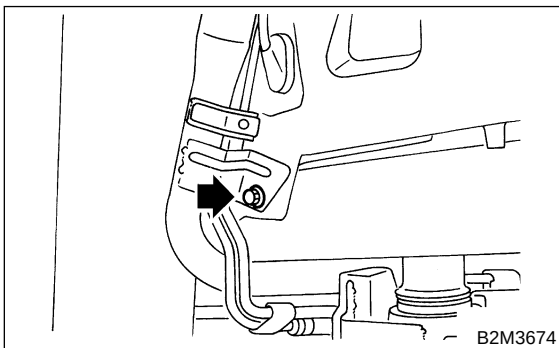
- 23) Disconnect canister hose from evaporation pipe assembly.



- 24) Disconnect evaporation hose (O) from fuel filler pipe.



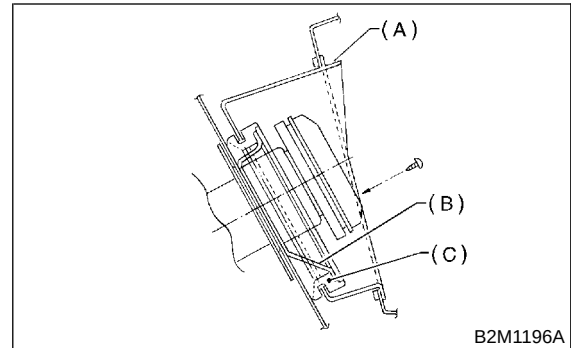
- 25) Remove bolt which holds fuel filler pipe to body.



- 26) Remove fuel filler pipe to under side of the vehicle.

B: INSTALLATION SI45022A11

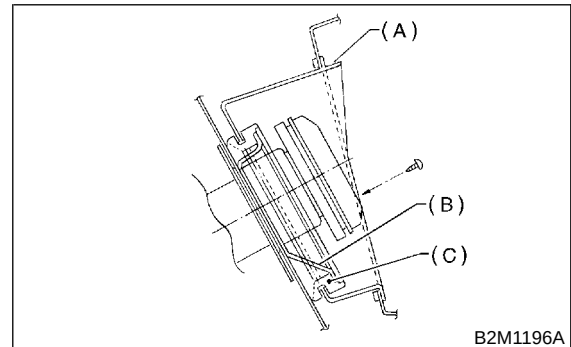
- 1) Hold fuel filler flap open.
- 2) Set fuel saucer (A) with rubber packing (C) and insert fuel filler pipe into hole from the inner side of apron.



- 3) Align holes in fuel filler pipe neck and set cup (B), and tighten screws.

NOTE:

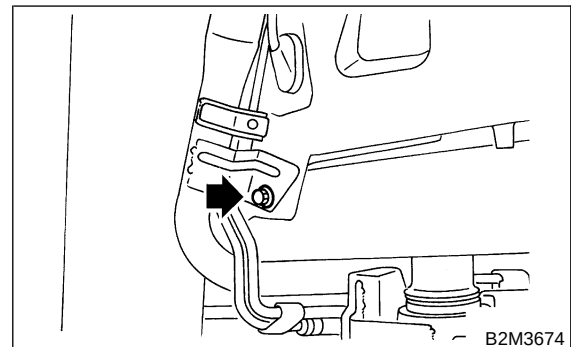
If edges of rubber packing are folded toward the inside, straighten it with a screwdriver.



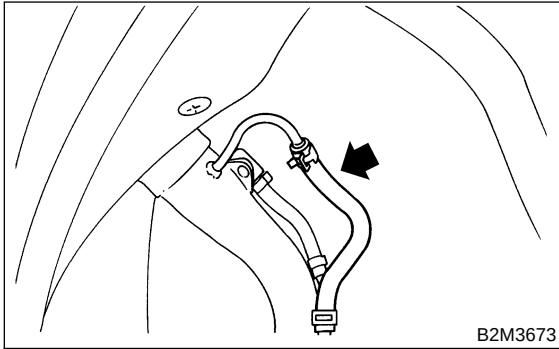
- 4) Tighten bolt which holds fuel filler pipe on body.

Tightening torque:

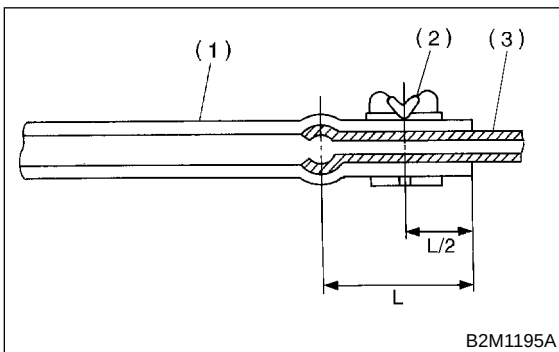
7.5 N·m (0.75 kgf·m, 5.4 ft·lb)



5) Insert evaporation hose (O) approximately 25 to 30 mm (0.98 to 1.18 in) into the lower end of evaporation pipe and hold clip.

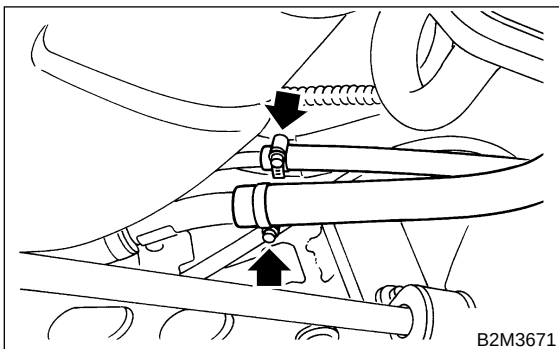


$L = 27.5 \pm 2.5 \text{ mm (1.083} \pm 0.098 \text{ in)}$

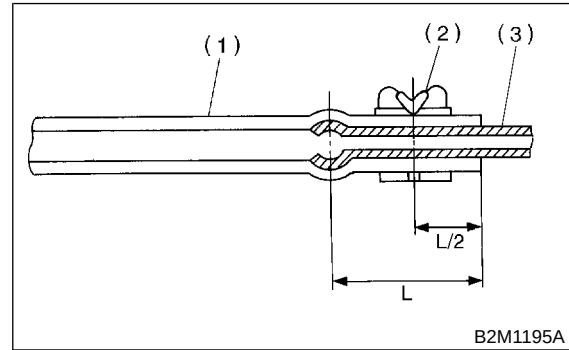


- (1) Hose
- (2) Clip
- (3) Pipe

6) Insert canister hoses approximately 25 to 30 mm (0.98 to 1.18 in) into the lower end of evaporation pipe assembly and tighten clamp.



$L = 27.5 \pm 2.5 \text{ mm (1.083} \pm 0.098 \text{ in)}$

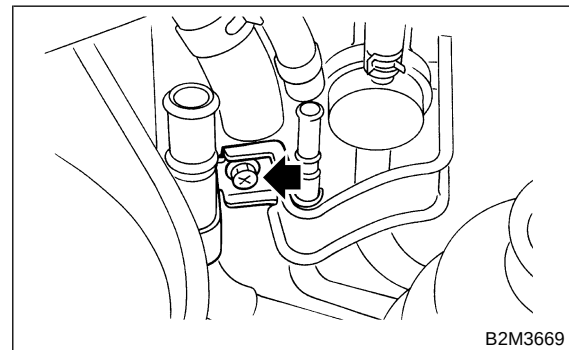


- (1) Hose
- (2) Clip
- (3) Pipe

7) Tighten bolt which holds evaporation pipe assembly on body.

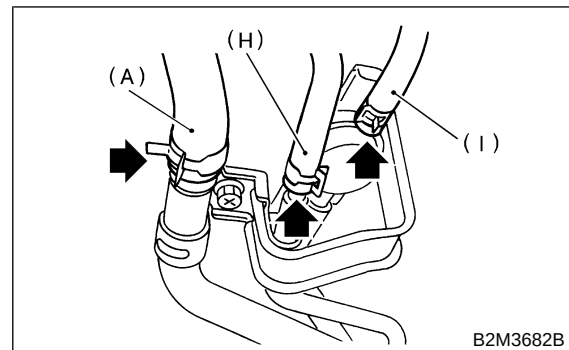
Tightening torque:

7.5 N·m (0.75 kgf-m, 5.4 ft-lb)



8) Insert air vent hose (A), evaporation hose (H) approximately 25 to 30 mm (0.98 to 1.18 in) into the lower end of evaporation pipe assembly and hold clip.

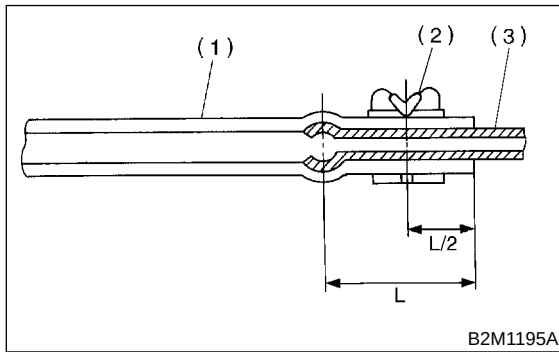
9) Insert evaporation hose (I) to pressure control solenoid valve and hold clip.



FUEL FILLER PIPE

Fuel Injection (Fuel Systems)

$L = 27.5 \pm 2.5 \text{ mm (1.083 \pm 0.098 in)}$



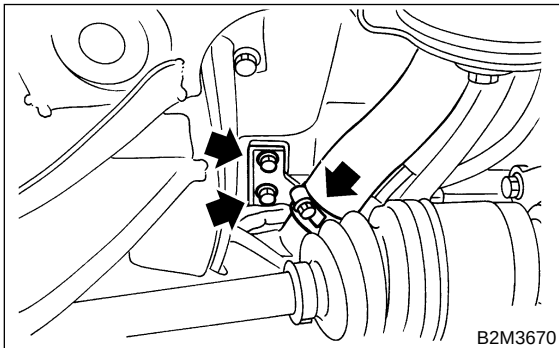
- (1) Hose
- (2) Clip
- (3) Pipe

10) Tighten bolt which holds fuel filler pipe on body and tighten bolt which holds fuel pressure sensor on fuel filler pipe.

Tightening torque:

$7.5 \text{ N}\cdot\text{m (0.75 kgf}\cdot\text{m, 5.4 ft}\cdot\text{lb)}$

11) Insert fuel filler hose approximately 35 to 40 mm (1.38 to 1.57 in) over the lower end of fuel filler pipe and tighten clamp.

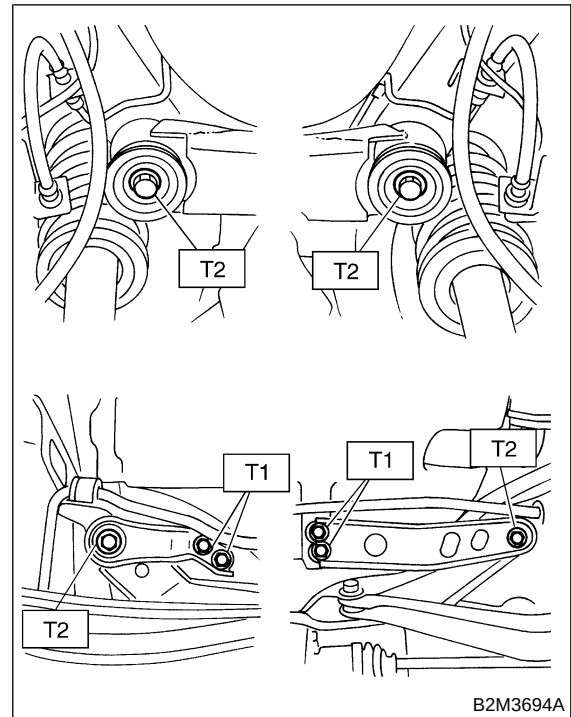


12) Jack-up the rear sub frame and tighten bolts which hold rear sub frame on body.

Tightening torque:

$T1: 66 \text{ N}\cdot\text{m (6.7 kgf}\cdot\text{m, 48.5 ft}\cdot\text{lb)}$

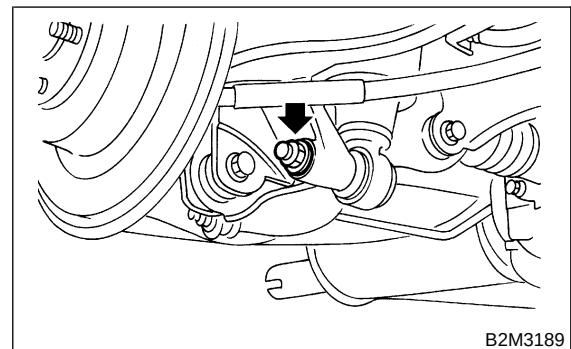
$T2: 172 \text{ N}\cdot\text{m (17.5 kgf}\cdot\text{m, 127 ft}\cdot\text{lb)}$



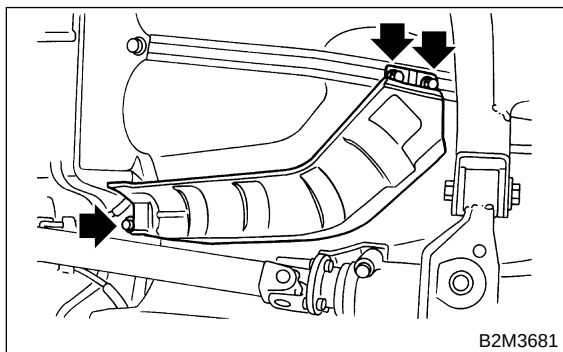
13) Tighten bolt which holds rear shock absorber to rear suspension arm. <Ref. to RS-22 INSTALLATION, Rear Shock Absorber.>

Tightening torque:

$157 \text{ N}\cdot\text{m (16 kgf}\cdot\text{m, 116 ft}\cdot\text{lb)}$



14) Install heat shield cover.



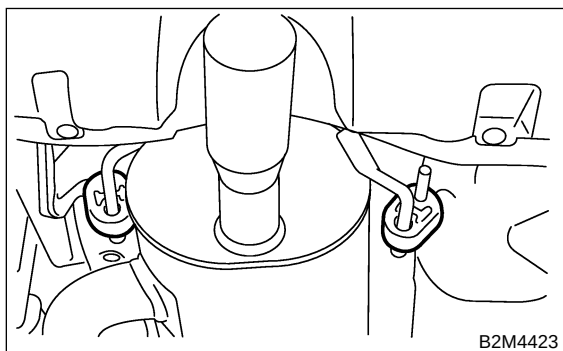
15) Install rear exhaust pipe and muffler.

NOTE:

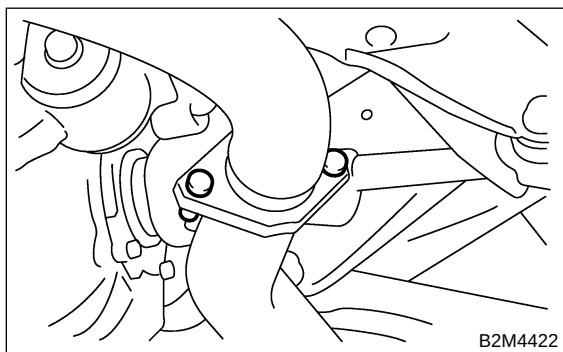
To facilitate the procedure, apply a coat of SUBARU CRC to matching area of rubber cushions in advance.

SUBARU CRC (Part No. 004301003)

(1) Install left and right rubber cushions.



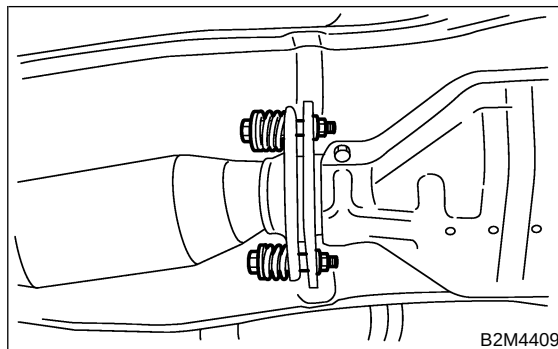
(2) Install front rubber cushion and attach muffler assembly.



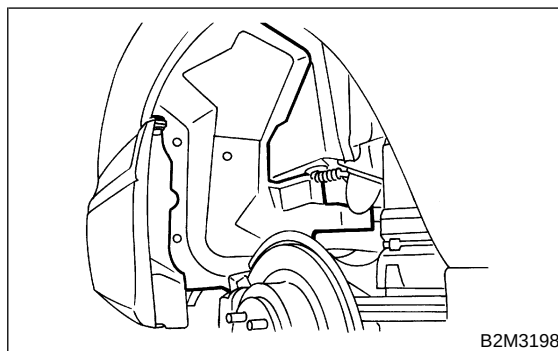
(3) Install rear exhaust pipe to center exhaust pipe.

Tightening torque:

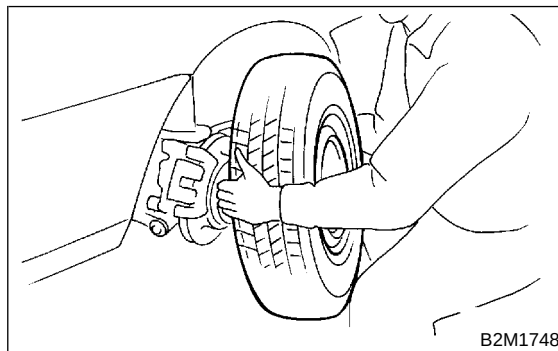
18 N·m (1.8 kgf·m, 13.0 ft·lb)



16) Install fuel filler pipe protector.



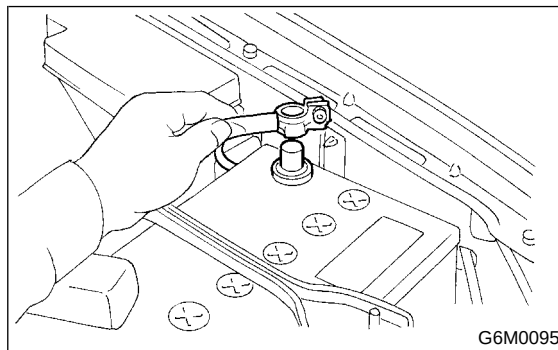
17) Install rear right wheel.



18) Lower the vehicle.

19) Tighten wheel nuts.

20) Connect battery ground terminal.



FUEL FILLER PIPE

Fuel Injection (Fuel Systems)

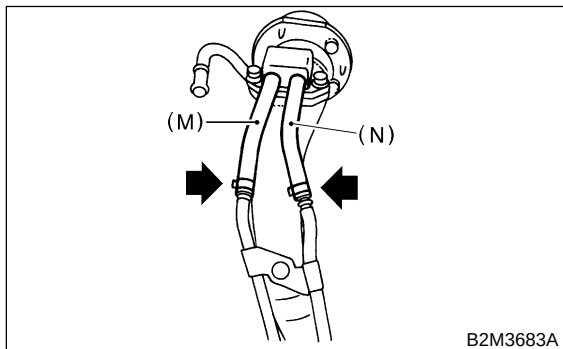
21) Remove fuel filler pipe to under side of the vehicle.

D: ASSEMBLY S145022A02

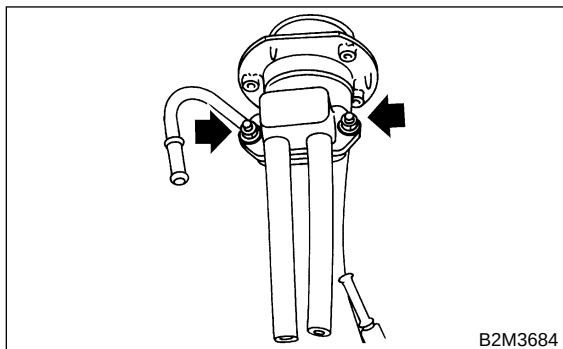
Assemble in the reverse order of disassembly.

C: DISASSEMBLY S145022A06

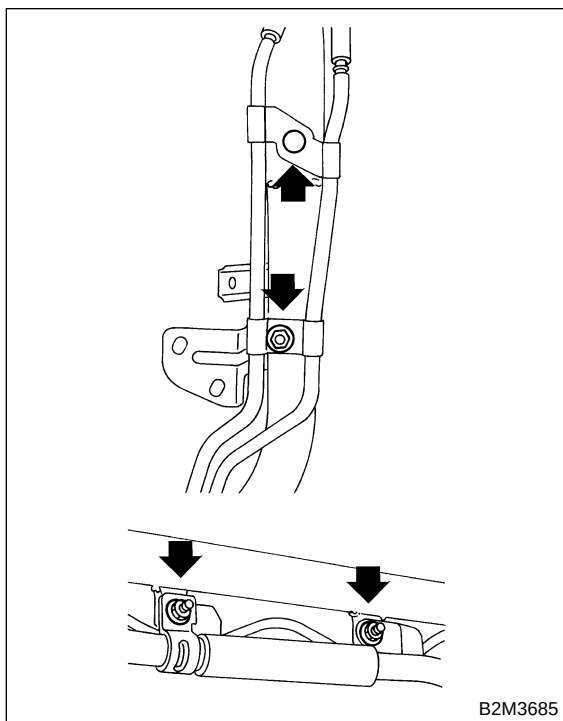
1) Disconnect evaporation hose (M) and (N) from evaporation pipe assembly.



2) Remove shut valve from fuel filler pipe.



3) Remove nut which holds evaporation pipe assembly on fuel filler pipe.



23. Fuel Pump S145025

A: REMOVAL S145025A18

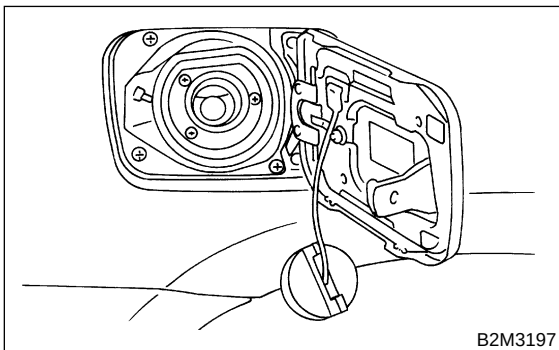
WARNING:

- Place “NO FIRE” signs near the working area.
- Be careful not to spill fuel on the floor.

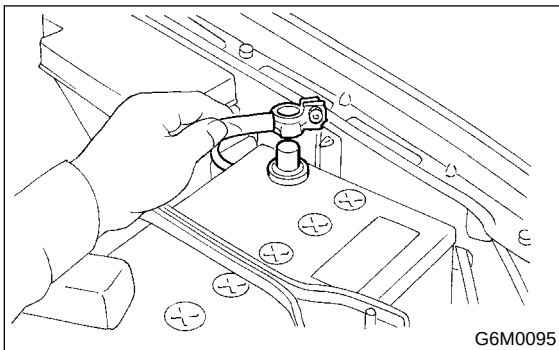
NOTE:

Fuel pump assembly consists of fuel pump and fuel level sensor.

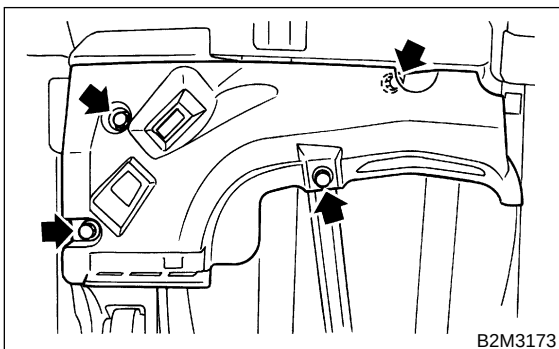
- 1) Release fuel pressure. <Ref. to FU(H6)-49 RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
- 2) Open fuel filler flap lid and remove fuel filler cap.



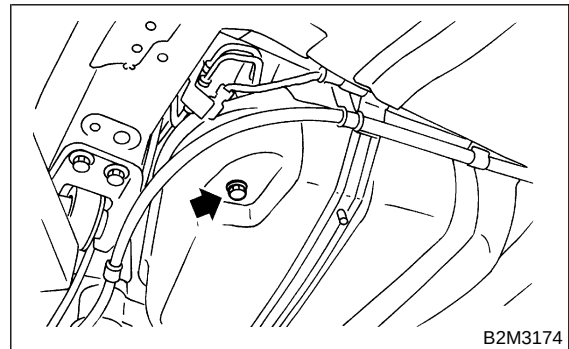
- 3) Disconnect battery ground cable.



- 4) Lift-up the vehicle.
- 5) Remove front side fuel tank cover.



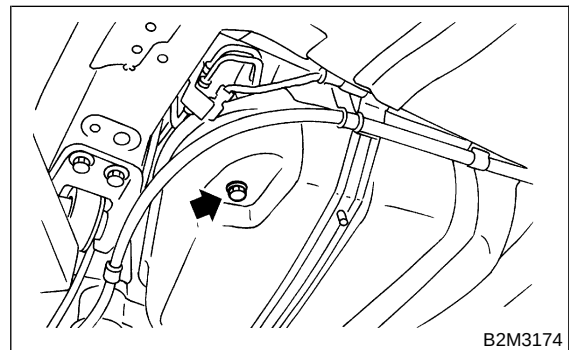
- 6) Drain fuel from fuel tank. Set a container under the vehicle and remove drain plug from fuel tank.



- 7) Tighten fuel drain plug and install front right side fuel tank cover.

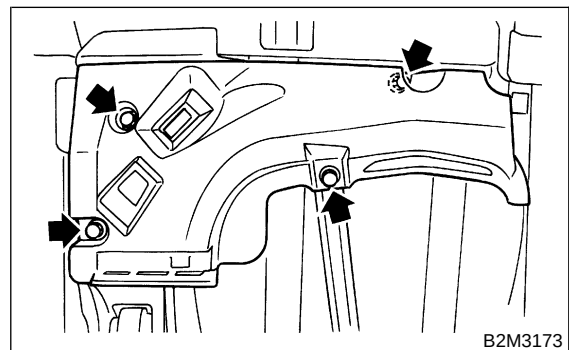
Tightening torque:

26 N·m (2.65 kgf-m, 19.2 ft-lb)



Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

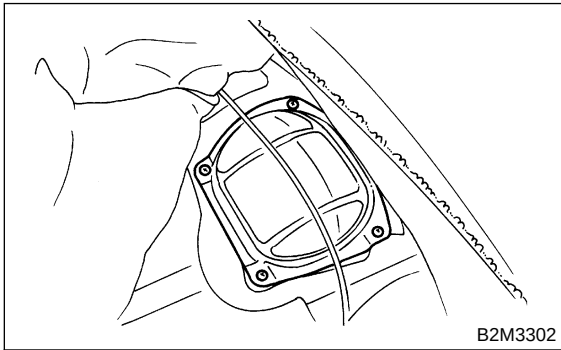


- 8) Raise rear seat and turn floor mat up.

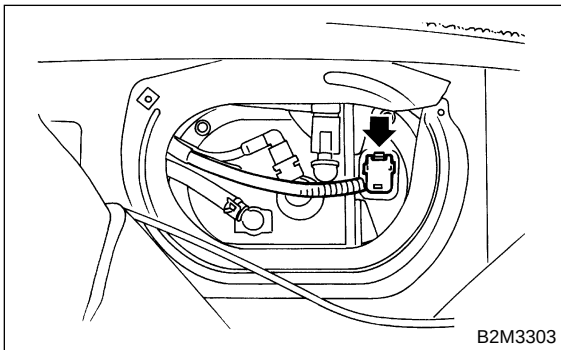
FUEL PUMP

Fuel Injection (Fuel Systems)

- 9) Remove access hole lid.

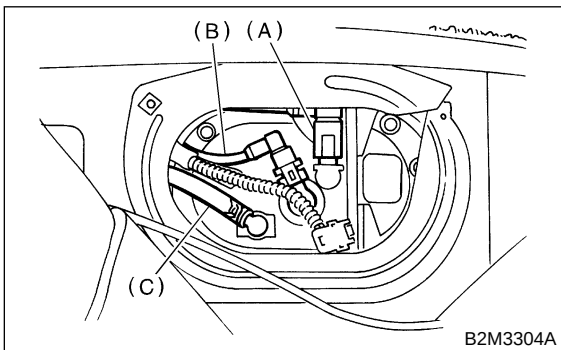


- 10) Disconnect connector from fuel pump.

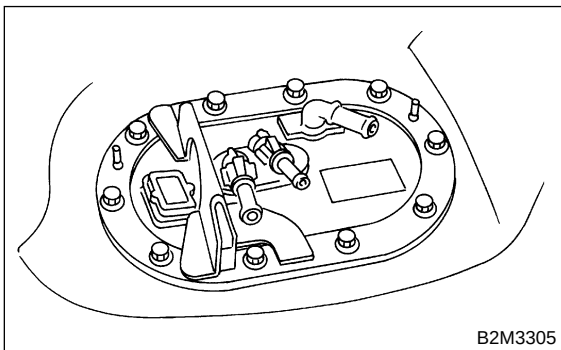


- 11) Move clips and then disconnect jet pump hose (C).

- 12) Disconnect quick connector and then disconnect fuel delivery hose (A) and return hose (B).
<Ref. to FU(H6)-77 REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



- 13) Remove nuts which install fuel pump assembly onto fuel tank.



- 14) Take off fuel pump assembly from fuel tank.

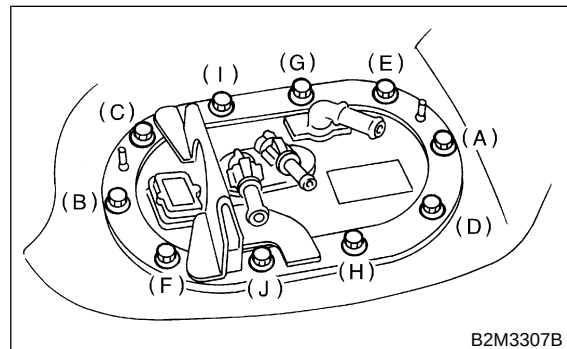
B: INSTALLATION S145025A11

Install 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:

5.9 N·m (0.6 kgf-m, 4.3 ft-lb)

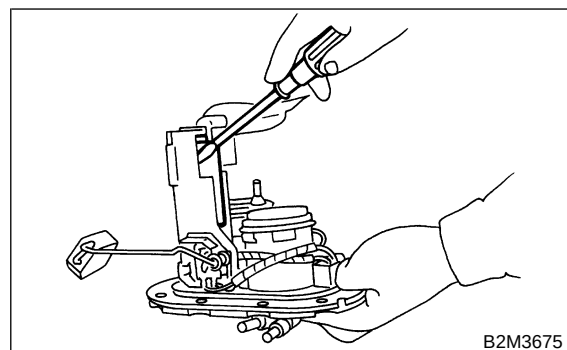


C: DISASSEMBLY S145025A06

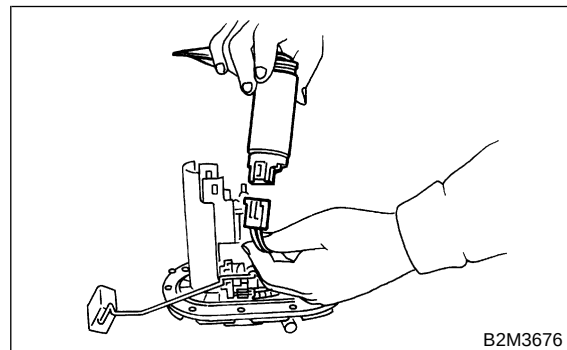
- 1) Remove fuel pump and pump holder.

NOTE:

When disassembling pump holder, be careful as it is installed with two pawls.



- 2) Disconnect connector from fuel pump.



D: ASSEMBLY S145025A02

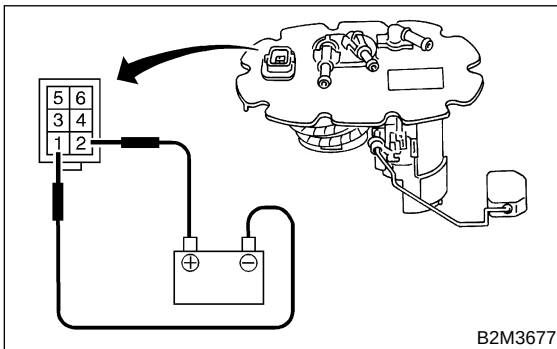
Assemble in the reverse order of disassembly.

E: INSPECTION S145025A10

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 no-load condition.



24. Fuel Level Sensor

S145026

A: REMOVAL

S145026A18

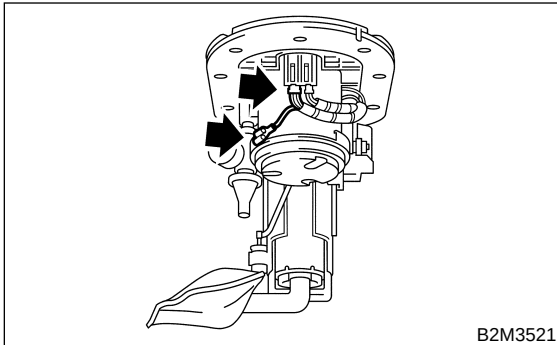
WARNING:

- Place “NO FIRE” signs near the working area.
- Be careful not to spill fuel on the floor.

NOTE:

Fuel level sensor is built in fuel pump assembly.

- 1) Remove fuel pump assembly. <Ref. to FU(H6)-69, REMOVAL, Fuel Pump.>
- 2) Disconnect connector from fuel pump bracket.

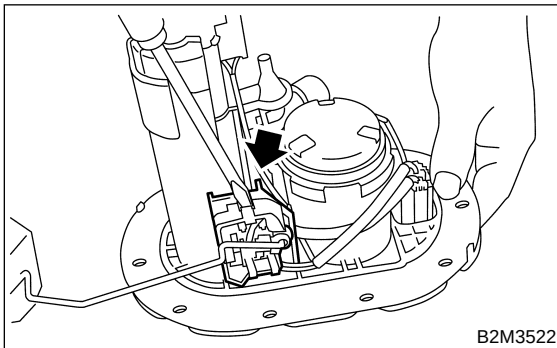


B2M3521

- 3) Pushing the pawls with a screwdriver, remove fuel meter unit by pulling it downwards.

NOTE:

Replace fuel filter pawls with new ones as they might break when removed.



B2M3522

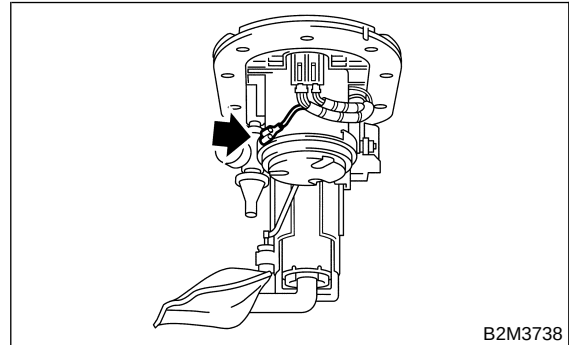
B: INSTALLATION

S145026A11

Install in the reverse order of removal.

WARNING:

- Ground cable must be connected.
- Spark may occur and ignite if fuel is nearby.



B2M3738

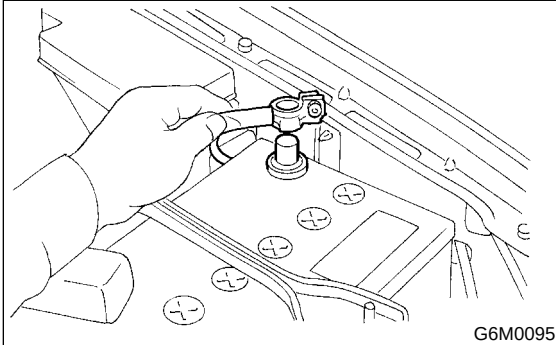
25. Fuel Sub Level Sensor S145023

A: REMOVAL S145023A18

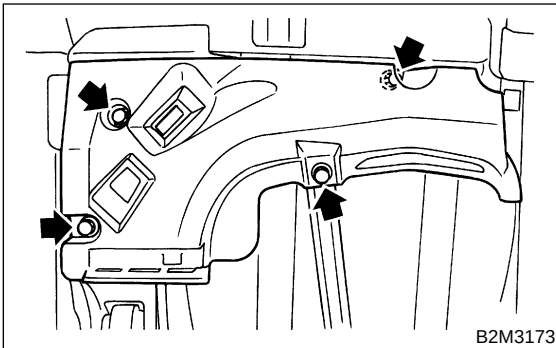
WARNING:

- Place "NO FIRE" signs near the working area.
- Be careful not to spill fuel on the floor.

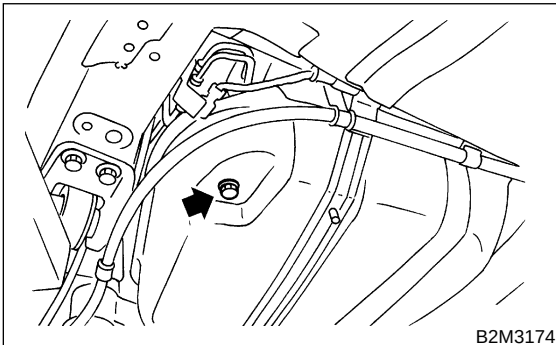
- 1) Disconnect battery ground cable.



- 2) Lift-up the vehicle.
- 3) Remove front side fuel tank cover.



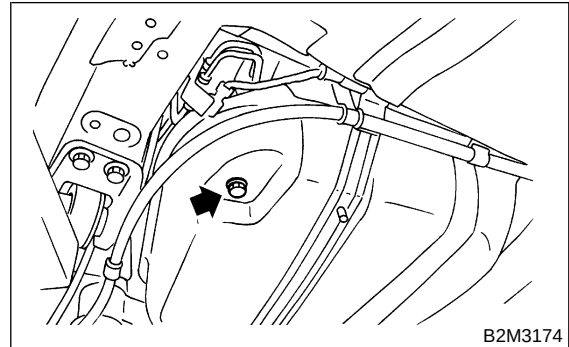
- 4) Drain fuel from fuel tank. Set a container under the vehicle and remove drain plug from fuel tank.



- 5) Tighten fuel drain plug and install front right side fuel tank cover.

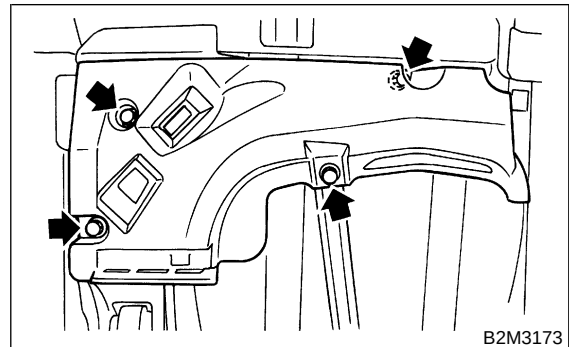
Tightening torque:

26 N·m (2.65 kgf-m, 19.2 ft-lb)

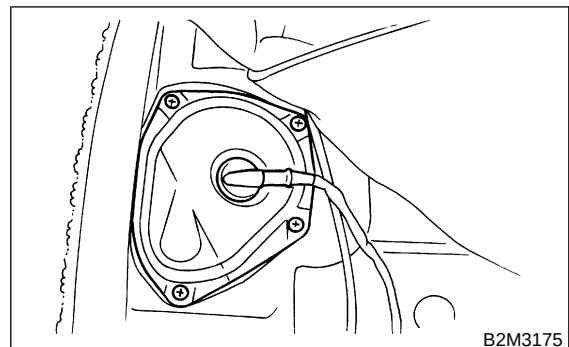


Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



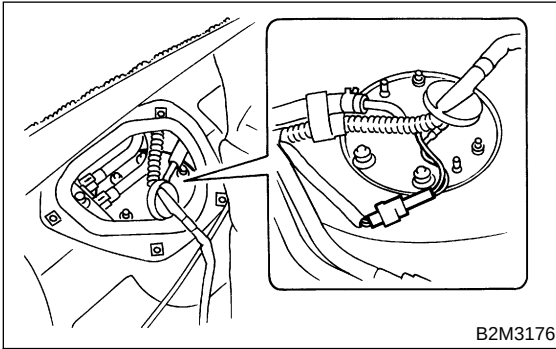
- 6) Raise rear seat and turn floor mat up. (Wagon model)
- 7) Remove rear seat. (Sedan model)
- 8) Remove service hole cover.



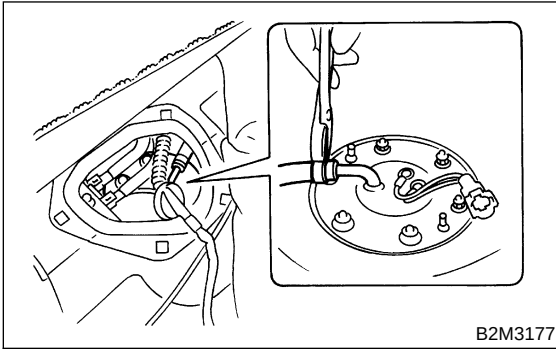
FUEL SUB LEVEL SENSOR

Fuel Injection (Fuel Systems)

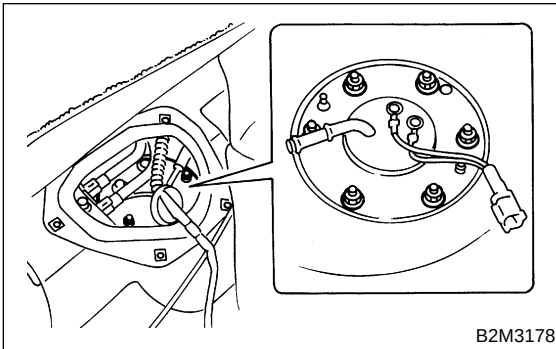
- 9) Disconnect connector from fuel sub level sensor.



- 10) Disconnect fuel jet pump hose.



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



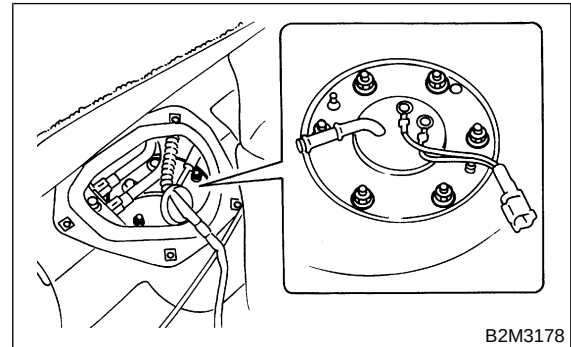
- 12) Remove fuel sub level sensor.

B: INSTALLATION SI45023A11

Install in the reverse order of removal.

Tightening torque:

4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



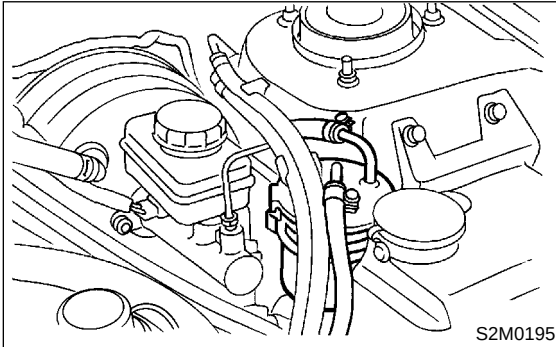
26. Fuel Filter S145027

A: REMOVAL S145027A18

WARNING:

- Place “NO FIRE” signs near the working area.
- Be careful not to spill fuel on the floor.

- 1) Release fuel pressure. <Ref. to FU(H6)-49, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
- 2) Disconnect fuel delivery hoses from fuel filter.



- 3) Remove filter from holder.

B: INSTALLATION S145027A11

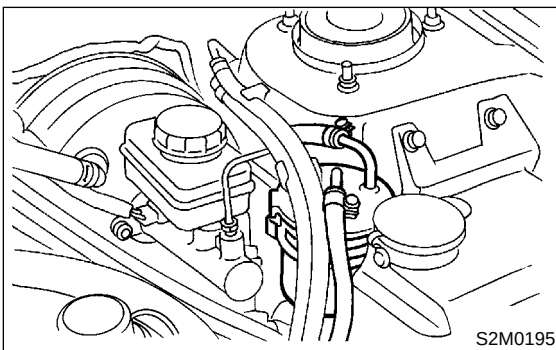
CAUTION:

- 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) Install in the reverse order of removal.
- 2) Tighten hose clamp screws.

Tightening torque:

1.0 N·m (0.1 kgf-m, 0.7 ft-lb)



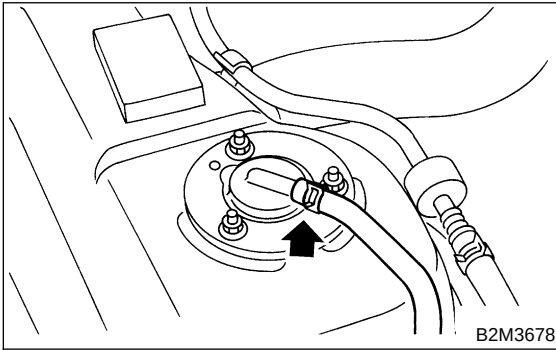
C: INSPECTION S145027A10

- 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.

27. Fuel Cut Valve S145021

A: REMOVAL S145021A18

- 1) Remove fuel tank. <Ref. to FU(H6)-52, REMOVAL, Fuel Tank.>
- 2) Move clip and disconnect evaporation hose from fuel cut valve.



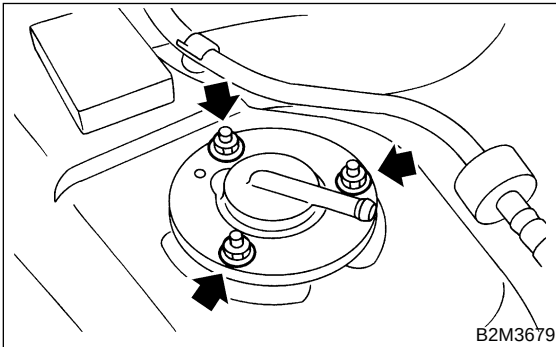
- 3) Remove bolts which install fuel cut valve.

B: INSTALLATION S145021A11

Install in the reverse order of removal.

Tightening torque:

4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



28. Fuel Delivery, Return and Evaporation Lines

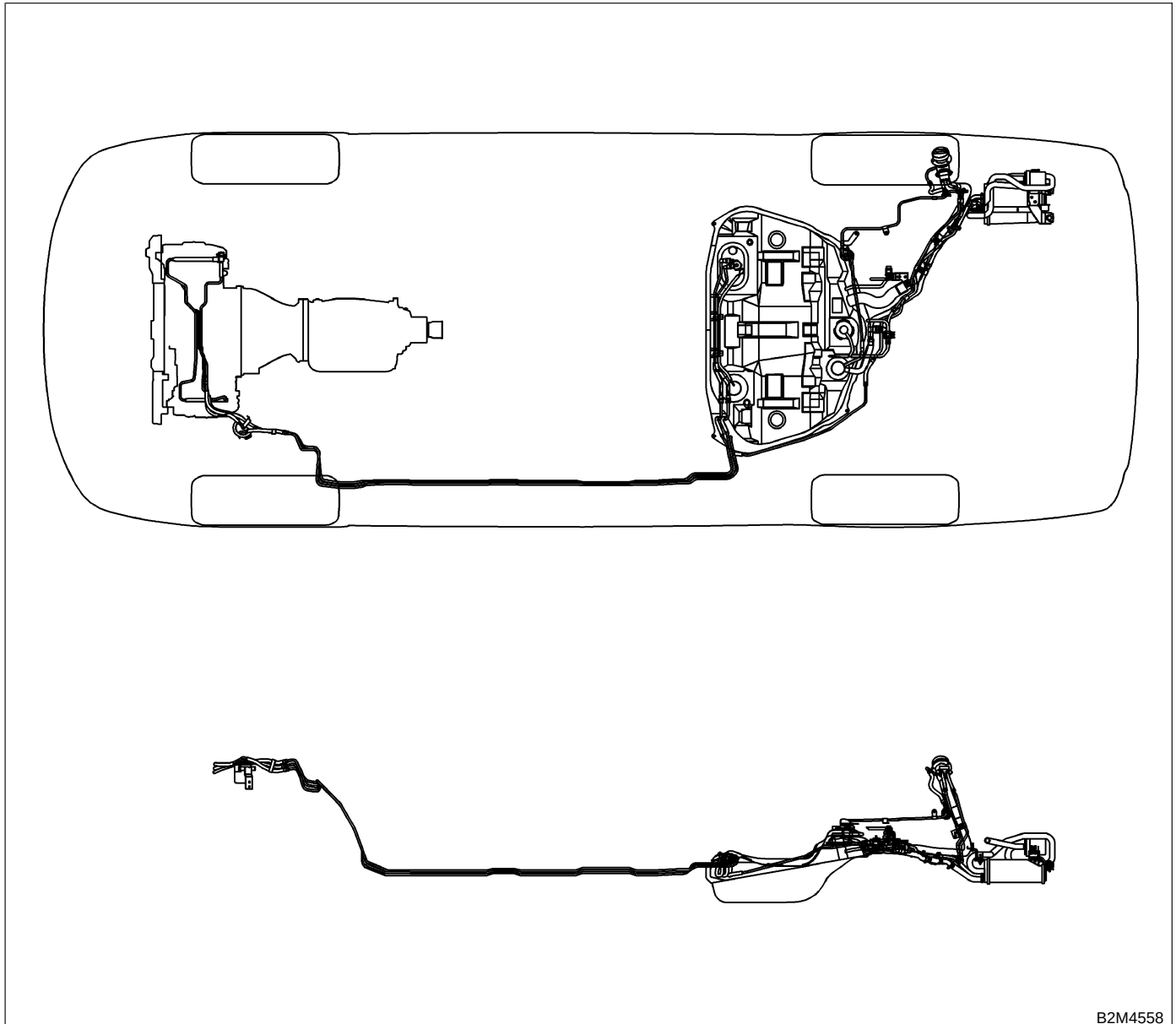
S145019

A: REMOVAL

S145019A18

- 1) Set vehicle on the lift.
- 2) Release fuel pressure. <Ref. to FU(H6)-49, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
- 3) Open fuel filler flap lid and remove fuel filler cap.

- 4) Remove fuel tank. <Ref. to FU(H6)-52, REMOVAL, Fuel Tank.>
- 5) Remove fuel filler pipe. <Ref. to FU(H6)-61, REMOVAL, Fuel Filler Pipe.>
- 6) Remove floor mat. <Ref. to EI-53, REMOVAL, Floor Mat.>
- 7) Remove fuel delivery pipes and hoses, fuel return pipes and hoses, evaporation pipes and hoses.

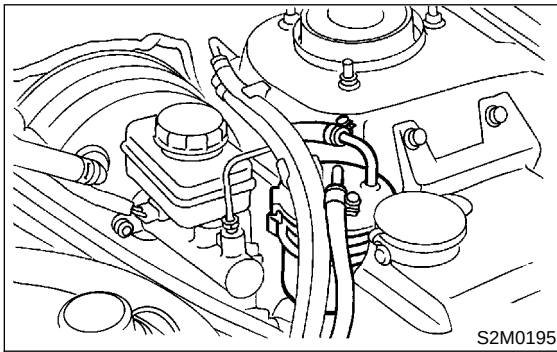


B2M4558

FUEL DELIVERY, RETURN AND EVAPORATION LINES

Fuel Injection (Fuel Systems)

8) In engine compartment, detach fuel delivery hoses, return hoses and evaporation hose.

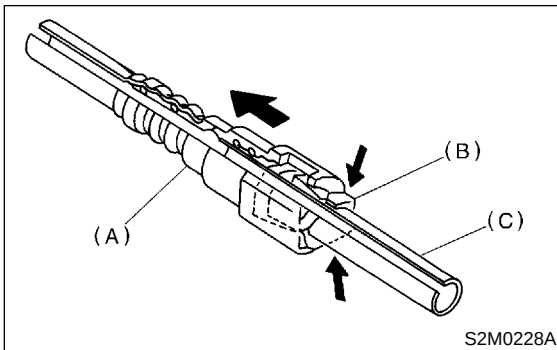


9) Separate quick connector on fuel delivery, return line and evaporation line.

- (1) Clean pipe and connector, if they are covered with dust.
- (2) Hold connector (A) and push retainer (B) down.
- (3) Pull out connector (A) from retainer (B).

CAUTION:

Replace retainer with new ones.



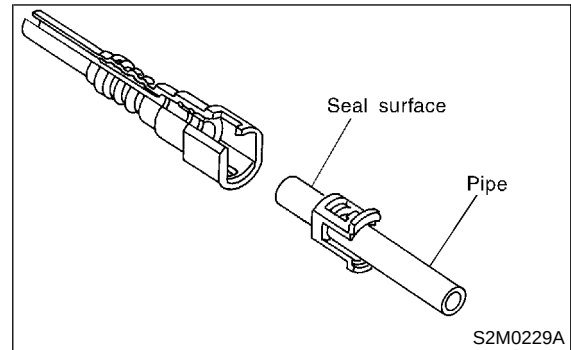
- (A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION S145019A11

1) Connect quick connector on fuel delivery and return line.

CAUTION:

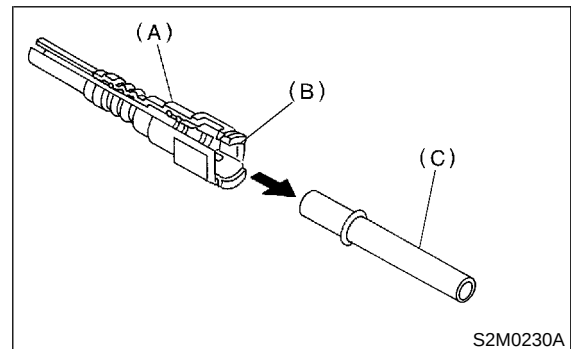
- Always use a new retainer.
- Make sure that the connected portion is not damaged or has dust. If necessary, clean seal surface of pipe.



- (1) Set new retainer (B) to connector (A).
- (2) Push pipe into connector completely.

NOTE:

At this time, clicking sound can be heard two times.



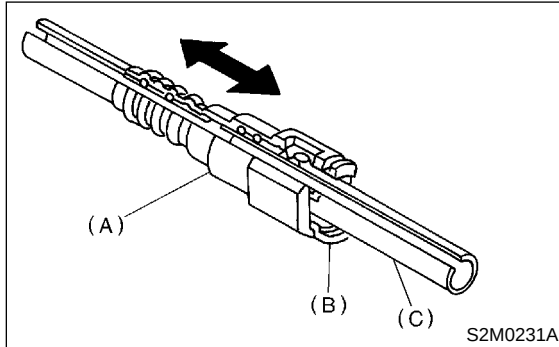
- (A) Connector
(B) Retainer
(C) Pipe

FUEL DELIVERY, RETURN AND EVAPORATION LINES

Fuel Injection (Fuel Systems)

CAUTION:

- Pull the connector to ensure it is connected securely.
- Ensure the two retainer pawls are engaged in their mating positions in the connector.
- Be sure to inspect hoses and their connections for any leakage of fuel.



- (A) Connector
(B) Retainer
(C) Pipe

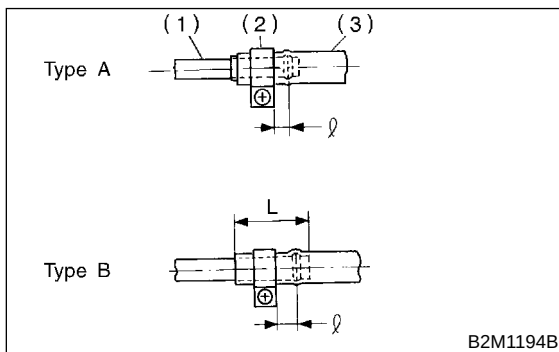
2) Connect fuel delivery hose to pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).

Type A: When fitting length is specified.

Type B: When fitting length is not specified.

$\ell : 2.5 \pm 1.5 \text{ mm } (0.098 \pm 0.059 \text{ in})$

$L: 22.5 \pm 2.5 \text{ mm } (0.886 \pm 0.098 \text{ in})$



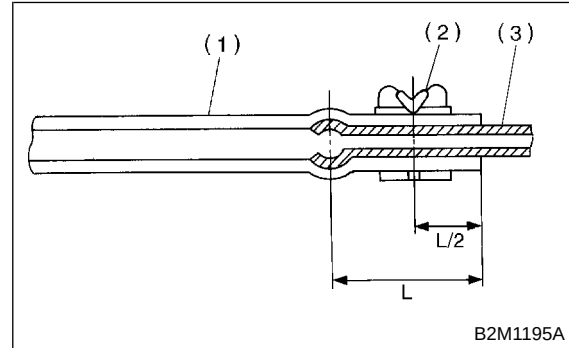
- (1) Fitting
(2) Clamp
(3) Hose

3) Connect evaporation hose to pipe by approx. 15 mm (0.59 in) from hose end.

$L = 17.5 \pm 2.5 \text{ mm } (0.689 \pm 0.098 \text{ in})$

CAUTION:

Be sure to inspect hoses and their connections for any leakage of fuel.



- (1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

S145019A10

1) Make sure that there are no cracks on the fuel pipes and fuel hoses.

2) Make sure that the fuel pipe and fuel hose connections are tight.

FUEL SYSTEM TROUBLE IN GENERAL

Fuel Injection (Fuel Systems)

29. Fuel System Trouble in General

S145571

A: INSPECTION

S145571A10

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)		Inoperative fuel pump modulator or circuit.	Replace.
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.

To prevent water condensation.

(1) Top off the fuel tank or drain the fuel completely.

(2) Drain water condensation from the fuel filter.

- Refilling the fuel tank.

Refill the fuel tank while there is still some fuel left in the tank.

- Protecting the fuel system against freezing and water condensation.

(1) 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 cool-

ing 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 below.

(2) 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.

- Observe the instructions, notes, etc., indicated on the label affixed to the anti-freeze solution (water removing agent) container before use.

1. General Description S140001

A: CAUTION S140001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

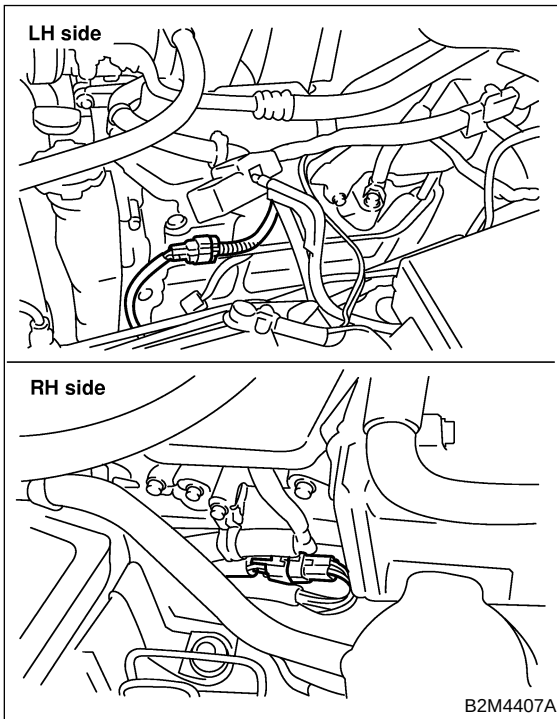
FRONT CATALYTIC CONVERTER

Emission Control (Aux. Emission Control Devices)

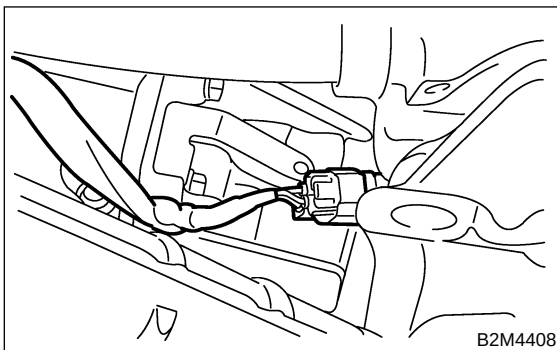
2. Front Catalytic Converter S140017

A: REMOVAL S140017A18

- 1) Set the vehicle on the lift.
- 2) Remove battery.
- 3) Remove air cleaner case and air intake duct.
<Ref. to IN(H6)-5, REMOVAL, Air Cleaner.> and
<Ref. to IN(H6)-7, REMOVAL, Air Intake Duct.>
- 4) Disconnect front oxygen (A/F) sensor connectors.



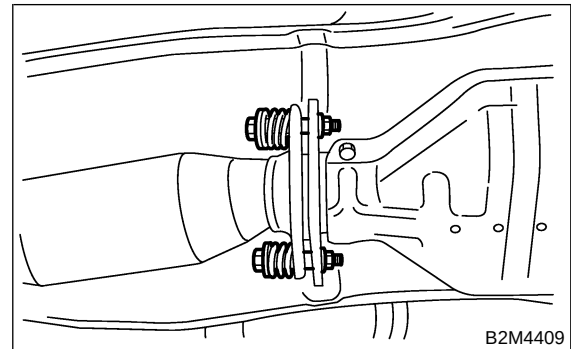
- 5) Lift-up the vehicle.
- 6) Remove under cover.
- 7) Remove front oxygen A/F sensor harness from the clips attached to both right and left cylinder head covers.
- 8) Disconnect connector from rear oxygen sensor connector.



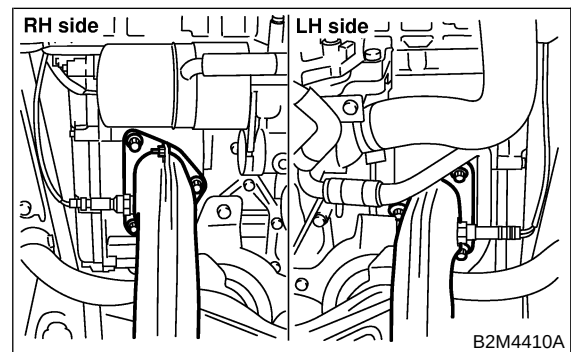
- 9) Separate front exhaust pipe from rear exhaust pipe.

CAUTION:

Be careful, exhaust pipe is hot.



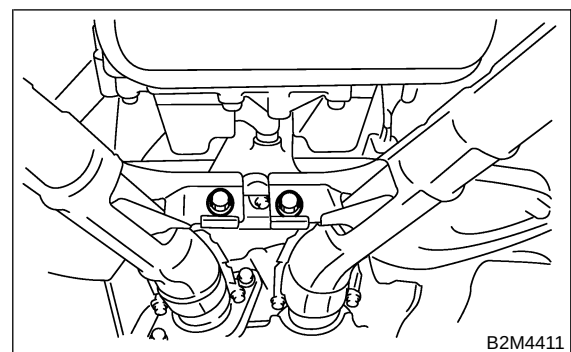
- 10) Remove bolts which hold front exhaust pipe onto cylinder heads.



- 11) Remove front exhaust pipe from hanger bracket.

CAUTION:

Be careful not to pull down front exhaust pipe.



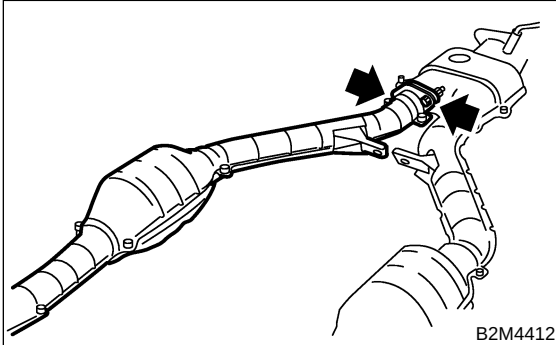
FRONT CATALYTIC CONVERTER

Emission Control (Aux. Emission Control Devices)

12) Separate front catalytic converter (RH) from front exhaust pipe.

NOTE:

The rear catalytic converter is integrated with front catalytic converter. Therefore, the procedure for removing rear catalytic converter is the same as the description above.



B: INSTALLATION

S140017A11

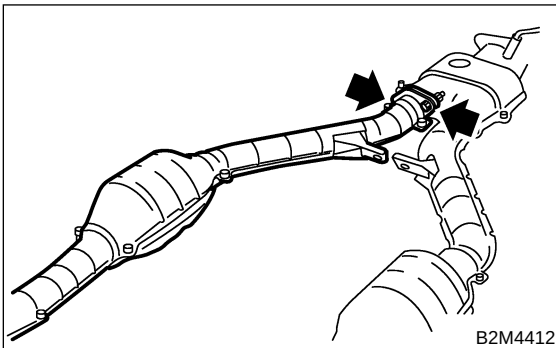
CAUTION:

Replace gaskets with new ones.

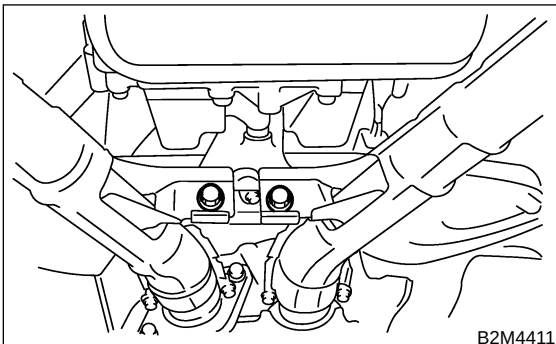
1) Install front catalytic converter (RH) to front exhaust pipe.

Tightening torque:

30 N·m (3.1 kgf-m, 22.4 ft-lb)



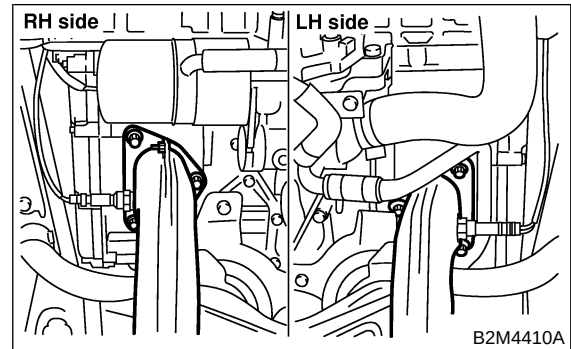
2) Install front exhaust pipe. And temporarily tighten bolt which installs front exhaust pipe to hanger bracket.



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

Tightening torque:

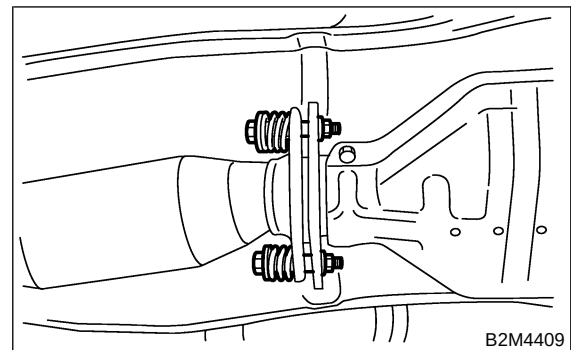
30 N·m (3.1 kgf-m, 22.4 ft-lb)



4) Install front exhaust pipe to rear exhaust pipe.

Tightening torque:

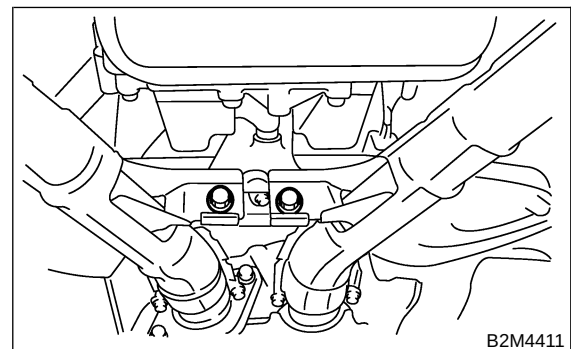
18 N·m (1.8 kgf-m, 13.0 ft-lb)



5) Tighten bolt which holds front exhaust pipes to hanger bracket.

Tightening torque:

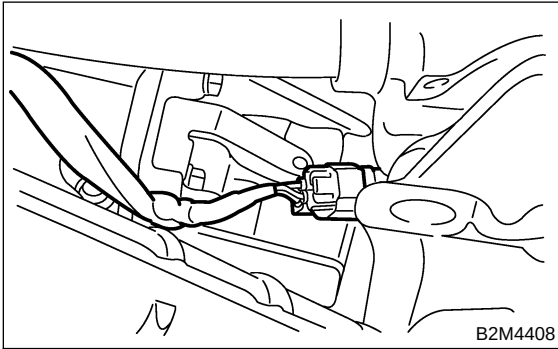
35 N·m (3.6 kgf-m, 26.0 ft-lb)



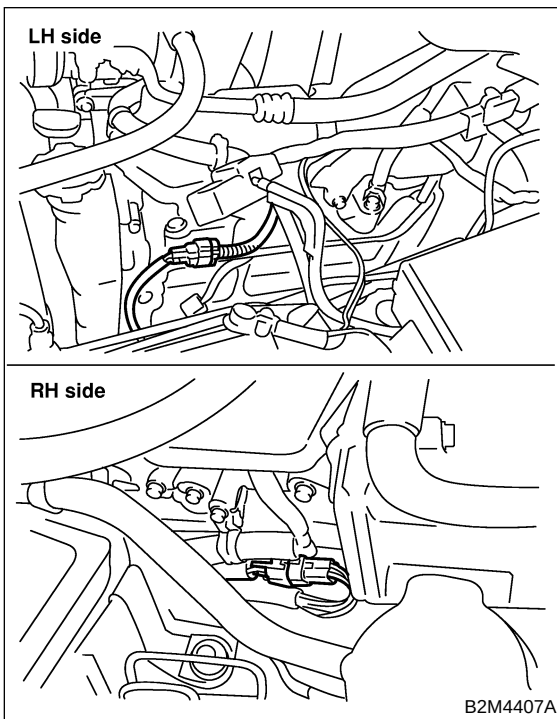
FRONT CATALYTIC CONVERTER

Emission Control (Aux. Emission Control Devices)

- 6) Connect connector to rear oxygen sensor connector.



- 7) Install front oxygen A/F sensor harness to the clips attached to the cylinder head covers.
8) Install under cover.
9) Lower the vehicle.
10) Connect front oxygen (A/F) sensor connector.



- 11) Install air cleaner case and air intake duct.
<Ref. to IN(H6)-5, INSTALLATION, Air Cleaner.>
and <Ref. to IN(H6)-7, INSTALLATION, Air Intake Duct.>
12) Install battery.

NOTE:

The rear catalytic converter is integrated with front catalytic converter. Therefore, the procedure for installing rear catalytic converter is the same as the description above.

C: INSPECTION S140017A10

- 1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

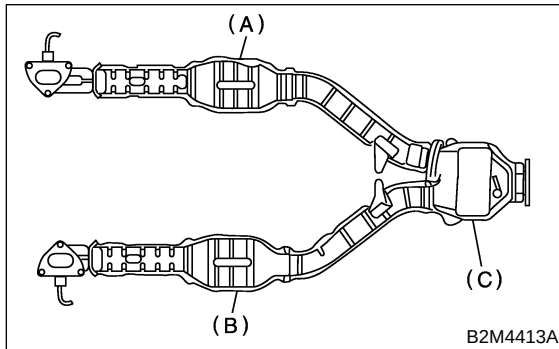
REAR CATALYTIC CONVERTER

Emission Control (Aux. Emission Control Devices)

3. Rear Catalytic Converter S140036

A: REMOVAL S140036A18

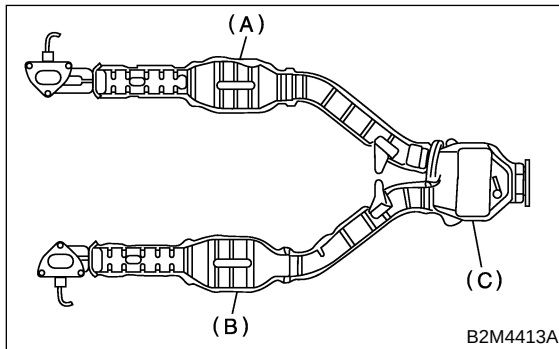
The front and rear catalytic converter are integrated into one unit. Therefore, the removal and installation procedures are the same as the those for the front catalytic converter. <Ref. to EC(H6)-3 REMOVAL, Front Catalytic Converter.>



- (A) Front catalytic converter RH
- (B) Front catalytic converter LH
- (C) Rear catalytic converter

B: INSTALLATION S140036A11

The front and rear catalytic converter are integrated into one unit. Therefore, the removal and installation procedures are the same as the ones described under front catalytic converter. <Ref. to EC(H6)-4 INSTALLATION, Front Catalytic Converter.>



- (A) Front catalytic converter RH
- (B) Front catalytic converter LH
- (C) Rear catalytic converter

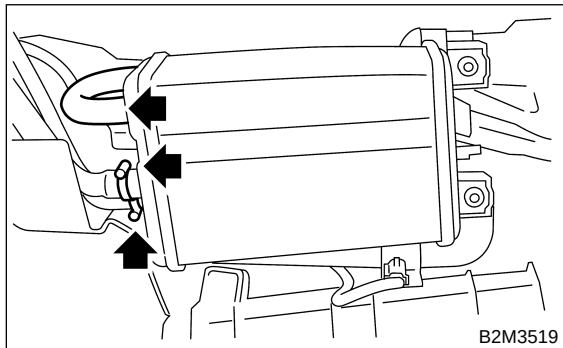
C: INSPECTION S140036A10

- 1) Make sure there are no exhaust leaks from connections and welds.
- 2) Make sure there are no holes or rusting.

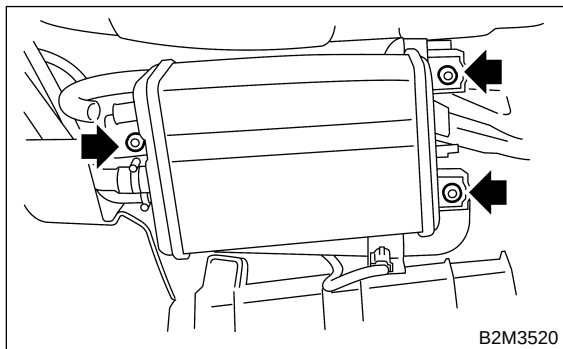
4. Canister S140037

A: REMOVAL S140037A18

- 1) Lift-up the vehicle.
- 2) Loosen two clamps which hold two canister hoses, and disconnect evaporation three hoses from canister.



- 3) Remove canister from body.

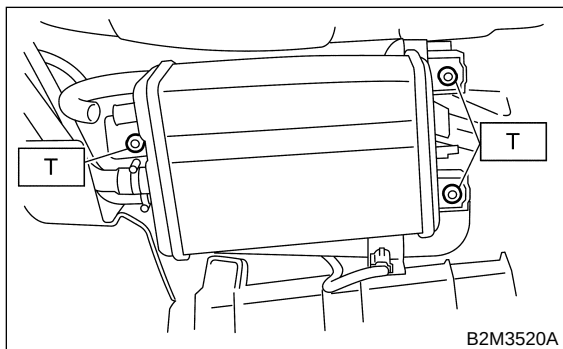


B: INSTALLATION S140037A11

Install in the reverse order of removal.

Tightening torque:

23 N·m (2.3 kgf-m, 17 ft-lb)



C: INSPECTION S140037A10

Make sure the canister and canister hoses are not cracked or loose.

PURGE CONTROL SOLENOID VALVE

Emission Control (Aux. Emission Control Devices)

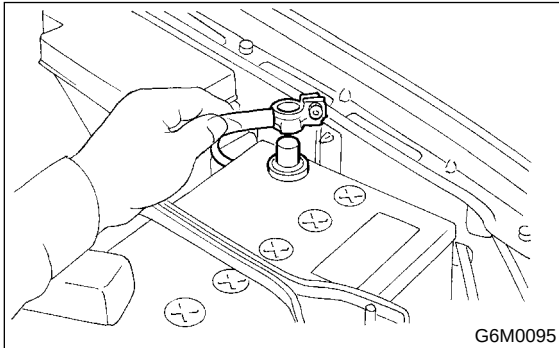
5. Purge Control Solenoid Valve

S140035

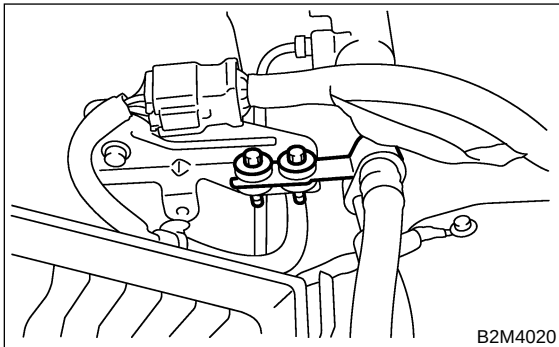
A: REMOVAL

S140035A18

- 1) Disconnect battery ground cable.



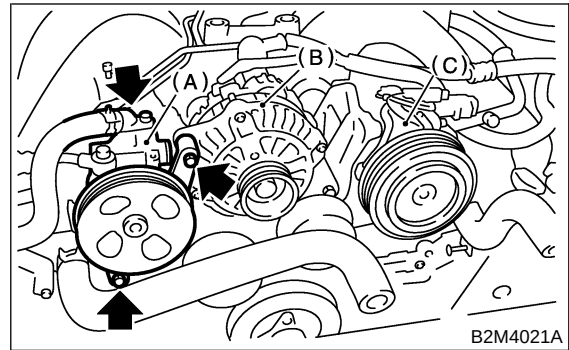
- 2) Remove power steering pump from bracket.
 - (1) Remove air intake duct and air cleaner case. <Ref. to IN(H6)-5, REMOVAL, Air Cleaner.> and <Ref. to IN(H6)-7, REMOVAL, Air Intake Duct.>
 - (2) Remove V-belt. <Ref. to ME(H6)-31, REMOVAL, V-belt.>
 - (3) Remove power steering oil pipe with bracket.



- (4) Remove bolts which install power steering pump bracket.

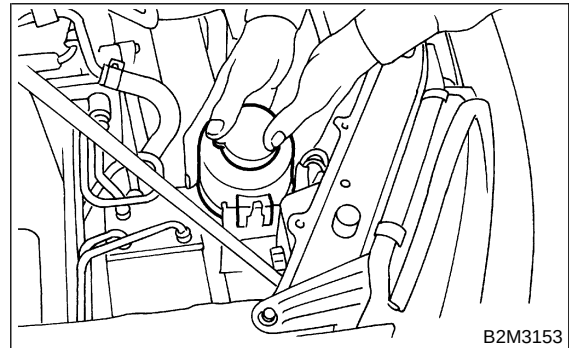
CAUTION:

Do not separate hose and pipe from the pump main unit.

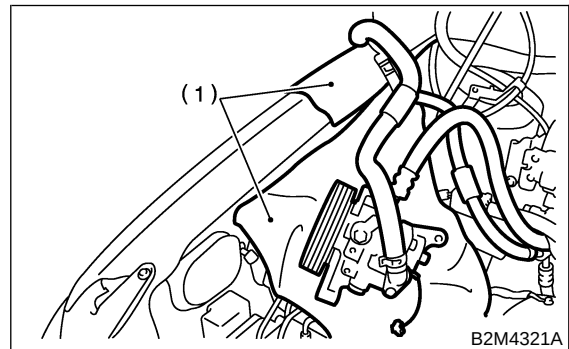


- (A) Power steering pump
- (B) Generator
- (C) A/C compressor

- (5) Remove power steering tank from the bracket by pulling it upward.



- (6) Place power steering pump on the right side wheel apron.

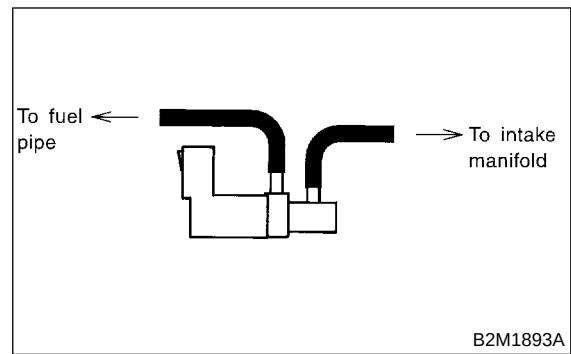
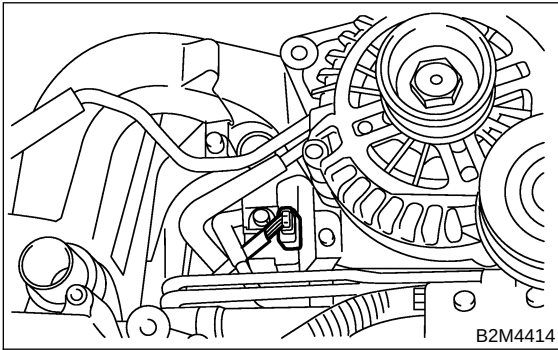


- (1) Cloth

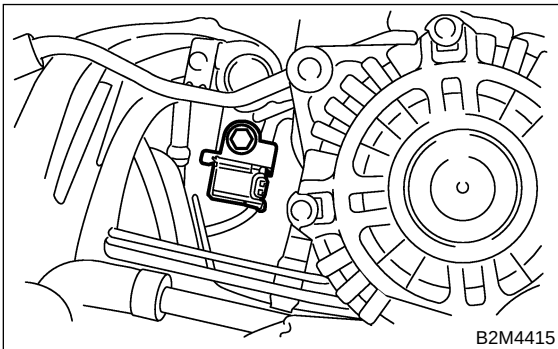
PURGE CONTROL SOLENOID VALVE

Emission Control (Aux. Emission Control Devices)

- 3) Disconnect connector and hoses from purge control solenoid valve.



- 4) Remove bolt which installs purge control solenoid valve onto intake manifold.



- 5) Take out purge control solenoid valve through the bottom of the intake manifold.

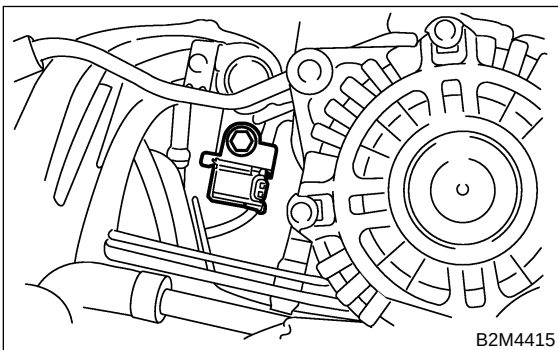
B: INSTALLATION

S140035A11

Install in the reverse order of removal.

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)



CAUTION:

Carefully connect the evaporation hoses.

C: INSPECTION

S140035A10

Make sure hoses are not cracked or loose.

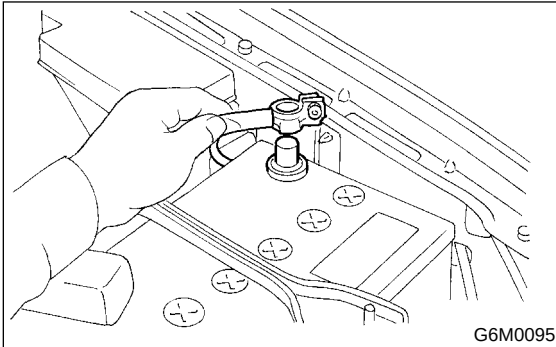
EGR VALVE

Emission Control (Aux. Emission Control Devices)

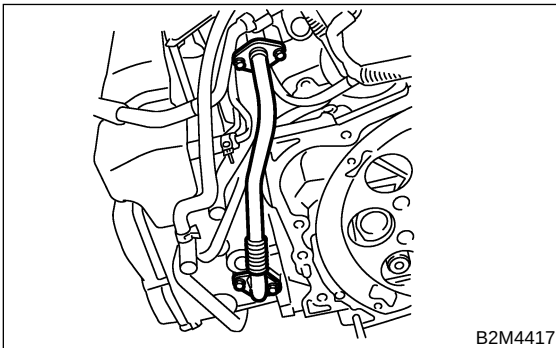
6. EGR Valve S140738

A: REMOVAL S140738A18

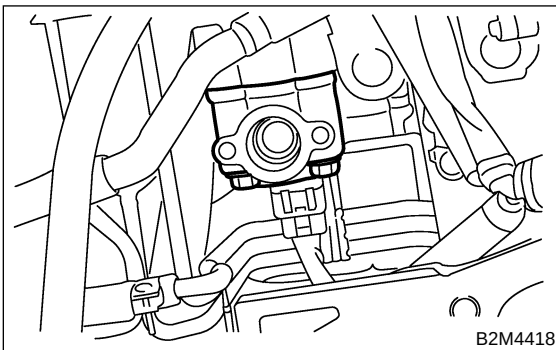
- 1) Disconnect battery ground cable.



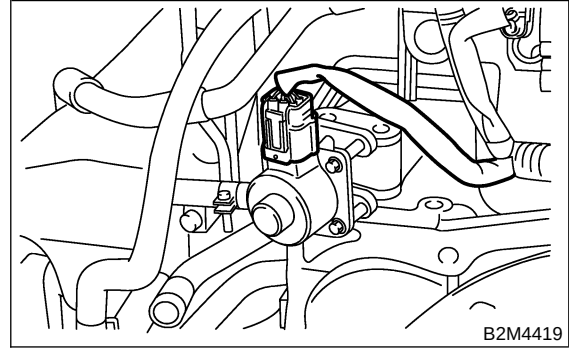
- 2) Remove air duct.
- 3) Remove starter. <Ref. to SC(H6)-6, REMOVAL, Starter.>
- 4) Remove EGR pipe from EGR valve and cylinder head.



- 5) Remove EGR valve from intake manifold.



- 6) Disconnect connector from EGR valve.

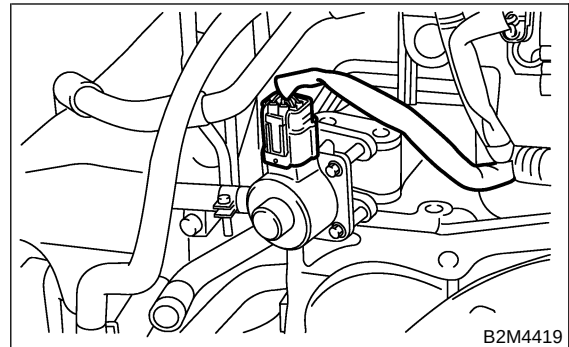


B: INSTALLATION S140738A11

NOTE:

Replace old gaskets with new one.

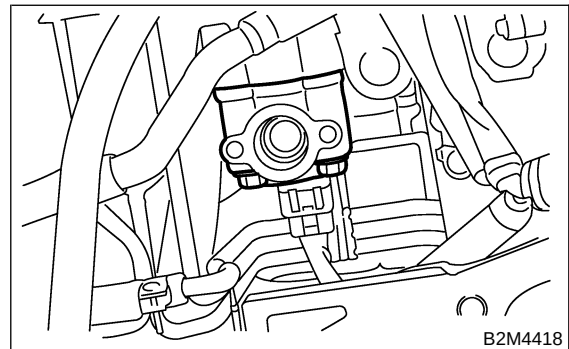
- 1) Connect connector EGR valve.



- 2) Install EGR valve to intake manifold.

Tightening torque:

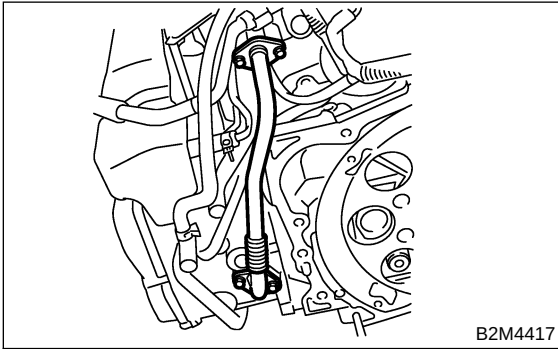
19 N·m (1.9 kgf-m, 14 ft-lb)



- 3) Install EGR pipe to EGR valve and cylinder head.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 4) Install starter. <Ref. to SC(H6)-6, INSTALLATION, Starter.>
- 5) Install air duct.
- 6) Connect battery ground cable.

C: INSPECTION S140738A10

- 1) Check the EGR valve for proper valve movement.
- 2) Check the EGR pipe, etc., for blockages or cracks.

MAIN FUEL LEVEL SENSOR

Emission Control (Aux. Emission Control Devices)

7. Main Fuel Level Sensor S140038

A: REMOVAL S140038A18

For work procedures, refer to "FU(H6)" section.
<Ref. to FU(H6)-72, REMOVAL, Fuel Lever Sensor.>

B: INSTALLATION S140038A11

For work procedures, refer to "FU(H6)" section.
<Ref. to FU(H6)-72, INSTALLATION, Fuel Lever Sensor.>

FUEL TEMPERATURE SENSOR

Emission Control (Aux. Emission Control Devices)

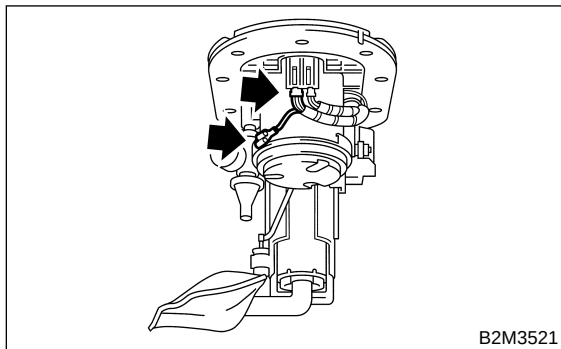
8. Fuel Temperature Sensor S140032

A: REMOVAL S140032A18

NOTE:

Fuel temperature sensor is built in fuel pump assembly.

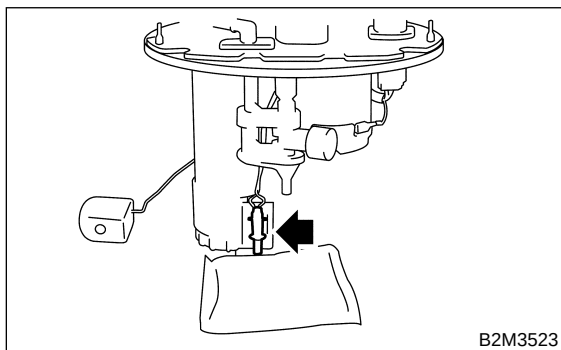
- 1) Remove fuel pump assembly. <Ref. to FU(H6)-69, REMOVAL, Fuel Pump.>
- 2) Disconnect connector from fuel pump bracket.



- 3) Remove fuel temperature sensor.

NOTE:

When replacing fuel temperature sensor, also replace fuel level sensor. <Ref. to FU(H6)-72, REMOVAL, Fuel Level Sensor.>

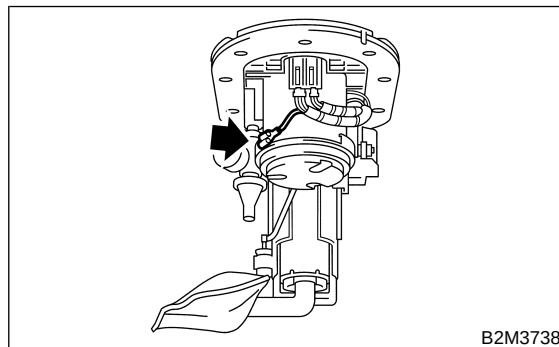


B: INSTALLATION S140032A11

Install in the reverse order of removal.

WARNING:

- Ground cable must be connected.
- Spark may occur and ignite if fuel is nearby.



SUB FUEL LEVEL SENSOR

Emission Control (Aux. Emission Control Devices)

9. Sub Fuel Level Sensor S140029

A: REMOVAL S140029A18

For work procedures, refer to "FU(H6)" section.
<Ref. to FU(H6)-94 REMOVAL, Fuel Sub Lever Sensor.>

B: INSTALLATION S140029A11

For work procedures, refer to "FU(H6)" section.
<Ref. to FU(H6)-95 INSTALLATION, Fuel Sub Lever Sensor.>

FUEL TANK PRESSURE SENSOR

Emission Control (Aux. Emission Control Devices)

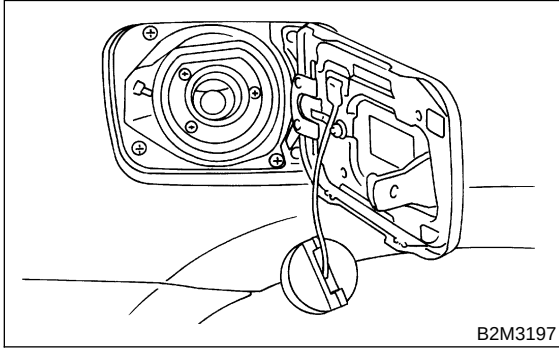
10. Fuel Tank Pressure Sensor

S140030

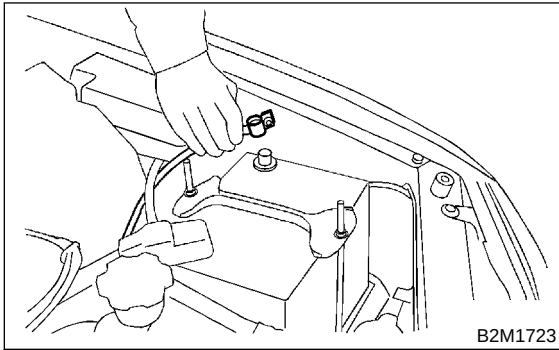
A: REMOVAL

S140030A18

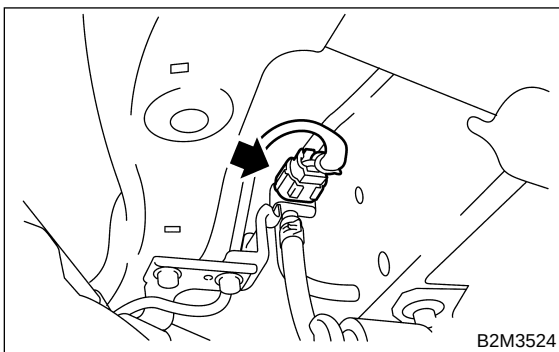
- 1) Set the vehicle on the lift.
- 2) Open fuel flap lid, and remove fuel filler cap.



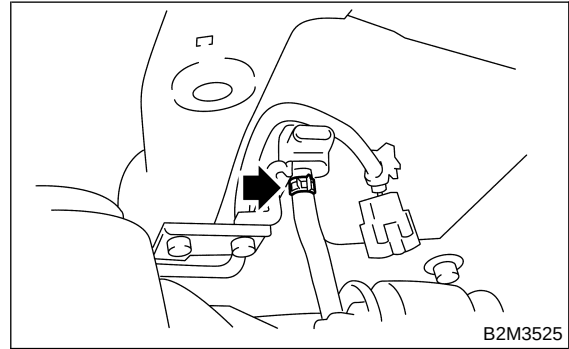
- 3) Disconnect battery ground cable.



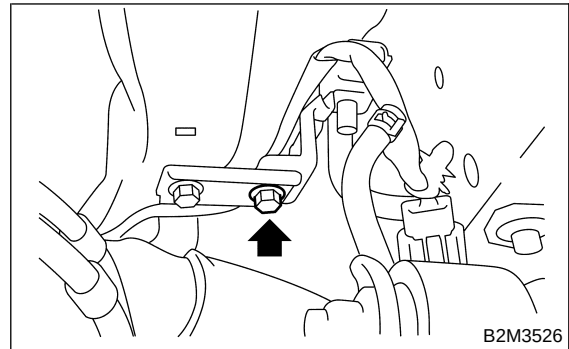
- 4) Lift-up the vehicle.
- 5) Disconnect connector from fuel tank pressure sensor.



- 6) Disconnect pressure hose from fuel tank pressure sensor.



- 7) Remove fuel tank pressure sensor.



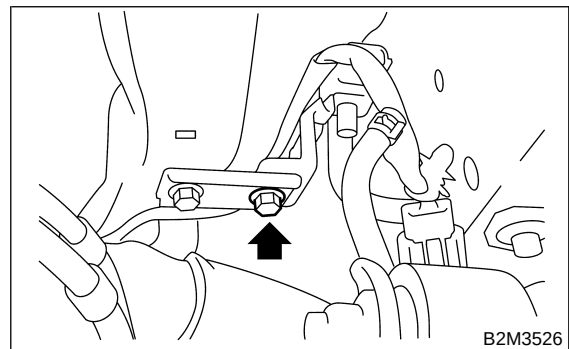
B: INSTALLATION

S140030A11

Install in the reverse order of removal.

Tightening torque:

7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



C: INSPECTION

S140030A10

Make sure that hoses are not cracked or loose.

PRESSURE CONTROL SOLENOID VALVE

Emission Control (Aux. Emission Control Devices)

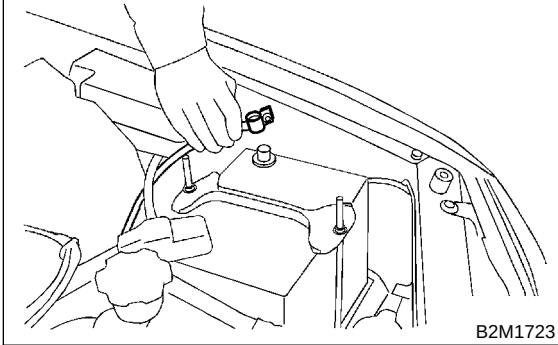
11. Pressure Control Solenoid Valve

S140031

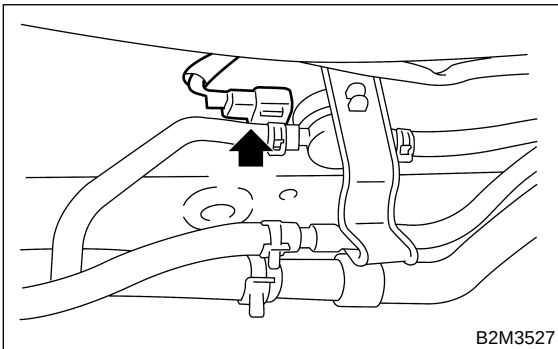
A: REMOVAL

S140031A18

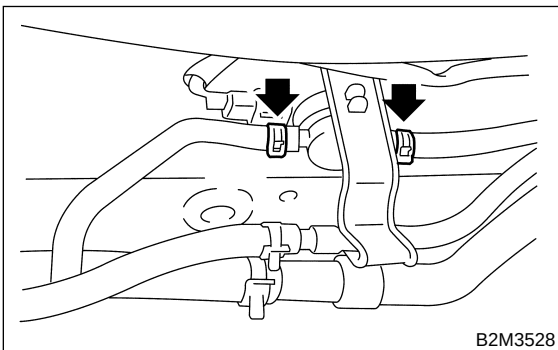
- 1) Set the vehicle on the lift.
- 2) Disconnect battery ground cable.



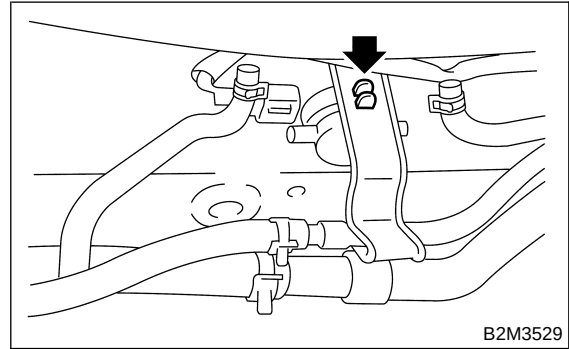
- 3) Lift-up the vehicle.
- 4) Disconnect connector from pressure control solenoid valve.



- 5) Disconnect two evaporation hoses from pressure control solenoid valve.



- 6) Remove pressure control solenoid valve from bracket.



B: INSTALLATION

S140031A11

Install in the reverse order of removal.

C: INSPECTION

S140031A10

Make sure that hoses are not cracked or loose.

DRAIN FILTER

Emission Control (Aux. Emission Control Devices)

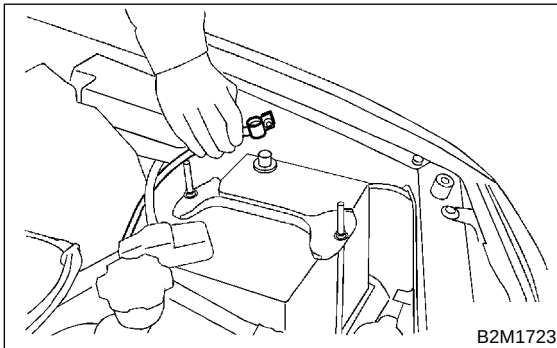
12. Drain Filter

S140567

A: REMOVAL

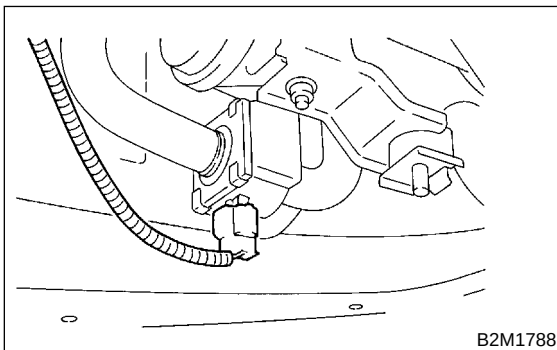
S140567A18

- 1) Set the vehicle on the lift.
- 2) Disconnect battery ground cable.



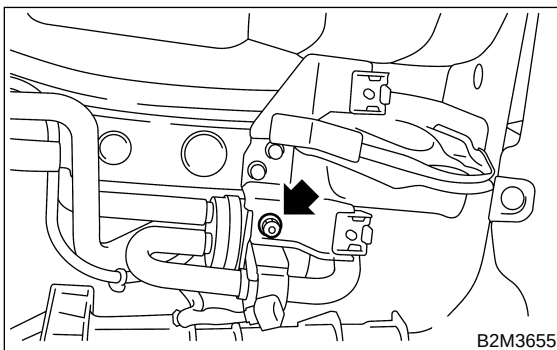
B2M1723

- 3) Lift-up the vehicle.
- 4) Remove canister. <Ref. to EC(H6)-7 REMOVAL, Canister.>
- 5) Disconnect connector from drain valve.



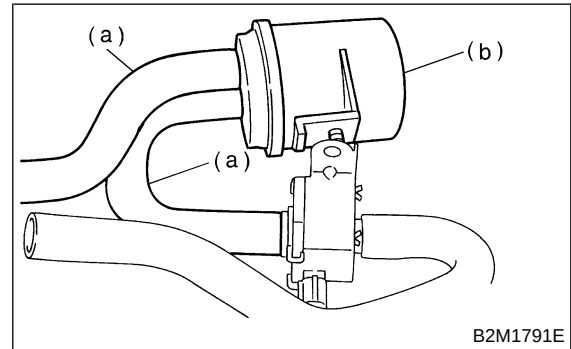
B2M1788

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



B2M3655

- 7) Disconnect evaporation hoses, (a) and remove drain filter (b).



B2M1791E

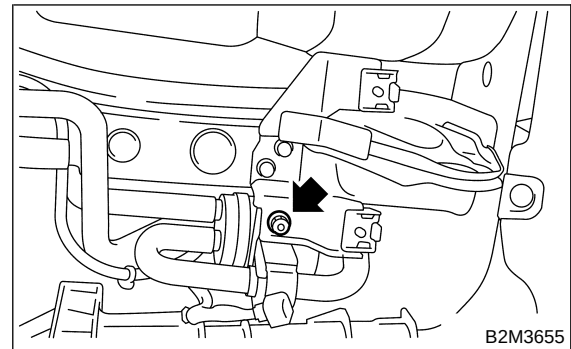
B: INSTALLATION

S140567A11

Install in the reverse order of removal.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



B2M3655

C: INSPECTION

S140567A10

- 1) Make sure that all hoses are installed correctly.
- 2) Make sure that hoses are not cracked or loose.

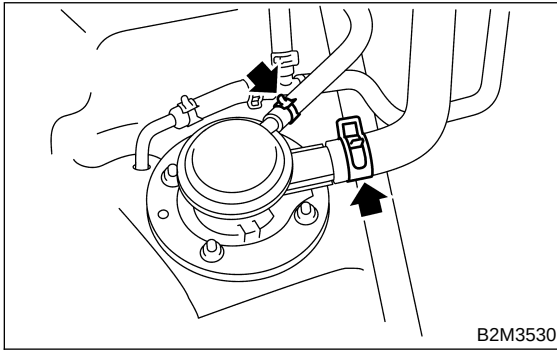
VENT VALVE

Emission Control (Aux. Emission Control Devices)

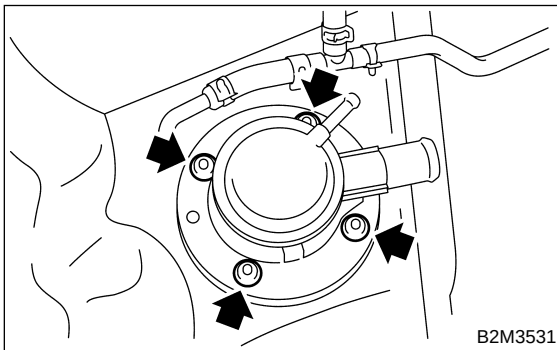
13. Vent Valve S140033

A: REMOVAL S140033A18

- 1) Remove fuel tank. <Ref. to FU(H6)-73 REMOVAL, Fuel Tank.>
- 2) Move clips, and disconnect hoses from vent valve.



- 3) Remove nuts which install vent valve on fuel tank.



B: INSTALLATION S140033A11

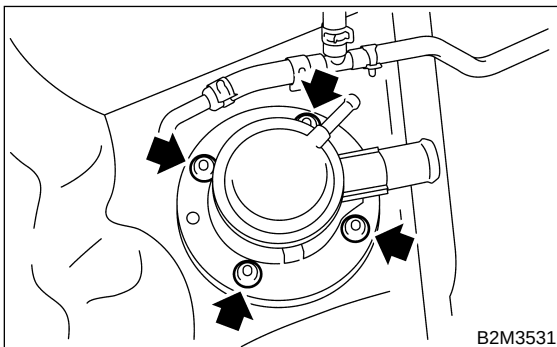
Install in the reverse order of removal.

CAUTION:

Replace rubber seat with a new one.

Tightening torque:

4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



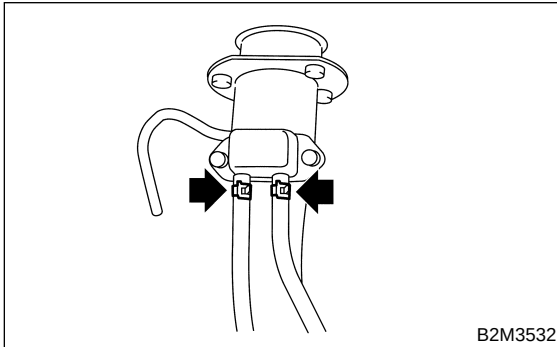
C: INSPECTION S140033A10

Make sure that hoses are not cracked or loose.

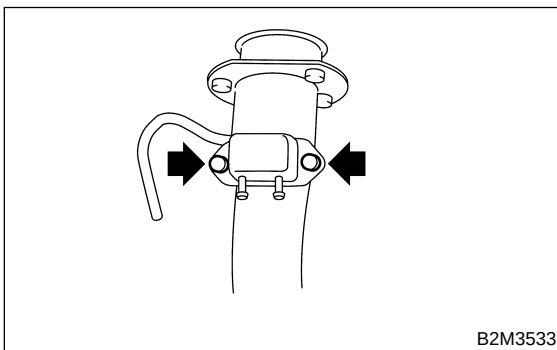
14. Shut Valve S140024

A: REMOVAL S140024A18

- 1) Drain fuel from fuel tank. <Ref. to FU(H6)-73 REMOVAL, Fuel Tank.>
- 2) Remove fuel filler pipe. <Ref. to FU(H6)-82 REMOVAL, Fuel Filler Pipe.>
- 3) Disconnect evaporation hoses from shut valve.



- 4) Remove shut valve from fuel filler pipe.

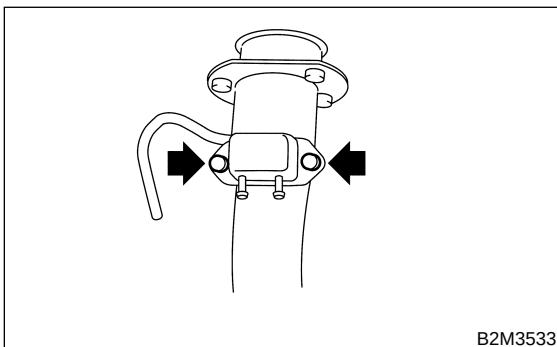


B: INSTALLATION S140024A11

Install in the reverse order of removal.

Tightening torque:

4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



C: INSPECTION S140024A10

Make sure that hoses are not cracked or loose.

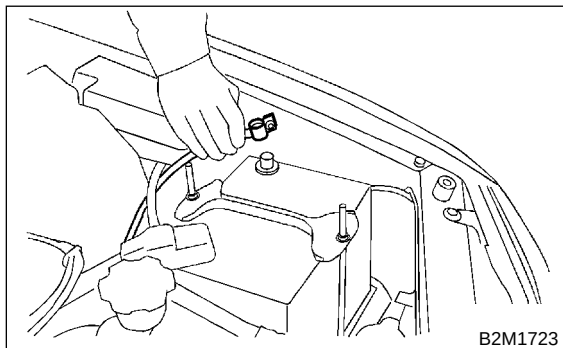
DRAIN VALVE

Emission Control (Aux. Emission Control Devices)

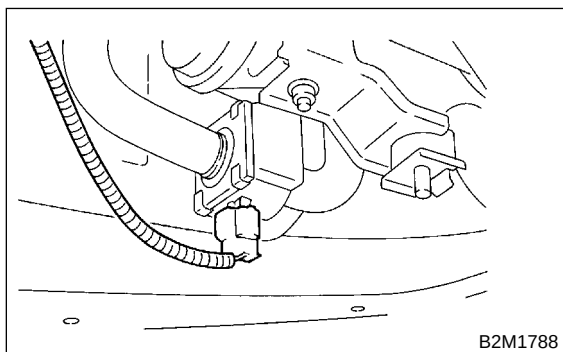
15. Drain Valve S140088

A: REMOVAL S140088A18

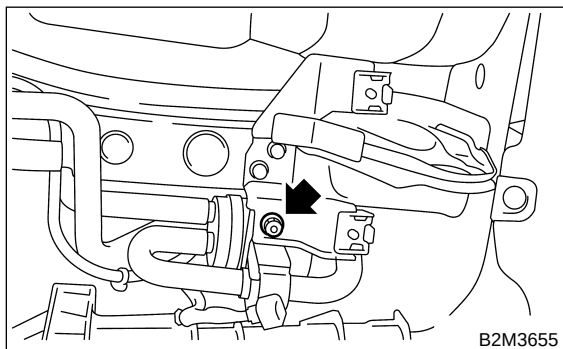
- 1) Set the vehicle on the lift.
- 2) Disconnect battery ground cable.



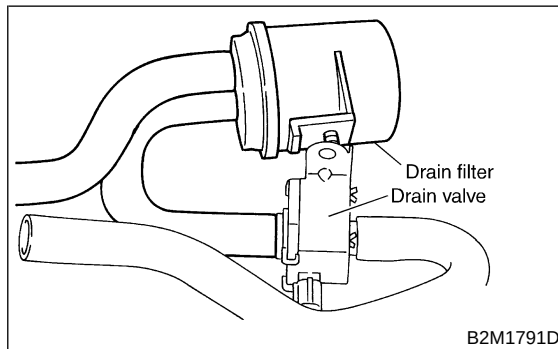
- 3) Lift-up the vehicle.
- 4) Remove canister. <Ref. to EC(H6)-7 REMOVAL, Canister.>
- 5) Disconnect connector from drain valve.



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



- 7) Disconnect evaporation hose and remove drain valve.

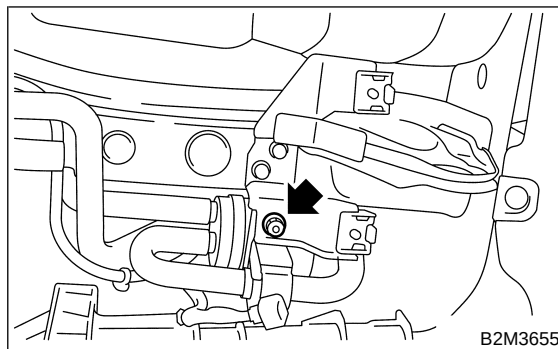


B: INSTALLATION S140088A11

Install in the reverse order of removal.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



C: INSPECTION S140088A10

- 1) Make sure that all hoses are installed correctly.
- 2) Make sure that hoses are not cracked or loose.

GENERAL DESCRIPTION

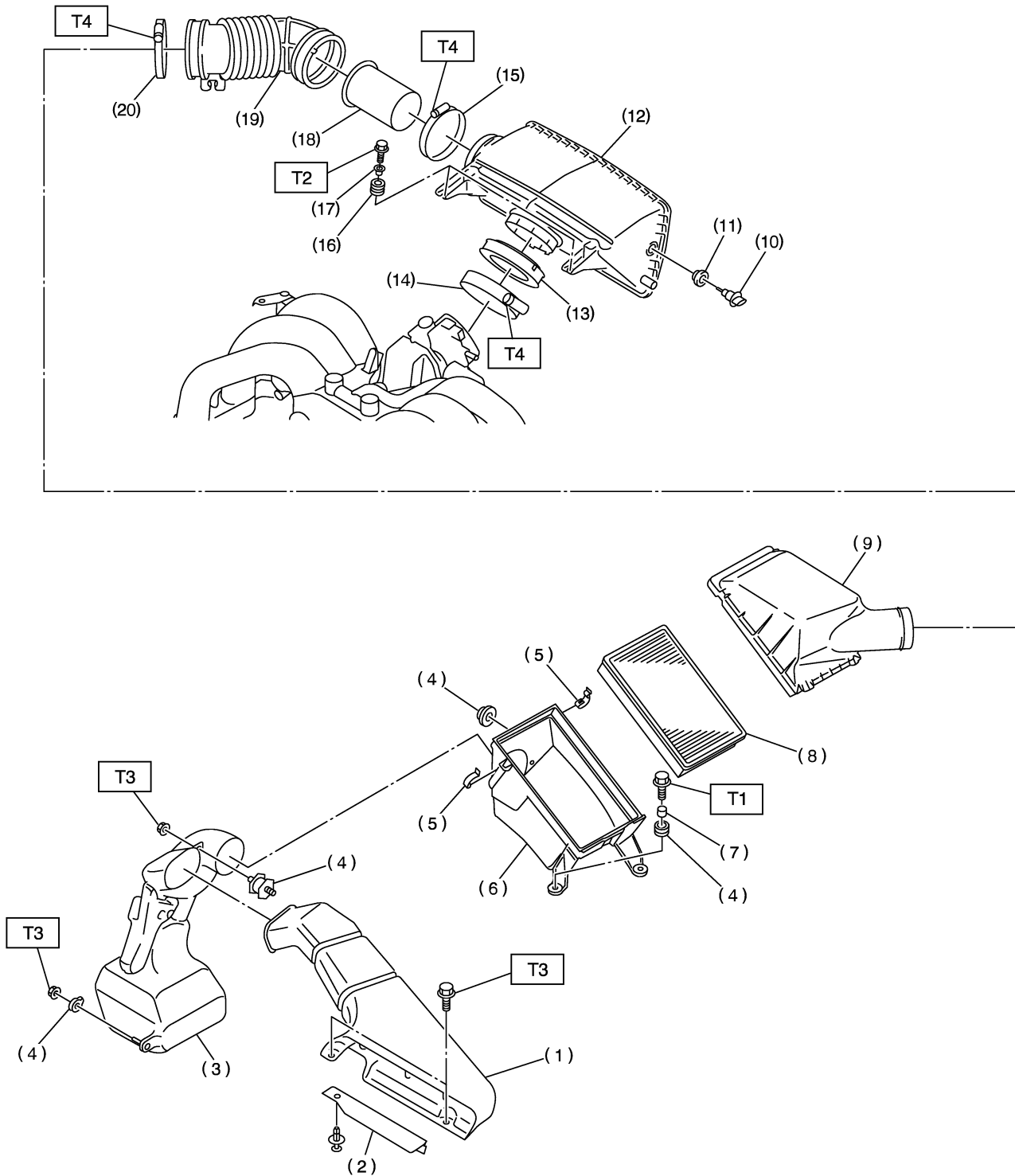
Intake (Induction)

1. General Description

S144001

A: COMPONENT

S144001A05



B2M4400A

GENERAL DESCRIPTION

Intake (Induction)

- (1) Air intake duct
- (2) Plate
- (3) Resonator chamber
- (4) Cushion
- (5) Clip
- (6) Air cleaner lower case
- (7) Spacer
- (8) Air cleaner element
- (9) Air cleaner upper cover

- (10) Intake air temperature sensor
- (11) Grommet
- (12) Air intake chamber
- (13) Grommet
- (14) Clamp
- (15) Clamp
- (16) Cushion
- (17) Spacer
- (18) Intake duct

- (19) Air intake boot
- (20) Clamp

Tightening torque: N·m (kgf-m, ft-lb)

T1: 32.3 (3.3, 23.9)

T2: 6.4 (0.65 4.7)

T3: 7.5 (0.76, 5.5)

T4: 3 (0.3, 2.2)

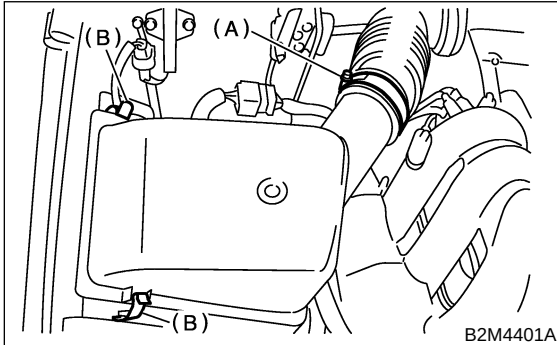
B: CAUTION SI44001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensor or units, be sure to disconnect negative terminal from battery.

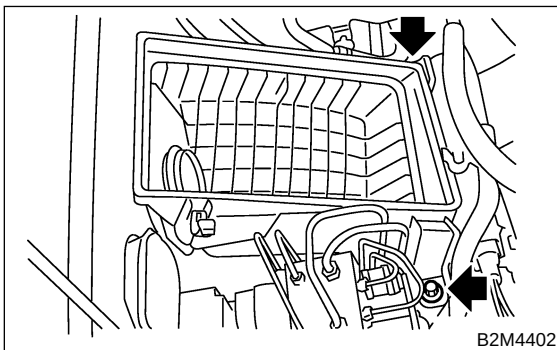
2. Air Cleaner S144087

A: REMOVAL S144087A18

- 1) Loosen clamp (A), and separate air cleaner upper cover and air intake chamber.
- 2) Remove the clip (B) above the air cleaner upper cover.



- 3) Remove air cleaner.
- 4) Remove air cleaner lower case.

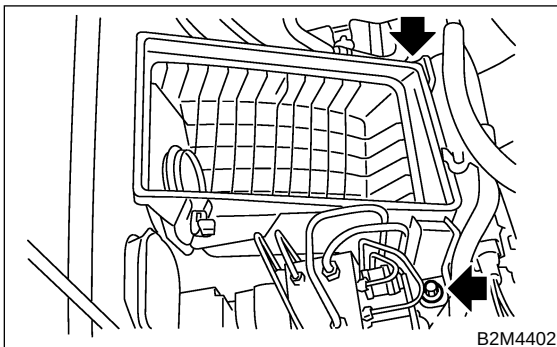


B: INSTALLATION S144087A11

- 1) Install the air cleaner lower case.

Tightening torque:

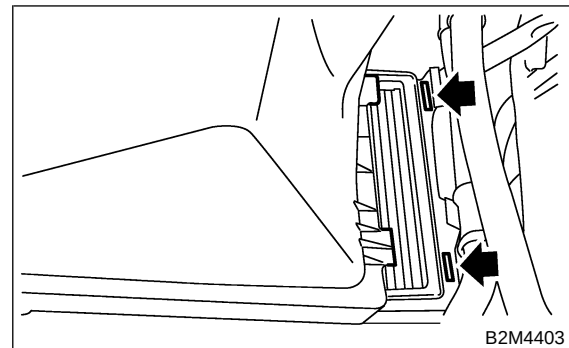
32.3 N·m (3.3 kgf·m, 23.9 ft·lb)



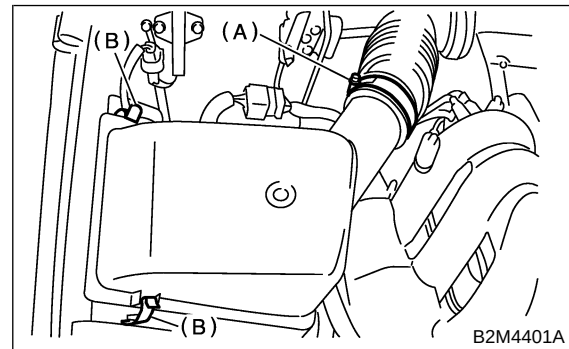
- 2) Set the air cleaner.
- 3) Install the air cleaner upper cover.

NOTE:

Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.



- 4) Install the clip (B) above the air cleaner upper cover.
- 5) Tighten clamp (A), and connect air intake boot and air cleaner upper cover.



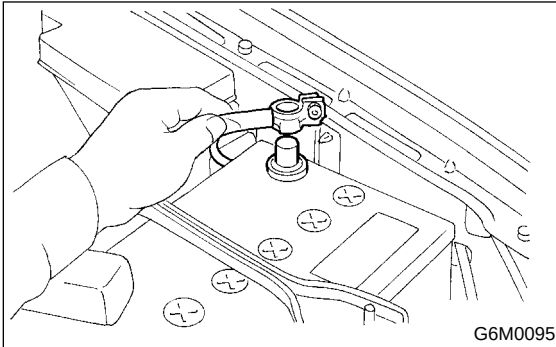
C: INSPECTION S144087A10

Replace if excessively damaged or dirty.

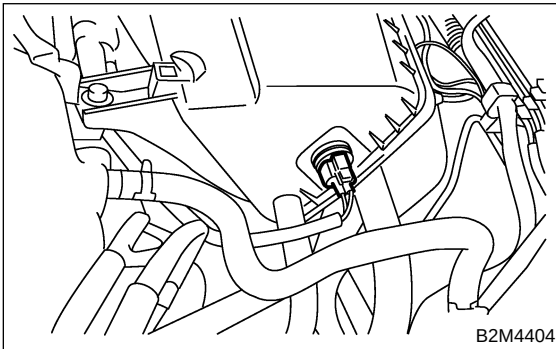
3. Air Intake Chamber S144757

A: REMOVAL S144757A18

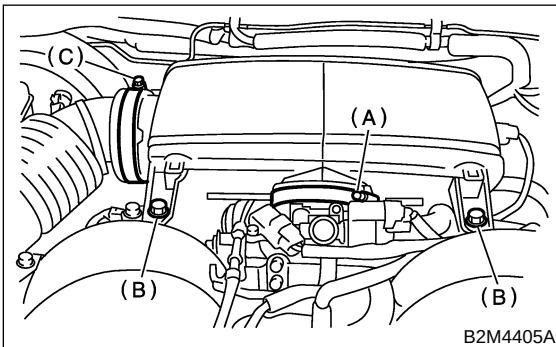
- 1) Disconnect battery ground cable.



- 2) Disconnect connector from intake air temperature sensor.



- 3) Loosen clamp (A) which connects air intake chamber to throttle body.
- 4) Remove bolts (B) which install air intake chamber to stays.
- 5) Loosen clamp (C) which connects air intake chamber to air intake boot.



- 6) Disconnect hoses from air intake chamber.
- 7) Remove air cleaner case.

B: INSTALLATION S144757A11

Install in the reverse order of removal.

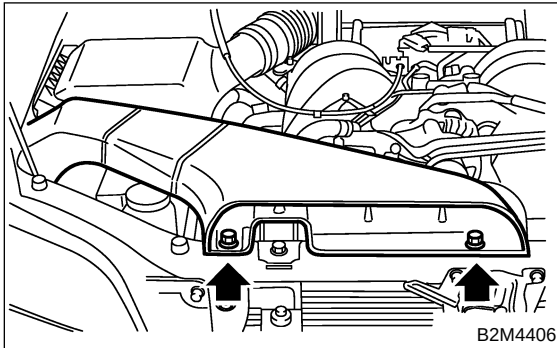
C: INSPECTION S144757A10

Inspect for cracks and loose connections.

4. Air Intake Duct S144566

A: REMOVAL S144566A18

1) Remove bolts which install air intake duct on the front side of body.



B: INSTALLATION S144566A11

Install in the reverse order of removal.

C: INSPECTION S144566A10

Inspect for cracks and loose connections. Check that no foreign objects are mixed in the air intake duct.

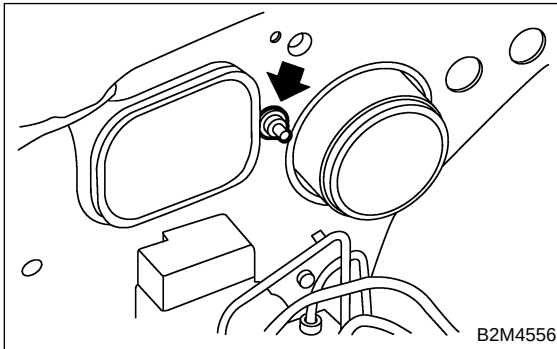
5. Resonator Chamber

S144639

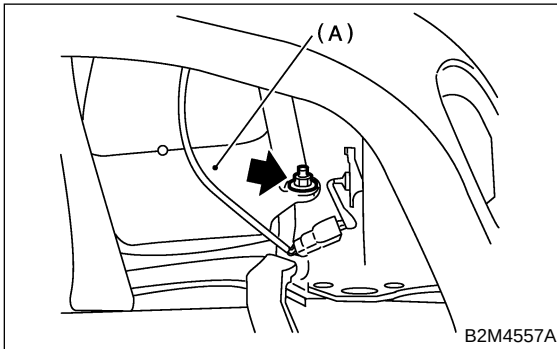
A: REMOVAL

S144639A18

- 1) Set vehicle on a lift.
- 2) Remove air intake duct. <Ref. to IN(H6)-7, REMOVAL, Air Intake Duct.>
- 3) Remove air cleaner lower case. <Ref. to IN(H6)-5, REMOVAL, Air Cleaner.>
- 4) Remove the resonator chamber mounting bolt on the right of engine compartment.



- 5) Remove the front right tire, and lift the vehicle.
- 6) Remove front mudguard RH.
- 7) Remove the resonator chamber (A) from the inside front fender.



B: INSTALLATION

S144639A11

Install in the reverse order of removal.

C: INSPECTION

S144639A10

Inspect for cracks and loose connections. Check that no foreign objects and mixed in the resonator chamber.

GENERAL DESCRIPTION

Mechanical

1. General Description S143001

A: SPECIFICATIONS S143001E49

Engine	Type		Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gasoline engine	
	Valve arrangement		Chain driven, double over-head camshaft, 4-valve/cylinder	
	Bore x Stroke mm (in)		87.2 x 80 (3.433 x 3.150)	
	Displacement cm ³ (cu in)		2,999 (183)	
	Compression ratio		10.7	
	Compression pressure (350 rpm and fully open throttle) kPa (kg/cm ² , psi)		1,275 — 1,471 (13.0 — 15.0, 185 — 213)	
	Number of piston rings		Pressure ring: 2, Oil ring: 1	
	Intake valve timing	Opening	5° BTDC	
		Closing	55° ABDC	
	Exhaust valve timing	Opening	52° BBDC	
		Closing	0° ATDC	
	Valve clearance	Intake mm (in)	0.20 ^{+0.04} / _{-0.06} (0.0079 ^{+0.0016} / _{-0.0024})	
		Exhaust mm (in)	0.25±0.05 (0.0098±0.0020)	
	Idle speed [At "P" or "N" position] rpm		600±50 (No load) 700±50 (A/C switch ON)	
	Firing order		1 → 6 → 3 → 2 → 5 → 4	
	Ignition timing BTDC/rpm		10°±3°/600	

NOTE:

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

Belt ten- sioner	Spacer O.D.			17.955 — 17.975 mm (0.7069 — 0.7077 in)
	Tensioner bushing I.D.			18.00 — 18.08 mm (0.7087 — 0.7118 in)
	Clearance between spacer and bushing	STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)	
		Limit	0.175 mm (0.0069 in)	
	Side clearance of spacer	STD	0.20 — 0.55 mm (0.0079 — 0.0217 in)	
		Limit	0.81 mm (0.0319 in)	
Camshaft	Bend limit			0.020 mm (0.0008 in)
	Thrust clearance	Intake	STD	0.075 — 0.135 mm (0.0030 — 0.0053 in)
			Limit	0.155 mm (0.0061 in)
		Exhaust	STD	0.048 — 0.108 mm (0.0019 — 0.0043 in)
			Limit	0.130 mm (0.0051 in)
	Cam lobe height	Intake	STD	46.05 — 46.15 mm (1.8130 — 1.8169 in)
			Limit	45.95 mm (1.8091 in)
		Exhaust	STD	45.55 — 45.65 mm (1.7933 — 1.7972 in)
			Limit	45.45 mm (1.7894 in)
	Camshaft journal O.D.	Front	37.963 — 37.946 mm (1.4946 — 1.4939 in)	
		Center & Rear	27.963 — 27.946 mm (1.1009 — 1.1002 in)	
	Camshaft journal hole I.D.	Front	38.000 — 38.018 mm (1.4961 — 1.4968 in)	
		Center & 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			0.1 mm (0.004 in)
	Standard height			124 mm (4.88 in)

GENERAL DESCRIPTION

Mechanical

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			5.500 — 5.512 mm (0.2165 — 0.2170 in)	
	Protrusion above head		Intake	12.3 — 12.7 mm (0.484 — 0.500 in)	
Valve	Head edge thickness	Intake	STD	1.0 mm (0.039 in)	
			Limit	0.8 mm (0.315 in)	
		Exhaust	STD	1.2 mm (0.047 in)	
			Limit	0.8 mm (0.315 in)	
	Stem diameter		Intake	5.455 — 5.470 mm (0.2148 — 0.2154 in)	
			Exhaust	5.455 — 5.460 mm (0.2148 — 0.2150 in)	
	Stem oil clearance	STD	Intake	0.030 — 0.057 mm (0.0012 — 0.0022 in)	
			Exhaust	0.040 — 0.067 mm (0.0016 — 0.0026 in)	
	Overall length		Limit	—	
			0.15 mm (0.0059 in)		
Valve spring	Free length			46.79 mm (1.8421 in)	
	Squareness			2.5°, 2.0 mm (0.079 in)	
	Tension/spring height		Set	186.2 — 205.8 N (18.99 — 20.99 kgf, 41.9 — 46.3 lb)/37.4 mm (1.472 in)	
			Lift	446.5 — 493.5 N (45.54 — 50.34 kgf, 100.3 — 110.9 lb)/27.5 mm (1.083 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	89.205 — 89.215 mm (3.5120 — 3.5124 in)	
			B	89.195 — 89.205 mm (3.5116 — 3.5120 in)	
Taper		Limit	0.050 mm (0.0020 in)		
Out-of-roundness		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)		
Piston	Enlarging (boring) limit			0.5 mm (0.020 in)	
	Outer diameter	STD	A	89.185 — 89.195 mm (3.5112 — 3.5116 in)	
			B	89.175 — 89.185 mm (3.5108 — 3.5112 in)	
		OS	0.25 mm (0.0098 in)	89.425 — 89.435 mm (3.5207 — 3.5211 in)	
			0.50 mm (0.0197 in)	89.675 — 89.685 mm (3.5305 — 3.5309 in)	
Piston pin	Standard inner diameter of piston pin hole			22.000 — 22.006 mm (0.8661 — 0.8664 in)	
	Outer diameter			21.994 — 22.000 mm (0.8659 — 0.8661 in)	
	Standard clearance between piston pin and hole in piston			0.004 — 0.008 mm (0.0002 — 0.0003 in)	
Piston pin	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).	

GENERAL DESCRIPTION

Mechanical

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	0.35 — 0.50 mm (0.0138 — 0.0197 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	0.022 — 0.052 mm (0.0009 — 0.0020 in)
			Limit	0.065 mm (0.0026 in)
	Thickness at center portion		STD	1.490 — 1.502 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		0.250 mm (0.0098 in)
	Crank pin 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, #3, #5, #7	STD	63.992 — 64.008 mm (2.5194 — 2.5200 in)
			0.03 mm (0.0012 in) US	63.962 — 63.978 mm (2.5182 — 2.5188 in)
			0.05 mm (0.0020 in) US	63.942 — 63.958 mm (2.5174 — 2.5180 in)
			0.25 mm (0.0098 in) US	63.742 — 63.758 mm (2.5095 — 2.5102 in)
		#2, #4, #6	STD	63.992 — 64.008 mm (2.5194 — 2.5200 in)
			0.03 mm (0.0012 in) US	63.962 — 63.978 mm (2.5182 — 2.5188 in)
			0.05 mm (0.0020 in) US	63.942 — 63.958 mm (2.5174 — 2.5180 in)
			0.25 mm (0.0098 in) US	63.742 — 63.758 mm (2.5095 — 2.5102 in)
	Thrust clearance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)
			Limit	0.25 mm (0.0098 in)
	Oil clearance		STD	0.015 — 0.030 mm (0.0006 — 0.0012 in)
			Limit	0.050 mm (0.0020 in)

GENERAL DESCRIPTION

Mechanical

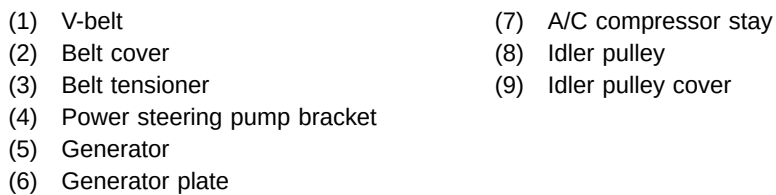
Crankshaft bearing	Crankshaft bearing thickness	#1, #3, #5, #7	STD	1.992 — 2.005 mm (0.0784 — 0.0789 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)
		#2, #4, #5	STD	1.996 — 2.000 mm (0.0786 — 0.0787 in)
			0.03 mm (0.0012 in) US	2.019 — 2.020 mm (0.0795 — 0.0795 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)

GENERAL DESCRIPTION

Mechanical

MEMO:

1. V-BELT *S143001A0508*



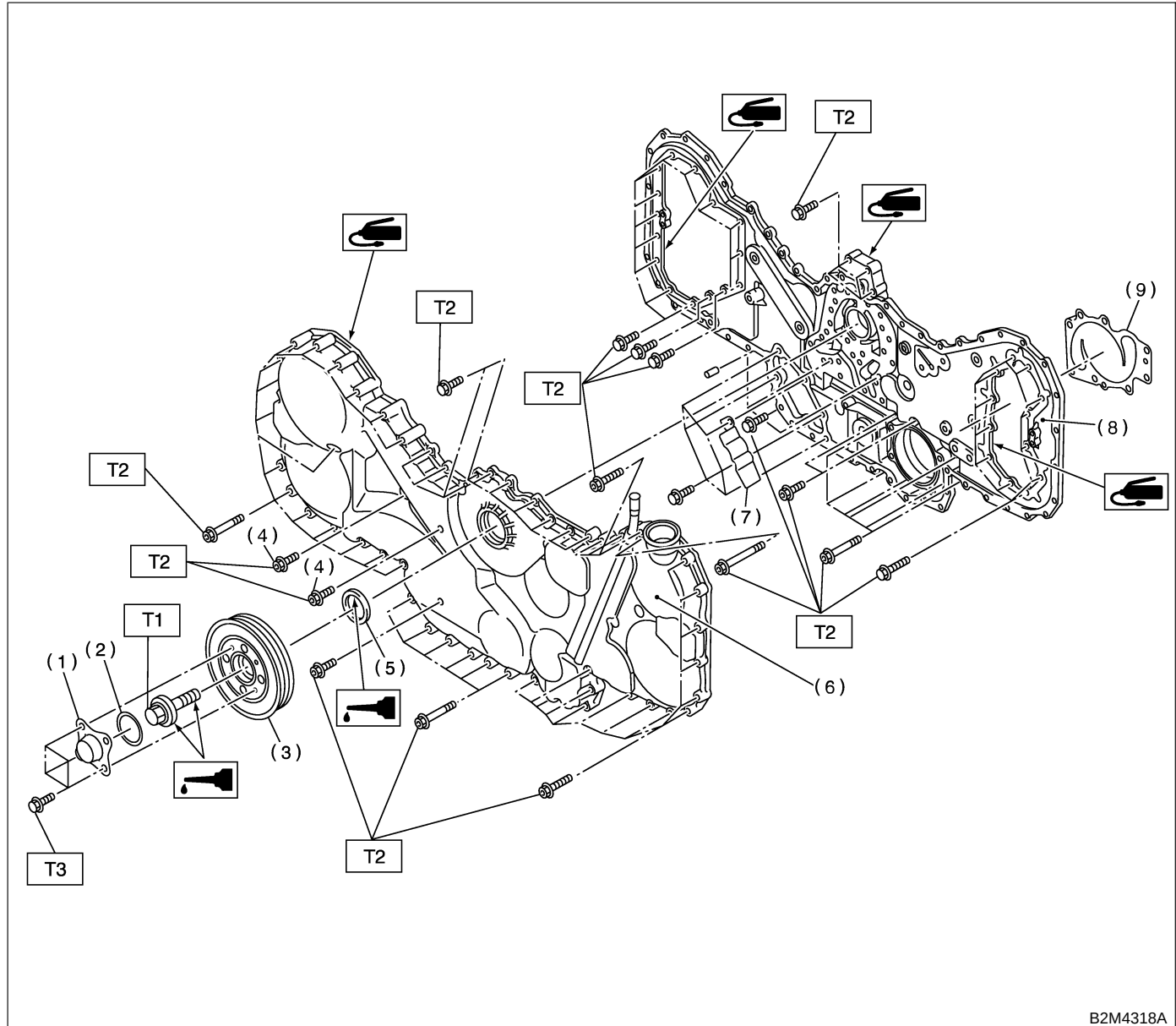
T4: 33 (3.4, 25)

GENERAL DESCRIPTION

Mechanical

2. TIMING CHAIN COVER

S143001A0509



(1) Crank pulley cover	(7) Baffle
(2) O-ring	(8) Rear chain cover
(3) Crank pulley	(9) Water pump gasket
(4) Sealing washer	
(5) Oil seal	
(6) Front chain cover	

Tightening torque: N·m (kgf-m, ft-lb)

T1: Refer to ME(H6)-42, Crankshaft Pulley.

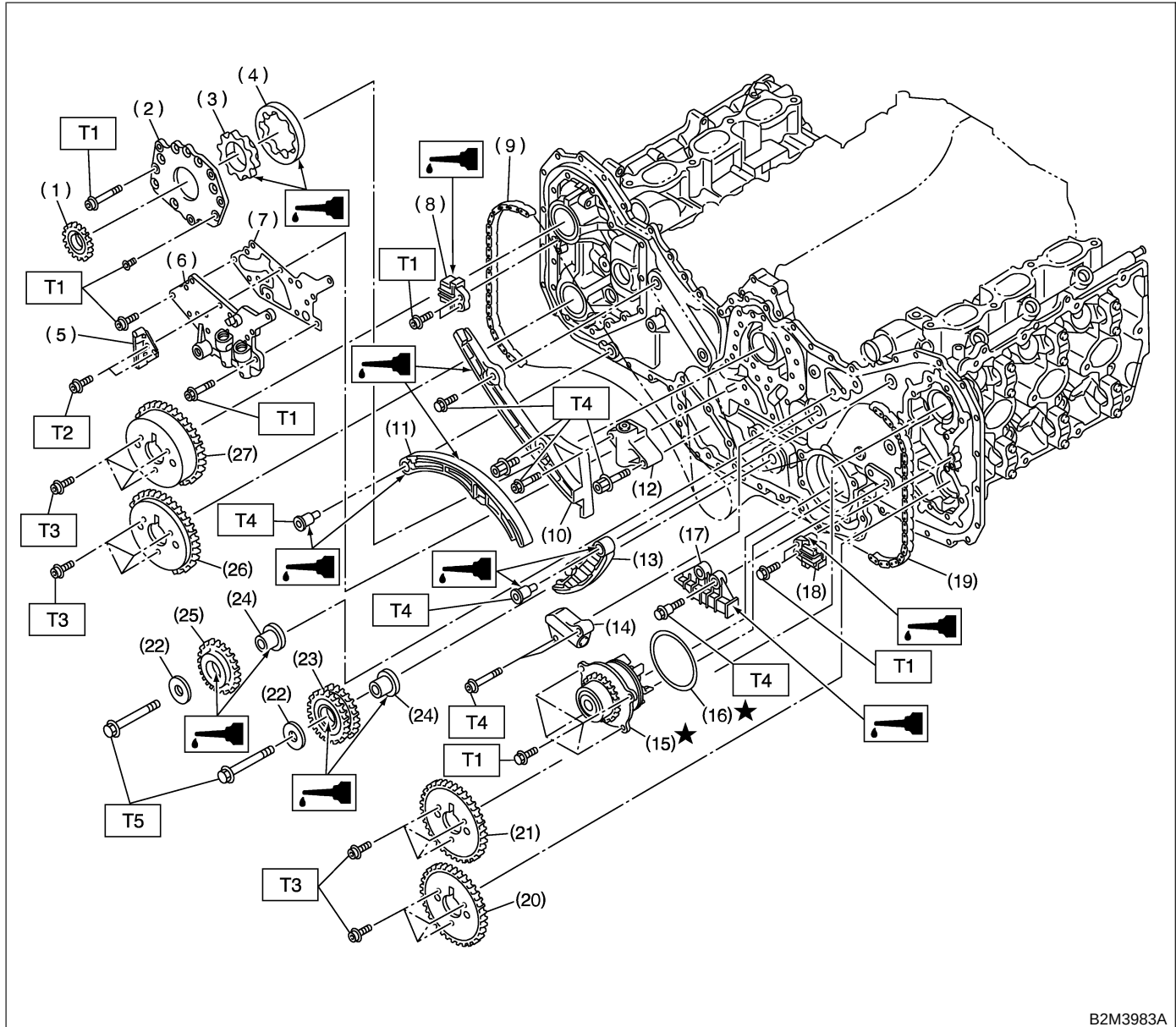
T2: Refer to ME(H6)-43, Front Chain Cover.

T3: 6.4 (0.65, 4.7)

ME(H6)-8

3. TIMING BELT

S143001A0501



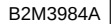
B2M3983A

(1) Crank sprocket	(13) Chain tensioner lever (LH)
(2) Oil pump cover	(14) Chain tensioner (LH)
(3) Inner rotor	(15) Water pump
(4) Outer rotor	(16) O-ring
(5) Chain guide (Center)	(17) Chain guide (LH)
(6) Relief valve case	(18) Chain guide (Left-hand between cams)
(7) Relief valve case gasket	(19) Timing chain (LH)
(8) Chain guide (Right-hand between cams)	(20) Exhaust cam sprocket (RH)
(9) Timing chain (RH)	(21) Intake cam sprocket (RH)
(10) Chain guide (RH)	(22) Idler sprocket plate
(11) Chain tensioner lever (RH)	(23) Idler sprocket (Lower)
(12) Chain tensioner (RH)	(24) Idler sprocket color

- (25) Idler sprocket (Upper)
 (26) Exhaust cam sprocket (LH)
 (27) Intake cam sprocket (LH)

Tightening torque: N·m (kgf-m, ft-lb)**T1: 6.4 (0.64, 4.7)****T2: 7.8 (0.80, 5.8)****T3: 13 (1.3, 9.4)****T4: 16 (1.6, 11.6)****T5: 69 (7.0, 50.6)**

S143001A0502

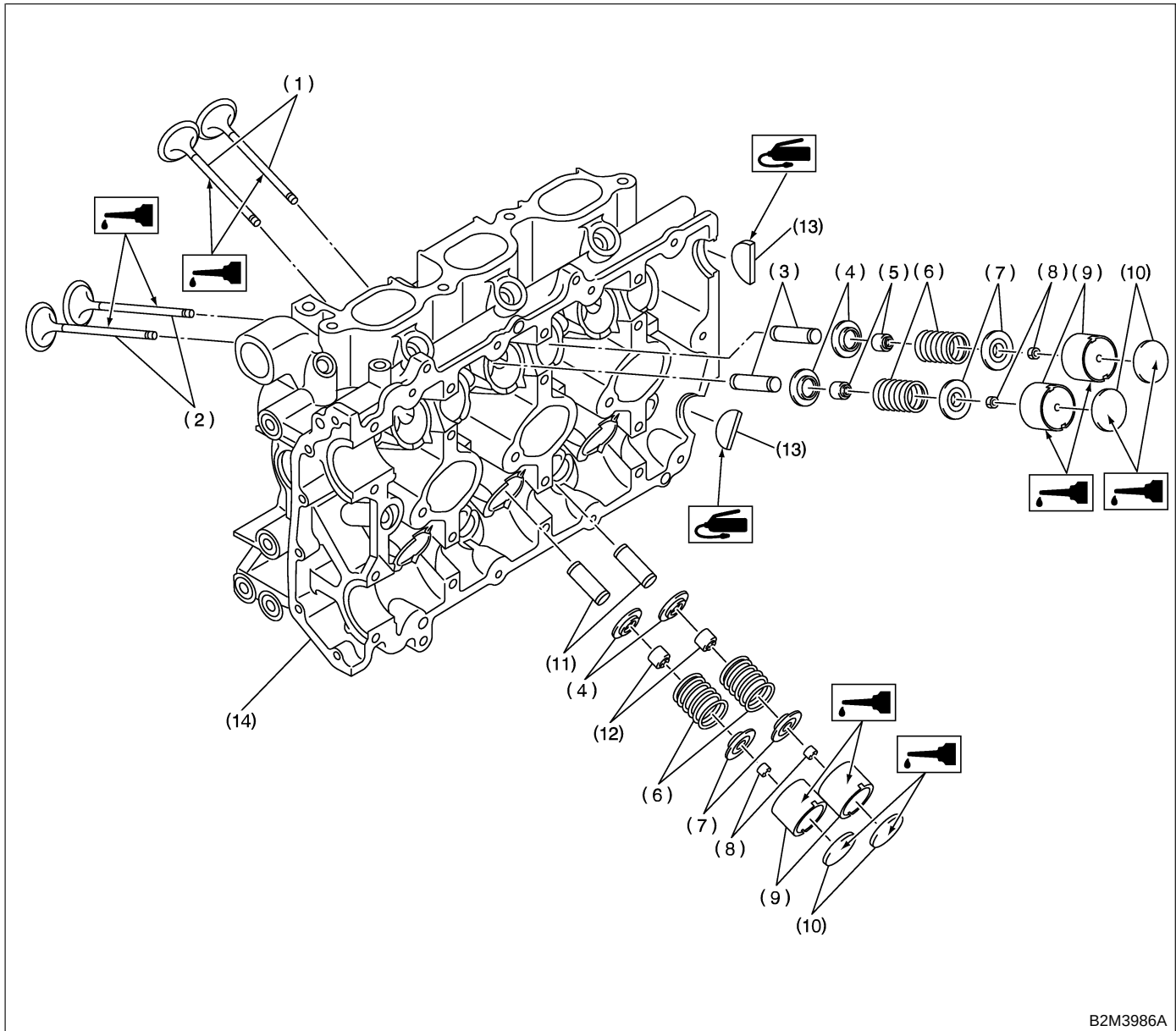


- (24) Plug
(25) Rocker cover (LH)

T5: 59 (6.0, 43)

5. CYLINDER HEAD AND VALVE ASSEMBLY

S143001A0504



B2M3986A

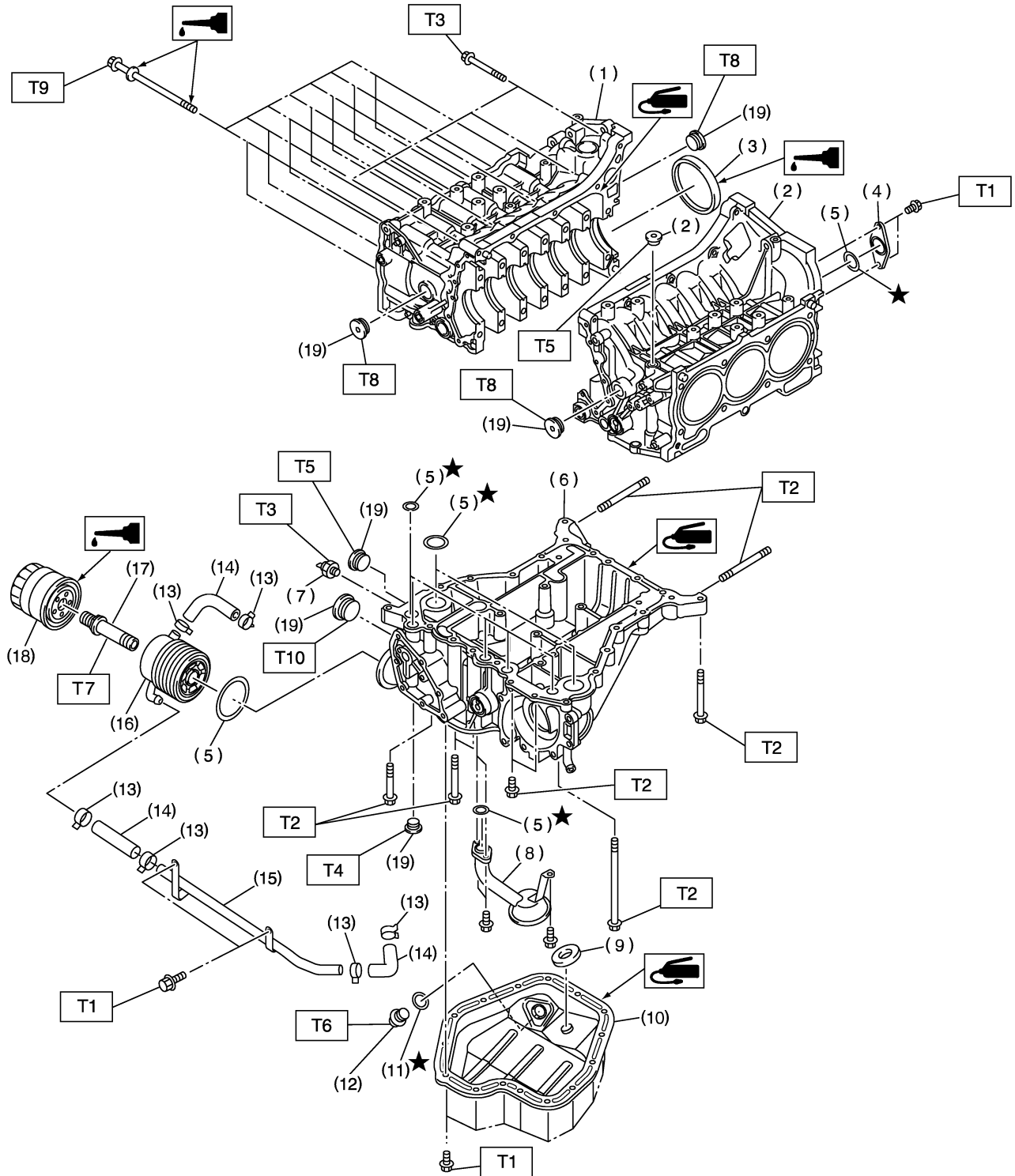
(1) Exhaust valve	(6) Valve spring	(11) Exhaust valve guide
(2) Intake valve	(7) Retainer	(12) Exhaust valve oil seal
(3) Intake valve guide	(8) Retainer key	(13) Cylinder head plug
(4) Valve spring seat	(9) Valve lifter	(14) Cylinder head
(5) Intake valve oil seal	(10) Shim	

GENERAL DESCRIPTION

Mechanical

6. CYLINDER BLOCK

S143001A0505



B2M3987A

GENERAL DESCRIPTION

Mechanical

- (1) Cylinder block (RH)
- (2) Cylinder block (LH)
- (3) Rear oil seal
- (4) Service hole cover
- (5) O-ring
- (6) Oil pan upper
- (7) Oil pressure switch
- (8) Oil strainer
- (9) Magnet
- (10) Oil pan
- (11) Metal gasket

- (12) Drain plug
- (13) Clamp
- (14) Hose
- (15) Oil cooler pipe
- (16) Oil cooler
- (17) Connector
- (18) Oil filter
- (19) Plug

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 18 (1.8, 13.0)

T3: 25 (2.5, 18)

T4: 34 (3.5, 25)

T5: 37 (3.8, 27)

T6: 44 (4.5, 33)

T7: 54 (5.5, 40)

T8: 69 (7.0, 51)

T9: Ref. to ME(H6)-65, Cylinder Block.

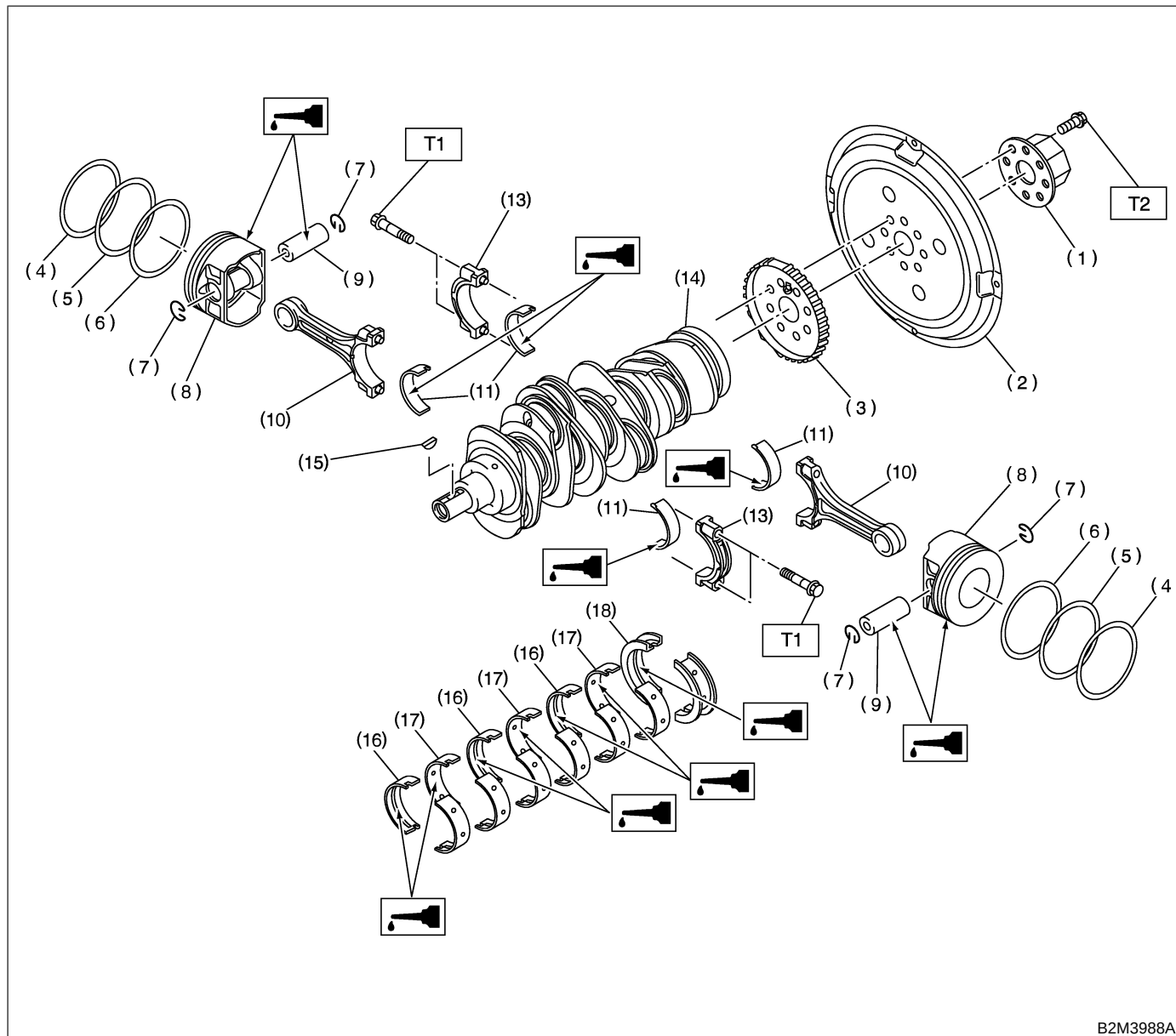
T10: 90 (9.2, 67)

GENERAL DESCRIPTION

Mechanical

7. CRANKSHAFT AND PISTON

S143001A0506



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

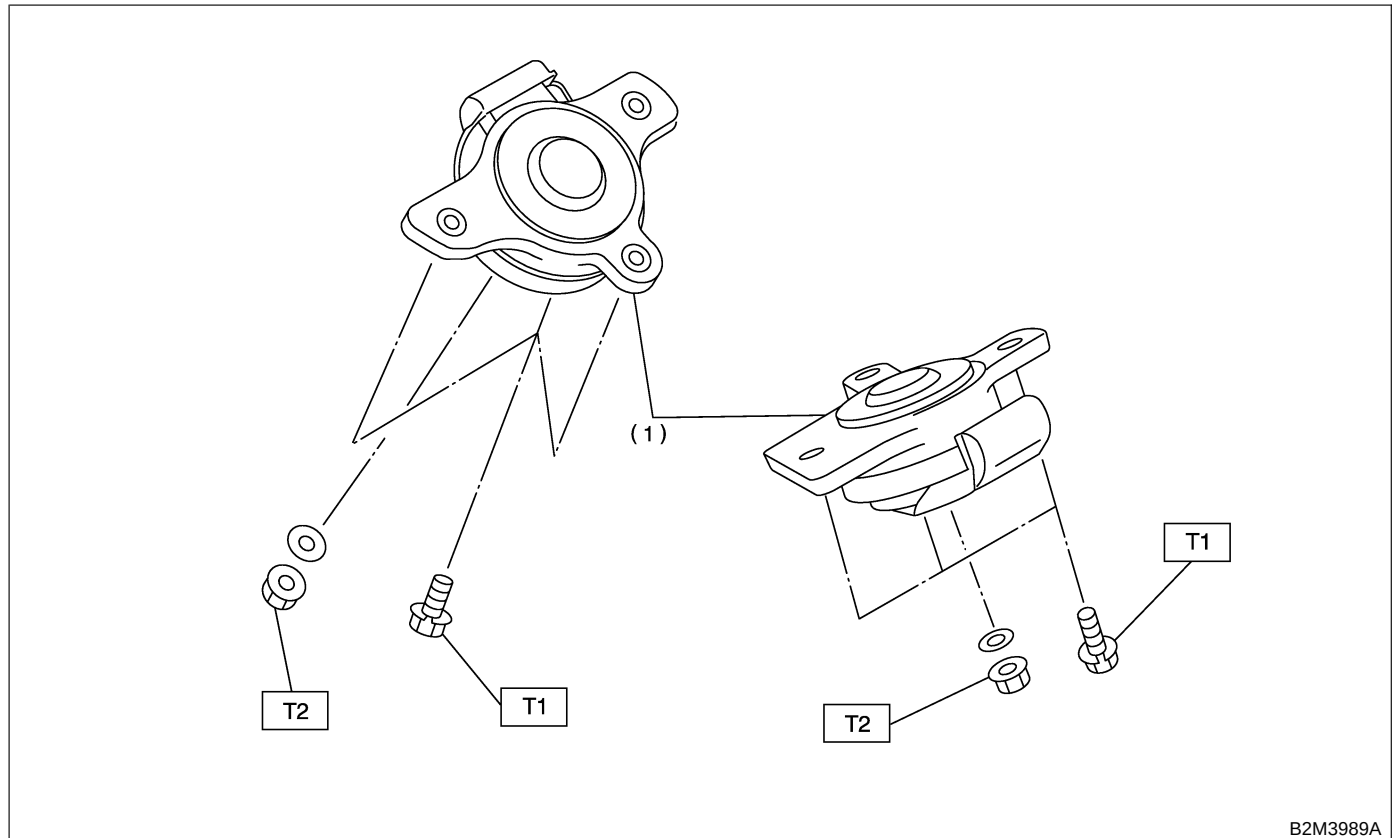
- | |
|------------------------------------|
| (17) Crankshaft bearing #2, #4, #6 |
| (18) Crankshaft bearing #7 |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 53 (5.4, 39)

T2: 81 (8.3, 60)

8. ENGINE MOUNTING S143001A0507



B2M3989A

(1) Front cushion rubber

Tightening torque: N·m (kgf·m, ft·lb)**T1: 34 (3.5, 25.3)****T2: 74 (7.5, 54)****C: CAUTION** S143001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

- All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
- Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
- Be careful not to let oil, grease or coolant contact the clutch disc and flywheel.
- All removed parts, if to be reused, should be reinstalled in the original positions and directions.
- Bolts, nuts and washers should be replaced with new ones as required.
- Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
- Remove or install engine in an area where chain hoists, lifting devices, etc. are available for ready use.
- 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.
- Prior to starting work, prepare the following:

GENERAL DESCRIPTION

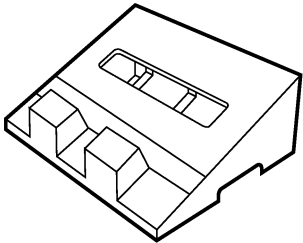
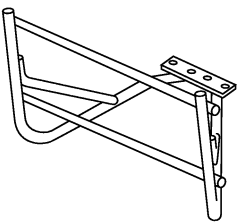
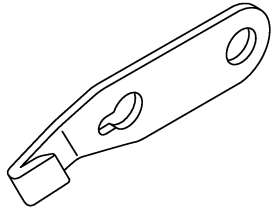
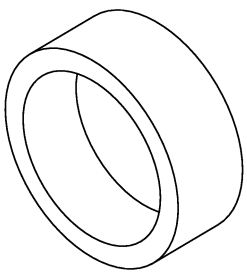
Mechanical

Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.

- Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

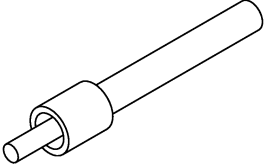
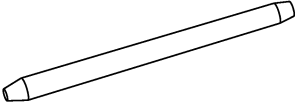
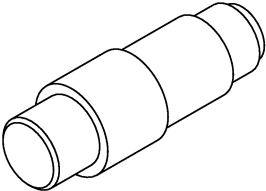
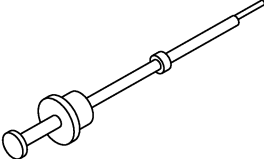
D: PREPARATION TOOL S143001A17

1. SPECIAL TOOLS S143001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3990	18250AA000 (Newly adopted tool)	CYLINDER HEAD TABLE	● Used for replacing valve guides. ● Used for removing and installing valve springs.
 B2M3991	18232AA000 (Newly adopted tool)	ENGINE STAND	Used for engine disassembly and assembly.
 B2M3853	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.
 B2M3854	18254AA000 (Newly adopted tool)	PISTON GUIDE	Used for installing piston in cylinder.

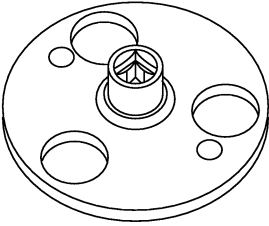
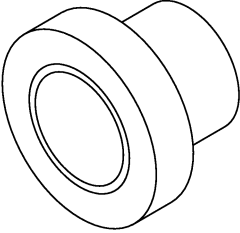
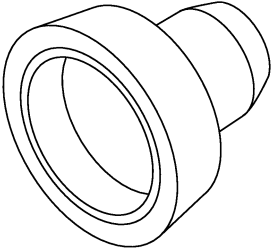
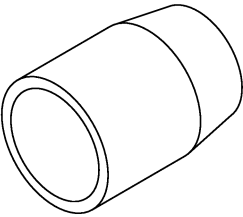
GENERAL DESCRIPTION

Mechanical

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3855	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 B2M3993	18253AA000 (Newly adopted tool)	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 B2M3857	18350AA000 (Newly adopted tool)	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.
 B2M3858	499097500	PISTON PIN REMOVER ASSY	Used for removing piston pin.

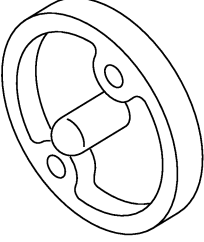
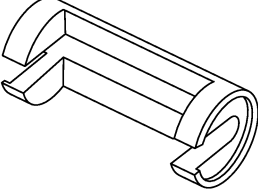
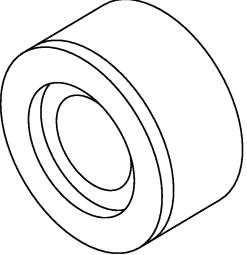
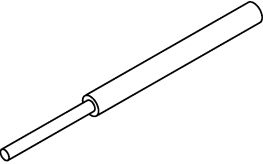
GENERAL DESCRIPTION

Mechanical

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3995	18231AA000 (Newly adopted tool)	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket.
 B2M3860	499587700	CAMSHAFT OIL SEAL INSTALLER	Used for installing cylinder head plug.
 B2M3861	499587200	CRANKSHAFT OIL SEAL INSTALLER	- Used for installing crankshaft oil seal. - Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 B2M3862	499597000	OIL SEAL GUIDE	- Used for installing camshaft oil seal. - Used with CAMSHAFT OIL SEAL INSTALLER (499587100).

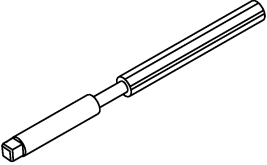
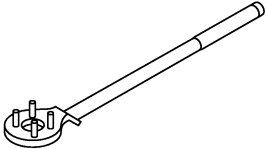
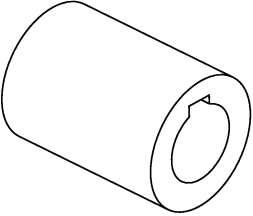
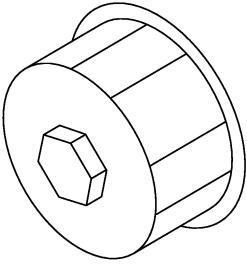
GENERAL DESCRIPTION

Mechanical

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3863	499597100	CRANKSHAFT OIL SEAL GUIDE	- Used for installing crankshaft oil seal. - Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
 B2M3864	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 B2M3865	18251AA000 (Newly adopted tool)	VALVE GUIDE ADJUSTER	Used for installing valve guides.
 B2M3867	499765700	VALVE GUIDE REMOVER	Used for removing valve guides.

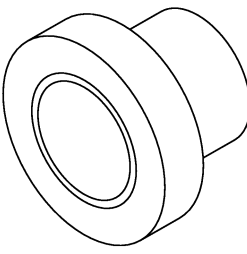
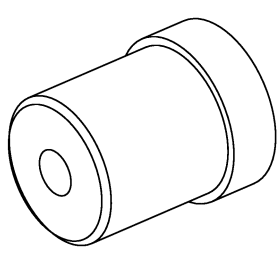
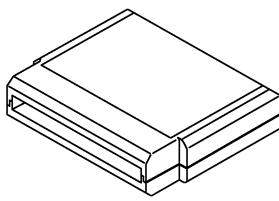
GENERAL DESCRIPTION

Mechanical

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3868	499765900	VALVE GUIDE REAMER	Used for reaming valve guides.
 B2M3870	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 B2M3871	18252AA000 (Newly adopted tool)	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 B2M3872	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.

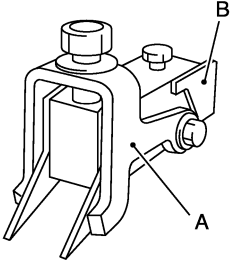
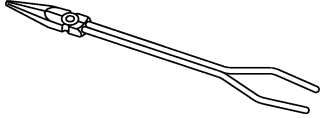
GENERAL DESCRIPTION

Mechanical

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3874	499587500	OIL SEAL INSTALLER	Used for installing front camshaft oil seal.
 B2M3875	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 B2M3876	24082AA130 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 B2M3877	22771AA0202	SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA020 (With printer) 22771AA030 (Without printer)

GENERAL DESCRIPTION

Mechanical

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3992A	18329AA000 (Newly adopted tool)	SHIM REPLACER ASSY	Used for correct valve clearance.
	A: 18330AA010 (Newly adopted tool)	LIFTER	If 498187200 SHIM REPLACER ASSY (H4) tool is available, it is commonly used for H6 by partially replacing the following parts: ● LIFTER (H4) → LIFTER (H6) A: 18330AA010 ● SLIDER (H4) → SLIDER (H6) B: 18351AA000
	B: 18351AA000 (Newly adopted tool)	SLIDER	
 B2M3994	18233AA000 (Newly adopted tool)	PISTON PIN CIR-CLIP PLIERS	Used for removing piston pin circlip.

2. GENERAL PURPOSE TOOLS S143001A1702

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.

E: PROCEDURE S143001E45

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- Camshaft
- Cylinder Head

2. Compression S143081

A: INSPECTION S143081A10

CAUTION:

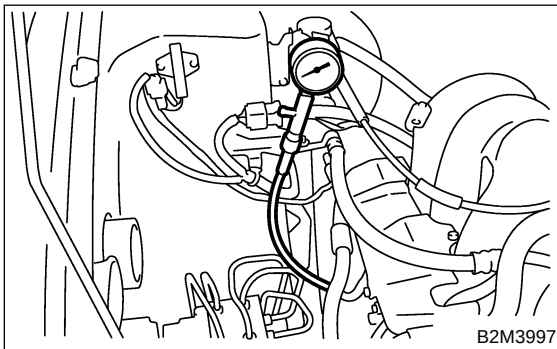
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

- 1) After warming-up the engine, turn ignition switch to OFF.
- 2) Make sure that the battery is fully charged.
- 3) Release fuel pressure. <Ref. to FU(H6)-49, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
- 4) Remove all the spark plugs. <Ref. to IG(H6)-4, REMOVAL, Spark Plug.>
- 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;

**1,275 — 1,471 kPa (13.0 — 15.0 kg/cm²,
185 — 213 psi)**

Limit;

1,128 kPa (11.5 kg/cm², 164 psi)

3. Idle Speed

S143082

A: INSPECTION

S143082A10

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.

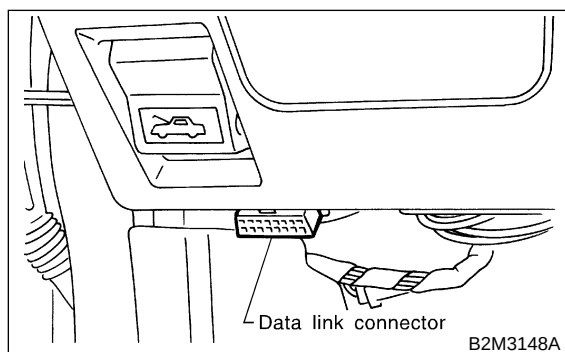
2) Warm-up the engine.

3) Stop the engine, and turn ignition switch to OFF.

4) When using SUBARU SELECT MONITOR <Ref. to ME(H6)-16, SPECIAL TOOLS, PREPARATION TOOL, General Description.>

(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 {Engine Control System} in Selection Menu.

(6) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.

(7) Select {1.12 Data Display} in Data Display Menu.

(8) 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.

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

Idle speed (No load and gears in N or P position):

600±50 rpm

6) 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 N or P position]:

700±50 rpm

CAUTION:

Never rotate idle adjusting screw. If idle speed is out of specifications, refer to General On-board Diagnosis Table under "Engine Control System". <Ref. to EN(H6)-2, Basic Diagnostic Procedure.>

4. Ignition Timing S143086

A: INSPECTION S143086A10

1) Before checking ignition timing, check the following:

(1) Ensure that air cleaner element is free from clogging, spark plugs are in good condition, and that hoses are connected properly.

(2) Ensure that malfunction indicator light (CHECK ENGINE light) does not illuminate.

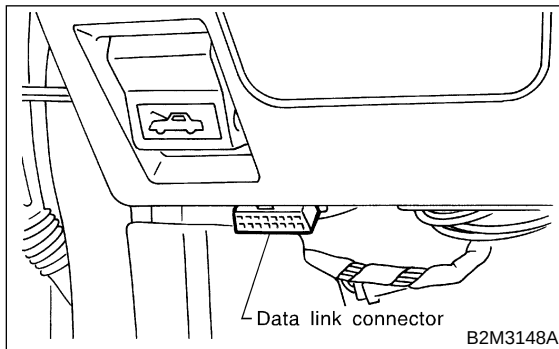
2) Warm-up the engine.

3) Stop the engine, and turn ignition switch to OFF.

4) When using SUBARU SELECT MONITOR <Ref. to ME(H6)-16, SPECIAL TOOLS, PREPARATION TOOL, General Description.>

(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 {Engine Control System} in Selection Menu.

(6) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.

(7) Select {1.12 Data Display} in Data Display Menu.

(8) Start engine at idle speed and check the ignition timing.

Ignition timing [BTDC/rpm]:

$10^{\circ} \pm 3^{\circ} / 600$

If the timing is not correct, check the ignition control system.

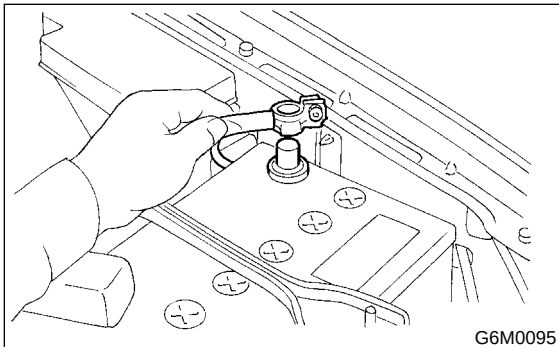
Refer to EN(H6) Engine Control System. <Ref. to EN(H6)-2, Basic Diagnostic Procedure.>

5. Valve Clearance S143083

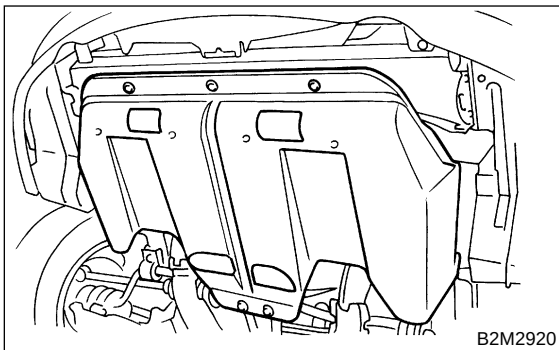
A: INSPECTION S143083A10

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

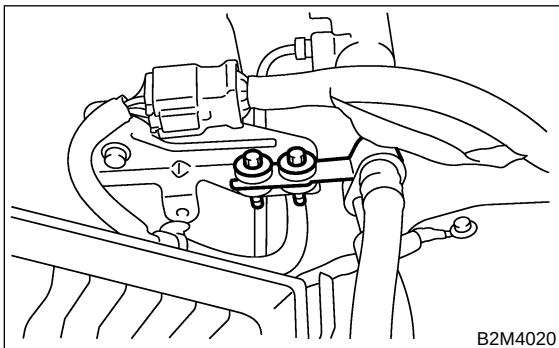
- 1) Set the vehicle on the lift.
- 2) Disconnect battery ground cable.



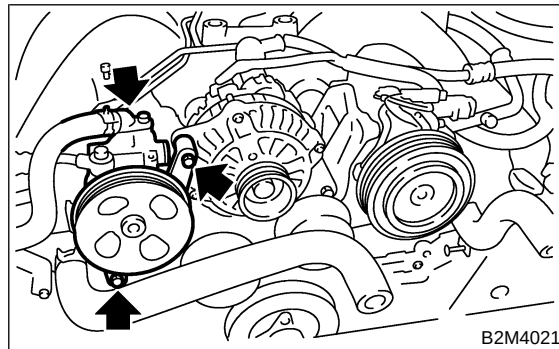
- 3) Lift up the vehicle.
- 4) Remove under cover.



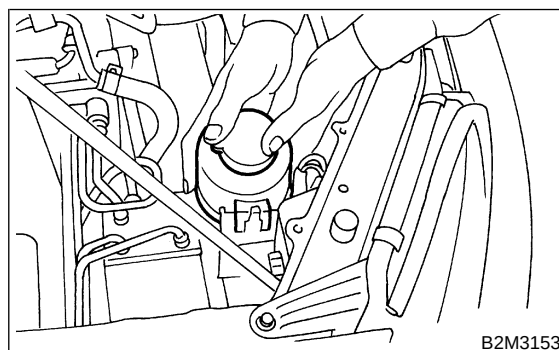
- 5) Lower the vehicle.
- 6) Place suitable container under the vehicle.
- 7) When inspecting RH side cylinder.
 - (1) Remove air intake duct and air cleaner case. <Ref. to IN(H6)-7, REMOVAL, Air Intake Duct.> and <Ref. to IN(H6)-5, REMOVAL, Air Cleaner.>
 - (2) Remove V-belt. <Ref. to ME(H6)-31, REMOVAL, V-belt.>
 - (3) Remove power steering hose from bracket.



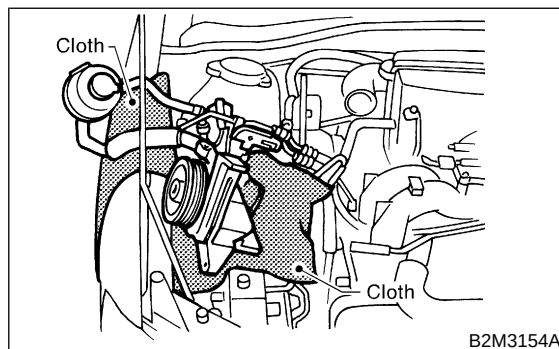
- (4) Remove bolts which install power steering pump bracket.



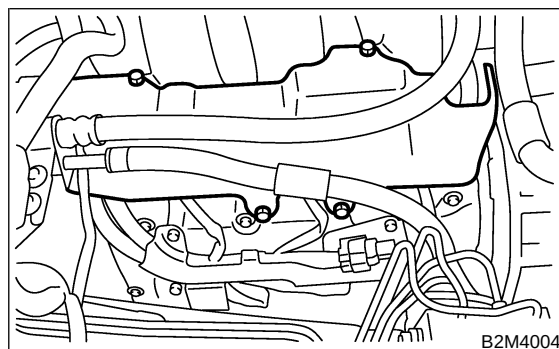
- (5) Remove power steering tank from the bracket by pulling it upward.



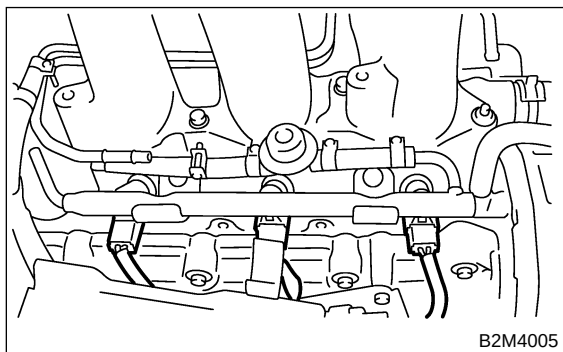
- (6) Place power steering pump on the right side wheel apron.



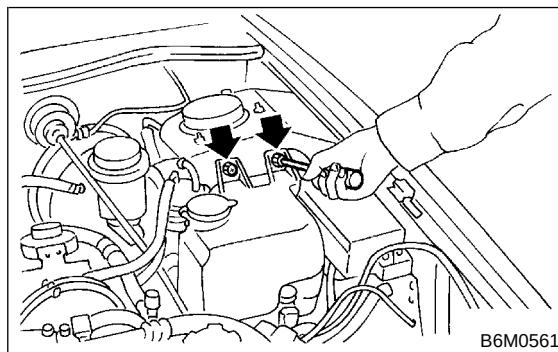
- (7) Remove fuel pipe protector RH.



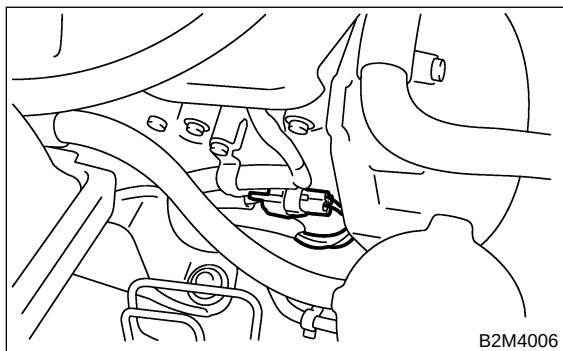
(8) Disconnect fuel injector connectors.



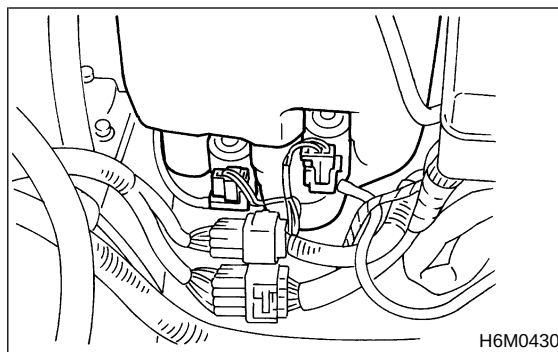
(3) Remove washer tank mounting bolts.



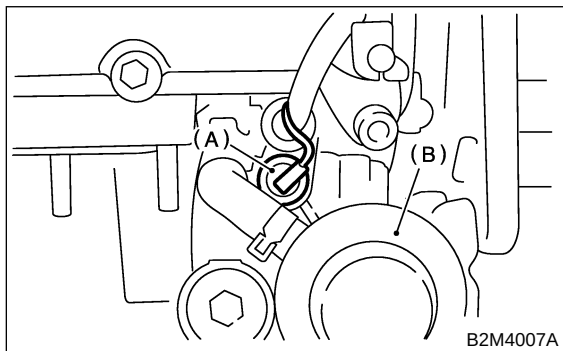
(9) Disconnect front oxygen (A/F) sensor connector.



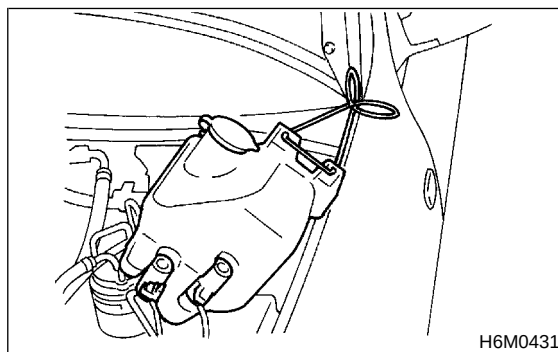
(4) Disconnect washer motor connectors.



(10) Disconnect oil pressure switch connector.

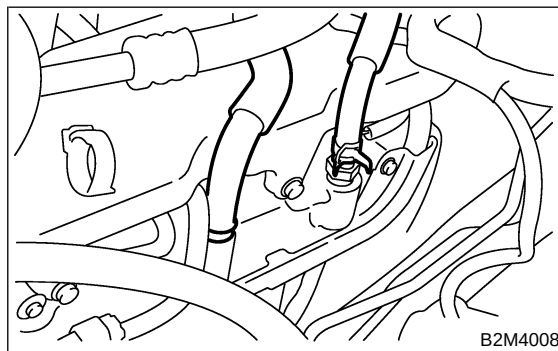


(5) Move washer tank upward.



- (A) Oil pressure switch
- (B) Oil filter

(6) Disconnect PCV and blow-by hose from rocker cover LH.



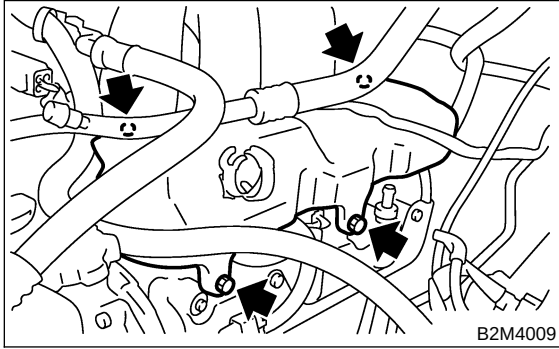
- (11) Remove ignition coils. <Ref. to IG(H6)-7, REMOVAL, Ignition Coil and Ignitor Assembly.>
- (12) Remove rocker cover RH. <Ref. to ME(H6)-55, REMOVAL, Camshaft.>

8) When inspecting LH side cylinder.

- (1) Set the vehicle on the lift.
- (2) Remove battery.

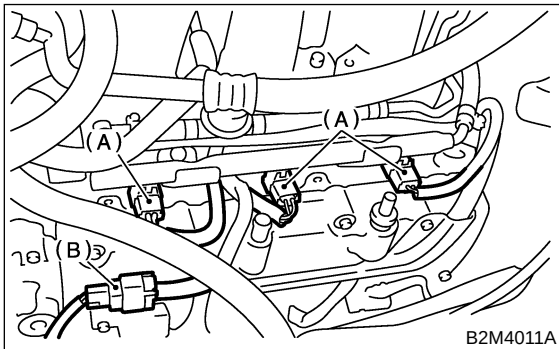
VALVE CLEARANCE

(7) Remove fuel pipe protector LH.



(8) Disconnect fuel injector connectors. (A)

(9) Disconnect front oxygen (A/F) sensor connector. (B)

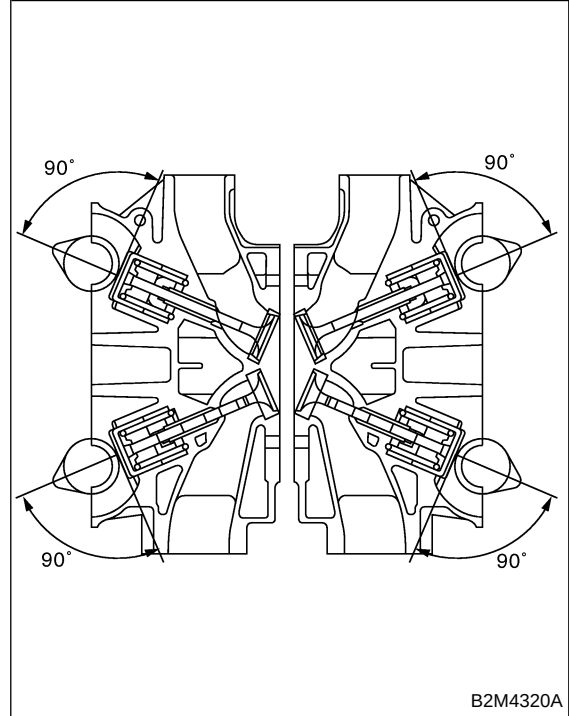


(10) Remove ignition coils. <Ref. to IG(H6)-7, REMOVAL, Ignition Coil and Ignitor Assembly.>

(11) Remove rocker cover LH. <Ref. to ME(H6)-55, REMOVAL, Camshaft.>

9) Using the ST, turn the crankshaft clockwise. Adjust the camshaft position so that the cam lobe is perpendicular to the shim as shown in the figure.

ST 18252AA000 CRANKSHAFT SOCKET



10) Measure intake valve and exhaust valve clearances by using thickness gauge (A).

CAUTION:

Insert the thickness gauge in as horizontal a direction as possible with respect to the shim.

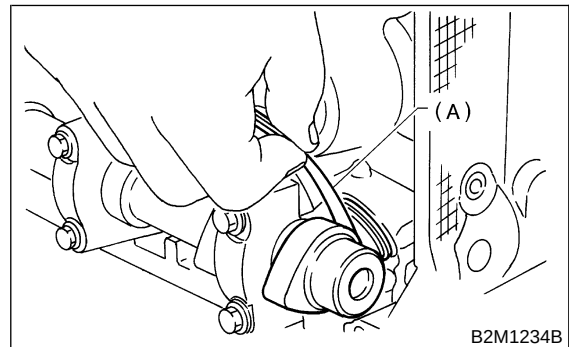
Valve clearance:

Intake: $0.20^{+0.04}_{-0.06}$ mm ($0.0079^{+0.0016}_{-0.0024}$ in)

Exhaust: 0.25 ± 0.05 mm (0.0098 ± 0.0020 in)

NOTE:

If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.



11) If necessary, adjust the valve clearance. <Ref. to ME(H6)-29, ADJUSTMENT, Valve Clearance.>

12) Further turn crankshaft pulley clockwise. Using the same procedure described previously, then measure valve clearances again.

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

B: ADJUSTMENT

S143083A01

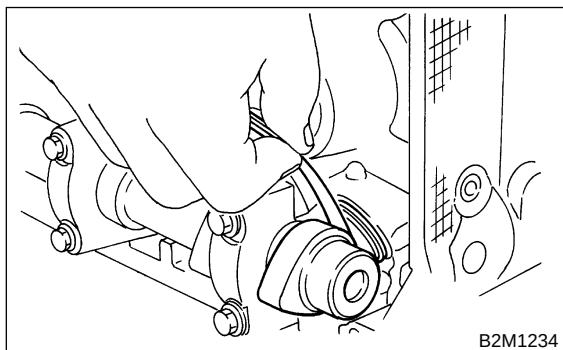
CAUTION:

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

1) Measure all valve clearances. <Ref. to ME(H6)-26, INSPECTION, Valve Clearance.>

NOTE:

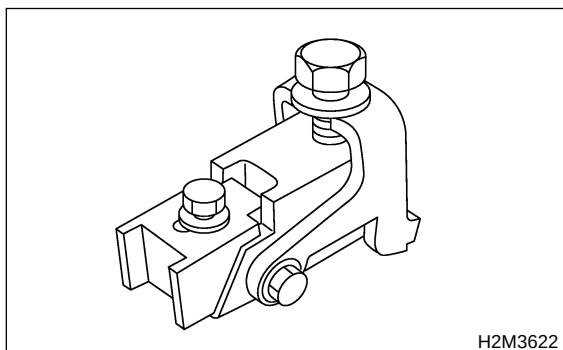
Record each valve clearance after it has been measured.



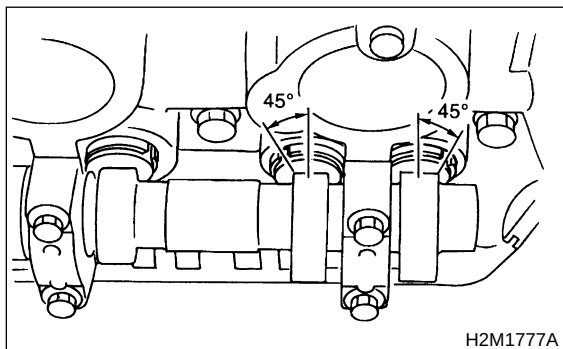
2) Remove shim from valve lifter.

(1) Prepare the ST.

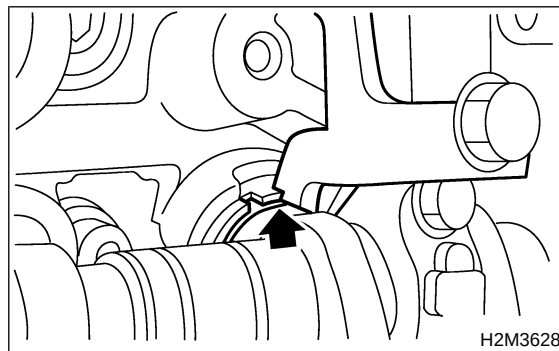
ST 18329AA000 SHIM REPLACER



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



(3) Adjust SHIM REPLACER notch to valve lifter and set it.

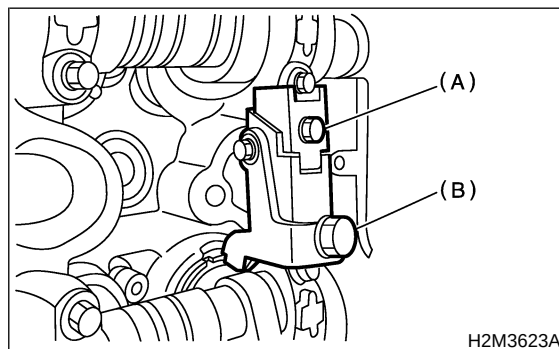


NOTE:

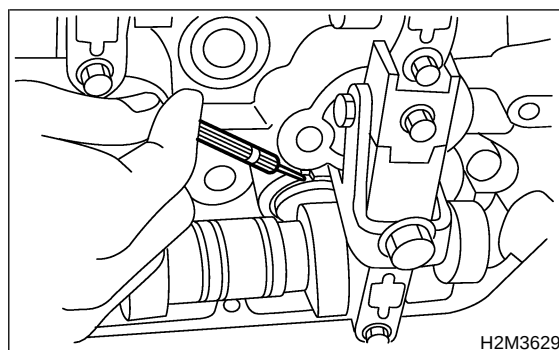
When setting, be careful SHIM REPLACER edge does not touch shim.

(4) Tighten bolt (A) and install it to the cylinder head.

(5) Tighten bolt (B) and insert the valve lifter.



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

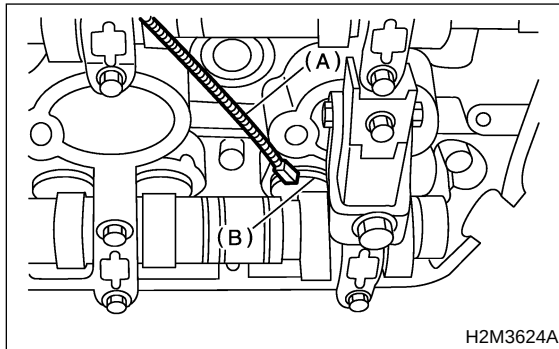


VALVE CLEARANCE

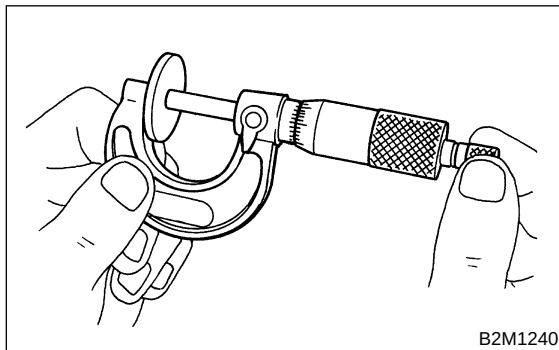
Mechanical

NOTE:

By using a magnet (A), the shim (B) can be taken out without dropping it.



3) Measure thickness of shim with micrometer.



4) Select a shim of suitable thickness using measured valve clearance and shim thickness, by referring to the following table.

5) Set suitable shim selected in step 4) to valve lifter.

Unit: mm	
Intake valve: $S = (V + T) - 0.20$	
Exhaust valve: $S = (V + T) - 0.25$	
S: Shim thickness to be used	
V: Measured valve clearance	
T: Shim thickness required	

Part No.	Thickness mm (in)
13218 AK010	2.00 (0.0787)
13218 AK020	2.02 (0.0795)
13218 AK030	2.04 (0.0803)
13218 AK040	2.06 (0.0811)
13218 AK050	2.08 (0.0819)
13218 AK060	2.10 (0.0827)
13218 AK070	2.12 (0.0835)
13218 AK080	2.14 (0.0843)
13218 AK090	2.16 (0.0850)
13218 AK100	2.18 (0.0858)
13218 AK110	2.20 (0.0866)
13218 AE710	2.22 (0.0874)
13218 AE730	2.24 (0.0882)
13218 AE750	2.26 (0.0890)
13218 AE770	2.28 (0.0898)
13218 AE790	2.30 (0.0906)
13218 AE810	2.32 (0.0913)
13218 AE830	2.34 (0.0921)
13218 AE850	2.36 (0.0929)
13218 AE870	2.38 (0.0937)
13218 AE890	2.40 (0.0945)
13218 AE910	2.42 (0.0953)
13218 AE920	2.43 (0.0957)
13218 AE930	2.44 (0.0961)
13218 AE940	2.45 (0.0965)
13218 AE950	2.46 (0.0969)
13218 AE960	2.47 (0.0972)
13218 AE970	2.48 (0.0976)
13218 AE980	2.49 (0.0980)
13218 AE990	2.50 (0.0984)
13218 AF000	2.51 (0.0988)
13218 AF010	2.52 (0.0992)
13218 AF020	2.53 (0.0996)
13218 AF030	2.54 (0.1000)
13218 AF040	2.55 (0.1004)
13218 AF050	2.56 (0.1008)
13218 AF060	2.57 (0.1012)
13218 AF070	2.58 (0.1016)
13218 AF090	2.60 (0.1024)
13218 AF110	2.62 (0.1031)
13218 AF130	2.64 (0.1039)
13218 AF150	2.66 (0.1047)
13218 AF170	2.68 (0.1055)
13218 AF190	2.70 (0.1063)

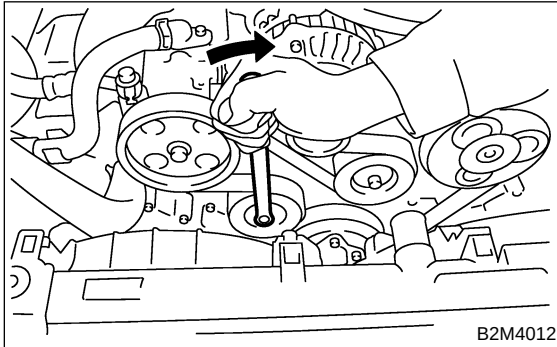
6) Inspect all valves for clearance again at this stage. If the valve clearance is not correct, repeat the procedure over again from the first step.

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

6. V-belt S143080

A: REMOVAL S143080A18

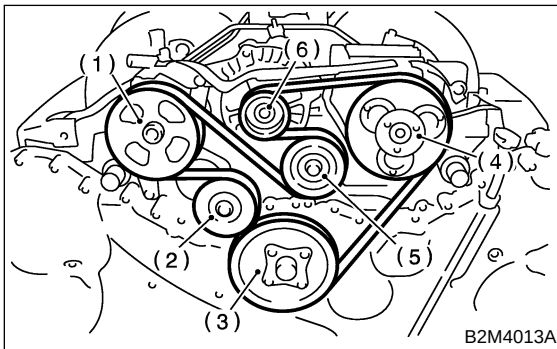
- 1) Fit the tool to the belt tensioner mounting bolt.
- 2) Turn the tool clockwise, and loosen the V-belt to remove.



- 3) Remove the V-belt cover.

B: INSTALLATION S143080A11

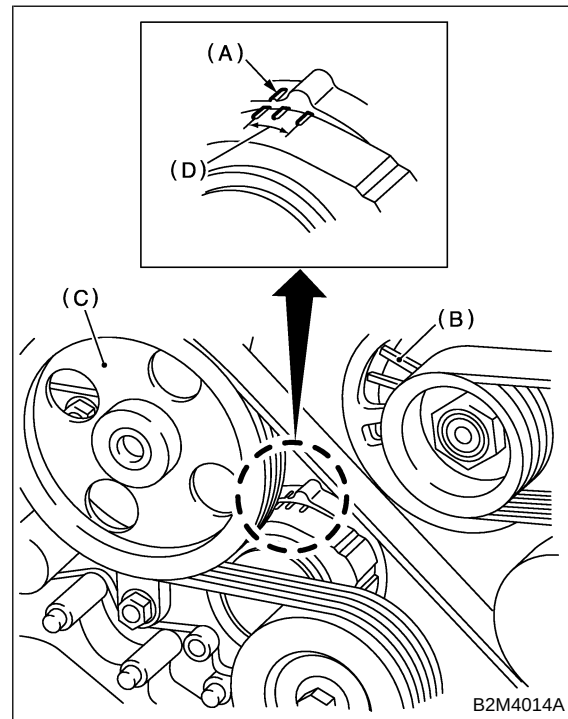
- 1) Install in the reverse order of removal.



- (1) Power steering oil pump
- (2) Belt tension adjuster
- (3) Crankshaft pulley
- (4) A/C compressor
- (5) Belt idler
- (6) Generator

C: INSPECTION S143080A10

- 1) Replace belts, if cracks, fraying or wear is found.
- 2) Check that the V-belt automatic tensioner indicator is within the range (D).



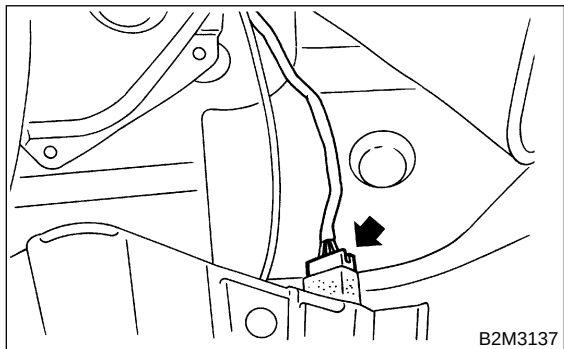
- (A) Indicator
- (B) Generator
- (C) Power steering oil pump
- (D) Service limit

7. Engine Assembly S143079

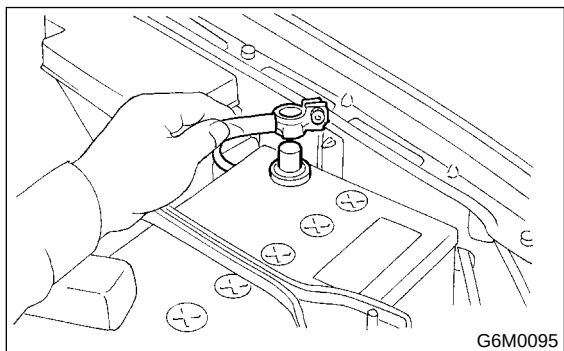
A: REMOVAL S143079A18

- 1) Set the vehicle on lift arms.
- 2) Open front hood fully and support with stay.
- 3) Raise rear seat, and turn floor mat up.
- 4) Release fuel pressure. <Ref. to FU(H6)-49, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>

- (1) Disconnect connector of fuel tank cord from the nearest harness.



- (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".
- 5) Remove filler cap.
- 6) Disconnect battery ground terminal.



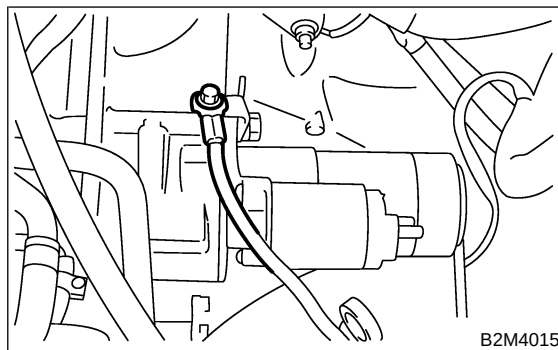
- 7) Remove air intake duct, air cleaner case and air intake chamber.

<Ref. to IN(H6)-7, REMOVAL, Air Intake Duct.>, <Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.> and <Ref. to IN(H6)-5, REMOVAL, Air Cleaner.>

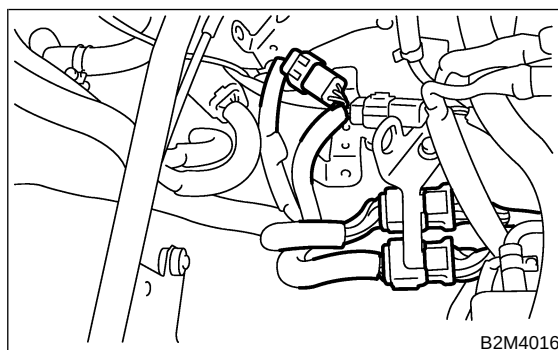
- 8) Lift up the vehicle.
- 9) Remove under cover.
- 10) Remove radiator from vehicle. <Ref. to CO(H6)-23, REMOVAL, Radiator.>
- 11) Remove V-belt. <Ref. to ME(H6)-31, REMOVAL, V-belt.>
- 12) Disconnect A/C pressure hoses from A/C compressor. <Ref. to AC-37, REMOVAL, Flexible Hose.>

- 13) Disconnect the following connectors and cables.

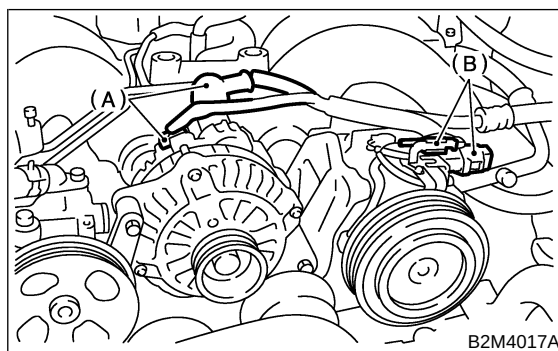
- (1) Engine ground terminal



- (2) Engine harness connectors

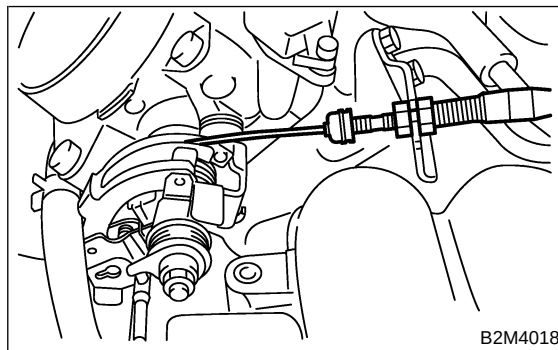


- (3) Generator connector, terminal and A/C compressor connector



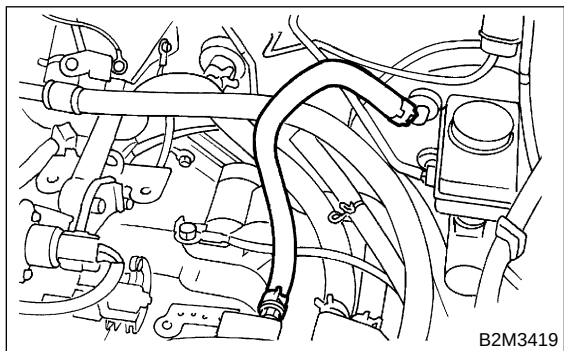
- (A) A/C compressor connector
- (B) Generator connector and terminal

- (4) Accelerator cable

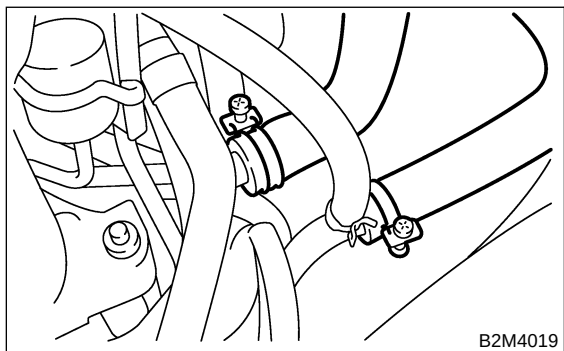


14) Disconnect the following hoses.

(1) Brake booster vacuum hose

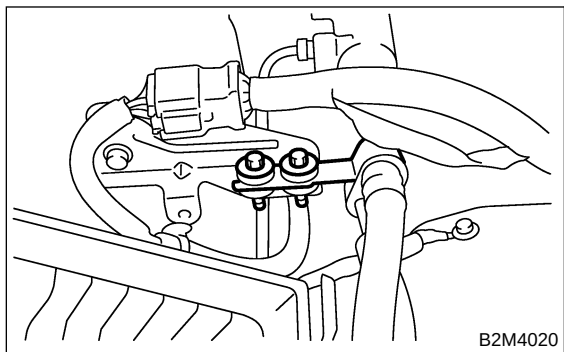


(2) Heater inlet outlet hose



15) Remove power steering pump from bracket.

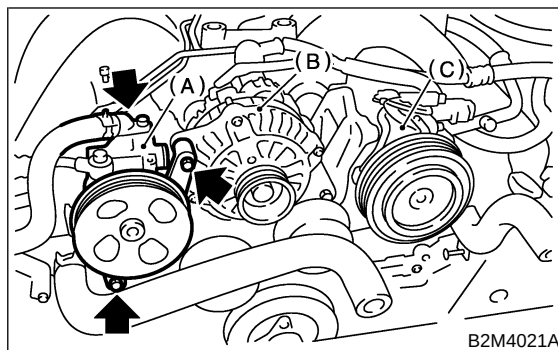
(1) Remove pipe with bracket.



(2) Remove bolts which install power steering pump bracket.

CAUTION:

Do not separate the hose and the pipe from the pump body.

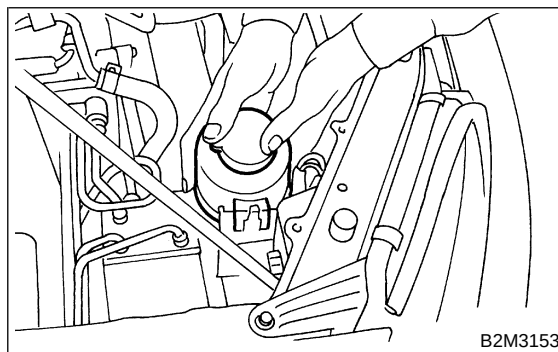


(A) Power steering pump

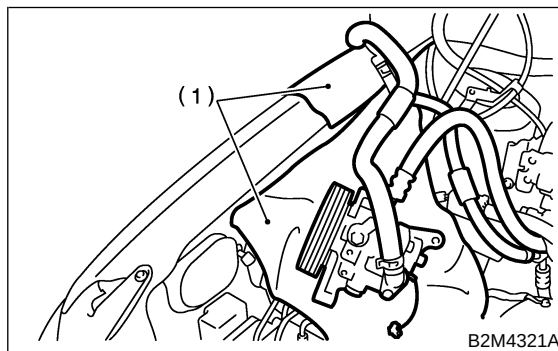
(B) Generator

(C) A/C compressor

(3) Remove power steering tank from the bracket by pulling it upward.



(4) Place power steering pump on the right side wheel apron.



(1) Cloth

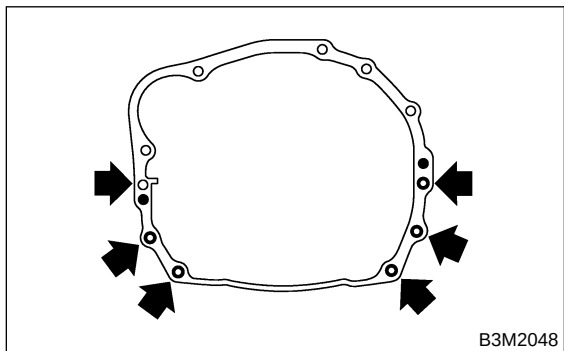
16) Remove front exhaust pipe.

<Ref. to EX(H6)-5, REMOVAL, Front Exhaust Pipe.>

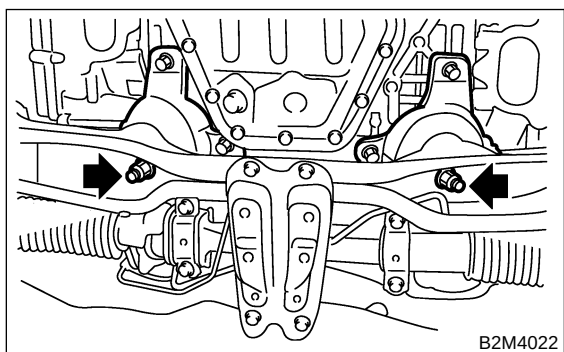
ENGINE ASSEMBLY

Mechanical

17) Remove nuts which hold lower side of transmission to engine.



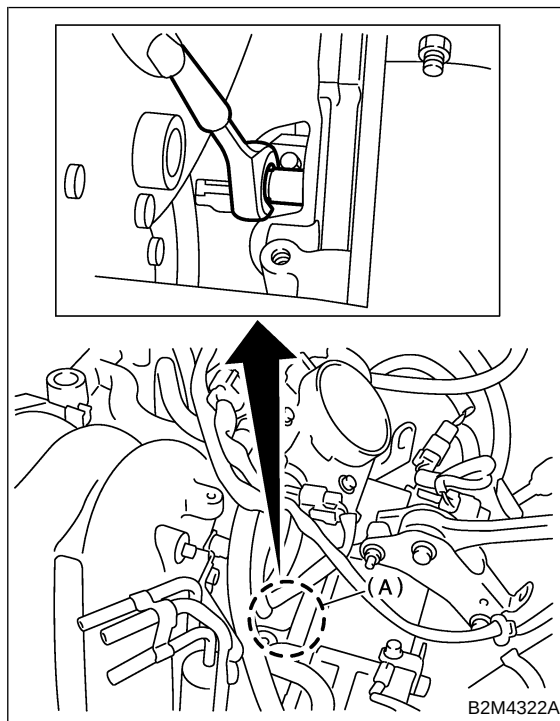
18) Remove nuts which install front cushion rubber onto front crossmember.



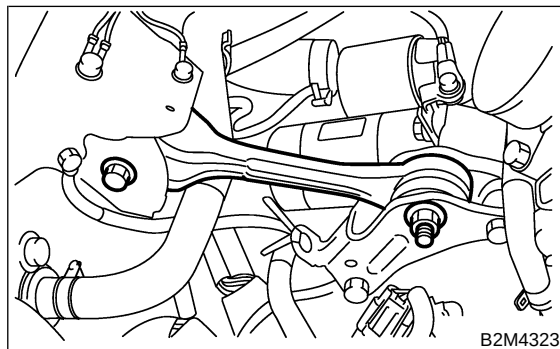
19) Separate torque converter clutch from drive plate.

- (1) Lower the vehicle.
- (2) Remove service hole plug (A).
- (3) Remove bolts which hold torque converter clutch to drive plate.
- (4) Remove other bolts while rotating the engine using ST.

ST 499977100 CRANK PULLEY WRENCH



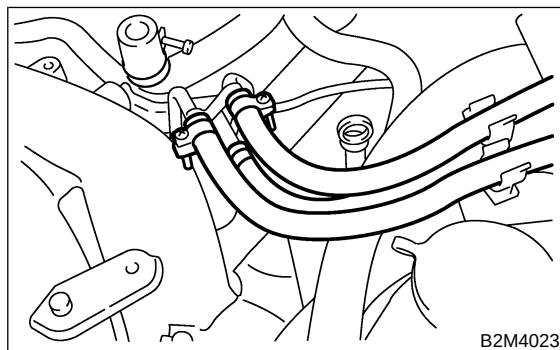
20) Remove pitching stopper.



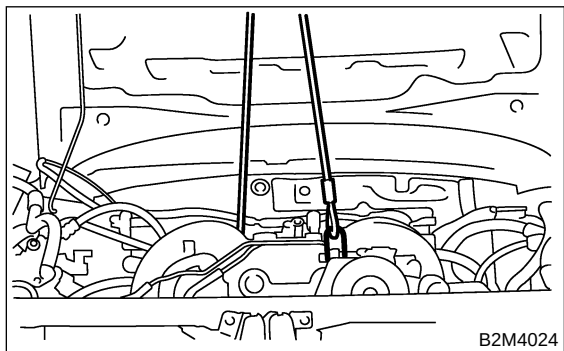
21) Disconnect fuel delivery hose, return hose and evaporation hose.

CAUTION:

- Disconnect hose with its end wrapped with cloth to prevent fuel from splashing.
- Catch fuel from hose into container.



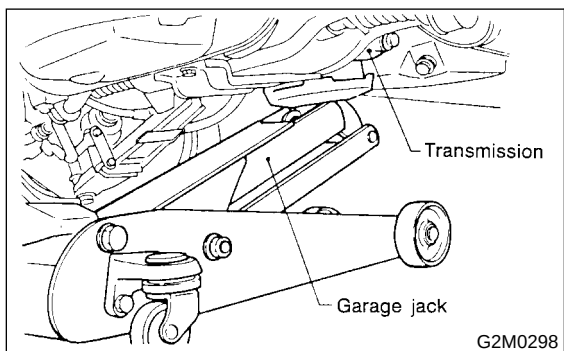
22) Support engine with a lifting device and wire ropes.



23) Support transmission with a garage jack.

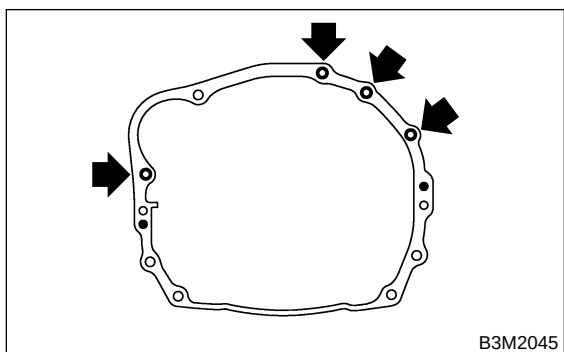
CAUTION:

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.



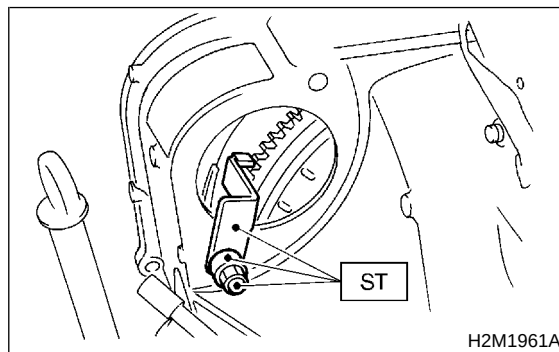
24) Separation of engine and transmission.

- (1) Remove starter. <Ref. to SC(H6)-6, REMOVAL, Starter.>
- (2) Remove bolts which hold upper side of transmission to engine.



25) Install ST to torque converter clutch case. (AT model)

ST 498277200 STOPPER SET

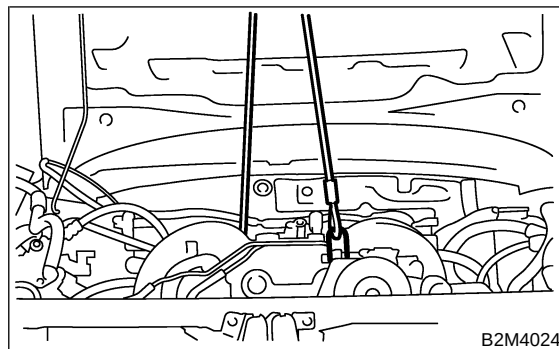


26) Remove engine from vehicle.

- (1) Slightly raise engine.
- (2) Raise transmission with garage jack.
- (3) Move engine horizontally until main shaft 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 level gauge, etc.



27) Remove front cushion rubbers.

B: INSTALLATION

S143079A11

- 1) Install front cushion rubbers.

Tightening torque:

34 N·m (3.5 kgf-m, 25.3 ft-lb)

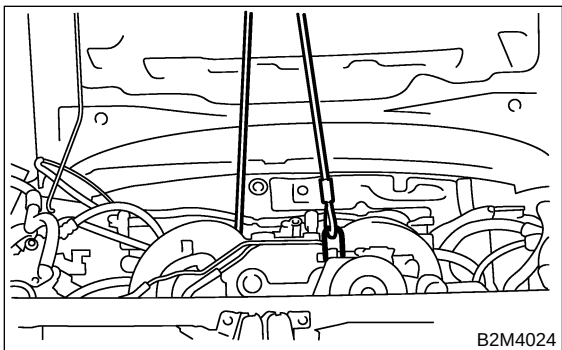
- 2) Position engine in engine compartment and align it with transmission.

ENGINE ASSEMBLY

Mechanical

CAUTION:

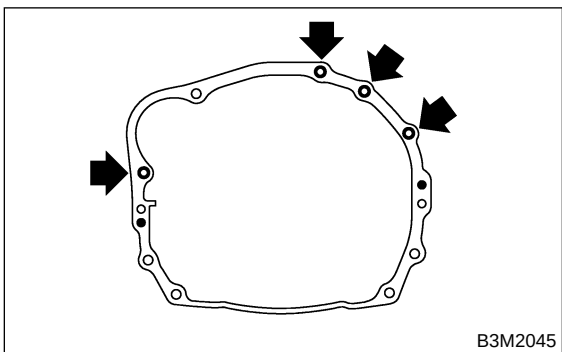
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.



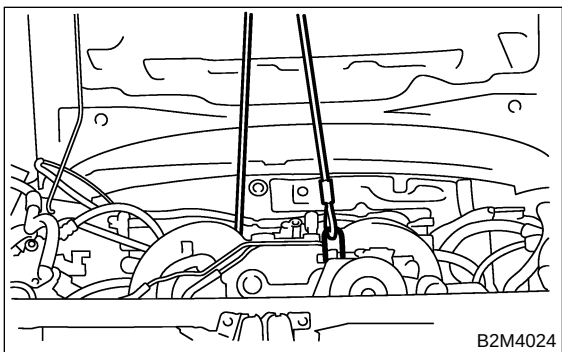
- 3) Tighten bolts which hold upper side of transmission to engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 4) Remove lifting device and wire ropes.



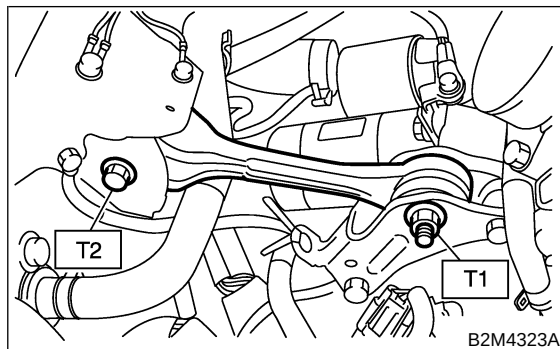
- 5) Remove garage jack.

- 6) Install pitching stopper.

Tightening torque:

T1: 49 N·m (5.0 kgf-m, 36.2 ft-lb)

T2: 57 N·m (5.8 kgf-m, 42 ft-lb)



- 7) Remove ST from torque converter clutch case.

NOTE:

Be careful not to drop the ST into the torque converter clutch case when removing ST.

ST 498277200 STOPPER SET

- 8) Install starter. <Ref. to SC(H6)-6, INSTALLATION, Starter.>

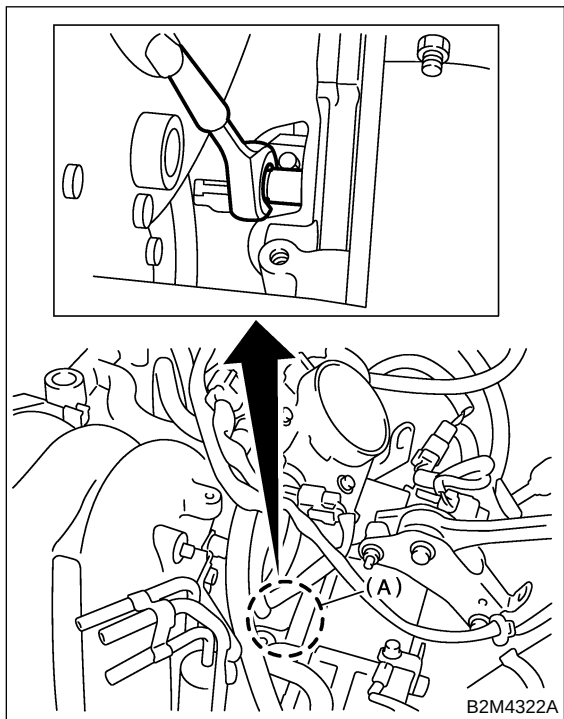
- 9) Install torque converter clutch onto drive plate.
(1) Tighten bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the engine by using ST.

CAUTION:

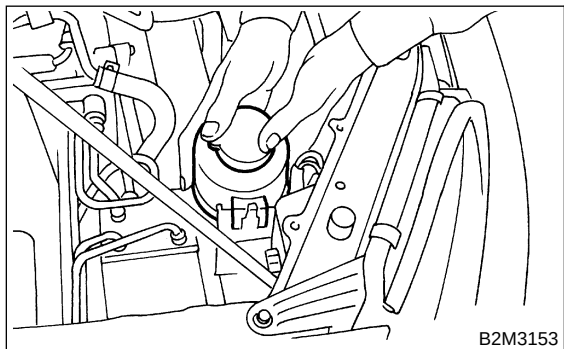
Be careful not to drop bolts into torque converter clutch housing.

ST 499977100 CRANK PULLEY WRENCH

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

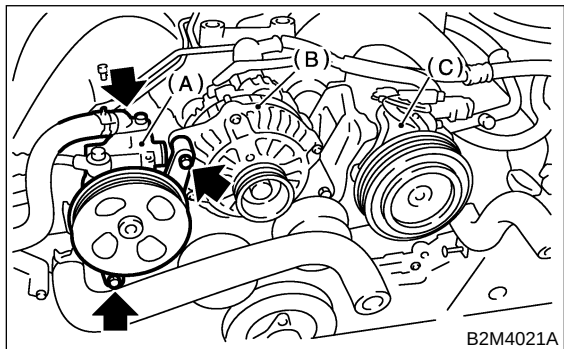


- (3) Clog plug (A) onto service hole.
 10) Install power steering pump on bracket.
 (1) Install power steering tank on bracket.

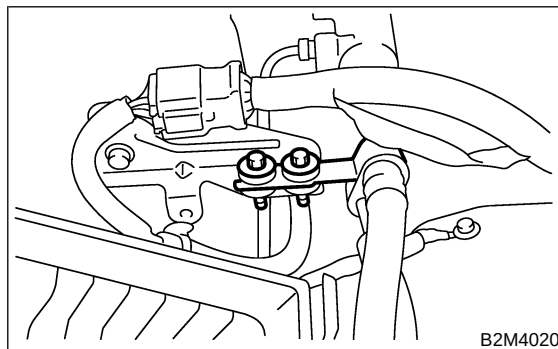


- (2) Install power steering pump on bracket, and tighten bolts.

Tightening torque:
20.1 N·m (2.05 kgf-m, 14.8 ft-lb)

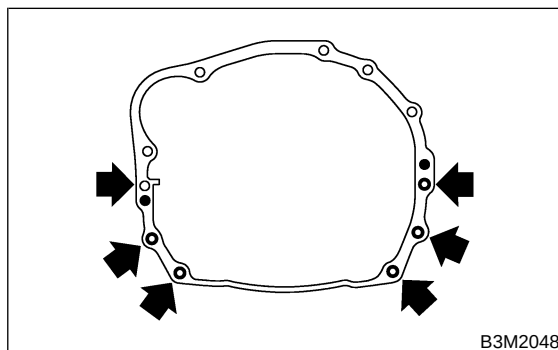


- (3) Tighten bolt which installs power steering pipe bracket.



- 11) Tighten nuts which hold lower side of transmission to engine.

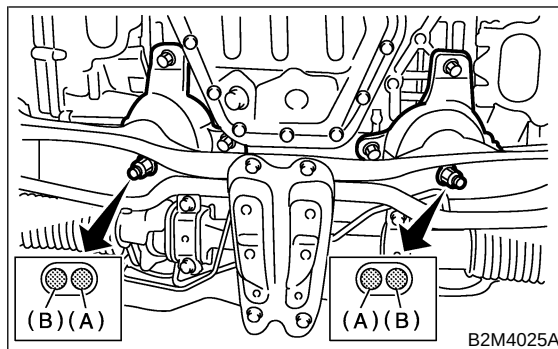
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 12) Tighten nuts which install front cushion rubber onto crossmember.

Tightening torque:
74 N·m (7.5 kgf-m, 54 ft-lb)

CAUTION:
 Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.

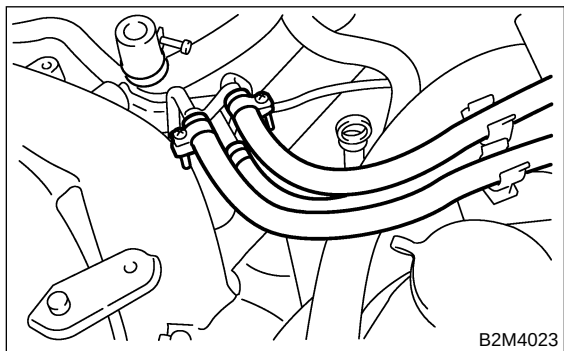


- 13) Install front exhaust pipe.
 <Ref. to EX(H6)-6, INSTALLATION, Front Exhaust Pipe.>
 14) Connect the following hoses.

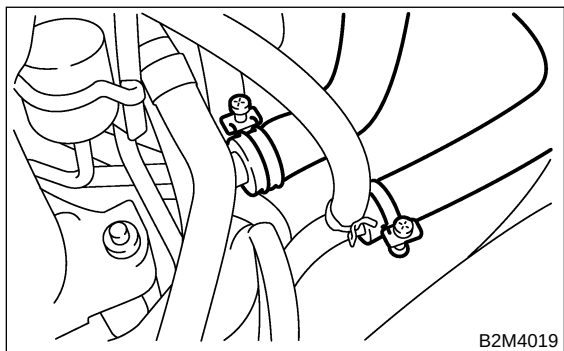
ENGINE ASSEMBLY

Mechanical

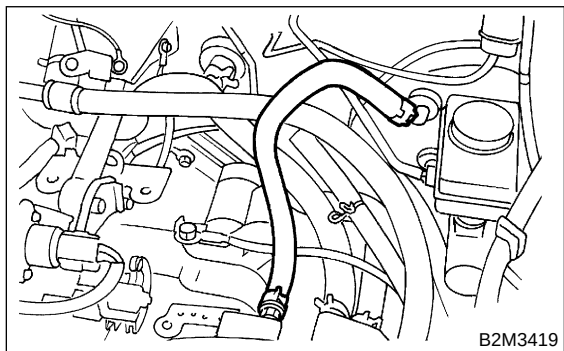
- (1) Fuel delivery hose, return hose and evaporation hose



- (2) Heater inlet and outlet hoses



- (3) Brake booster vacuum hose

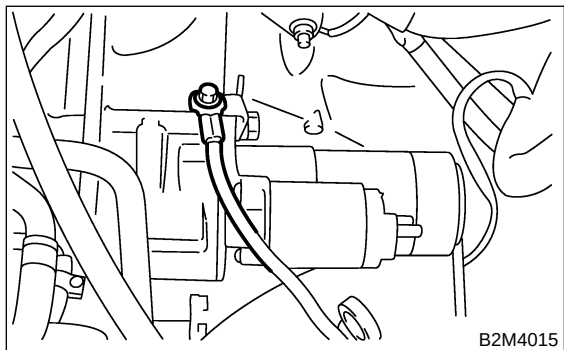


- 15) Connect the following connectors.

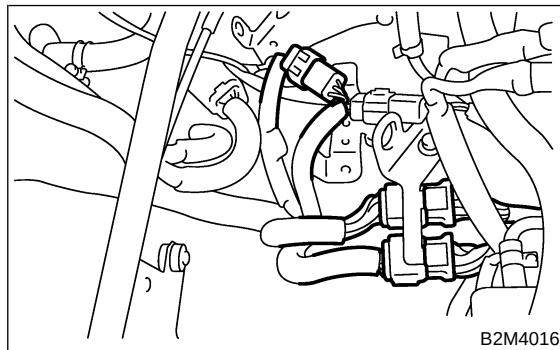
- (1) Engine ground terminals

Tightening torque:

14 N·m (1.4 kgf-m, 10.1 ft-lb)



- (2) Engine harness connectors



- (3) Alternator connector and terminal (A)

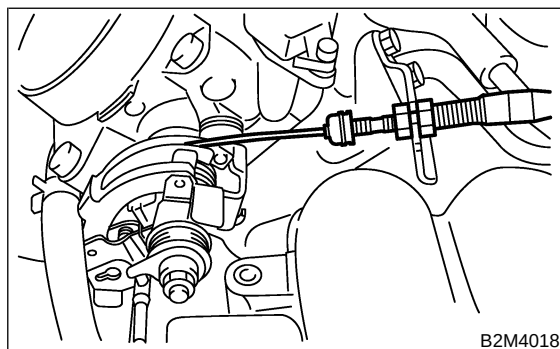
- (4) A/C compressor connectors (B)



- 16) Connect the following cables.

- (1)

Accelerator cable



CAUTION:

After connecting each cable, adjust them.

- 17) Install A/C pressure hoses.

<Ref. to AC-37, INSTALLATION, Flexible Hose.>

- 18) Install V-belt.

- 19) Install radiator to vehicle. <Ref. to CO(H6)-24, INSTALLATION, Radiator.>

- 20) Install air intake duct, cleaner case and air intake chamber.

<Ref. to IN(H6)-2, General Description.>

- 21) Install under cover.

- 22) Install battery in the vehicle, and connect cables.

- 23) Fill coolant.

<Ref. to CO(H6)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

24) Check ATF level and correct if necessary.

<Ref. to AT-9, Automatic Transmission Fluid.>

25) Charge A/C system with refrigerant.

<Ref. to AC-19, OPERATION, Refrigerant Charging Procedure.>

26) Remove front hood stay, and close front hood.

27) Take off the vehicle from lift arms.

C: INSPECTION S143079A10

1) Make sure pipes and hoses are installed correctly.

2) Make sure the engine coolant and ATF are at specified levels.

8. Engine Mounting S143085

A: REMOVAL S143085A18

- 1) Remove engine assembly. <Ref. to ME(H6)-32, REMOVAL, Engine Assembly.>
- 2) Remove engine mounting from engine assembly.

B: INSTALLATION S143085A11

Install in the reverse order of removal.

Tightening torque:

Engine mounting;

34 N·m (3.5 kgf-m, 25.3 ft-lb)

C: INSPECTION S143085A10

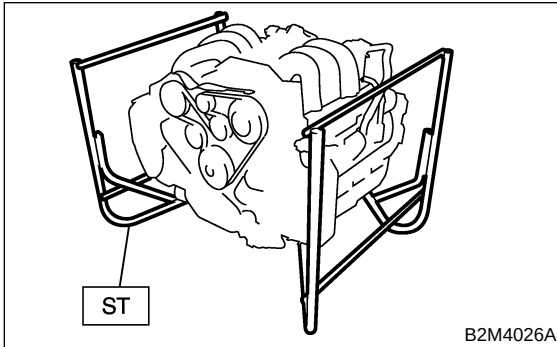
Make sure there are no cracks or other damage.

9. Preparation for Overhaul S143091

A: REMOVAL S143091A18

- 1) Remove engine from body. <Ref. to ME(H6)-32, REMOVAL, Engine Assembly.>
- 2) After removing engine from body, install ST onto engine.

ST 18232AA000 ENGINE STAND

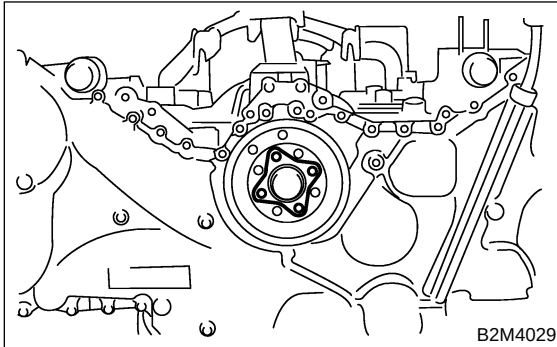


- 3) Remove sensors, pipes, and hoses installed on engine before starting overhaul.

- (1) Remove intake manifold. <Ref. to FU(H6)-17, REMOVAL, Intake Manifold.>
- (2) Remove generator. <Ref. to SC(H6)-11, REMOVAL, Generator.>
- (3) Remove A/C compressor. <Ref. to AC-31, REMOVAL, Compressor.>
- (4) Remove EGR pipe. <Ref. to EC(H6)-10, REMOVAL, EGR Valve.>
- (5) Remove water pipe and hoses.
- (6) Remove engine harness.
- (7) Remove spark plugs. <Ref. to IG(H6)-4, REMOVAL, Spark Plug.>
- (8) Remove camshaft position sensor. <Ref. to FU(H6)-31, REMOVAL, Camshaft Position Sensor.>
- (9) Remove crankshaft position sensor. <Ref. to FU(H6)-30, REMOVAL, Crankshaft Position Sensor.>
- (10) Remove knock sensor. <Ref. to FU(H6)-32, REMOVAL, Knock Sensor.>
- (11) Remove engine temperature sensor. <Ref. to FU(H6)-29, REMOVAL, Engine Coolant Temperature Sensor.>
- (12) Remove oil pressure switch. <Ref. to LU(H6)-17, REMOVAL, Oil Pressure Switch.>
- (13) Remove oil filter. <Ref. to LU(H6)-18, REMOVAL, Engine Oil Filter.>
- (14) Remove oil cooler. <Ref. to LU(H6)-19, REMOVAL, Oil Cooler.>

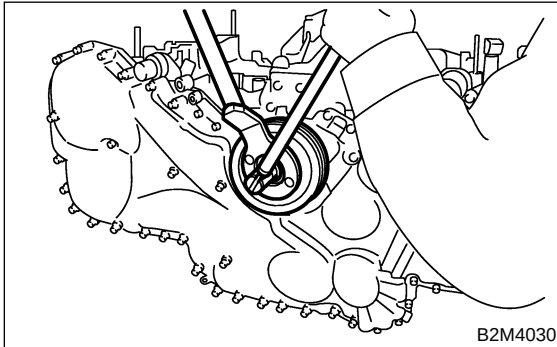
10. Crankshaft Pulley S143098**A: REMOVAL** S143098A18

- 1) Remove crankshaft pulley cover.



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

ST 49997100 CRANKSHAFT PULLEY WRENCH



- 3) Remove crankshaft pulley.

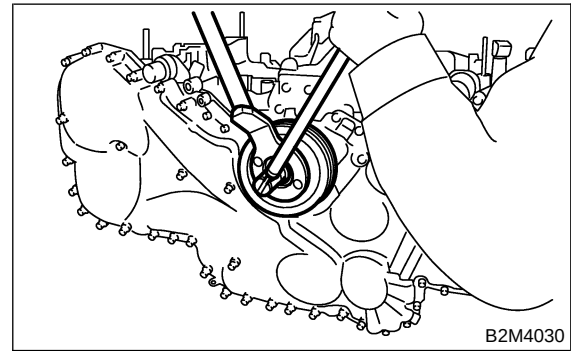
B: INSTALLATION S143098A11

- 1) Install crankshaft pulley.
- 2) Install crankshaft pulley bolt. To lock crankshaft, use ST.

ST 49997100 CRANKSHAFT PULLEY WRENCH

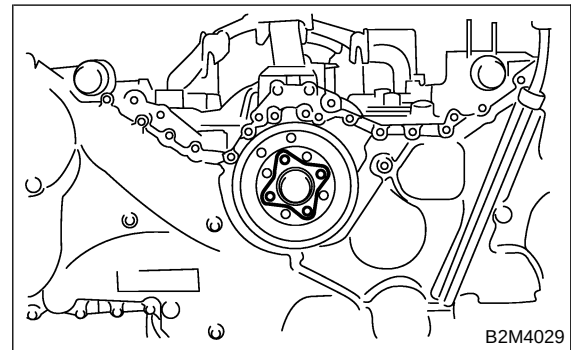
- (1) Clean the crankshaft pulley thread using an air gun.
- (2) Apply engine oil to the crankshaft pulley bolt seat and thread.
- (3) Tighten the crankshaft pulley bolts.

Tightening torque:
178 N·m (18.1 kgf-m, 131 ft-lb)



- 3) Install the crankshaft pulley cover.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

**C: INSPECTION** S143098A10

- 1) Check crankshaft pulley cover for oil leaks and bleeding.
- 2) Check crankshaft pulley for looseness.

11. Front Chain Cover

S143739

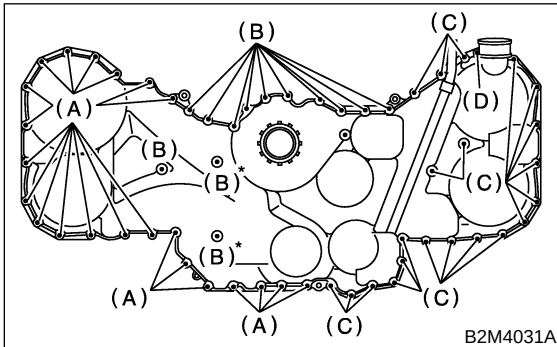
A: REMOVAL

S143739A18

- 1) Remove crankshaft pulley. <Ref. to ME(H6)-42, REMOVAL, Crankshaft Pulley.>
- 2) Remove front chain cover.

NOTE:

There are four different types of chain cover mounting bolts. Sort them into separate containers to avoid confusion at installation.



Bolt dimension:

- (A) 6 × 45
- (B) 6 × 16
- (C) 6 × 30
- (D) 6 × 50

*: Sealing washer

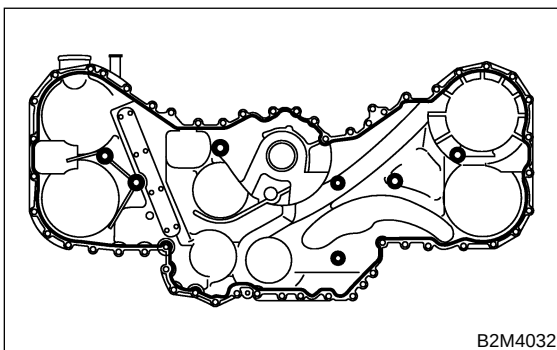
B: INSTALLATION

S143739A11

- 1) Remove old fluid packing on the matching surface, and degrease it.
- 2) Apply fluid packing to the mating surface of front chain cover.

Fluid packing:

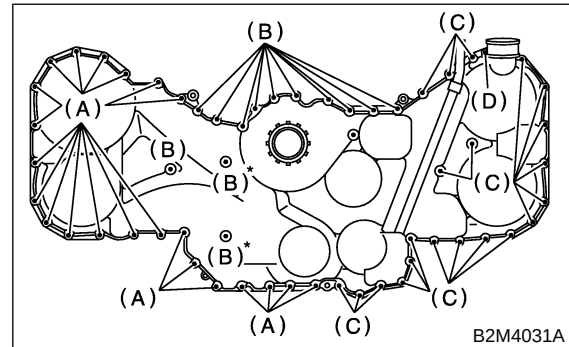
THREE BOND 1280B



- 3) Install front chain cover. Temporarily tighten the bolts.

CAUTION:

Do not confuse the mounting positions of the bolts.



Bolt dimension:

- (A) 6 × 45
- (B) 6 × 16
- (C) 6 × 30
- (D) 6 × 50

*: Sealing washer

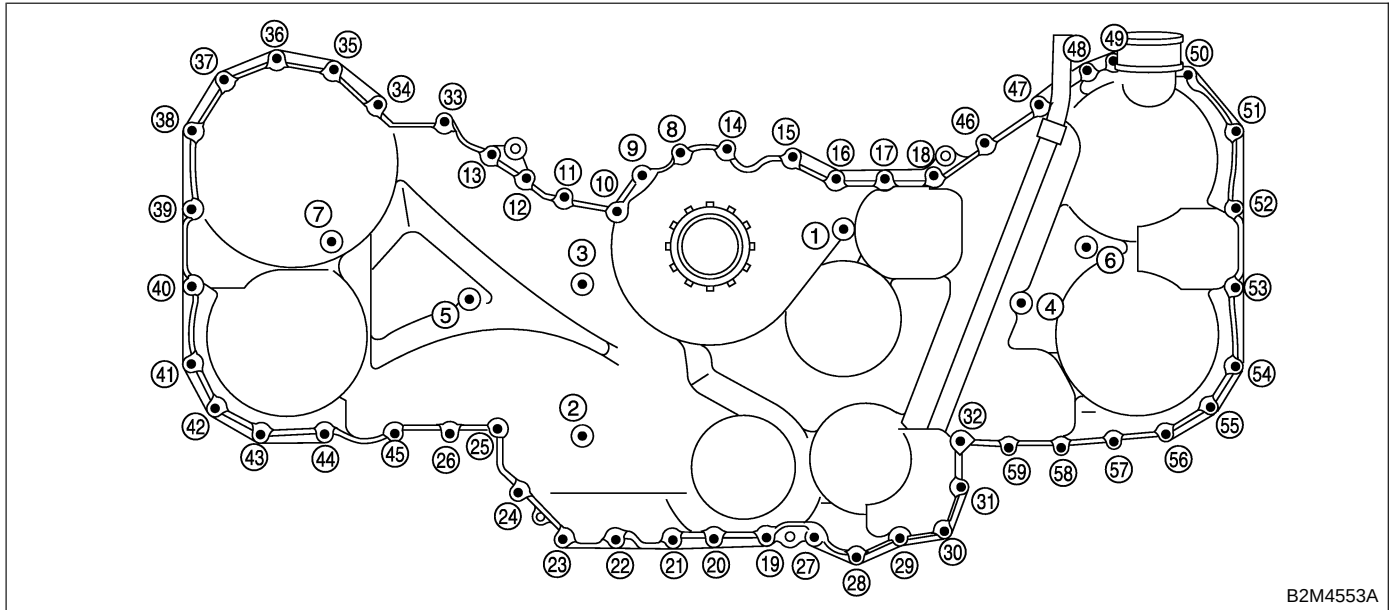
FRONT CHAIN COVER

Mechanical

4) Tighten the bolts in the numerical sequence shown in figure.

Tightening torque:

6.6 N·m (0.67 kgf-m, 4.8 ft-lb)



5) Install crankshaft pulley. <Ref. to ME(H6)-42, INSTALLATION, Crankshaft Pulley.>

C: INSPECTION S143739A10

Check the cover surface for flaws and dents.
Check the cover mating surface and the mounting point of crankshaft pulley for oil leaks.

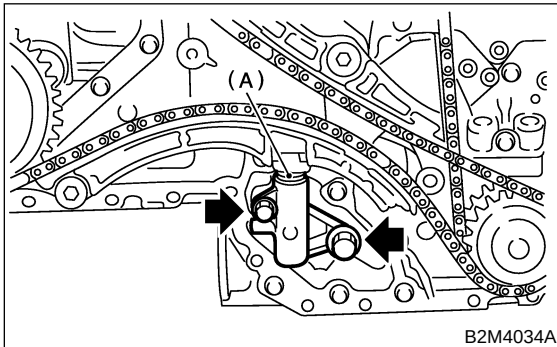
12. Timing Chain Assembly S143740

A: REMOVAL S143740A18

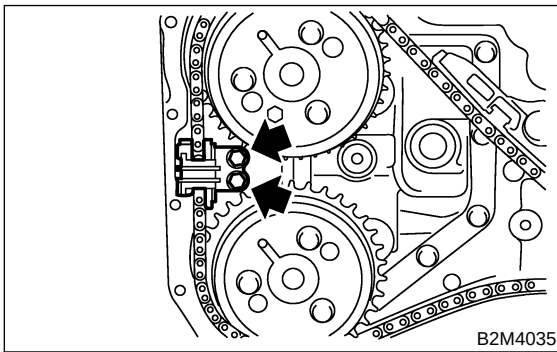
- 1) Remove crankshaft pulley. <Ref. to ME(H6)-42, REMOVAL, Crankshaft Pulley.>
- 2) Remove front chain cover. <Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
- 3) Remove chain tensioner (RH).

NOTE:

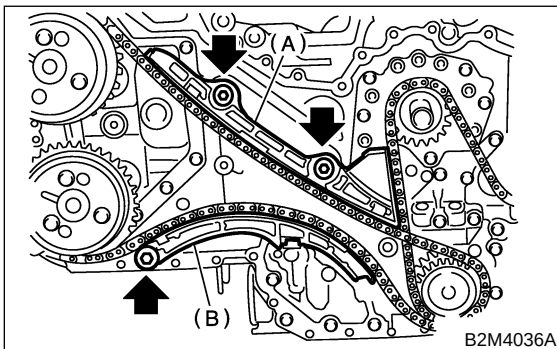
Make sure plunger (A) does not come out.



- 4) Remove chain guide. (Right-hand between cams)



- 5) Remove chain guide (RH).
- 6) Remove chain tensioner lever (RH).



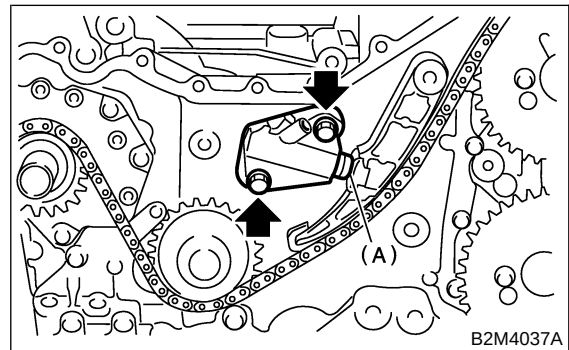
- (A) Chain guide (RH)
(B) Chain tensioner lever (RH)

- 7) Remove timing chain (RH).

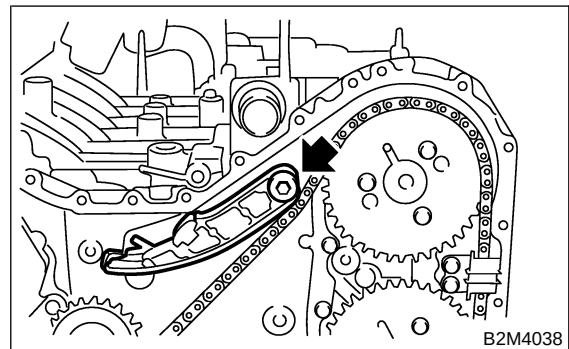
- 8) Remove chain tensioner (LH).

NOTE:

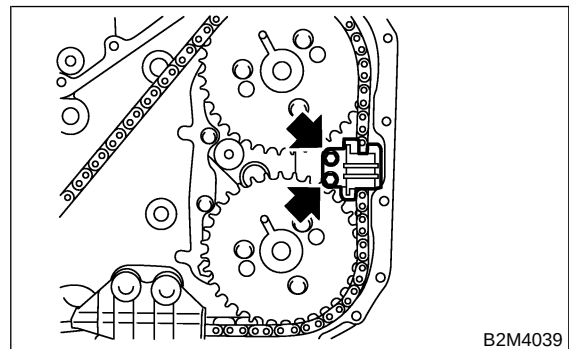
Make sure plunger (A) does not come out.



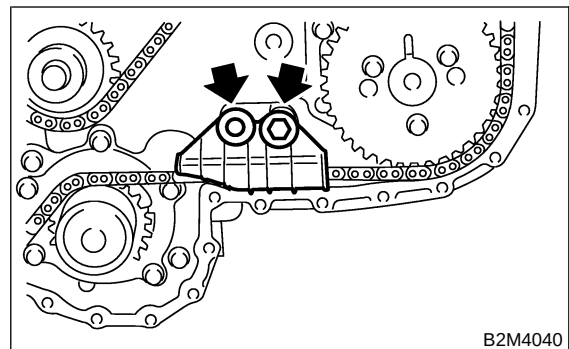
- 9) Remove chain tensioner lever (LH).



Remove chain guide. (Left-hand between cams)



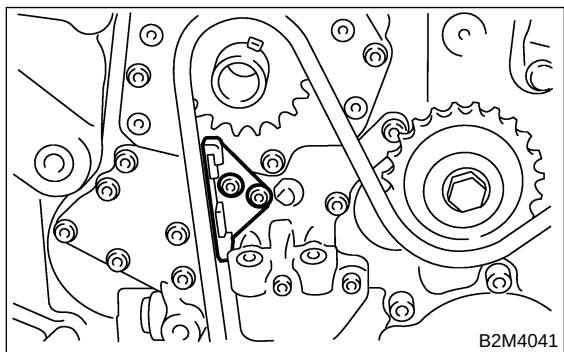
- 10) Remove chain guide (LH).



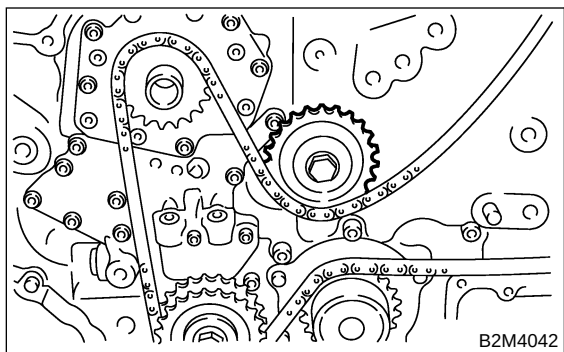
TIMING CHAIN ASSEMBLY

Mechanical

11) Remove chain guide. (Center)

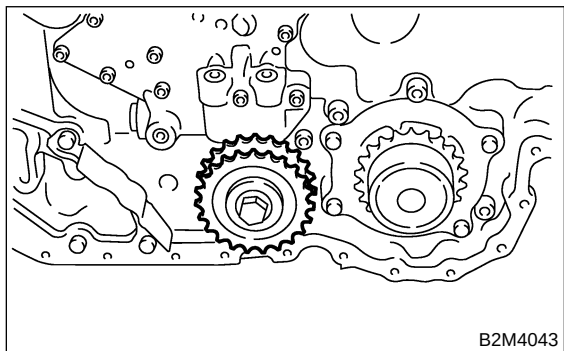


12) Remove idler sprocket. (Upper)



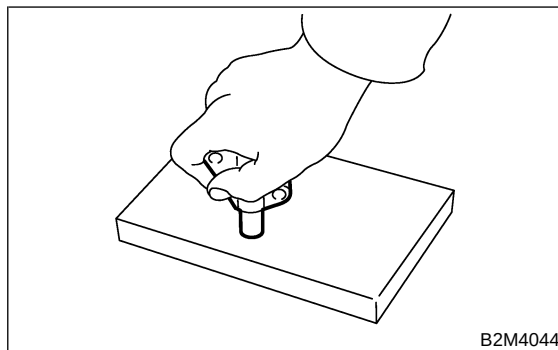
13) Remove timing chain (LH).

14) Remove idler sprocket. (Lower)



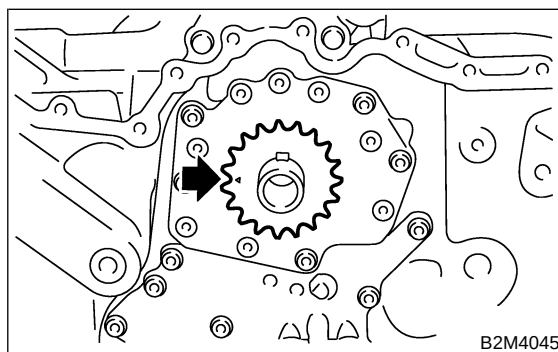
NOTE:

Carry out the work on rubber mat or other nonslip material.



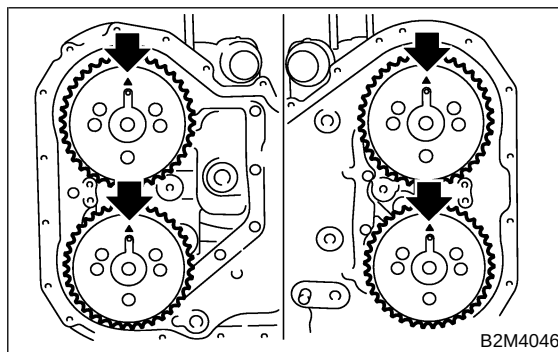
2) Using ST, align "top mark" on crankshaft sprocket at 9 o'clock position as shown in the figure.

ST 18252AA000 CRANKSHAFT SOCKET



3) Using ST, align four key grooves on camshaft sprocket at 12 o'clock position as shown in the figure.

ST 18231AA000 CAMSHAFT SPROCKET WRENCH



B: INSTALLATION

S143740A11

CAUTION:

- During installation, be careful to prevent foreign objects from attaching to or mixing with assembled components.
- Apply engine oil to chain guide, chain tensioner lever, and idler sprocket during installation.

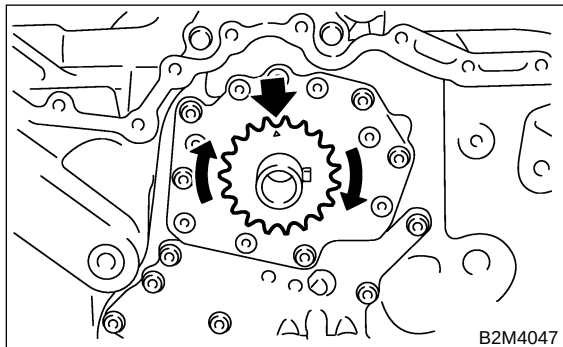
1) Preparation for installation of chain tensioner.

- (1) Put the screw, spring, pin and tension rod into the tensioner body.
- (2) While pressing tensioner onto rubber mat, twist it left and right to shorten tension rod. Then set a thin pin into the holes between tension rod and tensioner body to hold it.

4) Rotate crankshaft sprocket clockwise to align "top mark" at 12 o'clock position as shown in the figure. (Piston # 1 is at TDC.)

CAUTION:

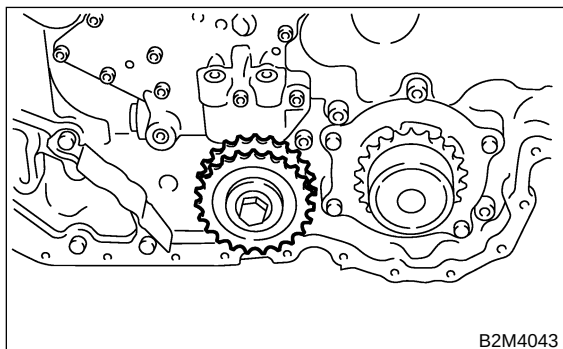
Do not rotate crankshaft and camshaft sprockets until timing chain is completely routed.



5) Install the idler sprocket. (Lower)

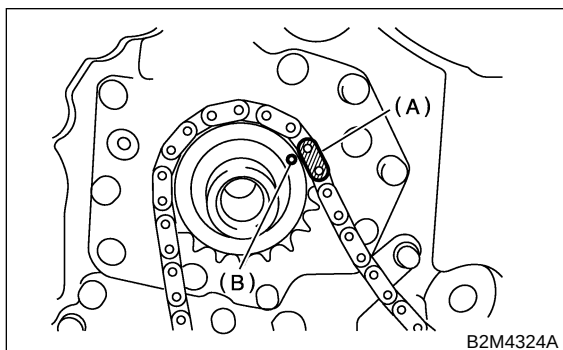
Tightening torque:

69 N·m (7.0 kgf-m, 50.6 ft-lb)



6) Install timing chain LH.

(1) Align the timing mark (B) on crankshaft sprocket with the matching mark (A) on timing chain LH.

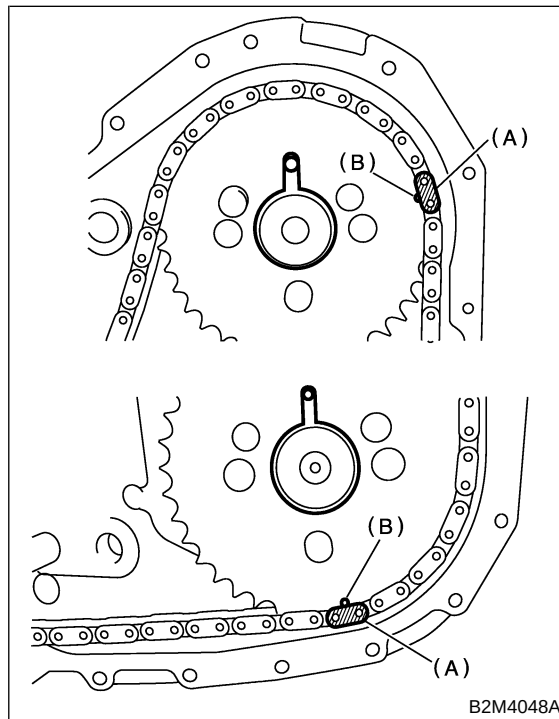


(A) Gold

(2) Route timing chain LH on idler sprocket (Lower), water pump, exhaust cam sprocket, and intake cam sprocket in order.

CAUTION:

Check that matching marks on camshaft sprocket and timing chain are aligned, same as crankshaft sprocket.

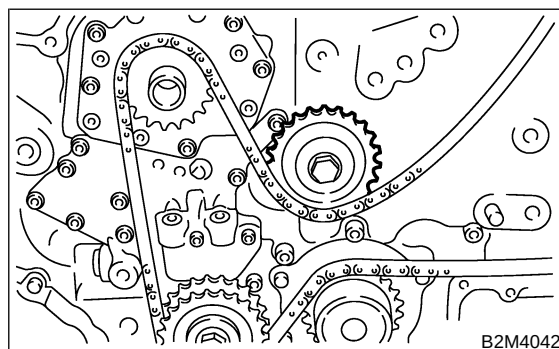


(A) Dark gray

(3) Install chain idler. (Upper)

Tightening torque:

69 N·m (7.0 kgf-m, 50.6 ft-lb)



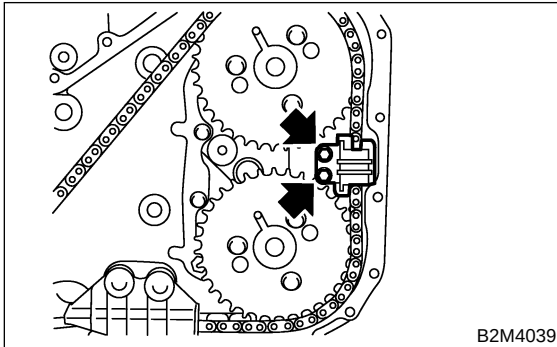
TIMING CHAIN ASSEMBLY

Mechanical

- (4) Install chain guide. (Left-hand between cams)

Tightening torque:

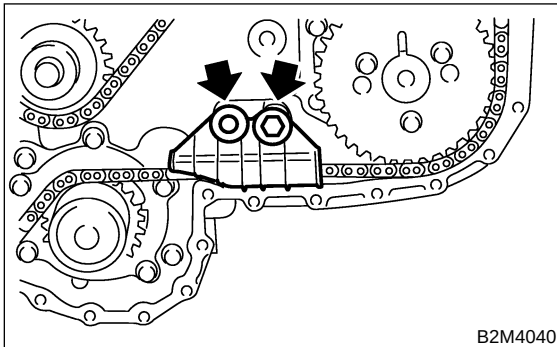
6.3N·m (0.64 kgf-m, 4.6 ft-lb)



- (5) Install chain guide (LH).

Tightening torque:

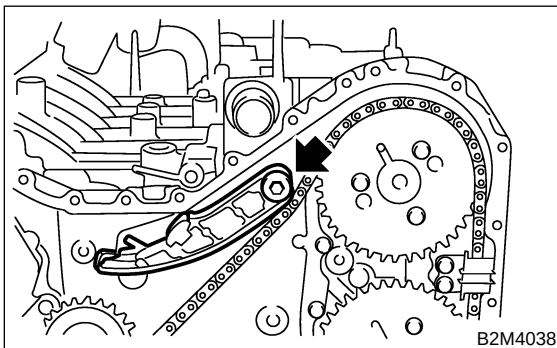
16 N·m (1.6 kgf-m, 11.6 ft-lb)



- (6) Install chain tensioner lever LH.

Tightening torque:

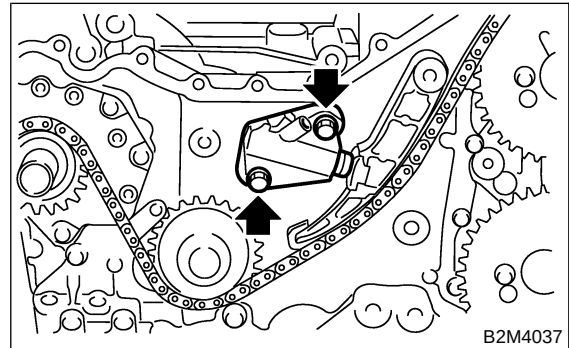
16 N·m (1.6 kgf-m, 11.6 ft-lb)



- (7) Install chain tensioner LH.

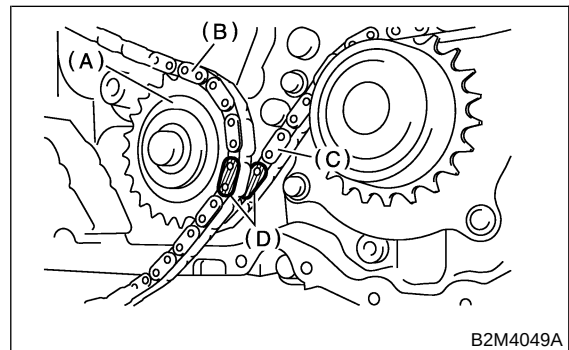
Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)



- 7) Install timing chain RH.

- (1) On idler sprocket (Lower) , align matching marks on timing chains LH and RH.

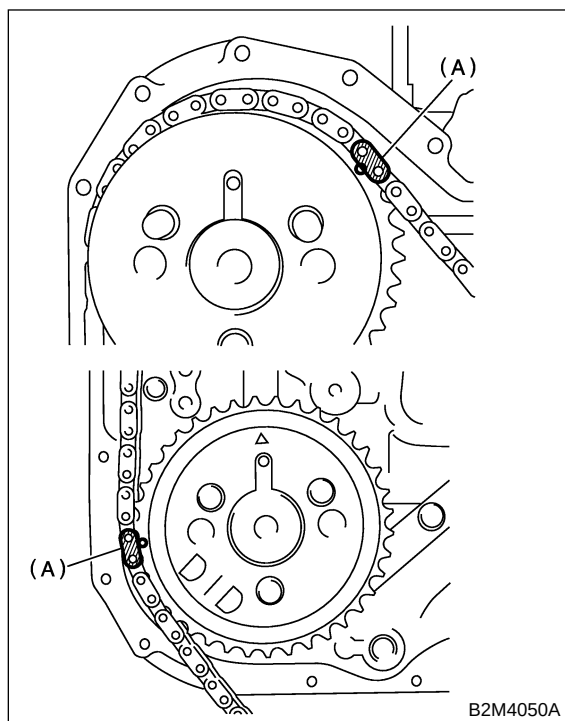


- (A) Lower idler sprocket
- (B) Timing chain RH
- (C) Timing chain LH
- (D) Dark gray

- (2) Route timing chain RH on intake cam sprocket and then exhaust cam sprocket.

CAUTION:

Check that matching marks on camshaft sprocket and timing chain are aligned, same as LH side.



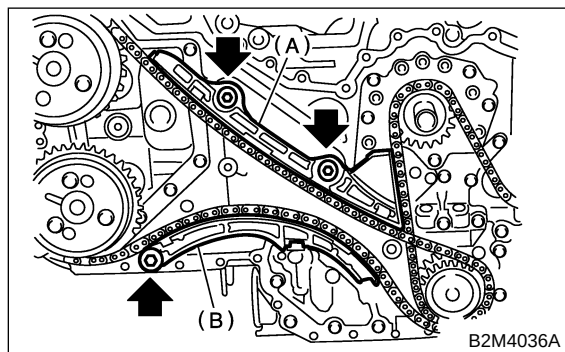
(A) Gold

(3) Install chain guide (RH).

(4) Install chain tensioner lever (RH).

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)



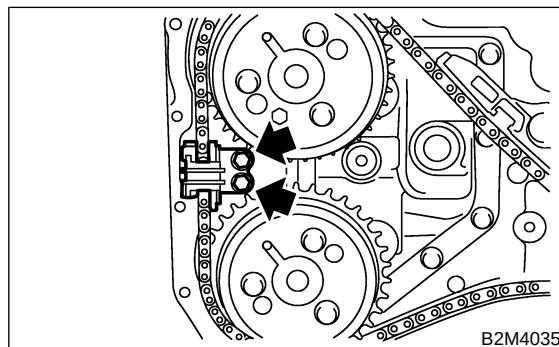
(1) Chain guide (RH)

(2) Chain tensioner lever (RH)

(5) Install timing chain guide RH No. 1.

Tightening torque:

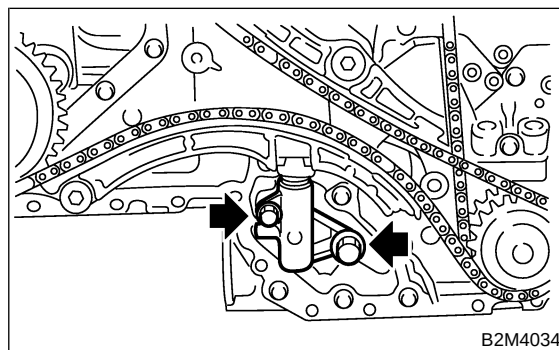
6.3 N·m (0.64 kgf-m, 4.6 ft-lb)



(6) Install the chain tensioner (RH).

Tightening torque:

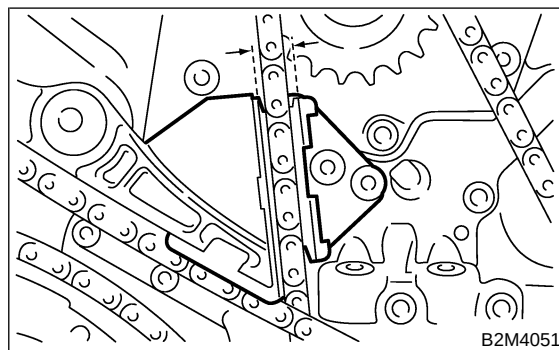
16 N·m (1.6 kgf-m, 11.6 ft-lb)



(7) Adjust the clearance between chain guide (RH) and chain guide (Center) to the range between 8.4 mm (0.331 in) to 8.6 mm (0.339 in). And install chain guide (Center).

Tightening torque:

7.8 N·m (0.8 kgf-m, 5.8 ft-lb)



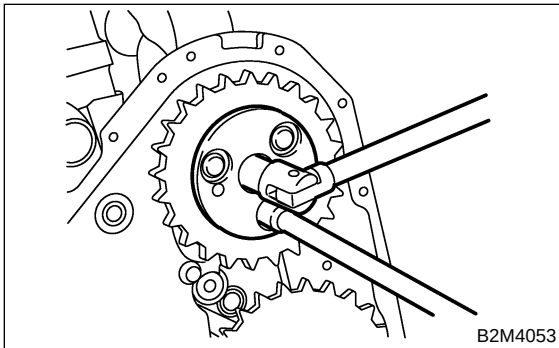
(8) After checking the matching marks on each sprocket and corresponding timing chain are aligned, pull stopper pin out of chain tensioner.

13. Camshaft Sprocket S143097

A: REMOVAL S143097A18

- 1) Remove crankshaft pulley. <Ref. to ME(H6)-42, REMOVAL, Crankshaft Pulley.>
- 2) Remove front chain cover. <Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
- 3) Remove timing chain assembly. <Ref. to ME(H6)-45, REMOVAL, Timing Chain Assembly.>
- 4) Remove camshaft sprocket. To lock camshaft, use ST.

ST 18231AA000 CAMSHAFT SPROCKET
WRENCH



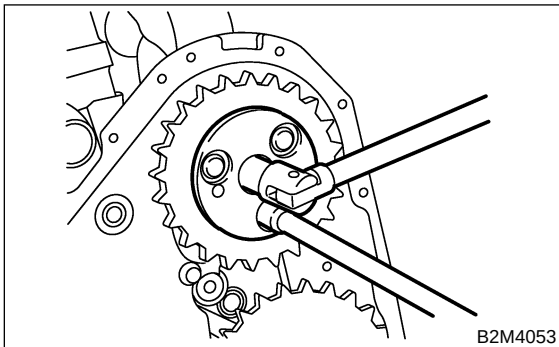
B: INSTALLATION S143097A11

- 1) Install camshaft sprocket. To lock camshaft, use ST.

ST 18231AA000 CAMSHAFT SPROCKET
WRENCH

Tightening torque:

13 N·m (1.0 kgf-m, 7.2 ft-lb)



- 2) Install timing chain assembly. <Ref. to ME(H6)-46, INSTALLATION, Timing Chain Assembly.>
- 3) Install front chain cover. <Ref. to ME(H6)-43, INSTALLATION, Front Chain Cover.>
- 4) Install crankshaft pulley. <Ref. to ME(H6)-42, INSTALLATION, Crankshaft Pulley.>

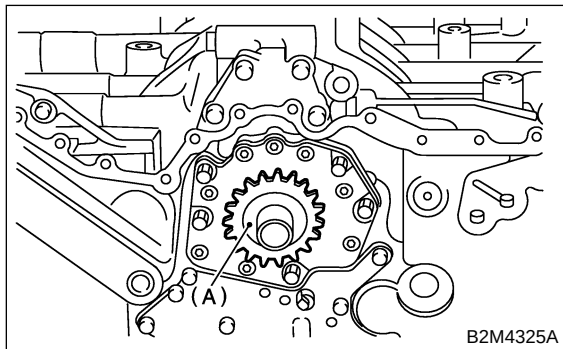
C: INSPECTION S143097A10

- 1) Check sprocket teeth for abnormal wear and scratches.
- 2) Make sure there is no free play between sprocket and key.

14. Crankshaft Sprocket S143101

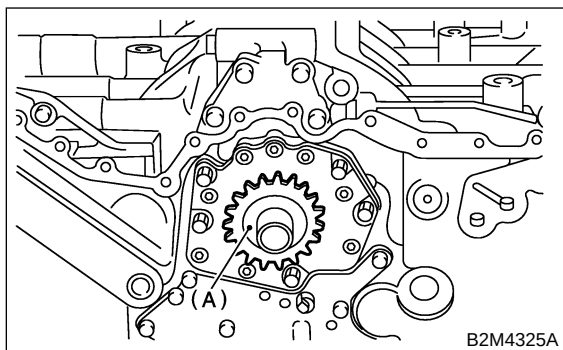
A: REMOVAL S143101A18

- 1) Remove crankshaft pulley. <Ref. to ME(H6)-42, REMOVAL, Crankshaft Pulley.>
- 2) Remove front chain cover. <Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
- 3) Remove timing chain assembly. <Ref. to ME(H6)-45, REMOVAL, Timing Chain Assembly.>
- 4) Remove camshaft sprocket. <Ref. to ME(H6)-50, REMOVAL, Camshaft Sprocket.>
- 5) Remove crankshaft sprocket (A).



B: INSTALLATION S143101A11

- 1) Install crankshaft sprocket (A).



- 2) Install camshaft sprocket. <Ref. to ME(H6)-50, INSTALLATION, Camshaft Sprocket.>
- 3) Install timing chain assembly. <Ref. to ME(H6)-46, INSTALLATION, Timing Belt Assembly.>
- 4) Install front chain cover. <Ref. to ME(H6)-43, INSTALLATION, Front Chain Cover.>
- 5) Install crankshaft pulley. <Ref. to ME(H6)-42, INSTALLATION, Crankshaft Pulley.>

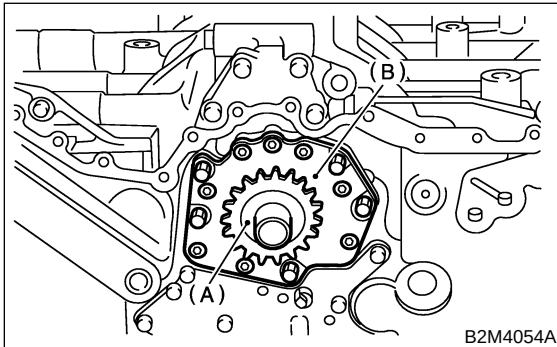
C: INSPECTION S143101A10

- 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.

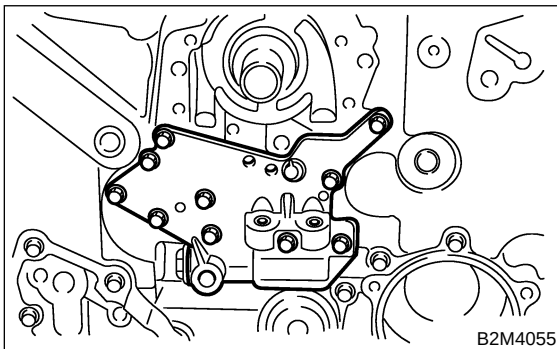
15. Rear Chain Cover S143741

A: REMOVAL S143741A18

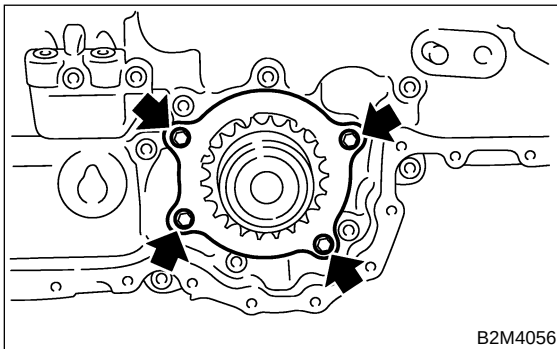
- 1) Remove crankshaft pulley. <Ref. to ME(H6)-42, REMOVAL, Crankshaft Pulley.>
- 2) Remove front chain cover. <Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
- 3) Remove timing chain. <Ref. to ME(H6)-45, REMOVAL, Timing Chain Assembly.>
- 4) Remove camshaft sprocket. <Ref. to ME(H6)-50, REMOVAL, Camshaft Sprocket.>
- 5) Remove crankshaft sprocket. (A)
- 6) Remove oil pump. (B)



- 7) Remove oil pump relief valve case.



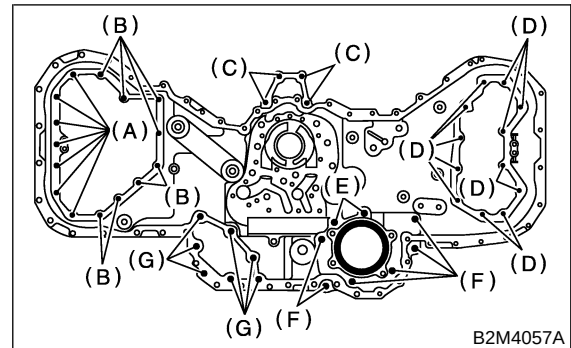
- 8) Remove water pump.



- 9) Remove rear chain cover.

CAUTION:

There are seven different types of mounting bolts. Sort them into separate containers to avoid confusion at installation.



Bolt dimension:

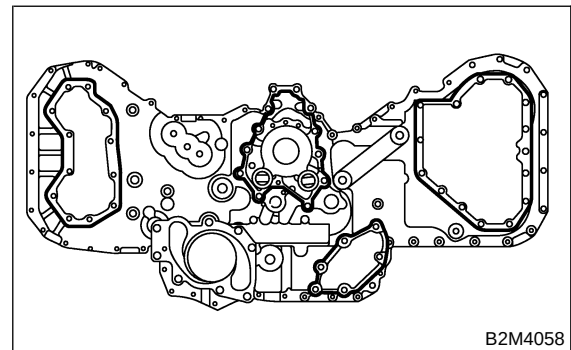
- (A) 6 × 14
- (B) 6 × 18 (Silver)
- (C) 6 × 30
- (D) 6 × 18
- (E) 6 × 40
- (F) 6 × 30
- (G) 6 × 22

B: INSTALLATION S143741A11

- 1) Remove old fluid packing on the matching surface, and degrease it.
- 2) Apply fluid packing to the mating surface of rear chain cover.

Fluid packing:

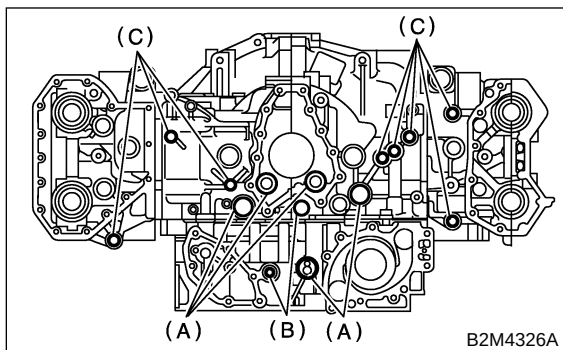
THREE BOND 1280B



- 3) Install O-ring.

CAUTION:

Do not reuse the O-ring.

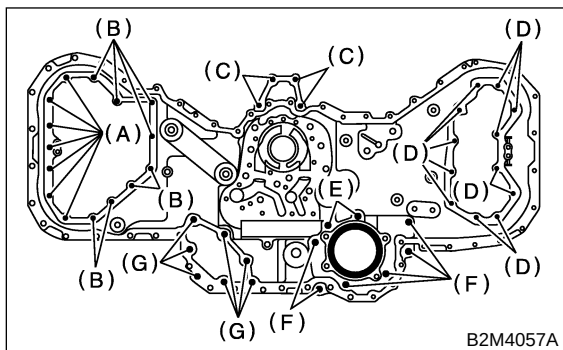


- (A) O-ring (Large)
- (B) O-ring (Medium)
- (C) O-ring (Small)

4) Temporarily tighten rear chain cover.

CAUTION:

Do not confuse the mounting positions of the bolts.



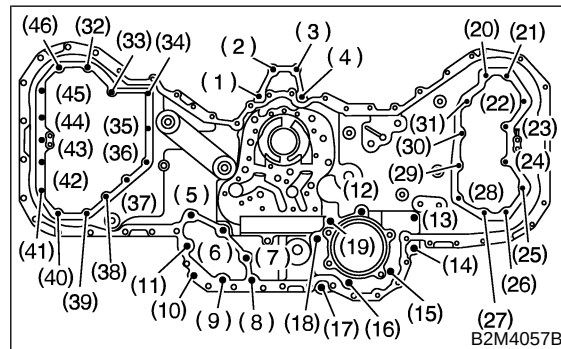
Bolt dimension:

- (A) 6 × 14
- (B) 6 × 18 (Silver)
- (C) 6 × 30
- (D) 6 × 18
- (E) 8 × 40
- (F) 8 × 30
- (G) 6 × 22

5) Tighten the bolts in the numerical sequence shown in figure.

Tightening torque:

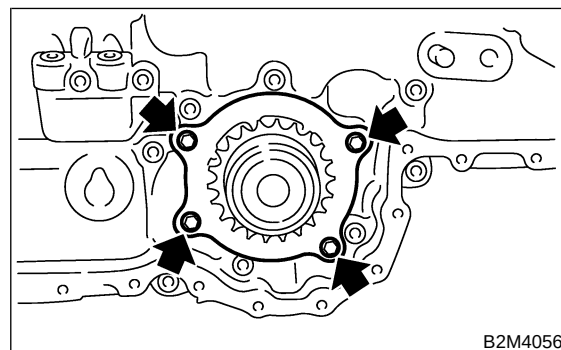
(1) to (11)	9 N·m (0.9 kgf-m, 6.5 ft-lb)
(12) to (19)	20 N·m (2.0 kgf-m, 14 ft-lb)
(20) to (31)	9 N·m (0.9 kgf-m, 6.5 ft-lb)
(32) to (39)	12 N·m (1.2 kgf-m, 8.7 ft-lb)
(40) to (46)	9 N·m (0.9 kgf-m, 6.5 ft-lb)



6) Install water pump.

Tightening torque:

6.3 N·m (0.64 kgf-m, 4.6 ft-lb)



7) Temporarily tighten oil pump relief valve case.

8) Tighten the bolts in the numerical sequence shown in figure.

Tightening torque:

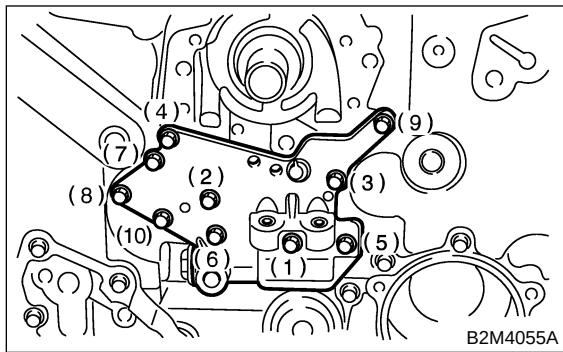
6.3 N·m (0.64 kgf-m, 4.6 ft-lb)

CAUTION:

Do not confuse the mounting positions of the bolts.

REAR CHAIN COVER

Mechanical



Bolt installation position	Bolt dimension
(1) and (5)	6 x 26
(2), (3), (4) and (9)	6 x 35
(6), (7), (8) and (10)	6 x 16

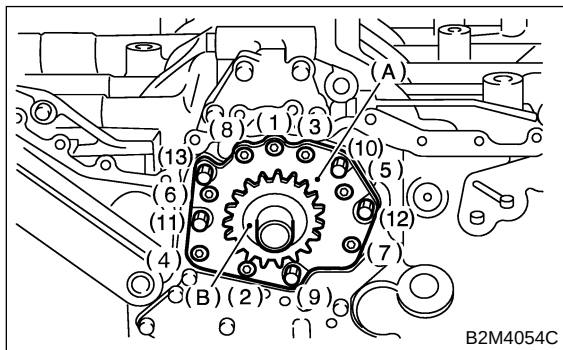
9) Install oil pump (A).

10) Tighten the bolts in the numerical sequence shown in figure.

Tightening torque:

6.3 N·m (0.64 kgf-m, 4.6 ft-lb)

11) Install crankshaft sprocket (B).



12) Install camshaft sprocket. <Ref. to ME(H6)-50, INSTALLATION, Camshaft Sprocket.>

13) Install timing chain. <Ref. to ME(H6)-46, INSTALLATION, Timing Chain Assembly.>

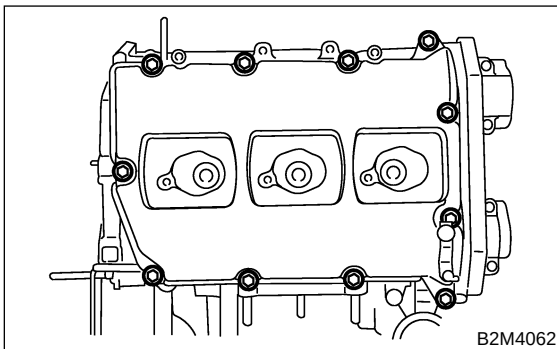
14) Install front chain cover. <Ref. to ME(H6)-43, INSTALLATION, Front Chain Cover.>

15) Install crankshaft pulley. <Ref. to ME(H6)-42, INSTALLATION, Crankshaft Pulley.>

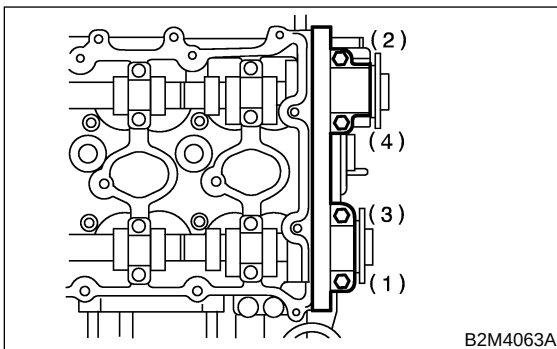
16. Camshaft S143092

A: REMOVAL S143092A18

- 1) Remove crankshaft pulley. <Ref. to ME(H6)-42, REMOVAL, Crankshaft Pulley.>
- 2) Remove front chain cover. <Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
- 3) Remove timing chain assembly. <Ref. to ME(H6)-45, REMOVAL, Timing Chain Assembly.>
- 4) Remove camshaft sprockets. <Ref. to ME(H6)-50, REMOVAL, Camshaft Sprocket.>
- 5) Remove crankshaft sprocket. <Ref. to ME(H6)-51, REMOVAL, Crankshaft Sprocket.>
- 6) Remove rear chain cover. <Ref. to ME(H6)-52, REMOVAL, Rear Chain Cover.>
- 7) Remove rocker cover (RH).

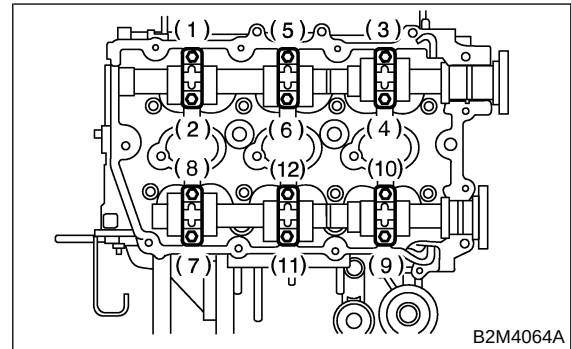


- 8) Loosen front camshaft cap bolts equally, a little at a time in numerical sequence shown in the figure (RH).



- 9) Remove camshaft cap and intake camshaft (RH).

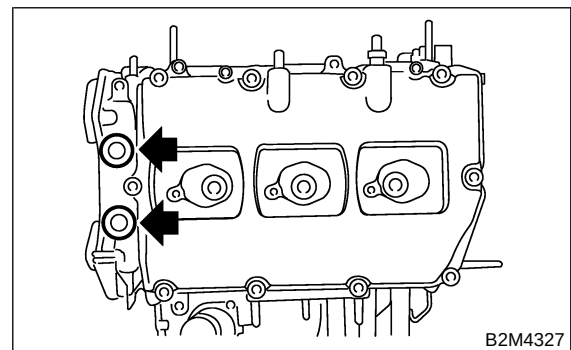
- 10) Loosen camshaft cap bolts equally, a little at a time in the numerical sequence shown in the figure.



- 11) Remove camshaft cap and exhaust camshaft (RH).

CAUTION:
Arrange camshaft caps in order so that they can be installed in their original position.

- 12) Remove plug (LH).

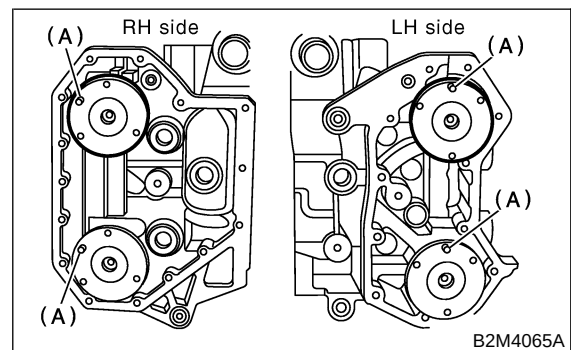


- 13) Similarly, remove left-hand camshafts and related parts.

B: INSTALLATION S143092A11

- 1) Apply a coat of engine oil to camshaft journals and install camshaft.

CAUTION:
When installing camshaft, adjust camshaft front flange knock pin (A) position as follows:
LH side: 12 o'clock
RH side: 10 o'clock



CAMSHAFT

Mechanical

2) Install camshaft cap.

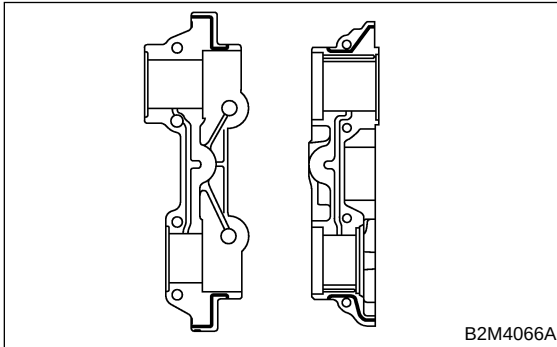
- (1) Apply fluid packing sparingly to back of front camshaft cap shown in the figure.

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:

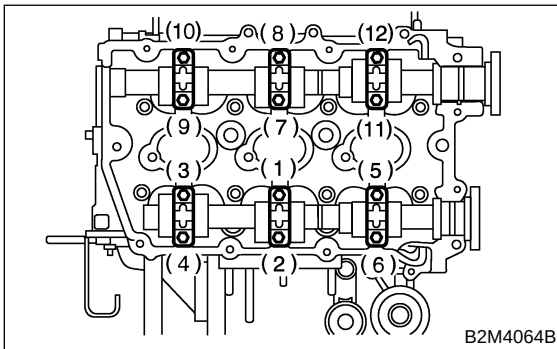
THREE BOND 1280B



- (2) Apply engine oil to cap bearing surface and install cap on camshaft.
- (3) Tighten the camshaft cap bolts in the numerical sequence shown in the figure.

Tightening torque:

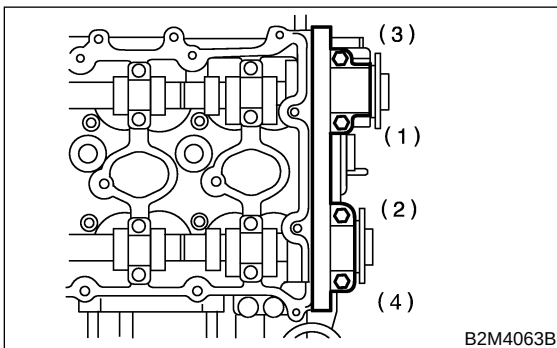
16 N·m (1.6 kgf-m, 11.6 ft-lb)



- (4) Tighten the front camshaft cap bolts in the numerical sequence shown in the figure.

Tightening torque:

9.8 N·m (1.0 kgf-m, 7.2 ft-lb)



3) Install rocker cover.

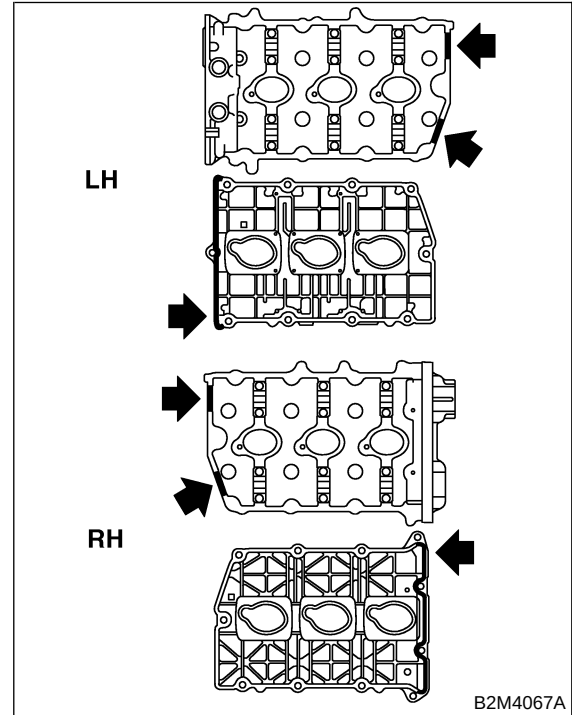
- (1) Apply fluid packing sparingly to matching surface of cylinder heads and rocker covers shown in the figure.

CAUTION:

Do not apply fluid packing excessively. Doing so may cause excess packing to come out and flow toward oil seal, resulting in oil leaks.

Fluid packing:

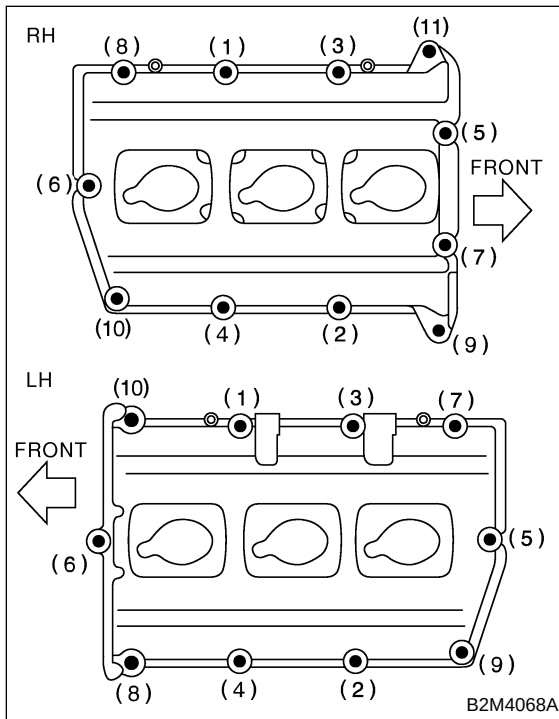
THREE BOND 1280B



(2) Tighten the rocker cover bolts in the numerical order shown in the figure.

Tightening torque:

6.3 N·m (0.64 kgf-m, 4.6 ft-lb)



- 4) Install rear chain cover. <Ref. to ME(H6)-52, INSTALLATION, Rear Chain Cover.>
- 5) Install crankshaft sprocket. <Ref. to ME(H6)-51, INSTALLATION, Crankshaft Sprocket.>
- 6) Install camshaft sprockets. <Ref. to ME(H6)-50, INSTALLATION, Camshaft Sprocket.>
- 7) Install timing chain assembly. <Ref. to ME(H6)-46, INSTALLATION, Timing Chain Assembly.>
- 8) Install front chain cover. <Ref. to ME(H6)-43, INSTALLATION, Front Chain Cover.>
- 9) Install crankshaft pulley. <Ref. to ME(H6)-42, INSTALLATION, Crankshaft Pulley.>

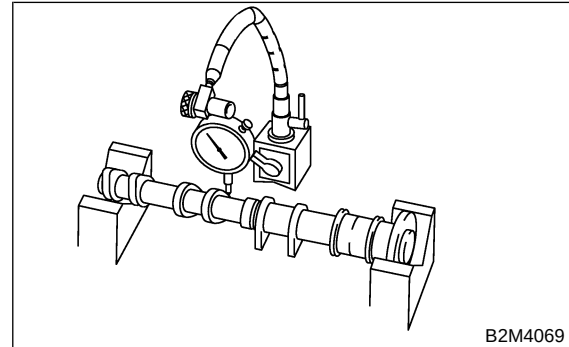
C: INSPECTION S143092A10

1. CAMSHAFT S143092A1001

- 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	37.946 — 38.037 mm (1.4939 — 1.4975 in)	27.946 — 28.037 mm (1.1002 — 1.1038 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.

CAUTION:

Do not turn the camshaft.

- (5) Remove the bearing caps.

CAMSHAFT

Mechanical

(6) Measure the widest point of the plastigauge on each journal.

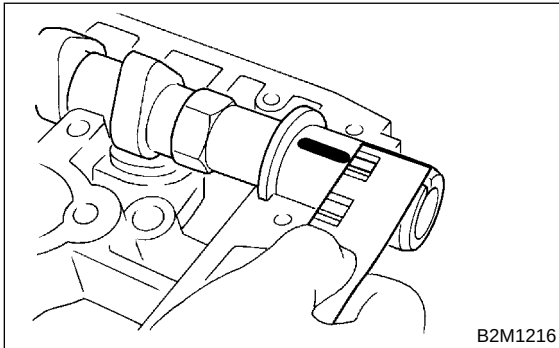
If the oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

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:

46.05 — 46.15 mm (1.8130 — 1.8169 in)

Exhaust:

45.55 — 45.65 mm (1.7933 — 1.7972 in)

Limit:

Intake:

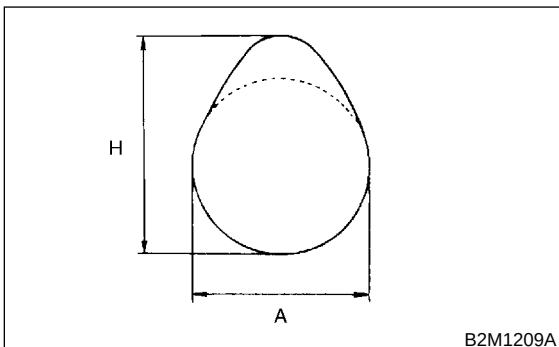
45.95 mm (1.8091 in)

Exhaust:

45.45 mm (1.7894 in)

Cam base circle diameter A:

36.0 mm (1.4173 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:

Intake:

0.075 — 0.135 mm (0.0030 — 0.0053 in)

Exhaust:

0.048 — 0.108 mm (0.0019 — 0.0043 in)

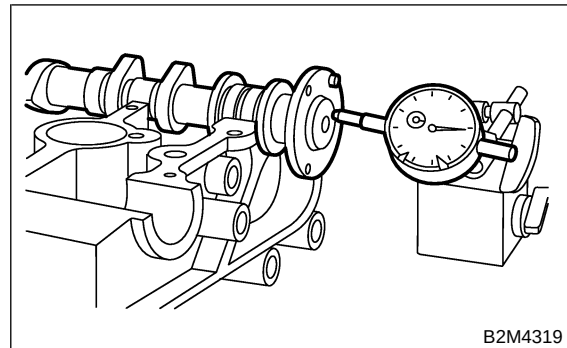
Limit:

Intake:

0.155 mm (0.0061 in)

Exhaust:

0.130 mm (0.0051 in)



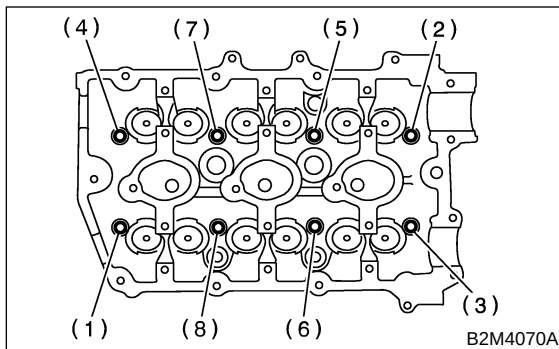
17. Cylinder Head Assembly S143093

A: REMOVAL S143093A18

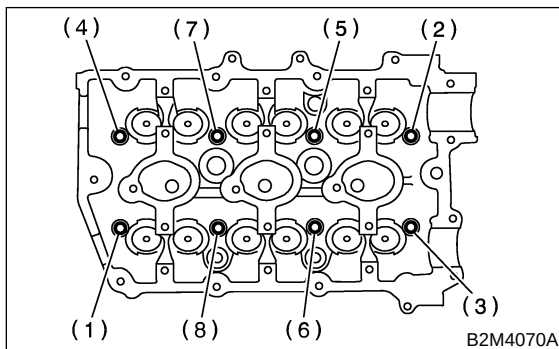
- 1) Remove crankshaft pulley. <Ref. to ME(H6)-42, REMOVAL, Crankshaft Pulley.>
- 2) Remove front chain cover. <Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
- 3) Remove timing chain assembly. <Ref. to ME(H6)-45, REMOVAL, Timing Chain Assembly.>
- 4) Remove camshaft sprockets. <Ref. to ME(H6)-50, REMOVAL, Camshaft Sprocket.>
- 5) Remove crankshaft sprocket. <Ref. to ME(H6)-51, REMOVAL, Crankshaft Sprocket.>
- 6) Remove rear chain cover. <Ref. to ME(H6)-52, REMOVAL, Rear Chain Cover.>
- 7) Remove camshafts. <Ref. to ME(H6)-55, REMOVAL, Camshaft.>
- 8) Remove cylinder head bolts in numerical sequence shown in figure.

CAUTION:

Leave bolts (2) and (4) engaged by three or four threads to prevent cylinder head from falling.



- 9) Tap cylinder head with a plastic hammer to separate it from cylinder block.
- 10) Remove bolts (2) and (4) to remove cylinder head.



- 11) Remove cylinder head gasket.

CAUTION:

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

- 12) Similarly, remove right side cylinder head.

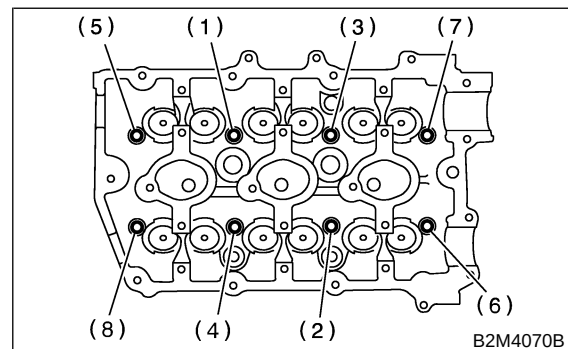
B: INSTALLATION S143093A11

- 1) Install cylinder head and gaskets on cylinder block.

CAUTION:

- Use new cylinder head gaskets.
- Be careful not to scratch the mating surface of cylinder block and oil pump.

- 2) Tighten cylinder head bolts.
 - (1) Coat the washers and threaded parts of the cylinder head bolts with engine oil.
 - (2) Install the cylinder head on the cylinder block and tighten the bolts in the numerical order shown in the figure to a tightening torque of 20 N·m (2.0 kgf-m, 14 ft-lb).
 - (3) Tighten the bolts in the numerical order shown in the figure to a tightening torque of 50 N·m (5.1 kgf-m, 37 ft-lb).
 - (4) Loosen all the bolts in 2 stages, 180° at a time, in the reverse order of tightening.
 - (5) Tighten the bolts in the numerical order shown in the figure to a tightening torque of 25 N·m (2.5 kgf-m, 18 ft-lb).
 - (6) Tighten the bolts in the numerical order shown in the figure to a tightening torque of 25 N·m (2.5 kgf-m, 18 ft-lb).
 - (7) Tighten all the bolts 90° in the numerical order shown in the figure.
 - (8) Tighten the (1) to (4) bolts 90° again in the numerical order shown in the figure.
 - (9) Tighten the (5) to (8) bolts 45° again in the numerical order shown in the figure.



- 3) Install camshafts. <Ref. to ME(H6)-55, INSTALLATION, Camshaft.>
- 4) Install rear chain cover. <Ref. to ME(H6)-52, INSTALLATION, Rear Chain Cover.>
- 5) Install crankshaft sprocket. <Ref. to ME(H6)-51, INSTALLATION, Crankshaft Sprocket.>
- 6) Install camshaft sprockets. <Ref. to ME(H6)-50, INSTALLATION, Camshaft Sprocket.>
- 7) Install timing chain assembly. <Ref. to ME(H6)-46, INSTALLATION, Timing Chain Assembly.>
- 8) Install front chain cover. <Ref. to ME(H6)-43, INSTALLATION, Front Chain Cover.>

CYLINDER HEAD ASSEMBLY

Mechanical

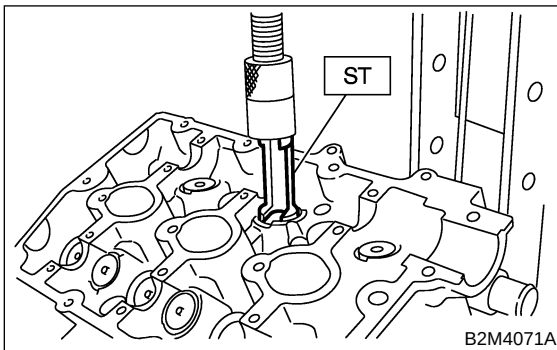
9) Install crankshaft pulley. <Ref. to ME(H6)-42, INSTALLATION, Crankshaft Pulley.>

C: DISASSEMBLY S143093A06

- 1) Place cylinder head on ST.
ST 18250AA000 CYLINDER HEAD TABLE
- 2) Remove valve shims and valve lifters.
- 3) 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:

- For correct re-installation, keep removed parts in order 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.



D: ASSEMBLY S143093A02

- 1) Installation of valve spring and valve
(1) Place cylinder head on ST.
ST 18250AA000 CYLINDER HEAD TABLE
- (2) Coat stem of each valve with engine oil and insert valve into valve guide.

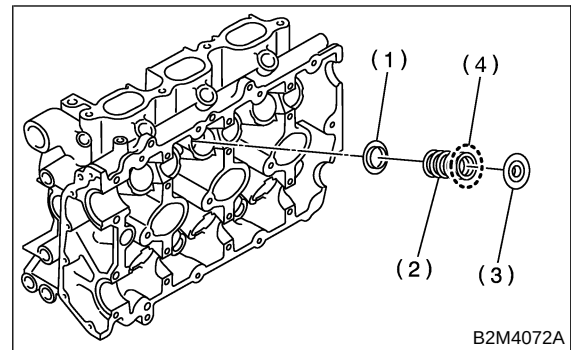
CAUTION:

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

- (3) Install valve spring and retainer.

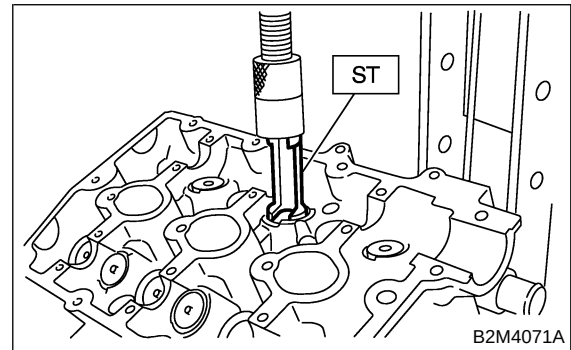
CAUTION:

- Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.
- Install valve spring with the painted surface facing the retainer side.



- (1) Seat
- (2) Valve spring
- (3) Retainer
- (4) Painted face

- (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.
- 2) Apply oil to the surface of the valve lifter and valve shim.
- 3) Install valve lifter and valve shim.

E: INSPECTION

S143093A10

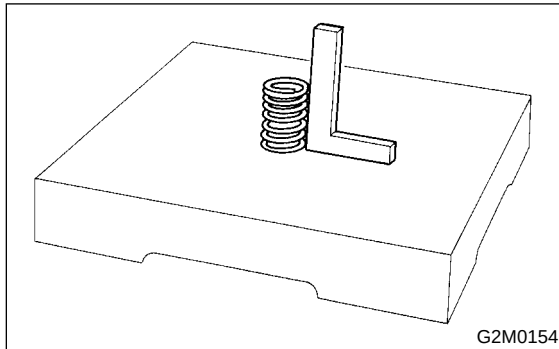
1. VALVE SPRING

S143093A1002

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		46.79 mm (1.8421 in)
Squareness		2.5°, 2.0 mm (0.079 in)
Tension/spring height	Set	186.2 — 205.8 N (18.79 — 20.99 kgf, 41.9 — 46.3 lb)/37.4 mm (1.472 in)
	Lift	446.5 — 493.5 N (45.54 — 50.34 kgf, 100.3 — 110.9 lb)/27.5 mm (1.083 in)



G2M0154

2. INTAKE AND EXHAUST VALVE OIL SEAL

S143093A1003

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. Use pliers to pinch and remove oil seal from valve.

1) Place cylinder head on ST1.

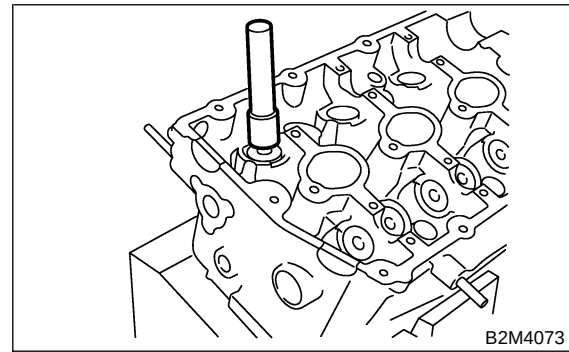
2) Press-fit oil seal to the specified dimension indicated in the figure using ST2.

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 18250AA000 CYLINDER HEAD TABLE

ST2 498857100 VALVE OIL SEAL GUIDE



B2M4073

3. VALVE LIFTER

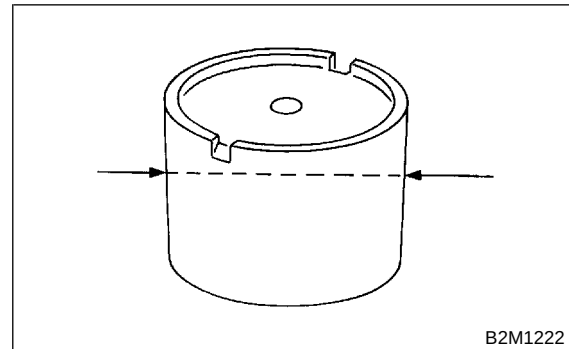
S143093A1001

1) Check valve lifter visually.

2) Measure outer diameter of valve lifter.

Outer diameter:

33.959 — 33.975 mm (1.3370 — 1.3376 in)

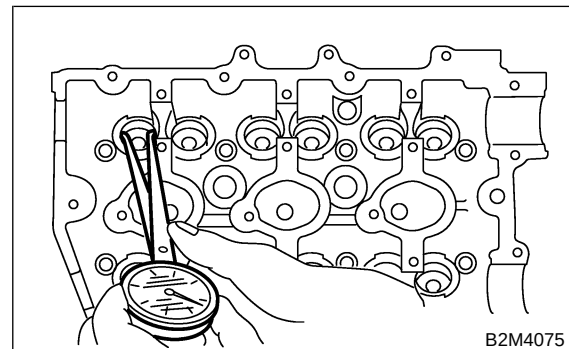


B2M1222

3) Measure inner diameter of valve lifter mating part on cylinder head.

Inner diameter:

34.006 — 34.016 mm (1.3388 — 1.3392 in)



B2M4075

CAUTION:

If difference between outer diameter of valve lifter and inner diameter of valve lifter mating part is over the limit, replace cylinder head.

CYLINDER HEAD ASSEMBLY

Mechanical

Standard:

0.019 — 0.057 mm (0.0007 — 0.0022 in)

Limit:

0.100 mm (0.0039 in)

F: ADJUSTMENT

S143093A01

1. CYLINDER HEAD

S143093A0101

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 18250AA000 CYLINDER HEAD TABLE

3) Measure the warping of the cylinder head surface that mates with crankcase 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:

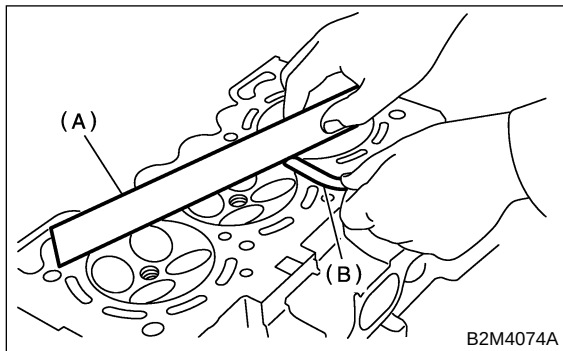
0.1 mm (0.004 in)

Standard height of cylinder head:

124 mm (4.88 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.



(A) Straight edge

(B) Thickness gauge

2. VALVE SEAT

S143093A0102

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)

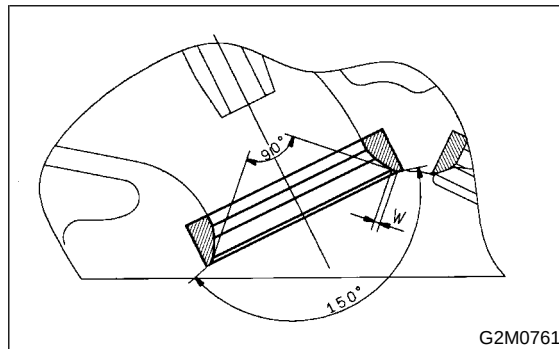
Exhaust

Standard

1.5 mm (0.059 in)

Limit

2.2 mm (0.087 in)



3. VALVE GUIDE

S143093A0103

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

0.030 — 0.057 mm (0.0012 — 0.0022 in)

Exhaust

0.040 — 0.067 mm (0.0016 — 0.0026 in)

Limit

0.15 mm (0.0059 in)

2) If the clearance between valve guide and stem exceeds the limit, replace valve guide or valve itself whichever shows greater amount of wear. See following procedure for valve guide replacement.

Valve guide inner diameter:

5.500 — 5.512 mm (0.2165 — 0.2170 in)

Valve stem outer diameter:

Intake

5.455 — 5.470 mm (0.2148 — 0.2154 in)

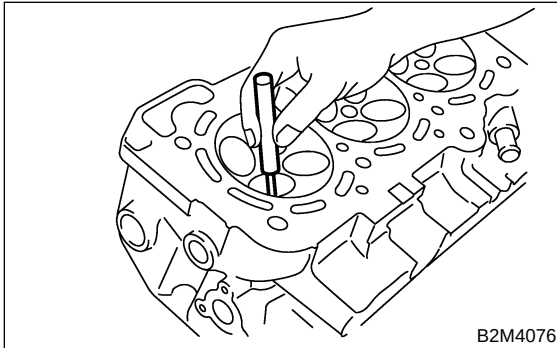
Exhaust

5.455 — 5.460 mm (0.2148 — 0.2150 in)

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

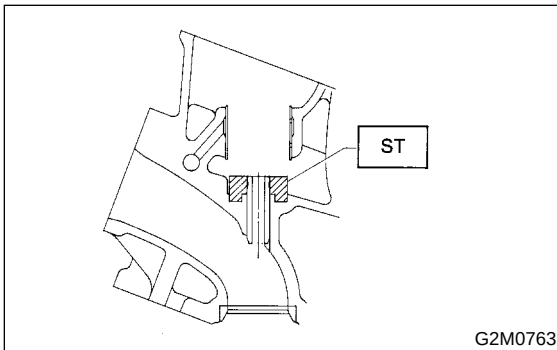
(2) Insert ST2 into valve guide and press it down to remove valve guide.

ST1 18250AA000 CYLINDER HEAD TABLE
ST2 499765700 VALVE GUIDE REMOVER



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

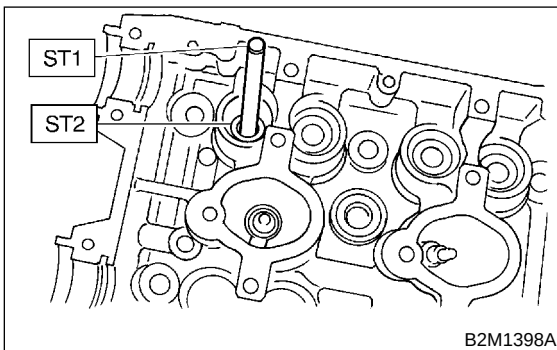
ST 18251AA000 VALVE GUIDE ADJUSTER



(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 499765700 VALVE GUIDE REMOVER
ST2 18251AA000 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion: L

12.3 — 12.7 mm (0.484 — 0.500 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 499765900 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 S143093A0104

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

CYLINDER HEAD ASSEMBLY

Mechanical

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)

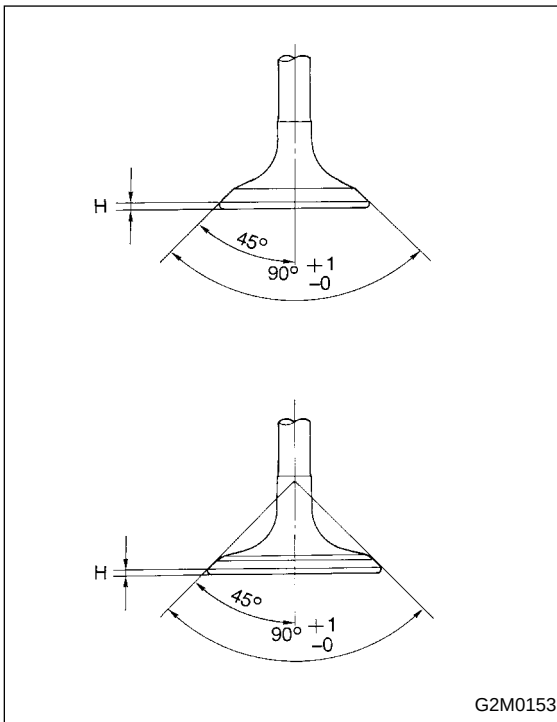
Valve overall length:

Intake

103.5 mm (4.075 in)

Exhaust

103.2 mm (4.063 in)

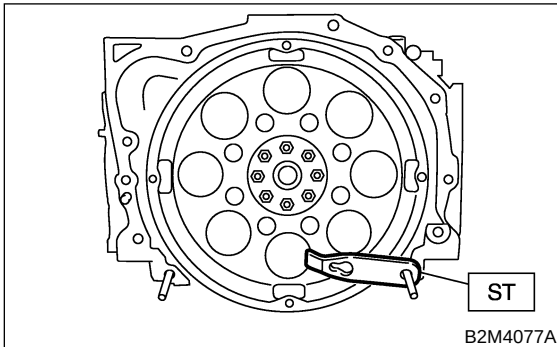


2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

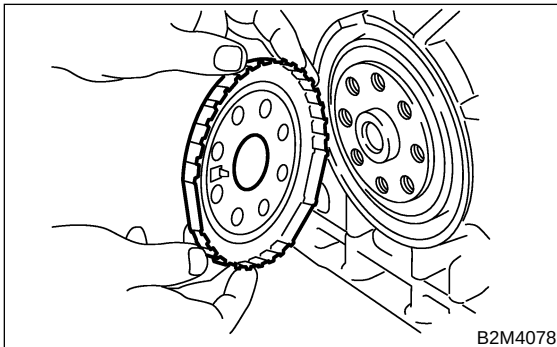
18. Cylinder Block SI43090

A: REMOVAL SI43090A18

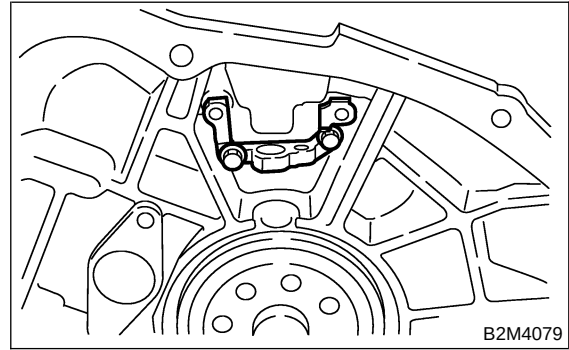
- 1) Remove crankshaft pulley. <Ref. to ME(H6)-42, REMOVAL, Crankshaft Pulley.>
 - 2) Remove front chain cover. <Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
 - 3) Remove timing chain assembly. <Ref. to ME(H6)-45, REMOVAL, Timing Chain Assembly.>
 - 4) Remove camshaft sprockets. <Ref. to ME(H6)-50, REMOVAL, Camshaft Sprocket.>
 - 5) Remove crankshaft sprocket. <Ref. to ME(H6)-51, REMOVAL, Crankshaft Sprocket.>
 - 6) Remove rear chain cover. <Ref. to ME(H6)-52, REMOVAL, Rear Chain Cover.>
 - 7) Remove camshafts. <Ref. to ME(H6)-55, REMOVAL, Camshaft.>
 - 8) Remove cylinder head assembly. <Ref. to ME(H6)-59, REMOVAL, Cylinder Head Assembly.>
 - 9) Remove drive plate.
- Using ST, lock crankshaft.
ST 498497100 CRANKSHAFT STOPPER



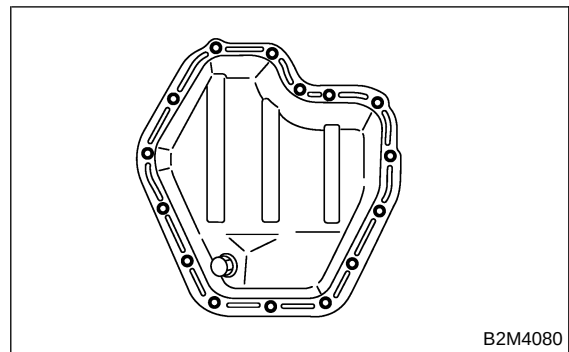
- 10) Remove crankshaft position sensor plate.



- 11) Remove crankshaft position sensor bracket.



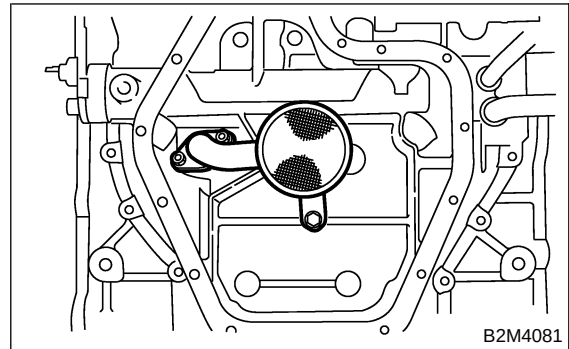
- 12) Rotate engine until oil pan comes to the top.
- 13) Remove bolts which secure lower oil pan to upper oil pan.



- 14) Insert an 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.

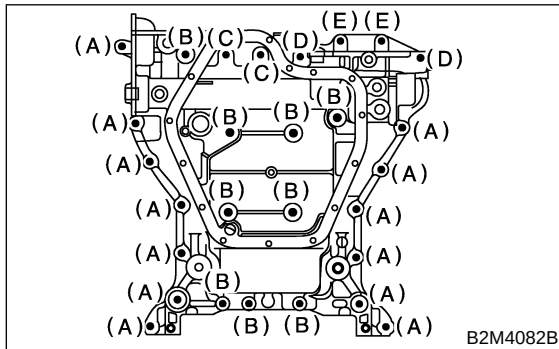
- 15) Remove oil strainer.



CYLINDER BLOCK

Mechanical

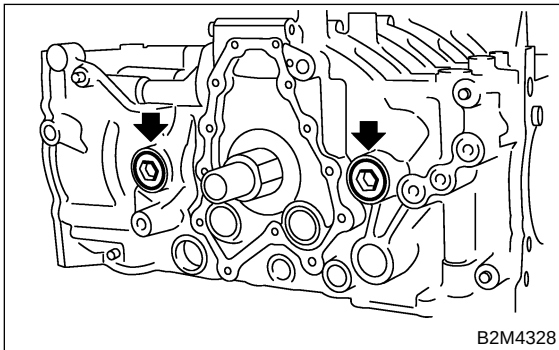
16) Remove bolts which secure upper oil pan to cylinder block.



Bolt dimension:

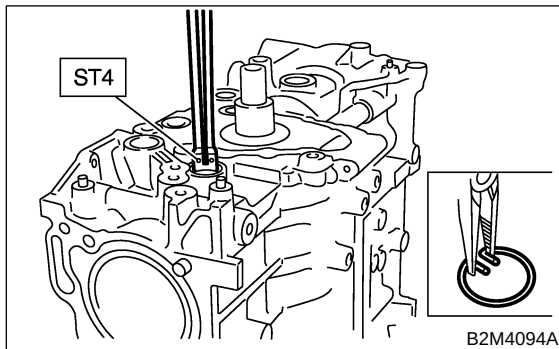
- (A) 8 × 40
- (B) 8 × 65
- (C) 8 × 85
- (D) 8 × 130
- (E) 8 × 24

17) Remove service hole cover and service hole plugs using hexagon wrench (14 mm).



18) 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 by using ST.

ST 18233AA000 PISTON PIN CIRCLIP PLIER

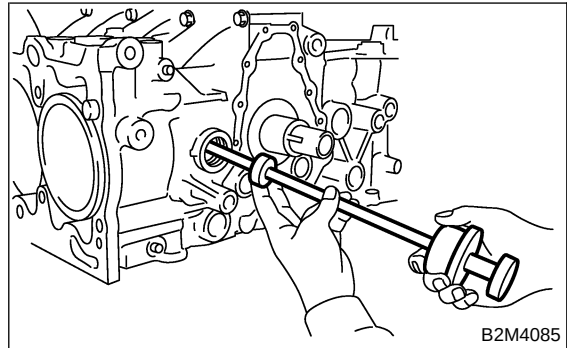


19) Draw out piston pin from #1 and #2 pistons by using ST.

ST 49997500 PISTON PIN REMOVER

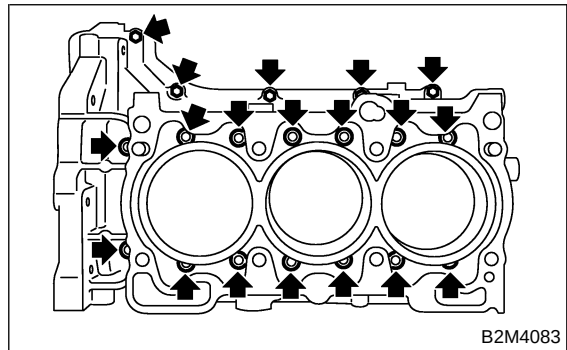
CAUTION:

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



20) Similarly remove piston pins from #3, #4, #5 and #6 pistons.

21) Remove bolts which connect cylinder block.



22) 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.

23) Remove rear oil seal.

24) Remove crankshaft together with connecting rod.

25) 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.

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

CAUTION:

Do not confuse combination of piston, piston pin and cylinder.

B: INSTALLATION S143090A11

1) Install ST to cylinder block, then install crankshaft bearing.

ST 18232AA000 ENGINE STAND

CAUTION:

Remove oil in the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

2) Position crankshaft and connecting rod on the #2, #4 and #6 cylinder.

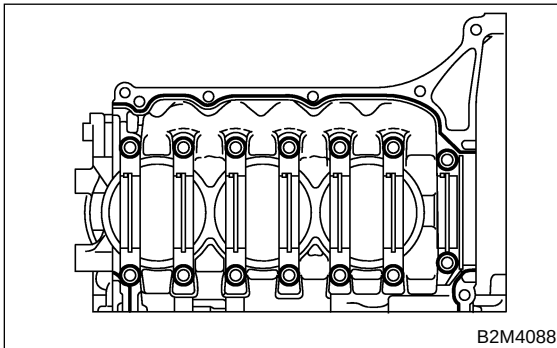
3) Apply fluid packing to the mating surface of #1, #3 and #5 cylinder block.

Fluid packing:

THREE BOND 1215B or equivalent

CAUTION:

Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.

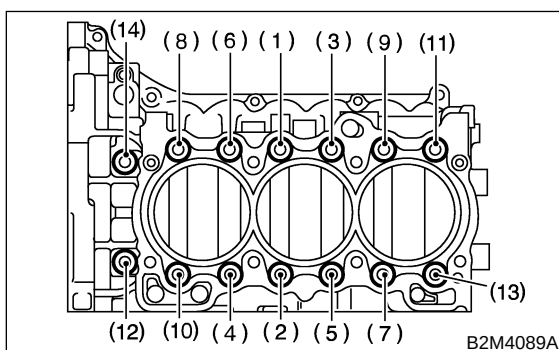


4) Apply engine oil to washers and threads of cylinder block connecting bolts. Tighten the bolts following the steps below.

(1) Tighten all the bolts in the numerical order shown in the figure.

Tightening torque:

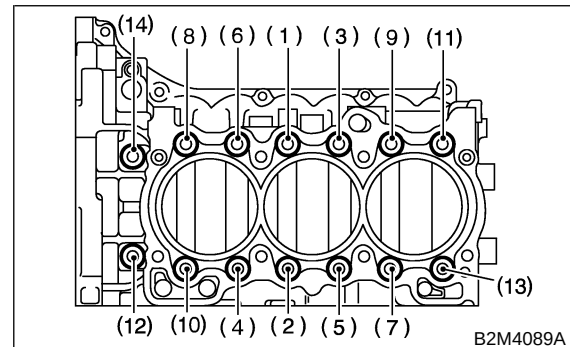
(1) to (11)	25 N·m (2.5 kgf-m, 18 ft-lb)
(12)	20 N·m (2.0 kgf-m, 14 ft-lb)
(13)	25 N·m (2.5 kgf-m, 18 ft-lb)
(14)	20 N·m (2.0 kgf-m, 14 ft-lb)



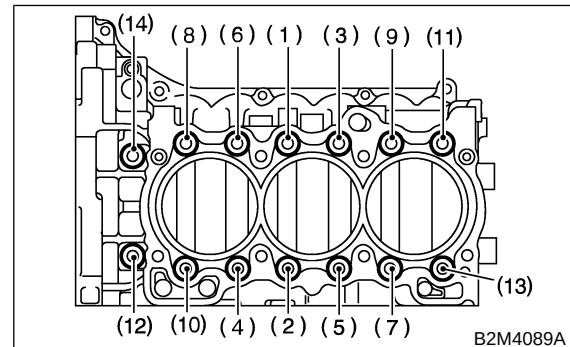
(2) Tighten all the bolts again in the order shown in the figure.

Tightening torque:

(1) to (11)	25 N·m (2.5 kgf-m, 18 ft-lb)
(12)	20 N·m (2.0 kgf-m, 14 ft-lb)
(13)	25 N·m (2.5 kgf-m, 18 ft-lb)
(14)	20 N·m (2.0 kgf-m, 14 ft-lb)



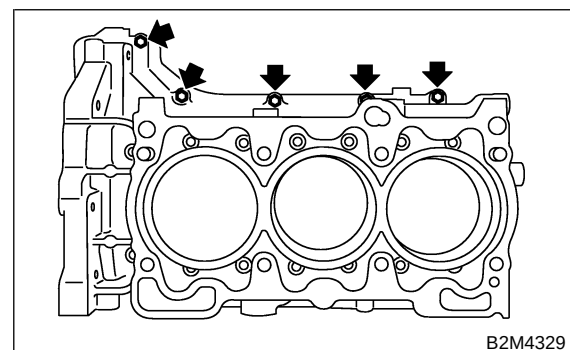
5) Tighten all the bolts by 90° in the order shown in the figure.



6) Install upper bolts on cylinder block.

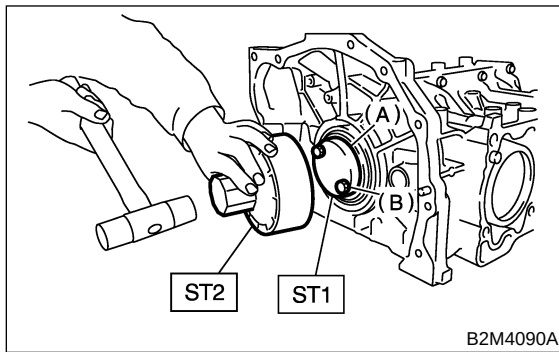
Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)



7) Install rear oil seal using ST1 and ST2.

CYLINDER BLOCK



- (A) Rear oil seal
(B) Drive plate attaching bolt

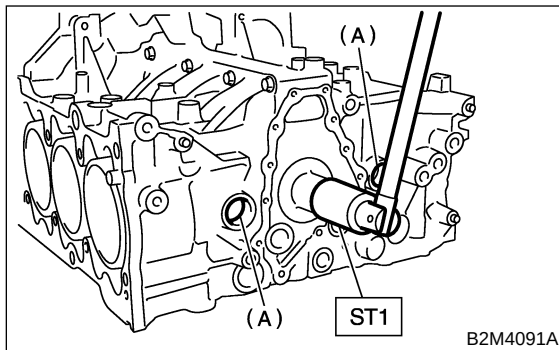
8) Installing piston.

CAUTION:

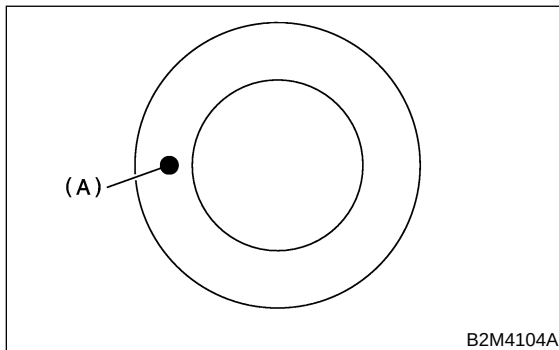
Install piston and piston pin to the same cylinder they were installed before overhaul.

- (1) Using ST1, rotate crankshaft until each small end of connecting rods #3 and #4 are aligned over service hole (A).

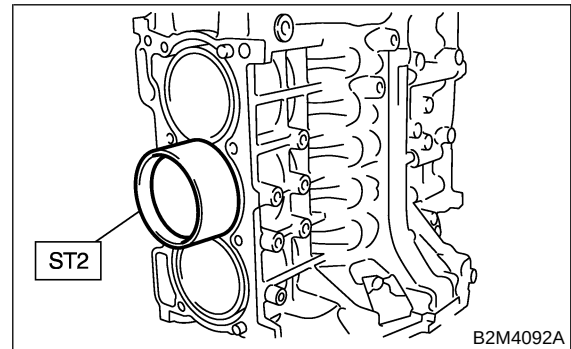
ST1 18252AA000 CRANKSHAFT SOCKET



- (2) Apply a coat of engine oil to piston and cylinders.
(3) Install pistons with their front marks (A) facing the front of engine.

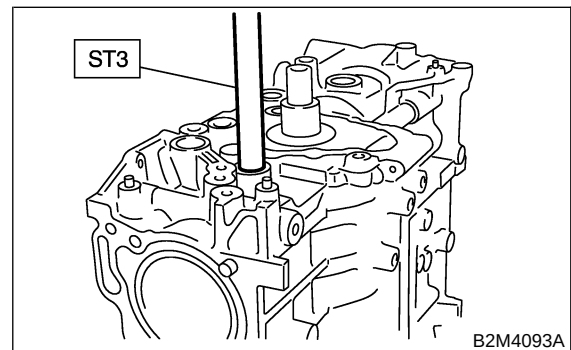


- (4) Insert pistons in their cylinders using ST2.
ST2 18254AA000 PISTON GUIDE



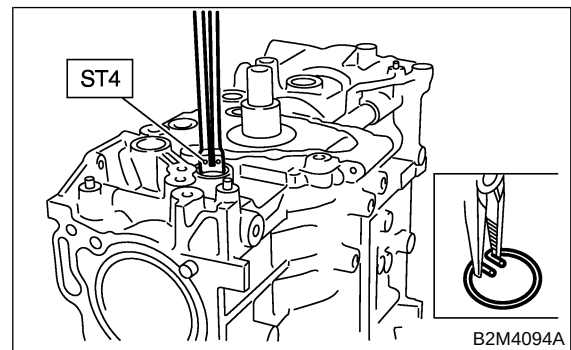
9) Installing piston pin.

- (1) Apply a coat of engine oil to ST3.
ST3 18253AA000 PISTON PIN GUIDE
(2) Insert ST3 into service hole to align piston pin hole with connecting rod small end.



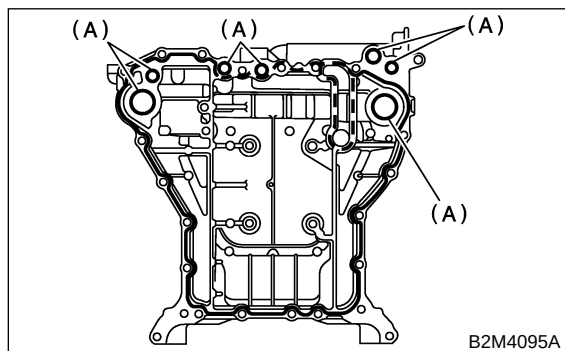
- (3) Apply a coat of engine oil to piston pin and insert piston pin into piston and connecting rod small end through service hole.
(4) Using ST4, install circlip.
ST4 18233AA000 PISTON PIN CIRCLIP PLIER

CAUTION:
Use a new circlip.



- 10) Repeat the same steps for pistons #1 and #2, #5 and #6.
11) Install service hole plug and cover.
12) Apply fluid packing to mating surface of upper oil pan.
13) Install O-ring.

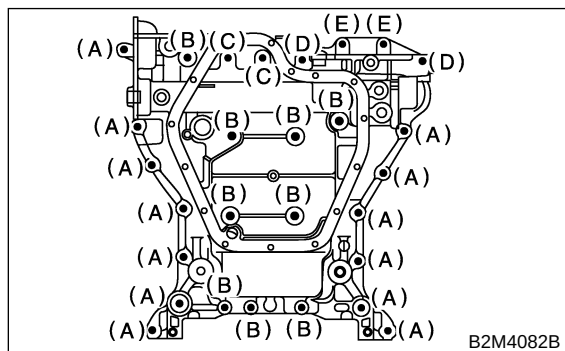
Fluid packing:
THREE BOND 1280B



(A) O-ring

14) Temporarily tighten the upper oil pan.

CAUTION:
Do not confuse the mounting positions of the bolts.

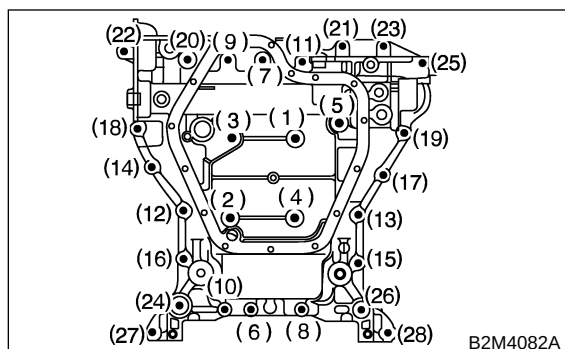


Bolt dimension:

- (A) 8 × 40
- (B) 8 × 65
- (C) 8 × 85
- (D) 8 × 130
- (E) 8 × 20

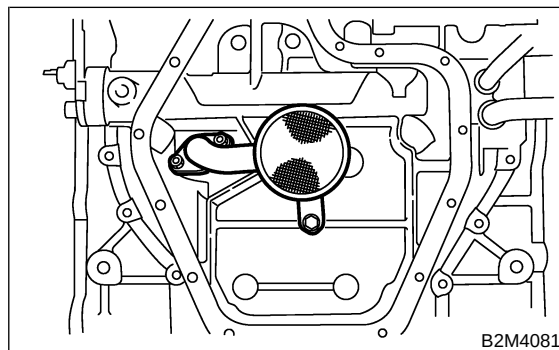
15) Tighten the upper oil pan mounting bolts in the numerical sequence shown in the figure.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



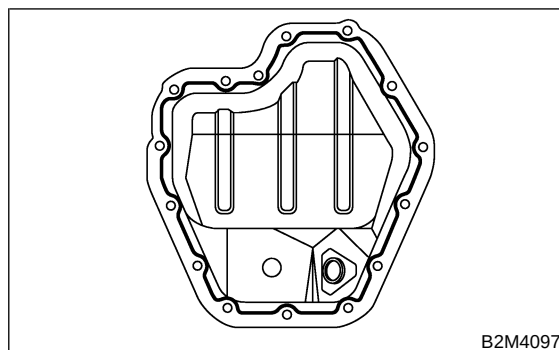
16) Install oil strainer.

CAUTION:
Use a new O-ring.



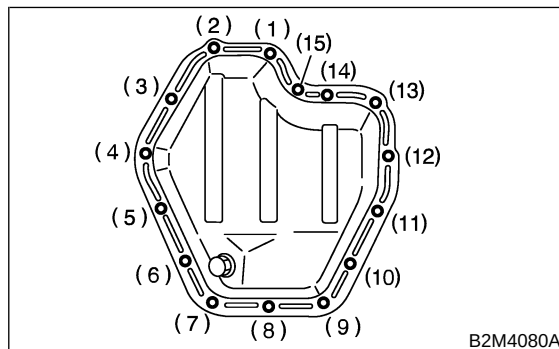
17) Apply fluid packing to mating surface of lower oil pan.

Fluid packing:
THREE BOND 1280B



18) Tighten the lower oil pan mounting bolts in the numerical sequence shown in the figure.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



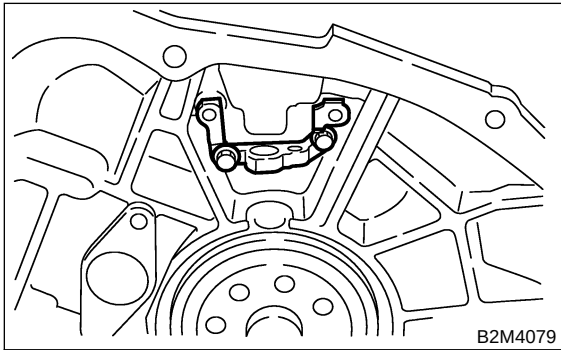
CYLINDER BLOCK

Mechanical

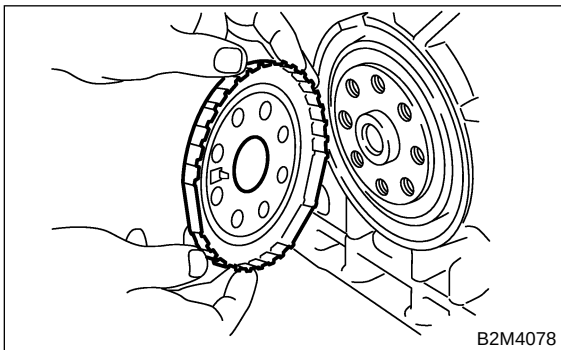
19) Install crankshaft position sensor bracket.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



20) Install crankshaft position sensor plate.



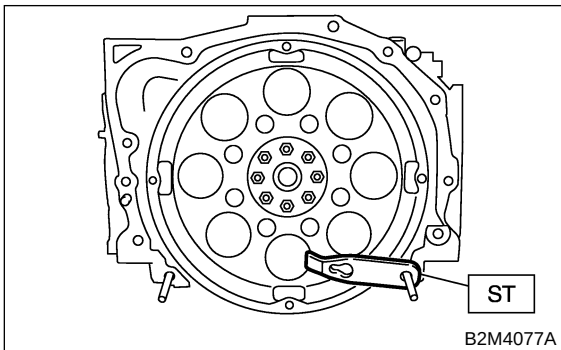
21) Install drive plate.

Using ST, lock crankshaft.

ST 498497100 CRANKSHAFT STOPPER

Tightening torque:

81 N·m (8.3 kgf-m, 60 ft-lb)



22) Install cylinder head assembly. <Ref. to ME(H6)-59, INSTALLATION, Cylinder Head Assembly.>

23) Install camshafts. <Ref. to ME(H6)-55, INSTALLATION, Camshaft.>

24) Install rear chain cover. <Ref. to ME(H6)-52, INSTALLATION, Rear Chain Cover.>

25) Install crankshaft sprocket. <Ref. to ME(H6)-51, INSTALLATION, Crankshaft Sprocket.>

26) Install camshaft sprockets. <Ref. to ME(H6)-50, INSTALLATION, Camshaft Sprocket.>

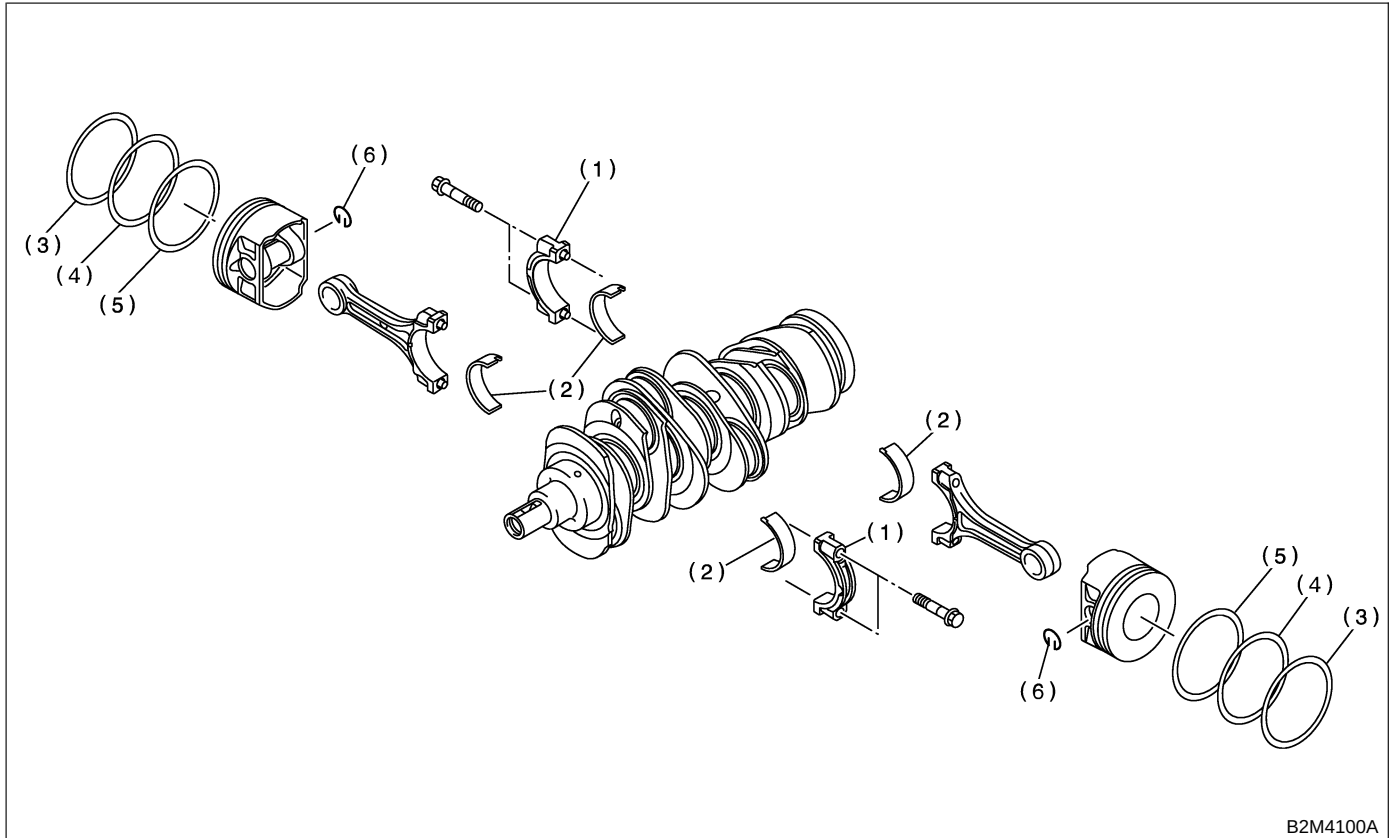
27) Install timing chain assembly. <Ref. to ME(H6)-46, INSTALLATION, Timing Chain Assembly.>

28) Install front chain cover. <Ref. to ME(H6)-43, INSTALLATION, Front Chain Cover.>

29) Install crankshaft pulley. <Ref. to ME(H6)-42, INSTALLATION, Crankshaft Pulley.>

C: DISASSEMBLY

S143090A06



B2M4100A

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

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

CAUTION:

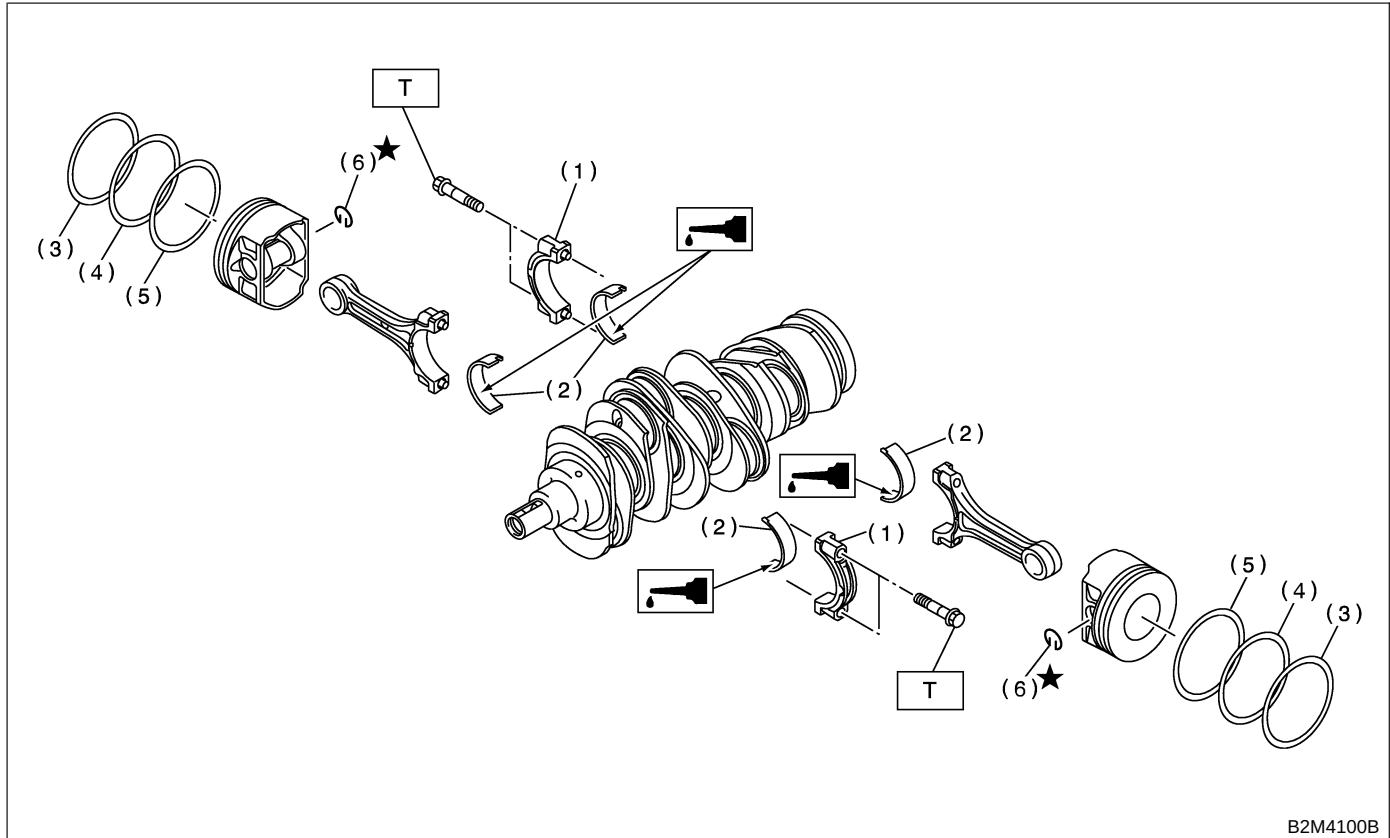
Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

- 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.

D: ASSEMBLY SI43090A02

B2M4100B

(1) Connecting rod bearing	(5) Second ring
(2) Connecting rod	(6) Top ring
(3) Connecting rod cap	(7) Circlip
(4) Oil ring	

Tightening torque: N·m (kgf·m, ft·lb)
T: 53 (5.4, 39)

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:

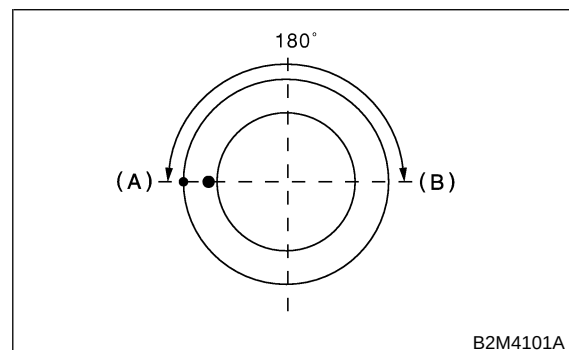
● **Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.**

● **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.

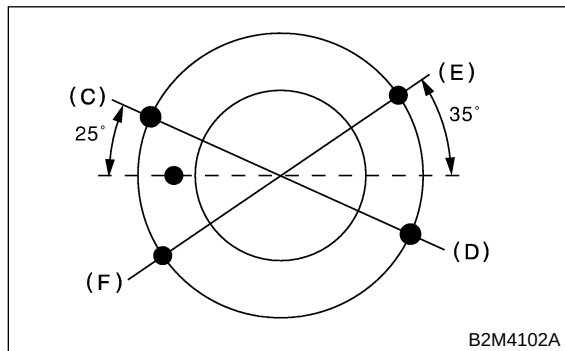
(2) Position the top ring gap at (A) or (B) in the figure.



B2M4101A

(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.

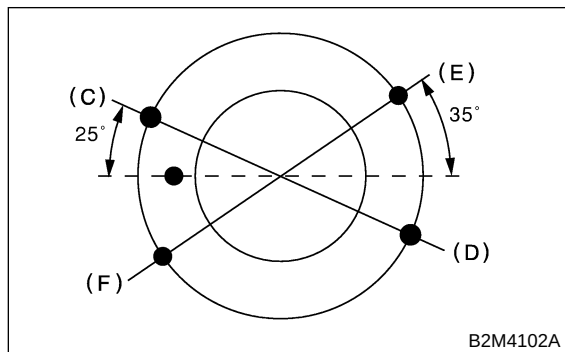


(5) Position the expander gap at 180° of the reverse side for the upper rail gap.

(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.

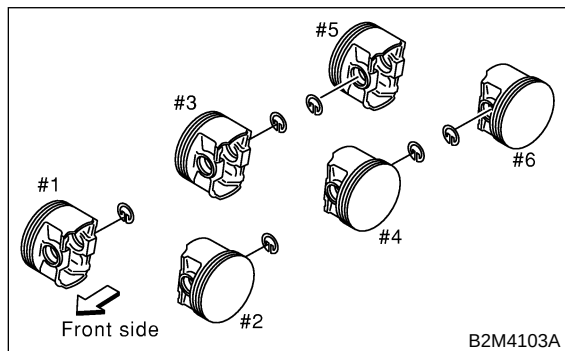


5) Install circlip.

Install circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

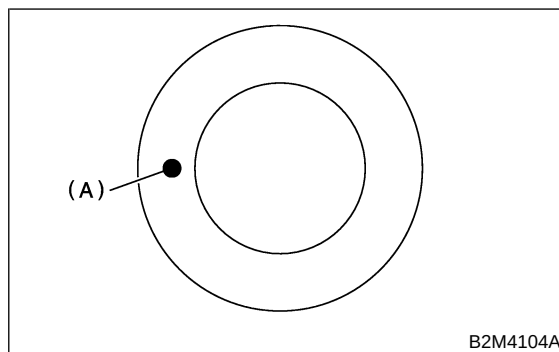
CAUTION:

Use new circlips.



CAUTION:

Piston front mark (A) faces towards the front of the engine.



E: INSPECTION

S143090A10

1. CYLINDER BLOCK

S143090A1002

- 1) Visually check for cracks and damage. 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:

202 mm (7.95 in)

2. CYLINDER AND PISTON

S143090A1003

- 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.

CYLINDER BLOCK

Mechanical

Standard diameter:

A: 89.205 — 89.215 mm (3.5120 — 3.5124 in)

B: 89.195 — 89.205 mm (3.5116 — 3.5120 in)

Taper:

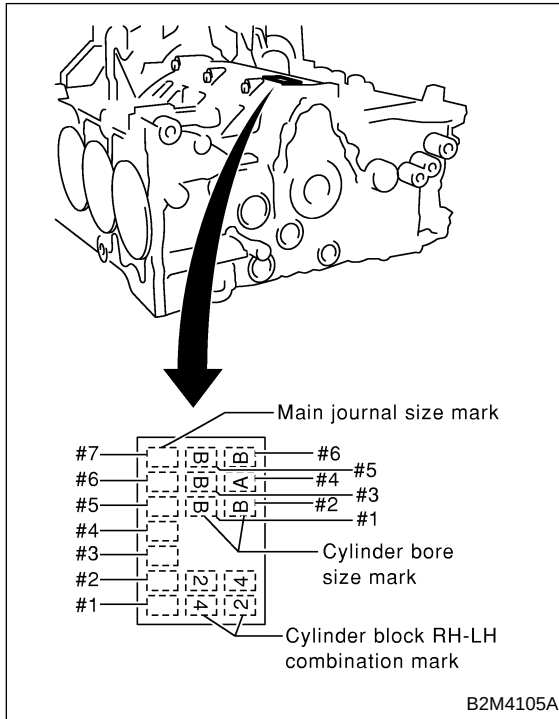
Limit

0.050 mm (0.0020 in)

Out-of-roundness:

Limit

0.050 mm (0.0020 in)

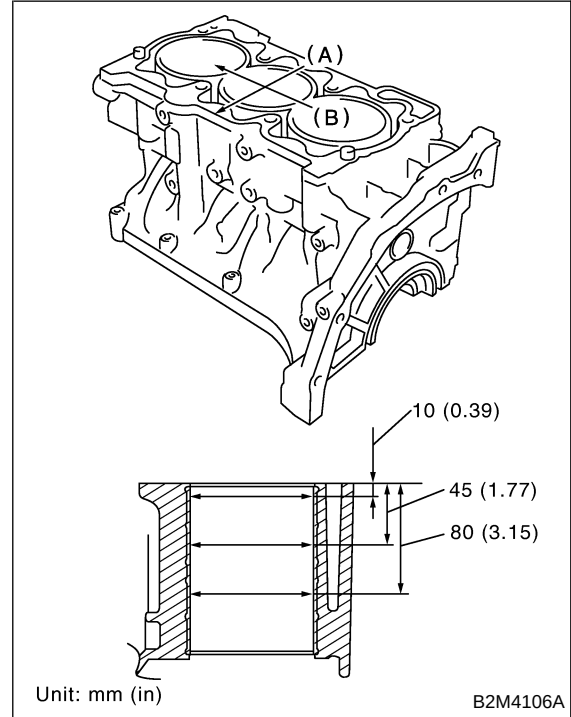


2) How to measure the inner diameter of each cylinder

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).



(A) Thrust direction

(B) Piston pin direction

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:

39.0 mm (1.535 in)

Piston outer diameter:

Standard

A: 89.185 — 89.195 mm

(3.5112 — 3.5116 in)

B: 89.175 — 89.185 mm

(3.5108 — 3.5112 in)

0.25 mm (0.0098 in) oversize

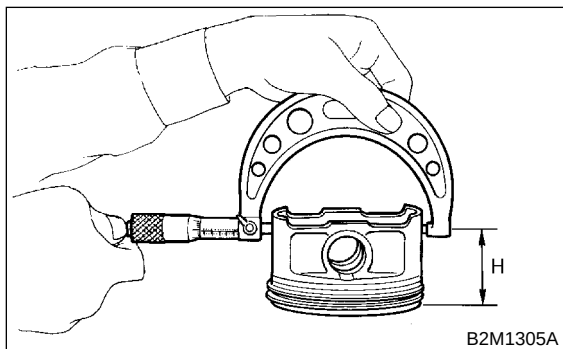
89.425 — 89.435 mm

(3.5207 — 3.5211 in)

0.50 mm (0.0197 in) oversize

89.675 — 89.685 mm

(3.5305 — 3.5309 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, rebores 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

S143090A1004

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 ME(H6)-73 CYLINDER AND PISTON, INSPECTION, Cylinder Block.> 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.

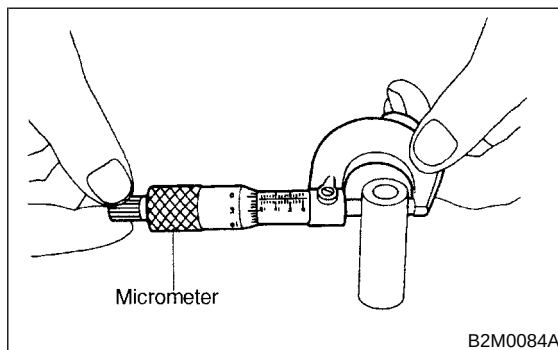
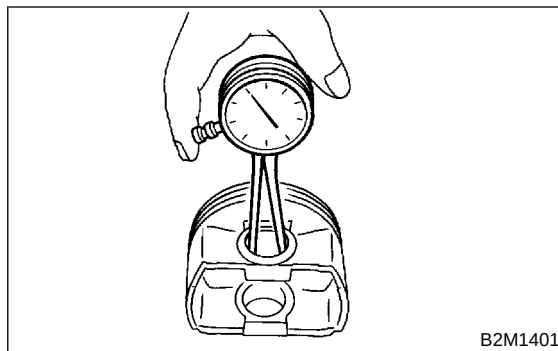
Standard clearance between piston pin and hole in piston:

Standard

0.004 — 0.008 mm (0.0002 — 0.0003 in)

Limit

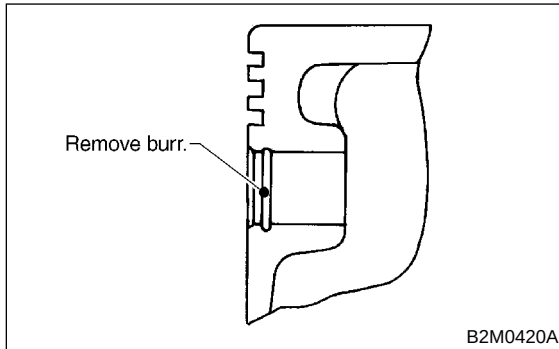
0.020 mm (0.0008 in)



CYLINDER BLOCK

Mechanical

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



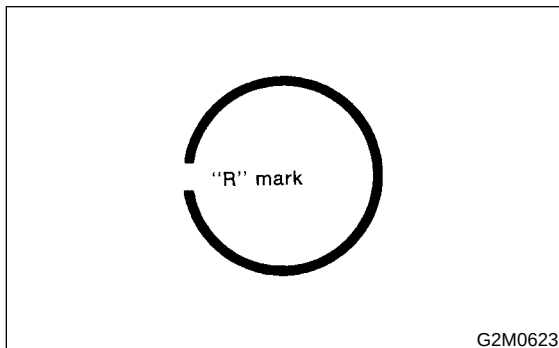
5) Check piston pin circlip for distortion, cracks and wear.

4. PISTON RING S143090A1005

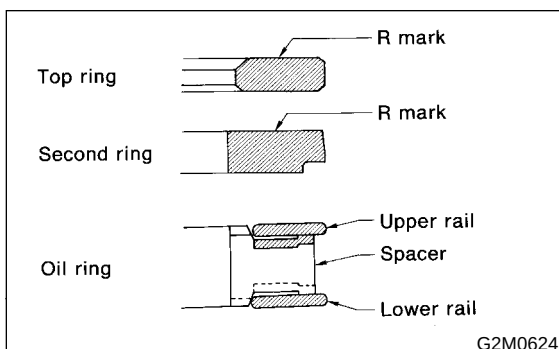
1) If piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace piston ring with a new one of the same size as the piston.

CAUTION:

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

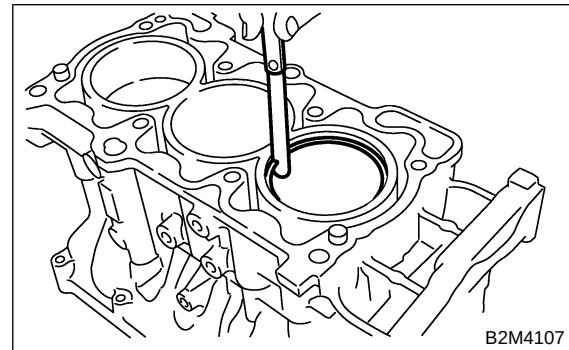


● The oil ring is a combined ring consisting of two rails and a spacer in between. When installing, be careful to assemble correctly.



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	0.35 — 0.50 (0.0138 — 0.0197)	1.0 (0.039)
	Oil ring rail	0.20 — 0.60 (0.0079 — 0.024)	1.5 (0.059)

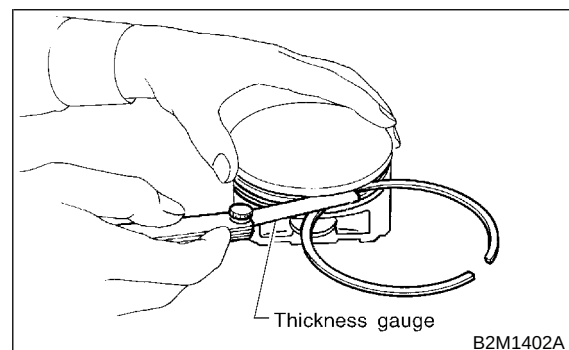


3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

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)

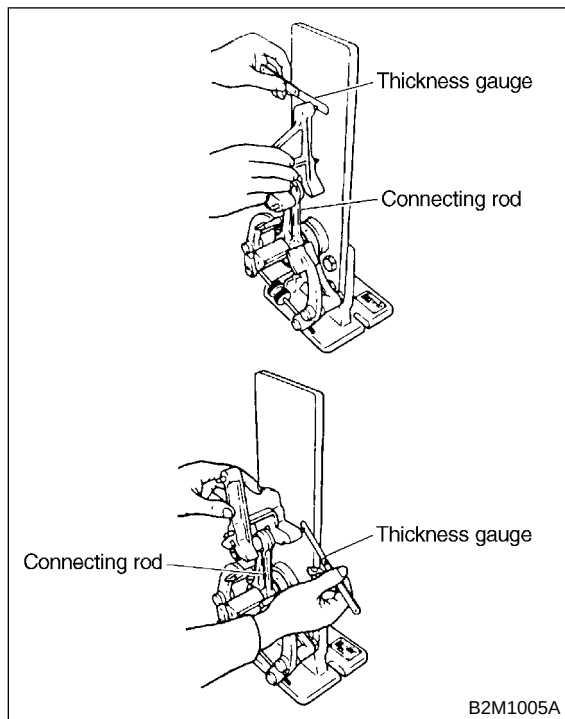


5. CONNECTING ROD S143090A1006

- 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.

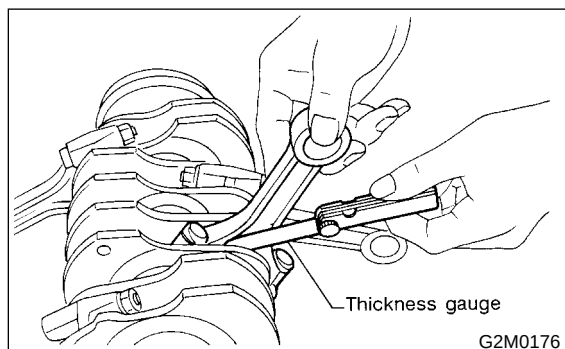
Connecting rod side clearance:

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

0.020 — 0.046 mm (0.0008 — 0.0018 in)

Limit

0.050 mm (0.0020 in)

Unit: mm (in)		
Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.490 — 1.502 (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.

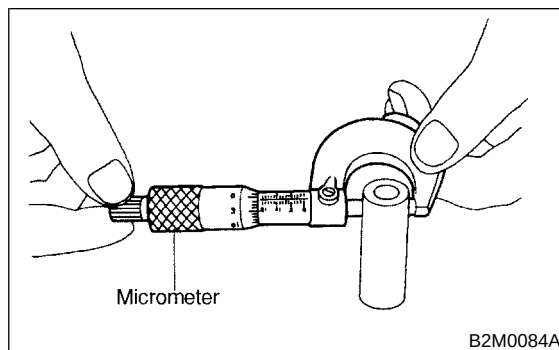
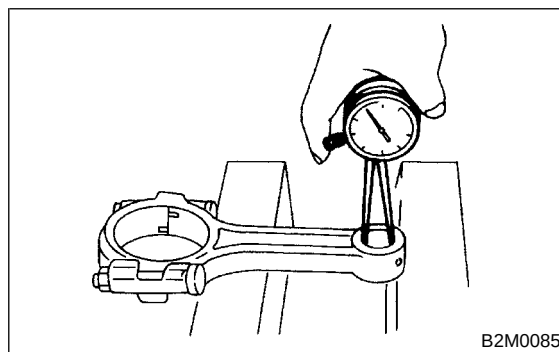
Clearance between piston pin and bushing:

Standard

0 — 0.022 mm (0 — 0.0009 in)

Limit

0.030 mm (0.0012 in)



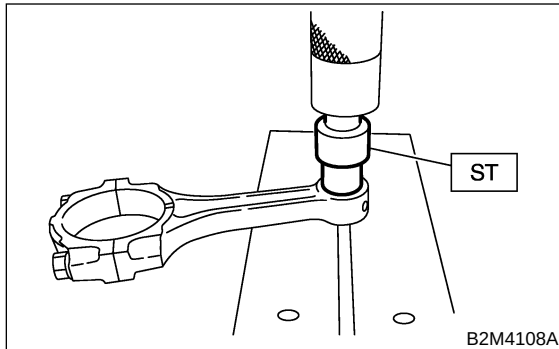
CYLINDER BLOCK

Mechanical

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 18350AA000 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

S143090A1007

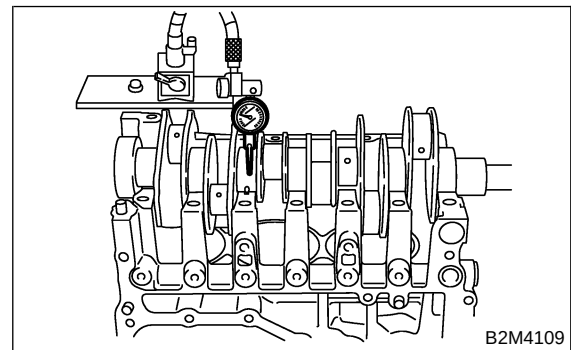
- 1) Clean crankshaft completely and check for cracks by means of red lead check etc., and replace if defective.
- 2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

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 they are not within the specifications, replace bearing with a suitable (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

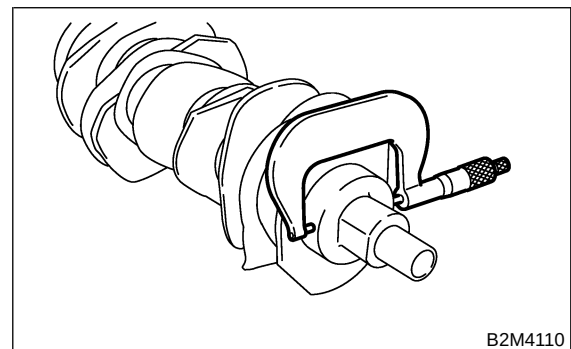
0.020 mm (0.0008 in) or less

Taper limit

0.07 mm (0.0028 in)

Grinding limit

0.250 mm (0.0098 in)



CYLINDER BLOCK

Mechanical

		Unit: mm (in)	
		Crank journal diameter	
		#1, #3, #5, #7	#2, #4, #6
Standard	Journal O.D.	63.992 — 64.008 (2.5194 — 2.5200)	
	Bearing size (Thickness at center)	1.992 — 2.005 (0.0784 — 0.0789)	1.996 — 2.000 (0.0786 — 0.0787)
0.03 (0.0012) undersize	Journal O.D.	63.962 — 63.978 (2.5182 — 2.5188)	
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.020 (0.0795 — 0.0795)
0.05 (0.0020) undersize	Journal O.D.	63.942 — 63.958 (2.5174 — 2.5180)	
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)
0.25 (0.0098) undersize	Journal O.D.	63.742 — 63.758 (2.5095 — 2.5102)	
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)

O.D. ... Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace bearing.

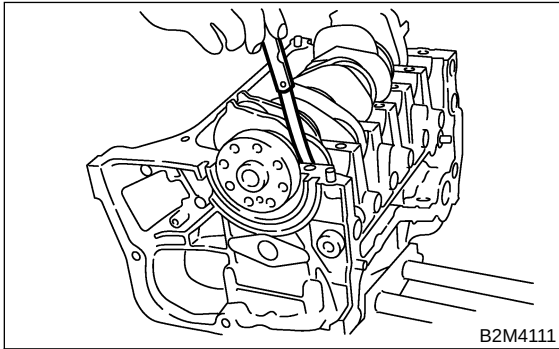
Crankshaft thrust clearance:

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	0.010 — 0.030 (0.0004 — 0.0012)
Limit	0.040 (0.0016)

ENGINE TROUBLE IN GENERAL

Mechanical

19. Engine Trouble in General

S143095

A: INSPECTION

S143095A10

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 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
	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		A
	● Fuel line	● Defective fuel pump and relay	A
		● Lack of or insufficient fuel	B
	● Chain	● 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

ENGINE TROUBLE IN GENERAL

Mechanical

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3) Initial combustion occur.	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		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
	● Chain	● 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
4) Engine stalls after initial combustion.	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		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
	● Chain	● 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

ENGINE TROUBLE IN GENERAL

Mechanical

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
2. Rough idle and engine stall	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		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
	● Chain	● 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

ENGINE TROUBLE IN GENERAL

Mechanical

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		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
	● Chain	● 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	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		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
	● Chain	● 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

ENGINE TROUBLE IN GENERAL

Mechanical

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
5. Engine does not return to idle.	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		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)	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		A
	● Cooling system	● Overheating	B
	● Others	● Malfunction of evaporative emission control system	B
7. After burning in exhaust system	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		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
	● Chain	● 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	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		A
	● Intake system	● Loosened oil filter cap	B
	● Chain	● 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

ENGINE TROUBLE IN GENERAL

Mechanical

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	● Engine control system <Ref. to EN(H6)-2 Basic Diagnostic Procedure.>		A
	● Intake system	● Dirty air cleaner element	A
	● Chain	● 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

20. Engine Noise S143096

A: INSPECTION S143096A10

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 water 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 EN(H6)-48 Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H6)-45 Inspection Mode.> after connecting fuel injector connector.

GENERAL DESCRIPTION

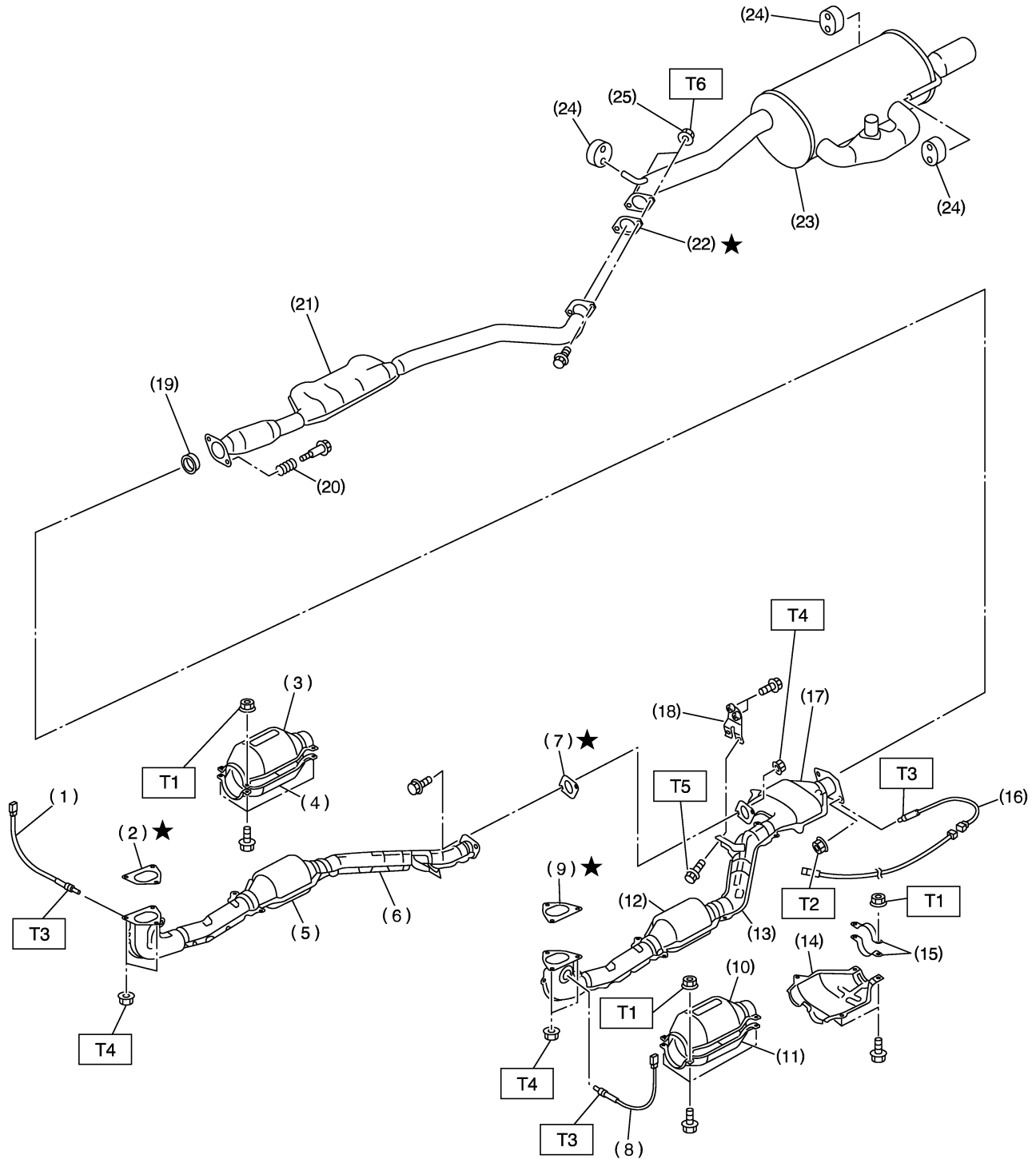
Exhaust

1. General Description

S142001

A: COMPONENT

S142001A05



B2M4421A

GENERAL DESCRIPTION

Exhaust

- (1) Front oxygen (A/F) sensor (RH)
- (2) Gasket (RH)
- (3) Upper front catalytic converter cover (RH)
- (4) Lower front catalytic converter cover (RH)
- (5) Front catalytic converter (RH)
- (6) Front exhaust pipe (RH)
- (7) Gasket (RH)
- (8) Front oxygen (A/F) sensor (LH)
- (9) Gasket (LH)
- (10) Upper front catalytic converter cover (LH)

- (11) Lower front catalytic converter cover (LH)
- (12) Front catalytic converter (LH)
- (13) Front exhaust pipe (LH)
- (14) Lower rear catalytic converter cover
- (15) Clamp
- (16) Rear oxygen sensor
- (17) Rear catalytic converter
- (18) Bracket
- (19) Gasket
- (20) Spring
- (21) Rear exhaust pipe

- (22) Gasket
- (23) Muffler
- (24) Cushion rubber
- (25) Self-locking nut

Tightening torque: N·m (kgf-m, ft-lb)

T1: 13 (1.3, 9.4)

T2: 18 (1.8, 13.0)

T3: 21 (2.1, 15)

T4: 30 (3.1, 22.4)

T5: 35 (3.6, 26.0)

T6: 48 (4.9, 35.4)

B: CAUTION SI42001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

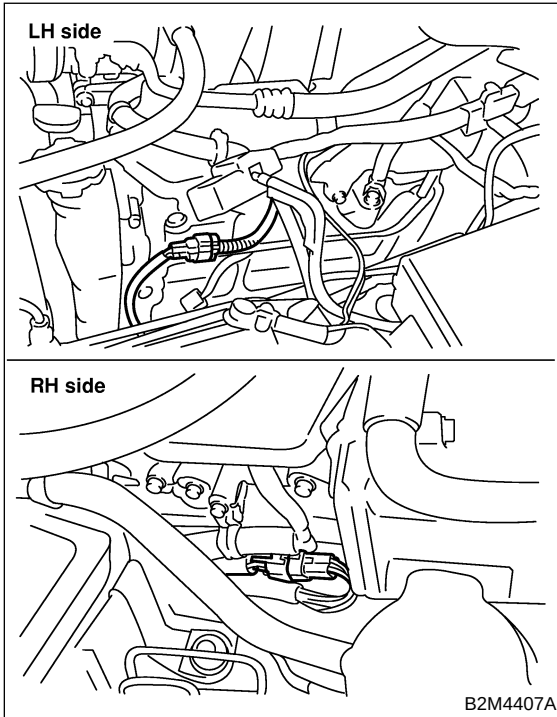
2. Front Exhaust Pipe

S142065

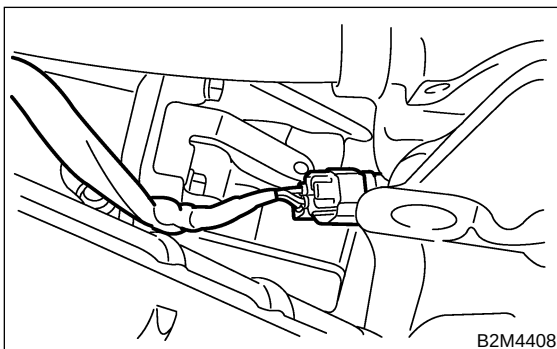
A: REMOVAL

S142065A18

- 1) Remove battery.
- 2) Remove air cleaner case and air intake duct.
<Ref. to IN(H6)-5, REMOVAL, Air cleaner.> and
<Ref. to IN(H6)-7, REMOVAL, Air Intake Duct.>
- 3) Disconnect front oxygen (A/F) sensor connector.



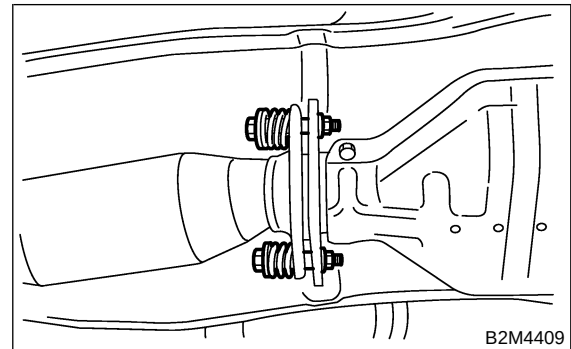
- 4) Lift-up the vehicle.
- 5) Disconnect rear oxygen sensor connector.



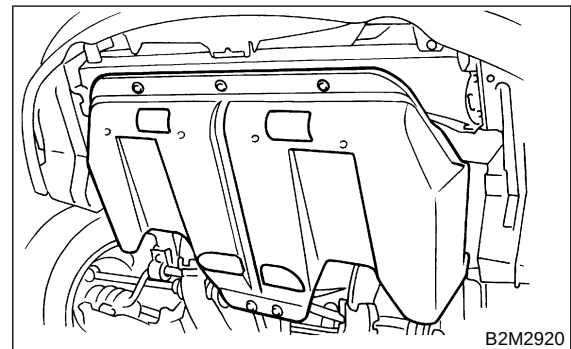
- 6) Separate front exhaust pipe assembly from rear exhaust pipe.

WARNING:

Be careful, exhaust pipe is hot.



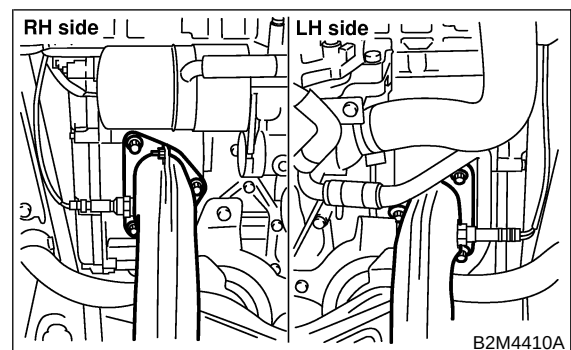
- 7) Remove under cover.



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

CAUTION:

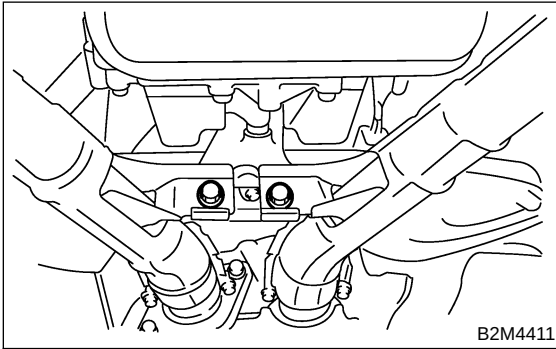
Be careful not to pull down front and center exhaust pipe assembly.



FRONT EXHAUST PIPE

Exhaust

- 9) Remove bolt which secures front exhaust pipe assembly to hanger bracket.

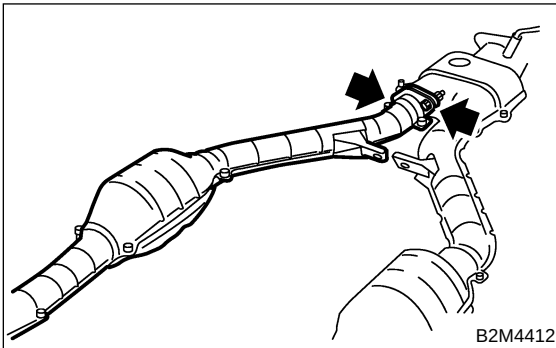


- 10) Remove front exhaust pipe from the vehicle.

CAUTION:

- Be careful not to let front exhaust pipe assembly fall off when removing as it is quite heavy.
- After removing front exhaust assembly, do not apply excessive pulling force on rear exhaust pipe.

- 11) Separate front exhaust pipe (RH) from front exhaust pipe assembly.



B: INSTALLATION S142065A11

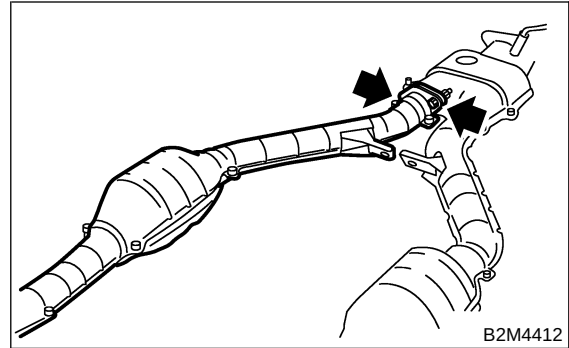
- 1) Install front exhaust pipe (RH) to front exhaust pipe assembly.

CAUTION:

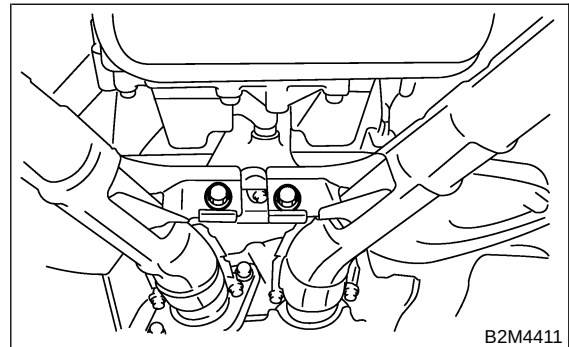
Replace gaskets with new ones.

Tightening torque:

30 N·m (3.1 kgf-m, 22.4 ft-lb)



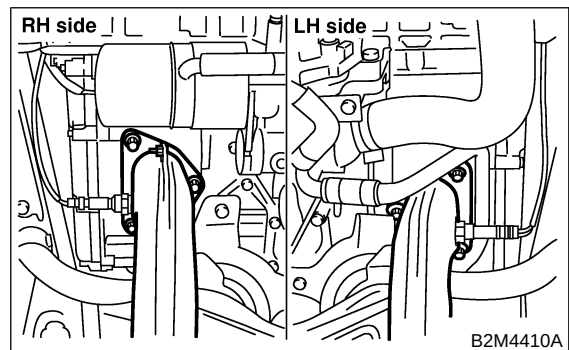
- 2) Install front and rear exhaust pipe assembly to the vehicle.
3) Temporarily tighten bolt which installs front exhaust pipe assembly to hanger bracket.



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

Tightening torque:

30 N·m (3.1 kgf-m, 22.4 ft-lb)

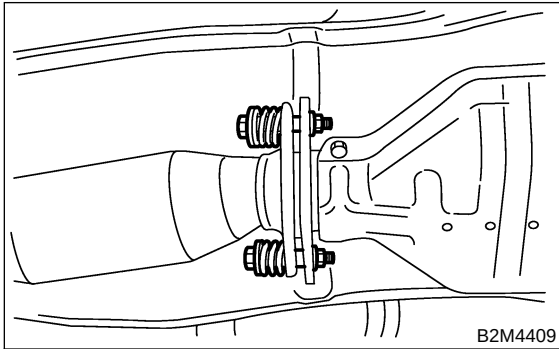


- 5) Install under cover.

- 6) Tighten bolts which install front exhaust pipe to rear exhaust pipe.

Tightening torque:

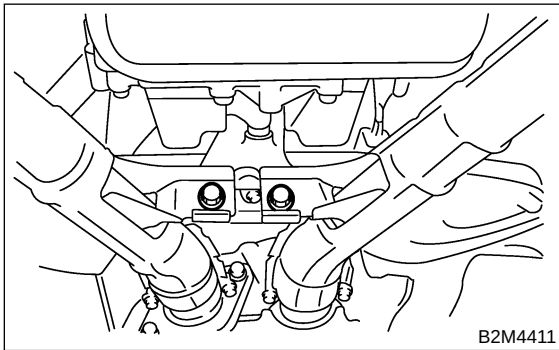
18 N·m (1.8 kgf-m, 13.0 ft-lb)



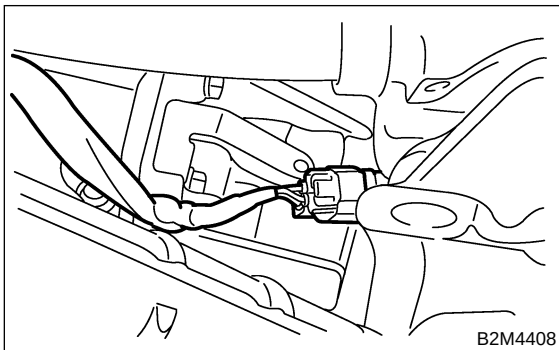
- 7) Tighten bolt which holds front exhaust pipe assembly to hanger bracket.

Tightening torque:

35 N·m (3.6 kgf-m, 26.0 ft-lb)

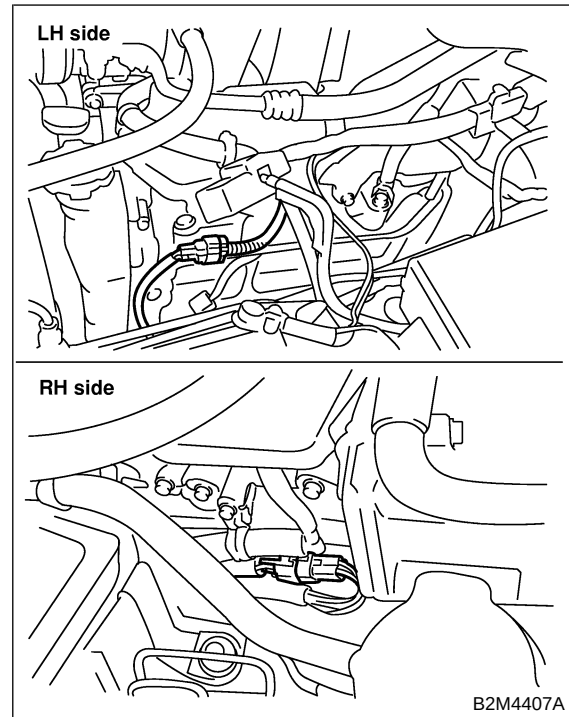


- 8) Connect rear oxygen sensor connector.



- 9) Lower the vehicle.

- 10) Connect front oxygen (A/F) sensor connectors.



- 11) Install air cleaner case and air intake duct.
<Ref. to IN(H6)-5, INSTALLATION, Air Cleaner.>
and <Ref. to IN(H6)-7, INSTALLATION, Air Intake Duct.>

- 12) Install battery.

C: INSPECTION

S142065A10

- 1) Make sure there are no exhaust leaks from connections and welds.
- 2) Make sure there are no holes or rusting.

3. Rear Exhaust Pipe

S142068

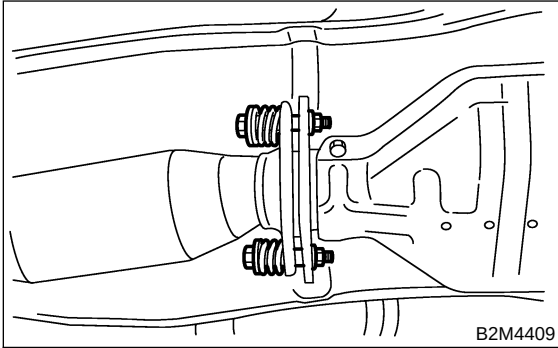
A: REMOVAL

S142068A18

- 1) Separate rear exhaust pipe from front exhaust pipe.

CAUTION:

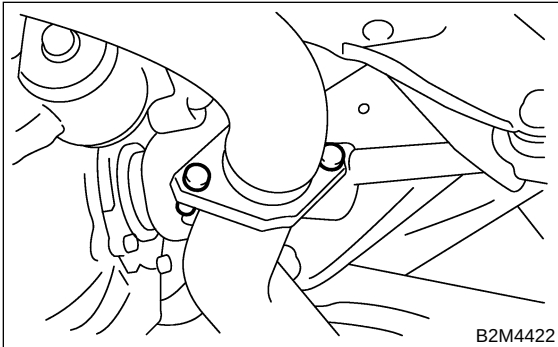
Be careful, exhaust pipe is hot.



- 2) Separate rear exhaust pipe from muffler.

CAUTION:

Be careful not to pull down rear exhaust pipe.



- 3) Remove rear exhaust pipe.

B: INSTALLATION

S142068A11

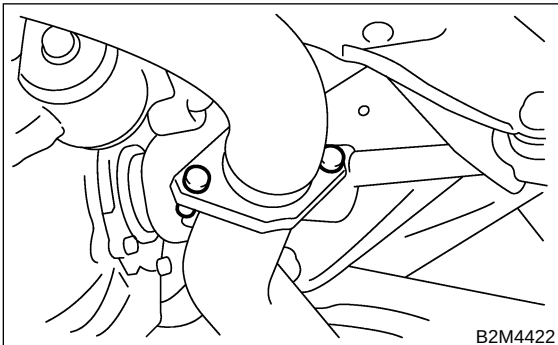
CAUTION:

Replace gaskets with new ones.

- 1) Install rear exhaust pipe to muffler.

Tightening torque:

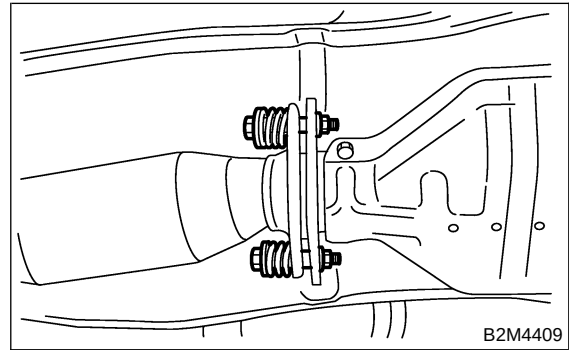
48 N·m (4.9 kgf-m, 35.4 ft-lb)



- 2) Install rear exhaust pipe to front exhaust pipe.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



C: INSPECTION

S142068A10

- 1) Make sure there are no exhaust leaks from connections and welds.
- 2) Make sure there are no holes or rusting.
- 3) Make sure the cushion rubber is not worn or cracked.

4. Muffler S142066

A: REMOVAL S142066A18

- 1) Separate muffler from rear exhaust pipe.

CAUTION:

Be careful, exhaust pipe is hot.



- 2) Remove left and right rubber cushions.

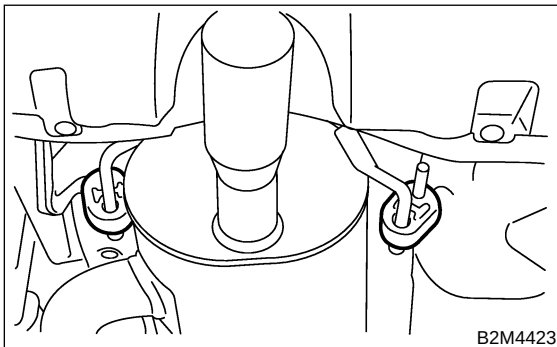
CAUTION:

Be careful not to drop the muffler during removal.

NOTE:

To facilitate removal, apply a coat of SUBARU CRC to mating area of rubber cushions in advance.

SUBARU CRC (Part No. 004301003)

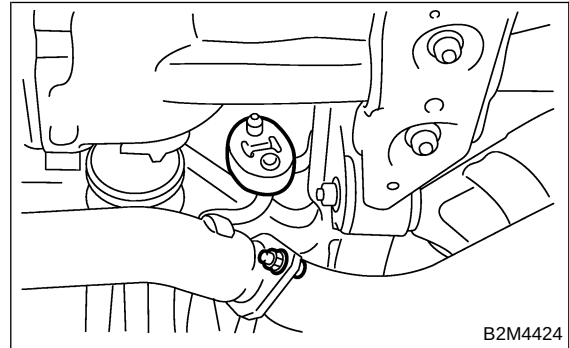


- 3) Remove front rubber cushion, and detach muffler assembly.

NOTE:

To facilitate removal, apply a coat of SUBARU CRC to mating area of rubber cushion in advance.

SUBARU CRC (Part No. 004301003)



B: INSTALLATION S142066A11

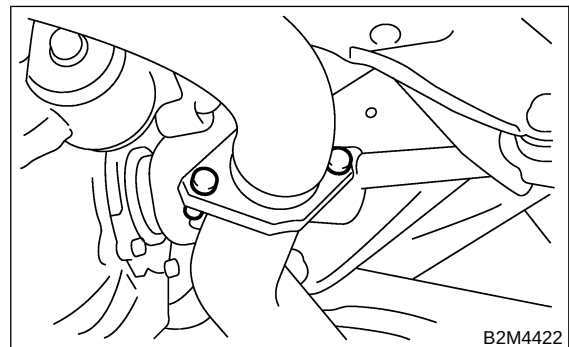
Install in the reverse order of removal.

CAUTION:

Replace gasket with a new one.

Tightening torque:

48 N·m (4.9 kgf-m, 35.4 ft-lb)



C: INSPECTION S142066A10

- 1) Make sure there are no exhaust leaks from connections and welds.
- 2) Make sure there are no holes or rusting.
- 3) Make sure the cushion rubber is not worn or cracked.

MUFFLER

Exhaust

MEMO:

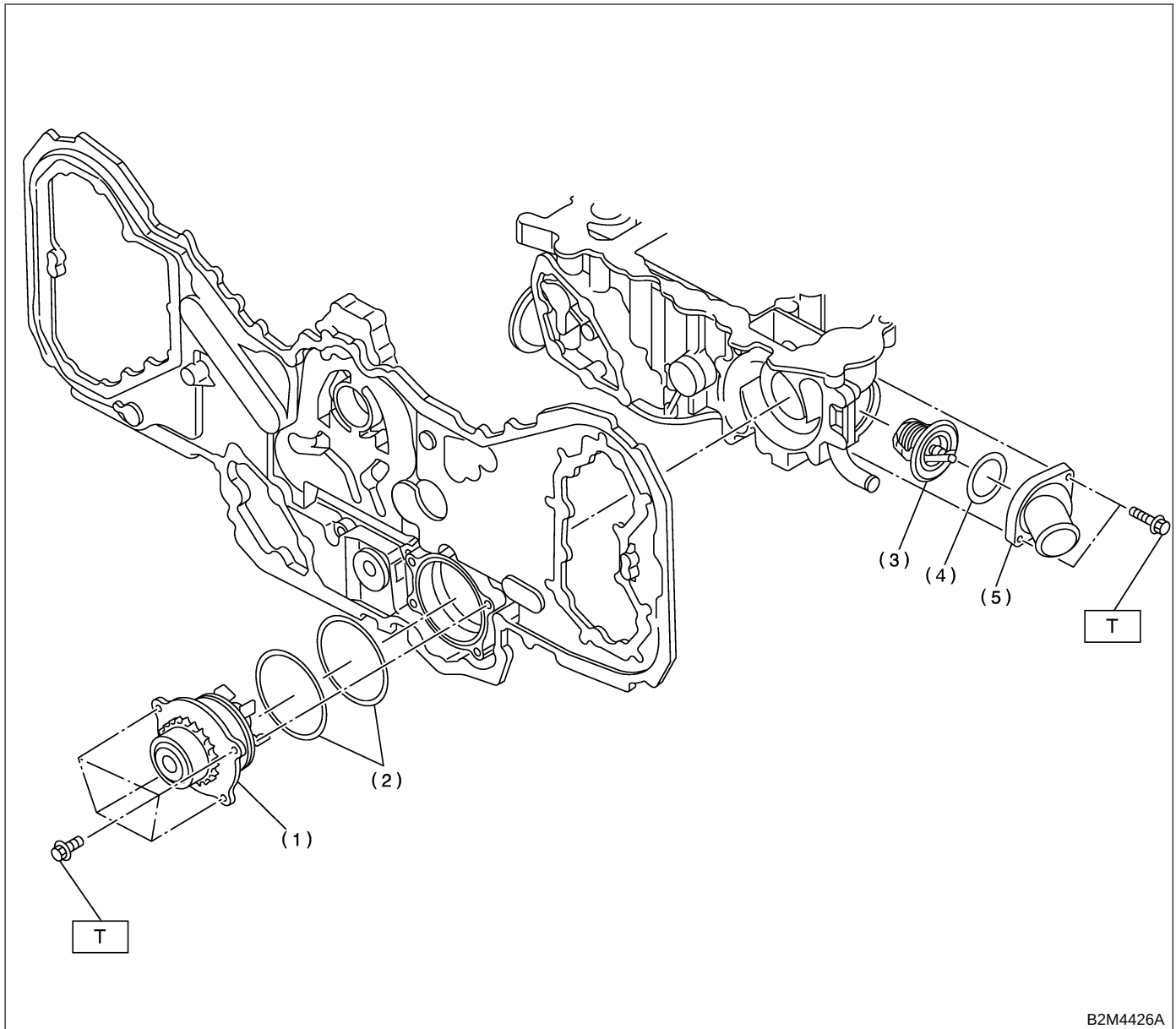
GENERAL DESCRIPTION

Cooling

1. General Description S146001

A: SPECIFICATIONS S146001E49

Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)			Approx. 6.2 (6.6, 5.5)
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	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)
	Type		Wax pellet type
	Start to open		76 — 80°C (169 — 176°F)
Radiator fan	Fully open		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) 120 W (sub fan)
	Fan diameter × Blade		320 mm (12.60 in) × 5 (main fan) 320 mm (12.60 in) × 7 (sub fan)
Radiator	Type		Down flow, pressure type
	Core dimensions		699 × 349 × t27 mm (27.52 × 13.74 × t1.06 in)
	Pressure range in which cap valve is open		Above: 108±15 kPa (1.1±0.15 kg/cm ² , 16±2 psi) Below: -1.0 to -4.9 kPa (-0.01 to -0.05 kg/cm ² , -0.1 to -0.7 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.45 ℓ (0.5 US qt, 0.4 Imp qt)

B: COMPONENT S146001A05**1. WATER PUMP** S146001A0501

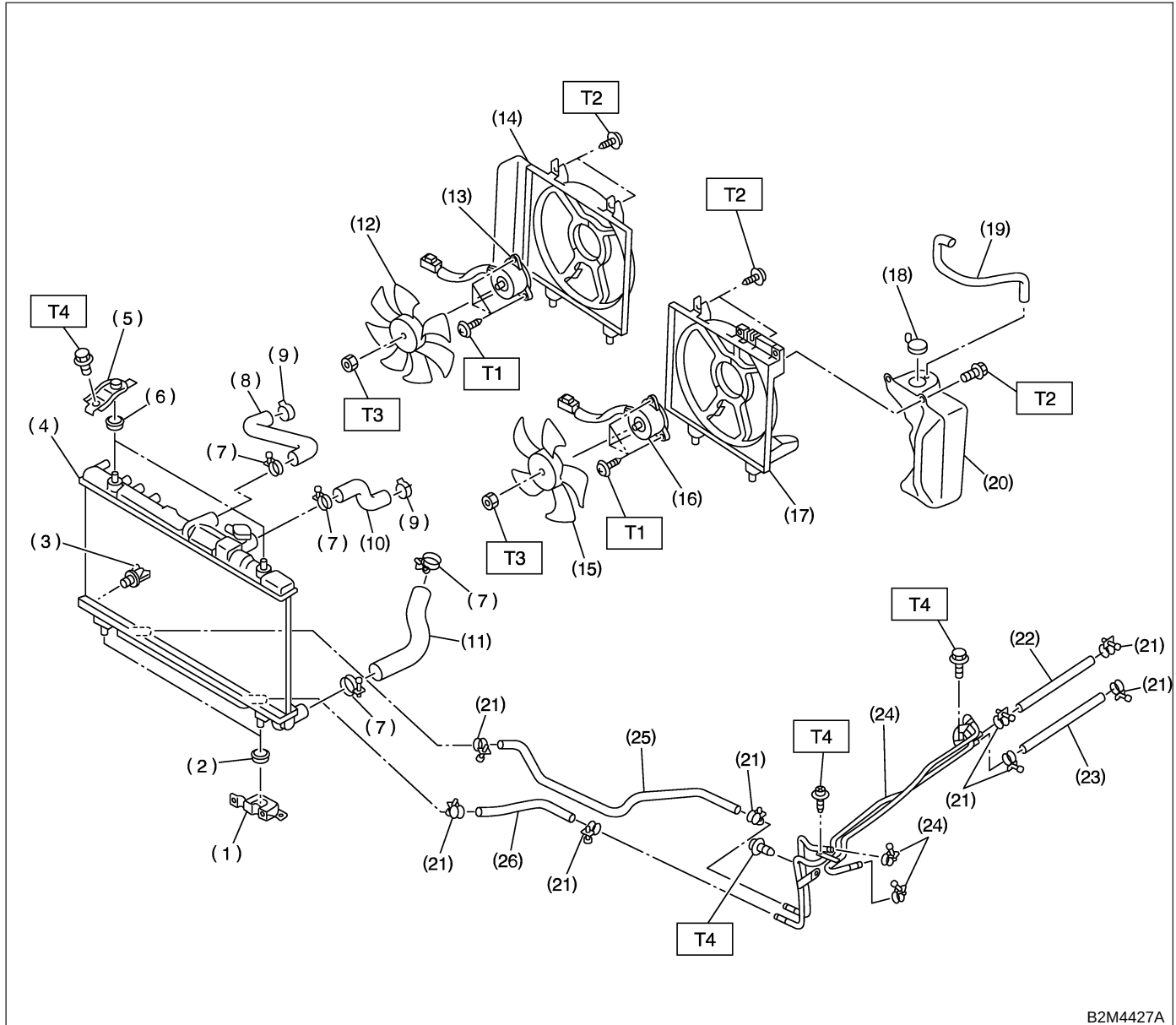
B2M4426A

(1) Water pump ASSY	(4) Gasket
(2) O-ring	(5) Thermostat cover
(3) Thermostat	

Tightening torque: N·m (kgf-m, ft-lb)
T: 6.4 (0.65, 4.7)

2. RADIATOR AND RADIATOR FAN

S146001A0502



B2M4427A

(1) Radiator lower bracket	(13) Radiator sub fan motor	(24) ATF pipe
(2) Radiator lower cushion	(14) Sub fan shroud	(25) ATF inlet hose B
(3) Drain cock	(15) Radiator main fan	(26) ATF outlet hose B
(4) Radiator	(16) Radiator main fan motor	
(5) Radiator upper bracket	(17) Main fan shroud	
(6) Radiator upper cushion	(18) Engine coolant reservoir tank cap	
(7) Clamp	(19) Over flow hose	
(8) Radiator inlet hose	(20) Engine coolant reservoir tank	
(9) Clamp	(21) ATF hose clamp	
(10) Reservoir hose	(22) ATF inlet hose A	
(11) Radiator outlet hose	(23) ATF outlet hose A	
(12) Radiator sub fan		

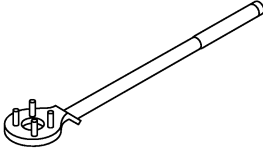
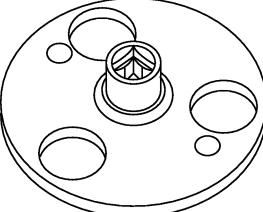
Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 4.9 (0.50, 3.6)
T3: 7.5 (0.76, 5.5)
T4: 12 (1.2, 8.7)

C: CAUTION S146001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.

- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

D: PREPARATION TOOL S146001A17**1. SPECIAL TOOLS** S146001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3870	499977100	CRANK PULLEY WRENCH	Used for stopping crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 B2M3995	18231AA000	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket.

2. GENERAL PURPOSE TOOLS S146001A1702

TOOL NAME	REMARKS
Radiator cap tester	Used for measuring pressure.

RADIATOR MAIN FAN SYSTEM

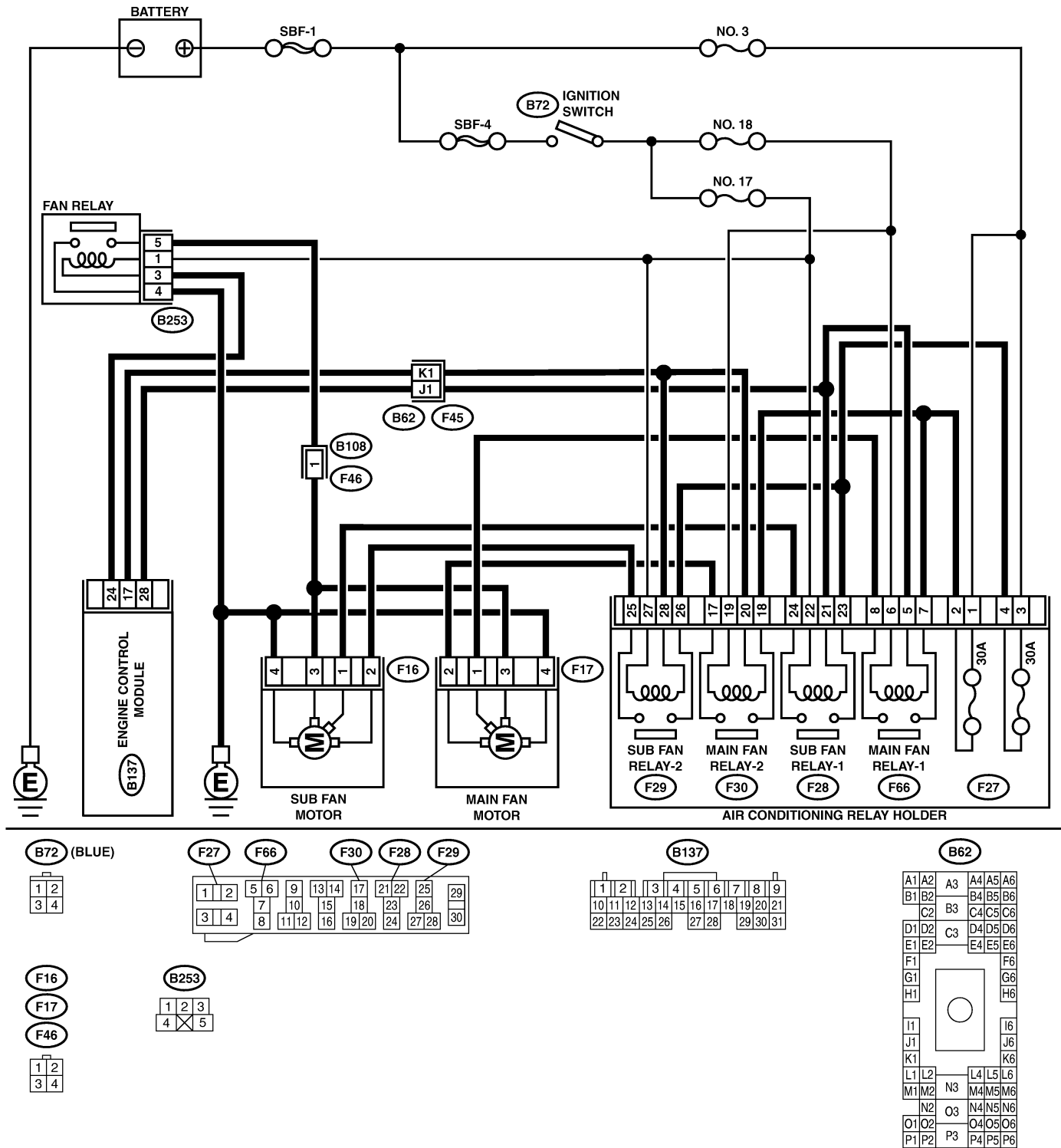
Cooling

2. Radiator Main Fan System

S146732

A: SCHEMATIC

S146732A21



B2M4362

CO(H6)-6

B: INSPECTION

S146732A10

TROUBLE SYMPTOM:

- Radiator main fan does not rotate in low speed under the following conditions:
 - (1) Coolant temperature 95°C (203°F) or more.
 - (2) A/C switch set to OFF.
- Radiator main fan does not rotate in middle speed under the following conditions:

- (1) Coolant temperature 95°C (203°F) or less.
 - (2) A/C switch set to ON and A/C temperature at the lowest position.
- Radiator main fan does not rotate in high speed under the following conditions:
 - (1) Coolant temperature 95°C (203°F) or more.
 - (2) A/C switch set to ON and A/C temperature at the lowest position.

No.	Step	Check	Yes	No
1	CHECK OPERATION OF RADIATOR FAN. 1) Run the engine at idle (Vehicle stationary) 2) Turn the A/C switch to ON, set temperature at the lowest position. 3) Inspect while coolant temperature is 95°C (203°F) or less.	When A/C compressor is operating, does the radiator main fan rotate in middle speed?	Go to step 2.	Go to step 4.
2	CHECK OPERATION OF RADIATOR FAN. 1) Turn the A/C switch to OFF. 2) Warm the engine until coolant temperature is over 95°C (203°F).	When A/C compressor is operating, does the radiator main fan rotate in low speed?	Go to step 3.	Go to step 18.
3	CHECK OPERATION OF RADIATOR FAN. Turn the A/C switch to ON, set temperature at the lowest position.	When A/C compressor is operating, does the radiator main fan rotate in high speed?	Radiator main fan system is okay.	Go to step 31.
4	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, keep coolant temperature below 95°C (203°F). 4) Turn the A/C switch to ON, set temperature at the lowest position. 5) Measure voltage while A/C compressor is rotating. 6) Measure voltage between main fan motor connector and chassis ground. Connector & terminal (F17) No. 2 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 5.	Go to step 8.
5	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. 4 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 6.	Repair open circuit in harness between main fan motor connector and chassis ground.
6	CHECK POOR CONTACT. Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair poor contact in main fan motor connector.	Go to step 7.
7	CHECK MAIN FAN MOTOR. Connect battery positive (+) terminal to terminal No. 2 and negative (-) terminal to terminal No. 4 of main fan motor connector.	Does the main fan rotate?	Repair poor contact in main fan motor connector.	Replace main fan motor with a new one.

RADIATOR MAIN FAN SYSTEM

Cooling

No.	Step	Check	Yes	No
8	CHECK POWER SUPPLY TO MAIN FAN RELAY 2. 1) Turn ignition 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. 18 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 9.	Go to step 10.
9	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. 19 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 13.	Go to step 12.
10	CHECK 30 A FUSE. 1) Remove 30 A fuse from A/C relay holder. 2) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Go to step 11.
11	CHECK POWER SUPPLY TO A/C RELAY HOLDER 30 A FUSE TERMINAL. Measure voltage of harness between A/C relay holder 30 A fuse terminal and chassis ground. Connector & terminal (F27) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair open circuit in harness between 30 A fuse and main fan relay 2 terminal.	Repair open circuit in harness between main fuse box connector and 30 A fuse terminal.
12	CHECK FUSE. 1) Turn ignition switch to OFF. 2) Remove fuse No. 18 from joint box. 3) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Repair open circuit in harness between main fan relay 2 and ignition switch.
13	CHECK MAIN FAN RELAY 2. 1) Turn ignition switch to OFF. 2) Remove main fan relay 2. 3) Measure resistance of main fan relay 2. Terminal No. 17 — No. 18:	Is the resistance more than 1 MΩ?	Go to step 14.	Replace main fan relay 2.
14	CHECK MAIN FAN RELAY 2. 1) Connect battery to terminals No. 19 and No. 20 of main fan relay 2. 2) Measure resistance of main fan relay 2. Terminal No. 17 — No. 18:	Is the resistance less than 1 Ω?	Go to step 15.	Replace main fan relay 2.
15	CHECK HARNESS BETWEEN MAIN FAN RELAY 2 TERMINAL AND MAIN FAN MOTOR CONNECTOR. Measure resistance of harness between main fan motor connector and main fan relay 2 terminal. Connector & terminal (F17) No. 2 — (F30) No. 17:	Is the resistance less than 1 Ω?	Go to step 16.	Repair open circuit in harness between main fan motor connector and main fan relay 2 terminal.

RADIATOR MAIN FAN SYSTEM

Cooling

No.	Step	Check	Yes	No
16	CHECK HARNESS BETWEEN MAIN FAN RELAY 2 AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between main fan relay 2 connector and ECM connector. Connector & terminal (F30) No. 20 — (B137) No. 17:	Is the resistance less than 1 Ω?	Go to step 17.	Repair open circuit in harness between main fan relay 2 and ECM.
17	CHECK POOR CONTACT. Check poor contact in connector between main fan and ECM.	Is there poor contact in connector between main fan motor and ECM.	Repair poor contact connector.	Contact with your Subaru distributor.
18	CHECK POWER SUPPLY TO MAIN FAN MOTOR. CAUTION: Be careful not to overheat engine during repair. 1) Turn ignition switch to OFF. 2) Disconnect main fan motor connector. 3) Start the engine, and warm it up until engine coolant temperature increases over 95°C (203°F). 4) Measure voltage between main fan motor connector and chassis ground. Connector & terminal (F17) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 19.	Go to step 21.
19	CHECK POOR CONTACT. Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair poor contact in main fan motor connector.	Go to step 20.
20	CHECK MAIN FAN MOTOR. Connect battery positive (+) terminal to terminal No. 1, and negative (-) terminal to terminal No. 4 of main fan motor connector.	Does the main fan rotate?	Repair poor contact in main fan motor connector.	Replace main fan motor with a new one.
21	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 (F66) No. 8 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 22.	Go to step 23.
22	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 (F66) No. 6 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 26.	Go to step 25.
23	CHECK 30 A FUSE. 1) Remove 30 A fuse from A/C relay holder. 2) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Go to step 24.
24	CHECK POWER SUPPLY TO A/C RELAY HOLDER 30 A FUSE TERMINAL. Measure voltage of harness between A/C relay holder 30 A fuse terminal and chassis ground. Connector & terminal (F27) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair open circuit in harness between 30 A fuse and main fan relay terminal.	Repair open circuit in harness between main fuse box connector and 30 A fuse terminal.

RADIATOR MAIN FAN SYSTEM

Cooling

No.	Step	Check	Yes	No
25	CHECK FUSE. 1) Turn ignition switch to OFF. 2) Remove fuse No. 18 from joint box. 3) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Repair open circuit in harness between main fan relay 1 and ignition switch.
26	CHECK MAIN FAN RELAY 1. 1) Turn ignition switch to OFF. 2) Remove main fan relay 1. 3) Measure resistance of main fan relay 1. Terminal No. 7 — No. 8:	Is the resistance more than 1 MΩ?	Go to step 27.	Replace main fan relay 1.
27	CHECK MAIN FAN RELAY. 1) Connect battery to terminals No. 5 and No. 6 of main fan relay 1. 2) Measure resistance of main fan relay 1. Terminal No. 7 — No. 8:	Is the resistance less than 1 Ω?	Go to step 28.	Replace main fan relay 1.
28	CHECK HARNESS BETWEEN MAIN FAN RELAY TERMINAL AND MAIN FAN MOTOR CONNECTOR. Measure resistance of harness between main fan motor connector and main fan relay 1 terminal. Connector & terminal (F17) No. 1 — (F66) No. 8:	Is the resistance less than 1 Ω?	Go to step 29.	Replace open circuit in harness between main fan motor connector and main fan relay 1 terminal.
29	CHECK HARNESS BETWEEN MAIN FAN RELAY 1 AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between main fan relay 1 connector and ECM connector. Connector & terminal (F66) No. 5 — (B137) No. 28:	Is the resistance less than 1 Ω?	Go to step 30.	Repair open circuit in harness between main fan relay 1 and ECM.
30	CHECK POOR CONTACT. Check poor contact in connector between main fan and ECM.	Is there poor contact in connector between main fan motor and ECM?	Repair poor contact connector.	Contact with your Subaru distributor.
31	CHECK HARNESS BETWEEN MAIN FAN MOTOR CONNECTOR AND CHASSIS GROUND. 1) Turn ignition switch to OFF. 2) Disconnect main fan motor connector. 3) Measure resistance of harness between main fan motor connector and chassis ground. Connector & terminal (F17) No. 3 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 32.	Go to step 33.
32	CHECK POOR CONTACT. Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair poor contact in main fan motor connector.	Replace main fan motor with a new one.
33	CHECK HARNESS BETWEEN MAIN FAN AND FAN RELAY. 1) Disconnect fan relay connector. 2) Measure resistance of between main fan motor connector and fan relay connector. Connector & terminal (F17) No. 3 — (B253) No. 5:	Is the resistance less than 1 Ω?	Go to step 34.	Repair open circuit between main fan motor connector and fan relay connector.

RADIATOR MAIN FAN SYSTEM

Cooling

No.	Step	Check	Yes	No
34	CHECK POWER SUPPLY TO FAN RELAY. 1) Turn ignition switch to ON. 2) Measure voltage between fan relay terminal and chassis ground. Connector & terminal (B253) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10V?	Go to step 36.	Go to step 35.
35	CHECK FUSE. 1) Turn ignition switch to OFF. 2) Remove fuse No. 18 from joint box. 3) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Repair open circuit in harness between main fan relay and ignition switch.
36	CHECK FAN RELAY. 1) Turn ignition switch to OFF. 2) Remove fan relay. 3) Measure resistance of fan relay. Terminal No. 4 — No. 5:	Is resistance more than 1 MΩ?	Go to step 37.	Replace fan relay.
37	CHECK FAN RELAY. 1) Connect battery to terminals No. 1 and No. 3 of fan relay. 2) Measure resistance of fan relay. Terminal No. 4 — No. 5:	Is resistance less than 1 Ω?	Go to step 38.	Replace fan relay.
38	CHECK HARNESS BETWEEN FAN RELAY TERMINAL AND CHASSIS GROUND. Measure resistance of harness between fan relay connector and chassis ground. Connector & terminal (B253) No. 4 — Chassis ground:	Is resistance less than 1 Ω?	Go to step 39.	Repair open circuit in harness between fan relay connector and chassis ground.
39	CHECK HARNESS BETWEEN FAN RELAY AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between fan relay and ECM connector. Connector & terminal (B253) No. 3 — (B137) No. 24:	Is resistance less than 1 Ω?	Go to step 40.	Repair open circuit in harness between fan relay connector and ECM.
40	CHECK POOR CONTACT. Check poor contact in connector between fan relay and ECM.	Is there poor contact in connector between fan relay and ECM?	Repair poor contact connector.	Contact with your Subaru distributor.

NOTE:

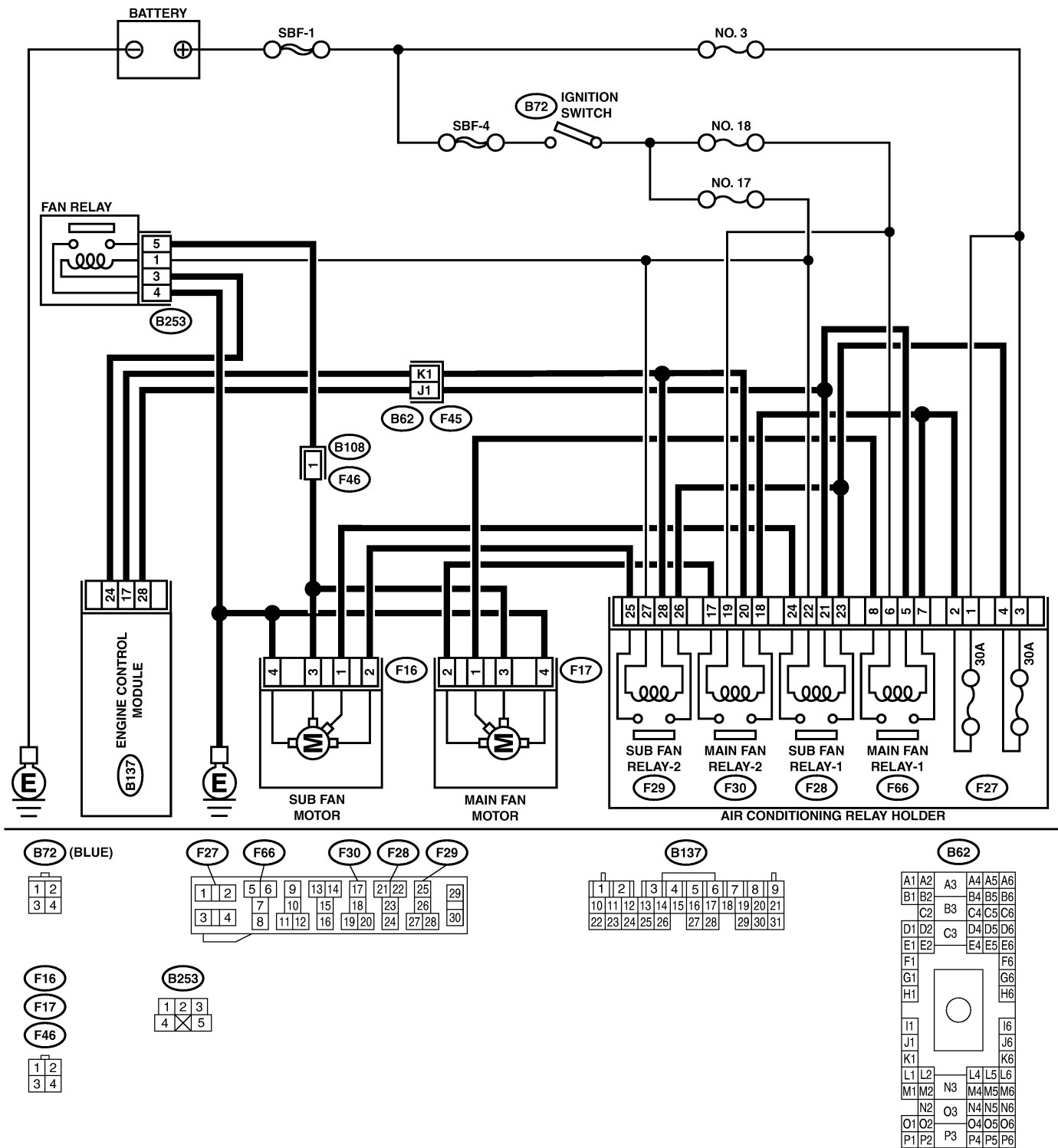
Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.

RADIATOR SUB FAN SYSTEM

Cooling

3. Radiator Sub Fan System

A: SCHEMATIC



B2M4362

B: INSPECTION

S146733A10

TROUBLE SYMPTOM:

- Radiator sub fan does not rotate in low speed under the following conditions:
 - (1) Coolant temperature 95°C (203°F) or more.
 - (2) A/C switch set to OFF.
- Radiator sub fan does not rotate in middle speed under the following conditions:

- (1) Coolant temperature 95°C (203°F) or less.
 - (2) A/C switch set to ON and A/C temperature at the lowest position.
- Radiator sub fan does not rotate in high speed under the following conditions:
 - (1) Coolant temperature 95°C (203°F) or more.
 - (2) A/C switch set to ON and A/C temperature at the lowest position.

No.	Step	Check	Yes	No
1	CHECK OPERATION OF RADIATOR FAN. 1) Run the engine at idle (Vehicle stationary) 2) Turn the A/C switch to ON, set temperature at the lowest position. 3) Inspect while coolant temperature is 95°C (203°F) or less.	When A/C compressor is operating, does the radiator sub fan rotate in middle speed?	Go to step 2.	Go to step 4.
2	CHECK OPERATION OF RADIATOR FAN. 1) Turn the A/C switch to OFF. 2) Warm the engine until coolant temperature is over 95°C (203°F).	When A/C compressor is operating, does the radiator sub fan rotate in low speed?	Go to step 3.	Go to step 18.
3	CHECK OPERATION OF RADIATOR FAN. 1) Turn the A/C switch to ON, set temperature at the lowest position.	When A/C compressor is operating, does the radiator sub fan rotate in high speed?	Radiator sub fan system is okay.	Go to step 31.
4	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, keep coolant temperature below 95°C (203°F). 4) Turn the A/C switch to ON, set temperature at the lowest position. 5) Measure voltage while A/C compressor is rotating. 6) Measure voltage between sub fan motor connector and chassis ground. Connector & terminal (F16) No. 2 (+) — Chassis ground (-):	Is the voltage more than 10V?	Go to step 5.	Go to step 8.
5	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. 4 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 6.	Repair open circuit in harness between sub fan motor connector and chassis ground.
6	CHECK POOR CONTACT. Check poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair poor contact in sub fan motor connector.	Go to step 7.
7	CHECK SUB FAN MOTOR. Connect battery positive (+) terminal to terminal No. 2 and negative (-) terminal to terminal No. 4 of sub fan motor connector.	Does the sub fan rotate?	Repair poor contact in sub fan motor connector.	Replace sub fan motor with a new one.

RADIATOR SUB FAN SYSTEM

Cooling

No.	Step	Check	Yes	No
8	CHECK POWER SUPPLY TO SUB FAN RELAY 2. 1) Turn ignition switch to OFF. 2) Remove sub fan relay 2 from A/C relay holder. 3) Measure voltage between sub fan relay 2 terminal and chassis ground. Connector & terminal (F29) No. 26 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 9.	Go to step 10.
9	CHECK POWER SUPPLY TO SUB FAN RELAY 2. 1) Turn ignition switch to ON. 2) Measure voltage between sub fan relay 2 terminal and chassis ground. Connector & terminal (F29) No. 27 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 13.	Go to step 12.
10	CHECK 30 A FUSE. 1) Remove 30 A fuse from A/C relay holder. 2) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Go to step 11.
11	CHECK POWER SUPPLY TO A/C RELAY HOLDER 30 A FUSE TERMINAL. Measure voltage of harness between A/C relay holder 30 A fuse terminal and chassis ground. Connector & terminal (F27) No. 3 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair open circuit in harness between 30 A fuse and sub fan relay 2 terminal.	Repair open circuit in harness between main fuse box connector and 30 A fuse terminal.
12	CHECK FUSE. 1) Turn ignition switch to OFF. 2) Remove fuse No. 18 from joint box. 3) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Repair open circuit in harness between sub fan relay 2 and ignition switch.
13	CHECK SUB FAN RELAY 2. 1) Turn ignition switch to OFF. 2) Remove sub fan relay 2. 3) Measure resistance of sub fan relay 2. Terminal No. 25 — No. 26:	Is the resistance more than 1 MΩ?	Go to step 14.	Replace sub fan relay 2.
14	CHECK SUB FAN RELAY 2. 1) Connect battery to terminals No. 27 and No. 28 of sub fan relay 2. 2) Measure resistance of sub fan relay 2. Terminal No. 25 — No. 26:	Is the resistance less than 1 Ω?	Go to step 15.	Replace sub fan relay 2.
15	CHECK HARNESS BETWEEN SUB FAN RELAY 2 TERMINAL AND SUB FAN MOTOR CONNECTOR. Measure resistance of harness between sub fan motor connector and sub fan relay 2 terminal. Connector & terminal (F16) No. 2 — (F29) No. 25:	Is the resistance less than 1 Ω?	Go to step 16.	Repair open circuit in harness between sub fan motor connector and sub fan relay 2 terminal.

RADIATOR SUB FAN SYSTEM

Cooling

No.	Step	Check	Yes	No
16	CHECK HARNESS BETWEEN SUB FAN RELAY 2 AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between sub fan relay 2 connector and ECM connector. Connector & terminal (F29) No. 28 — (B137) No. 17:	Is the resistance less than 1 Ω?	Go to step 17.	Repair open circuit in harness between sub fan relay 2 and ECM.
17	CHECK POOR CONTACT. Check poor contact in connector between sub fan and ECM.	Is there poor contact in connector between sub fan motor and ECM.	Repair poor contact connector.	Contact with your Subaru distributor.
18	CHECK POWER SUPPLY TO SUB FAN MOTOR. CAUTION: Be careful not to overheat engine during repair. 1) Turn ignition switch to OFF. 2) Disconnect sub fan motor connector. 3) Start the engine, and warm it up until engine coolant temperature increases over 95°C (203°F). 4) Measure voltage between sub fan motor connector and chassis ground. Connector & terminal (F16) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 19.	Go to step 21.
19	CHECK POOR CONTACT. Check poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair poor contact in sub fan motor connector.	Go to step 20.
20	CHECK SUB FAN MOTOR. Connect battery positive (+) terminal to terminal No. 1, and negative (-) terminal to terminal No. 4 of sub fan motor connector.	Does the sub fan rotate?	Repair poor contact in sub fan motor connector.	Replace sub fan motor with a new one.
21	CHECK POWER SUPPLY TO SUB FAN RELAY 1. 1) Turn ignition switch to OFF. 2) Remove sub fan relay 1 from A/C relay holder. 3) Measure voltage between sub fan relay 1 terminal and chassis ground. Connector & terminal (F28) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 22.	Go to step 23.
22	CHECK POWER SUPPLY TO SUB FAN RELAY 1. 1) Turn ignition switch to ON. 2) Measure voltage between sub fan relay 1 terminal and chassis ground. Connector & terminal (F28) No. 22 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 26.	Go to step 25.
23	CHECK 30 A FUSE. 1) Remove 30 A fuse from A/C relay holder. 2) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Go to step 24.
24	CHECK POWER SUPPLY TO A/C RELAY HOLDER 30 A FUSE TERMINAL. Measure voltage of harness between A/C relay holder 30 A fuse terminal and chassis ground. Connector & terminal (F27) No. 3(+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair open circuit in harness between 30 A fuse and sub fan relay 1 terminal.	Repair open circuit in harness between main fuse box connector and 30 A fuse terminal.

RADIATOR SUB FAN SYSTEM

Cooling

No.	Step	Check	Yes	No
25	CHECK FUSE. 1) Turn ignition switch to OFF. 2) Remove fuse No. 18 from joint box. 3) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Repair open circuit in harness between sub fan relay 1 and ignition switch.
26	CHECK SUB FAN RELAY 1. 1) Turn ignition switch to OFF. 2) Remove sub fan relay 1. 3) Measure resistance of sub fan relay 1. Terminal No. 23 — No. 24:	Is the resistance more than 1 MΩ?	Go to step 27.	Replace sub fan relay 1.
27	CHECK SUB FAN RELAY. 1) Connect battery to terminals No. 21 and No. 22 of sub fan relay 1. 2) Measure resistance of sub fan relay 1. Terminal No. 23 — No. 24:	Is the resistance less than 1 Ω?	Go to step 28.	Replace sub fan relay 1.
28	CHECK HARNESS BETWEEN SUB FAN RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR. Measure resistance of harness between sub fan motor connector and sub fan relay 1 terminal. Connector & terminal (F16) No. 1 — (F28) No. 24:	Is the resistance less than 1 Ω?	Go to step 29.	Replace open circuit in harness between sub fan motor connector and sub fan relay 1 terminal.
29	CHECK HARNESS BETWEEN SUB FAN RELAY 1 AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between sub fan relay 1 connector and ECM connector. Connector & terminal (F28) No. 21 — (B137) No. 28:	Is the resistance less than 1 Ω?	Go to step 30.	Repair open circuit in harness between sub fan relay and ECM.
30	CHECK POOR CONTACT. Check poor contact in connector between sub fan and ECM.	Is there poor contact in connector between sub fan motor and ECM?	Repair poor contact connector.	Contact with your Subaru distributor.
31	CHECK HARNESS BETWEEN SUB FAN MOTOR CONNECTOR AND CHASSIS GROUND. 1) Turn ignition switch to OFF. 2) Disconnect sub fan motor connector. 3) Measure resistance of harness between sub fan motor connector and chassis ground. Connector & terminal (F16) No. 3 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 32.	Go to step 33.
32	CHECK POOR CONTACT. Check poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair poor contact in sub fan motor connector.	Replace sub fan motor with a new one.
33	CHECK HARNESS BETWEEN SUB FAN AND FAN RELAY. 1) Disconnect fan relay connector. 2) Measure resistance between sub fan motor connector and fan relay connector. Connector & terminal (F16) No. 3 — (B253) No. 5:	Is the resistance less than 1 Ω?	Go to step 34.	Repair open circuit between sub fan motor connector and fan relay connector.

RADIATOR SUB FAN SYSTEM

Cooling

No.	Step	Check	Yes	No
34	CHECK POWER SUPPLY TO FAN RELAY. 1) Turn ignition switch to ON. 2) Measure voltage between fan relay terminal and chassis ground. Connector & terminal (B253) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10V?	Go to step 36.	Go to step 35.
35	CHECK FUSE. 1) Turn ignition switch to OFF. 2) Remove fuse No. 18 from joint box. 3) Check condition of fuse.	Is the fuse blown-out?	Replace fuse.	Repair open circuit in harness between fan relay and ignition switch.
36	CHECK FAN RELAY. 1) Turn ignition switch to OFF. 2) Remove fan relay. 3) Measure resistance of fan relay. Terminal No. 4 — No. 5:	Is resistance more than 1 MΩ?	Go to step 37.	Replace fan relay.
37	CHECK FAN RELAY. 1) Connect battery to terminals No. 1 and No. 3 of fan relay. 2) Measure resistance of fan relay. Terminal No. 4 — No. 5:	Is resistance less than 1 Ω?	Go to step 38.	Replace fan relay.
38	CHECK HARNESS BETWEEN FAN RELAY TERMINAL AND CHASSIS GROUND. Measure resistance of harness between fan relay connector and chassis ground. Connector & terminal (B253) No. 4 — Chassis ground:	Is resistance less than 1 Ω?	Go to step 39.	Repair open circuit in harness between fan relay connector and chassis ground.
39	CHECK HARNESS BETWEEN FAN RELAY AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between fan relay connector and ECM connector. Connector & terminal (B253) No. 3 — (B137) No. 24:	Is resistance less than 1 Ω?	Go to step 40.	Repair open circuit in harness between fan relay connector and ECM.
40	CHECK POOR CONTACT. Check poor contact in connector between fan relay and ECM.	Is there poor contact in connector between fan relay and ECM?	Repair poor contact connector.	Contact with your Subaru distributor.

NOTE:

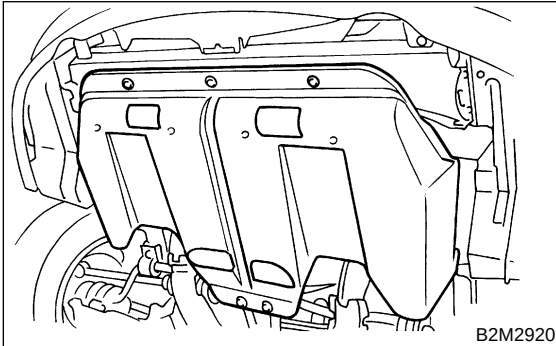
Inspection by your Subaru distributor is required, because probable cause is deterioration of multiple parts.

4. Engine Coolant S146060

A: REPLACEMENT S146060A20

1. DRAINING OF ENGINE COOLANT S146060A2001

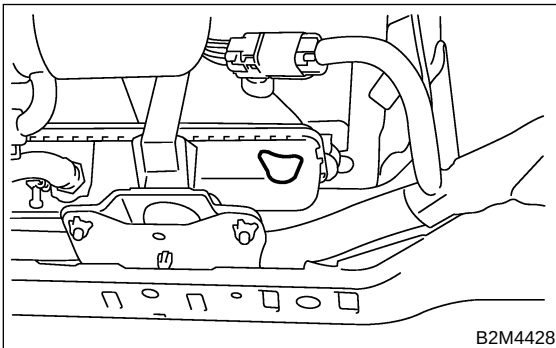
- 1) Lift-up the vehicle.
- 2) Remove under cover.



- 3) Remove drain cock to drain engine coolant into container.

NOTE:

Remove radiator cap so that engine coolant will drain faster.



2. FILLING OF ENGINE COOLANT S146060A2002

- 1) Fill engine coolant into radiator up to filler neck position.

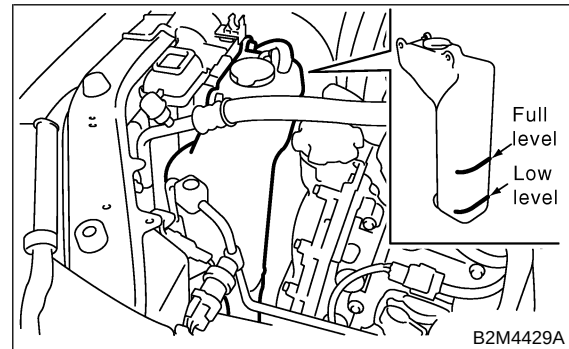
Coolant capacity (fill up to "FULL" level):

Approx. 7.7 ℓ (8-1/8 US qt, 6-3/4 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.

- 2) Fill engine coolant into reservoir tank up to upper level.



- 3) Attach radiator cap and reservoir tank cap properly.
- 4) Warm-up engine completely for more than five minutes at 2,000 to 3,000 rpm.
- 5) If engine coolant level drops in radiator, add engine coolant to filler neck position.
- 6) If engine coolant level drops from upper level of reservoir tank, add engine coolant to upper level.
- 7) Attach radiator cap and reservoir tank cap properly.

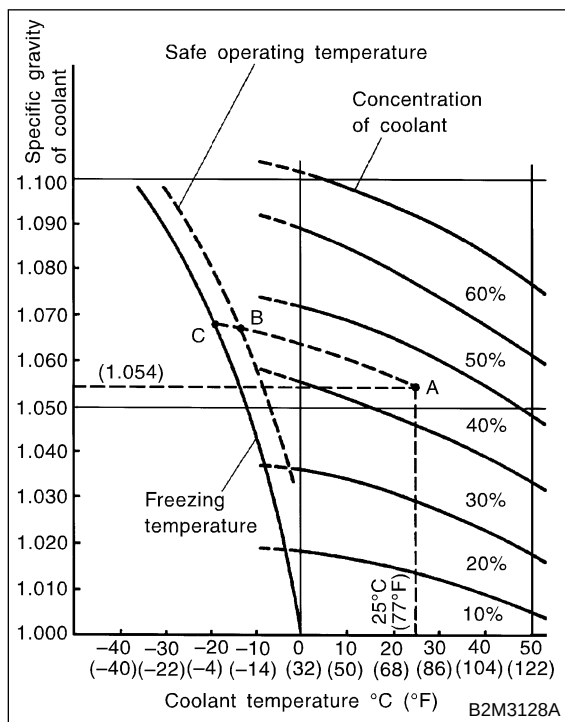
B: INSPECTION S146060A10

1. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE S146060A1001

The concentration and safe operating temperature of the SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.

[Example]

If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054, the concentration is 35% (point A), the safe operating temperature is -14°C (7°F) (point B), and the freezing temperature is -20°C (-4°F) (point C).



2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

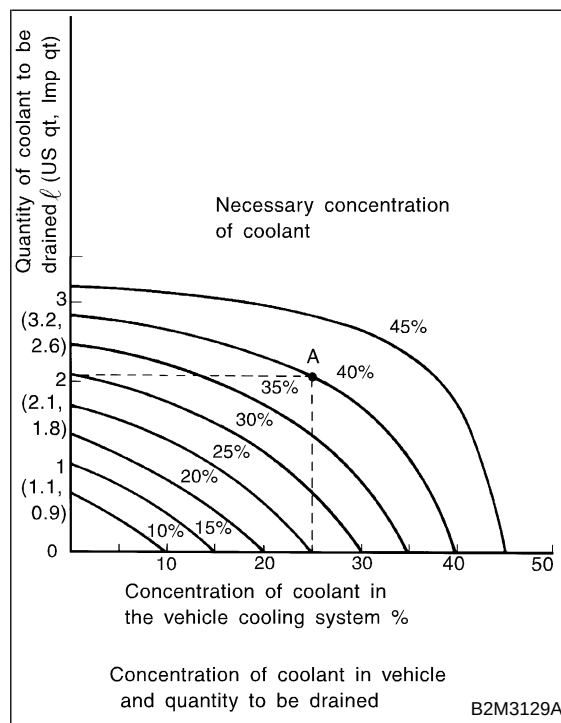
S146060A1002

To adjust the concentration of the coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50). The amount of coolant that should be replaced can be determined using the diagram.

[Example]

Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 liters (2.2 US qt, 1.8 Imp qt). Drain 2.1 liters (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 liters (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.

If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



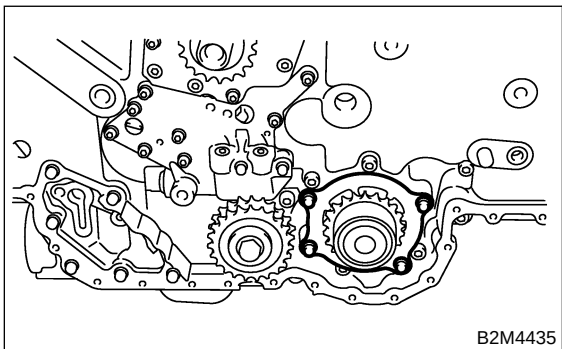
5. Water Pump

S146061

A: REMOVAL

S146061A18

- 1) Remove radiator. <Ref. to CO(H6)-28, REMOVAL, Radiator.>
- 2) Remove V-belt.
<Ref. to ME(H6)-31, REMOVAL, V-belt.>
- 3) Remove front chain cover.
<Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
- 4) Remove timing chain.
<Ref. to ME(H6)-45, REMOVAL, Timing Chain Assembly.>
- 5) Remove water pump.



B: INSTALLATION

S146061A11

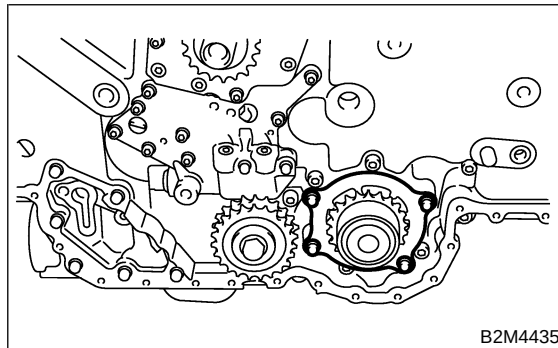
- 1) Install water pump onto rear chain cover.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

CAUTION:

Replace O-rings with a new one.



- 2) Install timing chain assembly. <Ref. to ME(H6)-46, INSTALLATION, Timing Chain Assembly.>
- 3) Install front chain cover.
<Ref. to ME(H6)-43, INSTALLATION, Front Chain Cover.>
- 4) Install V-belt. <Ref. to ME(H6)-31, INSTALLATION, V-belt.>
- 5) Install radiator. <Ref. to CO(H6)-29, INSTALLATION, Radiator.>
- 6) Fill coolant. <Ref. to CO(H6)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

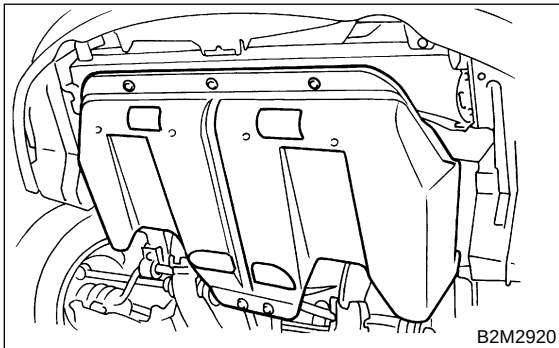
S146061A10

- 1) Check water pump bearing for smooth rotation.
- 2) Check water pump pulley for abnormalities.

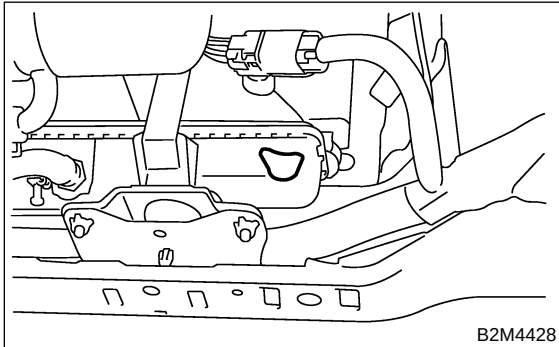
6. Thermostat S146062

A: REMOVAL S146062A18

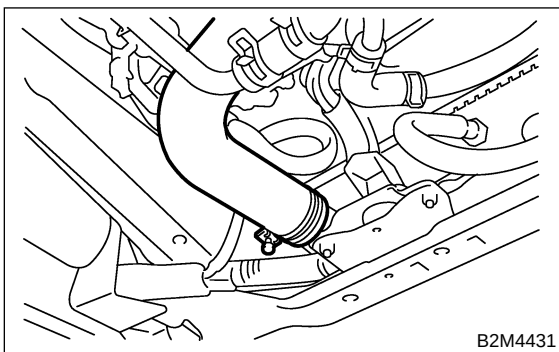
- 1) Lift-up the vehicle.
- 2) Remove under cover.



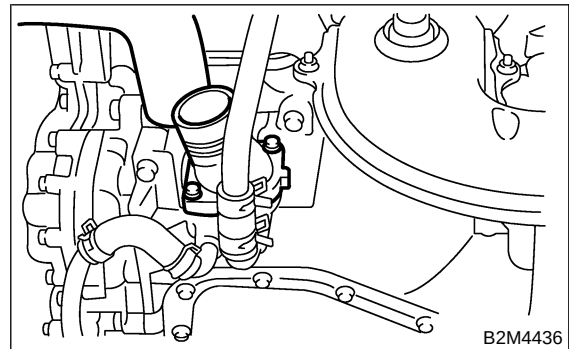
- 3) Drain engine coolant completely. <Ref. to CO(H6)-18 DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>



- 4) Disconnect radiator outlet hose from thermostat cover.



- 5) Remove thermostat cover and gasket, and pull out the thermostat.



B: INSTALLATION S146062A11

- 1) Install the thermostat to oil pan upper, 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 (A) facing to front side.
- At this time, set the jiggle pin of thermostat for front side.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

- 2) Connect radiator outlet hose to thermostat cover.
- 3) Fill coolant. <Ref. to CO(H6)-18 FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION S146062A10

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.

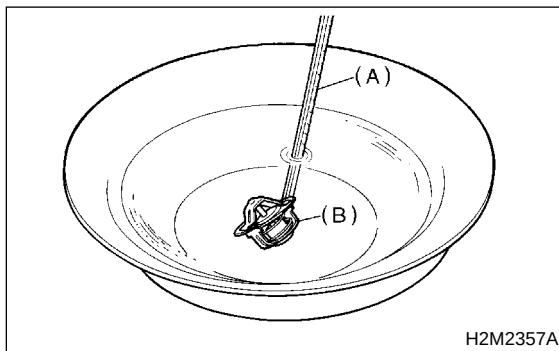
Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

Starts to open:

76.0 — 80.0°C (169 — 176°F)

Fully opens:

91°C (196°F)

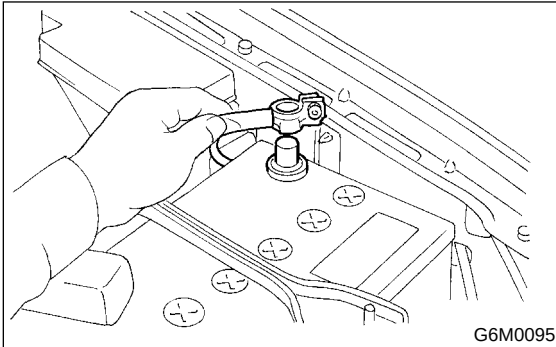


- (A) Thermometer
- (B) Thermostat

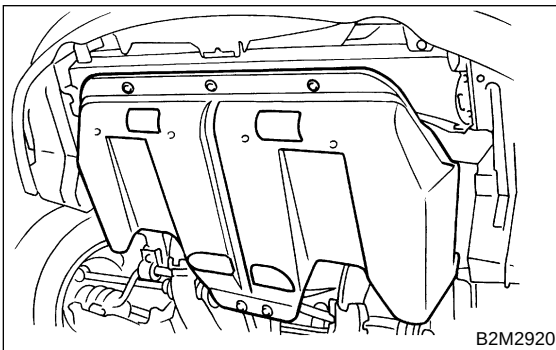
7. Radiator S146058

A: REMOVAL S146058A18

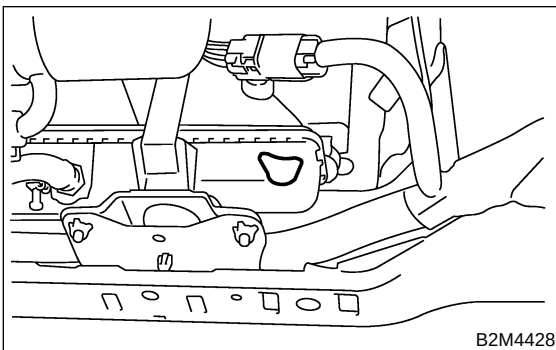
- 1) Disconnect battery ground cable.



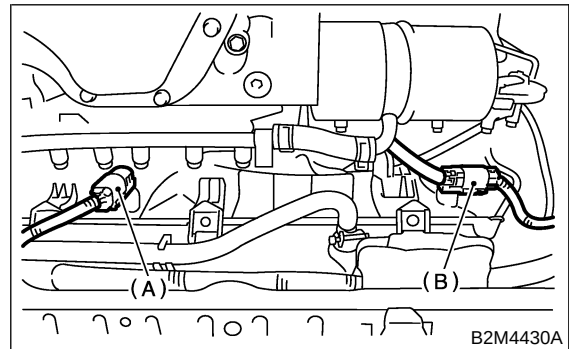
- 2) Lift-up the vehicle.
- 3) Remove under cover.



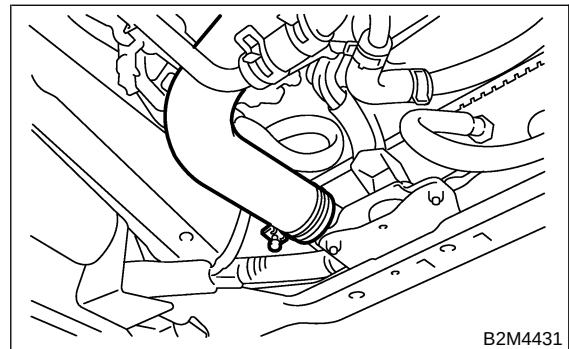
- 4) Drain engine coolant completely. <Ref. to CO(H6)-18 DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>



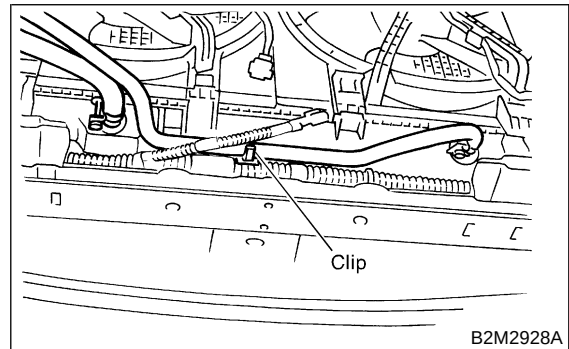
- 5) Disconnect connectors of radiator main fan (A) and sub fan (B) motor.



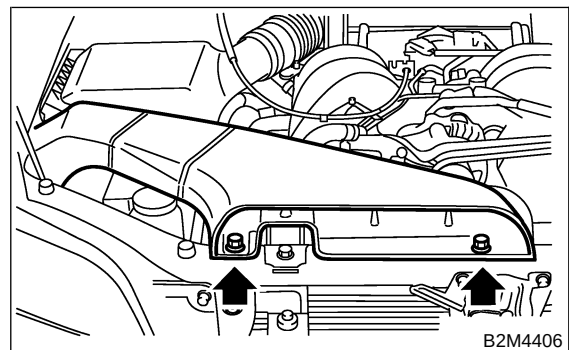
- 6) Disconnect radiator outlet hose from radiator.



- 7) Disconnect ATF cooler hoses from radiator.



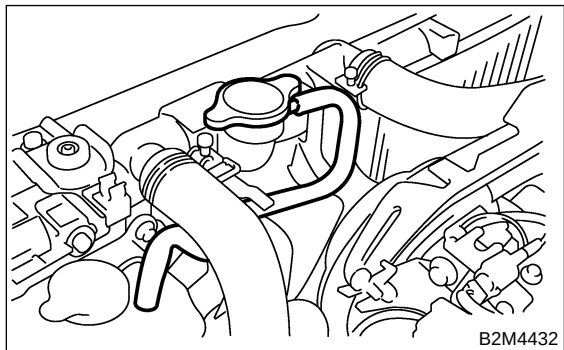
- 8) Lower the vehicle.
- 9) Remove air intake duct.



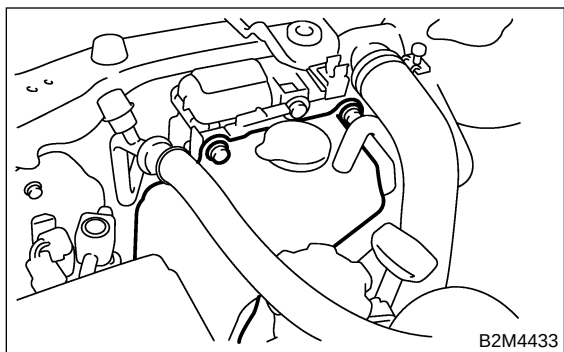
RADIATOR

Cooling

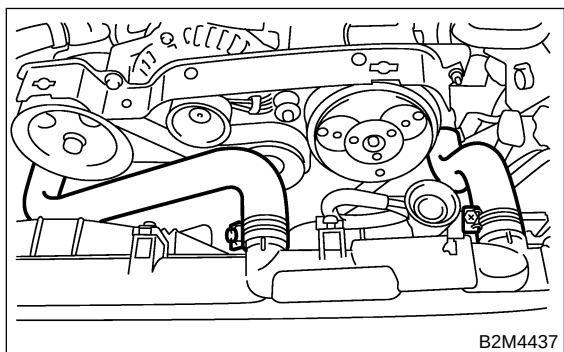
- 10) Disconnect over flow hose.



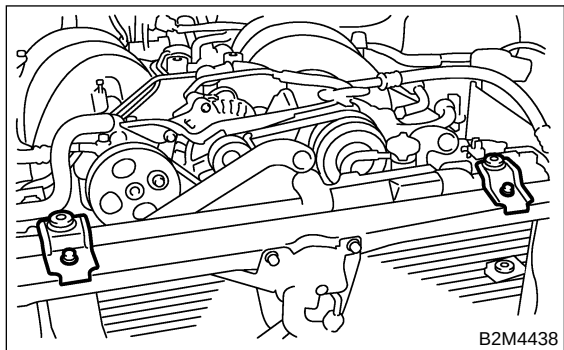
- 11) Remove reservoir tank.



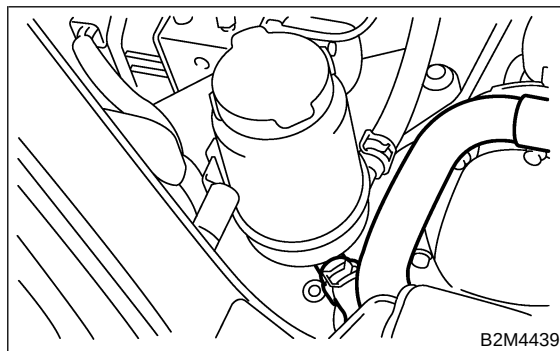
- 12) Disconnect radiator inlet hoses from radiator.



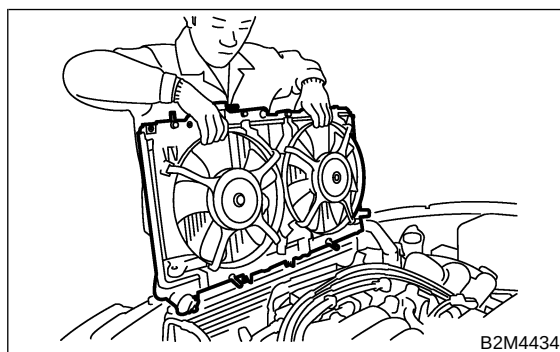
- 13) Remove radiator upper brackets.



- 14) Detach power steering hose from the clip on the radiator.

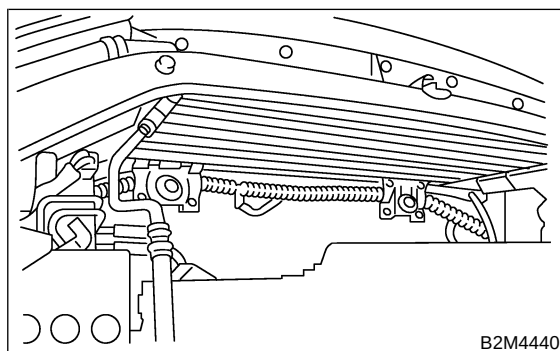


- 15) While slightly lifting radiator, slide it to left.
16) Lift radiator up and away from vehicle.



B: INSTALLATION S146058A11

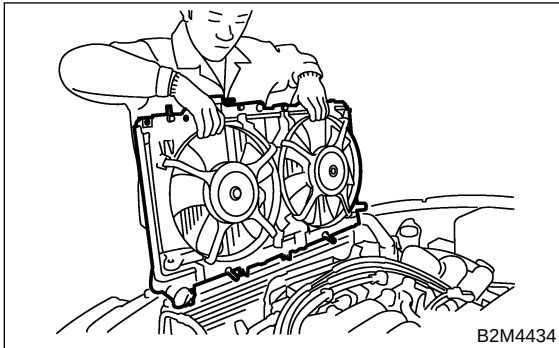
- 1) Attach radiator mounting cushions to holes on the vehicle.



- 2) Install radiator while fitting radiator pins to cushions.

NOTE:

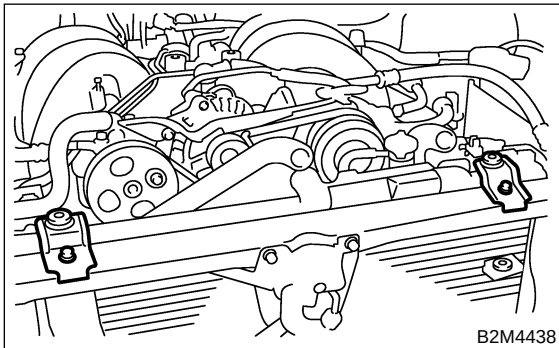
Fit pins on lower side of radiator into cushions on body side.



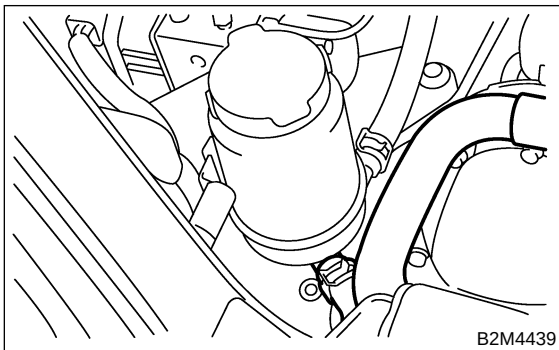
- 3) Install radiator brackets and tighten bolts.

Tightening torque:

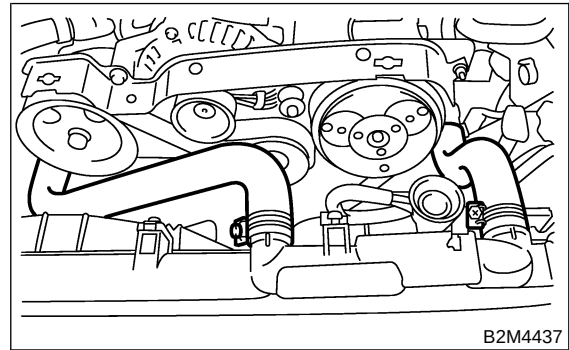
12 N·m (1.2 kgf-m, 8.7 ft-lb)



- 4) Attach power steering hose to the radiator.



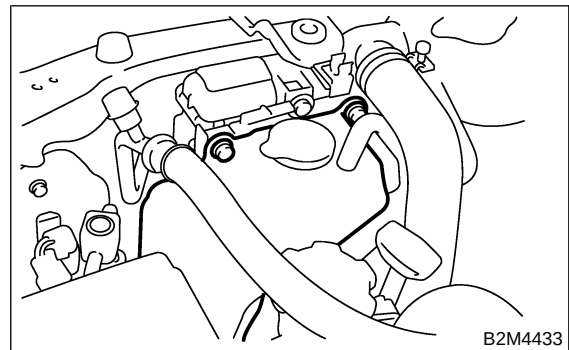
- 5) Connect radiator inlet hoses.



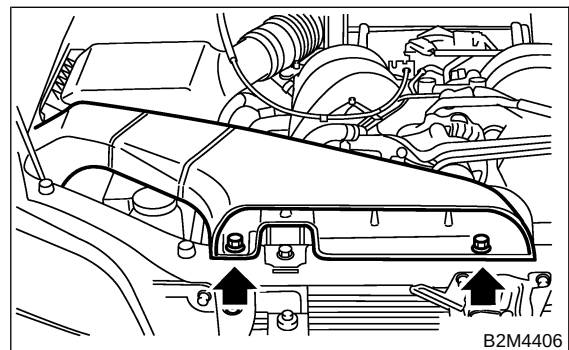
- 6) Install reservoir tank.

Tightening torque:

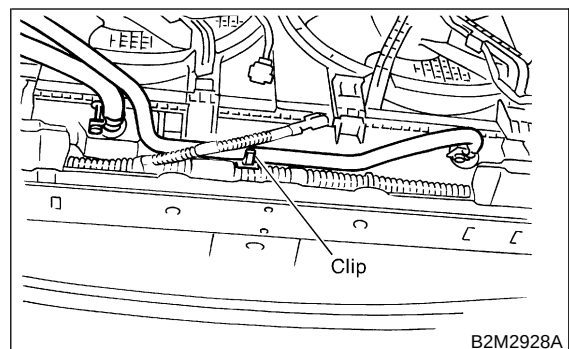
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



- 7) Install air intake duct.



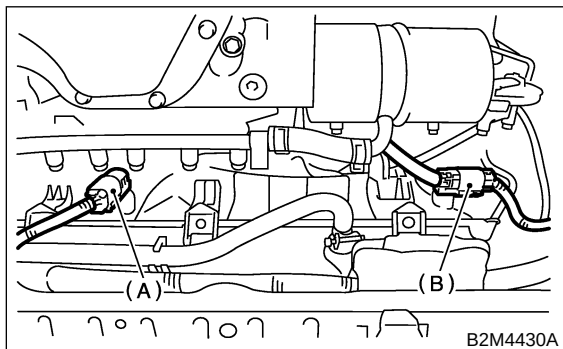
- 8) Lift-up the vehicle.
- 9) Connect ATF cooler hoses.



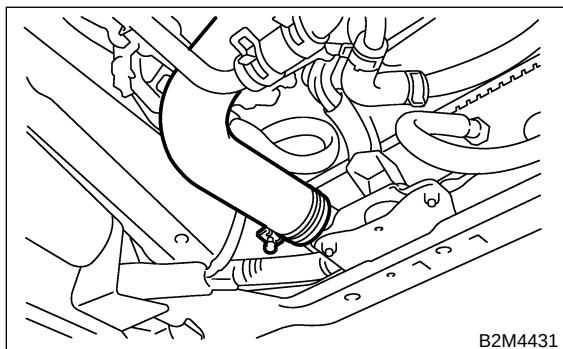
RADIATOR

Cooling

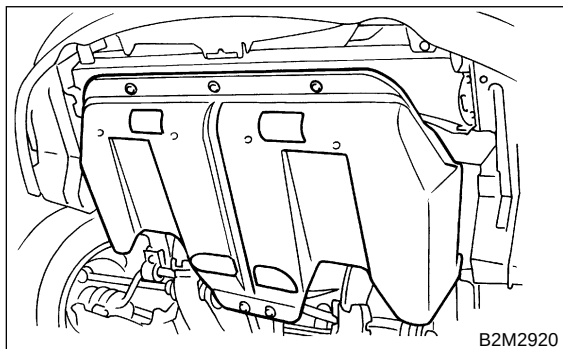
10) Connect connectors to radiator main fan motor (A) and sub fan motor (B).



11) Connect radiator outlet hose.

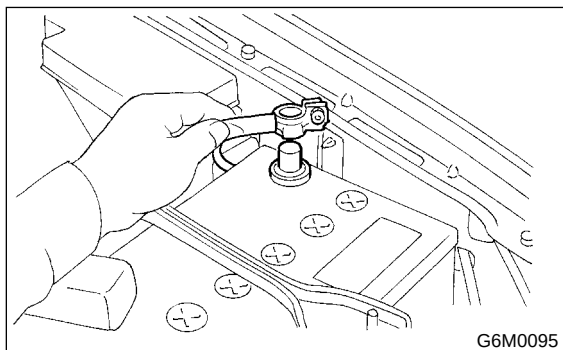


12) Install under cover.



13) Lower the vehicle.

14) Connect battery ground cable.

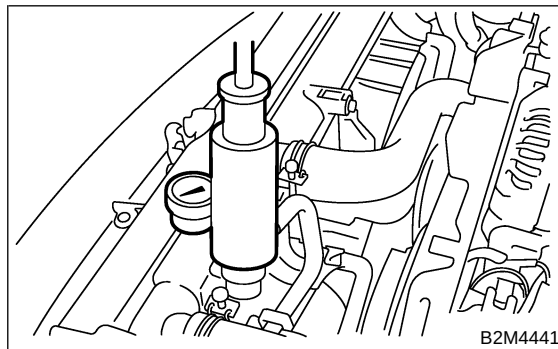


15) Fill coolant. <Ref. to CO(H6)-18 FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

16) Check ATF level. <Ref. to AT-9 REPLACEMENT, Automatic Transmission Fluid.>

C: INSPECTION S146058A10

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/cm², 23 psi) to radiator to check if:

- (1) Engine coolant leaks at/around radiator.
- (2) Engine coolant leaks at/around hoses or connections.

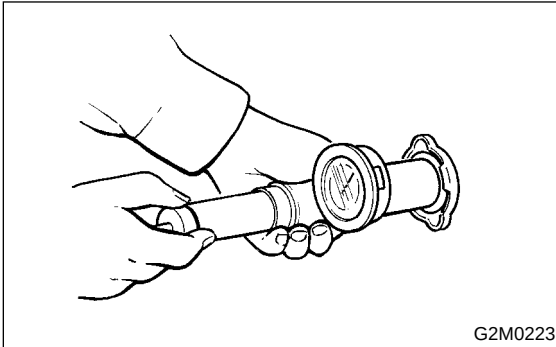
CAUTION:

- 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.

8. Radiator Cap S146064

A: INSPECTION S146064A10

- 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:

93 — 123 kPa (0.95 — 1.25 kg/cm², 14 — 18 psi)

Service limit pressure:

83 kPa (0.85 kg/cm², 12 psi)

CAUTION:

Be sure to remove foreign matter and rust from the cap in advance otherwise, results of pressure test will be incorrect.

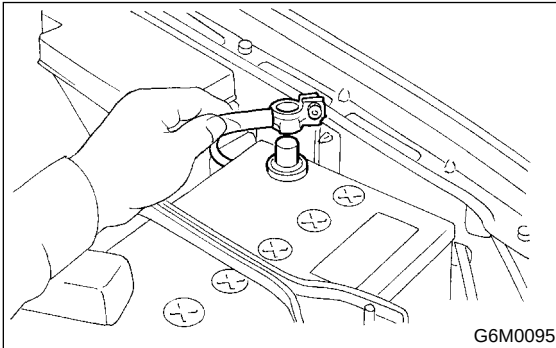
9. Radiator Main Fan and Fan Motor

S146059

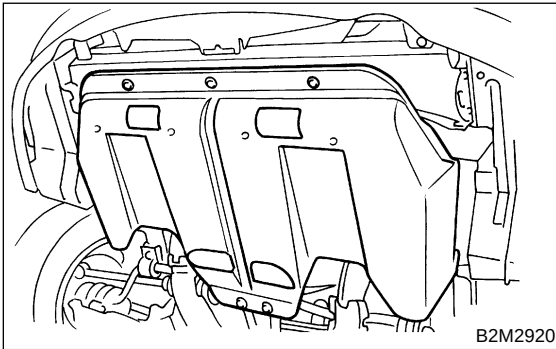
A: REMOVAL

S146059A18

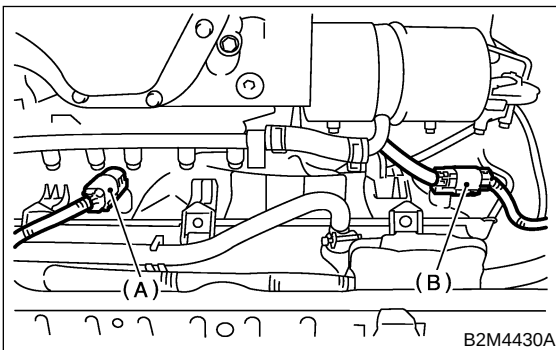
- 1) Disconnect battery ground cable.



- 2) Lift-up the vehicle.
- 3) Remove under cover.

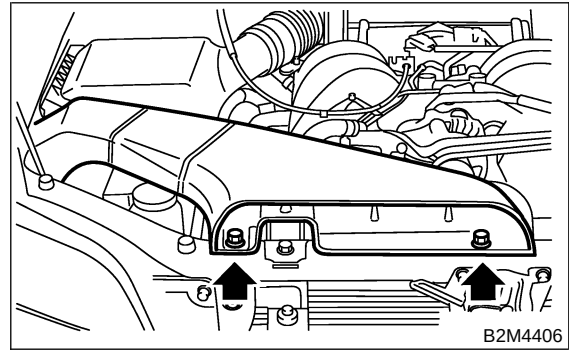


- 4) Drain engine coolant completely.
<Ref. to CO(H6)-18, Engine Coolant.>
- 5) Disconnect connectors of main and sub fan motor.

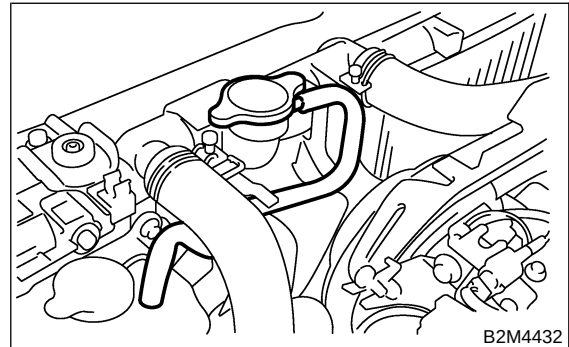


- (A) Main fan motor connector
(B) Sub fan motor connector

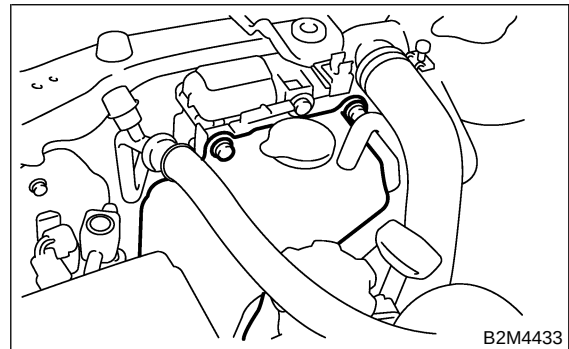
- 6) Lower the vehicle.
- 7) Remove air intake duct.



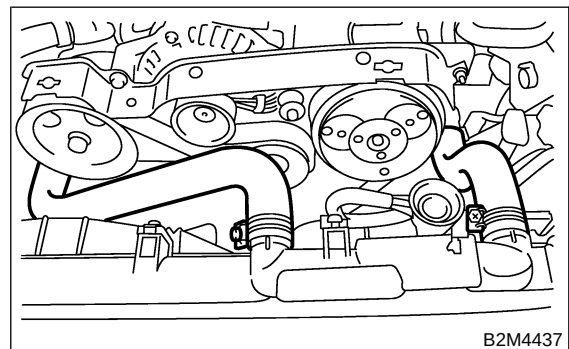
- 8) Disconnect over flow hose.



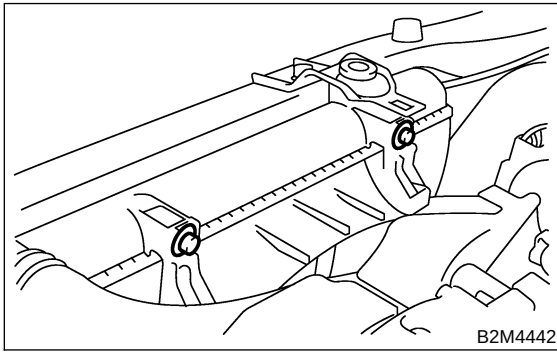
- 9) Remove reservoir tank.



- 10) Disconnect radiator inlet hoses from radiator.

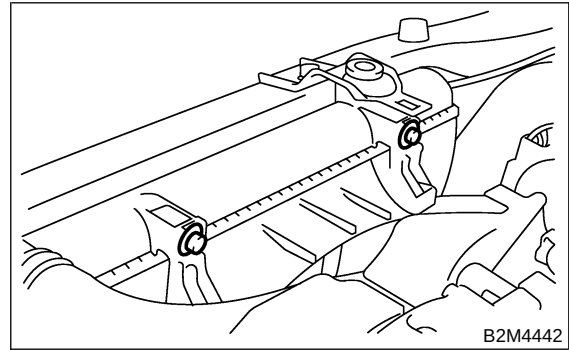


11) Remove radiator sub fan motor assembly.



Tightening torque:

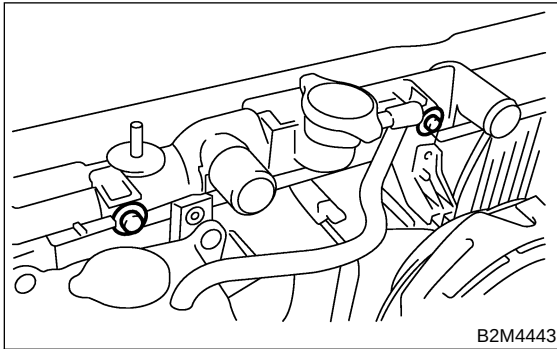
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



12) Remove radiator main fan motor assembly.

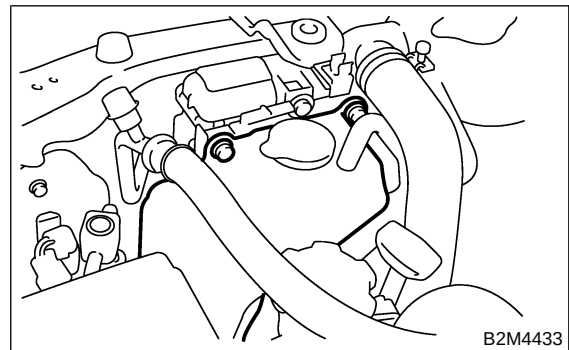
NOTE:

When removing main fan assembly by lifting it upward, main fan shroud will cause interference with coolant suction area. In order to avoid this, shift the main fan assembly over to sub fan side before removing it.



Tightening torque:

4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



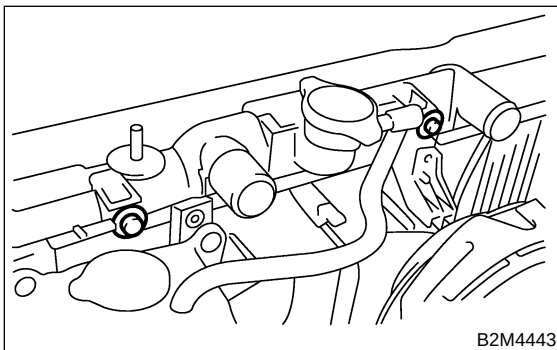
B: INSTALLATION

S146059A11

Install in the reverse order of removal.

Tightening torque:

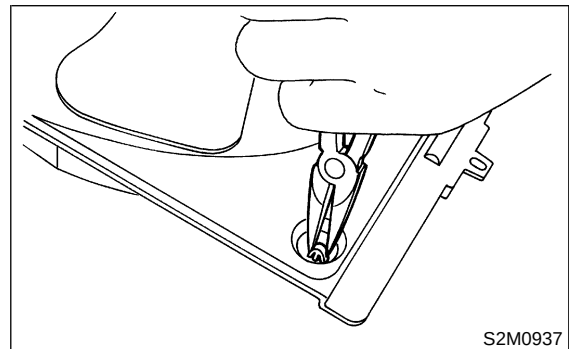
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



C: DISASSEMBLY

S146059A06

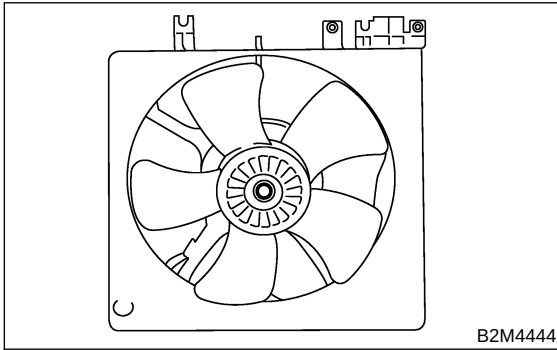
1) Remove clip which holds motor connector onto shroud.



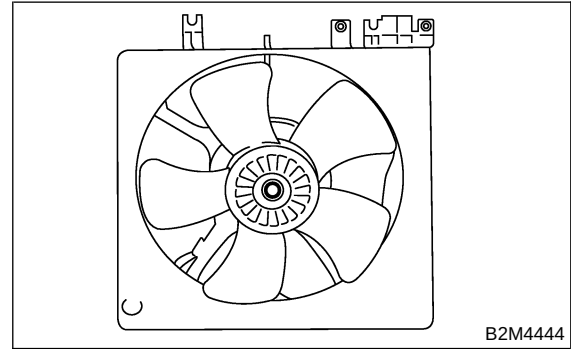
RADIATOR MAIN FAN AND FAN MOTOR

Cooling

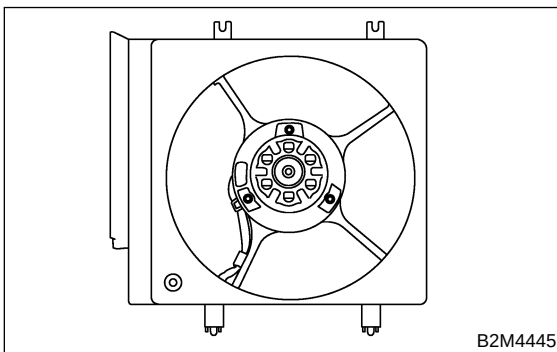
2) Remove nut which holds fan itself onto fan motor and shroud assembly.



Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



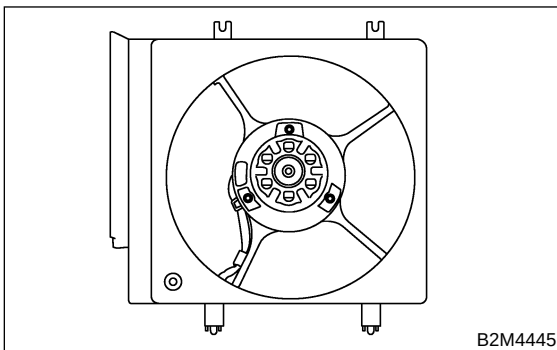
3) Remove screws which install fan motor onto shroud.



D: ASSEMBLY S146059A02

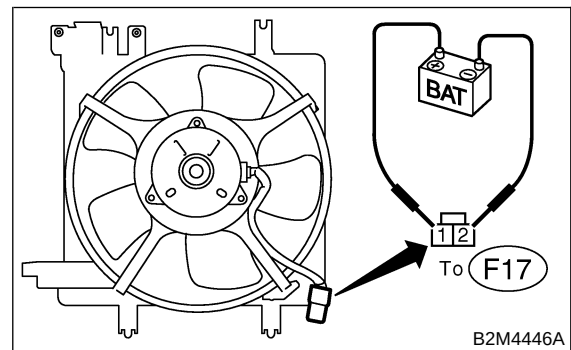
Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



E: INSPECTION S146059A10

- 1) Connect battery positive (+) terminal to terminal No. 2, and negative (-) terminal to terminal No. 1 of main fan motor connector.
- 2) Make sure the main fan motor operates properly. Replace it if it doesn't.



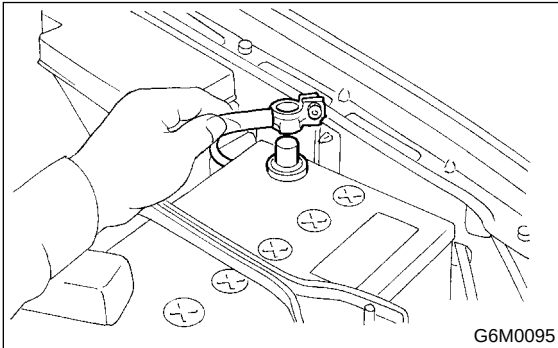
10. Radiator Sub Fan and Fan Motor

S146074

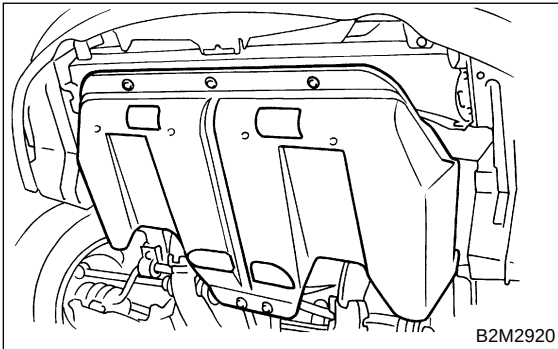
A: REMOVAL

S146074A18

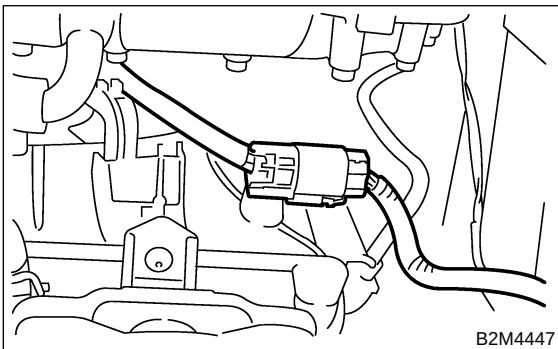
- 1) Disconnect battery ground cable.



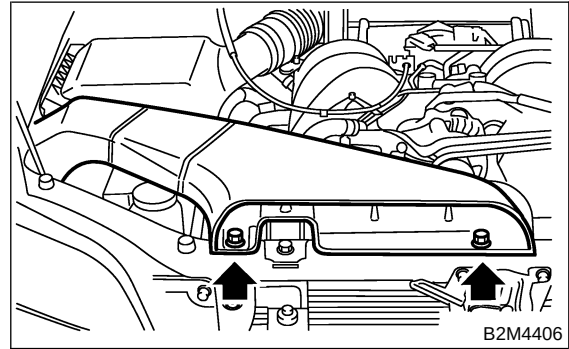
- 2) Lift-up the vehicle.
- 3) Remove under cover.



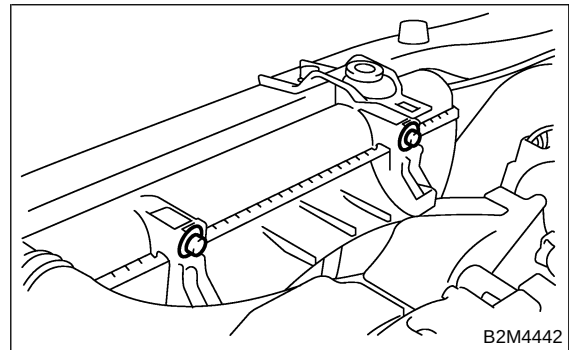
- 4) Disconnect connector of sub fan motor.



- 5) Lower the vehicle.
- 6) Remove air intake duct.



- 7) Remove bolts which hold sub fan shroud to radiator.
- 8) Remove radiator sub fan shroud through the under side of vehicle.



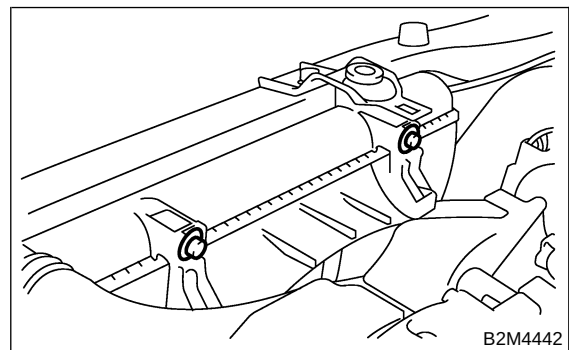
B: INSTALLATION

S146074A11

Install in the reverse order of removal.

Tightening torque:

4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

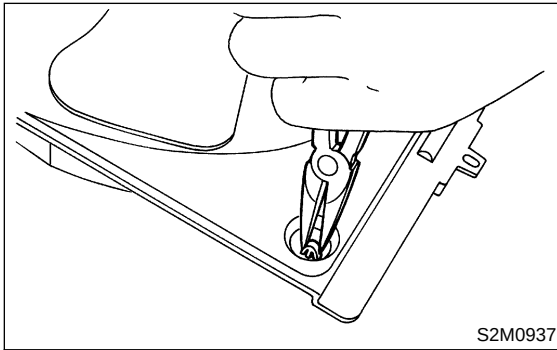


RADIATOR SUB FAN AND FAN MOTOR

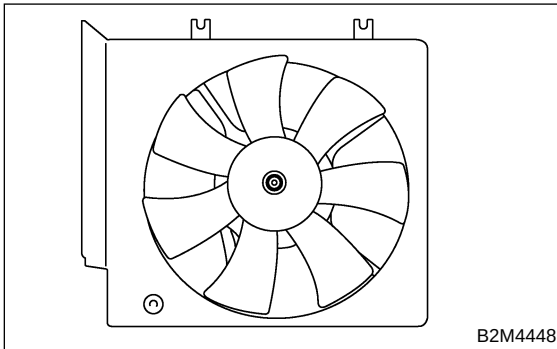
Cooling

C: DISASSEMBLY S146074A06

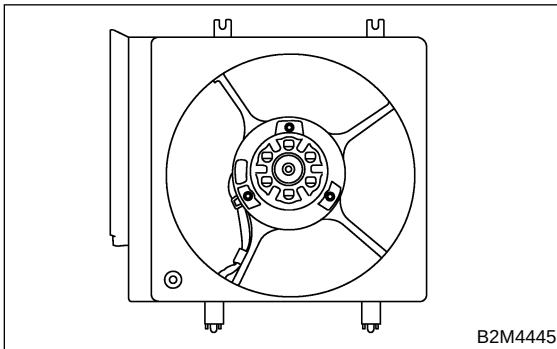
- 1) Remove clip which holds motor harness onto shroud.



- 2) Remove nut which holds fan itself onto fan motor and shroud assembly.



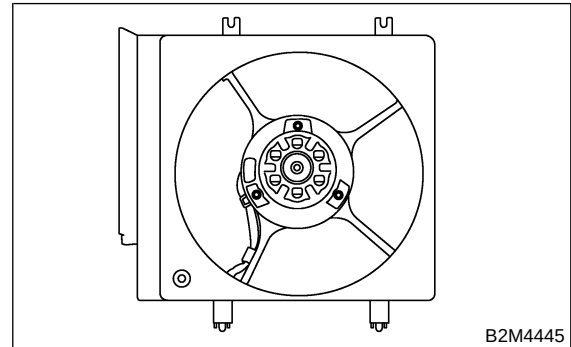
- 3) Remove screws which install fan motor onto shroud.



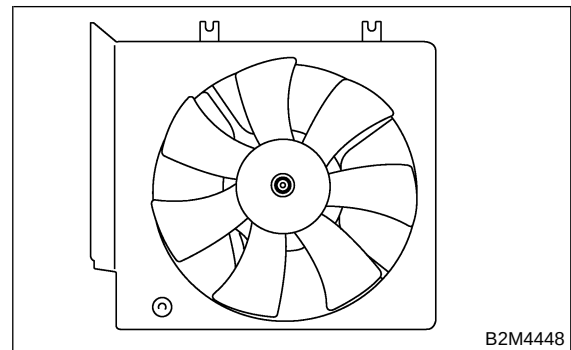
D: ASSEMBLY S146074A02

Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf·m, 3.3 ft·lb)

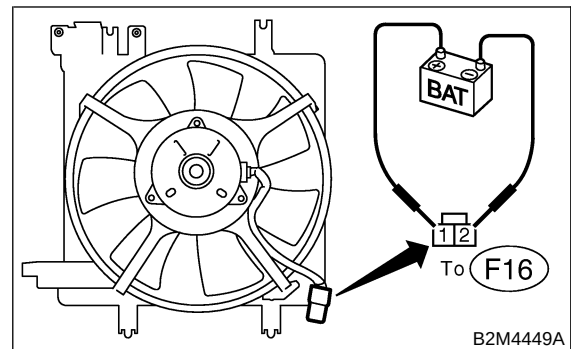


Tightening torque:
7.5 N·m (0.76 kgf·m, 5.5 ft·lb)



E: INSPECTION S146074A10

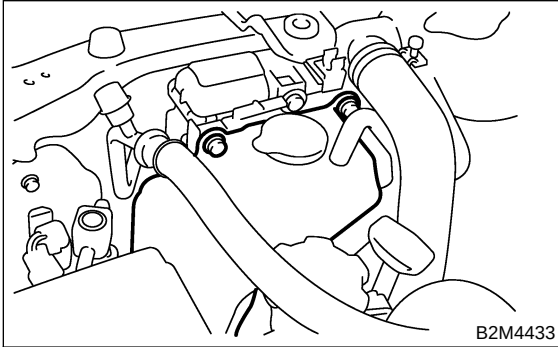
- 1) Connect battery positive (+) terminal to terminal No. 2, and negative (-) terminal to terminal No. 1 of sub fan motor connector.
- 2) Make sure the sub-fan motor operates properly. Replace it if it doesn't.



11. Reservoir Tank S146075

A: REMOVAL S146075A18

- 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.

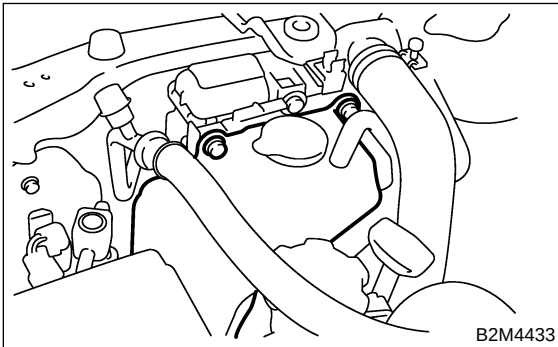


B: INSTALLATION S146075A11

Install in the reverse order of removal.

Tightening torque:

4.9N·m (0.50 kgf-m, 3.6 ft-lb)



C: INSPECTION S146075A10

Make sure the engine coolant level is between full and low.

ENGINE COOLING SYSTEM TROUBLE IN GENERAL

Cooling

12. Engine Cooling System Trouble in General

S146078

A: INSPECTION

S146078A10

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 EN(H6)-2, Basic Diagnostic Procedure.>
	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 EN(H6)-2, Basic Diagnostic Procedure.>
	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.

GENERAL DESCRIPTION

Lubrication

1. General Description S148001

A: SPECIFICATIONS S148001E49

Lubrication method				Forced lubrication	
Oil pump	Pump type			Trochoid type	
	Number of teeth	Inner rotor		9	
		Outer rotor		10	
	Outer rotor diameter × thickness			78 × 11 mm (3.07 × 0.43 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 — 0.18 mm (0.0039 — 0.0071 in)		
	LIMIT		0.25 mm (0.0098 in)		
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 capacity (includes oil filter)				5.8 ℓ (6.1 US qt, 5.1 Imp qt)	

GENERAL DESCRIPTION

Lubrication

MEMO:

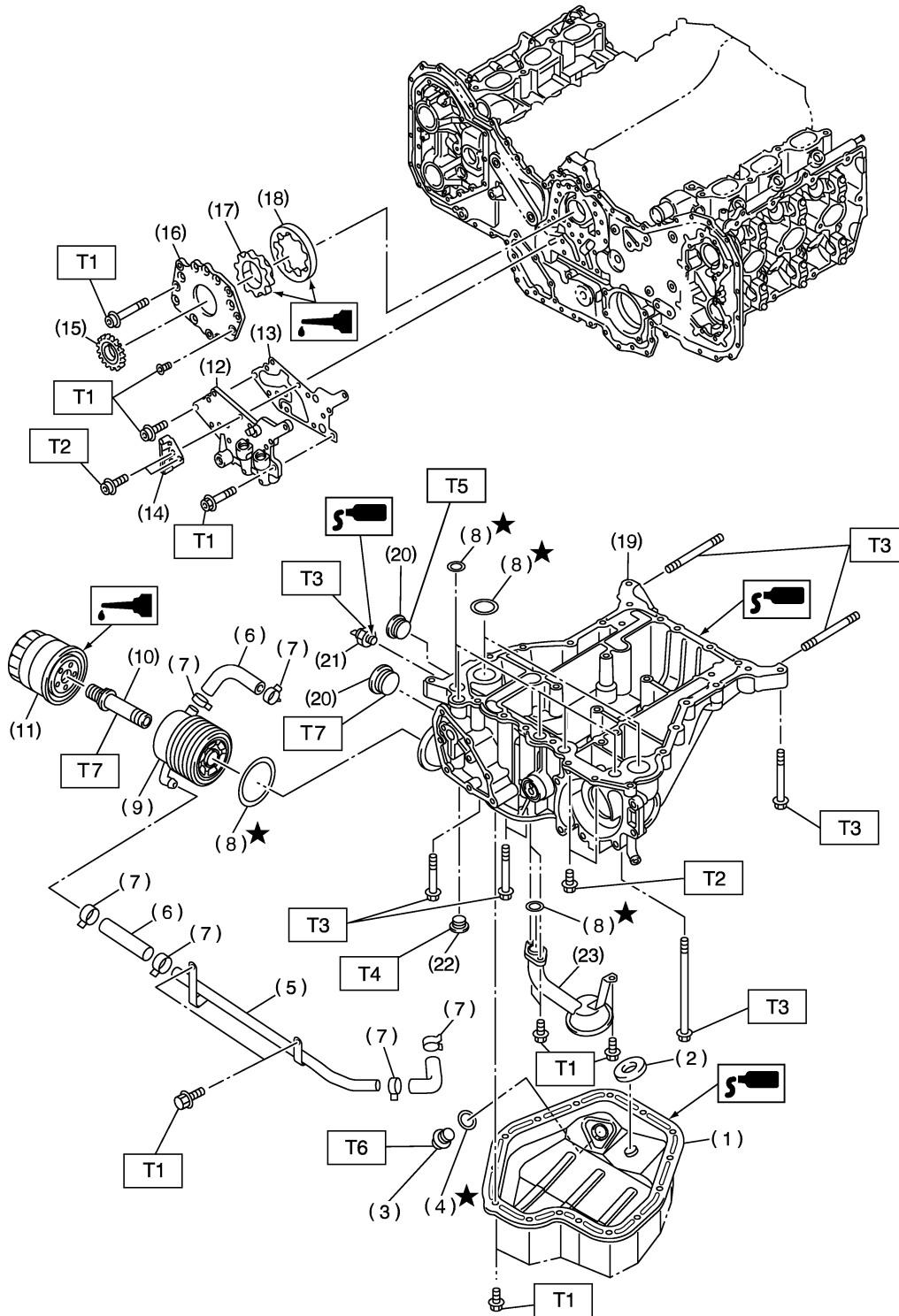
LU(H6)-3

GENERAL DESCRIPTION

Lubrication

B: COMPONENT

S148001A05



B2M4533A

LU(H6)-4

GENERAL DESCRIPTION

Lubrication

(1) Oil pan lower	(12) Relief valve case	(23) Oil strainer
(2) Magnet	(13) Relief valve case gasket	
(3) Drain plug	(14) Chain guide (center)	<i>Tightening torque: N·m (kgf-m, ft-lb)</i>
(4) O-ring	(15) Crank sprocket	<i>T1: 6.4 (0.65, 4.7)</i>
(5) Oil cooler pipe	(16) Oil pump cover	<i>T2: 7.8 (0.80, 5.8)</i>
(6) Hose	(17) Inner rotor	<i>T3: 18 (1.8, 13)</i>
(7) Clamp	(18) Outer rotor	<i>T4: 34 (3.5, 25)</i>
(8) O-ring	(19) Oil pan upper	<i>T5: 37 (3.8, 27)</i>
(9) Oil cooler	(20) Plug	<i>T6: 44 (4.5, 33)</i>
(10) Connector	(21) Oil pressure switch	<i>T7: 90 (9.2, 67)</i>
(11) Oil filter	(22) Plug	

GENERAL DESCRIPTION

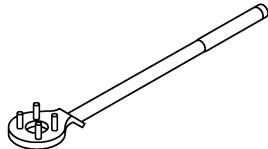
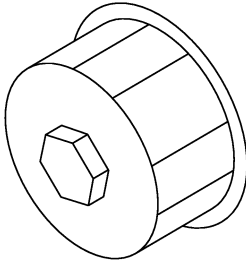
Lubrication

C: CAUTION S148001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.

- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

D: PREPARATION TOOL S148001A17

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3870	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolt.
 B2M3872	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.

GENERAL DESCRIPTION

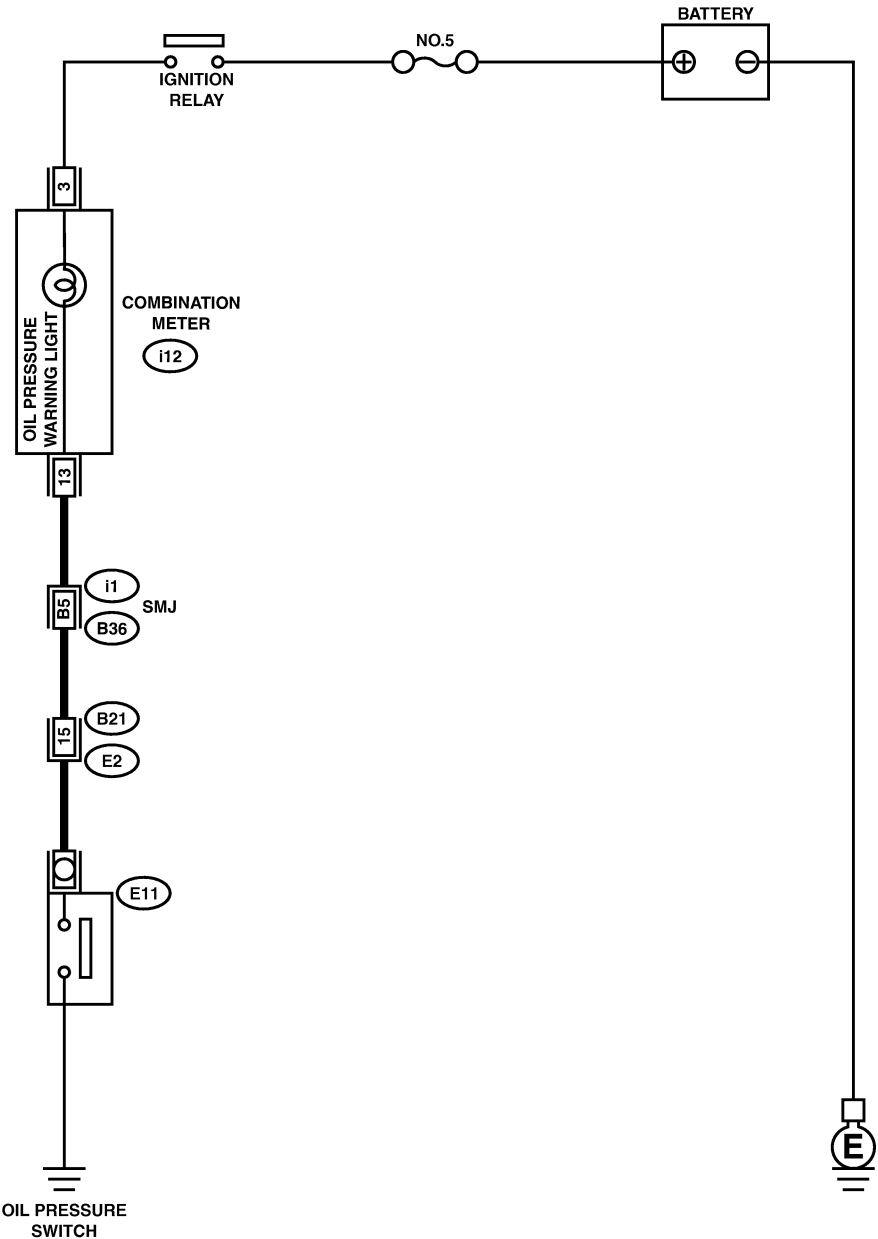
Lubrication

MEMO:

LU(H6)-7

2. Oil Pressure System

A: SCHEMATIC



C: i12 (GREEN)

1	2	3	4	5	6
7	8	9	10	11	12
13	14				

B21 (GRAY)

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20

A: i10 (GREEN)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30												

B36

A1	A2	A3	A4	A5	A6
B1	B2	B3	B4	B5	B6
C1	C2	C3	C4	C5	C6
D1	D2	D3	D4	D5	D6
E1	E2	E3	E4	E5	E6
F1	F2	F3	F4	F5	F6
G1	G2	G3	G4	G5	G6
H1	H2	H3	H4	H5	H6
I1	I2	I3	I4	I5	I6
J1	J2	J3	J4	J5	J6
K1	K2	K3	K4	K5	K6
L1	L2	L3	L4	L5	L6
M1	M2	M3	M4	M5	M6
N1	N2	N3	N4	N5	N6
O1	O2	O3	O4	O5	O6
P1	P2	P3	P4	P5	P6

B: INSPECTION

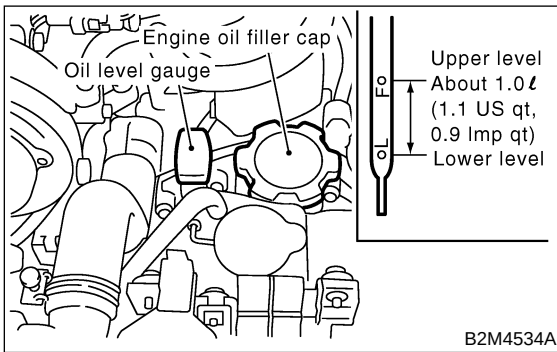
S148076A10

No.	Step	Check	Yes	No
1	CHECK COMBINATION METER. 1) Turn ignition switch to ON. (engine OFF) 2) Check other warning lights.	Does the warning lights go on?	Go to step 2.	Repair or replace the combination meter. <Ref. to IDI-10 INSPECTION, Combination Meter System.>
2	CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from the oil pressure switch. 3) Turn ignition switch ON. 4) Measure the voltage of harness between the combination meter connector and chassis ground. Connector & terminal (E11) No. 1 — Chassis ground:	Is the voltage more than 10 V?	Replace oil pressure switch.	Go to step 3.
3	CHECK COMBINATION METER. 1) Turn ignition switch to OFF. 2) Remove the combination meter. 3) Measure the resistance of the combination meter. Terminal No. 13 — No. 3:	Is the resistance less than 10 Ω ?	Replace the harness connector between combination meter and oil pressure switch.	Repair or replace the combination meter and the oil pressure switch warning light bulb.

3. Engine Oil S148077

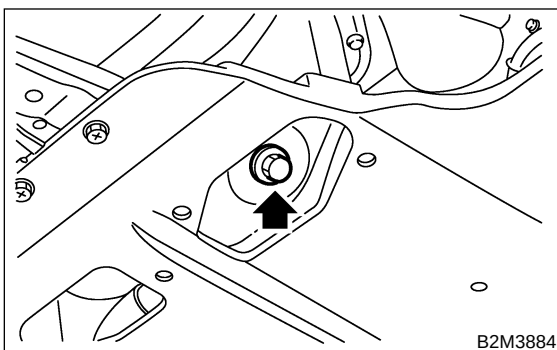
A: INSPECTION S148077A10

- 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.

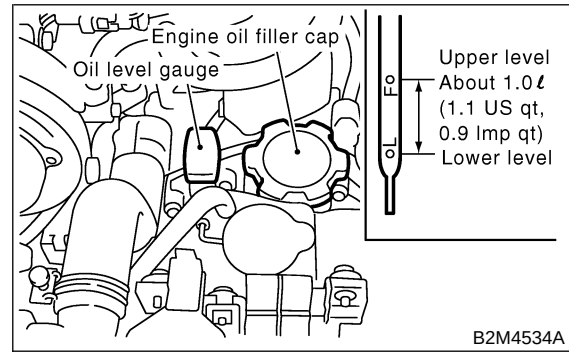


B: REPLACEMENT S148077A20

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



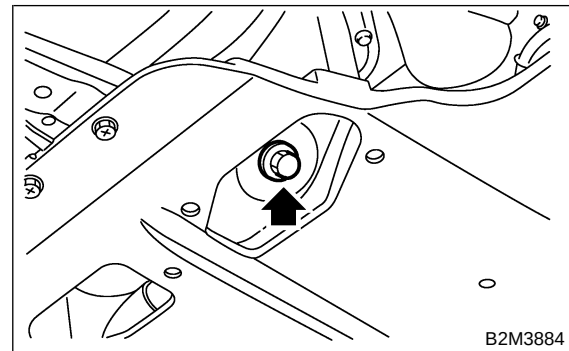
- 2) Open engine oil filler cap for quick draining of the engine oil.



- 3) Replace drain plug gasket.
- 4) Tighten engine oil drain plug after draining engine oil.

Tightening torque:

44 N·m (4.5 kgf-m, 33 ft-lb)



- 5) 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 specification G4 or G5, ACEA specification A1, A2 or A3, or New API mark displayed on the container (If it is impossible to get SJ or SH grade, you may use SG grade.)

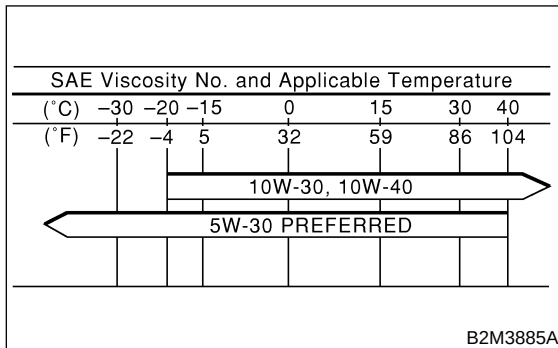
Engine oil capacity (excludes oil filter):

Upper level

5.5 ℓ (5.8 US qt, 4.8 Imp qt)

Lower level

4.5 ℓ (4.8 US qt, 4.0 Imp qt)



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

CAUTION:

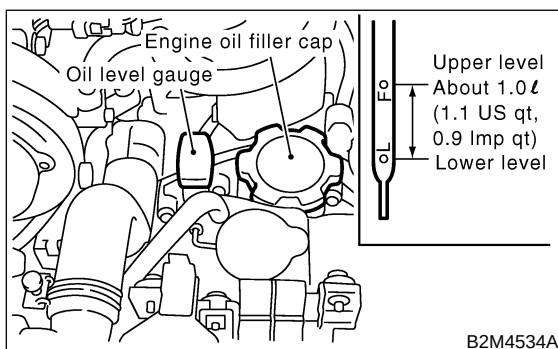
When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.

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 or SH

SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20W-50.

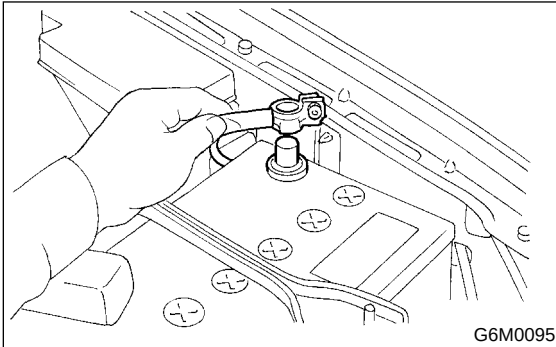
- 6) Close engine oil filler cap.
- 7) Start engine and warm it up for a time.
- 8) After engine stops, recheck the oil level. If necessary, add engine oil up to upper level on level gauge.



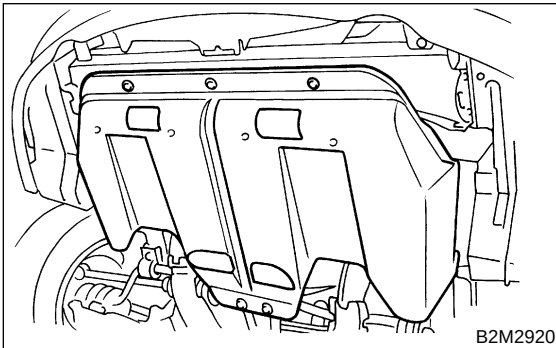
4. Oil Pump S148070

A: REMOVAL S148070A18

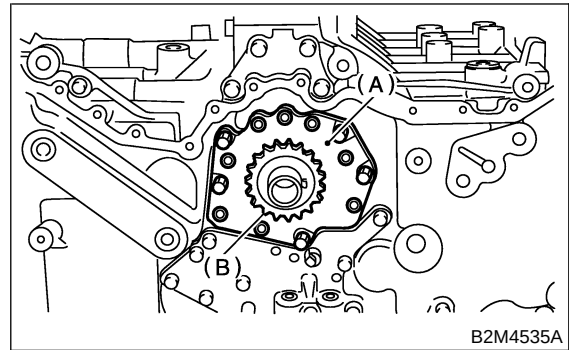
- 1) Disconnect battery ground cable.



- 2) Lift-up the vehicle.
- 3) Remove under cover.



- 4) Drain coolant. <Ref. to CO(H6)-18, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 5) Lower the vehicle.
- 6) Remove radiator. <Ref. to CO(H6)-23, REMOVAL, Radiator.>
- 7) Remove V-belt. <Ref. to ME(H6)-31, REMOVAL, V-belt.>
- 8) Remove front chain cover. <Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
- 9) Remove timing chain. <Ref. to ME(H6)-45, REMOVAL, Timing Chain.>
- 10) Remove oil pump cover and crankshaft sprocket.

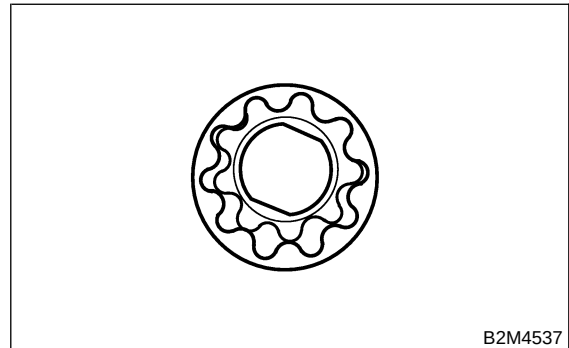


- (A) Oil pump cover
(B) Crankshaft sprocket

- 11) Remove inner rotor and outer rotor.

B: INSTALLATION S148070A11

- 1) Apply engine oil to the entire surface area of both inner and outer rotor.



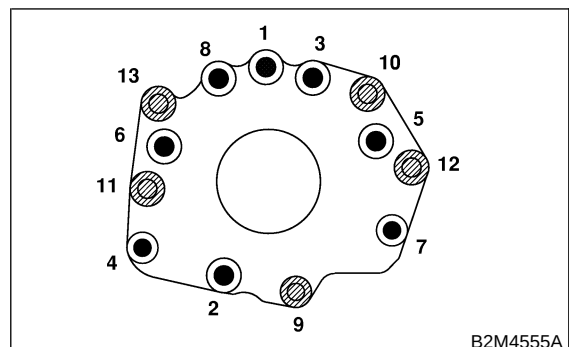
- 2) Install the inner rotor by fitting it into the groove on the crankshaft, and then assemble the outer rotor.
- 3) Install oil pump cover.
- 4) Tighten the bolts in the numerical sequence shown in the figure.

CAUTION:

Make sure that bolt mounting position is correct.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 5) Install crank sprocket.

- 6) Install timing chain. <Ref. to ME(H6)-46, INSTALLATION, Timing Chain.>
- 7) Install front chain cover. <Ref. to ME(H6)-43, INSTALLATION, Front Chain Cover.>
- 8) Install V-belt. <Ref. to ME(H6)-31, INSTALLATION, V-belt.>
- 9) Install radiator. <Ref. to CO(H6)-24, INSTALLATION, Radiator.>
- 10) Fill coolant. <Ref. to CO(H6)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

S148070A10

1. TIP CLEARANCE

S148070A1001

Measure the tip clearance of rotors. If the clearance exceeds the limit, replace rotors as a matched set.

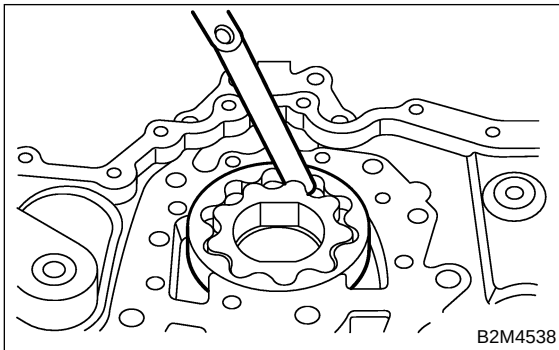
Tip clearance:

Standard

0.04 — 0.14 mm (0.0016 — 0.0055 in)

Limit

0.18 mm (0.0071 in)



2. CASE CLEARANCE

S148070A1002

Measure the clearance between the outer rotor and the rear chain cover rotor housing. If the clearance exceeds the limit, replace the rotor.

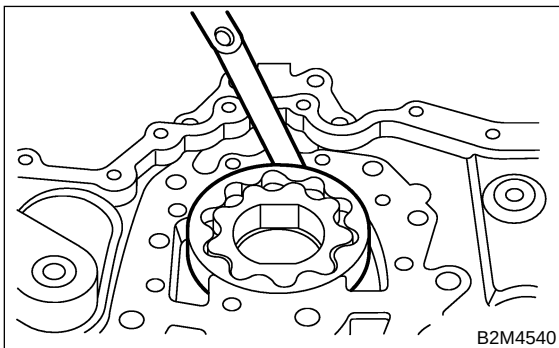
Case clearance:

Standard

0.10 — 0.18 mm (0.0039 — 0.0071 in)

Limit

0.25 mm (0.0098 in)



3. SIDE CLEARANCE

S148070A1003

Measure clearance between oil pump inner rotor and rear chain cover. If the clearance exceeds the limit, replace rotor or pump body.

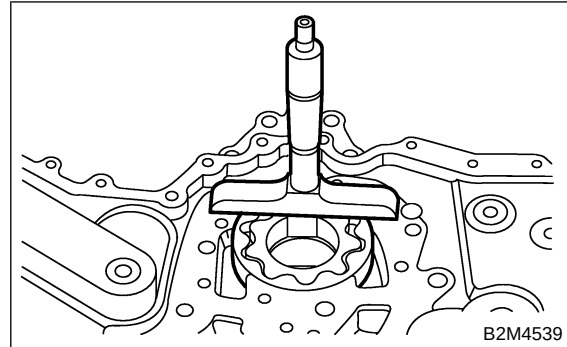
Side clearance:

Standard

0.02 — 0.07 mm (0.0008 — 0.0028 in)

Limit

0.15 mm (0.0059 in)



4. OIL PUMP CASE

S148070A1004

Check the oil pump case for worn shaft hole, clogged oil passage, cracks and other faults.

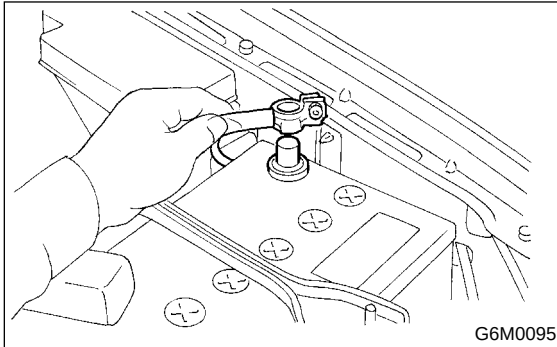
5. Oil Pump Relief Valve

S148744

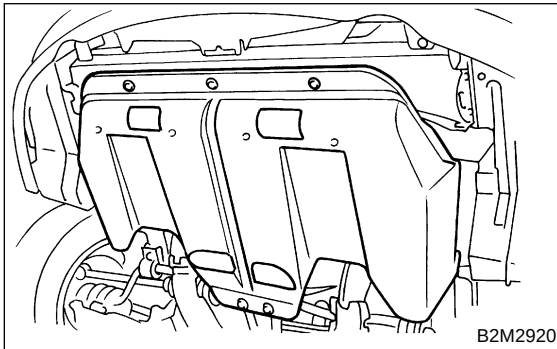
A: REMOVAL

S148744A18

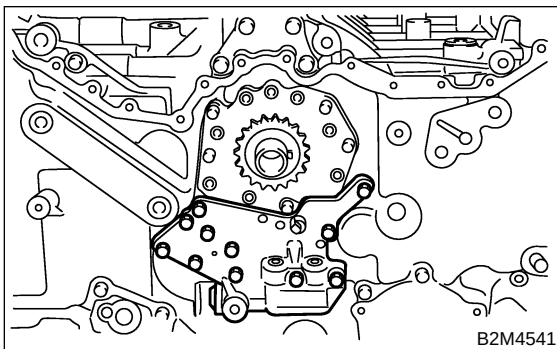
- 1) Disconnect battery ground cable.



- 2) Lift-up the vehicle.
- 3) Remove under cover.



- 4) Drain coolant. <Ref. to CO(H6)-18 DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 5) Lower the vehicle.
- 6) Remove radiator. <Ref. to CO(H6)-23, REMOVAL, Radiator.>
- 7) Remove V-belt. <Ref. to ME(H6)-31, REMOVAL, V-belt.>
- 8) Remove front chain cover. <Ref. to ME(H6)-43, REMOVAL, Front Chain Cover.>
- 9) Remove timing chain assembly. <Ref. to ME(H6)-45, REMOVAL, Timing Chain Assembly.>
- 10) Remove oil pump relief valve.



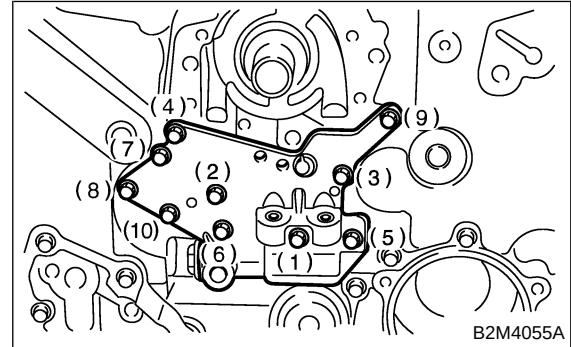
B: INSTALLATION

S148744A11

- 1) Install oil pump relief valve case and gasket
- 2) Tighten the bolts in the numerical sequence shown in the figure.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



Bolt installation position	Bolt dimension
(1) and (5)	6 x 26
(2), (3), (4) and (9)	6 x 35
(6), (7), (8) and (10)	6 x 16

- 3) Install timing chain assembly. <Ref. to ME(H6)-46, INSTALLATION, Timing Chain Assembly.>
- 4) Install front chain cover. <Ref. to ME(H6)-43, INSTALLATION, Front Chain Cover.>
- 5) Install V-belt. <Ref. to ME(H6)-31, INSTALLATION, V-belt.>
- 6) Install radiator. <Ref. to CO(H6)-24, INSTALLATION, Radiator.>
- 7) Fill coolant. <Ref. to CO(H6)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

S148744A10

Check the oil pump relief valve case for worn shaft hole, clogged oil passage, cracks and other faults.

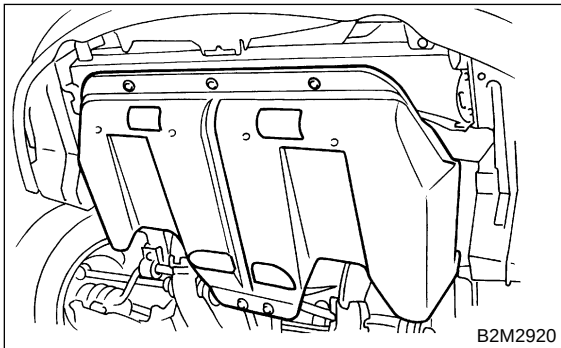
6. Oil Pan and Strainer S148071

A: REMOVAL S148071A18

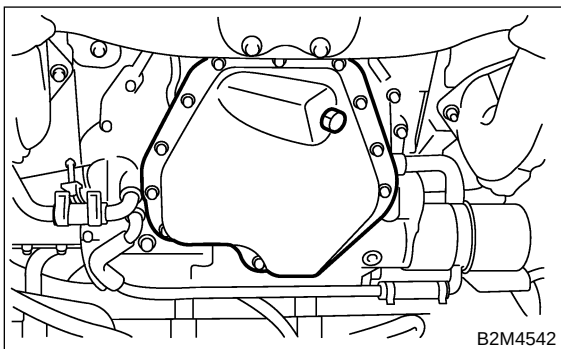
NOTE:

Oil pan upper cannot be removed from the normal vehicle position. The engine must be separated from the body prior to removal. <Ref. to ME(H6)-32, REMOVAL, Engine Assembly.>

- 1) Set the vehicle on lift arms.
- 2) Lift-up the vehicle.
- 3) Remove under cover.



- 4) Drain engine oil.
Set container under the vehicle, and remove drain plug from oil pan.

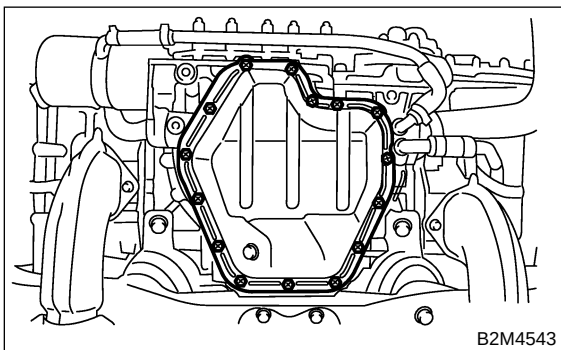


- 5) Insert oil pan cutter blade between upper and lower oil pans.

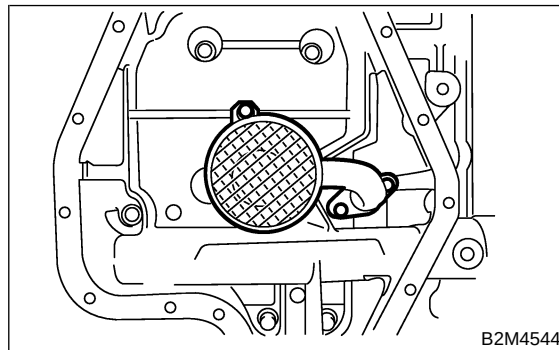
CAUTION:

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

- 6) Remove oil pan.



- 7) Remove oil strainer.



B: INSTALLATION S148071A11

CAUTION:

Before installing oil pan, clean sealant from lower oil pan and upper oil pan.

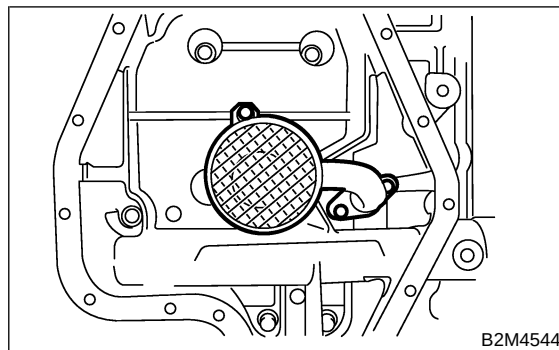
- 1) Install oil strainer onto baffle plate.

CAUTION:

Replace O-ring with a new one.

Tightening torque:

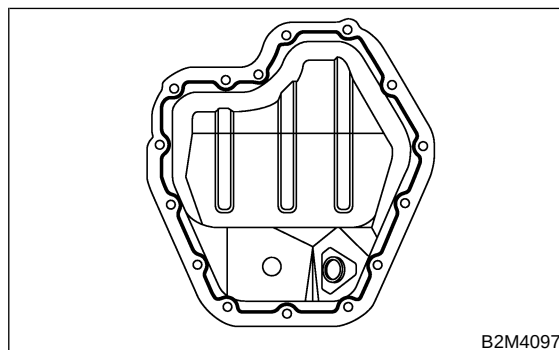
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 2) Apply fluid packing to mating surfaces and install oil pan.

Fluid packing:

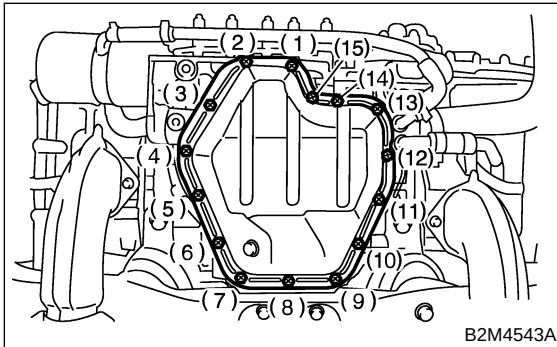
THREE BOND 1280B



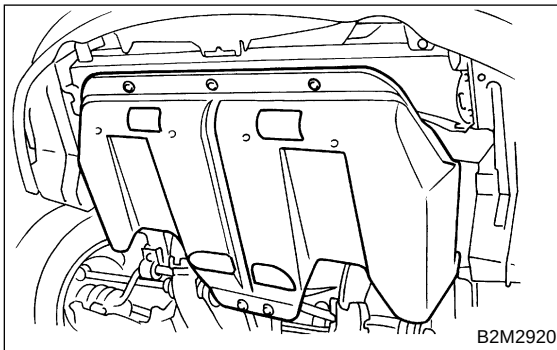
3) Tighten the lower oil pan mounting bolts in the numerical sequence shown in the figure.

Tightening torque:

5 N·m (0.5 kgf-m, 3.6 ft-lb)



4) Install under cover.



5) Fill engine oil. <Ref. to LU(H6)-10 INSPECTION, Engine Oil.>

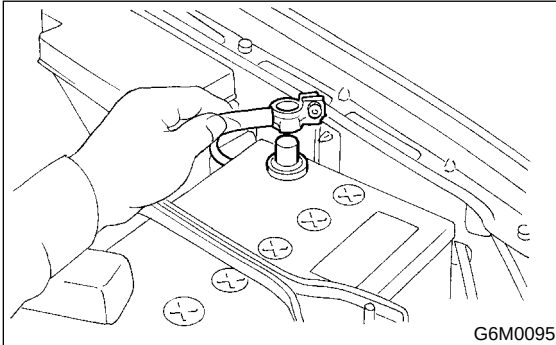
C: INSPECTION S148071A10

By visual check make sure oil pan, oil strainer and oil strainer stay are not damaged.

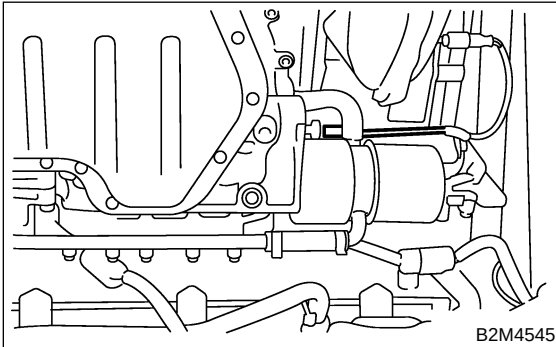
7. Oil Pressure Switch S148069

A: REMOVAL S148069A18

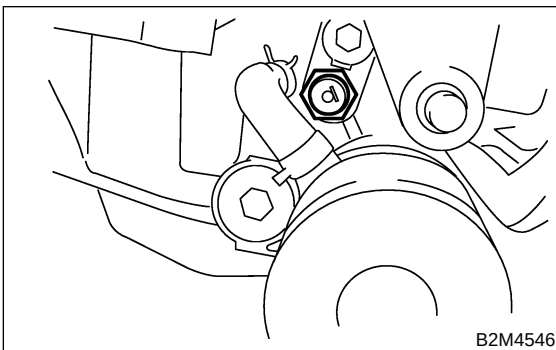
- 1) Set vehicle on the lift.
- 2) Disconnect battery ground cable.



- 3) Lift-up the vehicle.
- 4) Remove under cover.
- 5) Disconnect terminal from oil pressure switch.



- 6) Remove oil pressure switch.

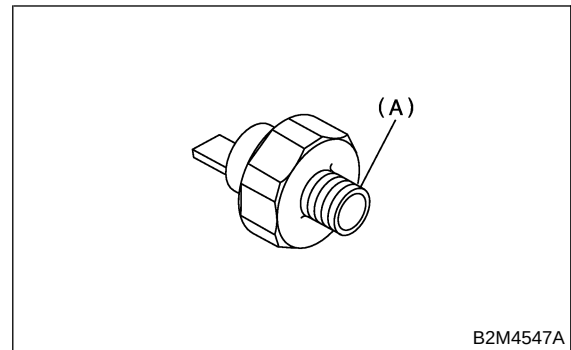


B: INSTALLATION S148069A11

- 1) Apply fluid packing to oil pressure switch threads.

Fluid packing:

THREE BOND 1324 or equivalent

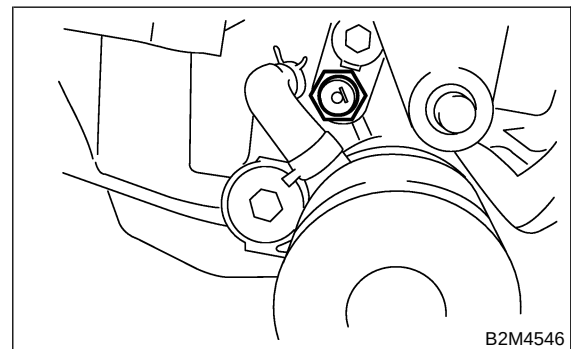


(A) Fluid packing

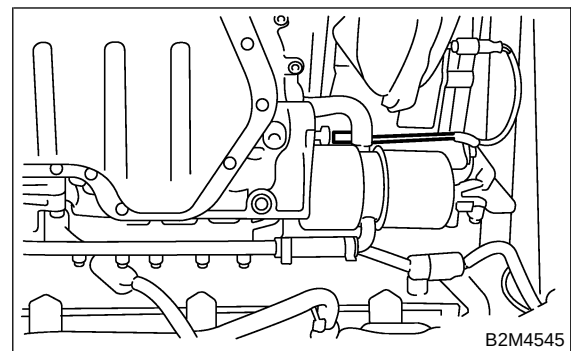
- 2) Install oil pressure switch.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- 3) Connect terminal of oil pressure switch.



- 4) Install under cover.

C: INSPECTION S148069A10

Make sure oil does not leak or seep from where the oil pressure switch is installed.

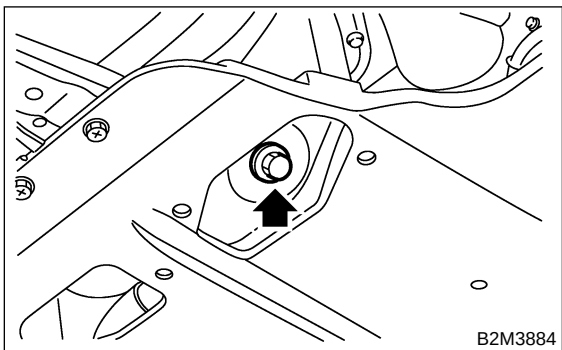
8. Engine Oil Filter

S148585

A: REMOVAL

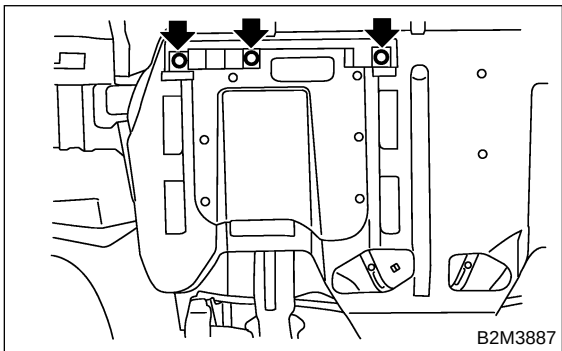
S148585A18

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



B2M3884

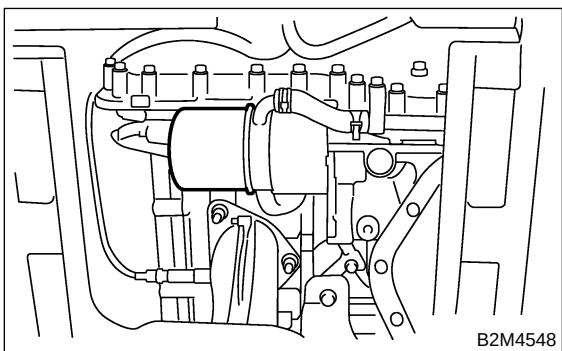
- 2) Remove access lid.



B2M3887

- 3) Remove oil filter with ST.

ST 498547000 OIL FILTER WRENCH



B2M4548

B: INSTALLATION

S148585A11

- 1) Get a new oil filter and apply a thin coat of engine oil to the rubber seal.
- 2) Install oil filter by turning it by hand, being careful not to damage rubber seal.
- 3) Tighten more (approximately 2/3 to 3/4 turn) after the rubber seal contacts the oil pump case. Do not tighten excessively, or oil may leak.

C: INSPECTION

S148585A10

- 1) After installing oil filter, run engine and make sure that no oil is leaking around rubber seal.

NOTE:

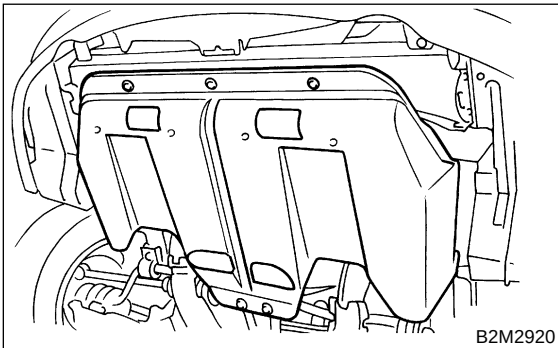
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

- 2) Check the engine oil level. <Ref. to LU(H6)-10 INSPECTION, Engine Oil.>

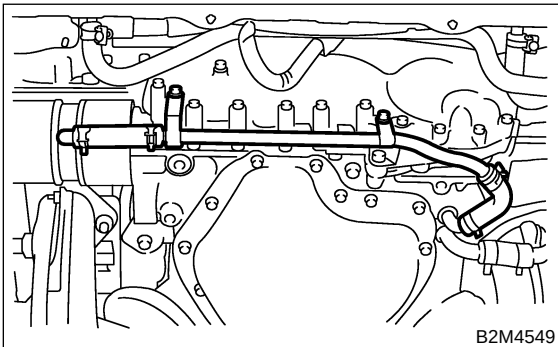
9. Oil Cooler S148073

A: REMOVAL S148073A18

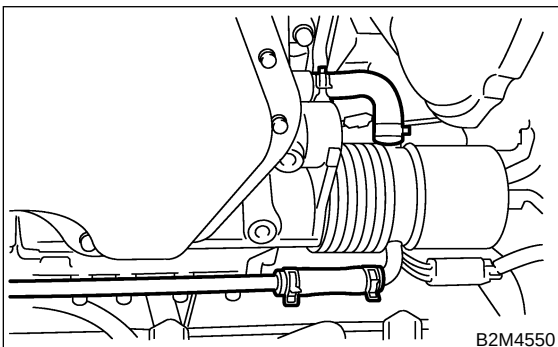
- 1) Lift-up the vehicle.
- 2) Remove under cover.



- 3) Drain engine coolant completely. <Ref. to CO(H6)-18, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 4) Drain engine oil. <Ref. to LU(H6)-10, REPLACEMENT, Engine Oil.>
- 5) Remove bolts which installs water pipe to engine.

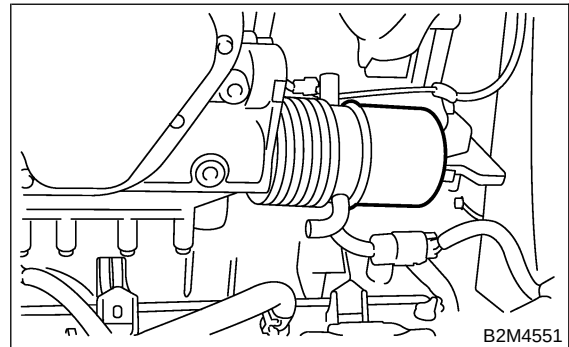


- 6) Disconnect water hoses from oil cooler.

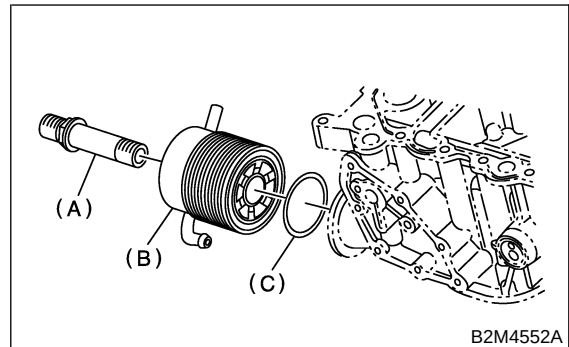


- 7) Remove oil filter using ST. <Ref. to LU(H6)-18, REMOVAL, Engine Oil Filter.>
ST 49854700 OIL FILTER WRENCH

NOTE:
Set container under the vehicle.



- 8) Remove connector and remove oil cooler.



- (A) Connector
(B) Oil cooler
(C) Gasket

B: INSPECTION S148073A10

- 1) Check that coolant passages are not clogged using air blow method.
- 2) Check mating surfaces of gasket, upper oil pan groove and oil filter for damage.

C: INSTALLATION S148073A11

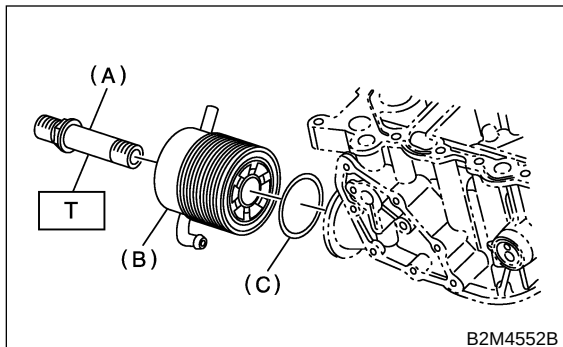
1) Install oil cooler on upper oil pan with connector pipe.

Tightening torque:

T: 54 ± 5 N·m (5.5 ± 0.5 kg·m, 39.8 ± 3.6 ft-lb)

CAUTION:

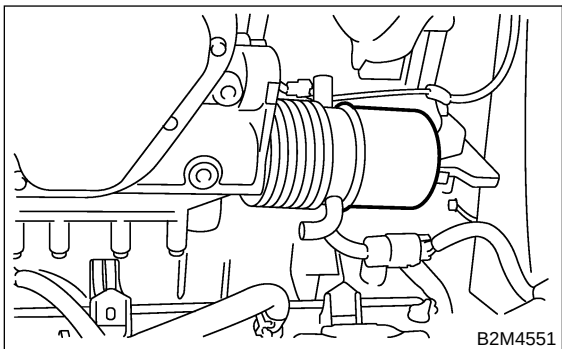
Always use a new gasket.



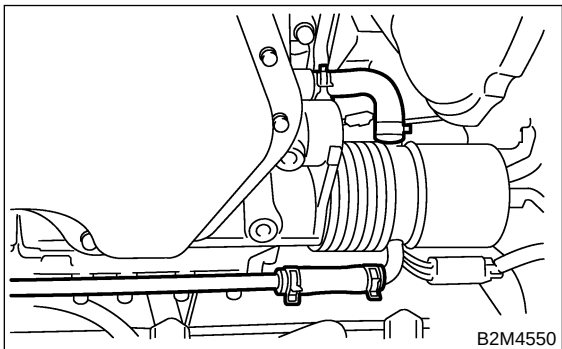
- (A) Connector
- (B) Oil cooler
- (C) Gasket

2) Install oil filter using ST. <Ref. to LU(H6)-18, INSTALLATION, Engine Oil Filter.>

ST 49854700 OIL FILTER WRENCH



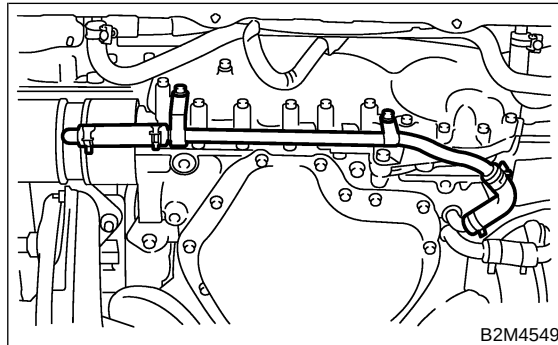
3) Install water hose.



4) Install water pipe to engine.

Tightening torque:

6.4 N·m (0.65 kgf·m, 4.7 ft-lb)



5) Fill engine oil. <Ref. to LU(H6)-10, REPLACEMENT, Engine Oil.>

6) Fill engine coolant. <Ref. to CO(H6)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

7) Check the engine oil level. <Ref. to LU(H6)-10, INSPECTION, Engine Oil.>

10. Engine Lubrication System Trouble in General

S148100

A: INSPECTION

S148100A10

Before performing diagnostics, 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 LUBRICATION SYSTEM TROUBLE IN GENERAL

Lubrication

MEMO:

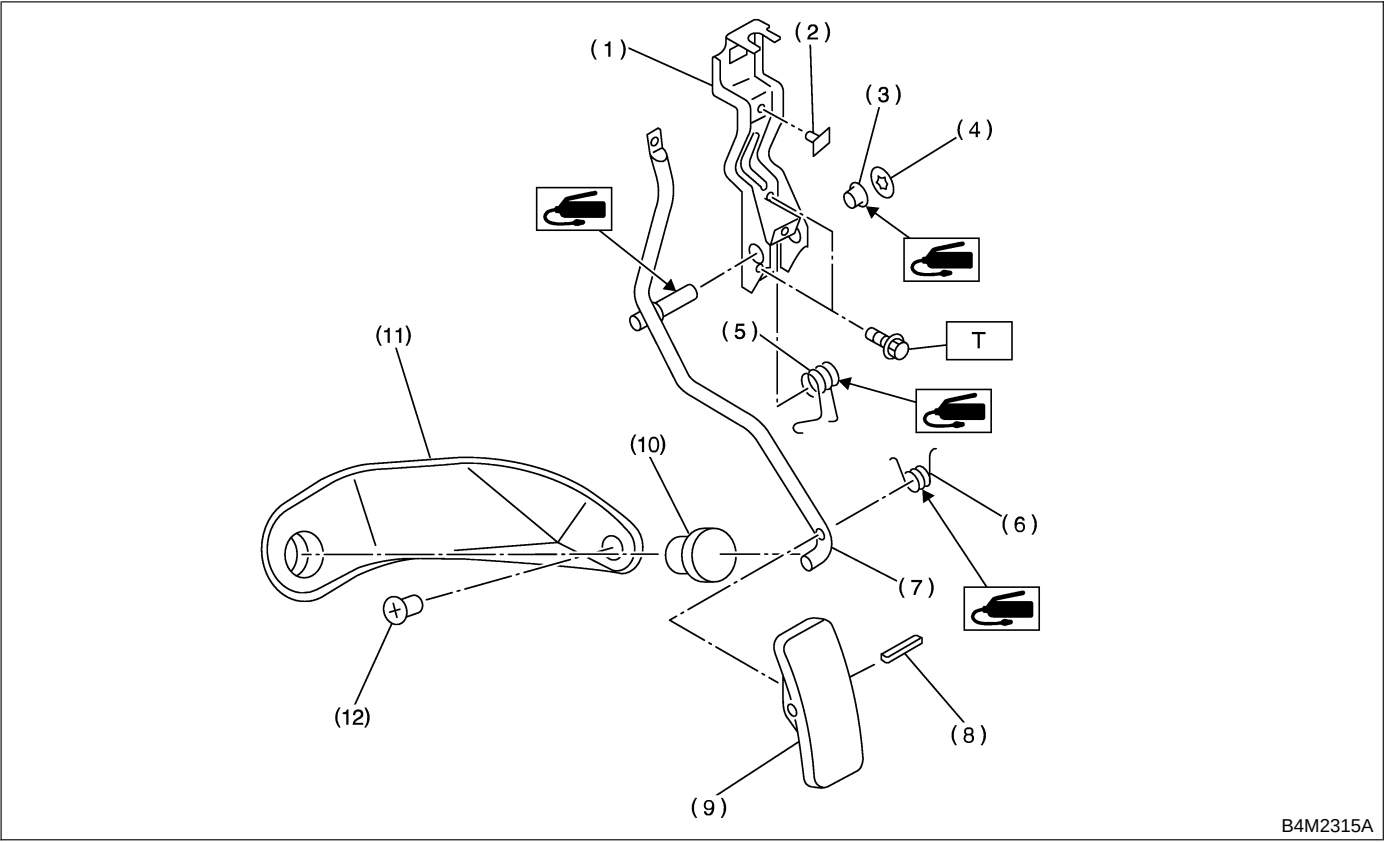
GENERAL DESCRIPTION

1. General Description S147001

A: SPECIFICATION S147001A22

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)

B: COMPONENT S147001A05



(1) Accelerator bracket	(6) Accelerator pedal spring	(11) Accelerator plate
(2) Stopper	(7) Accelerator pedal lever	(12) Clip
(3) Bushing	(8) Spring pin	
(4) Clip	(9) Accelerator pedal	
(5) Accelerator spring	(10) Accelerator stopper	

Tightening torque: N·m (kgf·m, ft·lb)
T: 18 (1.8, 13.0)

C: CAUTION S147001A03

- Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination, including dirt and corrosion, before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part in the vehicle is hot after running.

- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

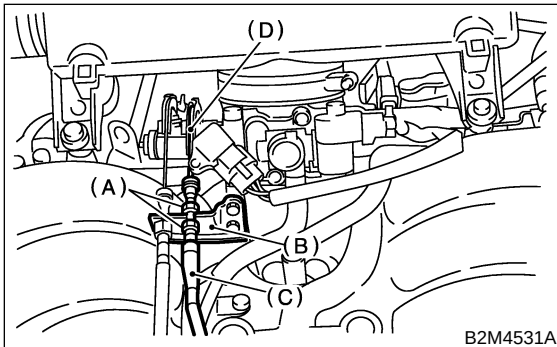
2. Accelerator Pedal S147005

A: REMOVAL S147005A18

- 1) Disconnect ground cable from battery.
- 2) Remove lock nut from accelerator cable bracket.
- 3) Separate accelerator cable from bracket.
- 4) Remove accelerator cable end from throttle cam.
- 5) Disconnect accelerator cable from throttle body.

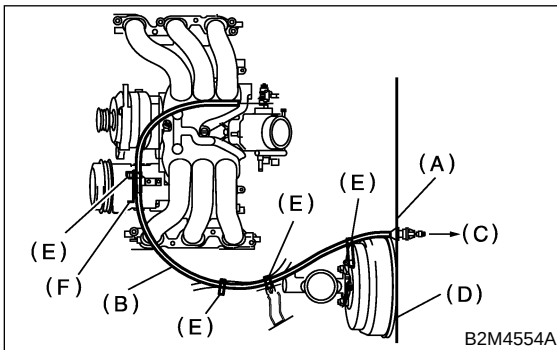
CAUTION:

Be careful not to kink accelerator cable.



- (A) Lock nut
- (B) Accelerator cable bracket
- (C) Accelerator cable
- (D) Throttle cam

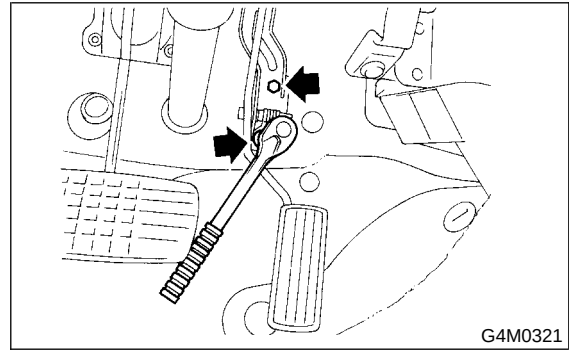
- 6) Remove clip inside engine compartment.



- (A) Toe board
- (B) Accelerator cable
- (C) To accelerator pedal
- (D) Brake booster
- (E) Clip
- (F) Bracket

- 7) Remove instrument panel lower cover from instrument panel, and connector.
- 8) Remove brake and clutch pedal bracket. (MT model) <Ref. to BR-60 REMOVAL, Brake Pedal.>

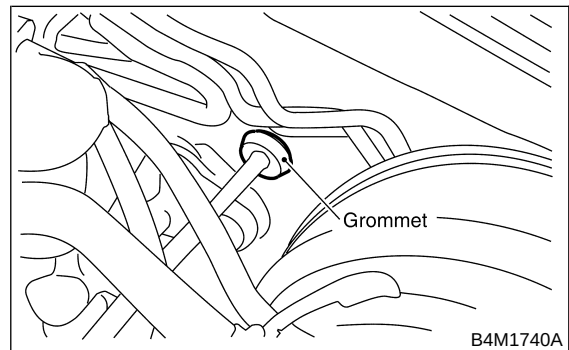
- 9) Remove accelerator pedal connecting bolt from accelerator pedal bracket.



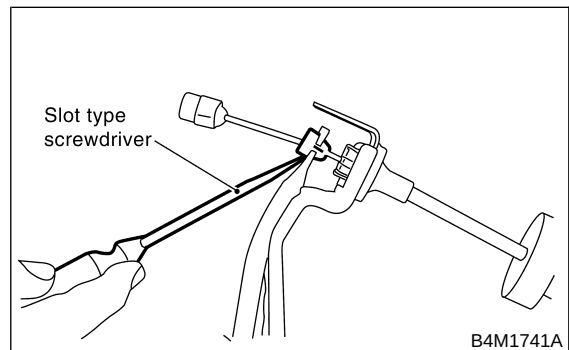
- 10) Disconnect grommet from toe board.

NOTE:

From inside compartment, push grommet into hole.



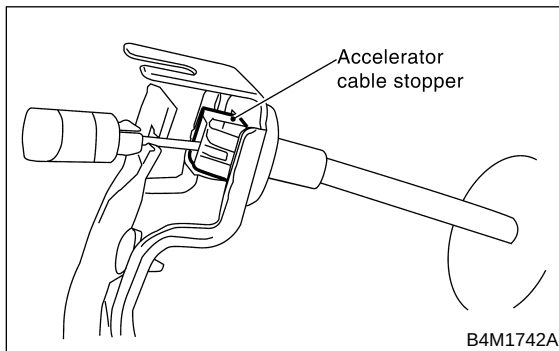
- 11) Pull out the cable from the toe board hole.
- 12) Disconnect accelerator cable bushing from accelerator pedal lever.



ACCELERATOR PEDAL

Speed Control Systems

13) Disconnect accelerator cable stopper from bracket.



14) Separate accelerator cable and bracket.

B: INSTALLATION

S147005A11

1) Install in the reverse order of removal.

CAUTION:

- If cable clamp is damaged, replace it with a new one.
- Never fail to cover outer cable end with boot.
- Be careful not to kink accelerator cable.
- Always use new clevis pins.

2) Check pedal stroke and free play by operating accelerator pedal by hand.

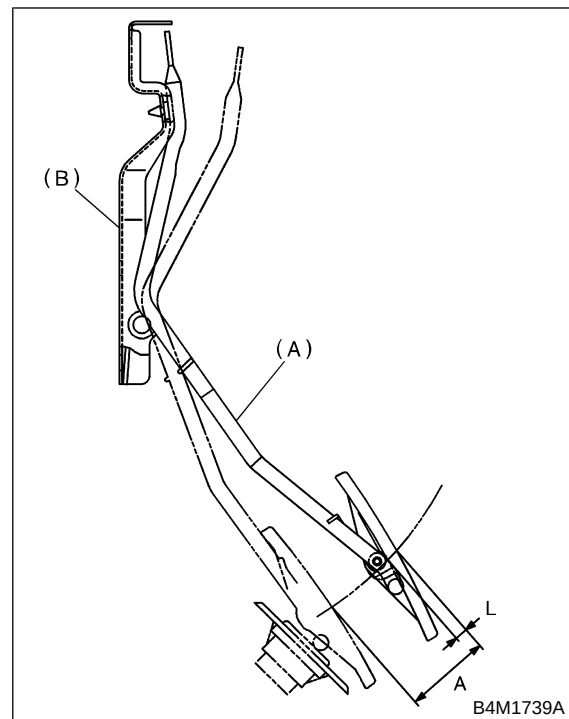
If it is not within specified value, adjust it by turning nut connecting accelerator cable to throttle body.

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)



(A) Accelerator pedal

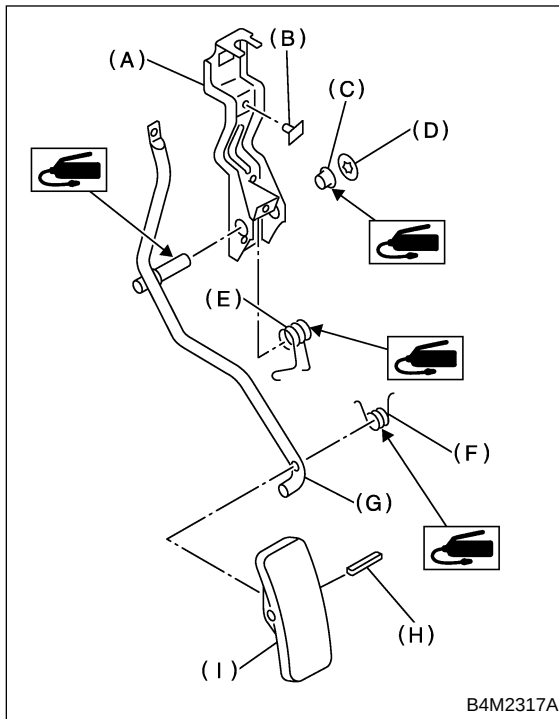
(B) Accelerator pedal bracket

Accelerator cable lock nut tightening torque:
12 N·m (1.2 kgf-m, 9 ft-lb)

C: DISASSEMBLY

S147005A06

- 1) Remove the clip, and then remove the accelerator pedal from the bracket.
- 2) Pull out the spring pin, and then remove the accelerator pedal from the accelerator pedal lever.



- (A) Bracket
- (B) Stopper
- (C) Bushing
- (D) Clip
- (E) Accelerator spring
- (F) Accelerator pedal spring
- (G) Accelerator pedal lever
- (H) Spring pin
- (I) Accelerator pedal

D: ASSEMBLY S147005A02

Assemble in the reverse order of disassembly.

CAUTION:

Clean and apply grease to spacer and inside bore of a accelerator pedal.

E: INSPECTION S147005A10

Lightly move pedal pad in lateral the direction to ensure pedal deflection is in specified range.

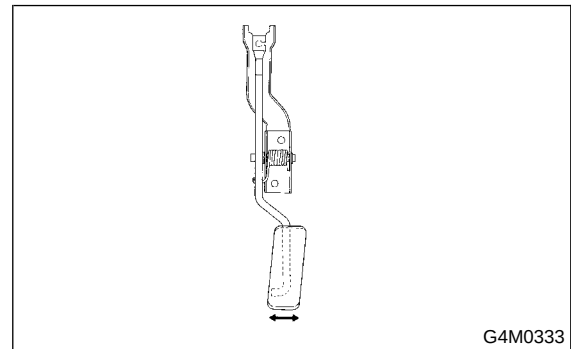
CAUTION:

If excessive deflection is noted, replace bushing and clip with new ones.

Deflection of accelerator pedal:

Service limit

5.0 mm (0.197 in) or less



3. Accelerator Control Cable S147007

A: REMOVAL S147007A18

- 1) Remove accelerator pedal. <Ref to SP(H6)-3, REMOVAL, Accelerator Pedal.>
- 2) Separate accelerator cable and accelerator pedal.

B: INSTALLATION S147007A11

- 1) Install in the reverse order of removal.

CAUTION:

- If cable clamp is damaged, replace it with a new one.
- Never fail to cover outer cable end with boot.
- Be careful not to kink accelerator cable.
- Do not apply grease to the throttle cable on the engine side.

- 2) Adjustment after pedal installation <Ref. to SP(H6)-4, INSTALLATION, Accelerator Pedal.>

C: INSPECTION S147007A10

- 1) Make sure the inner cable is not twisted or frayed.
- 2) Make sure the outer cable is not cracked.

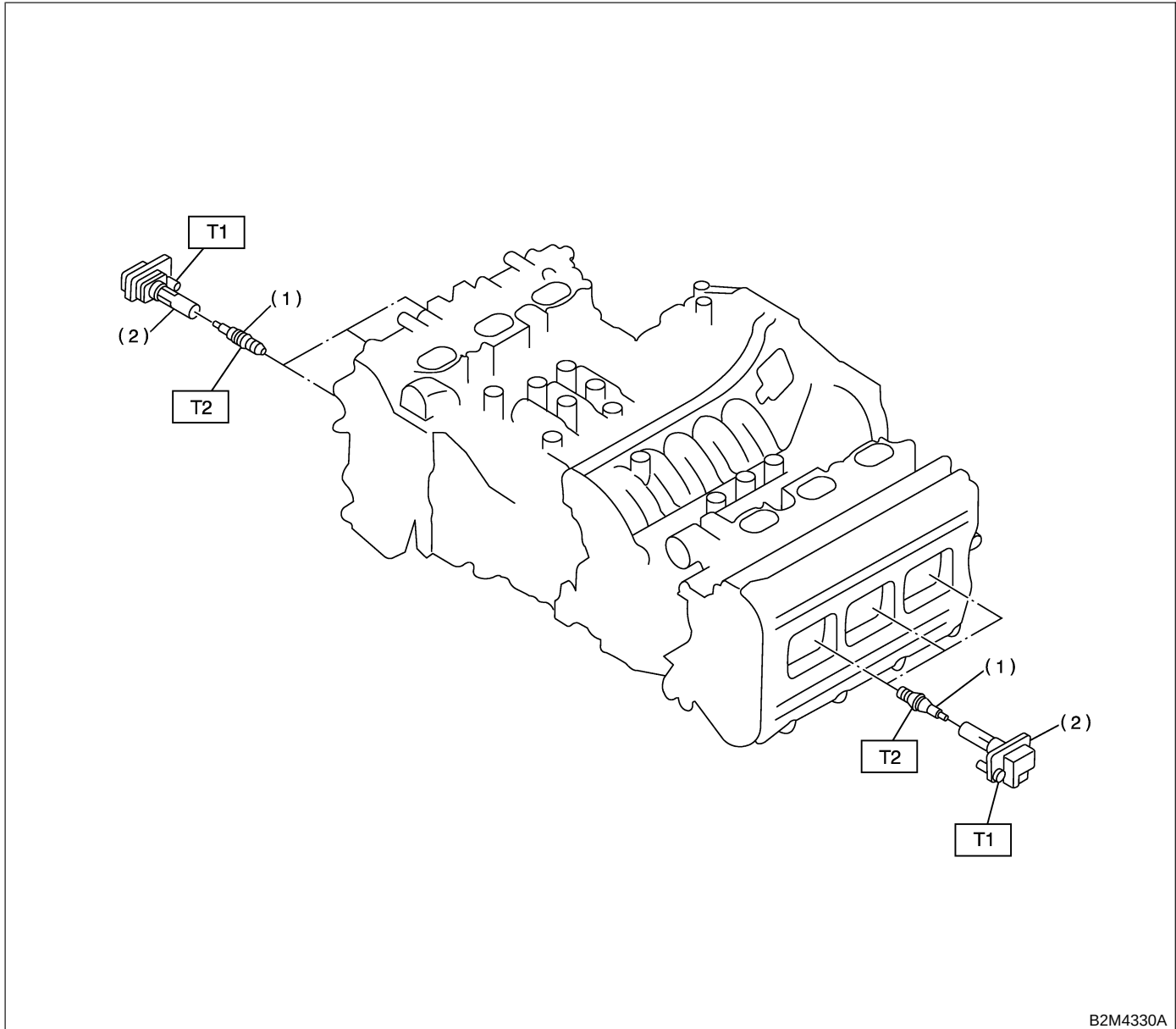
GENERAL DESCRIPTION

Ignition

1. General Description SI41001

A: SPECIFICATIONS SI41001E49

Item		Designation
Ignition coil and ignitor assembly	Model	FK0140
	Manufacturer	DIAMOND
Spark plug	Type and manufacturer	PLFR6A-11 NGK
	Thread size mm	14, P = 1.25
	Spark gap mm (in)	1.0 — 1.1 (0.039 — 0.043)

B: COMPONENT S141001A05

- (1) Spark plug
 (2) Ignition coil and ignitor ASSY

Tightening torque: N·m (kgf-m, ft-lb)

T1: 16 (1.6, 12)

T2: 21 (2.1, 15)

C: CAUTION S141001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary

removal, installation, disassembly, and replacement.

- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

2. Spark Plug S141003

A: REMOVAL S141003A18

CAUTION:

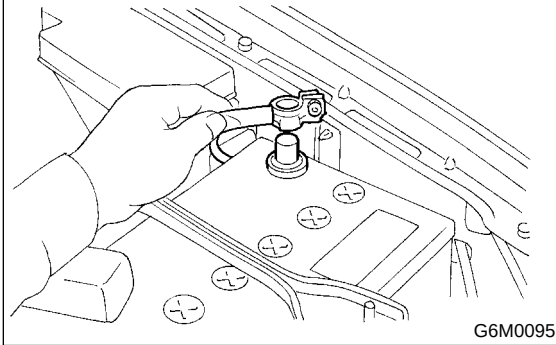
All spark plugs installed on an engine, must be of the same heat range.

Spark plug:

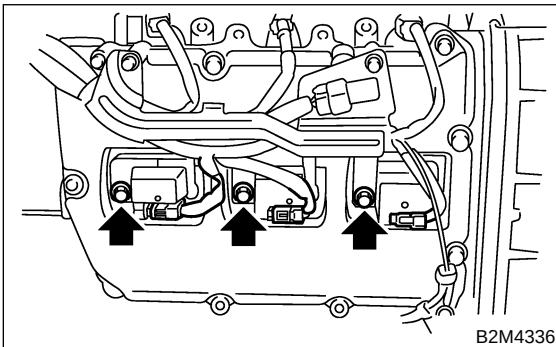
NGK: PLFR6A-11

1. RH SIDE S141003A1805

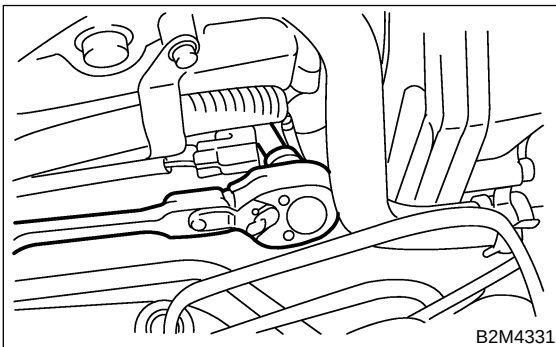
- 1) Disconnect battery ground cable.



- 2) Remove air cleaner lower case. <Ref. to IN(H6)-5, REMOVAL, Air Cleaner.>
- 3) Disconnect connector from ignition coil.
- 4) Remove ignition coil.

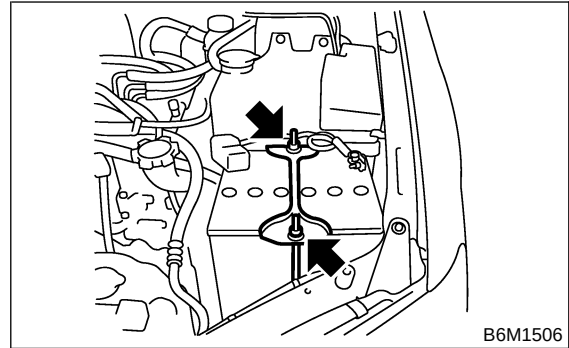


- 5) Remove spark plugs with the spark plug socket.

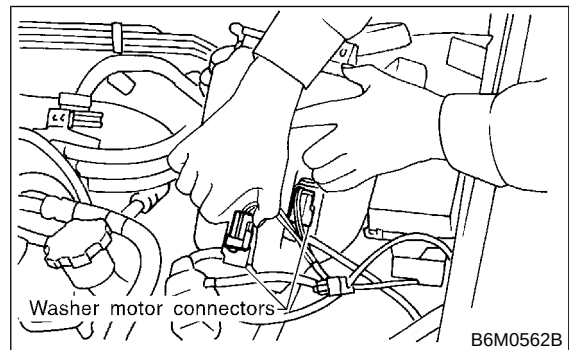


2. LH SIDE S141003A1806

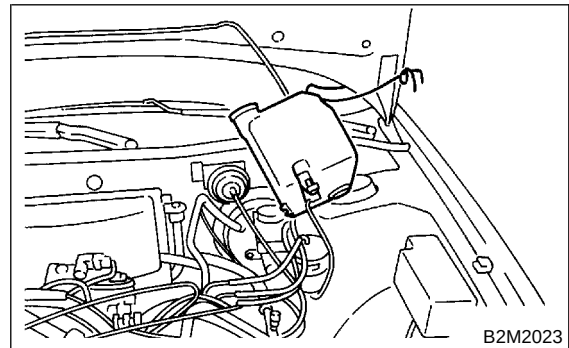
- 1) Disconnect battery cables and then remove battery and battery carrier.



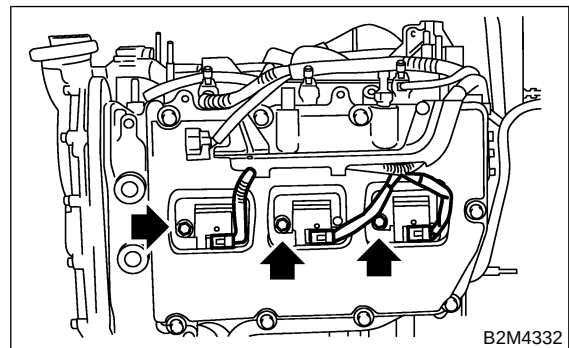
- 2) Disconnect washer motor connector.



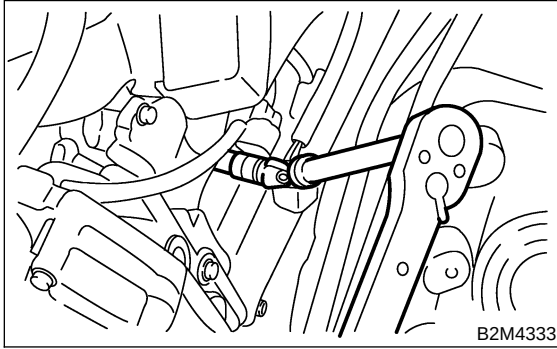
- 3) Remove the two bolts which hold the washer tank, then take the tank away from the working area.



- 4) Disconnect connector from ignition coil.
- 5) Remove ignition coil.



6) Remove spark plug with the spark plugs socket.



B: INSTALLATION

S141003A11

1. RH SIDE

S101003A1105

1) Install in the reverse order of removal.

Tightening torque (Spark plug):

21 N·m (2.1 kgf-m, 15 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.

Tightening torque (Ignition coil):

16 N·m (1.6 kgf-m, 12 ft-lb)

2. LH SIDE

S141003A1106

1) Install in the reverse order of removal.

Tightening torque (Spark plug):

21 N·m (2.1 kgf-m, 15 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.

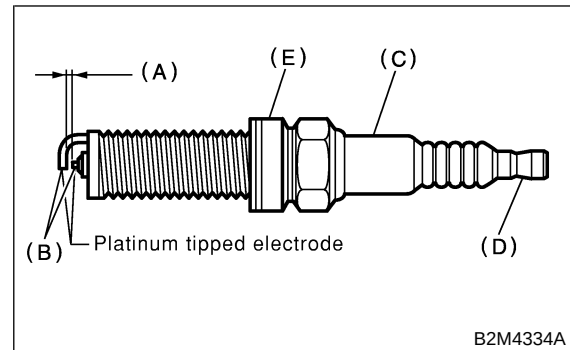
Tightening torque (Ignition coil):

16 N·m (1.6 kgf-m, 12 ft-lb)

C: INSPECTION

S141003A10

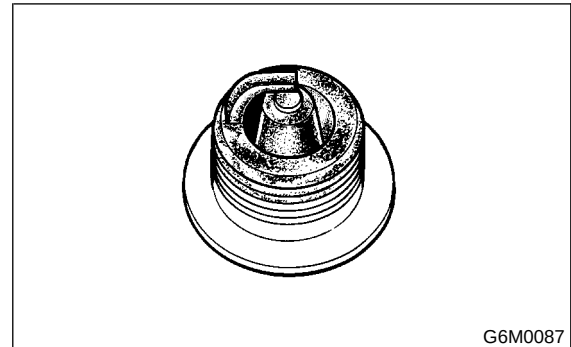
Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.



- (A) Electrode gap
- (B) Carbon accumulation or wear
- (C) Cracks
- (D) Damage
- (E) Damaged gasket

1) Normal

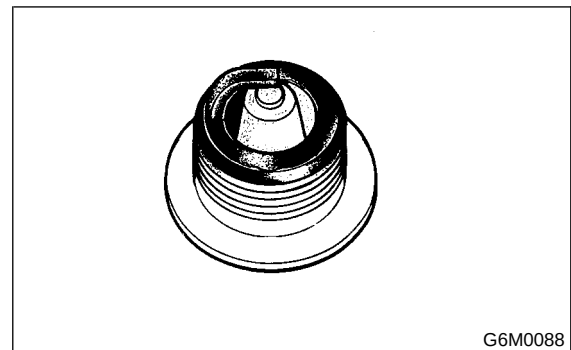
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



2) Carbon fouled

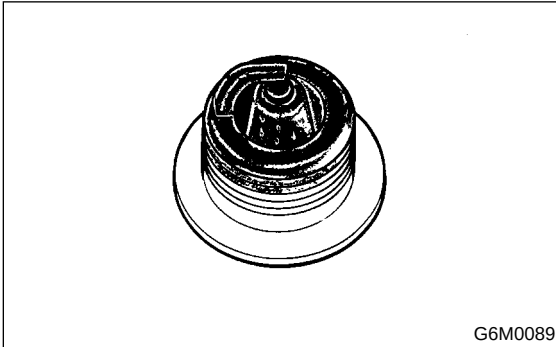
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.

It is advisable to replace with plugs having hotter heat range.



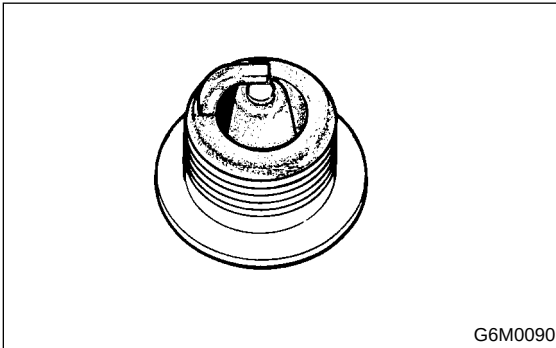
3) Oil fouled

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.



4) Overheating

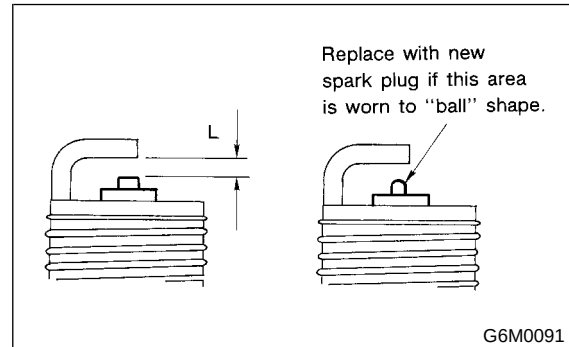
White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.

**E: ADJUSTMENT** S141003A01

Correct it if the spark plug gap is measured with a gap gauge, and it is necessary.

Spark plug gap: L

1.0 — 1.1 mm (0.039 — 0.043 in)

**D: CLEANING** S141003E56

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, replace plugs.

3. Ignition Coil and Ignitor Assembly

S141015

A: REMOVAL

S141015A18

Direct ignition type is adopted.

For the order of removal, refer to the removal of spark plugs.

B: INSTALLATION

S141015A11

Install in the reverse order of removal.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

C: INSPECTION

S141015A10

Because ignition coil is a direct ignition type, the resistance cannot be measured in a single unit. For inspection procedure of ignition system, refer to the following. <Ref. to EN(H6)-74, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>

IGNITION COIL AND IGNITOR ASSEMBLY

Ignition

MEMO:

GENERAL DESCRIPTION

Starting/Charging Systems

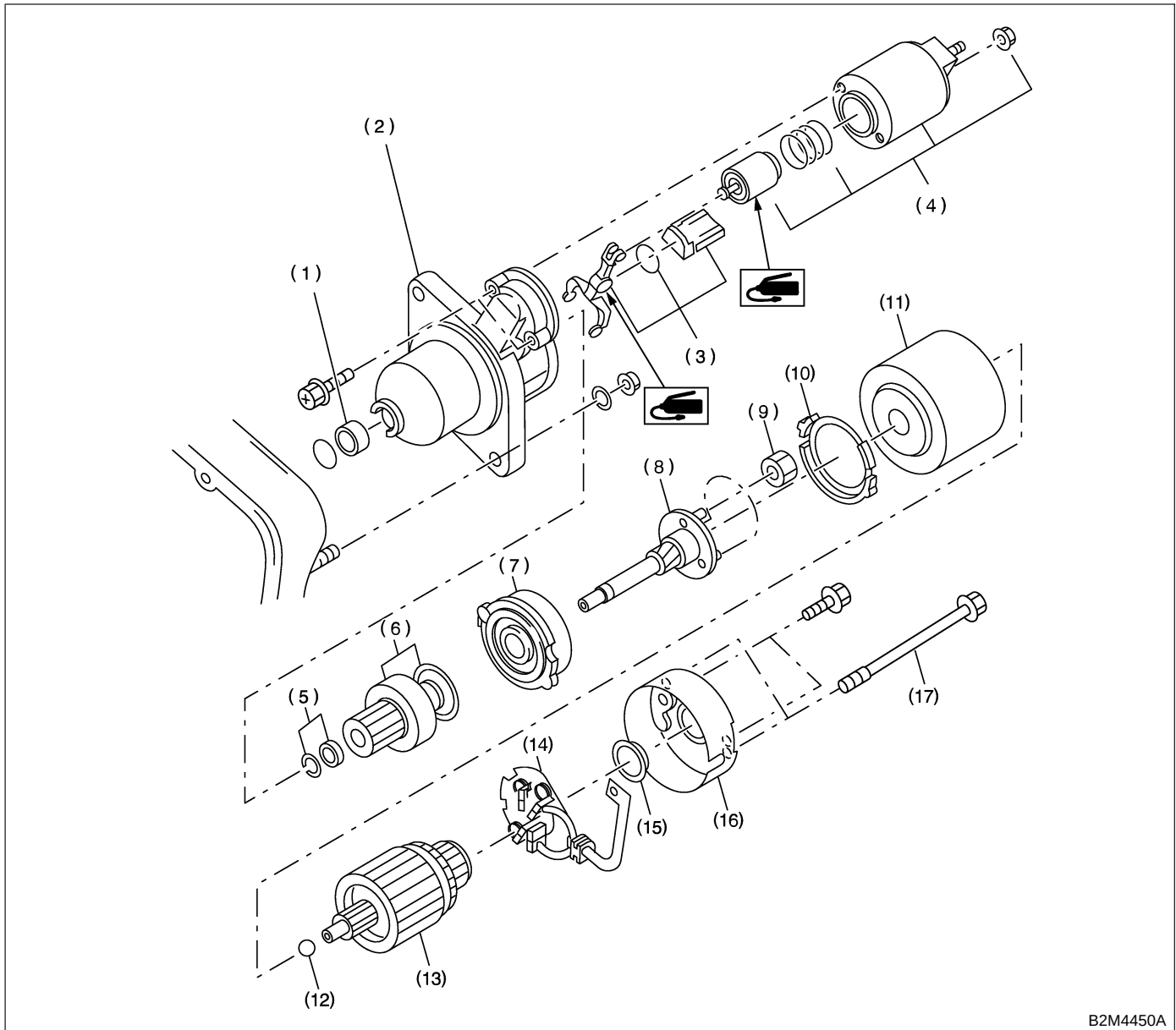
1. General Description SI49001

A: SPECIFICATIONS SI49001E49

Item		Designation
Starter	Type	Reduction type
	Model	TN128000-8321
	Manufacturer	NIPPONDENSO TENNESSEE
	Voltage and output	12 V — 1.4 kW
	Direction of rotation	Counterclockwise (when observed from pinion)
	Number of pinion teeth	9
	No-load characteristics	Voltage
		11 V
		Current
		90 A or less
		Rotating speed
		2,900 rpm or more
	Load characteristics	Voltage
		8 V
		Current
		370 A or less
	Lock characteristics	Torque
		13.7 N·m (1.4 kgf-m, 10.1 ft-lb)
		Rotating speed
		880 rpm or more
Generator	Type	Rotating-field three-phase type
	Model	LR190-742
	Manufacturer	MITUBISHI ELECTRIC
	Voltage and output	12 V — 100 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 — 43 A or more
		2,500 rpm — 76 A or more
		5,000 rpm — 100 A or more
	Regulated voltage	14.5 ^{+0.3} / _{-0.4} V [20°C (68°F)]

B: COMPONENT S149001A05

1. STARTER S149001A0501



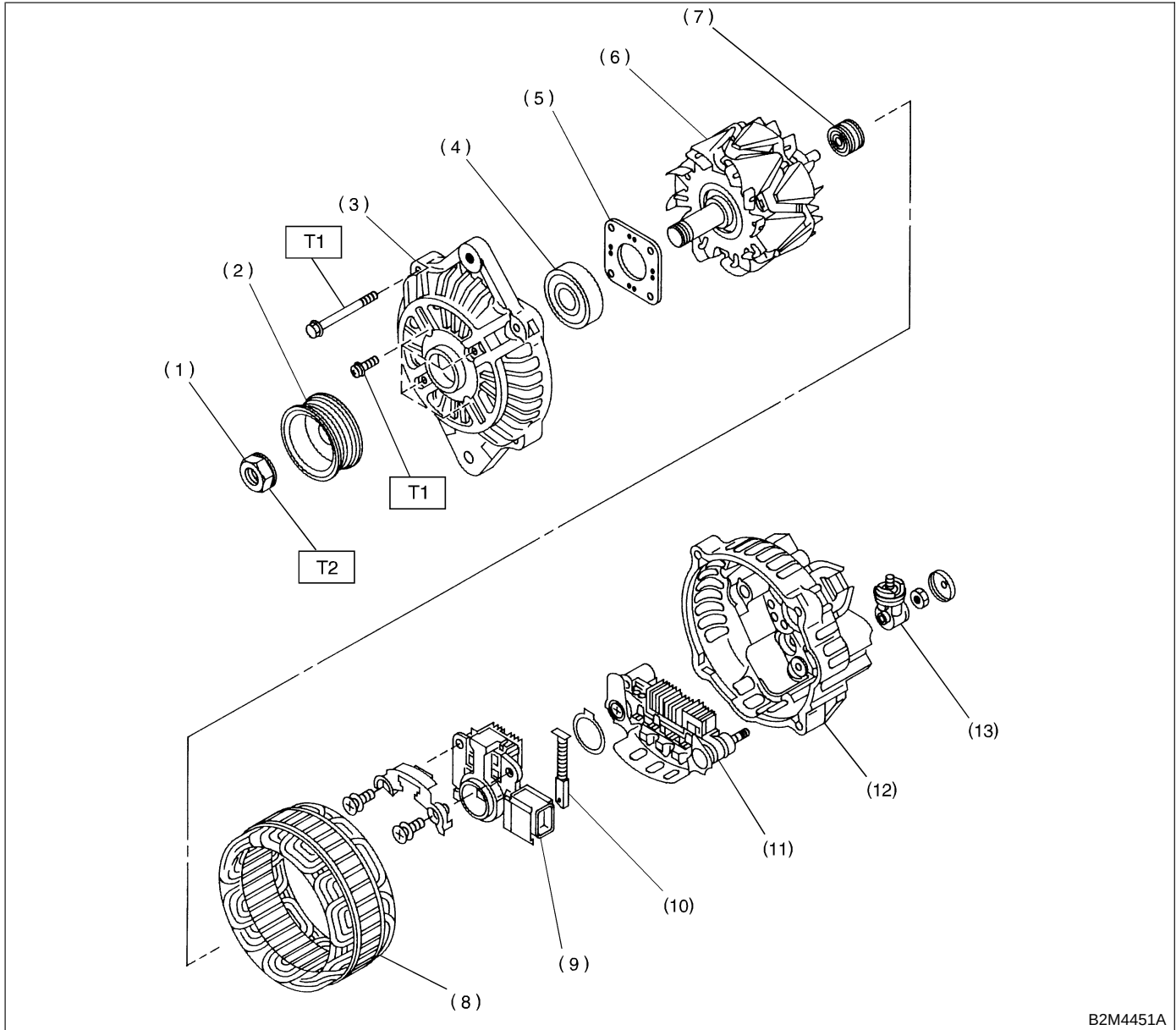
B2M4450A

(1) Sleeve bearing	(7) Internal gear ASSY	(13) Armature
(2) Front bracket	(8) Shaft ASSY	(14) Brush holder
(3) Lever set	(9) Gear ASSY	(15) Bearing
(4) Magnet switch ASSY	(10) Packing	(16) Rear bracket
(5) Stopper set	(11) Yoke	(17) Through bolt
(6) Overrunning clutch	(12) Ball	

GENERAL DESCRIPTION

Starting/Charging Systems

2. GENERATOR S149001A0502



B2M4451A

(1) Pulley nut	(7) Bearing
(2) Pulley	(8) Stator coil
(3) Front cover	(9) IC regulator with brush
(4) Ball bearing	(10) Brush
(5) Bearing retainer	(11) Rectifier
(6) Rotor	(12) Rear cover

- (13) Terminal

Tightening torque: N·m (kgf·m, ft·lb)

T1: 3.1 (0.32, 2.3)

T2: 63.7 (6.5, 47.0)

C: CAUTION SI49001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative battery terminal.

STARTER

Starting/Charging Systems

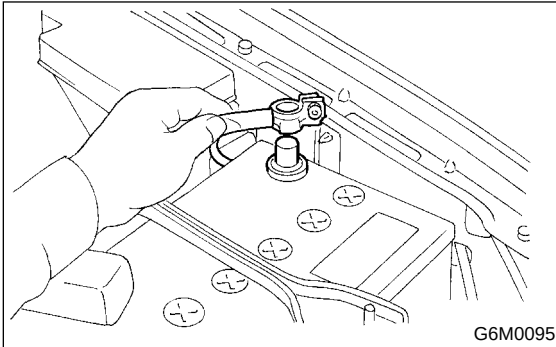
2. Starter

S149012

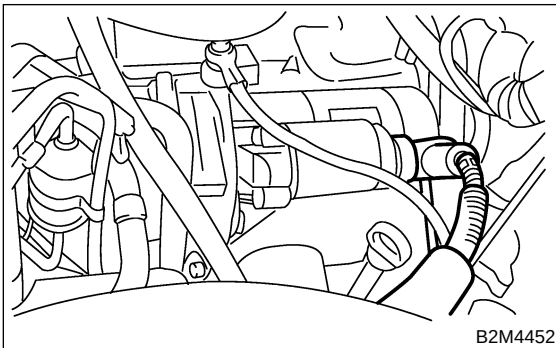
A: REMOVAL

S149012A18

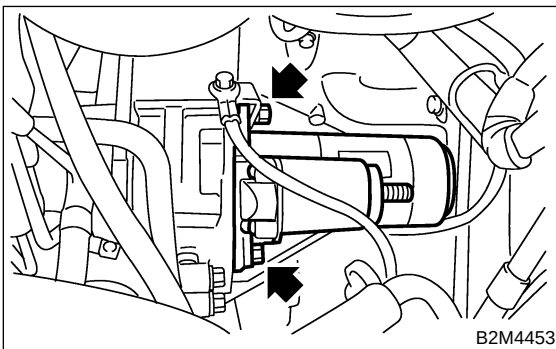
- 1) Disconnect battery ground cable.



- 2) Remove air intake chamber. <Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>
- 3) Disconnect connector and terminal from starter.



- 4) Remove starter from transmission.



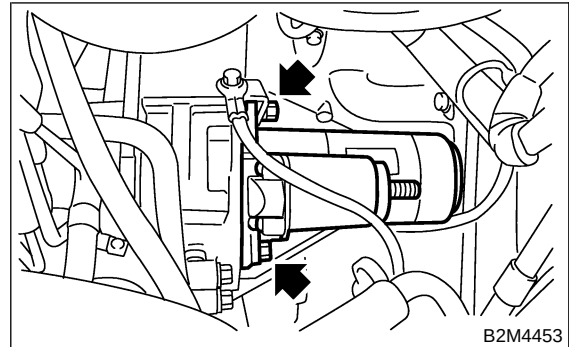
B: INSTALLATION

S149012A11

Install in the reverse order of removal.

Tightening torque:

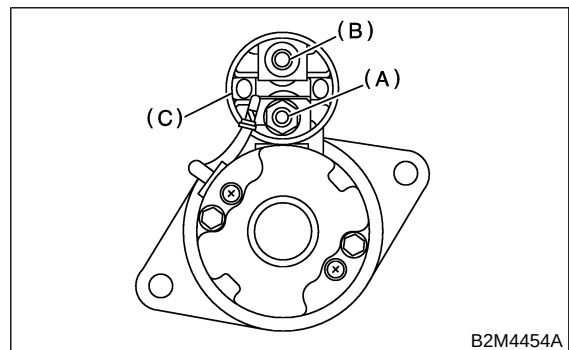
50 N·m (5.1 kgf-m, 37 ft-lb)



C: DISASSEMBLY

S149012A06

- 1) Loosen nut which holds terminal M of switch assembly, and disconnect connector.

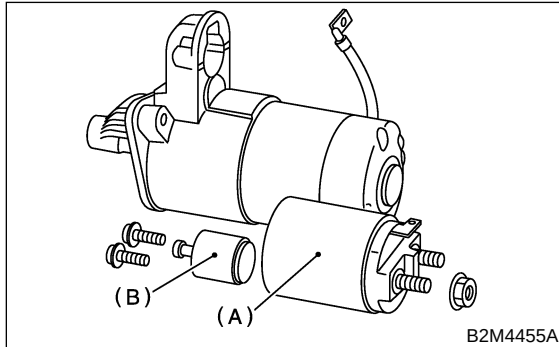


- (A) Terminal M
- (B) Terminal B
- (C) Terminal S

2) Remove bolts which hold switch assembly, and remove switch assembly, plunger and plunger spring from starter as a unit.

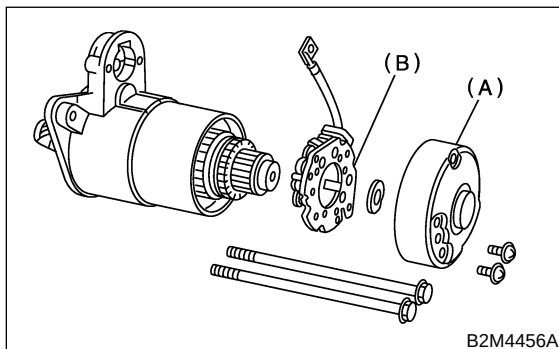
CAUTION:

Be careful because pinion gap adjustment washer may sometimes be used on the mounting surface of switch assembly.



- (A) Switch ASSY
- (B) Plunger

3) Remove both through-bolts and brush holder screws, and detach rear bracket and brush holder.

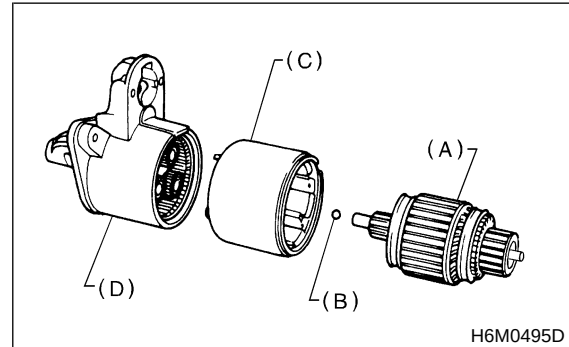


- (A) Rear bracket
- (B) Brush holder

4) Remove armature and yoke. Ball used as a bearing will then be removed from the end of armature.

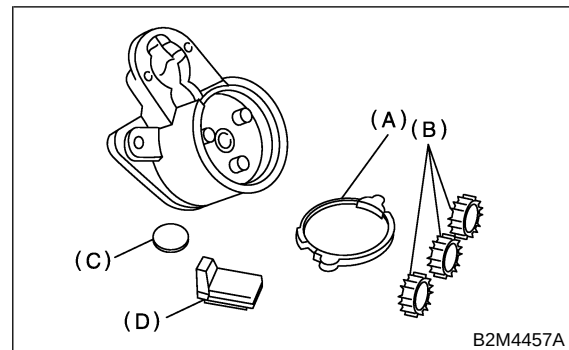
CAUTION:

Be sure to mark an alignment mark on yoke and front bracket before removing yoke.



- (A) Armature
- (B) Ball
- (C) Yoke
- (D) Front bracket

5) Remove packing A, three planetary gears, packing B and plate.



- (A) Packing A
- (B) Planetary gear
- (C) Plate
- (D) Packing B

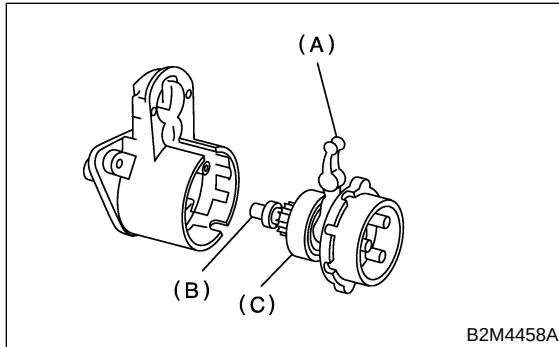
STARTER

Starting/Charging Systems

6) Remove shaft assembly and overrunning clutch as a unit.

CAUTION:

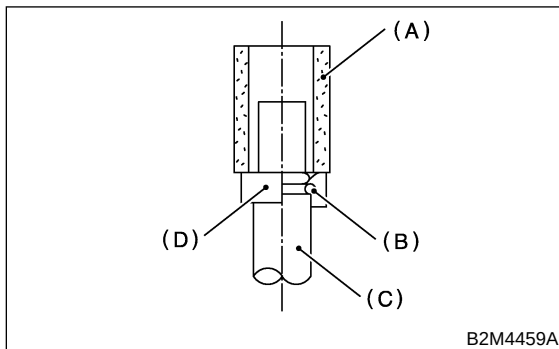
Record the direction of lever before removing.



- (A) Lever
- (B) Shaft ASSY
- (C) Overrunning clutch

7) Remove overrunning clutch from shaft assembly as follows:

- (1) Remove stopper from ring by lightly tapping a fit tool placed on stopper.
- (2) Remove ring, stopper and clutch from shaft.



- (A) Tool
- (B) Ring
- (C) Shaft
- (D) Stopper

D: ASSEMBLY SI49012A02

Assemble in the reverse order of disassembly. Do the following:

1) Carefully assemble all parts in the order of assembly and occasionally inspect nothing has been overlooked.

2) Apply grease to the following parts during assembly.

Grease:

ESSO BEACON 325

SHELL ALVANIA GREASE RA

or equivalent

- Front and rear bracket sleeve bearing
- Armature shaft gear
- Outer periphery of plunger
- Mating surface of plunger and lever
- Gear shaft splines
- Mating surface of lever and clutch
- Ball at the armature shaft end
- Internal and planetary gears

3) After assembling parts correctly, make sure starter operates properly.

E: INSPECTION S149012A10

1. ARMATURE S149012A1001

1) Check commutator for any sign of burns or 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.

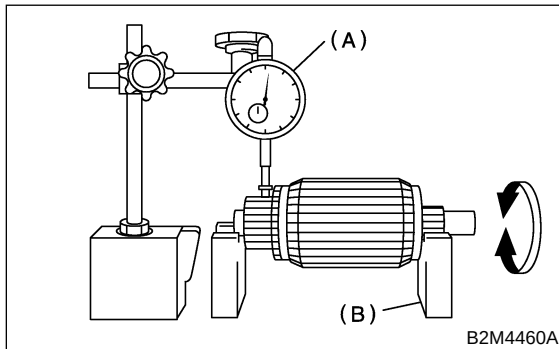
Commutator run-out:

Standard

0.05 mm (0.0020 in), or less

Service limit

Less than 0.10 mm (0.0039 in)



(A) Dial gauge

(B) Block

3) Depth of segment mold

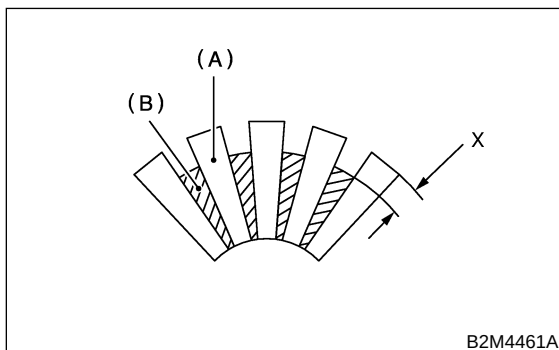
Check the depth of segment mold.

Depth of segment mold X:

0.6 mm (0.024 in)

Limit

0.2 mm (0.008 in)

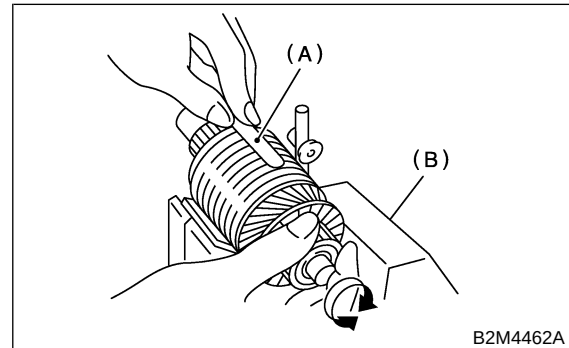


(A) Segment

(B) Mold

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.



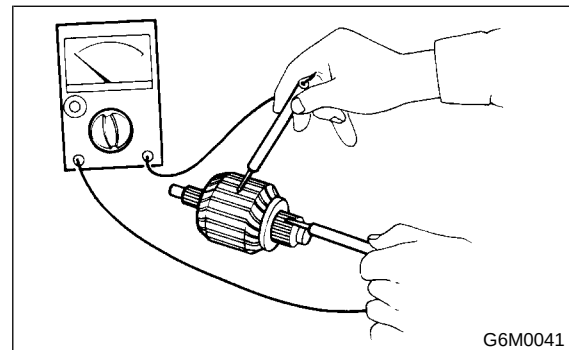
(A) Iron sheet

(B) Growler tester

5) Armature ground test

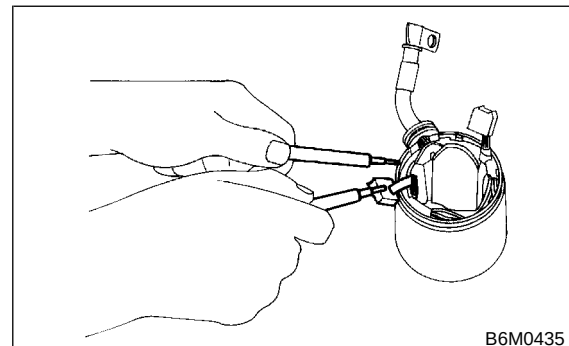
Using circuit tester, touch one probe to the commutator segment and the other to shaft. There should be no continuity. If there is a continuity, armature is grounded.

Replace armature if it is grounded.



2. YOKE S149012A1002

Make sure pole is set in position.



STARTER

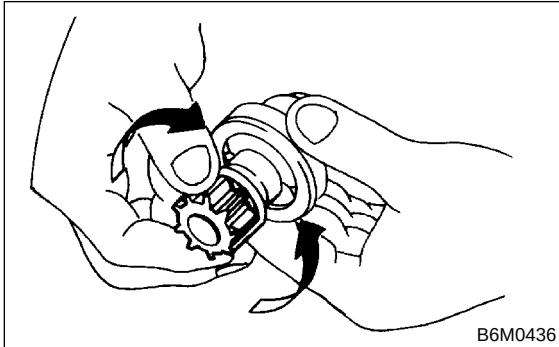
Starting/Charging Systems

3. OVERRUNNING CLUTCH S149012A1003

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 S149012A1004

1) Brush length

Measure the brush length and replace if it exceeds the service limit.

Replace if abnormal wear or cracks are noticed.

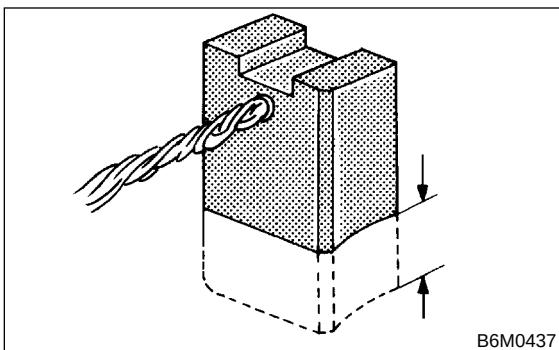
Brush length:

Standard

17.0 mm (0.669 in)

Service limit

11.5 mm (0.453 in)

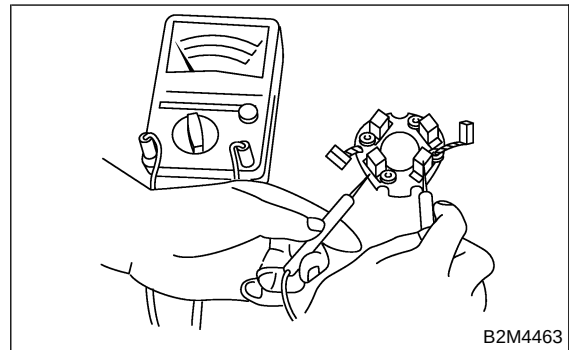


2) Brush movement

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.



5. MAGNETIC SWITCH S149012A1005

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.

6. SWITCH ASSEMBLY S149012A1006

Be sure there is continuity between terminals S and M, and between terminal S and ground. Use a circuit tester (set in "ohm").

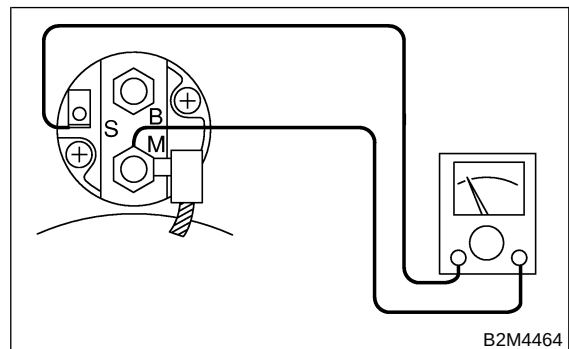
Also check to be sure there is no continuity between terminal M and B.

Terminal / Specified resistance:

S — M / Continuity

S — Ground / Continuity

M — B / No continuity



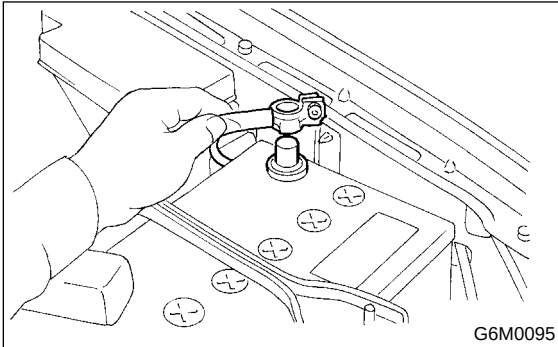
3. Generator

S149008

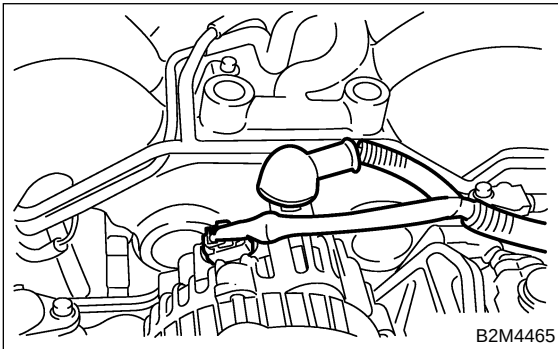
A: REMOVAL

S149008A18

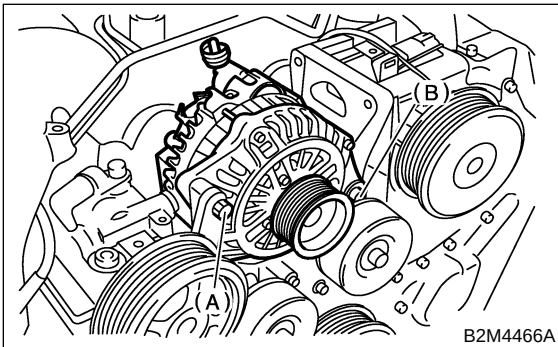
- 1) Disconnect battery ground cable.



- 2) Disconnect connector and terminal from generator.



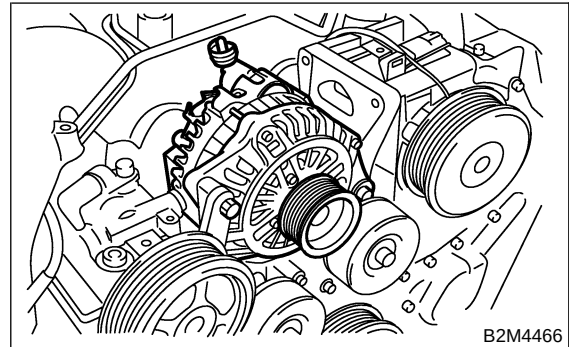
- 3) Remove V-belt. <Ref. to ME(H6)-31, REMOVE, V-belt.>
- 4) Remove bolt (A), and loosen bolt (B). Then, remove generator from bracket.



B: INSTALLATION

S149008A11

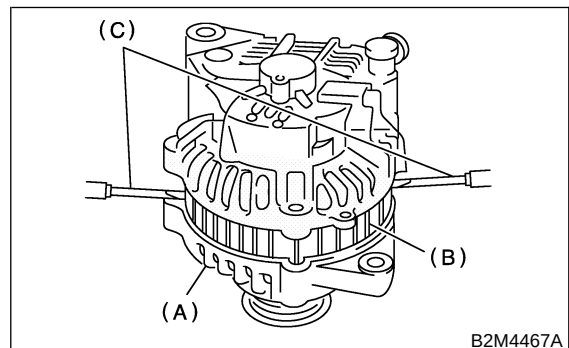
Install in the reverse order of removal.



C: DISASSEMBLY

S149008A06

- 1) Remove the four through bolts. Then insert the tip of a flat-head screwdriver into the gap between the stator and front bracket. Pry them apart to disassemble.

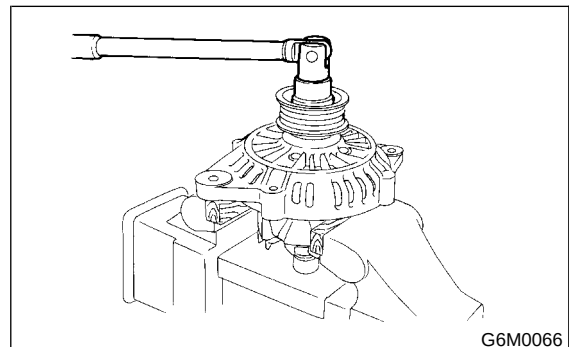


- (A) Front cover
- (B) Stator
- (C) Screwdriver

- 2) Hold rotor with a vise and remove pulley nut.

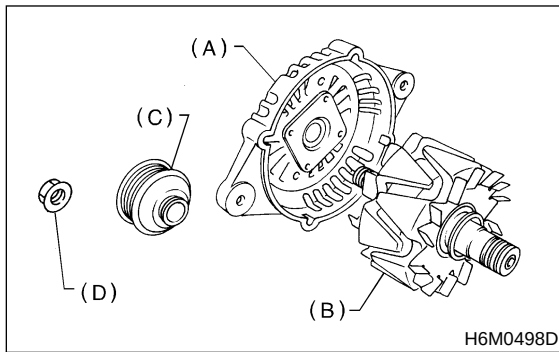
CAUTION:

When holding rotor with vise, insert aluminum plates or wood pieces on the contact surfaces of the vise to prevent rotor from damage.



GENERATOR

Starting/Charging Systems

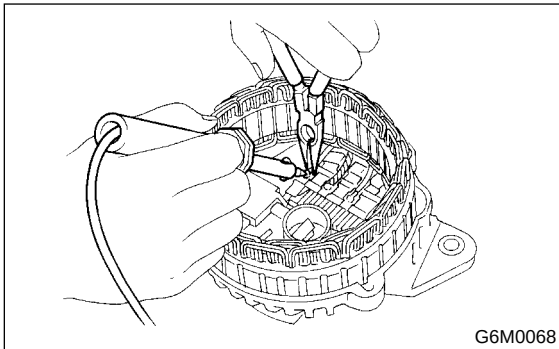


- (A) Front bracket
- (B) Rotor
- (C) Pulley
- (D) Nut

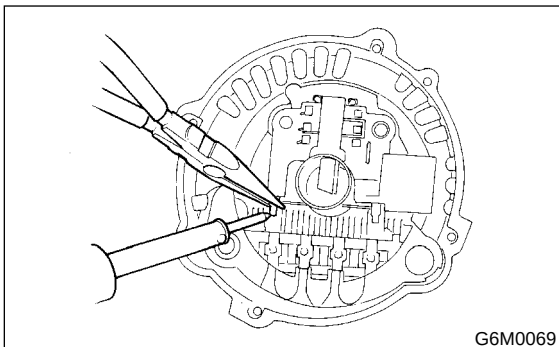
3) Unsolder connection between rectifier and stator coil to remove stator coil.

CAUTION:

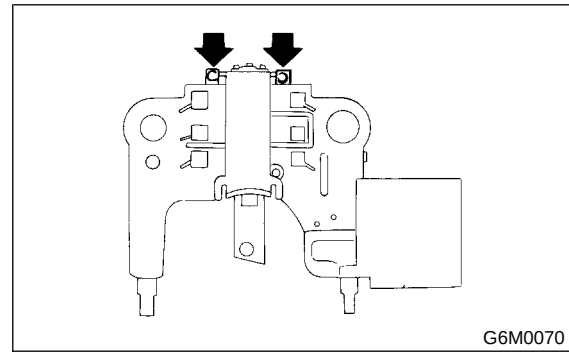
Finish the work rapidly (less than three seconds) because the rectifier cannot withstand heat very well.



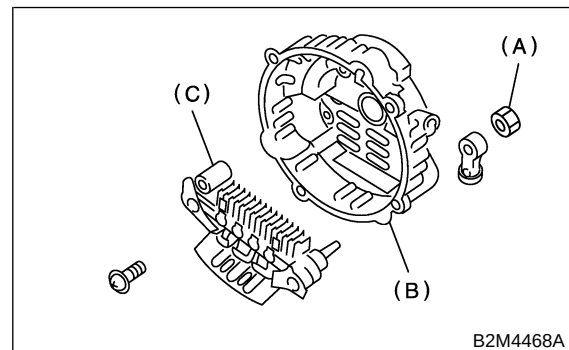
4) Remove screws which secure IC regulator to rear cover, and unsolder connection between IC regulator and rectifier to remove IC regulator.



5) Remove the brushes by unsoldering at the pig-tails.



6) Remove the nut and insulating bushing at terminal B, and remove rectifier.



- (A) Nut
- (B) Rear cover
- (C) Rectifier

D: ASSEMBLY

S149008A02

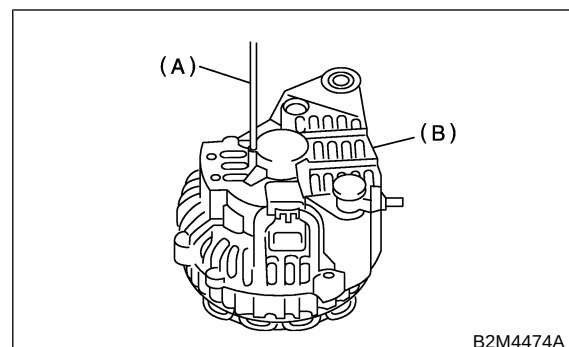
Assemble in the reverse order of disassembly.

1) Pulling up brush

Before assembling, press the brush down into the brush holder with your finger and secure in that position by passing a [2 mm (0.08 in) dia. length 4 to 5 cm (1.6 to 2.0 in)] wire (A) through the hole shown in the figure.

CAUTION:

Be sure to remove the wire after reassembly.



- (A) Wire
- (B) Rear cover

2) Heat the bearing box in the rear bracket [50 to 60°C (122 to 140°F)] and press the rear bearing into the rear bracket.

CAUTION:

Grease should not be applied for the rear bearing. Remove oil completely if it is found on the bearing box.

3) After reassembly, turn the pulley by hand to check that the rotor turns smoothly.

E: INSPECTION S149008A10

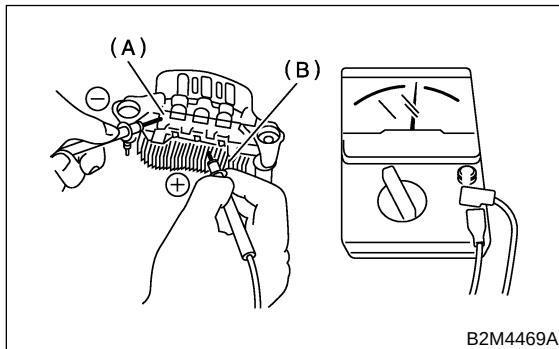
1. DIODE S149008A1001

CAUTION:

Never use a megatester (measuring use for high voltage) or any other similar measure for this test; otherwise, the diodes may be damaged.

1) Checking positive diode

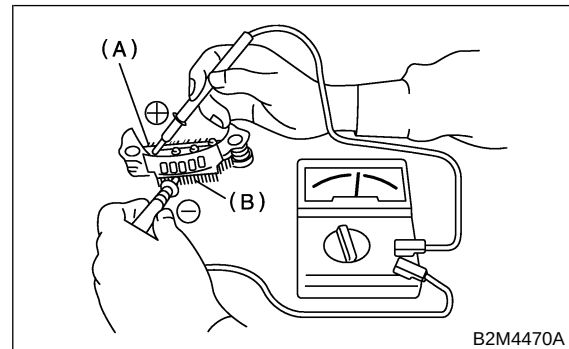
Check for continuity between the diode lead and the positive side heat sink. The positive diode is in good condition if continuity exists only in the direction from the diode lead to the heat sink.



(A) Diode lead
(B) Heat sink (Positive side)

2) Checking negative diode

Check for continuity between the negative side heat sink and diode lead. The negative diode is in good condition if continuity exists only in the direction from the heat sink to the diode lead.



(A) Diode lead
(B) Heat sink (Negative side)

2. ROTOR S149008A1002

1) Slip ring surface

Inspect slip rings for contamination or any roughness of the sliding surface. Repair slip ring surface using a lathe or sand paper.

2) Slip ring outer diameter

Measure slip ring outer diameter. If slip ring is worn replace rotor assembly.

Slip ring outer diameter:

Standard

22.7 mm (0.894 in)

Limit

22.1 mm (0.870 in)

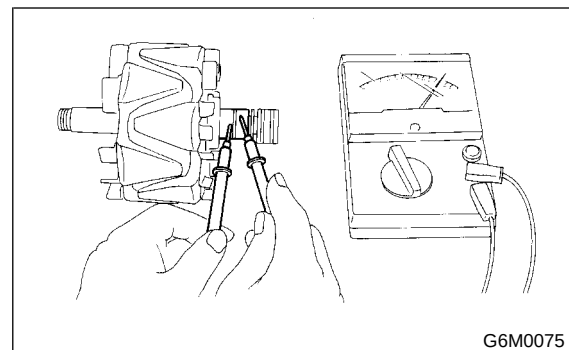
3) Continuity test

Check resistance between slip rings using circuit tester.

If the resistance is not within specification, replace rotor assembly.

Specified resistance:

Approx. 2.7 — 3.2 Ω

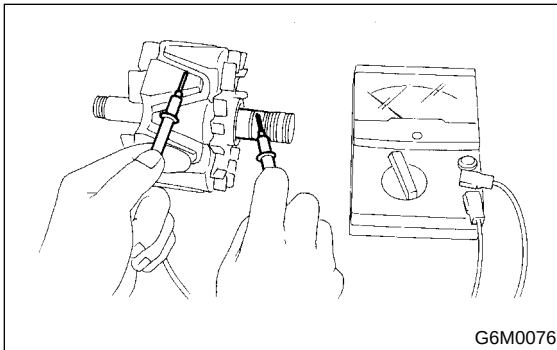


GENERATOR

Starting/Charging Systems

4) Insulation test

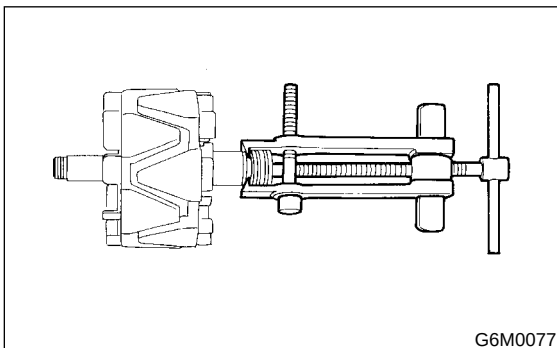
Check continuity between slip ring and rotor core or shaft. If continuity exists, the rotor coil is grounded, and so replace rotor assembly.



5) Ball bearing (rear side)

(1) Check rear ball bearing. Replace if it is noisy or if rotor does not turn smoothly.

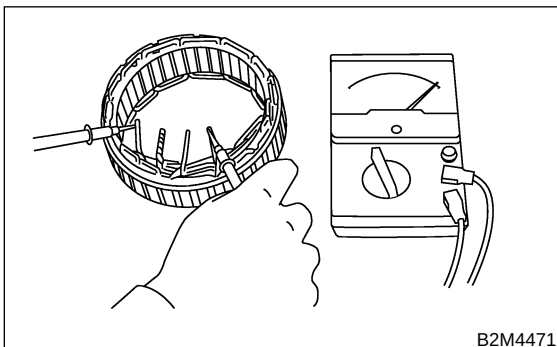
(2) The rear bearing can be removed by using common bearing puller.



3. STATOR S149008A1003

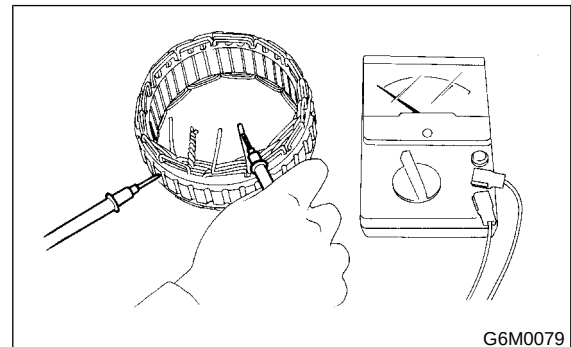
1) Continuity test

Inspect stator coil for continuity between each end of the lead wires. If there is no continuity between individual lead wires, the lead wire is broken, and so replace stator assembly.



2) Insulation test

Inspect stator coil for continuity between stator core and each end of the lead wire. If there is continuity, the stator coil is grounded, and so replace stator assembly.



4. BRUSH S149008A1004

1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark (A) on it.

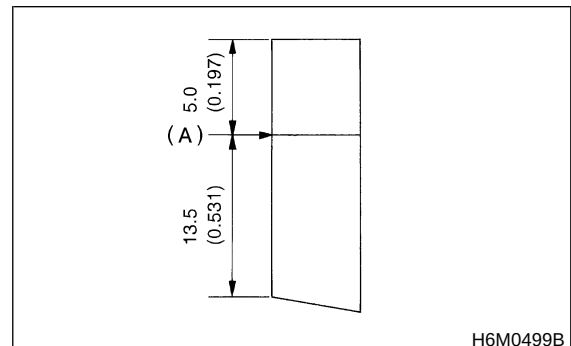
Brush length:

Standard

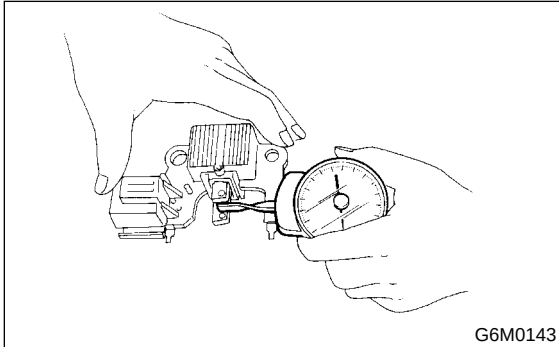
18.5 mm (0.728 in)

Service limit

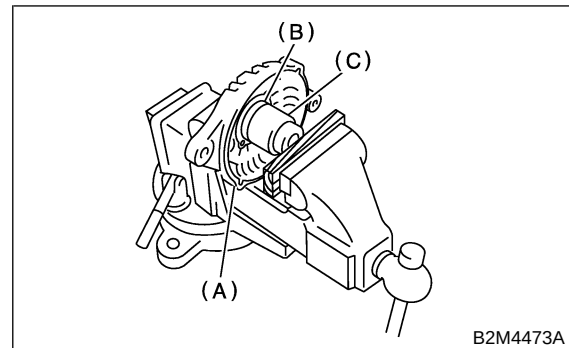
5.0 mm (0.197 in)



2) Checking brush spring for proper pressure
Using a spring pressure indicator, push the brush into the brush holder until its tip protrudes 2 mm (0.08 in). Then measure the pressure of the brush spring. If the pressure is less than 2.648 N (270 g, 9.52 oz), replace the brush spring with a new one. The new spring must have a pressure of 4.609 to 5.786 N (470 to 590 g, 16.58 to 20.81 oz).



(3) Set a new bearing and closely install a fit tool on the bearing outer race. Press the bearing down into place with a hand press or vise. A socket wrench can serve as the tool.
(4) Install front bearing retainer.



- (A) Front bracket
- (B) Bearing
- (C) Socket wrench

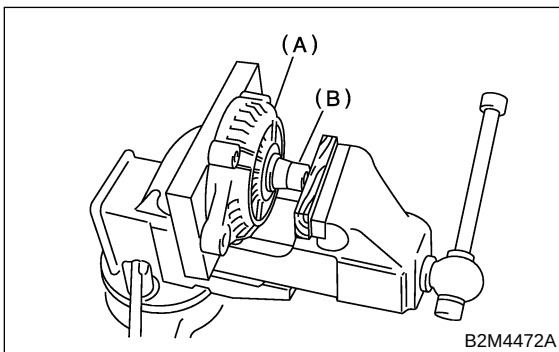
5. BEARING (FRONT SIDE) SI49008A1005

1) Check front ball bearing. If resistance is felt while rotating, or if abnormal noise is heard, replace the ball bearing.

2) Replacing front bearing

(1) Remove front bearing retainer.

(2) Closely install a fit tool on the bearing inner race. Press the bearing down out of front bracket with a hand press or vise. A socket wrench can serve as the tool.

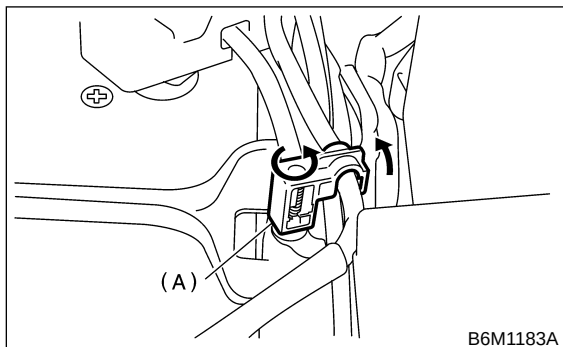


- (A) Front bracket
- (B) Socket wrench

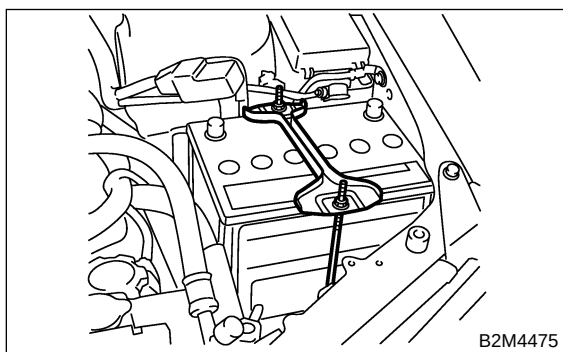
4. Battery S149011

A: REMOVAL S149011A18

- 1) Remove battery cable holder (A) from battery rod.



- 2) Disconnect the positive (+) terminal after disconnecting the negative (-) terminal of battery.
- 3) Remove flange nuts from battery rods and take off battery holder.



- 4) Remove battery.

B: INSTALLATION S149011A11

Install in the reverse order of removal.

Tightening torque:

3.4 N·m (0.35 kgf-m, 2.5 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.

C: INSPECTION S149011A10

WARNING:

- Electrolyte has toxicity; be careful handling the fluid.
- Avoid contact with skin, eyes or clothing. Especially at contact with eyes, bluish 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: S149011A1001

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: S149011A1002

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: S149011A1003

- 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:

$$S_{20} = S_t + 0.0007 \times (t - 20)$$

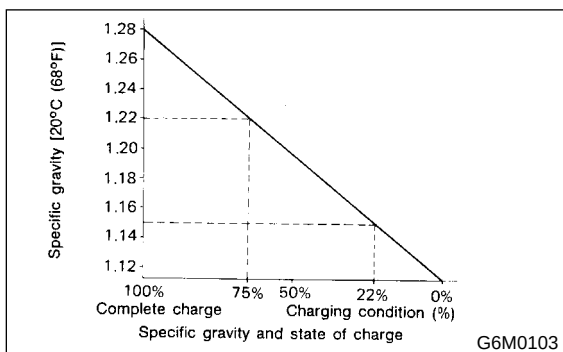
S_{20} : Specific gravity corrected at electrolyte temperature of 20°C

S_t : 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.

D: MEASUREMENT S149011A14

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 alternator's diodes or other electrical units.

1. JUDGMENT OF BATTERY IN CHARGED CONDITION S149011A1401

- Specific gravity of electrolyte is held at a specific value in a range from 1.250 to 1.290 for more than one hour.
- 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.

2. CHECK HYDROMETER FOR STATE OF CHARGE S149011A1402

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. NORMAL CHARGING S149011A1403

Charge the battery at current value specified by manufacturer or at approximately 1/10 of battery's ampere-hour rating.

4. QUICK CHARGING S149011A1404

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.
- Never use more than 10 amperes when charging the battery because that will shorten battery life.

BATTERY

Starting/Charging Systems

MEMO:

BASIC DIAGNOSTIC PROCEDURE

Engine (DIAGNOSTICS)

1. Basic Diagnostic Procedure

S048501

A: PROCEDURE S048501E45

1. ENGINE S048501E4501

No.	Step	Check	Yes	No
1	CHECK ENGINE START FAILURE. 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to EN(H6)-4 CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step 2.	Inspection using "Diagnostics for Engine Start Failure". <Ref. to EN(H6)-67 Diagnostics for Engine Starting Failure.>
2	CHECK ILLUMINATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).	Does CHECK ENGINE malfunction indicator lamp illuminate?	Go to step 3.	Inspection using "General Diagnostics Table". <Ref. to EN(H6)-362 INSPECTION, General Diagnostic Table.>
3	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.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC?	Go to step 4.	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 EN(H6)-52 Engine Malfunction Indicator Lamp (MIL).>
4	PERFORM THE DIAGNOSIS. 1) Inspect using "Diagnostics Procedure with Diagnostic Trouble Code (DTC)". NOTE: <Ref. to EN(H6)-96 Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: Carry out the basic check, only when DTC about automatic transmission is shown on display. <Ref. to EN(H6)-44 Read Diagnostic Trouble Code.> 2) Repair the trouble cause. 3) Perform the clear memory mode. <Ref. to EN(H6)-48 Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to EN(H6)-45 Inspection Mode.>	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC?	Inspect using "Diagnostics Procedure with Diagnostic Trouble Code (DTC)". NOTE: <Ref. to EN(H6)-96 Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

2. AUTOMATIC TRANSMISSION S048501E4502

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 AT-9 Automatic Transmission Fluid.>
- 2) Differential gear oil level check <Ref. to AT-10 Differential Gear Oil.>
- 3) ATF leak check <Ref. to AT-9 Automatic Transmission Fluid.>
- 4) Differential gear oil leak check <Ref. to AT-10 Differential Gear Oil.>
- 5) Stall test <Ref. to AT-12 Stall Test.>
- 6) Line pressure test <Ref. to AT-15 Line Pressure Test.>
- 7) Transfer clutch pressure test <Ref. to AT-17 Transfer Clutch Pressure Test.>
- 8) Time lag test <Ref. to AT-14 Time Lag Test.>
- 9) Road test <Ref. to AT-11 Road Test.>
- 10) Shift characteristics <Ref. to AT-17 Transfer Clutch Pressure Test.>

CHECK LIST FOR INTERVIEW

Engine (DIAGNOSTICS)

2. Check List for Interview S048502

A: CHECK S048502A04

1. CHECK LIST NO. 1 S048502A0401

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		
Vin no.					
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				

CHECK LIST FOR INTERVIEW

Engine (DIAGNOSTICS)

2. CHECK LIST NO. 2 S048502A0402

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
☐ VDC 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

3. General Description SO48001

A: CAUTION SO48001A03

1) 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.

2) 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.

3) 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.

4) Before disconnecting the connectors of each sensor and the ECM, be sure to turn OFF the ignition switch.

5) Poor contact has been identified as a primary cause of this problem. To measure the voltage and/or resistance of individual sensors or all electrical control modules at the harness side connector, use a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.

6) Before removing ECM from the located position, disconnect two cables on battery.

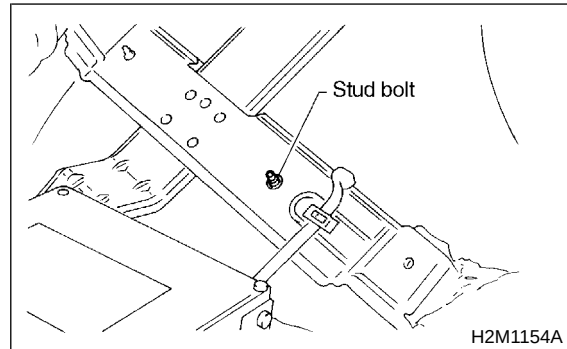
- Otherwise, the ECM may be damaged.

CAUTION:

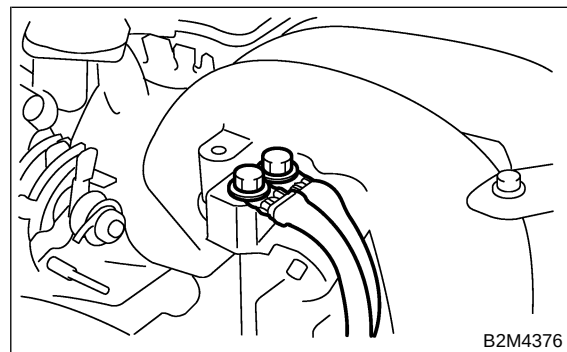
When replacing ECM, be careful not to use the wrong spec. ECM to avoid any damage on fuel injection system.

7) 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.

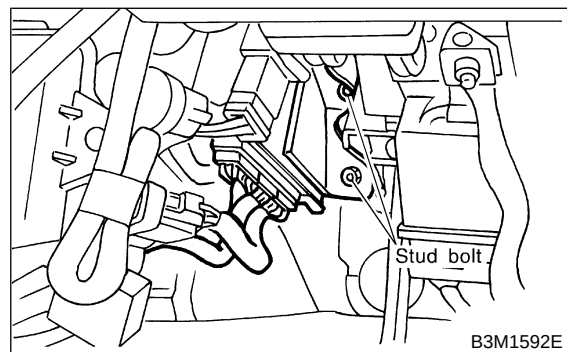
8) Use ECM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.



9) Use engine grounding terminal or engine proper as the grounding point to the body when measuring voltage and resistance in the engine compartment.



10) Use TCM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.



11) Every MFI-related part is a precision part. Do not drop them.

12) 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.

13) 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.

14) 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.

15) 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.

16) 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).

17) 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.

B: INSPECTION S048001A10

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY S048001A1001

1) Measure battery voltage and specific gravity of electrolyte.

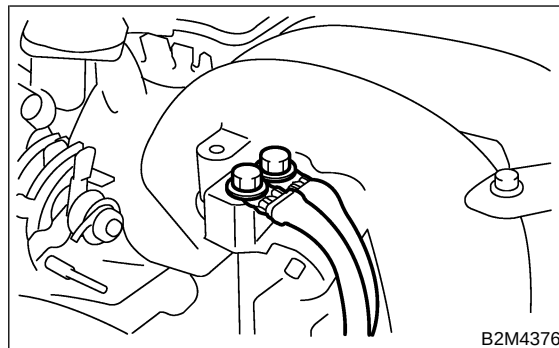
Standard voltage: 12 V

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 S048001A1002

Make sure the engine grounding terminal is properly connected to the engine.



C: NOTE S048001A15

1. DESCRIPTION S048001A1501

● 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

GENERAL DESCRIPTION

Engine (DIAGNOSTICS)

Select Monitor or the OBD-II general scan tool to the vehicle.

2. ENGINE AND EMISSION CONTROL SYSTEM

S048001A1502

- 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.

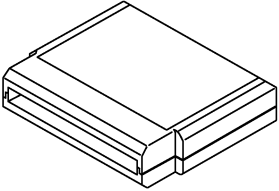
3. AUTOMATIC TRANSMISSION AND ELECTRONIC-HYDRAULIC CONTROL SYSTEM

S048001A1503

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 low clutch timing solenoid and 2-4 brake timing solenoid, line pressure duty solenoid, lock-up duty solenoid, transfer duty solenoid and 2-4 brake duty solenoid (a total of eight solenoids).

D: PREPARATION TOOL

S048001A17

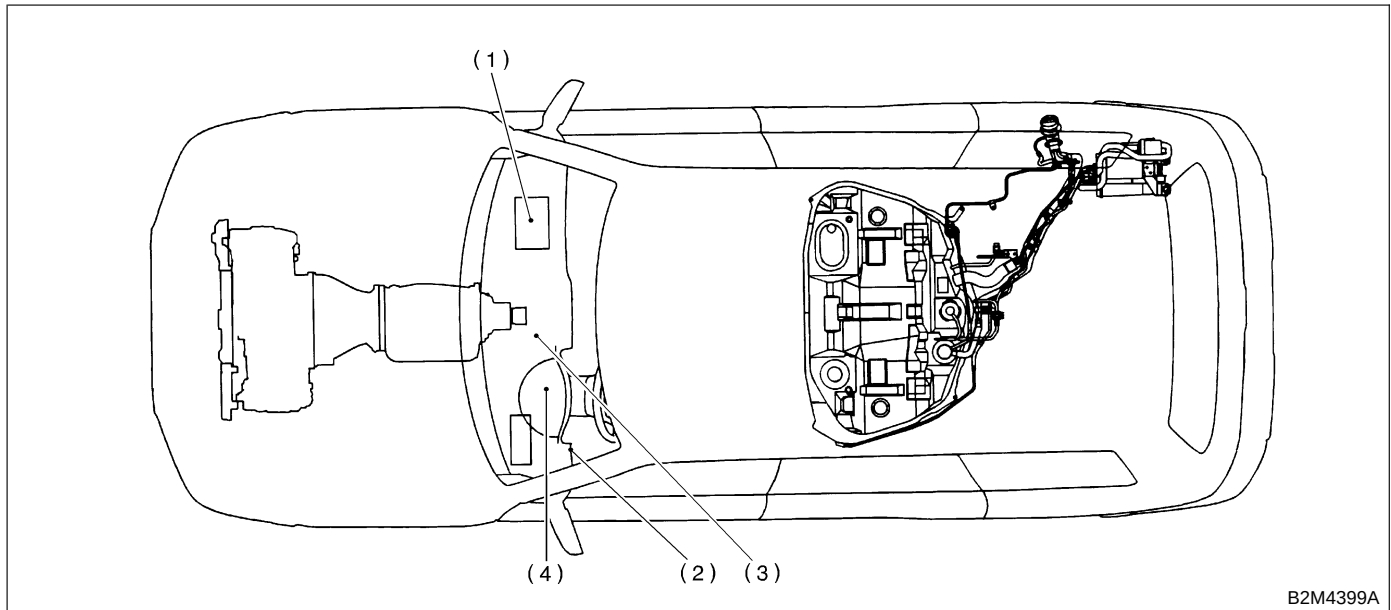
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA150 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 B2M3877	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. ● English: 22771AA030 (Without printer) ● German: 22771AA070 (Without printer) ● French: 22771AA080 (Without printer) ● Spanish: 22771AA090 (Without printer)

4. Electrical Components Location S048507

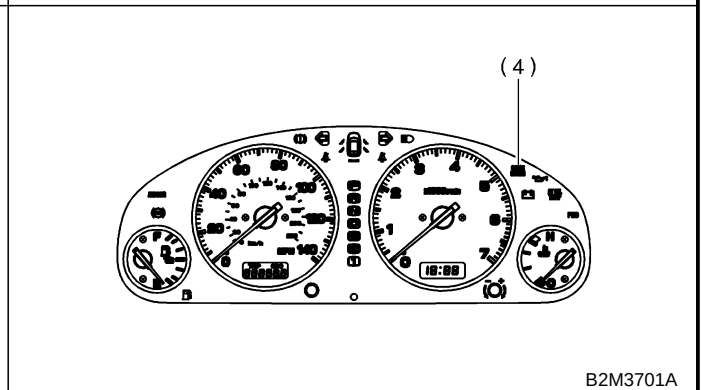
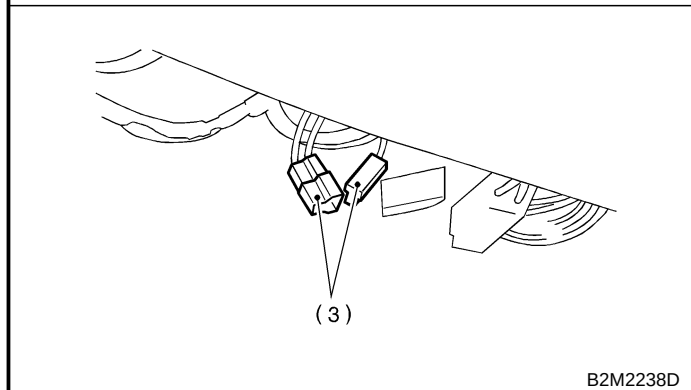
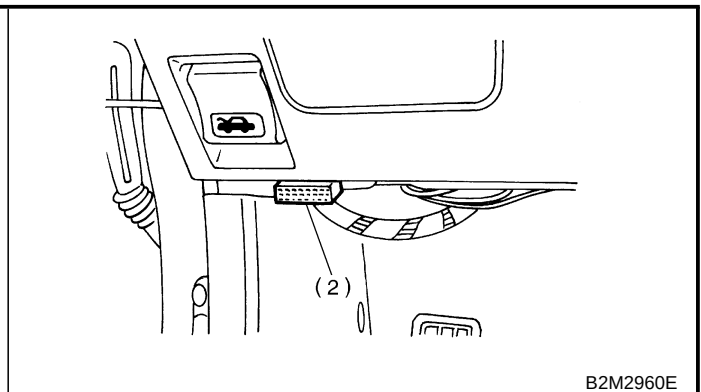
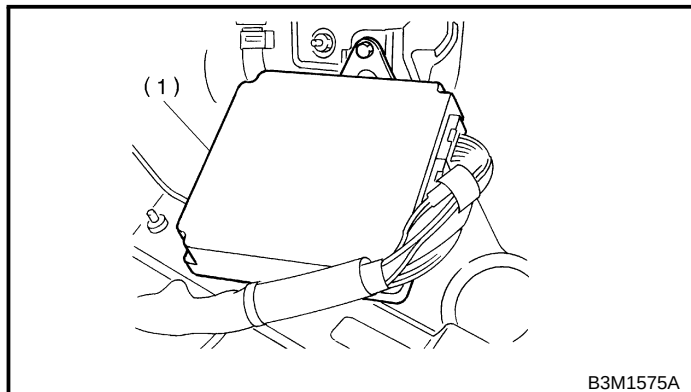
A: LOCATION S048507A13

1. ENGINE S048507A1301

● MODULE S048507A130101



(1) Engine control module (ECM)	(3) Test mode connector
(2) Data link connector (for Subaru Select Monitor and OBD-II general scan tool)	(4) CHECK ENGINE malfunction indicator lamp (MIL)



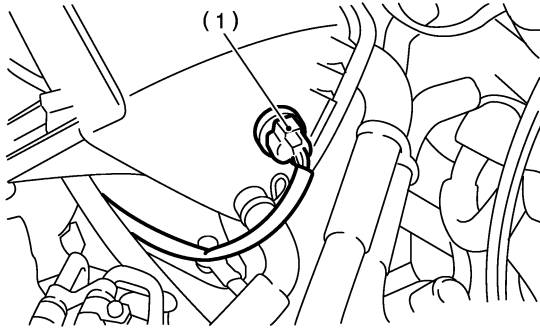
Engine (DIAGNOSTICS)

A detailed line drawing of a car engine, viewed from the front. The engine is a V-engine with a timing belt cover. Various components are labeled with numbers in parentheses: (1) points to the timing belt cover, (2) points to the timing belt, (3) points to the water pump, (4) points to the alternator, (5) points to the battery, (6) points to the air filter, and (7) points to the intake manifold. The drawing is a technical illustration showing the layout of the engine and its major components.

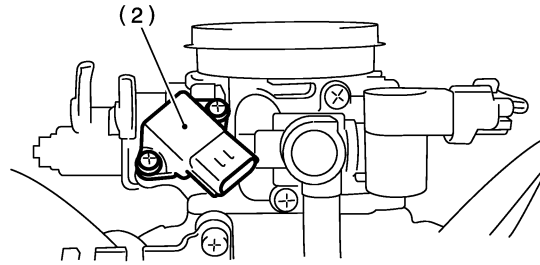
- EN(H6)-10**

ELECTRICAL COMPONENTS LOCATION

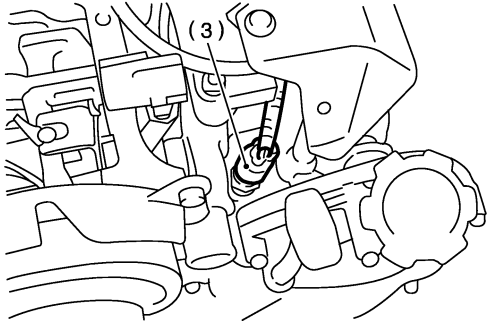
Engine (DIAGNOSTICS)



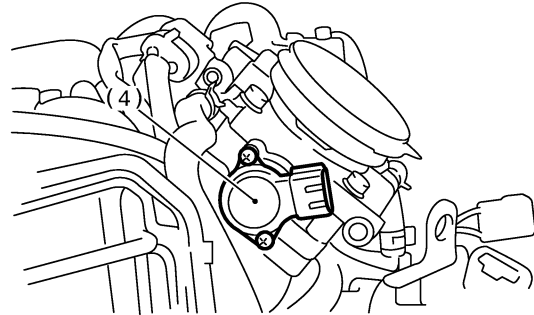
B2M4378A



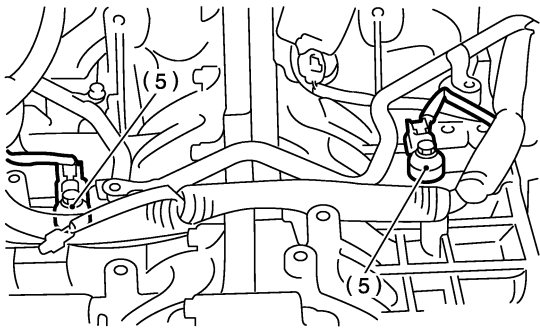
B2M4382A



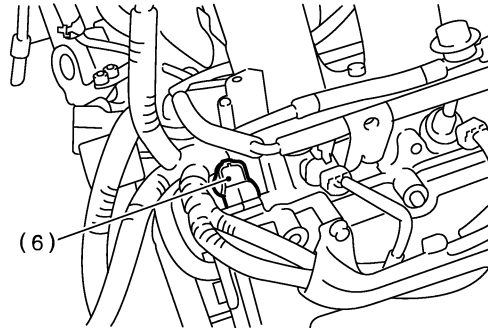
B2M4379A



B2M4383A



B2M4380A



B2M4381A

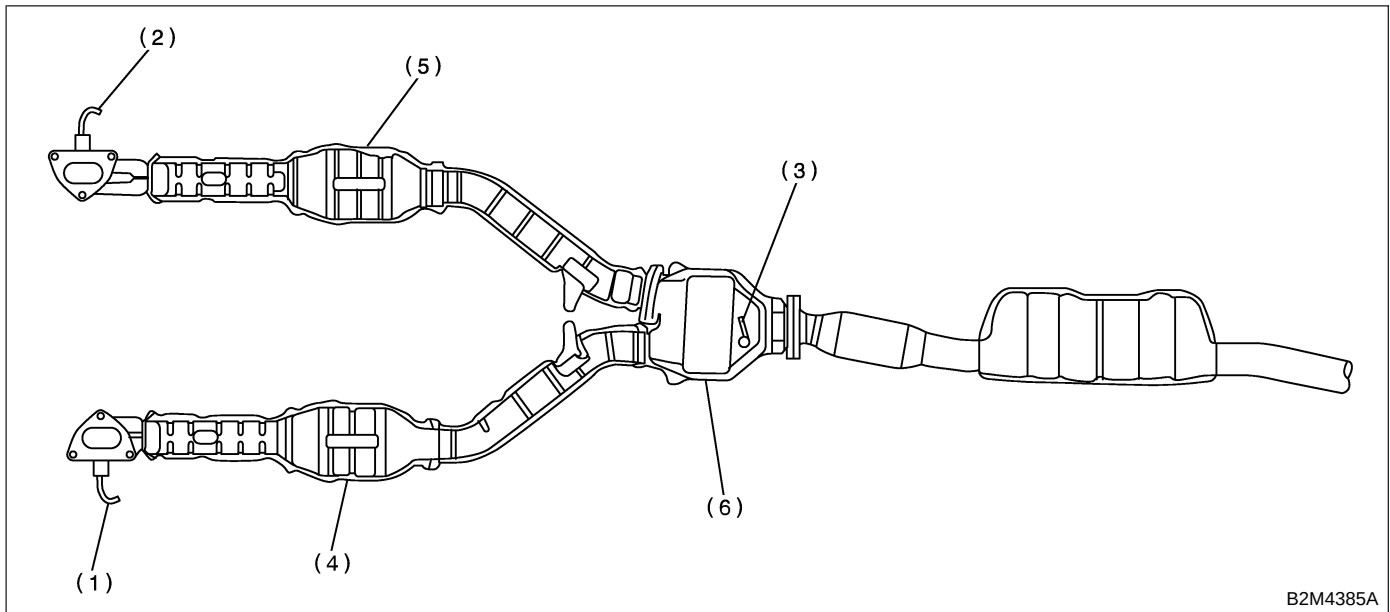


B2M4384A

SUBARU.

ELECTRICAL COMPONENTS LOCATION

Engine (DIAGNOSTICS)



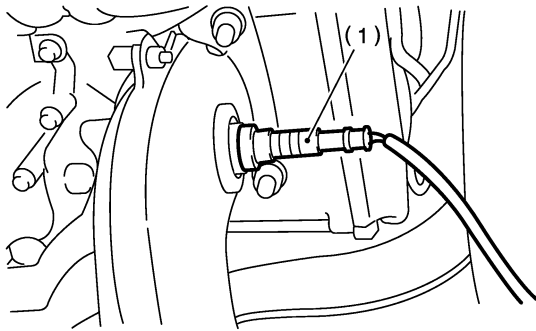
- (1) Front oxygen (A/F) sensor (LH)
- (2) Front oxygen (A/F) sensor (RH)

- (3) Rear oxygen sensor
- (4) Front catalytic converter (LH)

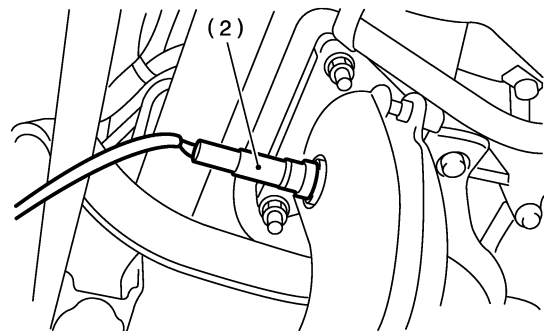
- (5) Front catalytic converter (RH)
- (6) Rear catalytic converter

ELECTRICAL COMPONENTS LOCATION

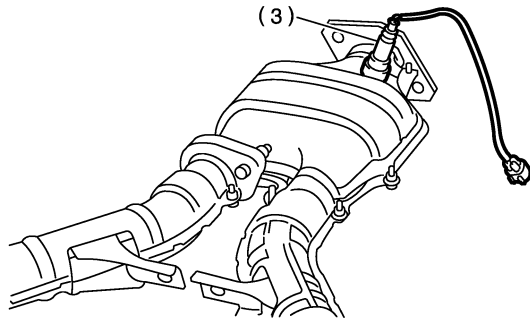
Engine (DIAGNOSTICS)



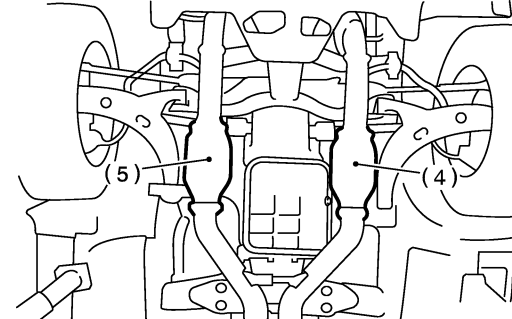
B2M4389A



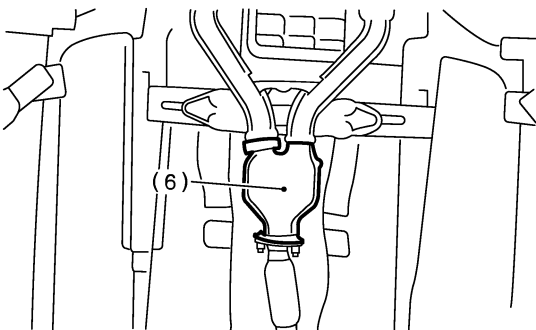
B2M4386A



B2M4387A



B2M4390A

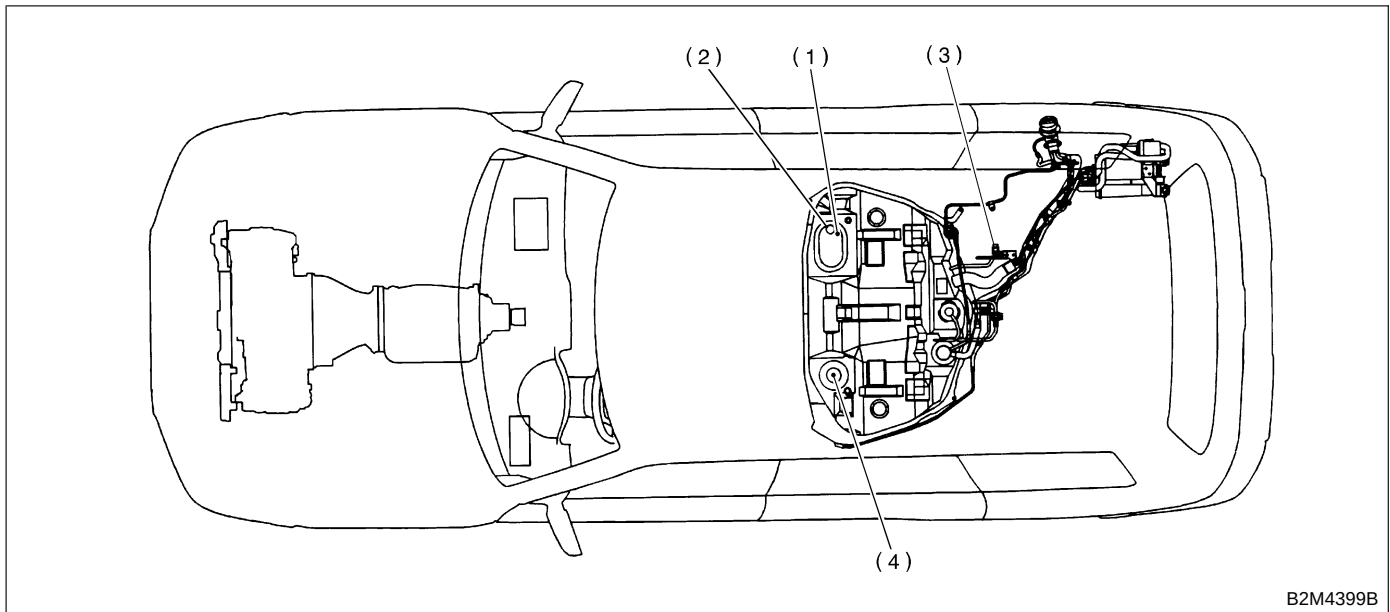


B2M4388A

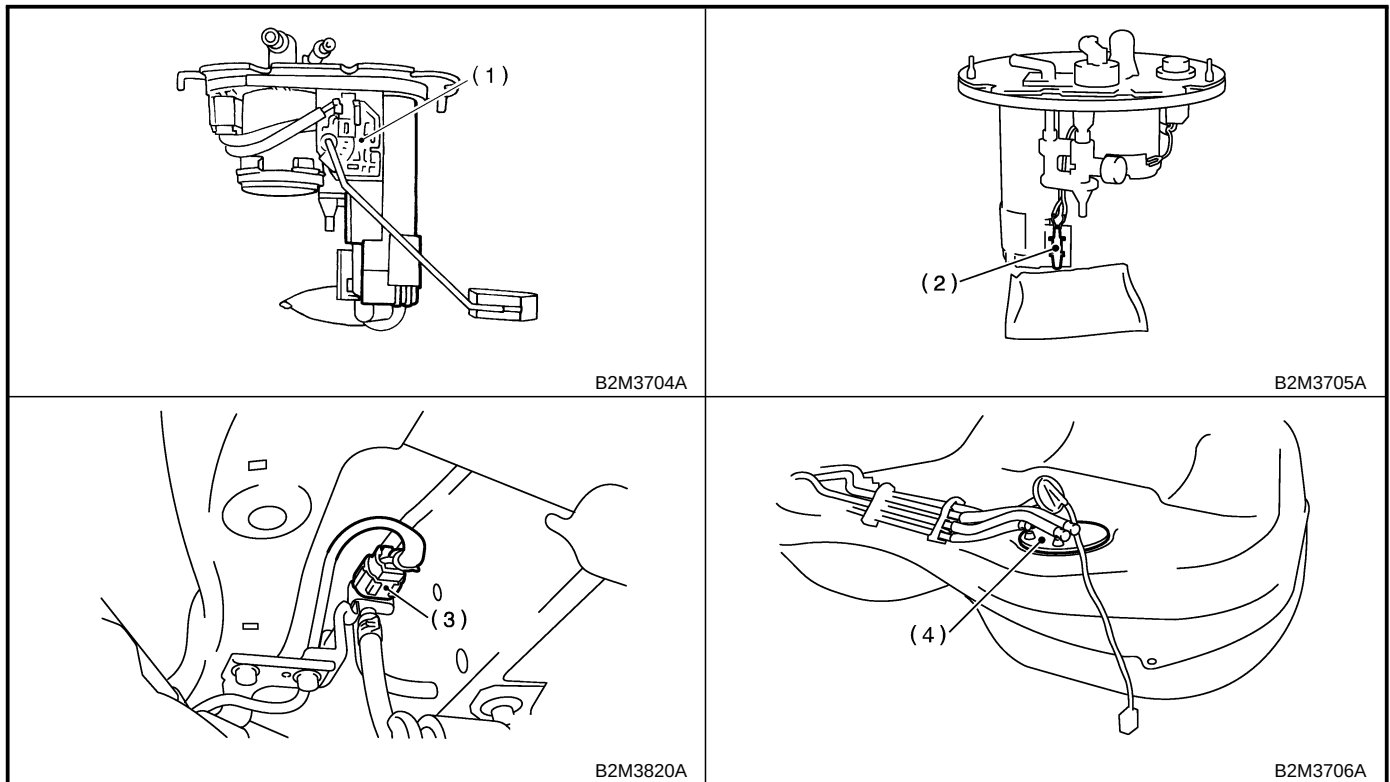
SUBARU.

ELECTRICAL COMPONENTS LOCATION

Engine (DIAGNOSTICS)



- (1) Fuel level sensor
- (2) Fuel temperature sensor
- (3) Fuel tank pressure sensor
- (4) Fuel sub level sensor



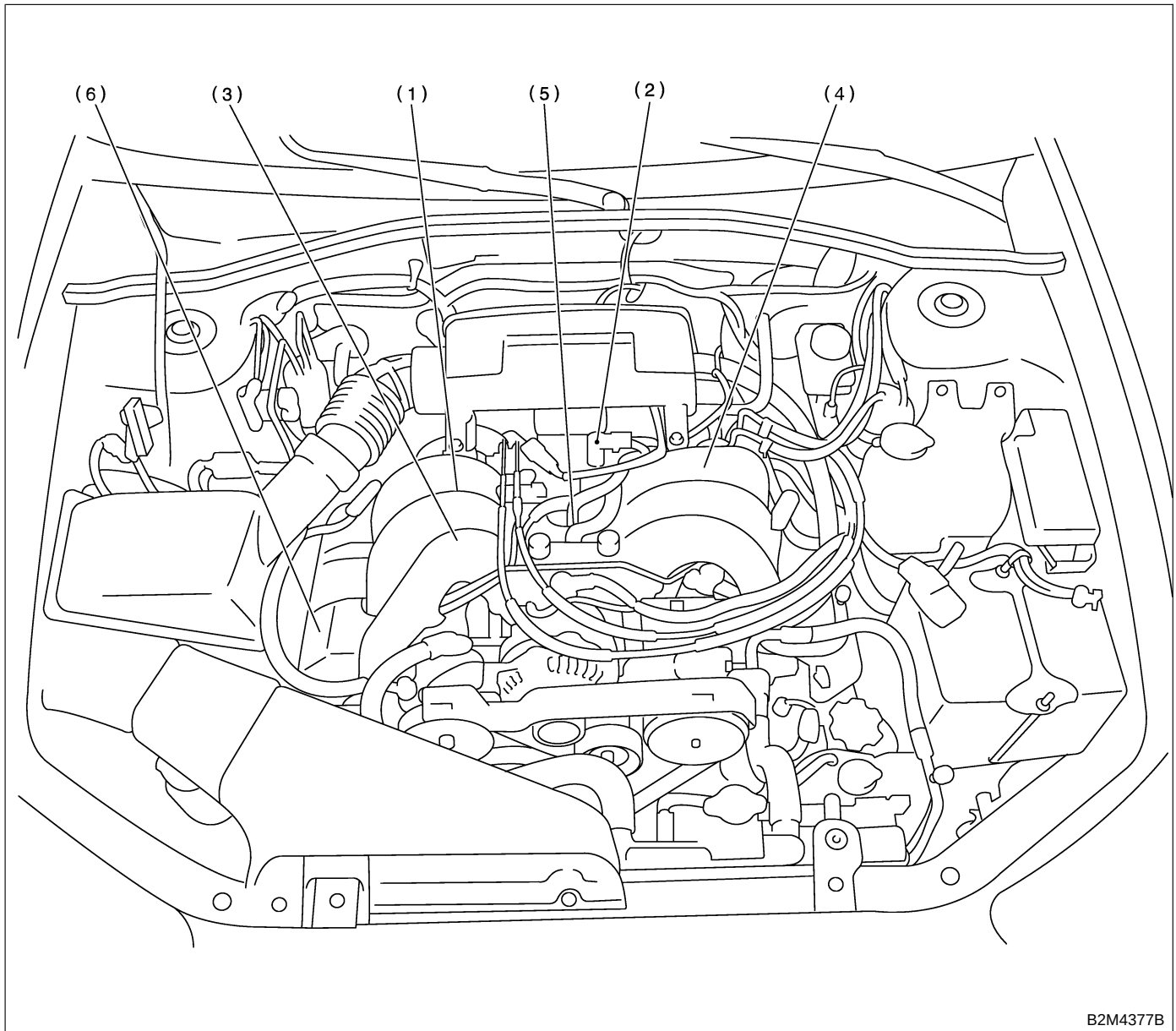
MEMO:

ELECTRICAL COMPONENTS LOCATION

Engine (DIAGNOSTICS)

● SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS

S048507A130103



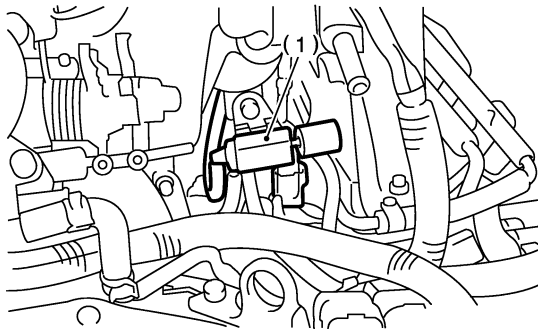
(1) Induction control solenoid valve
(2) Idle air control solenoid valve

(3) Purge control solenoid valve
(4) EGR solenoid valve

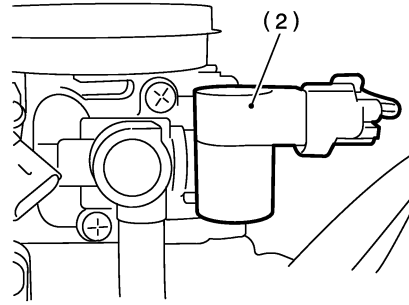
(5) Induction control valve
(6) Ignition coil & ignitor ASSY

ELECTRICAL COMPONENTS LOCATION

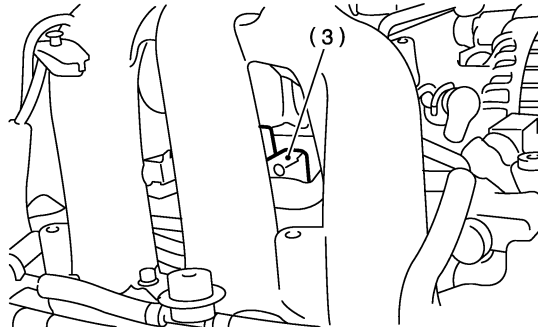
Engine (DIAGNOSTICS)



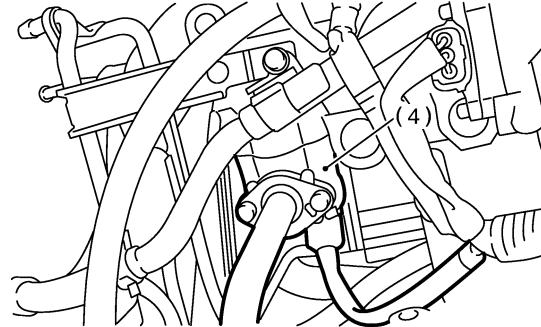
B2M4391A



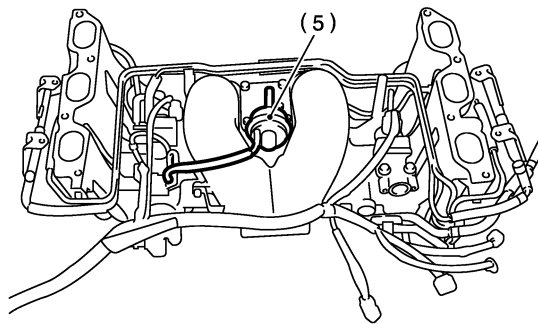
B2M4394A



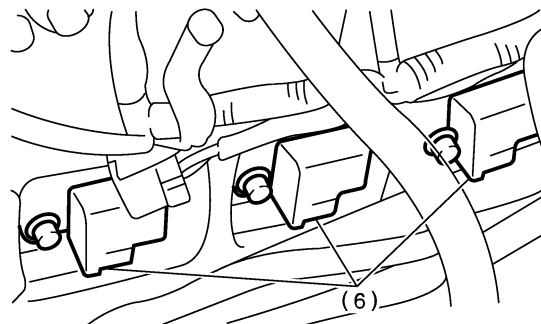
B2M4392A



B2M4395A



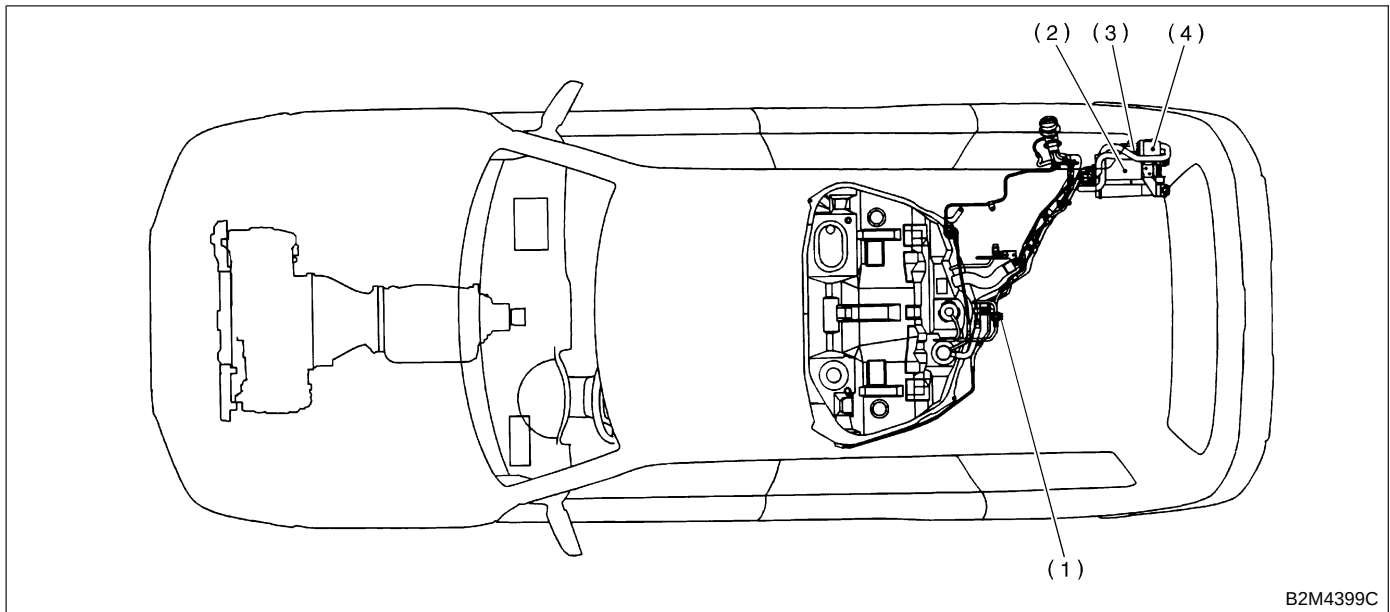
B2M4393A



B2M4396A

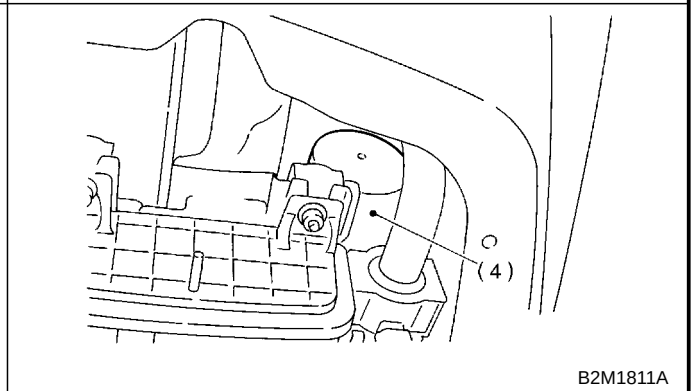
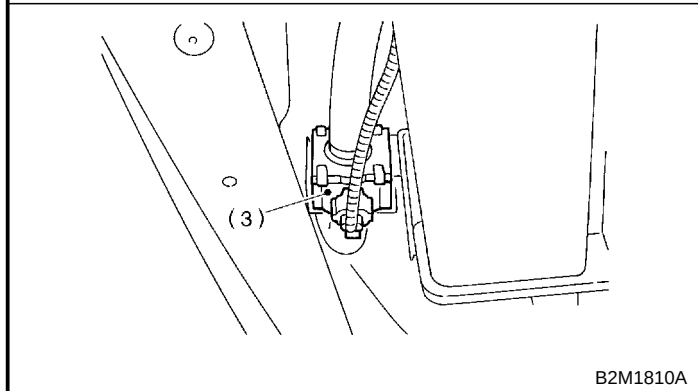
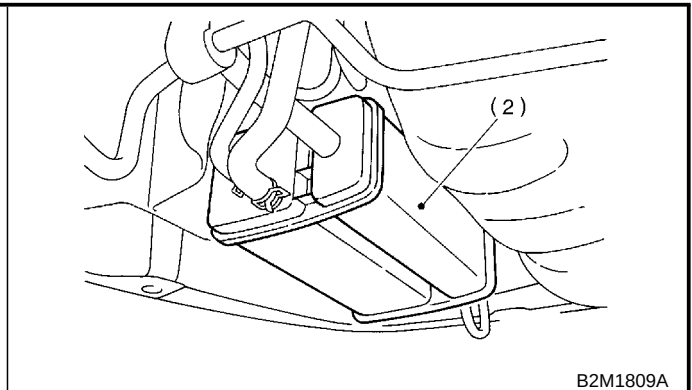
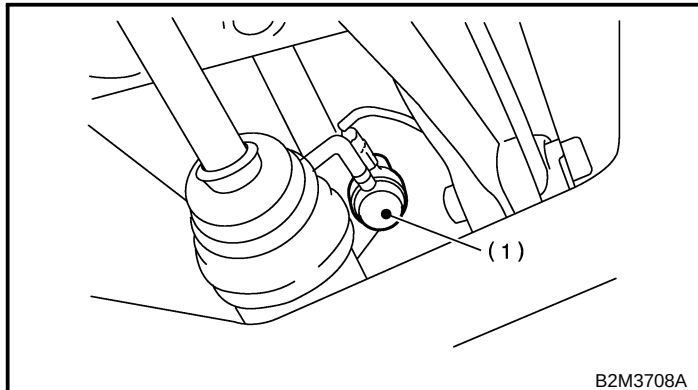
ELECTRICAL COMPONENTS LOCATION

Engine (DIAGNOSTICS)



- (1) Pressure control solenoid valve
(2) Canister

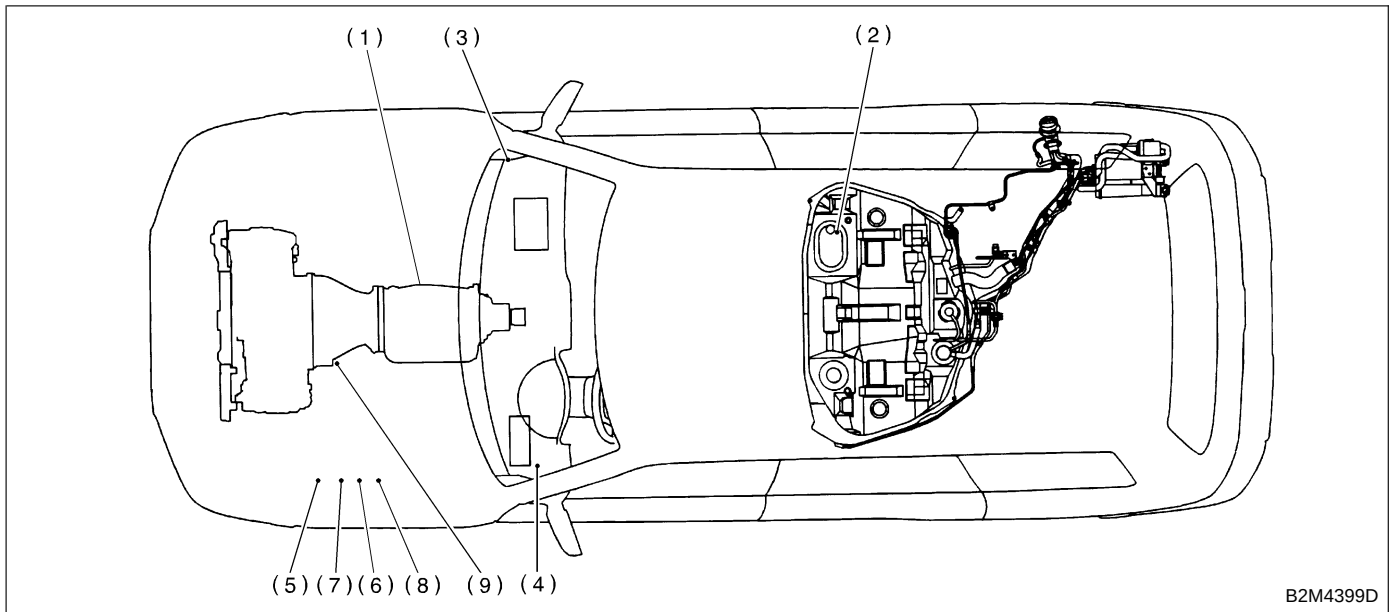
- (3) Drain valve
(4) Drain filter



MEMO:

ELECTRICAL COMPONENTS LOCATION

Engine (DIAGNOSTICS)



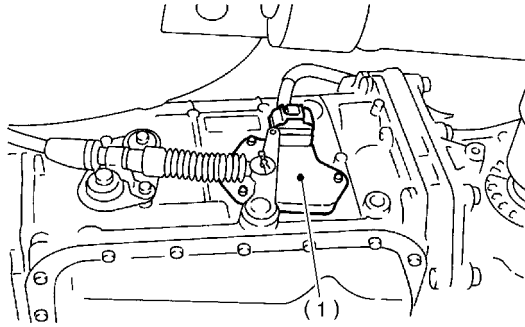
- (1) Inhibitor switch
- (2) Fuel pump
- (3) Main relay

- (4) Fuel pump relay
- (5) Radiator main fan relay-1
- (6) Radiator sub fan relay-1

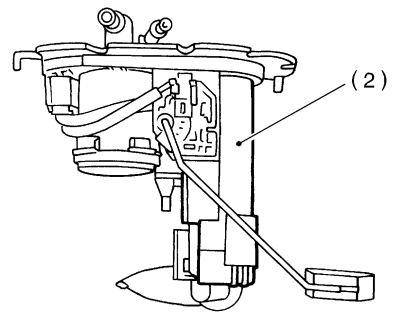
- (7) Radiator main fan relay-2
- (8) Radiator sub fan relay-2
- (9) Starter

ELECTRICAL COMPONENTS LOCATION

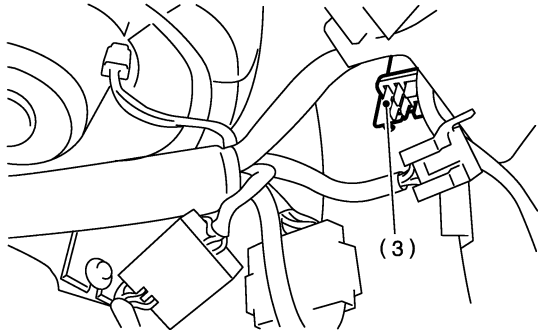
Engine (DIAGNOSTICS)



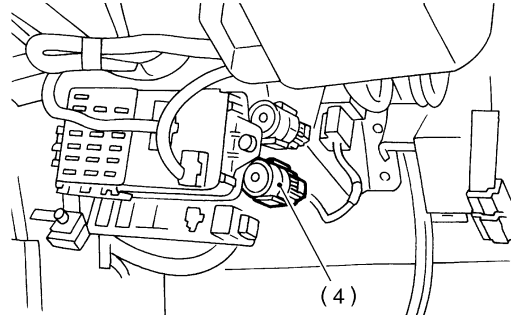
B2M2246A



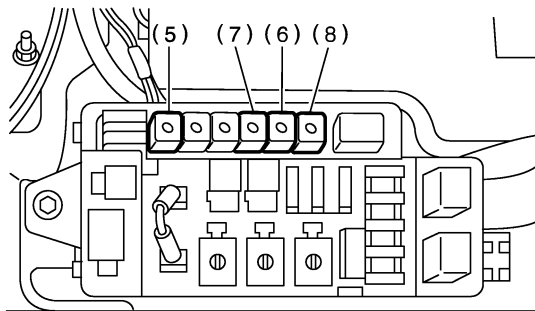
B2M3704C



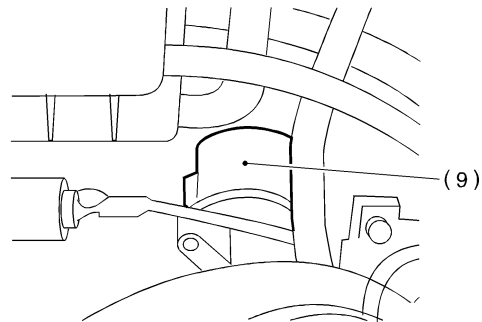
B2M3709B



B2M3710B



B2M4397A



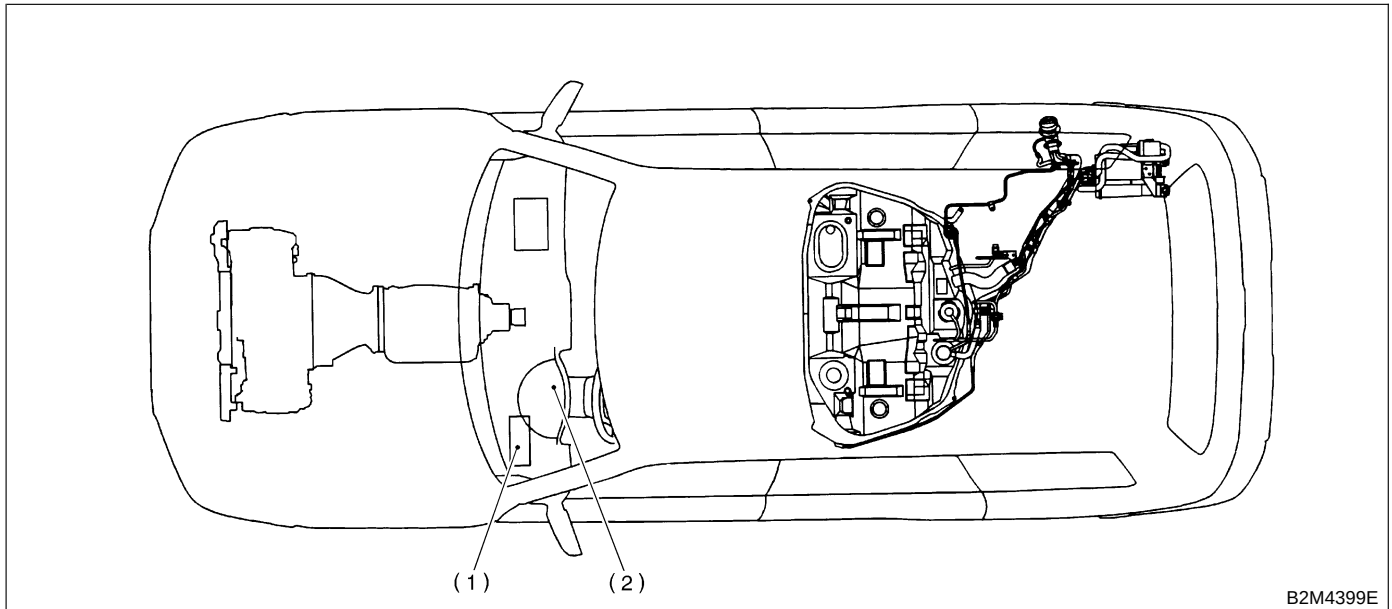
B2M2247F

ELECTRICAL COMPONENTS LOCATION

Engine (DIAGNOSTICS)

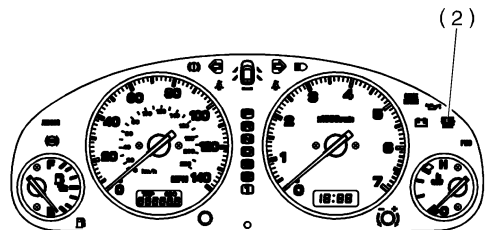
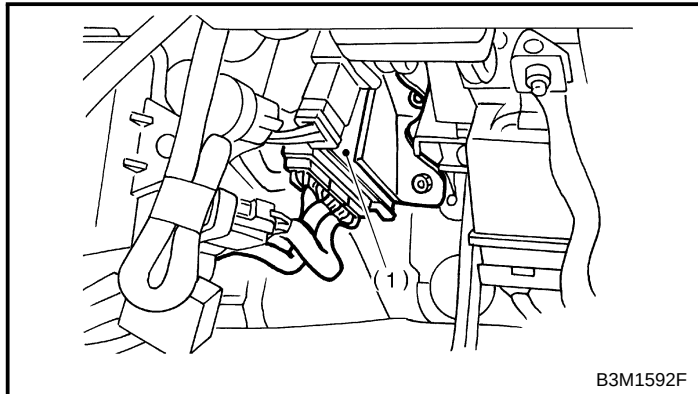
2. TRANSMISSION S048507A1302

● MODULE S048507A130201

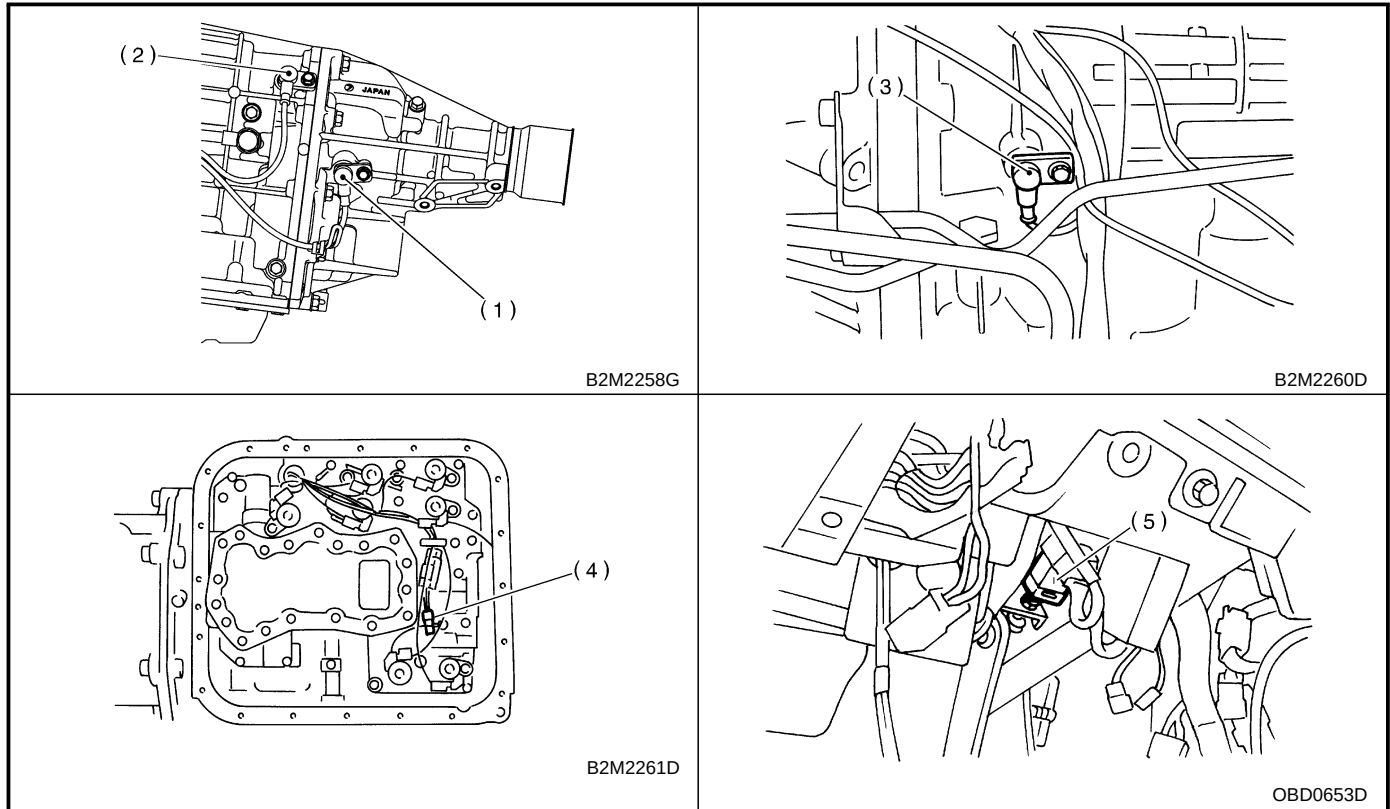


(1) Transmission Control Module
(TCM)

(2) AT diagnostic indicator light



● SENSOR S048507A130202

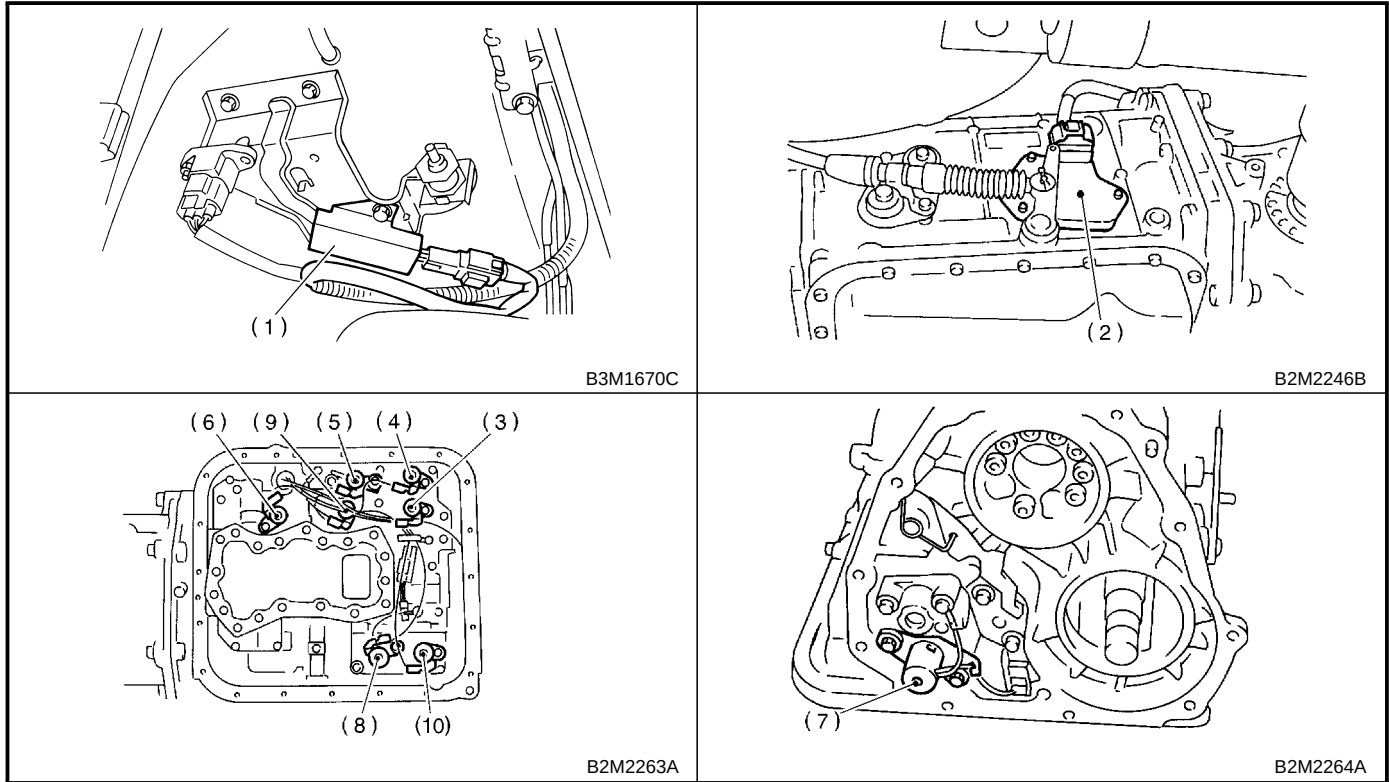


- (1) Rear vehicle speed sensor
- (2) Front vehicle speed sensor
- (3) Torque converter turbine speed sensor
- (4) ATF temperature sensor
- (5) Brake light switch

ELECTRICAL COMPONENTS LOCATION

Engine (DIAGNOSTICS)

● SOLENOID VALVE AND SWITCH S048507A130203



- (1) Dropping resistor
- (2) Inhibitor switch
- (3) Shift solenoid valve 1
- (4) Shift solenoid valve 2
- (5) Line pressure duty solenoid
- (6) Lock-up duty solenoid
- (7) Transfer duty solenoid
- (8) 2-4 brake duty solenoid
- (9) Low clutch timing solenoid valve
- (10) 2-4 brake timing solenoid valve

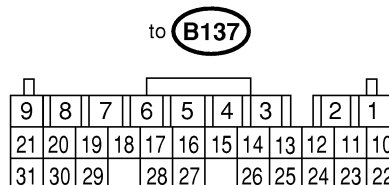
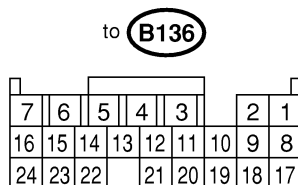
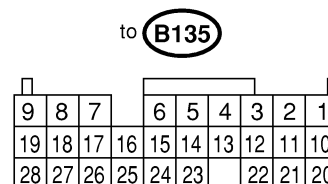
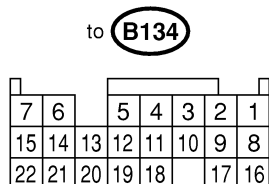
MEMO:

ENGINE CONTROL MODULE (ECM) I/O SIGNAL

Engine (DIAGNOSTICS)

5. Engine Control Module (ECM) I/O Signal S048526

A: ELECTRICAL SPECIFICATION S048526A08



B2M4398A

Content			Con- nector No.	Termi- nal No.	Signal (V)		Note
					Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)		B135	2	0	—	Sensor output wave- form <Ref. to EN(H6)- 29, WAVEFORM, MEASUREMENT, Control Module I/O Signal.>
	Signal (-)		B135	11	0	0	
	Shield		B135	21	0	0	
Camshaft position sensor	Signal (+)		B135	1	0	—	Sensor output wave- form <Ref. to EN(H6)- 29, WAVEFORM, MEASUREMENT, Control Module I/O Signal.>
	Signal (-)		B135	10	0	0	
Throttle position sensor	Signal		B135	7	Fully closed: 0.3 — 0.8 Fully open: 4.2 — 4.7	0.3 — 0.8	—
	Power supply		B135	9	5	5	—
	GND (sensor)		B135	19	0	0	—
Rear oxy- gen sensor	Signal		B135	17	0 — 0.5	0 — 0.9	—
	Shield		B135	26	0	0	—
Front oxy- gen (A/F) sensor heater	Signal	LH1	B137	7	—	—	—
		LH2	B137	6	—	—	—
		RH1	B137	5	—	—	—
		RH2	B137	4	—	—	—
Rear oxygen sensor heater signal			B136	13	—	—	—
Vehicle speed signal			B134	1	0 or 5	0 or 5	“5” and “0” are repeat- edly displayed when vehicle is driven.

ENGINE CONTROL MODULE (ECM) I/O SIGNAL

Engine (DIAGNOSTICS)

Content			Con- nector No.	Termi- nal No.	Signal (V)		Note
					Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Engine coolant tem- perature sensor	Signal		B135	18	—	—	After warm-up the engine.
	GND (sensor)		B134	7	0	0	After warm-up the engine.
				15			
Generator signal			B137	12	4 — 5	4 — 5	
Starter switch			B134	16	0	0	Cranking: 9 — 12
A/C switch			B134	2	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch			B134	5	10 — 13	13 — 14	—
Neutral position switch			B134	8	ON: 0 OFF: 5		Switch is ON when shift is in "N" or "P" position.
Test mode connector			B134	14	5	5	When connected: 0
Knock sen- sor	Signal	1	B135	4	2.5	2.5	—
		2		13	2.5	2.5	—
	Shield		B135	22	0	0	—
Back-up power supply			B137	10	10 — 13	13 — 14	Ignition switch "OFF": 10 — 13
Control unit power supply			B137	2	10 — 13	13 — 14	—
				3	10 — 13	13 — 14	—
Sensor power supply			B135	9	5	5	—
Line end check 1			B134	10	0	0	—
Ignition con- trol	#1		B136	24	0	—	Waveform
	#2		B136	23	0	—	Waveform
	#3		B136	22	0	—	Waveform
	#4		B136	21	0	—	Waveform
	#5		B136	20	0	—	Waveform
	#6		B136	19	0	—	Waveform
Fuel injector	#1		B137	1	10 — 13	1 — 14	Waveform
	#2		B136	6	10 — 13	1 — 14	Waveform
	#3		B136	5	10 — 13	1 — 14	Waveform
	#4		B136	4	10 — 13	1 — 14	Waveform
	#5		B136	3	10 — 13	1 — 14	Waveform
	#6		B136	1	10 — 13	1 — 14	Waveform
Idle air con- trol solenoid valve	Signal		B136	10	10 — 13	—	Waveform
Fuel pump relay control			B136	15	ON: 0.5, or less OFF: 10 — 13	0.5, or less	—
A/C relay control			B137	27	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 1 control			B137	17	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 2 control			B137	28	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	With A/C vehicles only
Radiator fan relay 3 control			B137	24	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Self-shutoff control			B134	6	10 — 13	13 — 14	—
Malfunction indicator lamp			B137	15	—	—	Light "ON": 1, or less Light "OFF": 10 — 14
Engine speed output			B136	9	—	0 — 13, or more	Waveform
Torque control 1 signal			B134	19	5	5	—

ENGINE CONTROL MODULE (ECM) I/O SIGNAL

Engine (DIAGNOSTICS)

Content		Con- nector No.	Termi- nal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Torque control 2 signal		B134	18	5	5	—
Torque control cut signal		B136	14	8	8	—
EGR solenoid valve (A-)		B137	26	10 — 13	13 — 14	—
EGR solenoid valve (B-)		B137	25	10 — 13	13 — 14	—
EGR solenoid valve (A+)		B137	14	10 — 13	13 — 14	—
EGR solenoid valve (B+)		B137	13	10 — 13	13 — 14	—
Induction control solenoid valve		B137	23	0	ON: 0 OFF: 13 — 14	—
Purge control solenoid valve		B137	16	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Fuel temperature sensor		B135	6	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (75°F)
Fuel level sensor		B135	25	0.12 — 4.75	0.12 — 4.75	—
Fuel tank pressure sensor	Signal	B135	15	2.3 — 2.7	2.3 — 2.7	The value obtained after the fuel filler cap was removed once and recapped.
	GND (sensor)	B134	15	0	0	
Fuel tank pressure control sole- noid valve		B137	22	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Drain valve		B137	11	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
A/C compressor switch		B134	13	—	—	—
A/C pressure switch		B135	23	—	—	—
AT diagnosis input signal		B135	20	Less than 1 ↔ More than 4	Less than 1 ↔ More than 4	Waveform
AT load signal		B135	28	4.3 — 4.4	0.9 — 1.4	—
Small light switch		B134	17	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Blower fan switch		B134	9	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Rear defogger switch		B134	3	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Front oxygen (A/F) sensor signal RH (+)		B137	29	3.7 — 3.9	3.7 — 3.9	—
Front oxygen (A/F) sensor signal RH (-)		B137	19	2.6 — 4.4	3.4 — 3.6	—
Front oxygen (A/F) sensor signal LH (+)		B137	30	3.7 — 3.9	3.7 — 3.9	—
Front oxygen (A/F) sensor signal LH (-)		B137	20	2.6 — 4.4	3.4 — 3.6	—
Front oxygen (A/F) sensor shield		B137	18	0	0	—
Pressure sensor		B135	8	3.0 — 4.2	1.0 — 2.6	—
Flash check switch		B134	20	—	—	—
Intake air temperature sensor		B135	27	—	—	—
Power steering switch		B137	24	ON: 0 OFF: 5	ON: 0 OFF: 5	—
SSM/GST communication line		B134	21	Less than 1 ↔ More than 4	Less than 1 ↔ More than 4	—
GND (sensors)		B134	15	0	0	—
GND (injectors)		B136	8	0	0	—
GND (ignition system)		B136	18	0	0	—

ENGINE CONTROL MODULE (ECM) I/O SIGNAL

Engine (DIAGNOSTICS)

Content		Con- nector No.	Termi- nal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
GND (power supply)		B134	22	0	0	—
		B136	17	0	0	—
GND (control systems)		B134	7	0	0	—
			15	0	0	—
GND (oxygen sensor heater LH)	1	B137	21	0	0	—
	2	B137	31			
GND (oxygen sensor heater RH)	1	B137	9	0	0	—
	2	B137	8			

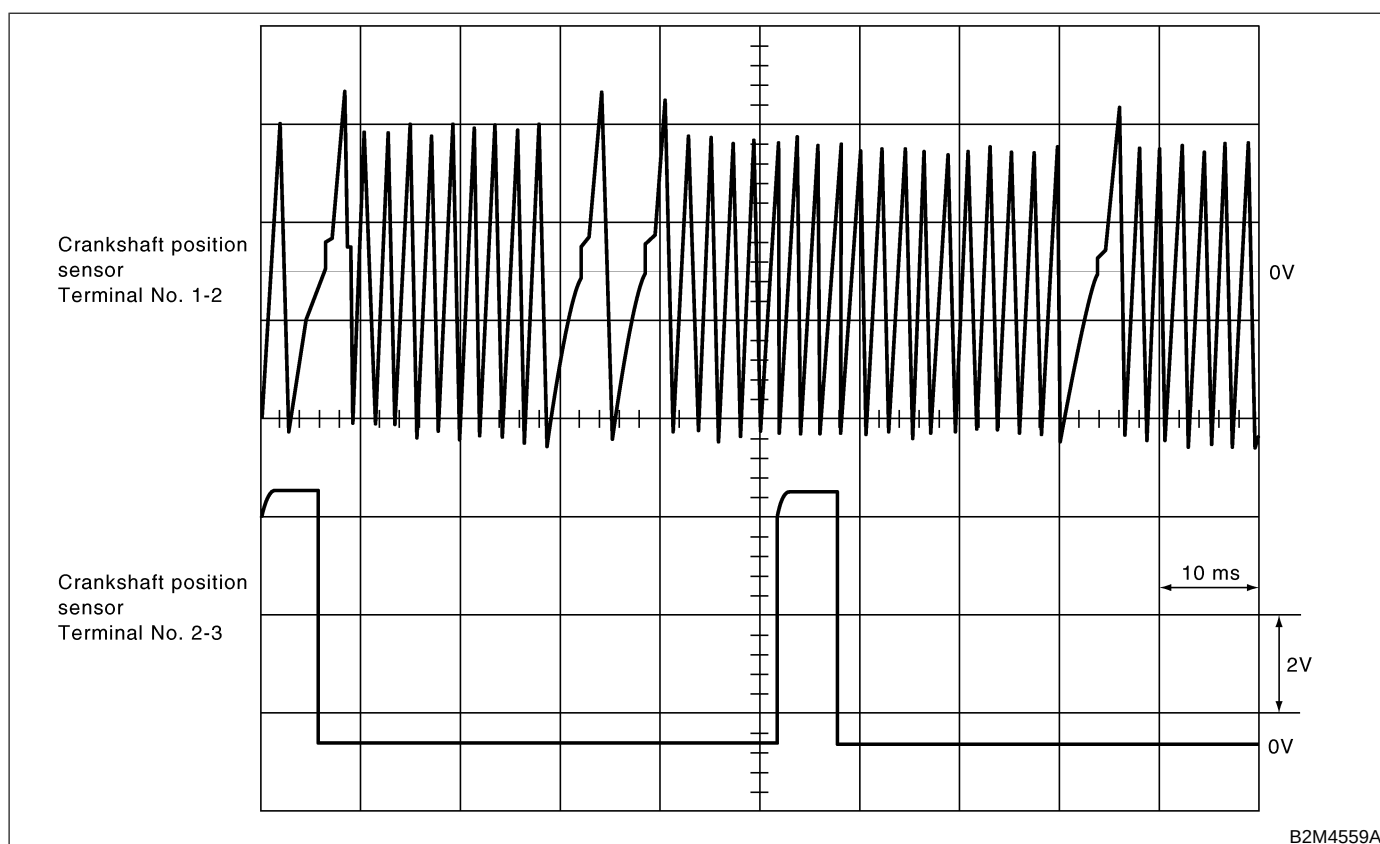
B: MEASUREMENT

S048526A14

Measure input/output signal voltage.

1. WAVEFORM

S048526A1401



B2M4559A

6. Engine Condition Data S048530

A: ELECTRICAL SPECIFICATION

S048530A08

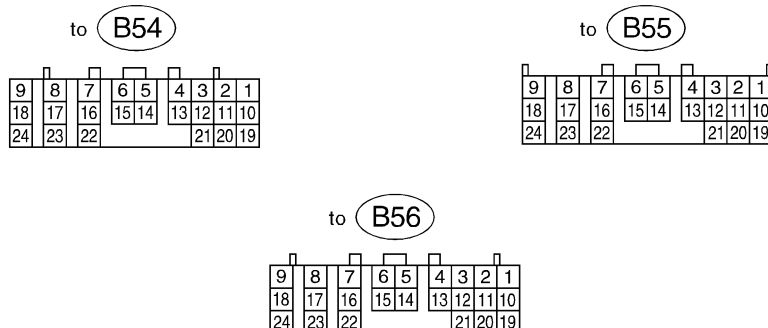
Content	Specified data
Engine load	1.6 — 4.0 (%): Idling
	6.4 — 12.8 (%): 2,500 rpm racing

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.

7. Transmission Control Module (TCM) I/O Signal S048506

A: ELECTRICAL SPECIFICATION S048506A08



S2M2131

Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B56	1	Ignition switch OFF	10 — 16	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 16	—
		B54	24			
Inhibitor switch	“P” range switch	B55	1	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	B55	14	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	B55	3	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 8	
	“D” range switch	B55	4	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 8	
	“3” range switch	B55	5	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 8	
	“2” range switch	B55	6	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 8	
	“1” range switch	B55	7	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 8	
Brake switch		B55	12	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Engine (DIAGNOSTICS)

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
VDC communication signal +	B56	9	Ignition ON	(+) — (–) Plus signal	—
VDC communication signal –	B56	18		(+) — (–) Plus signal	—
Kick-down switch	B55	11	Throttle fully opened.	Less than 1	—
			Throttle fully closed.	More than 6.5	
AT OIL TEMP warning light	B56	10	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B54	3	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.3 — 4.9	
Throttle position sensor power supply	B54	2	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B54	11	ATF temperature 20°C (68°F)	2.9 — 4.0	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	0.5 — 0.8	275 — 375
Rear vehicle speed sensor	B55	24	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	18	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range) 4	
Torque converter turbine speed sensor	B55	8	Engine idling after warm-up. (D range)	0	450 — 650
			Engine idling after warm-up. (N range)	More than 1 (AC range)	
Vehicle speed output signal	B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 4	—
Engine speed signal	B55	17	Ignition switch ON (with engine OFF)	More than 10.5	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B55	22	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 1	B56	5	Ignition switch ON (with engine ON)	More than 4.8	—
Torque control signal 2	B56	14	Ignition switch ON (with engine ON)	More than 4.8	—
Torque control cut signal	B55	10	Ignition switch ON	8	—
Intake manifold pressure signal	B54	10	Engine idling after warm-up.	1.2 — 1.8	—
Shift solenoid 1	B54	22	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	5	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Line pressure duty solenoid	B54	9	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 0.5	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Engine (DIAGNOSTICS)

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Dropping resistor	B54	8	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	7	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	6	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	18	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 0.5	
2-4 brake dropping resistor	B54	17	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B54	19	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1
System ground line	B56	19	—	0	Less than 1
	B54	20			
AT diagnosis signal	B56	21	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B56	15	—	—	—
		6	—	—	

DATA LINK CONNECTOR

Engine (DIAGNOSTICS)

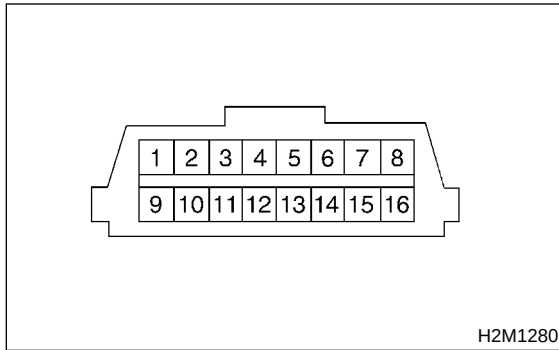
8. Data Link Connector S048505

A: NOTE S048505A15

- 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	Blank	12	Ground
5	Blank	13	Ground
6	Line end check signal 1	14	Blank
7	Blank	15	Blank
8	—	16	Blank

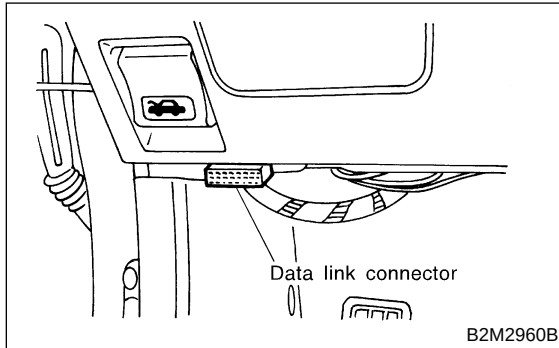
*: Circuit only for Subaru Select Monitor

9. OBD-II General Scan Tool S048527

A: OPERATION S048527A16

1. HOW TO USE OBD-II GENERAL SCAN TOOL S048527A1601

- 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).



- 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

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 List of Diagnostic Trouble Code (DTC).
<Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>

2. MODE \$01 (CURRENT POWERTRAIN DIAGNOSTIC DATA) S048527A1602

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 (Bank 1)	%
07	Long term fuel trim (Bank 1)	%
08	Short term fuel trim (Bank 2)	%
09	Long term fuel trim (Bank 2)	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
10	Air flow rate from pressure sensor	g/sec
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
24	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 1	V and %
28	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).

OBD-II GENERAL SCAN TOOL

Engine (DIAGNOSTICS)

3. MODE \$02 (POWERTRAIN FREEZE FRAME DATA) S048527A1603

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 (Bank 1)	%
07	Long term fuel trim (Bank 1)	%
08	Short term fuel trim (Bank 2)	%
09	Long term fuel trim (Bank 2)	%
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).

4. MODE \$03 (EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE) S048527A1604

Refer to Read Diagnostic Trouble Code for information about data denoting emission-related powertrain diagnostic trouble codes. <Ref. to EN(H6)-44 Read Diagnostic Trouble Code.>

5. MODE \$04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION) S048527A1605

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

NOTE:

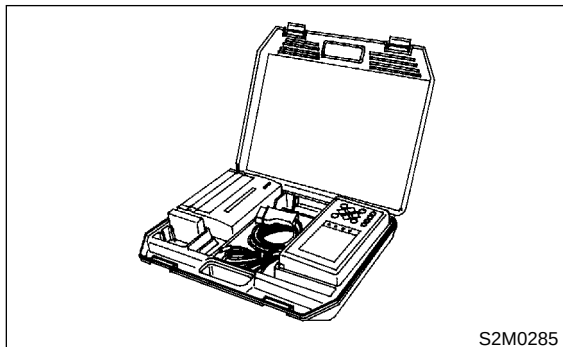
Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE \$04).

10. Subaru Select Monitor S048503

A: OPERATION S048503A16

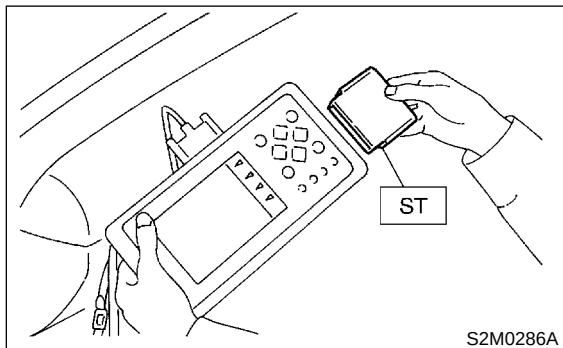
1. HOW TO USE SUBARU SELECT MONITOR S048503A1601

1) Prepare Subaru Select Monitor kit. <Ref. to EN(H6)-8 PREPARATION TOOL, General Description.>



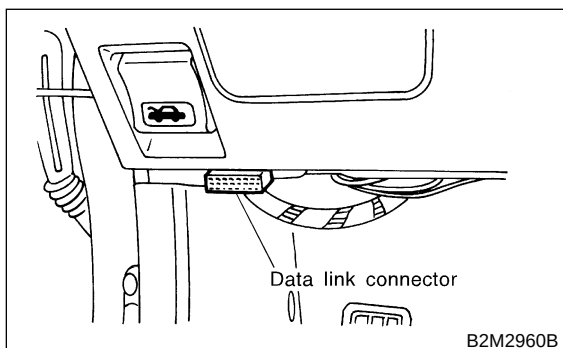
2) Connect diagnosis cable to Subaru Select Monitor.

3) Insert cartridge into Subaru Select Monitor. <Ref. to EN(H6)-8 PREPARATION TOOL, General Description.>



4) Connect Subaru Select Monitor to data link connector.

(1) Data link connector located in the lower portion of the instrument panel (on the driver's side).

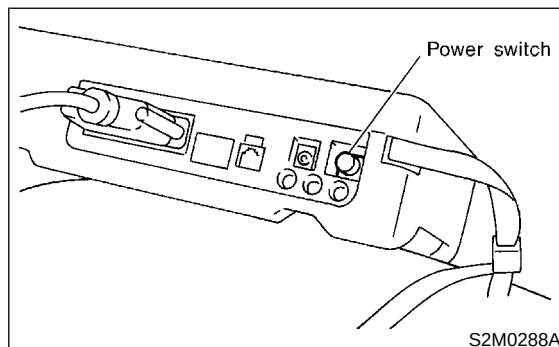


(2) Connect diagnosis cable to data link connector.

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) FOR ENGINE. (NORMAL MODE)

S048503A1610

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN(H6)-44 Read Diagnostic Trouble Code.>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (OBD MODE) S048503A1611

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN(H6)-44 Read Diagnostic Trouble Code.>

SUBARU SELECT MONITOR

Engine (DIAGNOSTICS)

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE) S048503A1604

- 1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
 - 2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of engine type.
 - 4) On the «Engine Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
 - 5) On the «Data Display Menu» display screen, select the {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
Throttle position signal	Throttle Opening Angle	%
Throttle position signal	Throttle Sensor Voltage	V
Injection pulse width 1	Fuel Injection #1 Pulse	ms
Injection pulse width 2	Fuel Injection #2 Pulse	ms
Idle air control signal	ISC Valve Duty Ratio	%
Engine load data	Engine Load	%
Front oxygen (A/F) sensor output signal 1	A/F Sensor #1	—
Front oxygen (A/F) sensor output signal 2	A/F Sensor #2	—
Front oxygen (A/F) sensor resistance 1	A/F Sensor #1 Resistance	Ω
Front oxygen (A/F) sensor resistance 2	A/F Sensor #2 Resistance	Ω
Rear oxygen sensor output signal	Rear O2 Sensor	V
Short term fuel trim 1	A/F Correction #1	%
Short term fuel trim 2	A/F Correction #2	%
Knock sensor signal	Knocking Correction	deg
Atmospheric absolute pressure signal	Atmosphere Pressure	mmHg or kPa or inHg or psi
Intake manifold relative pressure signal	Mani. Relative Pressure	mmHg or kPa or inHg or psi
EGR control signal	EGR Steps	STEP
Generator signal	ALT Duty	%
Front oxygen (A/F) sensor 1 current	A/F Sensor #1 Current	mA
Front oxygen (A/F) sensor 2 current	A/F Sensor #2 Current	mA
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
A/F correction (short term fuel trim) by rear oxygen sensor	A/F Correction #3	%
Long term whole fuel trim 1	A/F Learning #1	%
Long term whole fuel trim 2	A/F Learning #2	%
Long term whole fuel trim 3	A/F Learning #3	%
Front oxygen (A/F) sensor heater current 1	A/F Heater Current 1	A
Front oxygen (A/F) sensor heater current 2	A/F Heater Current 2	A
Rear oxygen sensor heater voltage	Rear O2 Heater Voltage	V
Canister purge control solenoid valve duty ratio	CPC Valve Duty Ratio	%
Fuel tank pressure signal	Fuel Tank Pressure	mmHg or kPa or inHg or psi
Fuel temperature signal	Fuel Temp.	°C or °F
Fuel level signal	Fuel Level	V
Intake air temperature signal	Intake Air Temp.	°C or °F

SUBARU SELECT MONITOR

Engine (DIAGNOSTICS)

Contents	Display	Unit of measure
Ignition switch signal	Ignition Switch	ON or OFF
Test mode connector signal	Test Mode Signal	ON or OFF
Neutral position switch signal	Neutral Position Switch	ON or OFF
Air conditioner switch signal	A/C Switch	ON or OFF
Radiator fan relay signal 1	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 fan relay signal 2	Radiator Fan Relay #2	ON or OFF
Engine torque control signal #1	Torque Control Signal #1	ON or OFF
Engine torque control signal #2	Torque Control Signal #2	ON or OFF
Engine torque control permission signal	Torque Control Permit	ON or OFF
Pressure control solenoid valve	PCV Solenoid Valve	ON or OFF
Drain valve	Vent. Solenoid Valve	ON or OFF
Starter switch signal	Starter Switch Signal	ON or OFF
Idle switch signal	Idle Switch Signal	ON or OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	ON or OFF
Camshaft position sensor signal	Camshaft Position Sig.	ON or OFF
Rear defogger switch signal	Rear Defogger Switch	ON or OFF
Blower fan switch signal	Blower Fan Switch	ON or OFF
Small light switch signal	Small Light Switch	ON or OFF
Power steering switch signal	P/S Switch	ON or OFF
Air conditioner lock switch signal	A/C Lock Signal	ON or OFF
Air conditioner mid pressure switch signal	A/C Mid Pressure Switch	ON or OFF
Air conditioner compressor signal	A/C Compressor Signal	ON or OFF
Radiator fan relay signal 3	Radiator Fan Relay #3	ON or OFF
Induction control solenoid signal	Variable Intake Air Sol.	ON or OFF

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

SUBARU SELECT MONITOR

Engine (DIAGNOSTICS)

5. READ CURRENT DATA FOR ENGINE. (OBD MODE) S048503A1605

- 1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
 - 2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of engine type.
 - 4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
 - 5) On the «OBD Menu» display screen, select the {Current Data Display & Save} and press the [YES] key.
 - 6) On the «Data Display Menu» display screen, select the {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 (Bank 1, Bank 2, Rear)	Oxygen sensor	ON or OFF
Test of oxygen sensor heater (Bank 1, Bank 2, Rear)	Oxygen sensor heater	ON or OFF
Test of EGR system	EGR steps	STEP
Air fuel ratio control system for bank 1	Fuel System for Bank 1	ON or OFF
Air fuel ratio control system for bank 2	Fuel System for Bank 2	ON or OFF
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor bank 1	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor bank 1	Long term fuel trim B1	%
Short term fuel trim by front oxygen (A/F) sensor bank 2	Short term fuel trim B2	%
Long term fuel trim by front oxygen (A/F) sensor bank 2	Long term fuel trim B2	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
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	°
Intake air temperature signal	Intake Air Temp.	°C or °F
Throttle position signal	Throttle Opening Angle	%
A/F sensor equipment	A/F sensor	ON or OFF
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 FOR ENGINE. (OBD MODE) S048503A1606

- 1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
 - 2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of engine type.
 - 4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
 - 5) On the «OBD Menu» display screen, select the {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
Air fuel ratio control system for bank 2	Fuel System for Bank 2	ON or OFF
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor bank 1	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor bank 1	Long term fuel trim B1	%
Short term fuel trim by front oxygen (A/F) sensor bank 2	Short term fuel trim B2	%
Long term fuel trim by front oxygen (A/F) sensor bank 2	Long term fuel trim B2	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
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.

SUBARU SELECT MONITOR

Engine (DIAGNOSTICS)

7. LED OPERATION MODE FOR ENGINE S048503A1608

- 1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
 - 2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of engine type.
 - 4) On the «Engine Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
 - 5) On the «Data Display Menu» display screen, select the {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.
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 functioning.
Radiator main fan relay signal	Radiator Fan Relay #1	ON or OFF	When radiator main fan relay is functioning.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	When fuel pump relay is functioning.
Knocking signal	Knocking Signal (#1 or #2)	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 functioning.
Engine torque control signal #1	Torque Control Signal #1	ON or OFF	When engine torque control signal 1 is entered.
Engine torque control signal #2	Torque Control Signal #2	ON or OFF	When engine torque control signal 2 is entered.
Engine torque control permission signal	Torque Control Permit	ON or OFF	When engine torque control permission signal is entered.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Pressure control solenoid valve	PCV Solenoid Valve	ON or OFF	When pressure control solenoid valve is functioning.
Drain valve	Vent. Solenoid Valve	ON or OFF	When drain valve is functioning.
Starter switch signal	Starter Switch Signal	ON or OFF	When starter switch signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Crankshaft position sensor signal	Crankshaft Position Sig.	ON or OFF	When crankshaft position sensor signal is entered.
Camshaft position sensor signal	Camshaft Position Sig.	ON or OFF	When camshaft position sensor signal is entered.
Radiator sub fan relay 2 signal	Radiator Fan Relay 3	ON or OFF	When radiator sub fan relay is functioning.
Air conditioner mid pressure switch signal	A/C Mid Pressure Switch	ON or OFF	When air conditioner mid pressure switch is entered.
Air conditioner lock switch signal	A/C Lock Signal	ON or OFF	When air conditioner lock switch is entered.

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

8. READ CURRENT DATA FOR AT. S048503A1612

- 1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
 - 2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
 - 3) Press the [YES] key after displayed the information of transmission type.
 - 4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
 - 5) On the «Data Display Menu» display screen, select the {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
Rear vehicle speed sensor signal	Vehicle Speed #1	km/h or MPH
Front vehicle speed sensor signal	Vehicle Speed #2	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	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
Torque converter turbine speed signal	AT Turbine Speed	rpm
2-4 brake timing pressure control duty ratio	2-4B Duty Ratio	%
Intake manifold pressure sensor voltage	Mani. Pressure Voltage	V
2 wheel drive switch signal	2WD 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
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
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal #1	ON or OFF
Torque control output signal #2	Torque Control Signal #2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
Automatic transmission diagnosis indicator lamp	AT Diagnosis Lamp	ON or OFF

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

11. Read Diagnostic Trouble Code S048508

A: OPERATION S048508A16

1. SUBARU SELECT MONITOR (NORMAL MODE) S048508A1601

- 1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
- 2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of engine type.
- 4) On the «Engine Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.
- 5) On the «Diagnostic Code(s) Display» display screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)} and press the [YES] key.

NOTE:

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
- For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC).

<Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE) S048508A1602

- 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 {Engine Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of engine type.
- 4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
- 5) On the «OBD Menu» display screen, select the {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 detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC).

<Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>

3. OBD-II GENERAL SCAN TOOL S048508A1603

Refers to data denoting emission-related powertrain diagnostic trouble codes.

For details concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC).

<Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to access emission-related powertrain diagnostic trouble codes (MODE \$03).

12. Inspection Mode S048510

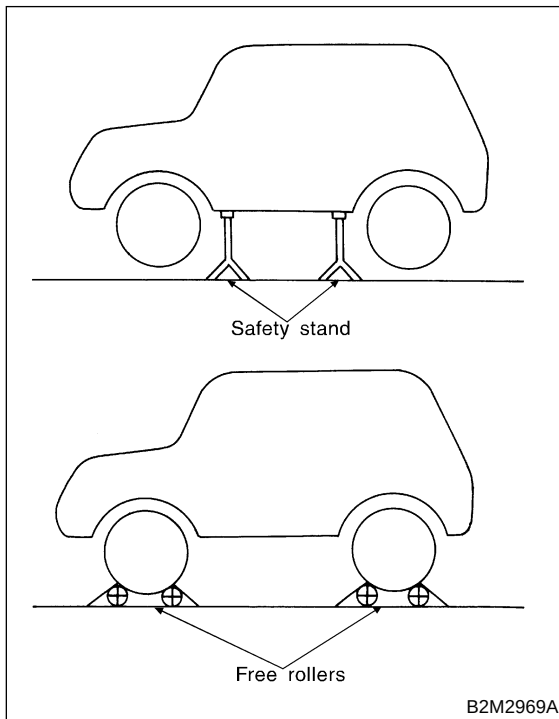
A: OPERATION S048510A16

1. PREPARATION FOR THE INSPECTION MODE S048510A1601

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

WARNING:

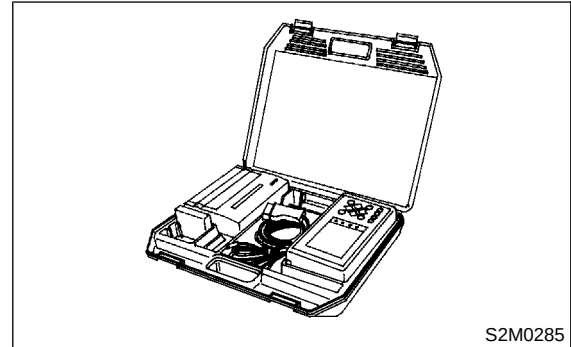
- Before raising the vehicle, ensure parking brakes are applied.
- Do not use a pantograph jack in place of a safety stand.
- Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
- Do not abruptly depress/release clutch pedal or accelerator 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.



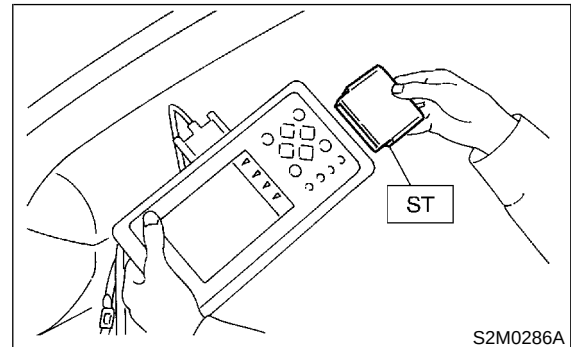
2. SUBARU SELECT MONITOR S048510A1602

After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data.

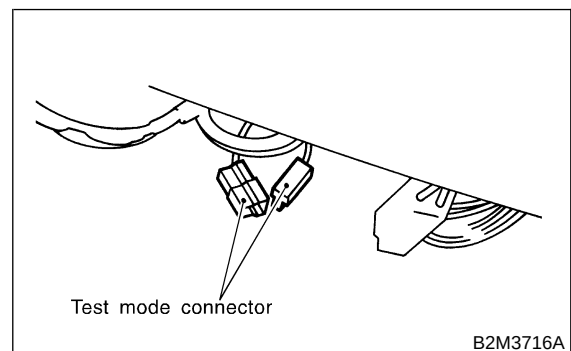
- 1) Prepare Subaru Select Monitor kit. <Ref. to EN(H6)-8 PREPARATION TOOL, General Description.>



- 2) Connect diagnosis cable to Subaru Select Monitor.
- 3) Insert cartridge into Subaru Select Monitor. <Ref. to EN(H6)-8 PREPARATION TOOL, General Description.>



- 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.

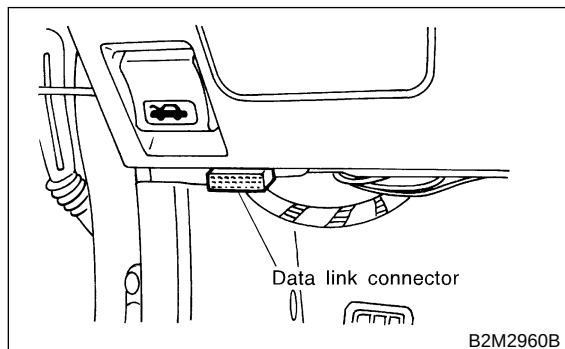


INSPECTION MODE

Engine (DIAGNOSTICS)

5) Connect Subaru Select Monitor to data link connector.

(1) Connect Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).

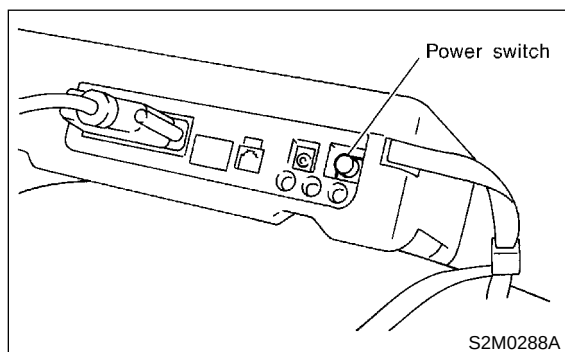


(2) Connect diagnosis cable to data link connector.

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 {Engine Control System} and press the [YES] key.

9) Press the [YES] key after displayed the information of engine type.

10) On the «Engine Diagnosis» display screen, select the {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 List of Diagnostic Trouble Code (DTC).

<Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>

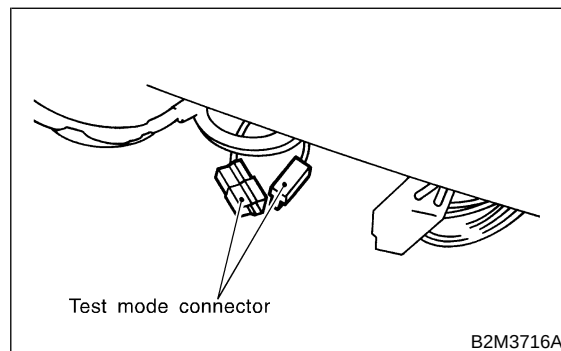
- Release the parking brake.

- 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 S048510A1603

After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data:

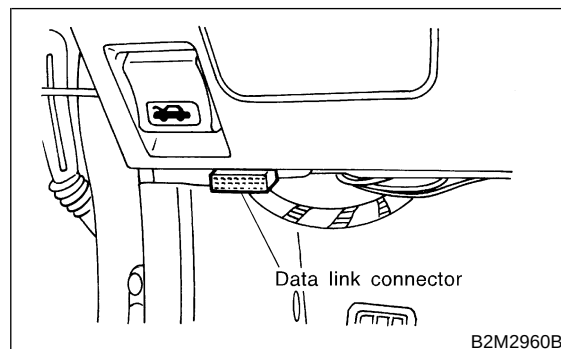
1) Connect test mode connector at the lower side of the instrument panel (on the driver's side), to the side of the center console box.



2) 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).

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.

- 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.
- 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 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 detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC).

<Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>

13. Clear Memory Mode S048513

A: OPERATION S048513A16

1. SUBARU SELECT MONITOR (NORMAL MODE) S048513A1601

- 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 {Engine Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of engine type.
- 4) On the «Engine Diagnosis» display screen, select the {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) S048513A1602

- 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 {Engine Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of engine type.
- 4) On the «Engine Diagnosis» display screen, select the {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 S048513A1603

For clear memory procedures using the OBD-II general scan tool, refer to the OBD-II General Scan Tool Instruction Manual.

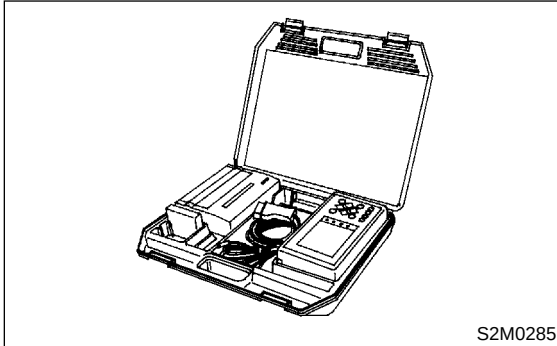
14. Compulsory Valve Operation Check Mode

S048528

A: OPERATION

S048528A16

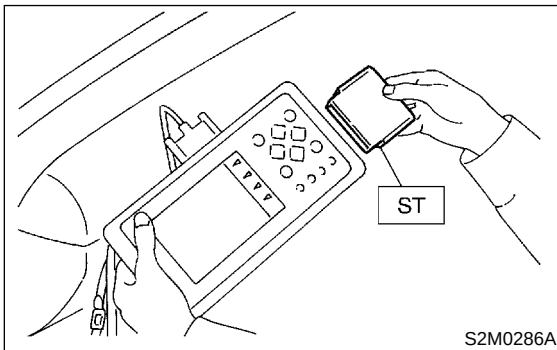
1) Prepare Subaru Select Monitor kit. <Ref. to EN(H6)-8 PREPARATION TOOL, General Description.>



S2M0285

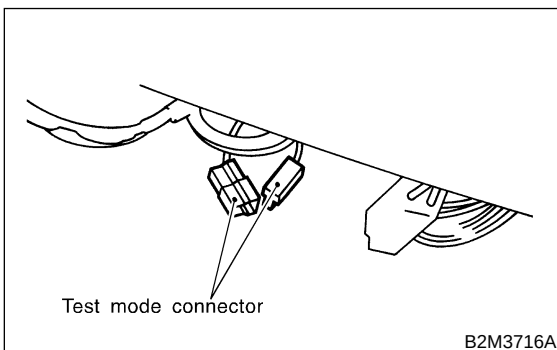
2) Connect diagnosis cable to Subaru Select Monitor.

3) Insert cartridge into Subaru Select Monitor. <Ref. to EN(H6)-8 PREPARATION TOOL, General Description.>



S2M0286A

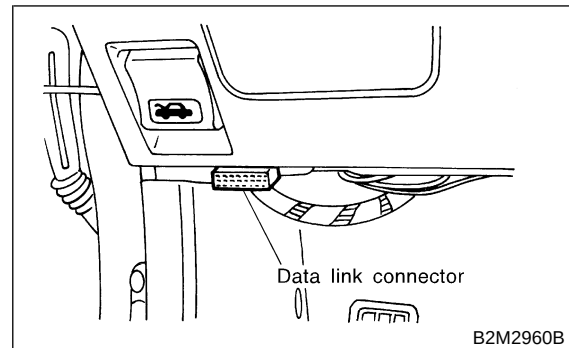
4) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



B2M3716A

5) Connect Subaru Select Monitor to data link connector.

(1) Connect Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).



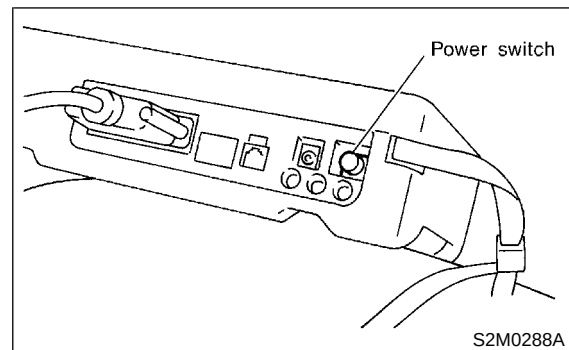
B2M2960B

(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.



S2M0288A

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 {Engine Control System} and press the [YES] key.

9) Press the [YES] key after displayed the information of engine type.

10) On the «Engine Diagnosis» display screen, select the {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.

COMPULSORY VALVE OPERATION CHECK MODE

Engine (DIAGNOSTICS)

- A list of the support data is shown in the following table.

Contents	Display
Compulsory fuel pump relay operation check	Fuel Pump Relay
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid Valve
Compulsory pressure control solenoid valve operation check	PCV Solenoid Valve
Compulsory drain valve operation check	Vent Control Solenoid Valve

NOTE:

- The following parts will be displayed but not functional because they are not installed on the vehicle.

Display
AAI Solenoid Valve
ASV Solenoid Valve
FICD Solenoid
Pressure Switching Sol. 1
Pressure Switching Sol. 2

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

COMPULSORY VALVE OPERATION CHECK MODE

Engine (DIAGNOSTICS)

MEMO:

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

15. Engine Malfunction Indicator Lamp (MIL) S048653

A: PROCEDURE S048653E45

1. Activation of check engine malfunction indicator lamp (MIL). <Ref. to EN(H6)-53 ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL), Engine Malfunction Indicator Lamp (MIL).>
↓
2. Check engine malfunction indicator lamp (MIL) does not come on. <Ref. to EN(H6)-54 CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>
↓
3. Check engine malfunction indicator lamp (MIL) does not go off. <Ref. to EN(H6)-58 CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT GO OFF., Engine Malfunction Indicator Lamp (MIL).>
↓
4. Check engine malfunction indicator lamp (MIL) does not blink at a cycle of 3 Hz. <Ref. to EN(H6)-60 CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 HZ., Engine Malfunction Indicator Lamp (MIL).>
↓
5. Check engine malfunction indicator lamp (MIL) remains blinking at a cycle of 3 Hz. <Ref. to EN(H6)-64 CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 HZ., Engine Malfunction Indicator Lamp (MIL).>

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

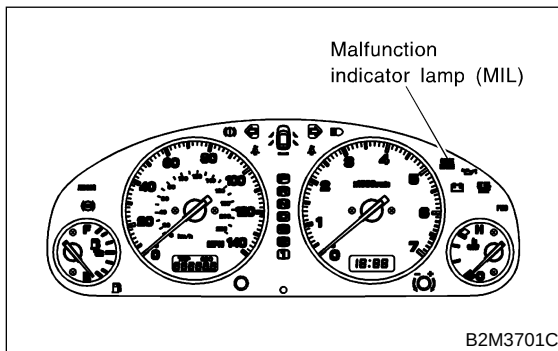
B: ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL)

S048653E89

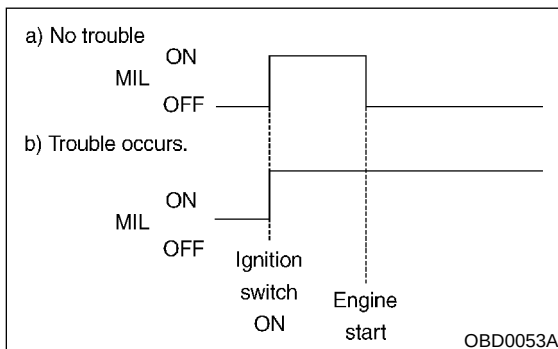
1) When ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter illuminates.

NOTE:

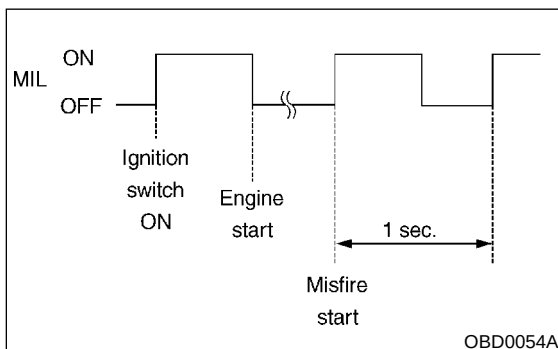
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to EN(H6)-54 CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL) Illumination Pattern.>



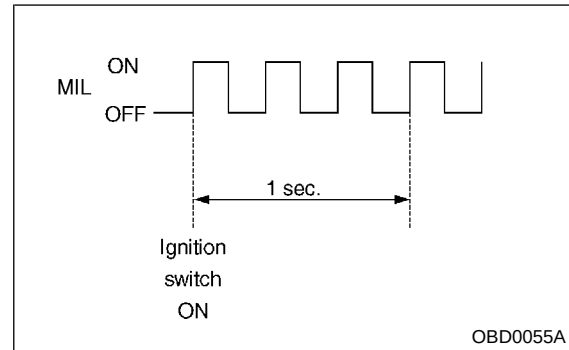
2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning.



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.



ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON.

S048653E90

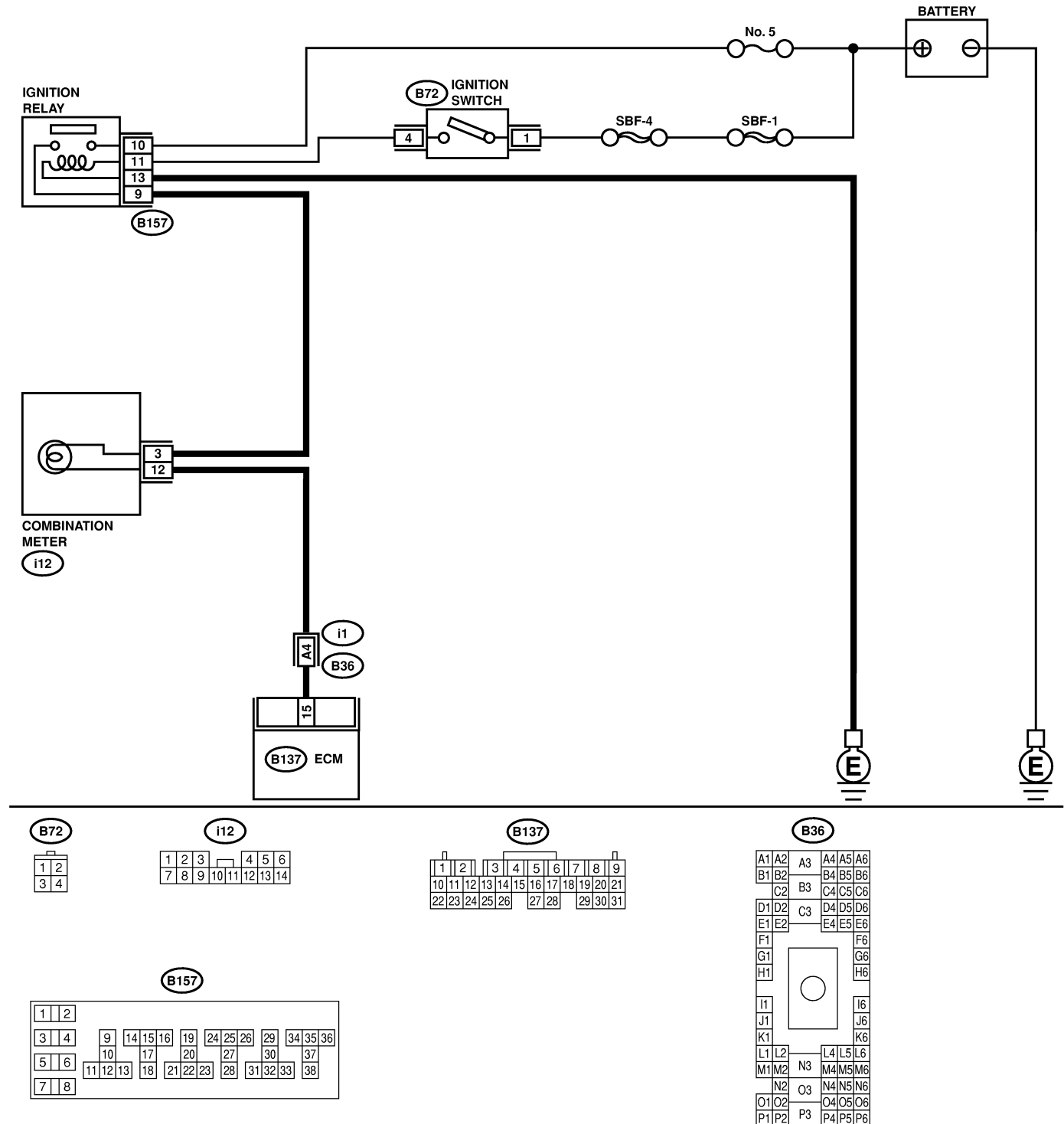
• DIAGNOSIS:

- 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:



ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 15 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 4.	Go to step 2.
2	CHECK POOR CONTACT.	Does the MIL come on when shaking or pulling ECM connector and harness?	Repair poor contact in ECM connector.	Go to step 3.
3	CHECK ECM CONNECTOR.	Is ECM connector correctly connected?	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Repair connection of ECM connector.
4	CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR. 1) Turn ignition switch to OFF. 2) Remove combination meter. <Ref. to IDI-17 Combination Meter Assembly.> 3) Disconnect connector from ECM and combination meter. 4) Measure resistance of harness between ECM and combination meter connector. Connector & terminal (B137) No. 15 — (i12) No. 12:	Is resistance less than 1 Ω ?	Go to step 5.	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
5	CHECK POOR CONTACT. Check poor contact in combination meter connector.	Is there poor contact in combination meter connector?	Repair poor contact in combination meter connector.	Go to step 6.

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR. Measure voltage between combination meter connector and chassis ground. Connector & terminal (i12) No. 3 (+) — Chassis ground (-):	Is voltage more than 10 V?	Go to step 7.	Check the following and repair if necessary. NOTE: ● Broken down ignition relay. ● Blown out fuse (No. 5). ● If replaced fuse (No. 5) blows easily, check the harness for short circuit of harness between fuse (No. 5) and ignition relay connector. ● Open or short circuit in harness between fuse (No. 5) and battery terminal ● Open circuit in harness between fuse (No. 5) and ignition relay connector ● Poor contact in ignition relay connector ● Poor contact in ignition switch connector
7	CHECK LAMP BULB. Remove engine malfunction indicator lamp bulb.	Is lamp bulb condition OK?	Repair combination meter connector.	Replace lamp bulb.

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

MEMO:

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

D: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT GO OFF. S048653E91

- **DIAGNOSIS:**

- The CHECK ENGINE malfunction indicator lamp (MIL) circuit is shorted.

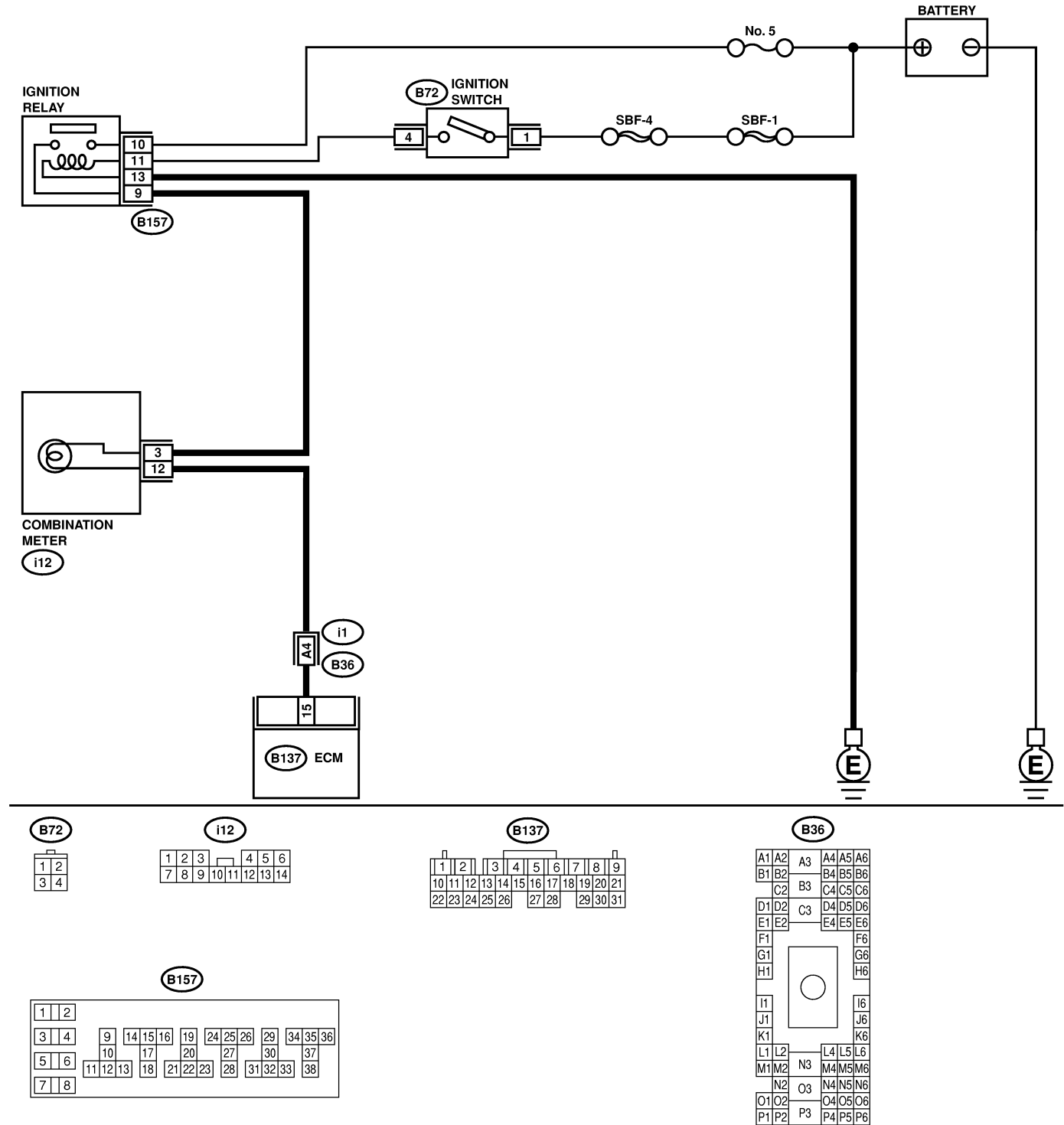
- **TROUBLE SYMPTOM:**

- Although MIL comes on when engine runs, trouble code is not shown on Subaru select monitor or OBD-II general scan tool display.

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

● WIRING DIAGRAM:



B2M4337

No.	Step	Check	Yes	No
1	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.	Does the MIL come on?	Repair short circuit in harness between combination meter and ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

E: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 Hz. S048653E92

- **DIAGNOSIS:**

- The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
- Test mode connector circuit is open.

- **TROUBLE SYMPTOM:**

- When inspection mode, MIL does not blink at a cycle of 3 Hz.

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL). 1) Turn ignition switch to OFF. 2) Disconnect test mode connector. 3) Turn ignition switch to ON. (engine OFF)	Does the MIL come on?	Go to step 2.	Repair the MIL circuit. <Ref. to EN(H6)-54 CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>
2	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.	Does the MIL come on?	Repair ground short circuit in harness between combination meter and ECM connector.	Go to step 3.
3	CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between test mode connector and chassis ground. Connector & terminal (B76) No. 1 — Chassis ground:	Is resistance less than 1 Ω ?	Go to step 4.	Repair harness and connector. NOTE: In this case, repair the following: Open circuit in harness between test mode connector and chassis ground
4	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Go to step 5.
5	CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR. 1) Connect test mode connector. 2) Measure resistance of harness between ECM and chassis ground. Connector & terminal (B134) No. 14 — Chassis ground:	Is resistance less than 1 Ω ?	Go to step 6.	Repair open circuit in harness between ECM and test mode connector.
6	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

MEMO:

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

F: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 Hz. S048653E93

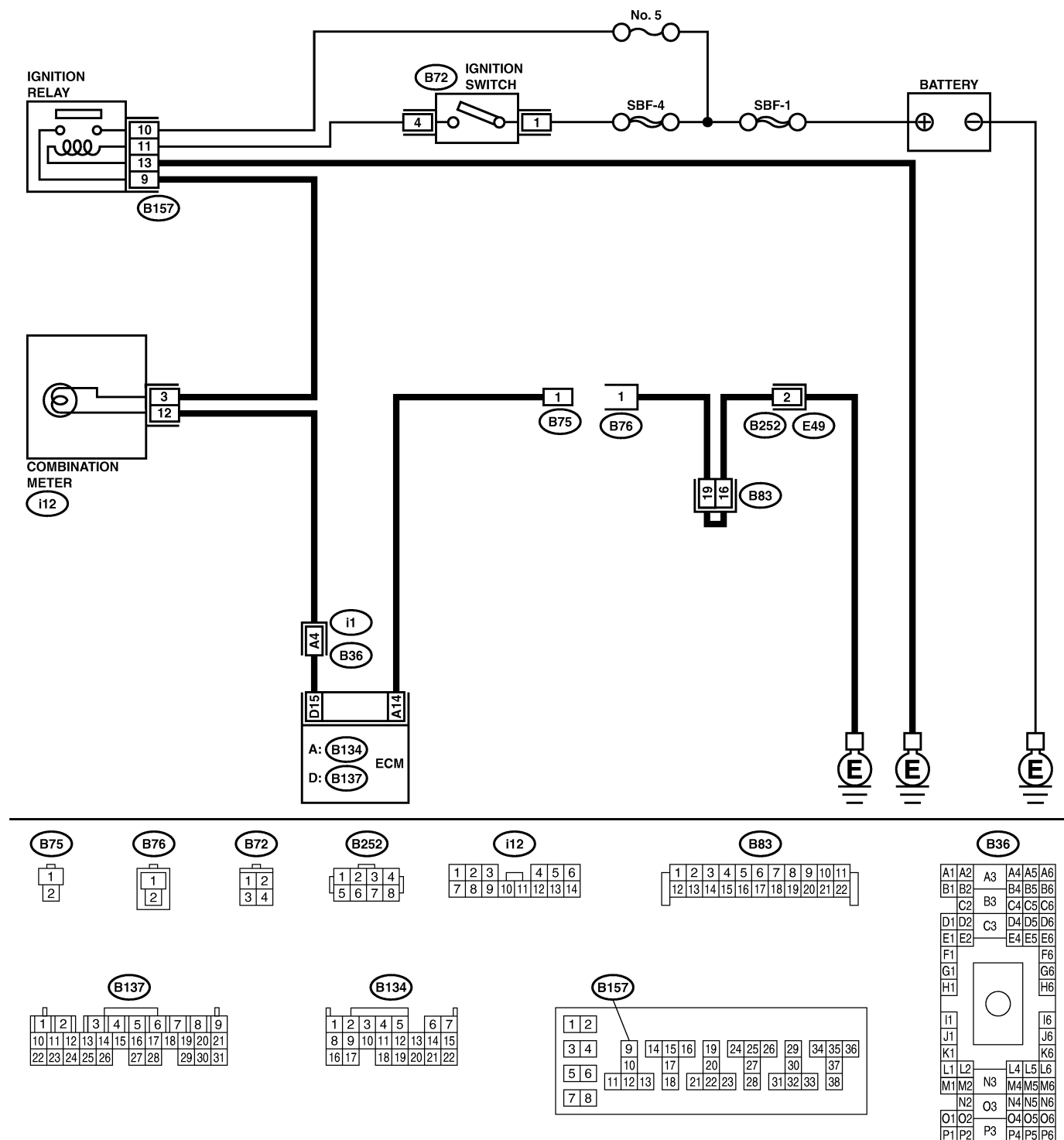
• DIAGNOSIS:

- Test mode connector circuit is shorted.

• TROUBLE SYMPTOM:

- MIL blinks at a cycle of 3 Hz when ignition switch is turned to ON.

• WIRING DIAGRAM:



ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK TEST MODE CONNECTOR. 1) Disconnect test mode connector. 2) Turn ignition switch to ON.	Does MIL flash on and off?	Go to step 2.	System is in good order. NOTE: MIL blinks at a cycle of 3 Hz when test mode connector is connected.
2	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 (B134) No. 14 — Chassis ground:	Is resistance less than 5 Ω ?	Repair short circuit in harness between ECM and test mode connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>

ENGINE MALFUNCTION INDICATOR LAMP (MIL)

Engine (DIAGNOSTICS)

MEMO:

16. Diagnostics for Engine Starting Failure

S048533

A: PROCEDURE

S048533E45

1. Inspection of starter motor circuit. <Ref. to EN(H6)-68 STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN(H6)-70 CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN(H6)-74 IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN(H6)-78 FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN(H6)-82 FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of crankshaft position sensor circuit. <Ref. to EN(H6)-86 CRANKSHAFT POSITION SENSOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
7. Inspection of camshaft position sensor circuit. <Ref. to EN(H6)-86 CAMSHAFT POSITION SENSOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
8. Inspection using Subaru Select Monitor or OBD-II general scan tool <Ref. to EN(H6)-96 Diagnostic Procedure with Diagnostic Trouble Code (DTC).> or inspection using "19. General Diagnostics Table". <Ref. to EN(H6)-362 General Diagnostic Table.>

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

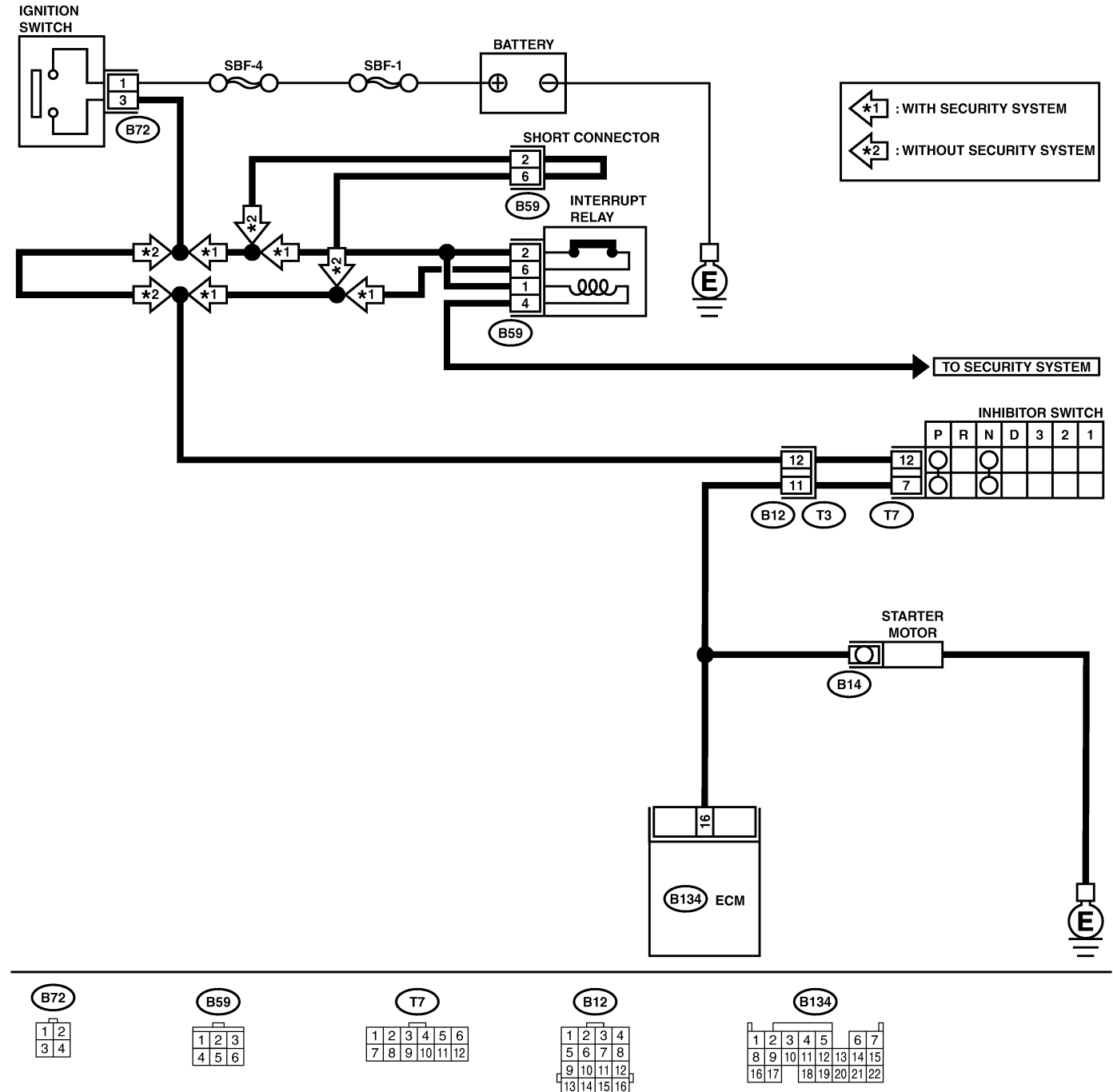
B: STARTER MOTOR CIRCUIT

S048533E94

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H6)-48 Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H6)-45 Inspection Mode.>.

● WIRING DIAGRAM:



B2M4339

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK BATTERY.	Is the voltage more than 12 V?	Go to step 2.	Charge or replace battery.
2	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: Place the selector lever in the "P" or "N" position.	Is the voltage more than 10 V?	Go to step 3.	Go to step 4.
3	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.	Is resistance less than 5 Ω ?	Check starter motor. <Ref. to SC(H6)-6, Starter.>	Repair open circuit of ground cable.
4	CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR. 1) Disconnect connector from ignition switch. 2) Measure power supply voltage between ignition switch connector and chassis ground. Connector & terminal (B72) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 5.	Repair open circuit in harness between ignition switch and battery, and check fuse SBF No. 4 and SBF No.1.
5	CHECK IGNITION SWITCH. 1) Disconnect connector from ignition switch. 2) Measure resistance between ignition switch terminals while turning ignition switch to the "ST" position. Terminals No. 1 — No. 3:	Is the resistance less than 5 Ω ?	Go to step 6.	Replace ignition switch.
6	CHECK INPUT VOLTAGE OF INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from inhibitor switch. 3) Connect connector to ignition switch. 4) Measure input voltage between inhibitor switch connector terminal and engine ground while turning ignition switch to ST. Connector & terminal (B12) No. 12 (+) — Engine ground (-):	Is the voltage more than 10 V?	Go to step 6.	Repair open or ground short circuit in harness between inhibitor switch and ignition switch. NOTE: Check security system (if equipped). <Ref. to SL-24 Security System.>
7	CHECK INHIBITOR SWITCH. 1) Place the selector lever in the "P" or "N" position. 2) Measure resistance between inhibitor switch terminals. Connector & terminal (T3) No. 11 — No. 12:	Is the resistance less than 1 Ω ?	Repair open or ground short circuit in harness between inhibitor switch and starter motor.	Replace inhibitor switch. <Ref. to AT-28 Inhibitor Switch.>

DIAGNOSTICS FOR ENGINE STARTING FAILURE

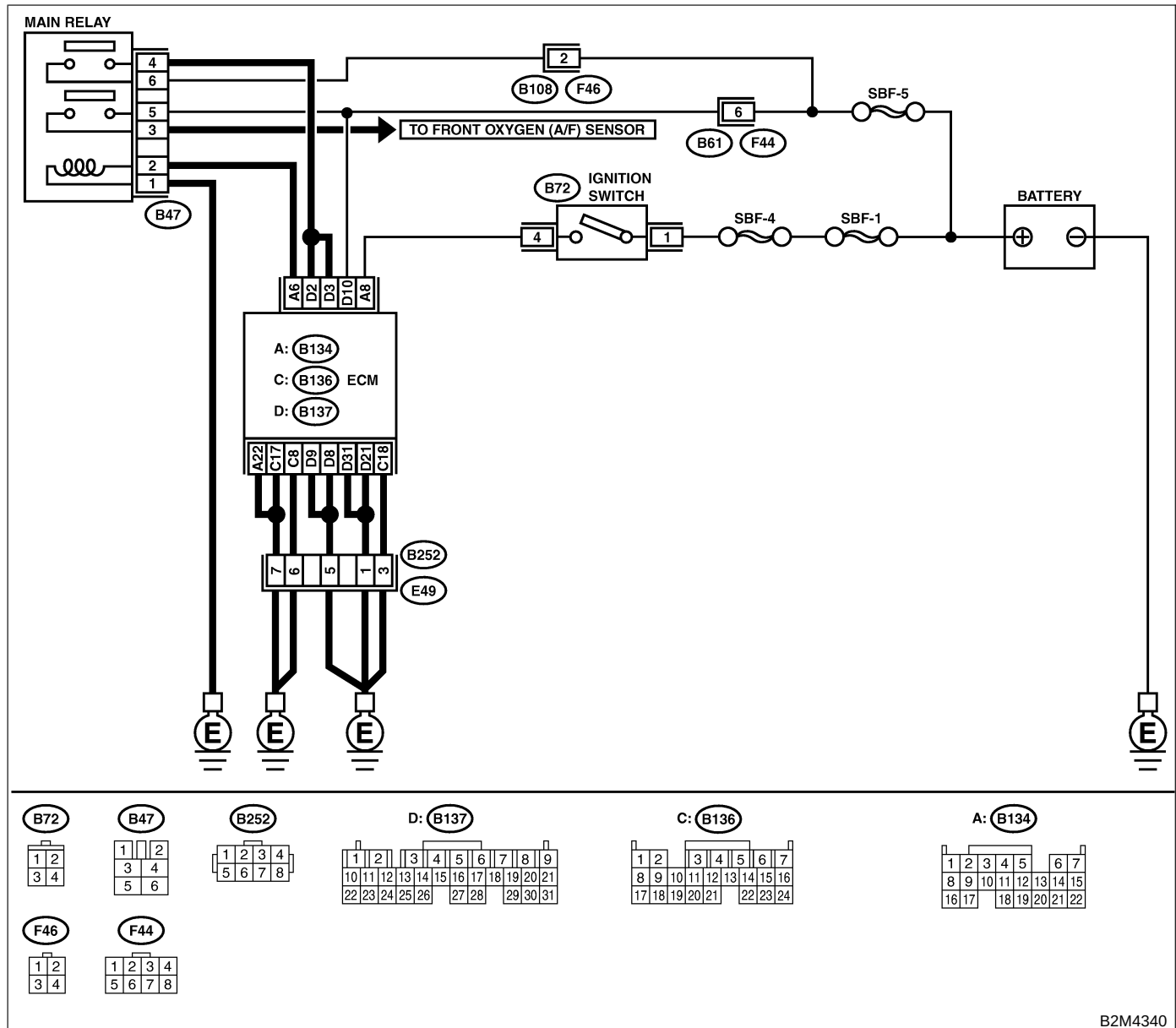
Engine (DIAGNOSTICS)

C: CONTROL MODULE POWER SUPPLY AND GROUND LINE S048533E37

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H6)-48 Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(H6)-45 Inspection Mode.>

● WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	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:	Is the resistance less than 10 Ω?	Go to step 2.	Replace main relay.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	CHECK MAIN RELAY. Measure resistance between main relay terminals. Terminals No. 4 — No. 6:	Is the resistance less than 10 Ω ?	Go to step 3.	Replace main relay.
3	CHECK GROUND CIRCUIT OF ECM. 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and chassis ground. Connector & terminal (B134) No. 22 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 4.	Repair open circuit in harness between ECM connector and engine ground terminal.
4	CHECK GROUND CIRCUIT OF ECM. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B136) No. 17 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 5.	Repair open circuit in harness between ECM connector and engine ground terminal.
5	CHECK GROUND CIRCUIT OF ECM. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B136) No. 8 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 6.	Repair open circuit in harness between ECM connector and engine ground terminal.
6	CHECK GROUND CIRCUIT OF ECM. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B137) No. 8 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 7.	Repair open circuit in harness between ECM connector and engine ground terminal.
7	CHECK GROUND CIRCUIT OF ECM. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B137) No. 9 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 8.	Repair open circuit in harness between ECM connector and engine ground terminal.
8	CHECK GROUND CIRCUIT OF TCM. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B137) No. 31 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 9.	Repair open circuit in harness between ECM connector and engine ground terminal.
9	CHECK GROUND CIRCUIT OF TCM. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B137) No. 21 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 10.	Repair open circuit in harness between ECM connector and engine ground terminal.
10	CHECK GROUND CIRCUIT OF TCM. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B136) No. 18 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 11.	Repair open circuit in harness between ECM connector and engine ground terminal.
11	CHECK INPUT VOLTAGE OF ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 10 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 12.	Repair open or ground short circuit of power supply circuit.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
12	CHECK INPUT VOLTAGE OF ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground. <i>Connector & terminal</i> (B134) No. 8 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 13.	Repair open or ground short circuit of power supply circuit.
13	CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR. 1) Turn ignition switch to OFF. 2) Measure resistance between ECM and chassis ground. <i>Connector & terminal</i> (B134) No. 6 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 14.	Repair ground short circuit in harness between ECM connector and main relay connector, then replace ECM.
14	CHECK OUTPUT VOLTAGE FROM ECM. 1) Connect connector to ECM. 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and chassis ground. <i>Connector & terminal</i> (B134) No. 6 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 15.	Replace ECM.
15	CHECK INPUT VOLTAGE OF MAIN RELAY. Check voltage between main relay connector and chassis ground. <i>Connector & terminal</i> (B47) No. 2 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 16.	Repair open circuit in harness between ECM connector and main relay connector.
16	CHECK GROUND CIRCUIT OF MAIN RELAY. 1) Turn ignition switch to OFF. 2) Measure resistance between main relay connector and chassis ground. <i>Connector & terminal</i> (B47) No. 1 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 17.	Repair open circuit between main relay and chassis ground.
17	CHECK INPUT VOLTAGE OF MAIN RELAY. Measure voltage between main relay connector and chassis ground. <i>Connector & terminal</i> (B47) No. 5 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 18.	Repair open or ground short circuit in harness of power supply circuit.
18	CHECK INPUT VOLTAGE OF MAIN RELAY. Measure voltage between main relay connector and chassis ground. <i>Connector & terminal</i> (B47) No. 6 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 19.	Repair open or ground short circuit in harness of power supply circuit.
19	CHECK INPUT VOLTAGE OF ECM. 1) Connect main relay connector. 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and chassis ground. <i>Connector & terminal</i> (B137) No. 2 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 20.	Repair open or ground short circuit in harness between ECM connector and main relay connector.
20	CHECK INPUT VOLTAGE OF ECM. Measure voltage between ECM connector and chassis ground. <i>Connector & terminal</i> (B137) No. 3 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H6)-74 IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair open or ground short circuit in harness between ECM connector and main relay connector.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

MEMO:

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

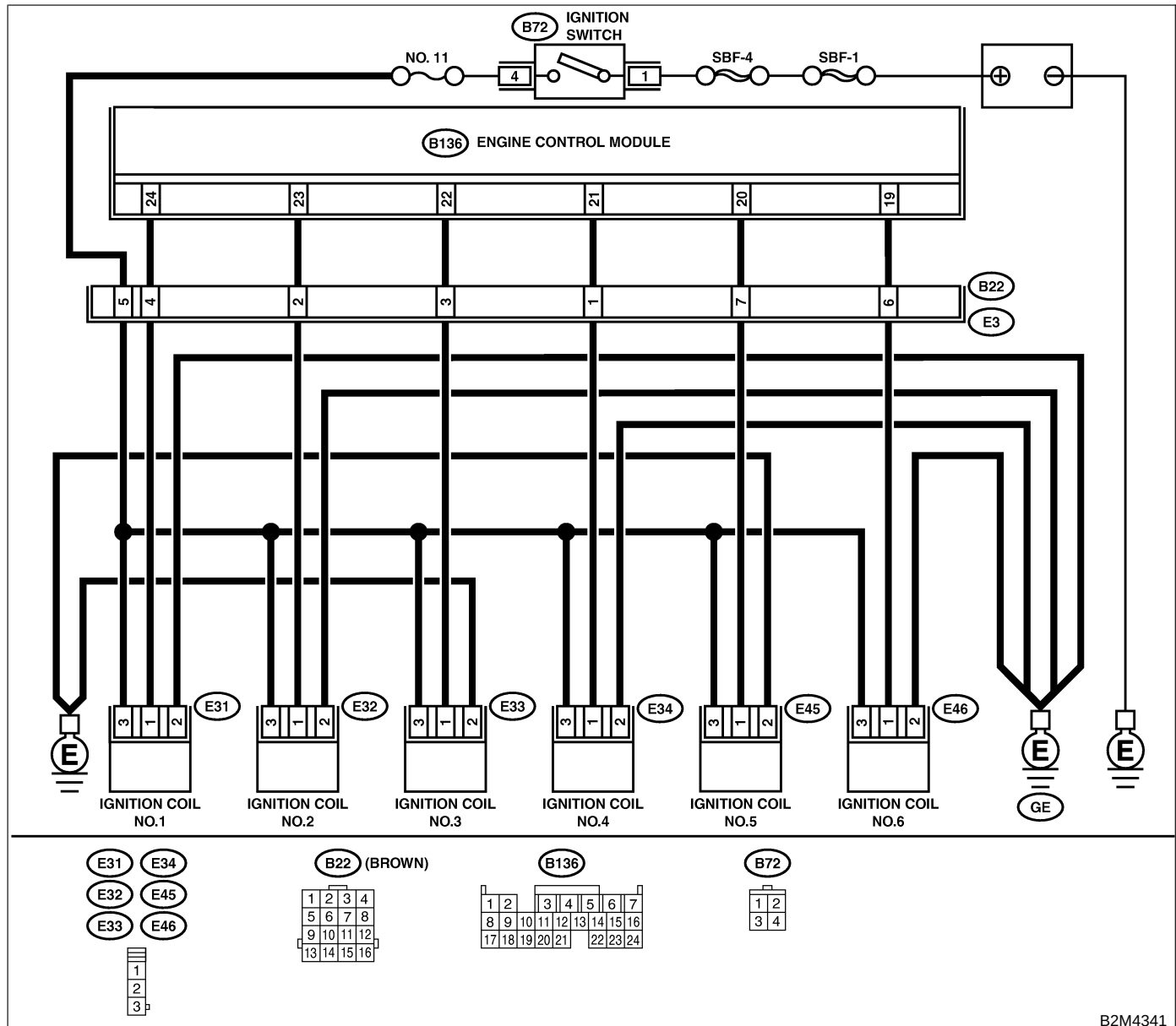
D: IGNITION CONTROL SYSTEM

S048533E95

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H6)-48 Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H6)-45 Inspection Mode.>.

● WIRING DIAGRAM:



B2M4341

No.	Step	Check	Yes	No
1	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.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H6)-78 FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step 2.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSEMBLY. 1) Turn ignition switch to OFF. 2) Disconnect connector from ignition coil & ignitor assembly. 3) Turn ignition switch to ON. 4) Measure power supply voltage between ignition coil & ignitor assembly connector and engine ground. Connector & terminal (E31) No. 3 (+) — Engine ground (-): (E32) No. 3 (+) — Engine ground (-): (E33) No. 3 (+) — Engine ground (-): (E34) No. 3 (+) — Engine ground (-): (E45) No. 3 (+) — Engine ground (-): (E46) No. 3 (+) — Engine ground (-):	Is the voltage more than 10 V?	Go to step 3.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ignition coil & ignitor assembly, and ignition switch connector ● Poor contact in coupling connectors
3	CHECK HARNESS OF IGNITION COIL & IGNITOR ASSEMBLY GROUND CIRCUIT. 1) Turn ignition switch to OFF. 2) Measure resistance between ignition coil & ignitor assembly connector and engine ground. Connector & terminal (E31) No. 2 — Engine ground: (E32) No. 2 — Engine ground: (E33) No. 2 — Engine ground: (E34) No. 2 — Engine ground: (E45) No. 2 — Engine ground: (E46) No. 2 — Engine ground:	Is the resistance between less than 5 Ω ?	Go to step 4.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ignition coil & ignitor assembly connector and engine grounding terminal
4	CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Disconnect connector from ignition coil & ignitor assembly. 4) Measure resistance of harness between ECM and ignition coil & ignitor assembly connector. Connector & terminal (B136) No. 24 — (E31) No. 1: (B136) No. 23 — (E32) No. 1: (B136) No. 22 — (E33) No. 1: (B136) No. 21 — (E34) No. 1: (B136) No. 20 — (E45) No. 1: (B136) No. 19 — (E46) No. 1:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and ignition coil & ignitor assembly connector ● Poor contact in coupling connector
5	CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR. Measure resistance of harness between ECM and engine ground. Connector & terminal: (B136) No. 24 — Engine ground: (B136) No. 23 — Engine ground: (B136) No. 22 — Engine ground: (B136) No. 21 — Engine ground: (B136) No. 20 — Engine ground: (B136) No. 19 — Engine ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly connector.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY. 1) Connect connector to ignition coil & ignitor assembly. 2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor assembly connector and engine ground. Connector & terminal <i>(E31) No. 1 (+) — Engine ground (-):</i> <i>(E32) No. 1 (+) — Engine ground (-):</i> <i>(E33) No. 1 (+) — Engine ground (-):</i> <i>(E34) No. 1 (+) — Engine ground (-):</i> <i>(E45) No. 1 (+) — Engine ground (-):</i> <i>(E46) No. 1 (+) — Engine ground (-):</i>	Is the voltage more than 10 V?	Go to step 7.	Replace ignition coil & ignitor assembly. <Ref. to IG(H6)-7, Ignition Coil and Ignitor Assembly.>
7	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Check fuel pump circuit. <Ref. to EN(H6)-78 FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

MEMO:

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

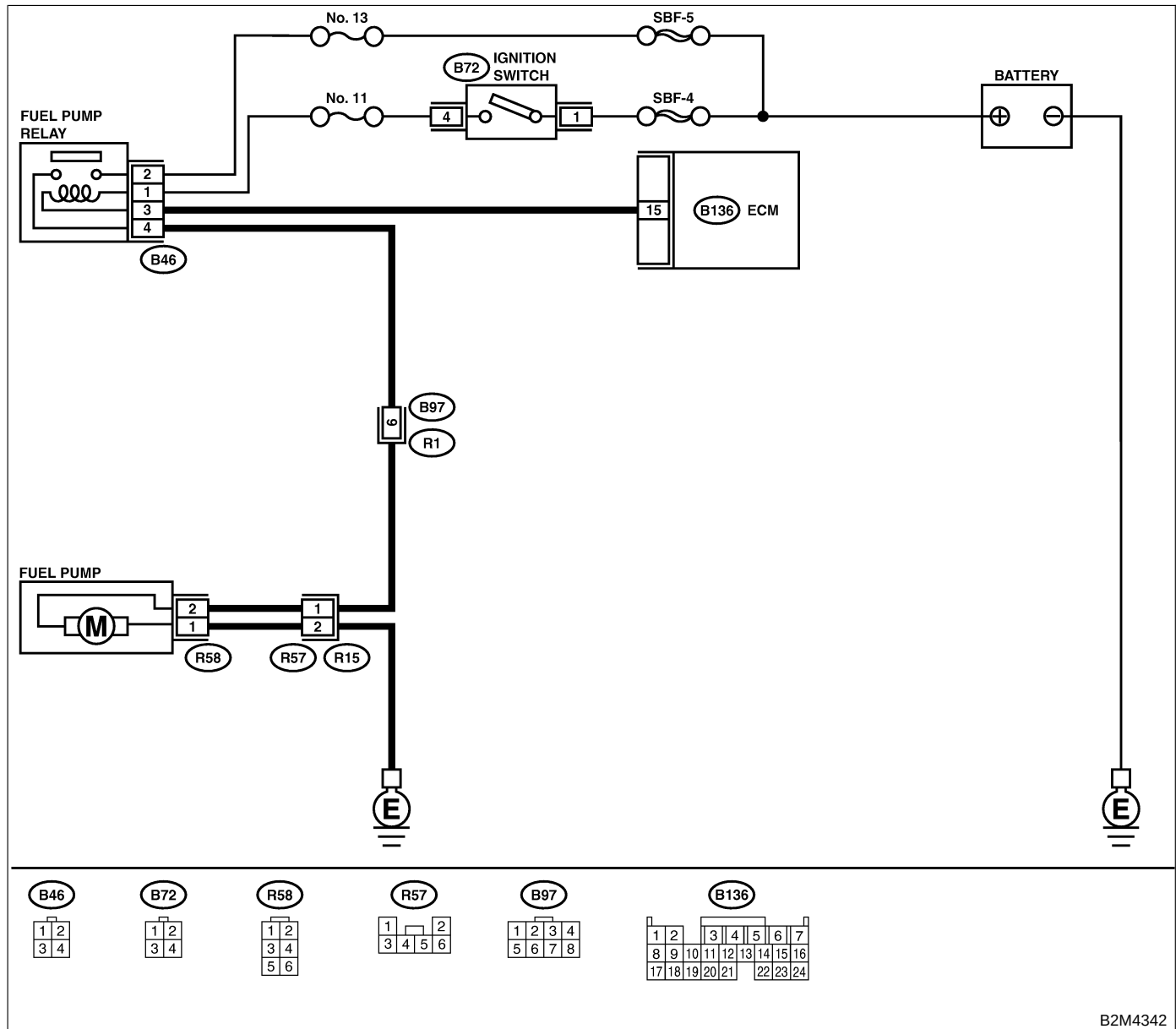
E: FUEL PUMP CIRCUIT

S048533E96

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H6)-48 Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H6)-45 Inspection Mode.>.

● WIRING DIAGRAM:



B2M4342

No.	Step	Check	Yes	No
1	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 can also be executed using Subaru Select Monitor (Function mode: FD01). For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-49 Compulsory Valve Operation Check Mode.>	Does fuel pump produce operating sound?	Check fuel injector circuit. <Ref. to EN(H6)-82 FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step 2.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	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 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. 1 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 3.	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
3	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. 2 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Replace fuel pump. <Ref. to FU(H6)-69, Fuel Pump.>	Go to step 4.
4	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. 2 — (B46) No. 4:	Is the resistance less than 1 Ω ?	Go to step 5.	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
5	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. 2 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair short circuit in harness between fuel pump and fuel pump relay connector.
6	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:	Is the resistance less than 10 Ω ?	Go to step 7.	Replace fuel pump relay. <Ref. to FU(H6)-48, Fuel Pump Relay.>

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	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 (B136) No. 15 — (B46) No. 3:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair open circuit in harness between ECM and fuel pump relay connector.
8	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Check fuel injector circuit. <Ref. to EN(H6)-82 FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

MEMO:

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

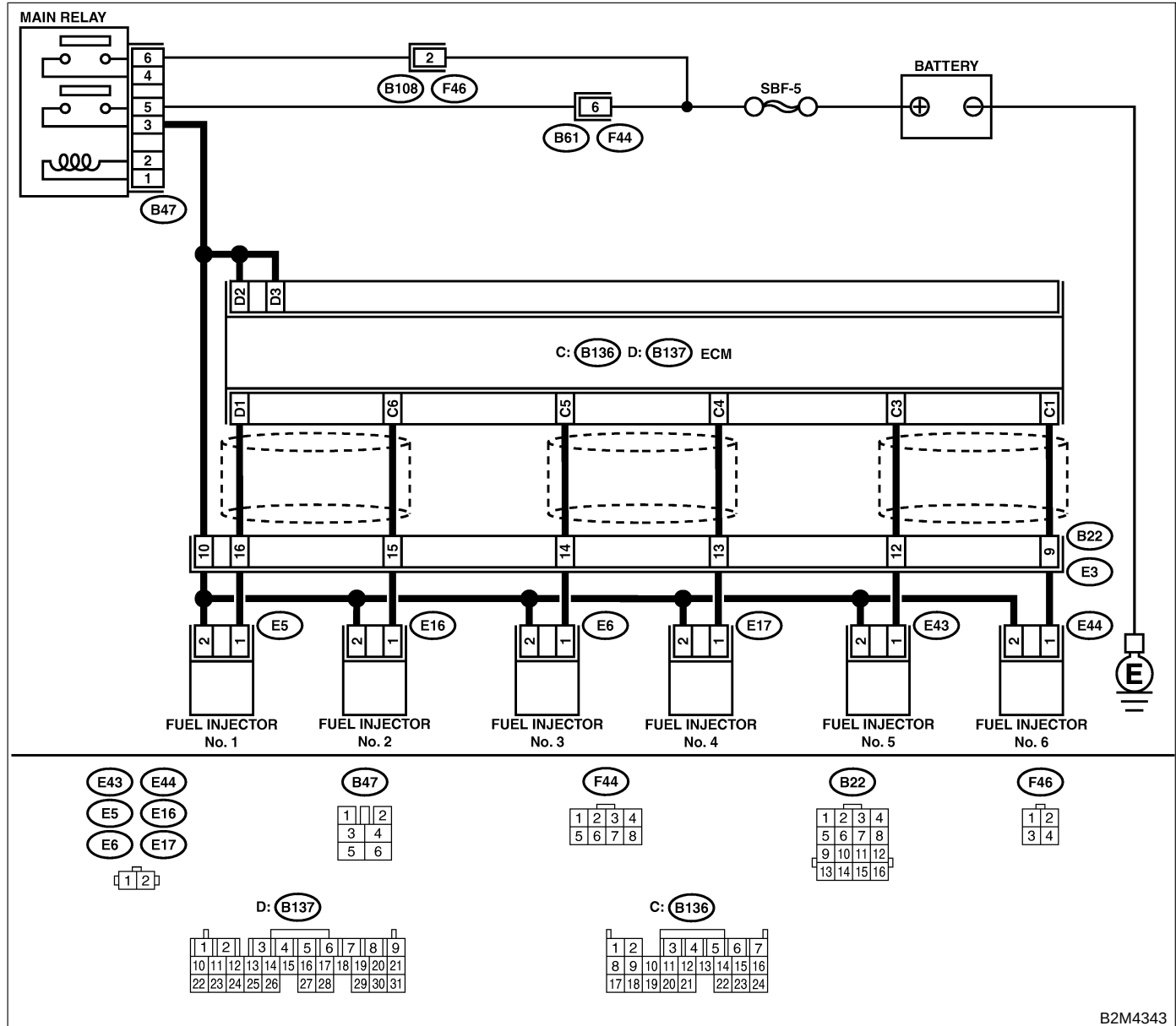
F: FUEL INJECTOR CIRCUIT

S048533E97

CAUTION:

- Check or repair only faulty parts.
- After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H6)-48 Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(H6)-45 Inspection Mode.>

• WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK OPERATION OF EACH FUEL INJECTOR. While cranking the engine, check that each fuel injector emits "operating" sound. Use a sound scope or attach a screwdriver to injector for this check.	Does the fuel injector emit "operating" sound?	Check fuel pressure. <Ref. to FU(H6)-49, Fuel.>	Go to step 2.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	CHECK POWER SUPPLY TO EACH FUEL INJECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from #1 cylinder fuel injector. 3) Turn ignition switch to ON. 4) Measure power supply voltage between the fuel injector terminal and engine ground. 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 (-): #5 (E43) No. 2 (+) — Engine ground (-): #6 (E44) No. 2 (+) — Engine ground (-):	Is the voltage more than 10 V?	Go to step 3.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between main relay and fuel injector connector ● Poor contact in main relay connector ● Poor contact in coupling connector ● Poor contact in fuel injector connector
3	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and fuel injector connector. Connector & terminal (B137) No. 1 — (B137) No. 3:	Is the resistance between 5 and 20 Ω ?	Go to step 4.	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
4	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. Connector & terminal (B137) No. 1 — Chassis ground:	Is the resistance less than 1 Ω ?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step 5.
5	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. Connector & terminal (B136) No. 6 — (B137) No. 3:	Is the resistance between 5 and 20 Ω ?	Go to step 6.	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
6	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. Connector & terminal (B136) No. 6 — Chassis ground:	Is the resistance less than 1 Ω ?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step 7.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. <i>Connector & terminal</i> <i>(B136) No. 5 — (B137) No. 3:</i>	Is the resistance between 5 and 20 Ω ?	Go to step 8.	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
8	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. <i>Connector & terminal</i> <i>(B136) No. 5 — Chassis ground:</i>	Is the resistance less than 1 Ω ?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step 9.
9	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. <i>Connector & terminal</i> <i>(B136) No. 4 — (B137) No. 3:</i>	Is the resistance between 5 and 20 Ω ?	Go to step 10.	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
10	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. <i>Connector & terminal</i> <i>(B136) No. 4 — Chassis ground:</i>	Is the resistance less than 1 Ω ?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step 11.
11	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. <i>Connector & terminal</i> <i>(B136) No. 3 — (B137) No. 3:</i>	Is the resistance between 5 and 20 Ω ?	Go to step 12.	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
12	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. <i>Connector & terminal</i> <i>(B137) No. 3 — Chassis ground:</i>	Is the resistance less than 1 Ω ?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step 13.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
13	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. Connector & terminal (B136) No. 1 — (B137) No. 3:	Is the resistance between 5 and 20 Ω ?	Go to step 14.	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
14	CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure resistance of harness between ECM and fuel injector connector. Connector & terminal (B136) No. 1 — Chassis ground:	Is the resistance less than 1 Ω ?	Repair ground short circuit in harness between ECM and fuel injector connector.	Go to step 15.
15	CHECK EACH FUEL INJECTOR. 1) Turn ignition switch to OFF. 2) Measure resistance between each fuel injector terminals. Terminals No. 1 — No. 2:	Is the resistance between 5 and 20 Ω ?	Go to step 16.	Replace faulty fuel injector.
16	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Check crankshaft position sensor circuit. <Ref. to EN(H6)-86 CRANKSHAFT POSITION SENSOR CIRCUIT, Diagnostics for Engine Starting Failure.>

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (DIAGNOSTICS)

G: CRANKSHAFT POSITION SENSOR CIRCUIT S048533E98

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H6)-48 Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H6)-45 Inspection Mode.>.

NOTE:

Check crankshaft position sensor circuit.

<Ref. to EN(H6)-204 DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

H: CAMSHAFT POSITION SENSOR CIRCUIT S048533E99

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check camshaft position sensor circuit.

<Ref. to EN(H6)-208, DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

17. List of Diagnostic Trouble Code (DTC) S048525

A: LIST S048525A12

DTC No.	Item	Index
P0031	Bank #1 and sensor #1 oxygen (A/F) sensor (front RH) heater circuit low input	<Ref. to EN(H6)-96 DTC P0031 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) HEATER CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	Bank #1 and sensor #1 oxygen (A/F) sensor (front RH) heater circuit high input	<Ref. to EN(H6)-100 DTC P0032 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) HEATER CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	Bank #1 and sensor #2 oxygen sensor (rear) heater circuit low input	<Ref. to EN(H6)-102 DTC P0037 — BANK #1 AND SENSOR #2 OXYGEN SENSOR (REAR) HEATER CIRCUIT MAL-FUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	Bank #1 and sensor #2 oxygen sensor (rear) heater circuit high input	<Ref. to EN(H6)-106 DTC P0038 — BANK #1 AND SENSOR #2 OXYGEN SENSOR (REAR) HEATER CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0051	Bank #2 and sensor #1 oxygen (A/F) sensor (front LH) heater circuit low input	<Ref. to EN(H6)-108 DTC P0051 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) HEATER CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0052	Bank #2 and sensor #1 oxygen (A/F) sensor (front LH) heater circuit high input	<Ref. to EN(H6)-112 DTC P0052 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) HEATER CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0106	Intake manifold pressure sensor circuit range/performance problem (low input)	<Ref. to EN(H6)-114 DTC P0106 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Intake manifold pressure sensor circuit low input	<Ref. to EN(H6)-116 DTC P0107 — PRESSURE SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Intake manifold pressure sensor circuit high input	<Ref. to EN(H6)-120 DTC P0108 — PRESSURE SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0111	Intake air temperature sensor circuit range/performance problem	<Ref. to EN(H6)-124 DTC P0111 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake air temperature sensor circuit low input	<Ref. to EN(H6)-126 DTC P0112 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake air temperature sensor circuit high input	<Ref. to EN(H6)-128 DTC P0113 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine coolant temperature sensor circuit low input	<Ref. to EN(H6)-132 DTC P0117 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine coolant temperature sensor circuit high input	<Ref. to EN(H6)-134 DTC P0118 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

DTC No.	Item	Index
P0121	Throttle position sensor circuit range/performance problem (high input)	<Ref. to EN(H6)-138 DTC P0121 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle position sensor circuit low input	<Ref. to EN(H6)-140 DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle position sensor circuit high input	<Ref. to EN(H6)-144 DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient coolant temperature for closed loop fuel control	<Ref. to EN(H6)-146 DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0128	Thermostat malfunction	<Ref. to EN(H6)-148 DTC P0128 — THERMOSTAT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	Bank #1 and sensor #1 oxygen (A/F) sensor (front RH) circuit range/performance problem	<Ref. to EN(H6)-149 DTC P0131 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0132	Bank #1 and sensor #1 oxygen (A/F) sensor (front RH) circuit range/performance problem	<Ref. to EN(H6)-150 DTC P0132 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	Bank #1 and sensor #1 oxygen (A/F) sensor (front RH) circuit slow response	<Ref. to EN(H6)-154 DTC P0133 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT SLOW RESPONSE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0136	Bank #1 and sensor #2 oxygen sensor circuit malfunction	<Ref. to EN(H6)-156 DTC P0136 — BANK #1 AND SENSOR #2 OXYGEN SENSOR (REAR) CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	Bank #1 and sensor #2 oxygen sensor circuit slow response	<Ref. to EN(H6)-160 DTC P0139 — BANK #1 AND SENSOR #2 OXYGEN SENSOR (REAR) CIRCUIT SLOW RESPONSE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0151	Bank #2 and sensor #1 oxygen (A/F) sensor (front LH) circuit range/performance problem	<Ref. to EN(H6)-162 DTC P0151 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0152	Bank #2 and sensor #1 oxygen (A/F) sensor (front LH) circuit range/performance problem	<Ref. to EN(H6)-164 DTC P0152 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0153	Bank #2 and sensor #1 oxygen (A/F) sensor (front LH) circuit slow response	<Ref. to EN(H6)-168 DTC P0153 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) CIRCUIT SLOW RESPONSE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	Fuel trim #1 (RH) malfunction (A/F too lean)	<Ref. to EN(H6)-170 DTC P0171 — FUEL TRIM #1 (RH) MALFUNCTION (A/F TOO LEAN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	Fuel trim #1 (RH) malfunction (A/F too rich)	<Ref. to EN(H6)-170 DTC P0172 — FUEL TRIM #1 (RH) MALFUNCTION (A/F TOO RICH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0174	Fuel trim #2 (LH) malfunction (A/F too lean)	<Ref. to EN(H6)-174 DTC P0174 — FUEL TRIM #2 (LH) MALFUNCTION (A/F TOO LEAN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

DTC No.	Item	Index
P0175	Fuel trim #2 (LH) malfunction (A/F too rich)	<Ref. to EN(H6)-174 DTC P0175 — FUEL TRIM #2 (LH) MALFUNCTION (A/F TOO RICH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0181	Fuel temperature sensor A circuit range/performance problem	<Ref. to EN(H6)-178 DTC P0181 — FUEL TEMPERATURE SENSOR A CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0182	Fuel temperature sensor A circuit low input	<Ref. to EN(H6)-180 DTC P0182 — FUEL TEMPERATURE SENSOR A CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0183	Fuel temperature sensor A circuit high input	<Ref. to EN(H6)-182 DTC P0183 — FUEL TEMPERATURE SENSOR A CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 misfire detected	<Ref. to EN(H6)-185 DTC P0301 — CYLINDER 1 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 misfire detected	<Ref. to EN(H6)-185 DTC P0302 — CYLINDER 2 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 misfire detected	<Ref. to EN(H6)-185 DTC P0303 — CYLINDER 3 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 misfire detected	<Ref. to EN(H6)-186 DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0305	Cylinder 5 misfire detected	<Ref. to EN(H6)-186 DTC P0305 — CYLINDER 5 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0306	Cylinder 6 misfire detected	<Ref. to EN(H6)-186 DTC P0306 — CYLINDER 6 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock sensor 1 circuit low input	<Ref. to EN(H6)-196 DTC P0327 — KNOCK SENSOR 1 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock sensor 1 circuit high input	<Ref. to EN(H6)-198 DTC P0328 — KNOCK SENSOR 1 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0332	Knock sensor circuit 2 low input	<Ref. to EN(H6)-200 DTC P0332 — KNOCK SENSOR 2 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0333	Knock sensor circuit 2 high input	<Ref. to EN(H6)-202 DTC P0333 — KNOCK SENSOR 2 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft position sensor circuit malfunction	<Ref. to EN(H6)-204 DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0336	Crankshaft position sensor circuit range/performance problem	<Ref. to EN(H6)-206 DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft position sensor circuit malfunction	<Ref. to EN(H6)-208 DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0341	Camshaft position sensor circuit range/performance problem	<Ref. to EN(H6)-210 DTC P0341 — CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

DTC No.	Item	Index
P0400	EGR system malfunction	<Ref. to EN(H6)-212 DTC P0400 — EGR system malfunction —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst system efficiency below threshold	<Ref. to EN(H6)-216 DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0442	Evaporative emission control system malfunction	<Ref. to EN(H6)-218 DTC P0442 — EVAPORATIVE EMIS- SION CONTROL SYSTEM MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0444	Evaporative emission control system purge control valve circuit low input	<Ref. to EN(H6)-222 DTC P0444 — EVAPORATIVE EMIS- SION CONTROL SYSTEM PURGE CONTROL VALVE CIR- CUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0445	Evaporative emission control system purge control valve circuit high input	<Ref. to EN(H6)-226 DTC P0445 — EVAPORATIVE EMIS- SION CONTROL SYSTEM PURGE CONTROL VALVE CIR- CUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0447	Evaporative emission control system vent control low input	<Ref. to EN(H6)-228 DTC P0447 — EVAPORATIVE EMIS- SION CONTROL SYSTEM VENT CONTROL LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0448	Evaporative emission control system vent control high input	<Ref. to EN(H6)-232 DTC P0448 — EVAPORATIVE EMIS- SION CONTROL SYSTEM VENT CONTROL HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0451	Evaporative emission control system pressure sensor range/performance problem	<Ref. to EN(H6)-234 DTC P0451 — EVAPORATIVE EMIS- SION CONTROL SYSTEM PRESSURE SENSOR RANGE/ PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0452	Evaporative emission control system pressure sensor low input	<Ref. to EN(H6)-236 DTC P0452 — EVAPORATIVE EMIS- SION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0453	Evaporative emission control system pressure sensor high input	<Ref. to EN(H6)-240 DTC P0453 — EVAPORATIVE EMIS- SION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0461	Fuel level sensor circuit range/performance problem	<Ref. to EN(H6)-244 DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel level sensor circuit low input	<Ref. to EN(H6)-246 DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnos- tic Trouble Code (DTC).>
P0463	Fuel level sensor circuit high input	<Ref. to EN(H6)-250 DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diag- nostic Trouble Code (DTC).>
P0464	Fuel level sensor intermittent input	<Ref. to EN(H6)-254 DTC P0464 — FUEL LEVEL SENSOR INTERMITTENT INPUT —, Diagnostic Procedure with Diag- nostic Trouble Code (DTC).>
P0480	Cooling fan relay 1 circuit low input	<Ref. to EN(H6)-256 DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnos- tic Trouble Code (DTC).>
P0483	Cooling fan function problem	<Ref. to EN(H6)-260 DTC P0483 — COOLING FAN FUNC- TION PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle speed sensor malfunction	<Ref. to EN(H6)-264 DTC P0500 — VEHICLE SPEED SEN- SOR MALFUNCTION —, Diagnostic Procedure with Diagnos- tic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

DTC No.	Item	Index
P0506	Idle control system RPM lower than expected	<Ref. to EN(H6)-266 DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0507	Idle control system RPM higher than expected	<Ref. to EN(H6)-268 DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0508	Idle control system circuit low input	<Ref. to EN(H6)-270 DTC P0508 — IDLE CONTROL SYSTEM CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0509	Idle control system circuit high input	<Ref. to EN(H6)-272 DTC P0509 — IDLE CONTROL SYSTEM CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter switch circuit high input	<Ref. to EN(H6)-274 DTC P0512 — STARTER SWITCH CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal control module memory check sum error	<Ref. to EN(H6)-278 DTC P0604 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0661	Induction valve control solenoid circuit low input (LOW)	<Ref. to EN(H6)-280 DTC P0661 — INDUCTION VALVE CONTROL SOLENOID CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0662	Induction valve control solenoid circuit high input (HIGH)	<Ref. to EN(H6)-284 DTC P0662 — INDUCTION VALVE CONTROL SOLENOID CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0703	Brake switch input malfunction	<Ref. to EN(H6)-286 DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0705	Transmission range sensor circuit malfunction	<Ref. to EN(H6)-288 DTC P0705 — TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0710	Transmission fluid temperature sensor circuit malfunction	<Ref. to EN(H6)-288 DTC P0710 — TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0715	Torque converter turbine speed sensor circuit malfunction	<Ref. to EN(H6)-288 DTC P0715 — TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output speed sensor (vehicle speed sensor 2) circuit malfunction	<Ref. to EN(H6)-289 DTC P0720 — OUTPUT SPEED SENSOR (VEHICLE SPEED SENSOR 2) CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0725	Engine speed input circuit malfunction	<Ref. to EN(H6)-289 DTC P0725 — ENGINE SPEED INPUT CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 incorrect ratio	<Ref. to EN(H6)-289 DTC P0731 — GEAR 1 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 incorrect ratio	<Ref. to EN(H6)-289 DTC P0732 — GEAR 2 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 incorrect ratio	<Ref. to EN(H6)-289 DTC P0733 — GEAR 3 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 incorrect ratio	<Ref. to EN(H6)-290 DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

DTC No.	Item	Index
P0741	Torque converter clutch system malfunction	<Ref. to EN(H6)-292 DTC P0741 — TORQUE CONVERTER CLUTCH SYSTEM MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0743	Torque converter clutch system (Lock-up duty solenoid) electrical	<Ref. to EN(H6)-294 DTC P0743 — TORQUE CONVERTER CLUTCH SYSTEM (LOCK-UP DUTY SOLENOID) ELECTRICAL —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure control solenoid (Line pressure duty solenoid) electrical	<Ref. to EN(H6)-294 DTC P0748 — PRESSURE CONTROL SOLENOID (LINE PRESSURE DUTY SOLENOID) ELECTRICAL —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift solenoid A (Shift solenoid 1) electrical	<Ref. to EN(H6)-294 DTC P0753 — SHIFT SOLENOID A (SHIFT SOLENOID 1) ELECTRICAL —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift solenoid B (Shift solenoid 2) electrical	<Ref. to EN(H6)-295 DTC P0758 — SHIFT SOLENOID B (SHIFT SOLENOID 2) ELECTRICAL —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0778	2-4 brake pressure control solenoid valve circuit malfunction	<Ref. to EN(H6)-295 DTC P0778 — 2-4 BRAKE PRESSURE CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0785	2-4 brake timing control solenoid valve circuit malfunction	<Ref. to EN(H6)-295 DTC P0785 — 2-4 BRAKE TIMING CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1110	Atmospheric pressure sensor low input	<Ref. to EN(H6)-296 DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1111	Atmospheric pressure sensor high input	<Ref. to EN(H6)-296 DTC P1111 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1112	Atmospheric pressure sensor range/performance problem	<Ref. to EN(H6)-297 DTC P1112 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1130	Bank #1 and sensor #1 oxygen (A/F) sensor (front RH) circuit malfunction (open circuit)	<Ref. to EN(H6)-298 DTC P1130 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT MALFUNCTION (OPEN CIRCUIT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1131	Bank #1 and sensor #1 oxygen (A/F) sensor (front RH) circuit malfunction (short circuit)	<Ref. to EN(H6)-300 DTC P1131 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT MALFUNCTION (SHORT CIRCUIT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1134	Front oxygen (A/F) sensor micro-computer problem	<Ref. to EN(H6)-302 DTC P1134 — FRONT OXYGEN (A/F) SENSOR MICRO-COMPUTER PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1135	Bank #2 and sensor #1 oxygen (A/F) sensor (front LH) circuit malfunction (open circuit)	<Ref. to EN(H6)-304 DTC P1135 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) CIRCUIT MALFUNCTION (OPEN CIRCUIT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1136	Bank #2 and sensor #1 oxygen (A/F) sensor (front LH) circuit malfunction (short circuit)	<Ref. to EN(H6)-306 DTC P1136 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) CIRCUIT MALFUNCTION (SHORT CIRCUIT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1139	Bank #1 and sensor #1 oxygen (A/F) sensor (front RH) heater circuit range/performance problem	<Ref. to EN(H6)-308 DTC P1139 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) HEATER CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

DTC No.	Item	Index
P1140	Bank #2 and sensor #1 oxygen (A/F) sensor (front LH) heater circuit range/performance problem	<Ref. to EN(H6)-310 DTC P1140 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) HEATER CIRCUIT RANGE/PERFORMANCE PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1142	Throttle position sensor circuit range/performance problem (low input)	<Ref. to EN(H6)-312 DTC P1142 — THROTTLE POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1146	Pressure sensor circuit range/performance problem (high input)	<Ref. to EN(H6)-314 DTC P1146 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1400	Fuel tank pressure control solenoid valve circuit low input	<Ref. to EN(H6)-316 DTC P1400 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1420	Fuel tank pressure control solenoid valve circuit high input	<Ref. to EN(H6)-320 DTC P1420 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1443	Evaporative emission control system vent control function problem	<Ref. to EN(H6)-322 DTC P1443 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL FUNCTION PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1480	Cooling fan relay 1 circuit high input	<Ref. to EN(H6)-324 DTC P1480 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1507	Idle control system malfunction (fail-safe)	<Ref. to EN(H6)-328 DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter switch circuit low input	<Ref. to EN(H6)-330 DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-up voltage circuit malfunction	<Ref. to EN(H6)-334 DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1590	Neutral position switch circuit high input	<Ref. to EN(H6)-336 DTC P1590 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1591	Neutral position switch circuit low input	<Ref. to EN(H6)-340 DTC P1591 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1594	Automatic transmission diagnosis input signal circuit malfunction	<Ref. to EN(H6)-342 DTC P1594 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1595	Automatic transmission diagnosis input signal circuit low input	<Ref. to EN(H6)-344 DTC P1595 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1596	Automatic transmission diagnosis input signal circuit high input	<Ref. to EN(H6)-346 DTC P1596 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1698	Engine torque control cut signal circuit low input	<Ref. to EN(H6)-348 DTC P1698 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1699	Engine torque control cut signal circuit high input	<Ref. to EN(H6)-350 DTC P1699 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

DTC No.	Item	Index
P1700	Throttle position sensor circuit malfunction for automatic transmission	<Ref. to EN(H6)-352 DTC P1700 — THROTTLE POSITION SENSOR CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1701	Cruise control set signal circuit malfunction for automatic transmission	<Ref. to EN(H6)-354 DTC P1701 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AUTOMATIC TRANSMISSION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1703	Low clutch timing control solenoid valve circuit malfunction	<Ref. to EN(H6)-356 DTC P1703 — LOW CLUTCH TIMING CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1711	Engine torque control signal 1 circuit malfunction	<Ref. to EN(H6)-358 DTC P1711 — ENGINE TORQUE CONTROL SIGNAL 1 CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1712	Engine torque control signal 2 circuit malfunction	<Ref. to EN(H6)-360 DTC P1712 — ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

MEMO:

18. Diagnostic Procedure with Diagnostic Trouble Code (DTC) S048521

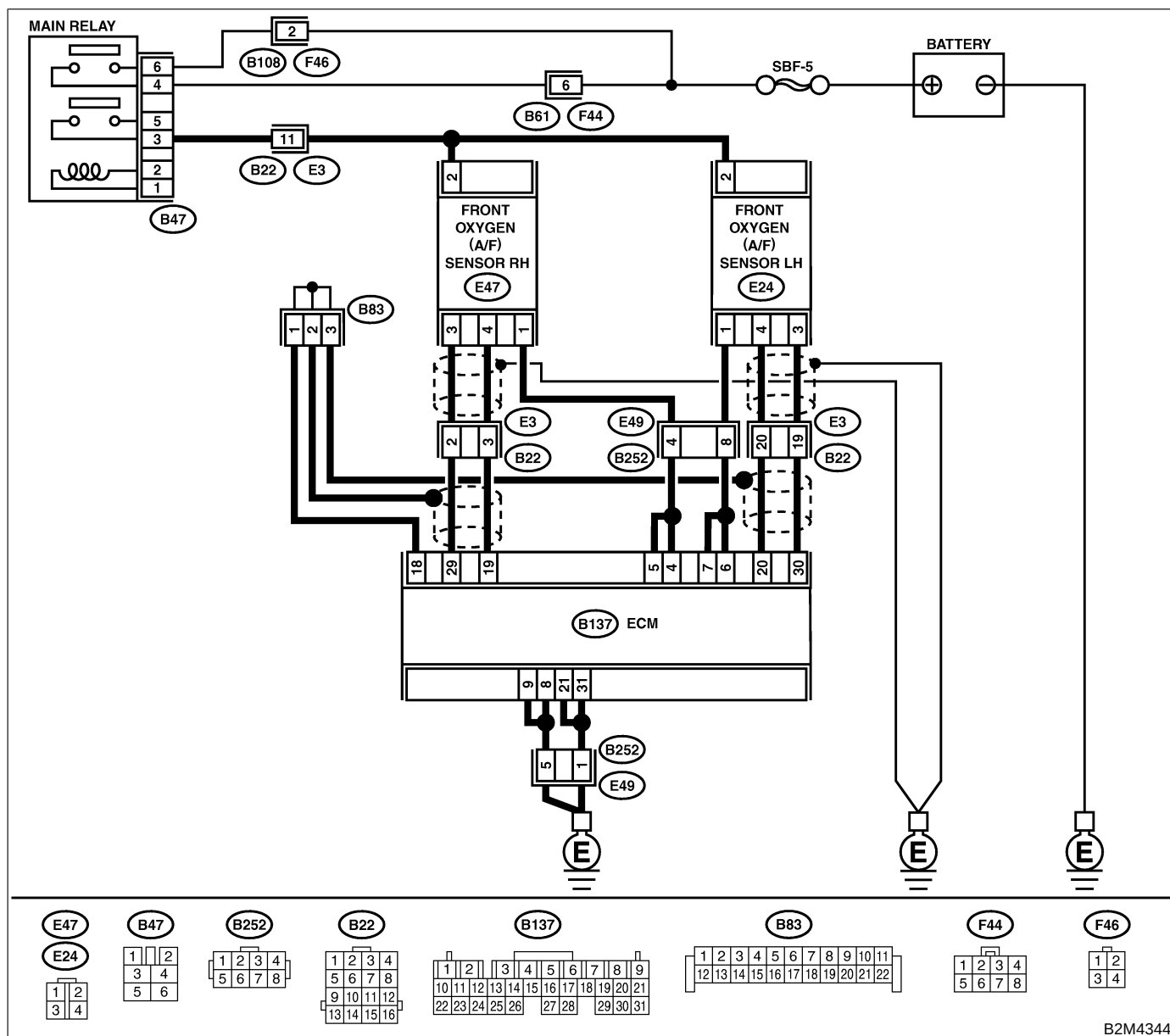
A: DTC P0031 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) HEATER CIRCUIT LOW INPUT — S048521H21

- DTC DETECTING CONDITION:
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● WIRING DIAGRAM:



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0031, 0051 and P0037 at the same time?	Go to step 2.	Go to step 3.
2	CHECK GROUND CIRCUIT OF ECM. Measure resistance of harness between ECM connector and chassis ground. Connector & terminal (B137) No. 31 — Chassis ground: (B137) No. 21 — Chassis ground: (B137) No. 8 — Chassis ground: (B137) No. 9 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 6.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and engine ground terminal ● Poor contact in ECM connector Poor contact in coupling connector
3	CHECK CURRENT DATA. 1) Start engine 2) Read data of front oxygen (A/F) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 0.2 A?	Repair poor contact in connector. NOTE: In this case, repair the following: ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in ECM connector	Go to step 4.
4	CHECK OUTPUT SIGNAL FROM ECM. 1) Start and idle the engine. 2) Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 4 (+) — Chassis ground (-):	Is the voltage less than 1.0 V?	Go to step 6.	Go to step 5.
5	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 4 (+) — Chassis ground (-):	Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Go to step 6.
6	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 5 (+) — Chassis ground (-):	Is the voltage less than 1.0 V?	Go to step 8.	Go to step 7.
7	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 5 (+) — Chassis ground (-):	Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Go to step 8.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from front oxygen (A/F) sensor. 3) Turn ignition switch to ON. 4) Measure voltage between front oxygen (A/F) sensor connector and engine ground. Connector & terminal (E47) No. 2 (+) — Engine ground (-):	Is the voltage more than 10 V?	Go to step 9.	Repair power supply line. NOTE: In this case, repair the following: ● Open circuit in harness between main relay and front oxygen (A/F) sensor connector ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in main relay connector
9	CHECK FRONT OXYGEN (A/F) SENSOR. 1) Turn ignition switch to OFF. 2) Measure resistance between front oxygen (A/F) sensor connector terminals. Terminals (E47) No. 2 — No. 1:	Is the resistance less than 10 Ω ?	Repair harness and connector. NOTE: In this case, repair the following: ● Open or ground short circuit in harness between front oxygen (A/F) sensor and ECM connector ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in ECM connector	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

MEMO:

Engine (DIAGNOSTICS)

S048521H22

- After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.**

MAIN RELAY

BATTERY

SBF-5

FRONT OXYGEN (A/F) SENSOR RH

FRONT OXYGEN (A/F) SENSOR LH

ECM (B137)

Connectors and Pin Configurations:

- B108:** 6, 4, 5, 3, 2, 1
- B46:** 2
- B61:** 6
- F44:** 1, 2, 3, 4
- B22:** 1, 2, 3, 4, 5, 6, 7, 8
- E3:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
- B47:** 1, 2, 3, 4, 5, 6
- B83:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
- B252:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
- E49:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
- E24:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
- E47:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 4 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 3.	Go to step 2.
2	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 5 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 3.	Go to step 4.
3	CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT. 1) Turn ignition switch to OFF. 2) Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn ignition switch to ON. 4) Read data of front oxygen (A/F) sensor heater current 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 2.3 A?	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	END
4	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 4 (+) — Chassis ground (-):	Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	Go to step 5.
5	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 5 (+) — Chassis ground (-):	Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	END

**C: DTC P0037 — BANK #1 AND SENSOR #2 OXYGEN SENSOR (REAR)
HEATER CIRCUIT LOW INPUT —** S048521H23

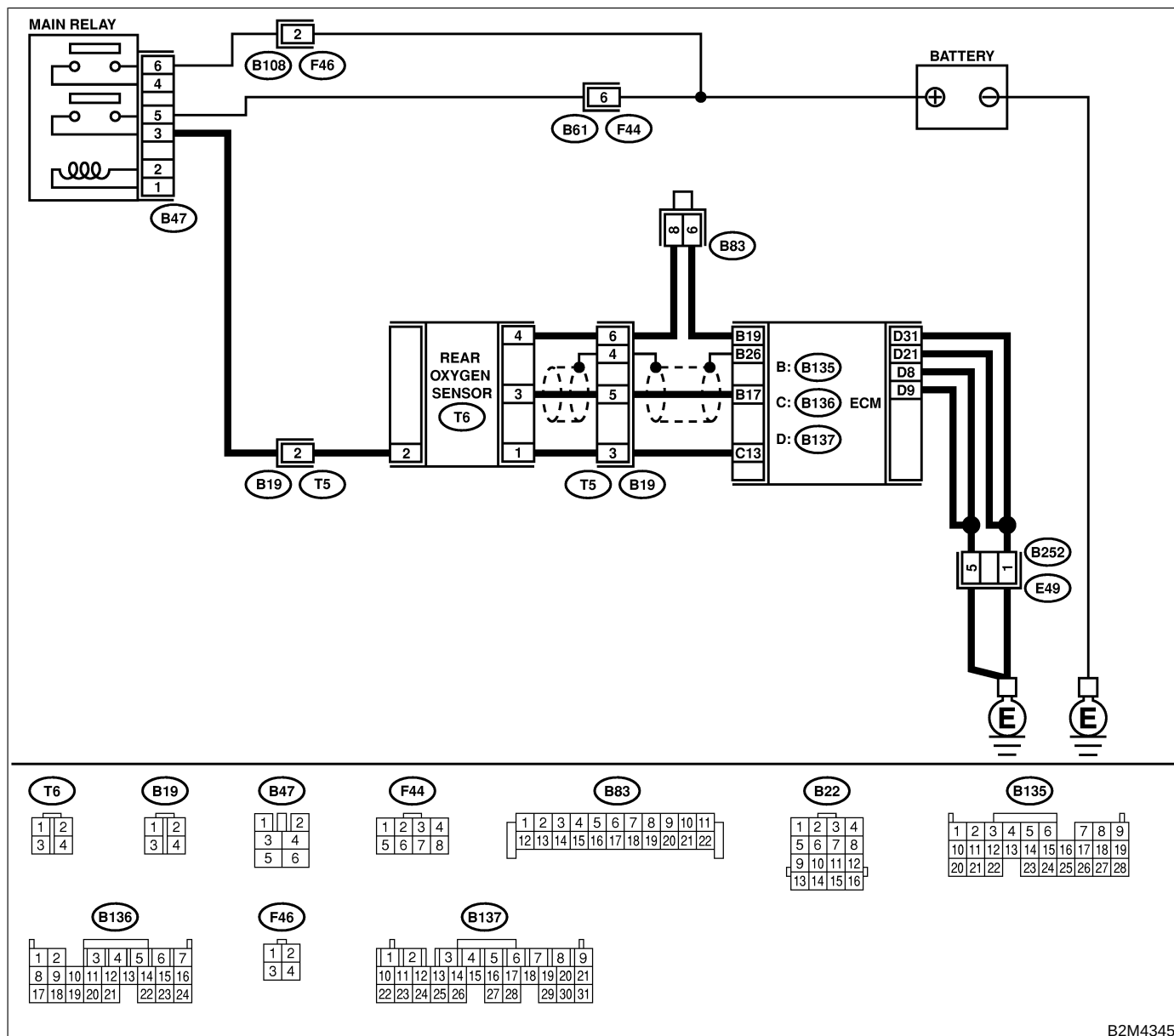
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4345

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK GROUND CIRCUIT OF ECM. 1) Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and engine ground terminal ● Poor contact in ECM connector ● Poor contact in coupling connector (B22) 2) Measure resistance of harness between ECM connector and chassis ground. Connector & terminal (B137) No. 31 — Chassis ground: (B137) No. 21 — Chassis ground: (B137) No. 8 — Chassis ground: (B137) No. 9 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 2.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and engine ground terminal ● Poor contact in ECM connector ● Poor contact in coupling connector
2	CHECK CURRENT DATA. 1) Start engine. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 0.2 A?	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	Go to step 3.
3	CHECK OUTPUT SIGNAL FROM ECM. 1) Start and idle the engine. 2) Measure voltage between ECM connector and chassis ground. Connector & terminal (B136) No. 13 (+) — Chassis ground (-):	Is the voltage less than 1.0 V?	Go to step 6.	Go to step 4.
4	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B136) No. 13 (+) — Chassis ground (-):	Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Go to step 5.
5	CHECK OUTPUT SIGNAL FROM ECM. 1) Disconnect connector from rear oxygen sensor. 2) Measure voltage between ECM connector and chassis ground. Connector & terminal (B136) No. 13 (+) — Chassis ground (-):	Is the voltage less than 1.0 V?	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Repair battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace ECM. <Ref. to FU(H6)-67 Engine Control Module.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	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 (-):	Is the voltage more than 10 V?	Go to step 7.	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 coupling connector
7	CHECK REAR OXYGEN SENSOR. 1) Turn ignition switch to OFF. 2) Measure resistance between rear oxygen sensor connector terminals. Terminals No. 1 — No. 2:	Is the resistance less than 30 Ω?	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 coupling connector	Replace rear oxygen sensor. <Ref. to FU(H6)-45, Rear Oxygen Sensor.>

MEMO:

**D: DTC P0038 — BANK #1 AND SENSOR #2 OXYGEN SENSOR (REAR)
HEATER CIRCUIT HIGH INPUT —** S048521H24

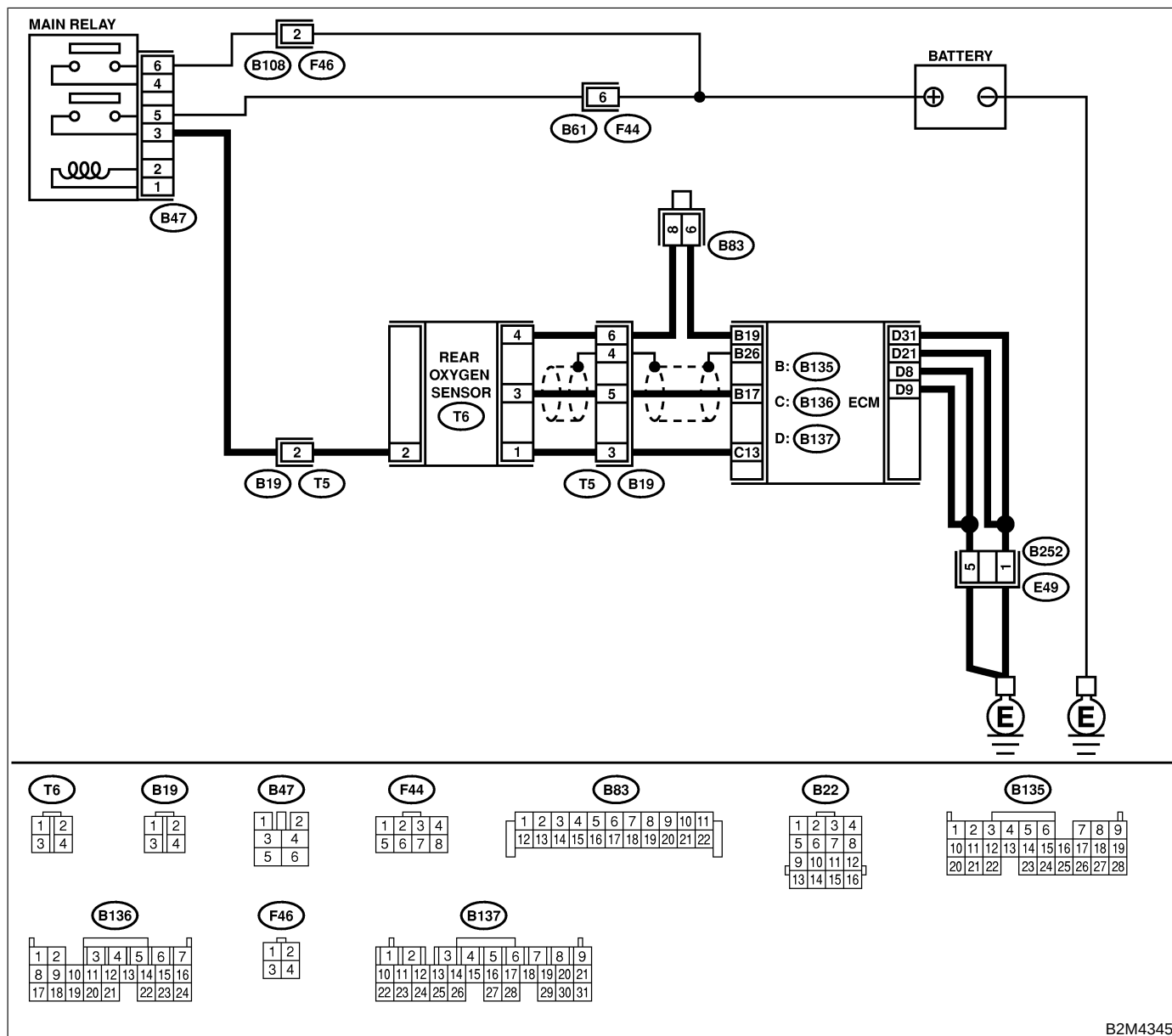
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4345

No.	Step	Check	Yes	No
1	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B136) No. 13 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 2.	Go to step 3.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	CHECK CURRENT DATA. 1) Turn ignition switch to OFF. 2) Repair battery short circuit in harness between ECM and rear oxygen sensor connector. 3) Turn ignition switch to ON. 4) Read data of rear oxygen sensor heater current 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 7 A?	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	END
3	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	END

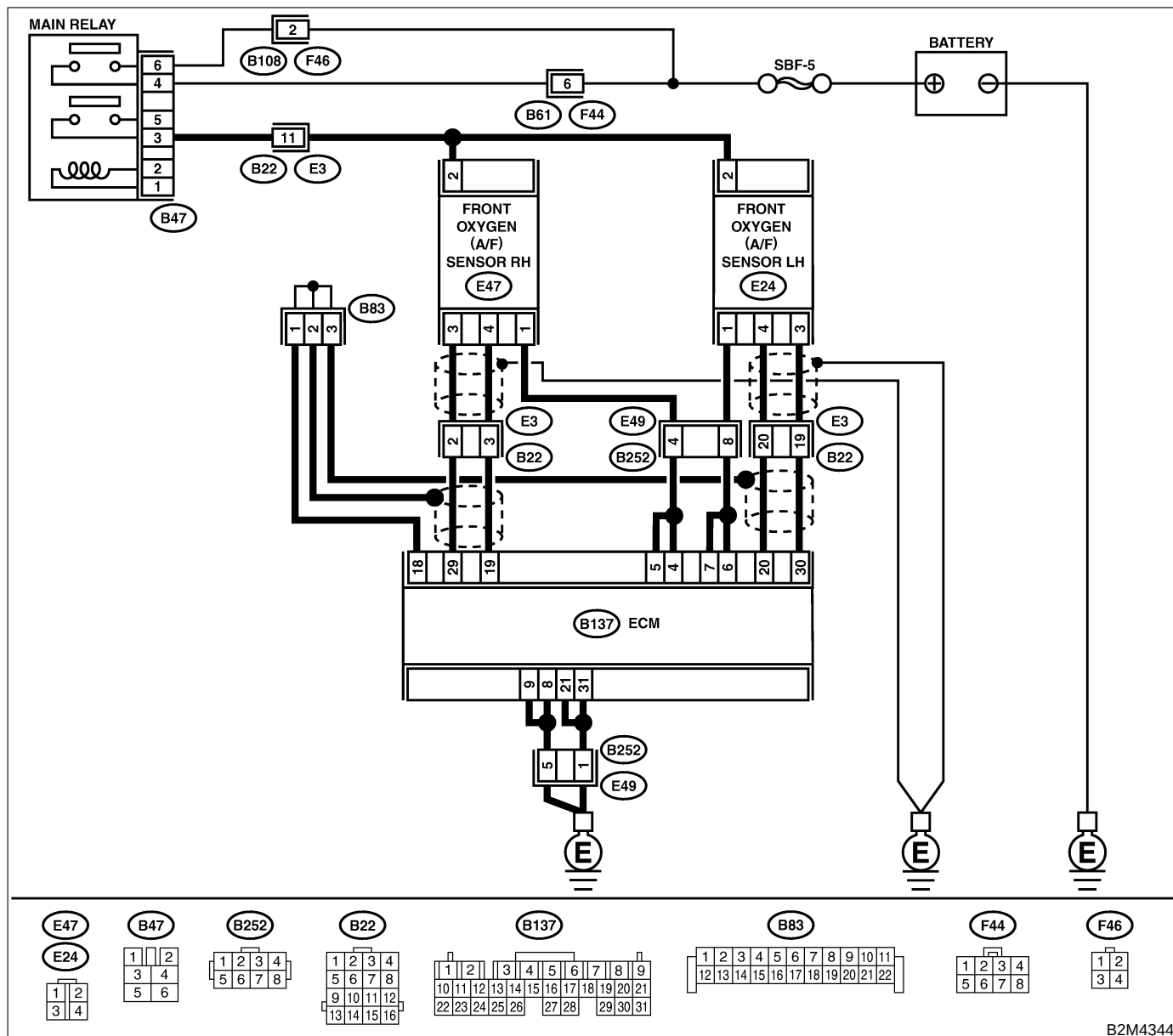
**E: DTC P0051 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR
(FRONT LH) HEATER CIRCUIT LOW INPUT —** S048521H25

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0031, P0051 and P0037 at the same time?	Go to step 2.	Go to step 3.
2	CHECK GROUND CIRCUIT OF ECM. Measure resistance of harness between ECM connector and chassis ground. Connector & terminal (B137) No. 31 — Chassis ground: (B137) No. 21 — Chassis ground: (B137) No. 8 — Chassis ground: (B137) No. 9 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 3.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and engine ground terminal ● Poor contact in ECM connector Poor contact in coupling connector
3	CHECK CURRENT DATA. 1) Start engine 2) Read data of front oxygen (A/F) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 0.2 A?	Repair poor contact in connector. NOTE: In this case, repair the following: ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in ECM connector	Go to step 4.
4	CHECK OUTPUT SIGNAL FROM ECM. 1) Start and idle the engine. 2) Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 7 (+) — Chassis ground (-):	Is the voltage less than 1.0 V?	Go to step 6.	Go to step 5.
5	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 7 (+) — Chassis ground (-):	Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Go to step 6.
6	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 6 (+) — Chassis ground (-):	Is the voltage less than 1.0 V?	Go to step 8.	Go to step 7.
7	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 6 (+) — Chassis ground (-):	Does the voltage change less than 1.0 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Go to step 7.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from front oxygen (A/F) sensor. 3) Turn ignition switch to ON. 4) Measure voltage between front oxygen (A/F) sensor connector and engine ground. Connector & terminal (E24) No. 2 (+) — Engine ground (-):	Is the voltage more than 10 V?	Go to step 9.	Repair power supply line. NOTE: In this case, repair the following: ● Open circuit in harness between main relay and front oxygen (A/F) sensor connector ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in main relay connector
9	CHECK FRONT OXYGEN (A/F) SENSOR. 1) Turn ignition switch to OFF. 2) Measure resistance between front oxygen (A/F) sensor connector terminals. Terminals No. 2 — No. 1:	Is the resistance less than 10 Ω?	Repair harness and connector. NOTE: In this case, repair the following: ● Open or ground short circuit in harness between front oxygen (A/F) sensor and ECM connector ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in ECM connector	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

MEMO:

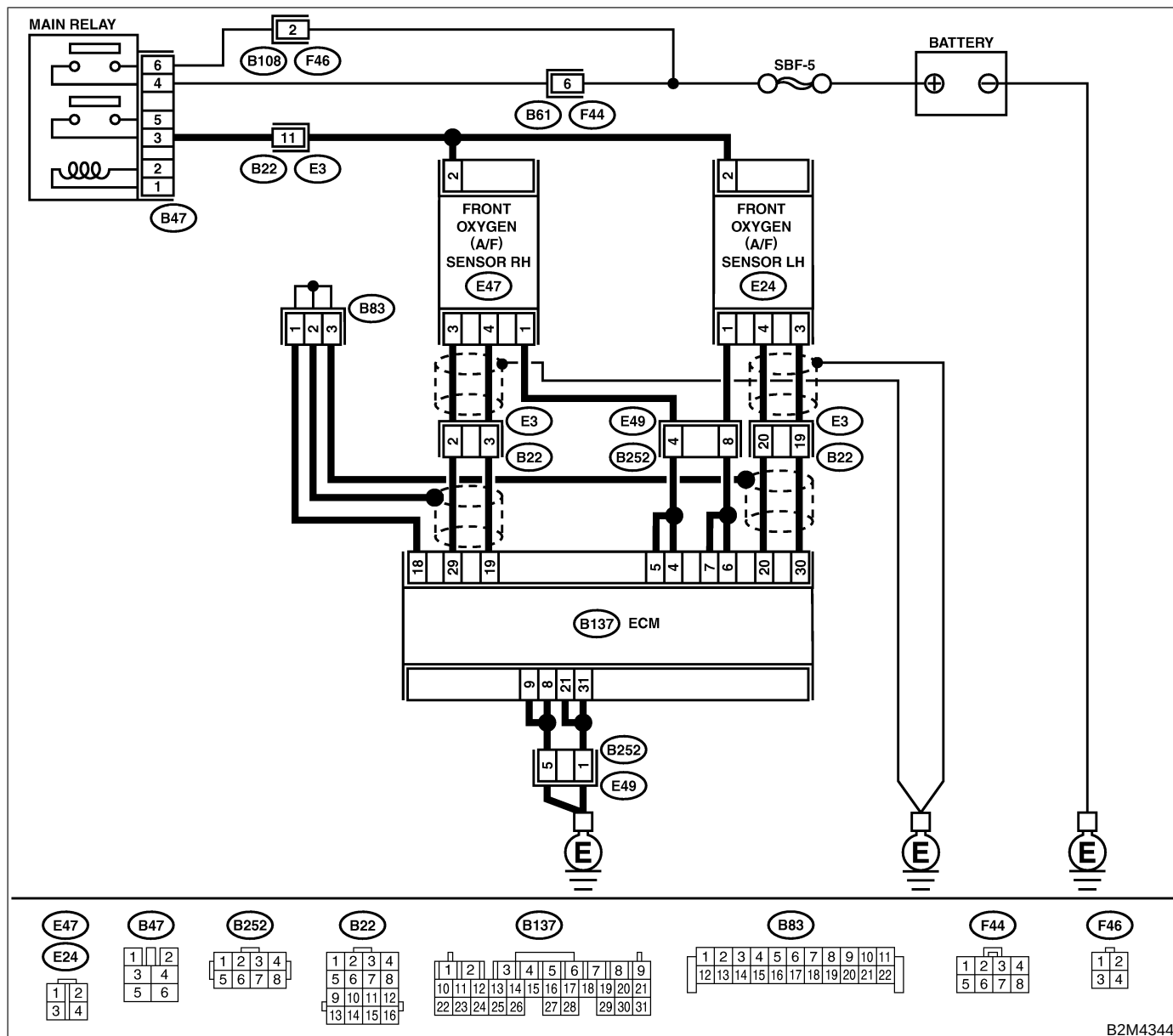
**F: DTC P0052 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR
(FRONT LH) HEATER CIRCUIT HIGH INPUT —** S048521H26

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 6 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 3.	Go to step 2.
2	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 7 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 3.	Go to step 4.
3	CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT. 1) Turn ignition switch to OFF. 2) Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn ignition switch to ON. 4) Read data of front oxygen (A/F) sensor heater current 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 FOR ENGINE". <Ref. to EN(H6)-37, Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 2.3 A?	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	END
4	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 6 (+) — Chassis ground (-):	Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	Go to step 5.
5	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 7 (+) — Chassis ground (-):	Does the voltage change more than 8 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	END

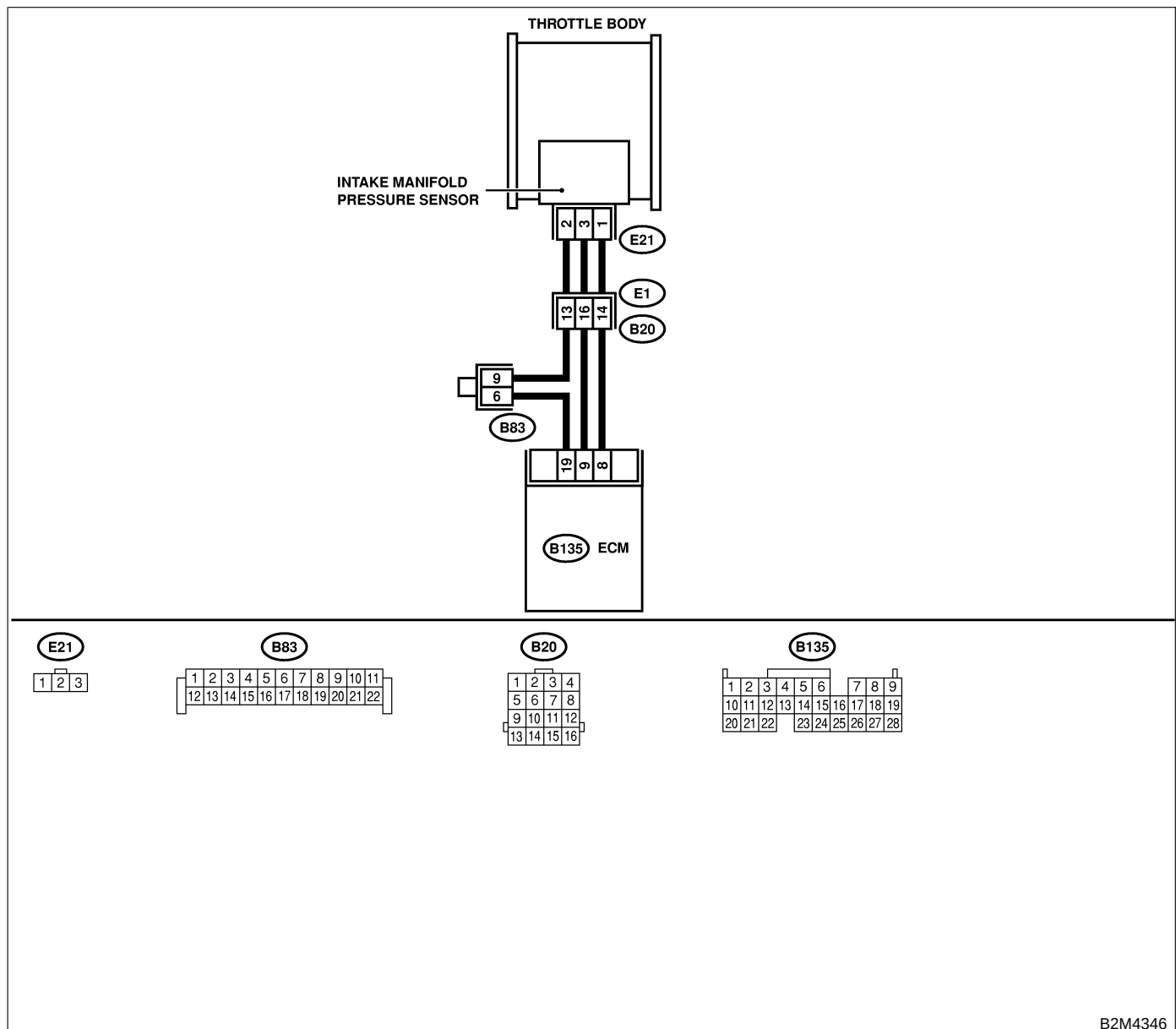
G: DTC P0106 — INTAKE MANIFOLD PRESSURE SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM — S048521F00

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM**
 - Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK IDLE SWITCH SIGNAL. 1) Turn ignition switch to ON. 2) Operate the LED operation mode for engine using Subaru Select Monitor. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.>	Does the LED of {Idle Switch Signal} come on?	Go to step 2.	Check throttle position sensor circuit. <Ref. to EN(H6)-138 DTC P0121 — THROTTLE POSITION SENSOR CIRCUIT RANGE/ PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.
2	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0107, P0108 or P1112?	Inspect DTC P0107, P0108 or P1112 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.	Go to step 3.
3	CHECK CONDITION OF INTAKE MANIFOLD PRESSURE SENSOR.	Is the intake manifold pressure sensor installation bolt tightened securely?	Go to step 4.	Tighten intake manifold pressure sensor installation bolt securely.
4	CHECK CONDITION OF THROTTLE BODY.	Is the throttle body installation bolt tightened securely?	Go to step 5.	Tighten throttle body installation bolt securely.
5	CHECK CONDITION OF EGR VALVE.	Is there any foreign object caught between EGR solenoid valve and intake manifold?	Completely remove foreign object, and install EGR solenoid valve securely to the intake manifold.	Replace intake manifold pressure sensor. <Ref. to FU(H6)-34, Intake Manifold Pressure Sensor.>

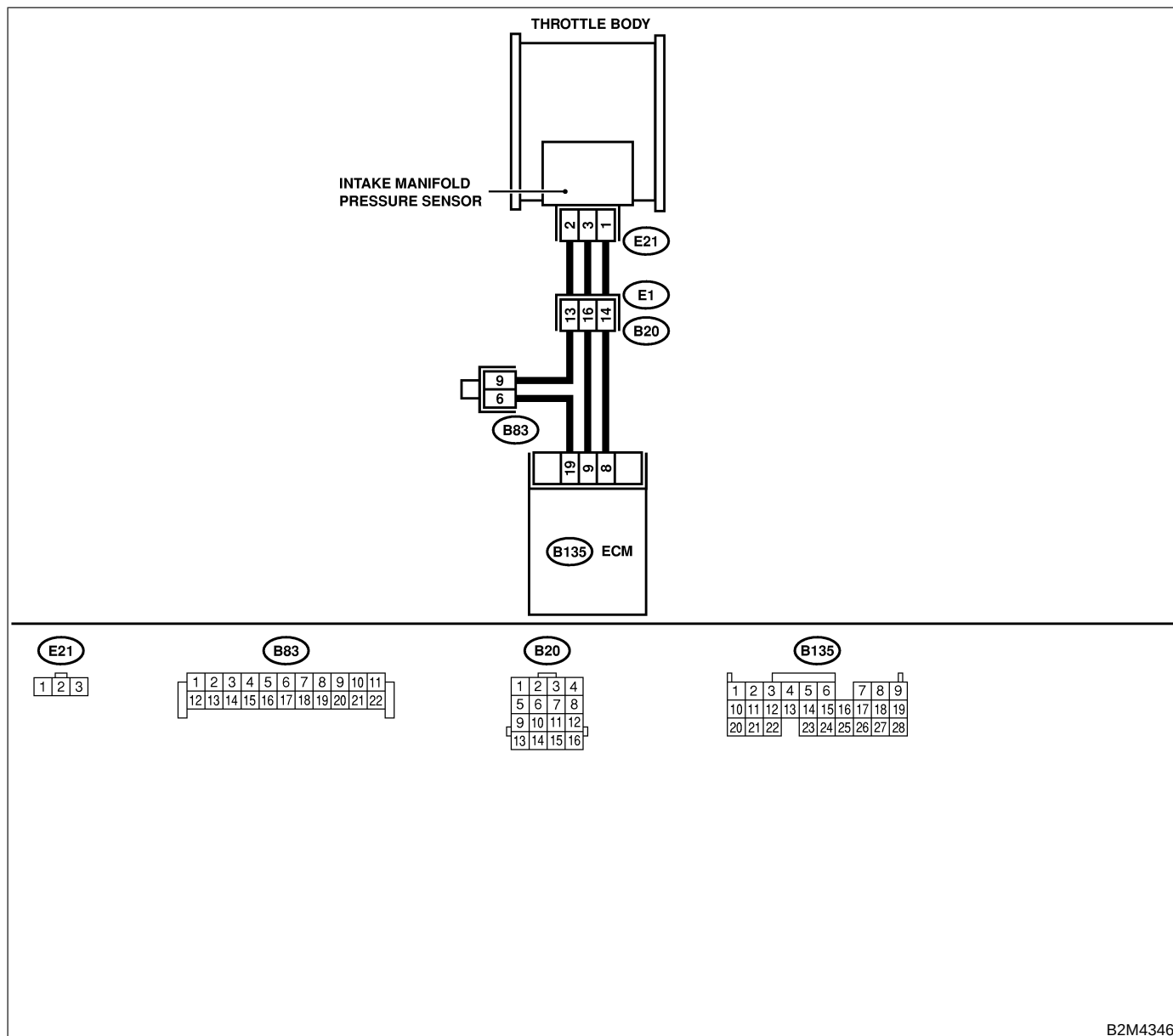
H: DTC P0107 — INTAKE MANIFOLD PRESSURE SENSOR CIRCUIT LOW INPUT — S048521F01

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● WIRING DIAGRAM:



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Start engine. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than 1.7 kPa (13 mmHg, 0.51 inHg)?	Go to step 3.	Go to step 2.
2	CHECK POOR CONTACT. Check poor contact in ECM and pressure sensor connector.	Is there poor contact in ECM or pressure sensor connector?	Repair poor contact in ECM or pressure sensor connector.	Even if MIL lights up, the circuit has returned to a normal condition at this time.
3	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 9 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 5.	Go to step 4.
4	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 9 (+) — Chassis ground (-):	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact with SOA service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM and chassis ground. Connector & terminal (B135) No. 8 (+) — Chassis ground (-):	Is the voltage less than 0.7 V?	Go to step 7.	Go to step 6.
6	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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.>	Does the value change more than 1.7 kPa (13 mmHg, 0.51 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair poor contact in ECM connector.	Go to step 7.
7	CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from intake manifold pressure sensor. 3) Turn ignition switch to ON. 4) Measure voltage between intake manifold pressure sensor connector and engine ground. Connector & terminal (E21) No. 3 (+) — Engine ground (-):	Is the voltage more than 4.5 V?	Go to step 8.	Repair open circuit in harness between ECM and intake manifold pressure sensor connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and intake manifold pressure sensor connector. Connector & terminal (B135) No. 19 — (E21) No. 2:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between ECM and intake manifold pressure sensor connector.
9	CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR. Measure resistance of harness between intake manifold pressure sensor connector and engine ground. Connector & terminal (E21) No. 1 — Engine ground:	Is the resistance more than 500 k Ω ?	Go to step 10.	Repair ground short circuit in harness between ECM and intake manifold pressure sensor connector.
10	CHECK POOR CONTACT. Check poor contact in intake manifold pressure sensor connector.	Is there poor contact in intake manifold pressure sensor connector?	Repair poor contact in intake manifold pressure sensor connector.	Replace intake manifold pressure sensor. <Ref. to FU(H6)-34, Intake Manifold Pressure Sensor.>

MEMO:

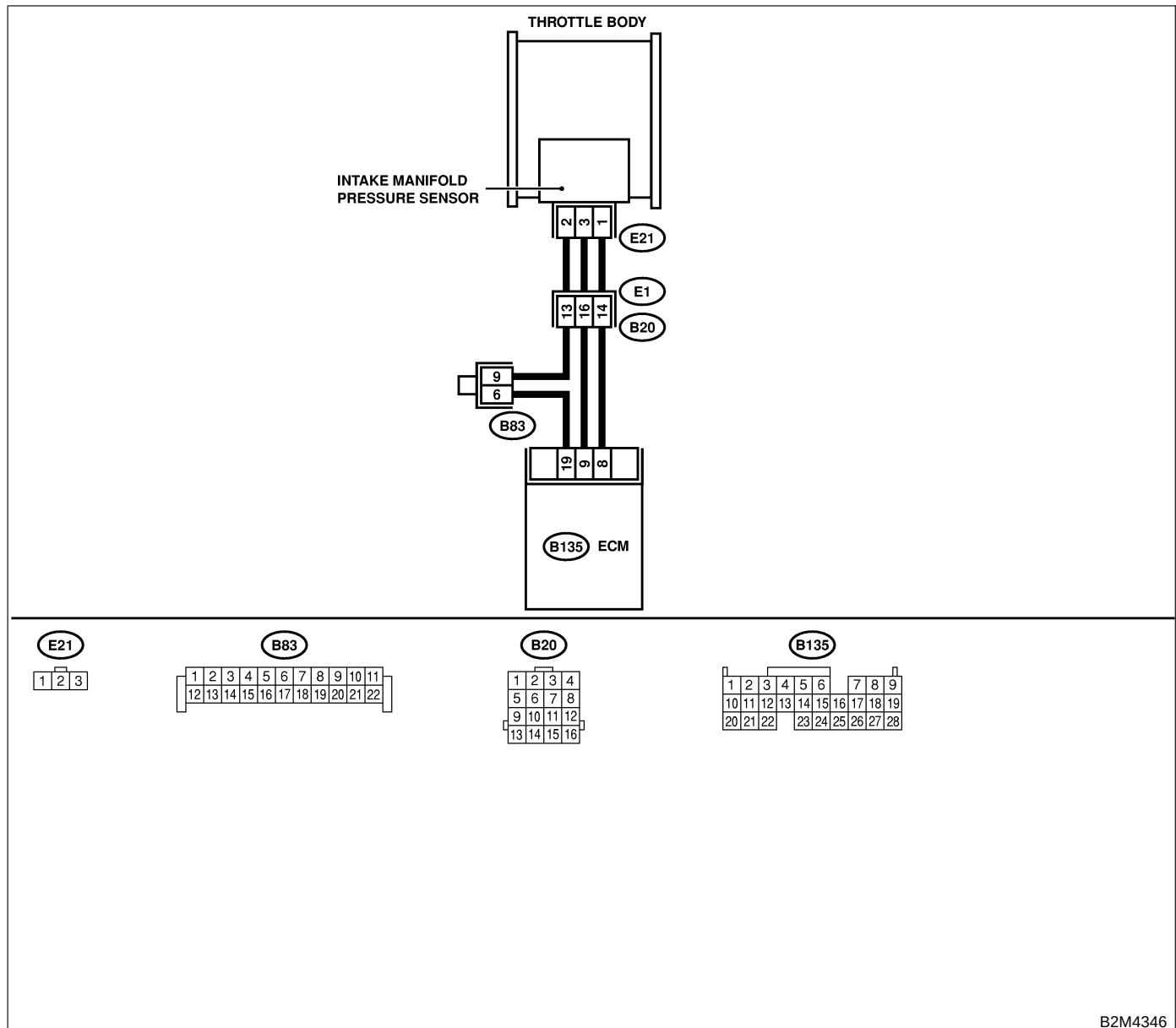
I: DTC P0108 — INTAKE MANIFOLD PRESSURE SENSOR CIRCUIT HIGH INPUT — S048521F02

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4346

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Start engine. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 130 kPa (975 mmHg, 38.39 inHg)?	Go to step 10.	Go to step 2.
2	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 9 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 4.	Go to step 3.
3	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 9 (+) — Chassis ground (-):	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact with SOA service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 8 (+) — Chassis ground (-):	Is the voltage less than 0.7 V?	Go to step 6.	Go to step 5.
5	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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.>	Does the value change more than 1.7 kPa (13 mmHg, 0.51 inHg) by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair poor contact in ECM connector.	Go to step 6.
6	CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from intake manifold pressure sensor. 3) Turn ignition switch to ON. 4) Measure voltage between intake manifold pressure sensor connector and engine ground. Connector & terminal (E21) No. 3 (+) — Engine ground (-):	Is the voltage more than 4.5 V?	Go to step 7.	Repair open circuit in harness between ECM and intake manifold pressure sensor connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and intake manifold pressure sensor connector. Connector & terminal (B135) No. 8 — (E21) No. 1:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair open circuit in harness between ECM and intake manifold pressure sensor connector.
8	CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR. Measure resistance of harness between ECM and intake manifold pressure sensor connector. Connector & terminal (B135) No. 19 — (E21) No. 2:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between ECM and intake manifold pressure sensor connector.
9	CHECK POOR CONTACT. Check poor contact in intake manifold pressure sensor connector.	Is there poor contact in intake manifold pressure sensor connector?	Repair poor contact in intake manifold pressure sensor connector.	Replace intake manifold pressure sensor. <Ref. to FU(H6)-34, Intake Manifold Pressure Sensor.>
10	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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 130 kPa (975 mmHg, 38.39 inHg)?	Repair battery short circuit in harness between ECM and intake manifold pressure sensor connector.	Replace intake manifold pressure sensor. <Ref. to FU(H6)-34, Intake Manifold Pressure Sensor.>

MEMO:

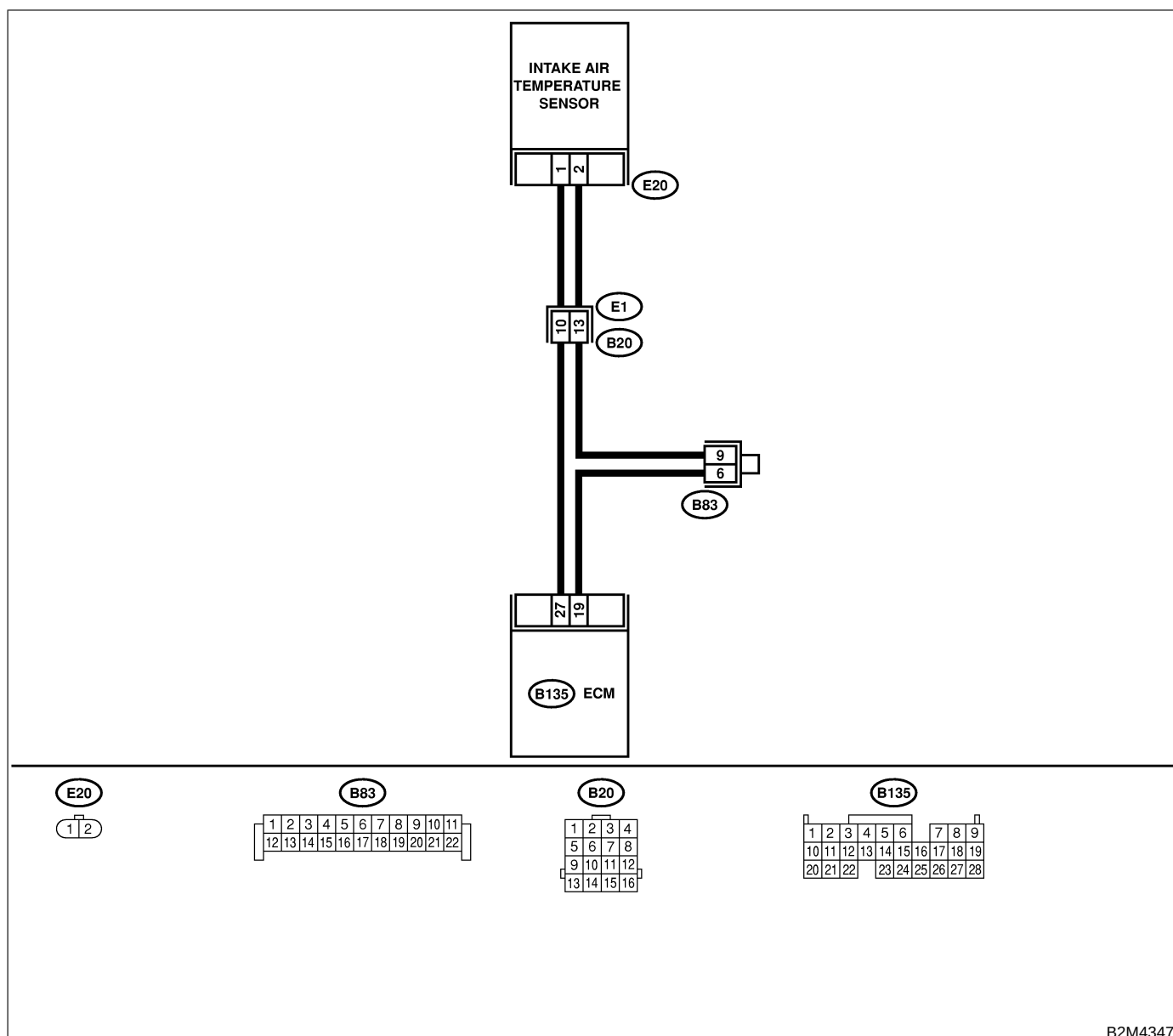
J: DTC P0111 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM — S048521B14

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Erroneous idling
 - Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4347

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0112 or P0113?	Inspect DTC P0112 or P0113 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0111.	Replace intake air temperature sensor. <Ref. to FU(H6)-35, Intake Air Temperature Sensor.>

K: DTC P0112 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW INPUT

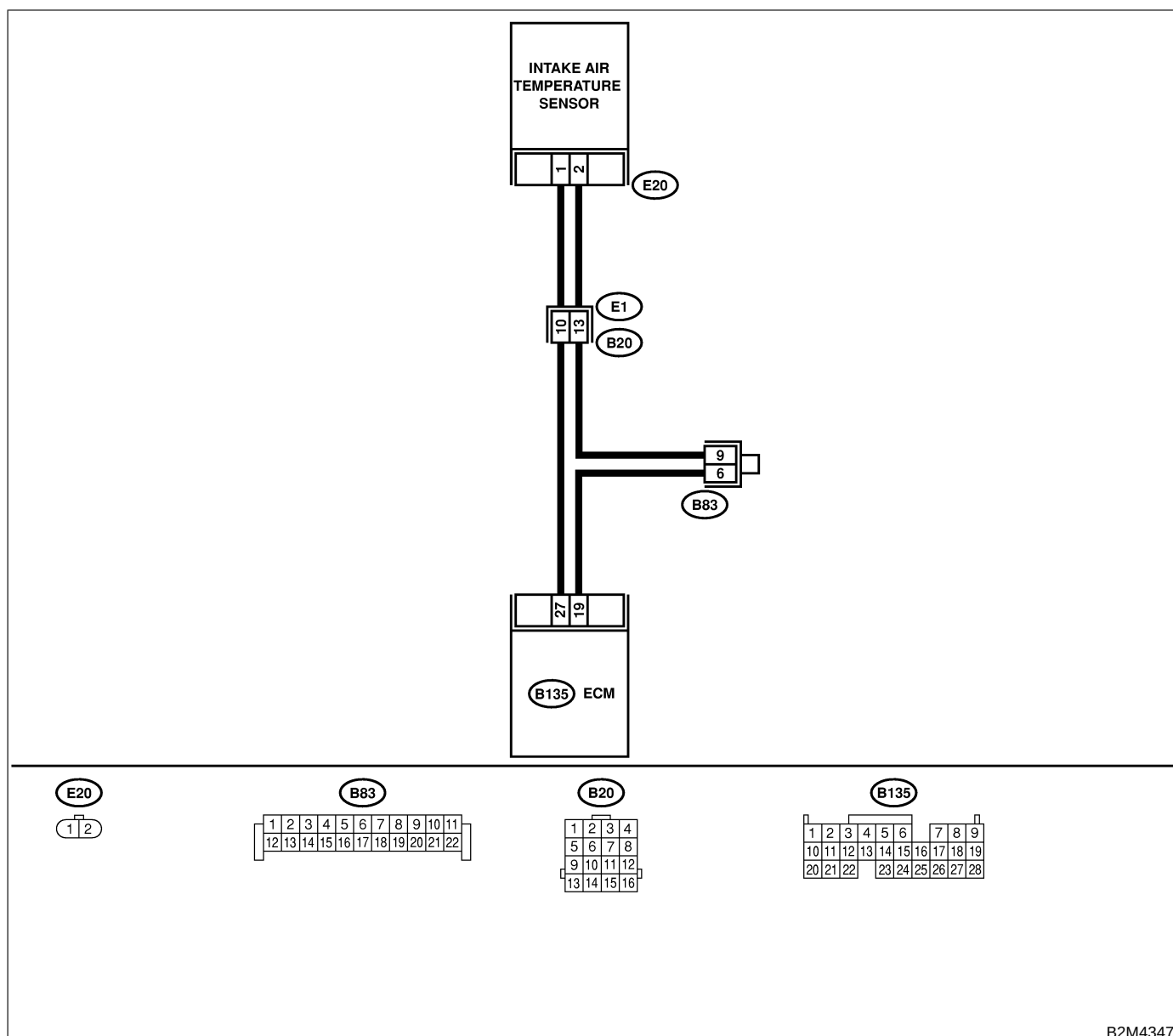
S048521B15

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Erroneous idling
 - Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Start engine. 2) Read data of intake air 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> - OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value greater than 120°C (248°F)?	Go to step 2.	Repair poor contact. NOTE: In this case, repair the following: - Poor contact in intake air temperature sensor - Poor contact in ECM - Poor contact in coupling connector - Poor contact in joint connector
2	CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from intake air temperature sensor. 3) Turn ignition switch to ON. 4) Read data of intake air 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> - OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than -40°C (-40°F)?	Replace intake air temperature sensor. <Ref. to FU(H6)-35, Intake Air Temperature Sensor.>	Repair ground short circuit in harness between intake air temperature sensor and ECM connector.

L: DTC P0113 — INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH INPUT

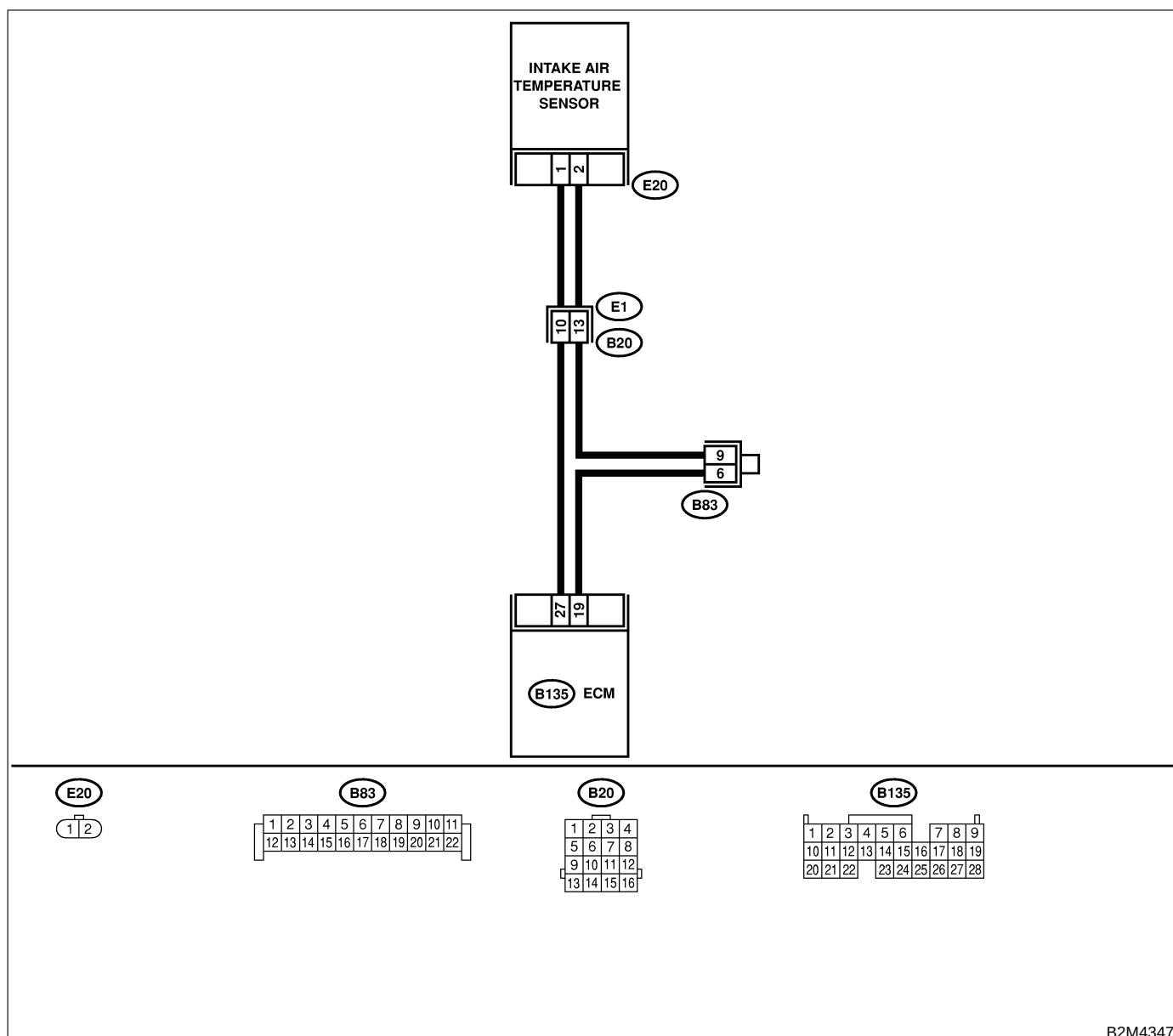
S048521B16

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Erroneous idling
 - Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Turn ignition switch to ON. 2) Start engine. 3) Read data of intake air 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than -40°C (-40°F)?	Go to step 2.	Repair poor contact. NOTE: In this case, repair the following: ● Poor contact in intake air temperature sensor ● Poor contact in ECM ● Poor contact in coupling connector ● Poor contact in joint connector
2	CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from intake air temperature sensor. 3) Measure voltage between intake air temperature sensor connector and engine ground. Connector & terminal (E20) No. 1 (+) — Engine ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between intake air temperature sensor and ECM connector.	Go to step 3.
3	CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR. 1) Turn ignition switch to ON. 2) Measure voltage between intake air temperature sensor connector and engine ground. Connector & terminal (E20) No. 1 (+) — Engine ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between intake air temperature sensor and ECM connector.	Go to step 4.
4	CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR. Measure voltage between intake air temperature sensor connector and engine ground. Connector & terminal (E20) No. 1 (+) — Engine ground (-):	Is the voltage more than 3 V?	Go to step 5.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between intake air temperature sensor and ECM connector ● Poor contact in intake air temperature sensor ● Poor contact in ECM ● Poor contact in coupling connector ● Poor contact in joint connector

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
5	CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR. 1) Turn ignition switch to OFF. 2) Measure resistance of harness between intake air temperature sensor connector and engine ground. Connector & terminal (E20) No. 2 — Engine ground:	Is the resistance less than 5 Ω ?	Replace intake air temperature sensor. <Ref. to FU(H6)-35, Intake Air Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between intake air temperature sensor and ECM connector ● Poor contact in intake air temperature sensor ● Poor contact in ECM ● Poor contact in coupling connector ● Poor contact in joint connector

MEMO:

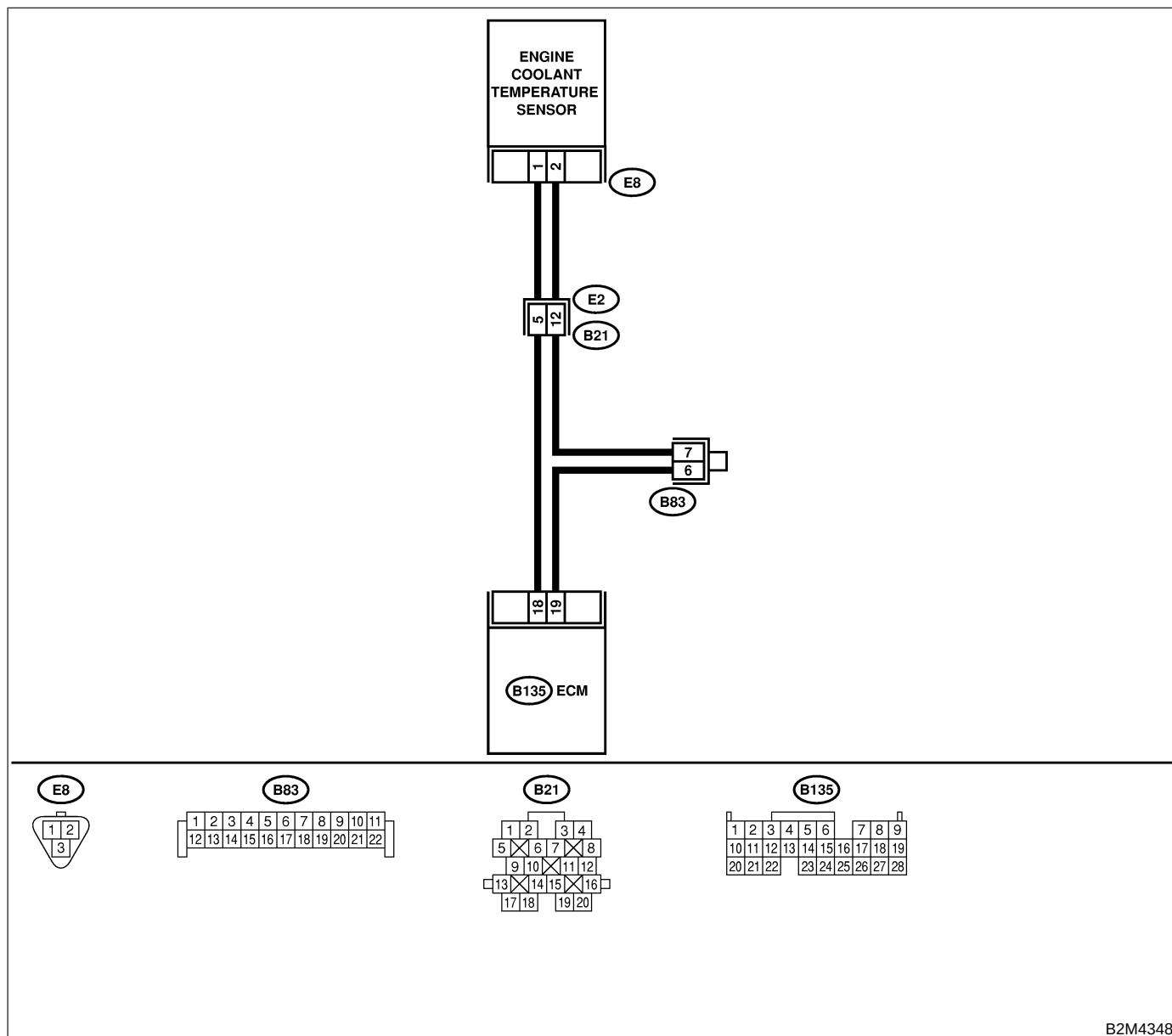
M: DTC P0117 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW INPUT — S048521F91

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4348

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Start engine. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> - OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value greater than 150°C (302°F)?	Go to step 2.	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 - Poor contact in joint connector
2	CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from engine coolant temperature sensor. 3) Turn ignition switch to ON. 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 FOR ENGINE". <Ref. to EN(H6)-37, Subaru Select Monitor.> - OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than -40°C (-40°F)?	Replace engine coolant temperature sensor. <Ref. to FU(H6)-29, Engine Coolant Temperature Sensor.>	Repair ground short circuit in harness between engine coolant temperature sensor and ECM connector.

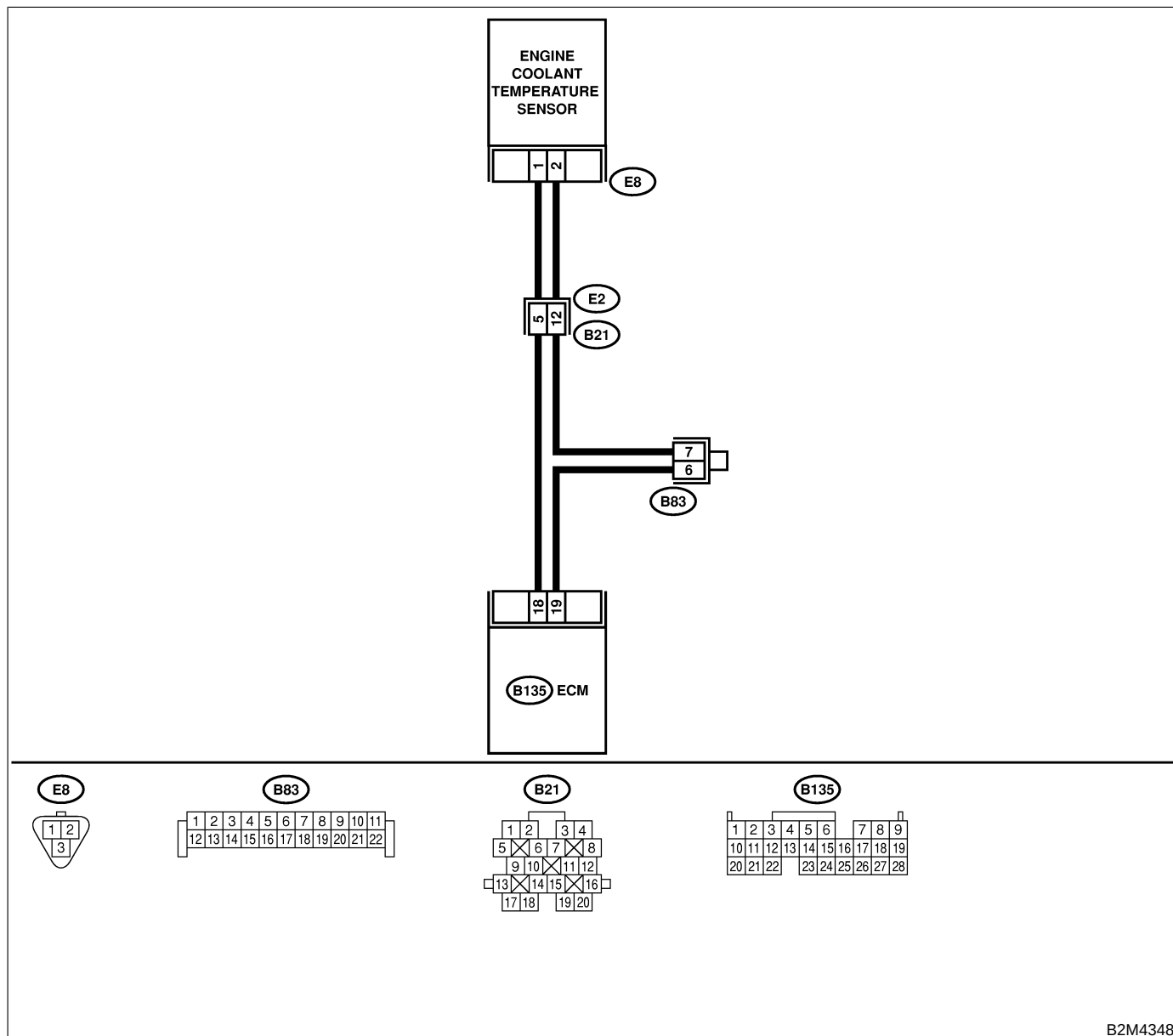
N: DTC P0118 — ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH INPUT — S048521F92

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4348

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Start engine. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> - OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than -40°C (-40°F)?	Go to step 2.	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 - Poor contact in joint connector
2	CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from engine coolant temperature sensor. 3) Measure voltage between engine coolant temperature sensor connector and engine ground. Connector & terminal (E8) No. 1 (+) — Engine ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step 3.
3	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 (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step 4.
4	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 (-):	Is the voltage more than 4 V?	Go to step 5.	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 - Poor contact in joint connector

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
5	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:	Is the resistance less than 5 Ω?	Replace engine coolant temperature sensor. <Ref. to FU(H6)-29, Engine Coolant Temperature Sensor.>	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 ● Poor contact in joint connector

MEMO:

Engine (DIAGNOSTICS)

S048521B19

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0122 or P0123?	Inspect DTC P0122 or P0123 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0121.	Replace throttle position sensor. <Ref. to FU(H6)-33, Throttle Position Sensor.>

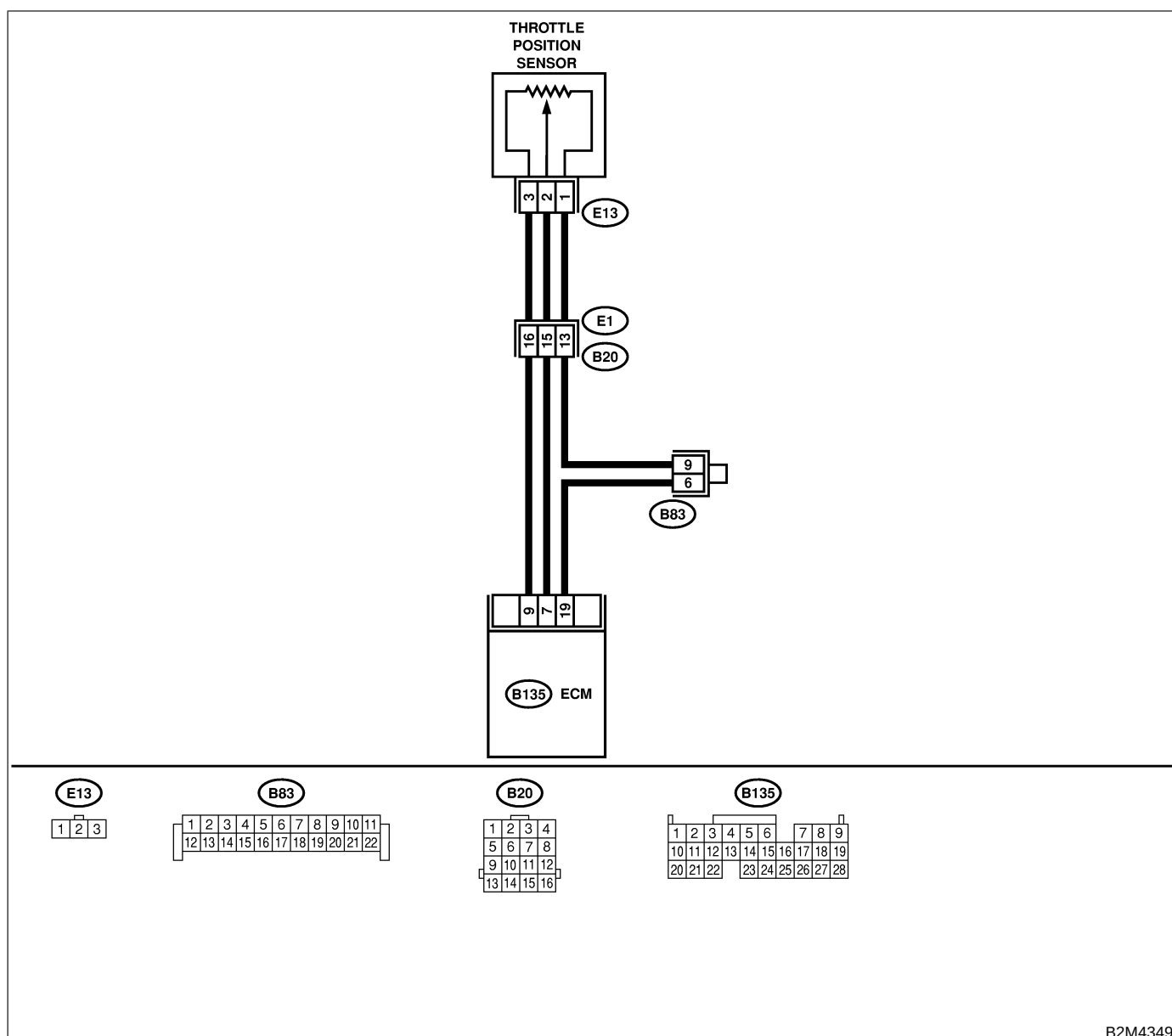
P: DTC P0122 — THROTTLE POSITION SENSOR CIRCUIT LOW INPUT — S048521B20

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4349

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Start engine. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> - OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than 0.1 V?	Go to step 2.	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
2	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground while throttle valve is fully closed. Connector & terminal (B135) No. 7 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 4.	Go to step 3.
3	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 7 (+) — Chassis ground (-):	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact with SOA service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 9 (+) — Chassis ground (-):	Is the voltage less than 0.1 V?	Go to step 6.	Go to step 5.
5	CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.) Measure voltage between ECM connector and chassis ground.	Does the voltage change more than 0.1 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair poor contact in ECM connector.	Go to step 6.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	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. 1 (+) — Engine ground (-):	Is the voltage more than 4.5 V?	Go to step 7.	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 ● Poor contact in joint connector
7	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 (B135) No. 9 — (E13) No. 3:	Is the resistance less than 1 Ω ?	Go to step 8.	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
8	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. 3 — Engine ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between throttle position sensor and ECM connector.	Go to step 9.
9	CHECK POOR CONTACT. Check poor contact in throttle position sensor connector.	Is there poor contact in throttle position sensor connector?	Repair poor contact in throttle position sensor connector.	Replace throttle position sensor. <Ref. to FU(H6)-33, Throttle Position Sensor.>

MEMO:

Q: DTC P0123 — THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT —

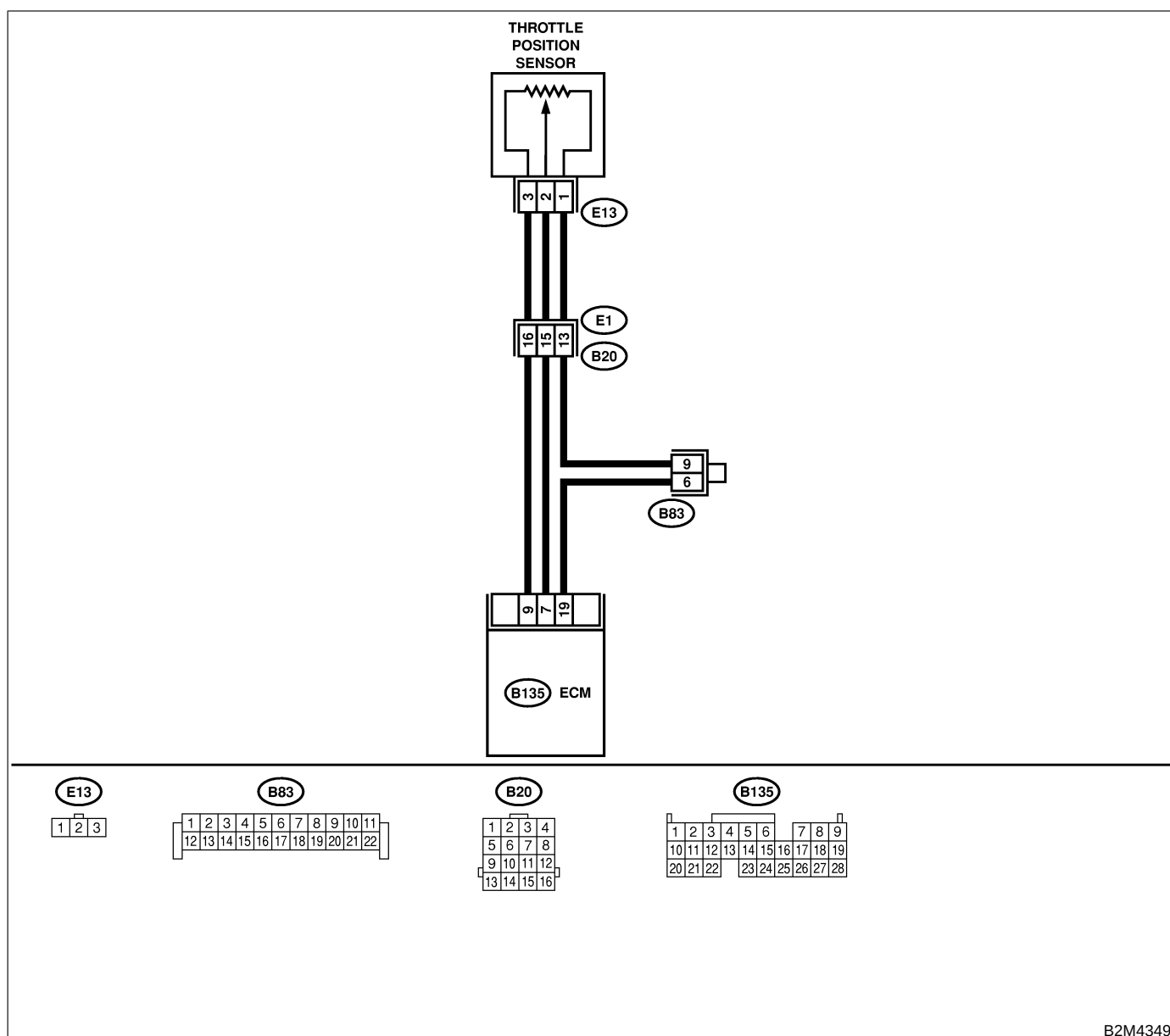
S048521B21

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4349

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Start engine. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> - OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 4.75 V?	Go to step 2.	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
2	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. 2 — Engine ground:	Is the resistance less than 5 Ω?	Go to step 3.	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 - Poor contact in joint connector
3	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. 3 (+) — Engine ground (-):	Is the voltage more than 4.9 V?	Repair battery short circuit in harness between throttle position sensor and ECM connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Replace throttle position sensor. <Ref. to FU(H6)-33, Throttle Position Sensor.>

R: DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL — S048521B22

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

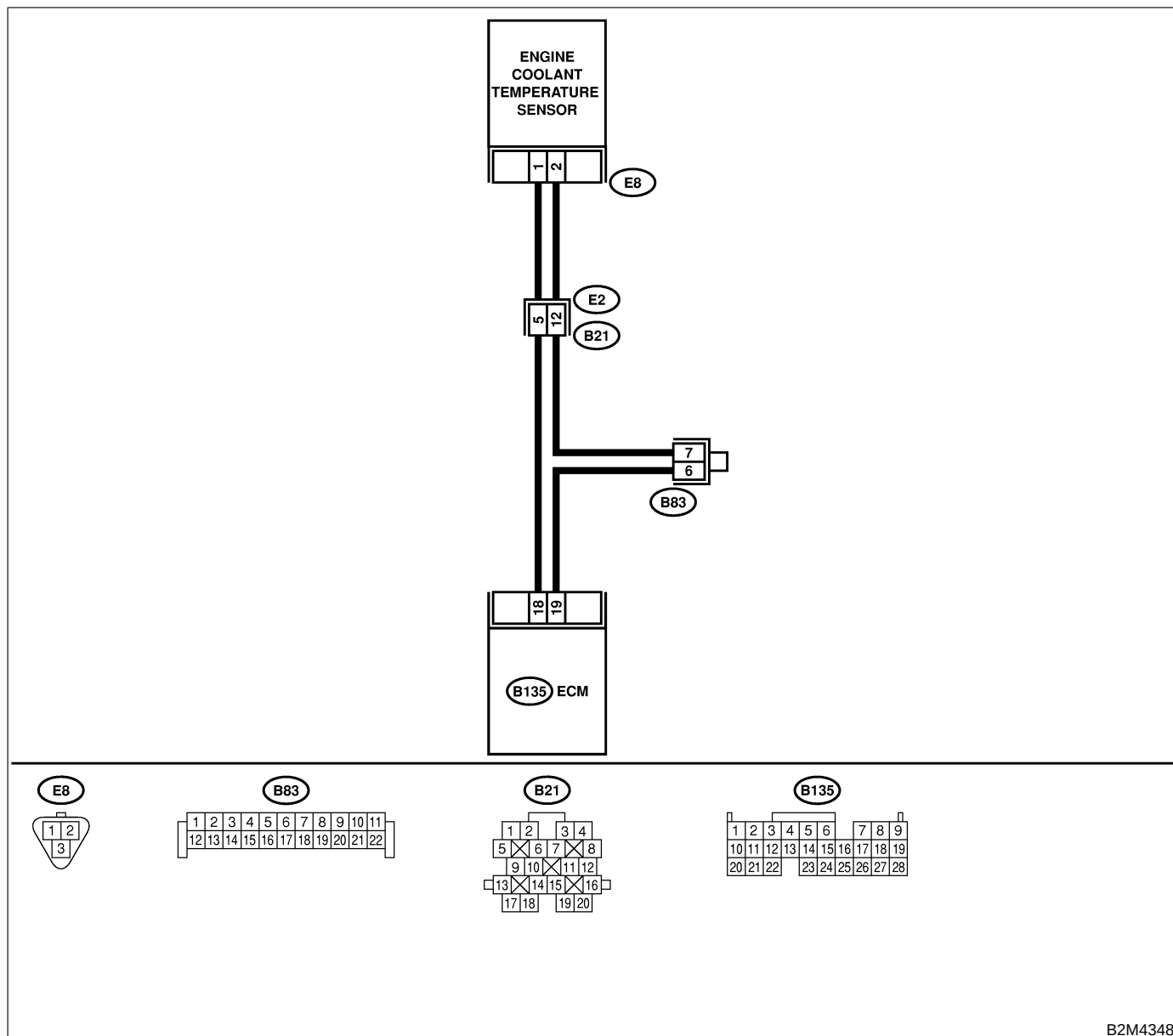
● **TROUBLE SYMPTOM:**

- Engine does not return to idle.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0117 or P0118?	Inspect DTC P0118 or P0117 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step 2.
2	CHECK TIRE SIZE.	Is the tire size the same as designated tire and four-wheel tire?	Go to step 3.	Replace tire.
3	CHECK ENGINE COOLANT. Check the following items. ● Engine coolant volume ● Engine coolant freezing ● Contamination in engine coolant	Is the engine coolant normal?	Go to step 4.	Refill or replace coolant. <Ref. to CO(H6)-18, INSPECTION, Engine Coolant.>
4	CHECK THERMOSTAT.	Does thermostat remain open?	Replace thermostat. <Ref. to CO(H6)-21, Thermostat.>	Replace engine coolant temperature sensor. <Ref. to FU(H6)-29, Engine Coolant Temperature Sensor.>

S: DTC P0128 — THERMOSTAT MALFUNCTION — S048521F93

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Thermostat remains open.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45, OPERATION, Inspection Mode.>.

No.	Step	Check	Yes	No
1	CHECK VEHICLE CONDITION.	Has engine operated at idle or has vehicle been driven with part of engine submerged under water?	In this case, it is not necessary to inspect DTC P0128.	Go to step 2.
2	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0125, P0301, P0302, P0303, P0304, P0305 and P0306 at same time?	Go to step 3.	Inspect DTC P0125, P0301, P0302, P0303, P0304, P0305 and P0306 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87, List of Diagnostic Trouble Code (DTC).>
3	CHECK ENGINE COOLANT.	Are coolant level and mixture ratio of cooling water to anti-freeze solution correct?	Go to step 4.	Replace engine coolant. <Ref. to CO(H6)-18, REPLACEMENT, Engine Coolant.>
4	CHECK RADIATOR FAN. 1) Start the engine. 2) Check radiator fan operation.	Does radiator fan continuously rotate for more than 3 minutes during idling?	Repair radiator fan circuit. <Ref. to CO(H6)-20, Radiator Main Fan and Fan Motor.> and <Ref. to CO(H6)-23, Radiator Sub Fan and Fan Motor.>	Replace thermostat. <Ref. to CO(H6)-13, Thermostat.>

T: DTC P0131 — BANK #1 AND SENSOR #2 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) — S048521H27**NOTE:**

For the diagnostic procedure, refer to DTC P0132. <Ref. to EN(H6)-150 DTC P0132 — BANK #1 AND SENSOR #2 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

U: DTC P0132 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —

S048521H28

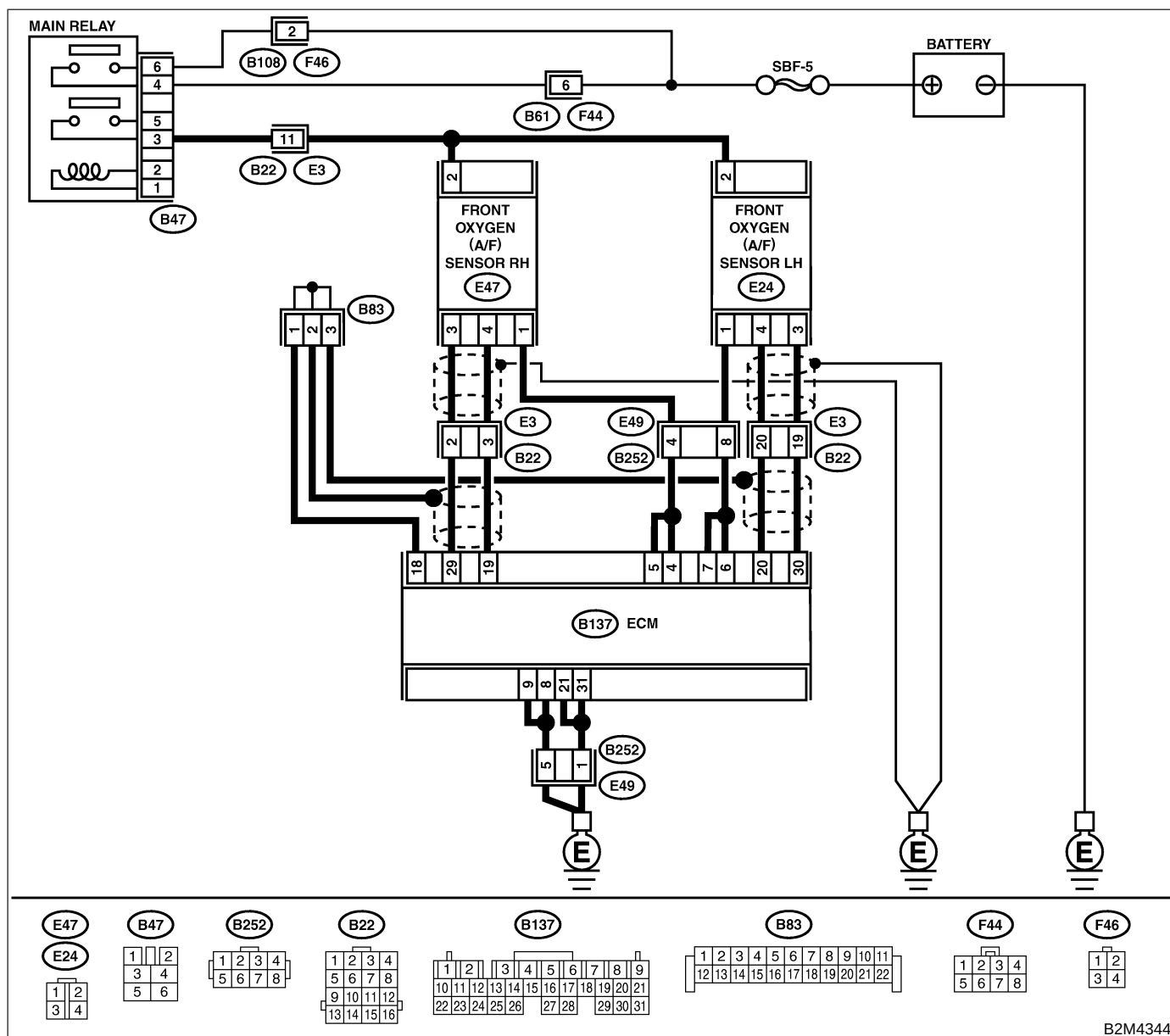
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1130, P1131, P0031, P0032, P0133, P0136, P0139, P0037, P0038, P0051, P0052, P0131, P0132, P0151, P0152, P0153, P1134, P1135, P1136, P1139 or P1140?	Inspect DTC P1130, P1131, P0031, P0032, P0133, P0136, P0139, P0037, P0038, P0051, P0052, P0131, P0132, P0151, P0152, P0153, P1134, P1135, P1136, P1139 or P1140 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK FRONT (A/F) OXYGEN SENSOR DATA. 1) Start engine. 2) While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 75°C (167°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value equal to or more than 0.85 and equal to less than 1.15 in idling?	Go to step 3.	Go to step 4.
3	CHECK REAR OXYGEN SENSOR SIGNAL. 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.>	Does the LED of {Rear O2 Rich Signal} blink?	Repair poor contact in front oxygen (A/F) sensor and rear oxygen sensor connector.	Check rear oxygen sensor circuit. <Ref. to FU(H6)-45, Rear Oxygen Sensor.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
4	CHECK EXHAUST SYSTEM. Check exhaust system parts. NOTE: Check the following items. ● Loose installation of portions ● Damage (crack, hole etc.) of parts ● Looseness of front oxygen (A/F) sensor ● Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

MEMO:

**V: DTC P0133 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR
(FRONT RH) CIRCUIT SLOW RESPONSE —** S048521H29

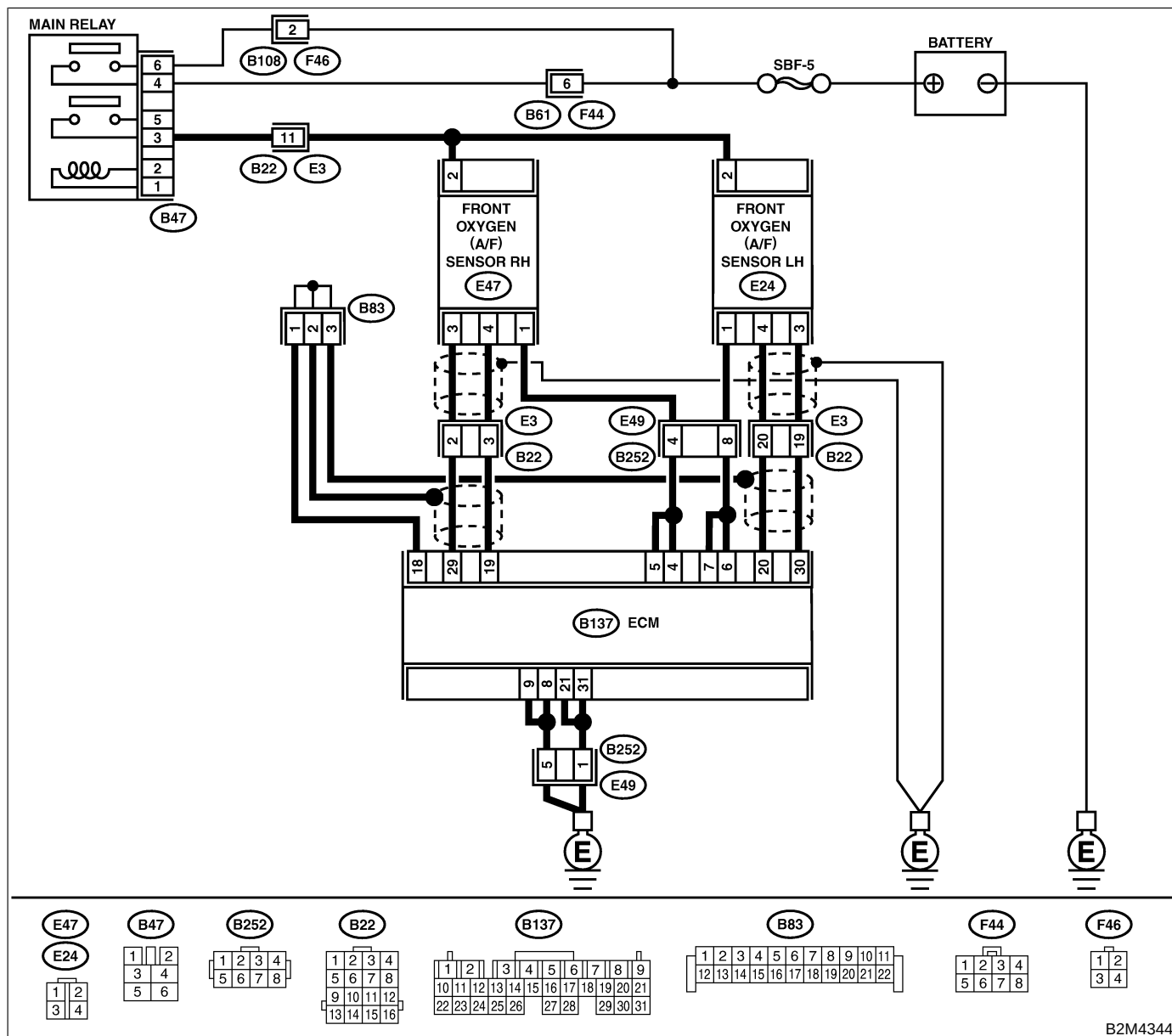
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1130, P1131, P0031, P0032, P1134, P0133, P0136, P0139, P0037, P0038, P0051, P0052, P0131, P0132, P0151, P0152, P0153, P1135, P1136, P1139 or P1140?	Inspect DTC P1130, P1131, P0031, P0032, P1134, P0133, P0136, P0139, P0037, P0038, P0051, P0052, P0131, P0132, P0151, P0152, P0153, P1135, P1136, P1139 or P1140 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step 2.
2	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 (RH side) ● Damage of exhaust pipe resulting in a hole	Is there a fault in exhaust system?	Repair exhaust system.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

Engine (DIAGNOSTICS)

S048521H30

- Two consecutive driving cycles with fault

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

[illegible]

B2M4345

EN(H6)-156

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	CHECK FAILURE CAUSE OF P1130 or P1131. Inspect DTC P1130, P1131, P1135 or P1136 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Is the failure cause of P1130, P1131, P1135 or P1136 in the fuel system?	Check fuel system. NOTE: In this case, it is not necessary to inspect DTC P0136.	Go to step 3.
3	CHECK REAR OXYGEN SENSOR DATA. 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 2,000 rpm to 3,000 rpm for two minutes. 2) 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 EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Does the value fluctuate?	Go to step 7.	Go to step 4.
4	CHECK REAR OXYGEN SENSOR DATA. Read data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II General Scan Tool.	Is output maximum value 0.49 V or more and output minimum value 0.25 V or less?	Go to step 5.	Replace rear oxygen sensor. <Ref. to FU(H6)-45, Rear Oxygen Sensor.>
5	CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and rear oxygen sensor. 3) Measure resistance of harness between ECM and rear oxygen sensor connector. Connector & terminal (B135) No. 19 — (T6) No. 4:	Is the resistance more than 3 Ω?	Repair open circuit in harness between ECM and rear oxygen sensor connector.	Go to step 6.
6	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. 3 (+) — Engine ground (-):	Is the voltage more than 0.2 V?	Replace rear oxygen sensor. <Ref. to FU(H6)-45, Rear Oxygen Sensor.>	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

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	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 (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace rear oxygen sensor. <Ref. to FU(H6)-45 Rear Oxygen Sensor.>

MEMO:

Engine (DIAGNOSTICS)

S048521H31

- Two consecutive driving cycles with fault

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

[illegible]

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0136?	Inspect DTC P0136 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Replace rear oxygen sensor. <Ref. to FU(H6)-45, Rear Oxygen Sensor.>

Y: DTC P0151 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) CIRCUIT RANGE/PERFORMANCE PROBLEM (LOW INPUT) —

S048521H32

NOTE:

For the diagnostic procedure, refer to DTC P0152. <Ref. to EN(H6)-164 DTC P0152 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

MEMO:

Engine (DIAGNOSTICS)

S048521H33

- Two consecutive driving cycles with fault

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

MAIN RELAY

BATTERY

SBF-5

FRONT OXYGEN (A/F) SENSOR RH

FRONT OXYGEN (A/F) SENSOR LH

B137 ECM

Legend:

- E47**: 1, 2, 3, 4
- E24**: 1, 2, 3, 4
- B47**: 1, 2, 3, 4, 5, 6
- B252**: 1, 2, 3, 4, 5, 6, 7, 8
- B22**: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
- B137**: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
- B83**: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
- F44**: 1, 2, 3, 4, 5, 6, 7, 8
- F46**: 1, 2, 3, 4

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1130, P1131, P0031, P0032, P1134, P0133, P0136, P0139, P0037, P0038, P0051, P0052, P0131, P0132, P0151, P0152, P0153, P1135, P1136, P1139 or P1140?	Inspect DTC P1130, P1131, P0031, P0032, P1134, P0133, P0136, P0139, P0037, P0038, P0051, P0052, P0131, P0132, P0151, P0152, P0153, P1135, P1136, P1139 or P1140 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK FRONT (A/F) OXYGEN SENSOR DATA. 1) Start engine. 2) While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 75°C (167°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value equal to or more than 0.85 and equal to less than 1.15 in idling?	Go to step 3.	Go to step 4.
3	CHECK REAR OXYGEN SENSOR SIGNAL. 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: ● Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(H6)-37, Subaru Select Monitor.>	Does the LED of {Rear O2 Rich Signal} blink?	Repair poor contact in front oxygen (A/F) sensor and rear oxygen sensor connector.	Check rear oxygen sensor circuit. <Ref. to FU(H6)-45, Rear Oxygen Sensor.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
4	CHECK EXHAUST SYSTEM. Check exhaust system parts. NOTE: Check the following items. ● Loose installation of portions ● Damage (crack, hole etc.) of parts ● Looseness of front oxygen (A/F) sensor ● Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

MEMO:

**AA: DTC P0153 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR
(FRONT LH) CIRCUIT SLOW RESPONSE —** SO48521H34

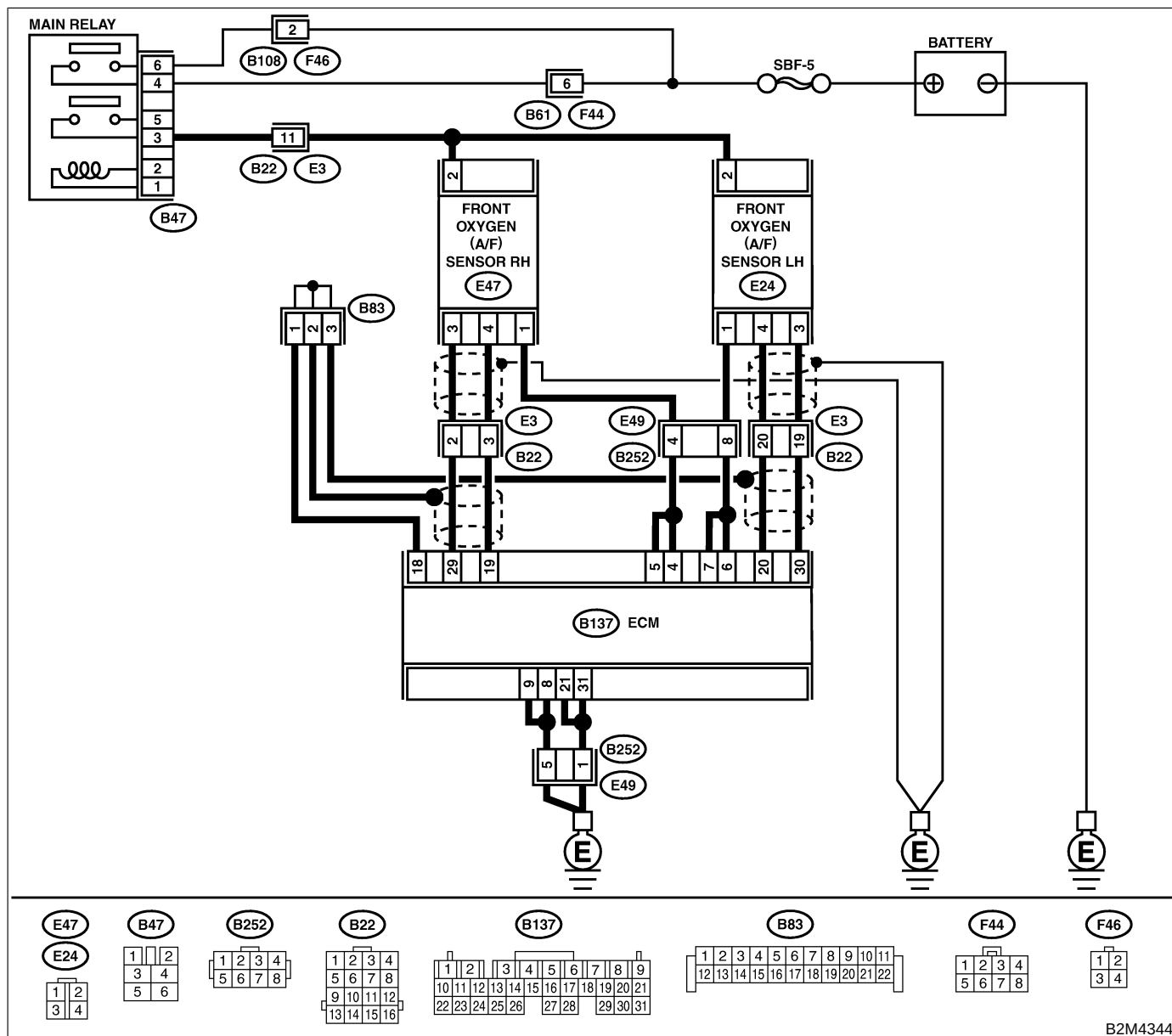
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1130, P1131, P0031, P0032, P1134, P0133, P0136, P0139, P0037, P0038, P0051, P0052, P0131, P0132, P0151, P0152, P0153, P1135, P1136, P1139 or P1140?	Inspect DTC P1130, P1131, P0031, P0032, P1134, P0133, P0136, P0139, P0037, P0038, P0051, P0052, P0131, P0132, P0151, P0152, P0153, P1135, P1136, P1139 or P1140 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0153.	Go to step 2.
2	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 (RH side) ● Damage of exhaust pipe resulting in a hole	Is there a fault in exhaust system?	Repair exhaust system.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

AB: DTC P0171 — FUEL TRIM #1 (RH) MALFUNCTION (A/F TOO LEAN) — S048521H35

NOTE:

For the diagnostic procedure, refer to DTC P0172. <Ref. to EN(H6)-170 DTC P0172 — FUEL TRIM #1 (RH) MALFUNCTION (A/F TOO RICH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AC: DTC P0172 — FUEL TRIM #1 (RH) MALFUNCTION (A/F TOO RICH) — S048521H36

● **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

No.	Step	Check	Yes	No
1	CHECK EXHAUST SYSTEM.	Are there holes or loose bolts on exhaust system?	Repair exhaust system.	Go to step 2.
2	CHECK AIR INTAKE SYSTEM.	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step 3.
3	CHECK FUEL PRESSURE. WARNING: ● Place “NO FIRE” signs near the working area. ● Be careful not to spill fuel on the floor. 1) Release fuel pressure. (1) Disconnect connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn ignition switch to OFF. 2) Connect connector to fuel pump relay. 3) Disconnect fuel delivery hose from fuel filter, and connect fuel pressure gauge. 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.	Is fuel pressure between 284 and 314 kPa (2.9 — 3.2 kg/cm ² , 41 — 46 psi)?	Go to step 4.	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

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
4	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.	Is fuel pressure between 206 and 235 kPa (2.1 — 2.4 kg/cm ² , 30 — 34 psi)?	Go to step 5.	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
5	CHECK FUEL INJECTOR. 1) Turn ignition switch to OFF. 2) Remove right bank fuel injector. <Ref. to FU(H6)-39, REMOVAL, Fuel Injector.> 3) Check fuel injector	Is fuel injector clogged?	Replace fuel injector. <Ref. to FU(H6)-39, Fuel Injector.>	Go to step 6.
6	CHECK FUEL INJECTOR. Measure resistance between terminals of fuel injector. Terminals No. 1 — No. 2	Is the resistance between 5 and 20 Ω?	Go to step 7.	Replace fuel injector. <Ref. to FU(H6)-39, Fuel Injector.>
7	CHECK ENGINE COOLANT TEMPERATURE SENSOR. 1) Start the engine and warm-up completely. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is temperature greater than 75°C (167°F)?	Go to step 8.	Replace engine coolant temperature sensor. <Ref. to FU(H6)-29, Engine Coolant Temperature Sensor.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	CHECK INTAKE MANIFOLD PRESSURE SENSOR. 1) Start the engine and warm-up engine until coolant temperature is greater than 75°C (167°F). 2) Place the shift lever in neutral position. 3) Turn A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read data of intake manifold 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual. Specification: ● Intake manifold absolute pressure <i>Ignition ON</i> 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) <i>Idling</i> 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg)	Is the value within the specifications?	Go to step 9.	Replace intake manifold pressure sensor. <Ref. to FU(H6)-34, Intake Manifold Pressure Sensor.>
9	CHECK INTAKE AIR TEMPERATURE SENSOR. 1) Start the engine and warm-up engine until coolant temperature is greater than 75°C (167°F). 2) Place the shift lever in neutral position. 3) Turn A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Open front hood. 6) Measure ambient temperature. 7) Read data of intake manifold 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is value obtained when ambient temperature is subtracted from intake air temperature greater than -10°C (14°F) and less than 50°C (122°F)?	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Check intake air temperature sensor. <Ref. to FU(H6)-35, Intake Air Temperature Sensor.>

MEMO:

AD: DTC P0174 — FUEL TRIM #2 (LH) MALFUNCTION (A/F TOO LEAN) — S048521H37

NOTE:

For the diagnostic procedure, refer to DTC P0175. <Ref. to EN(H6)-174 DTC P0175 — FUEL TRIM #2 (LH) MALFUNCTION (A/F TOO RICH) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AE: DTC P0175 — FUEL TRIM #2 (LH) MALFUNCTION (A/F TOO RICH) — S048521H38

● **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

No.	Step	Check	Yes	No
1	CHECK EXHAUST SYSTEM.	Are there holes or loose bolts on exhaust system?	Repair exhaust system.	Go to step 2.
2	CHECK AIR INTAKE SYSTEM.	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step 3.
3	CHECK FUEL PRESSURE. WARNING: ● Place “NO FIRE” signs near the working area. ● Be careful not to spill fuel on the floor. 1) Release fuel pressure. (1) Disconnect connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn ignition switch to OFF. 2) Connect connector to fuel pump relay. 3) Disconnect fuel delivery hose from fuel filter, and connect fuel pressure gauge. 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.	Is fuel pressure between 284 and 314 kPa (2.9 — 3.2 kg/cm ² , 41 — 46 psi)?	Go to step 4.	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

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
4	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.	Is fuel pressure between 206 and 235 kPa (2.1 — 2.4 kg/cm ² , 30 — 34 psi)?	Go to step 5.	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
5	CHECK FUEL INJECTOR. 1) Turn ignition switch to OFF. 2) Remove left bank fuel injector. <Ref. to FU(H6)-39, REMOVAL, Fuel Injector.> 3) Check fuel injector.	Is fuel injector clogged?	Replace fuel injector. <Ref. to FU(H6)-39, Fuel Injector.>	Go to step 6.
6	CHECK FUEL INJECTOR. Measure resistance between terminals of fuel injector. Terminals No. 1 — No. 2	Is the resistance between 5 and 20 Ω?	Go to step 7.	Replace fuel injector. <Ref. to FU(H6)-39, Fuel Injector.>
7	CHECK ENGINE COOLANT TEMPERATURE SENSOR. 1) Start the engine and warm-up completely. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is temperature greater than 75°C (167°F)?	Go to step 8.	Replace engine coolant temperature sensor. <Ref. to FU(H6)-29, Engine Coolant Temperature Sensor.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	CHECK INTAKE MANIFOLD PRESSURE SENSOR. 1) Start the engine and warm-up engine until coolant temperature is greater than 75°C (167°F). 2) Place the shift lever in neutral position. 3) Turn A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read data of intake manifold 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual. Specification: ● Intake manifold absolute pressure <i>Ignition ON</i> 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) <i>Idling</i> 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg)	Is the value within the specifications?	Go to step 9.	Replace intake manifold pressure sensor. <Ref. to FU(H6)-34, Intake Manifold Pressure Sensor.>
9	CHECK INTAKE AIR TEMPERATURE SENSOR. 1) Start the engine and warm-up engine until coolant temperature is greater than 75°C (167°F). 2) Place the shift lever in neutral position. 3) Turn A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Open front hood. 6) Measure ambient temperature. 7) Read data of intake manifold 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is value obtained when ambient temperature is subtracted from intake air temperature greater than -10°C (14°F) and less than 50°C (122°F)?	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Check intake air temperature sensor. <Ref. to FU(H6)-35, Intake Air Temperature Sensor.>

MEMO:

**AF: DTC P0181 — FUEL TEMPERATURE SENSOR A CIRCUIT
RANGE/PERFORMANCE PROBLEM —** S048521B34

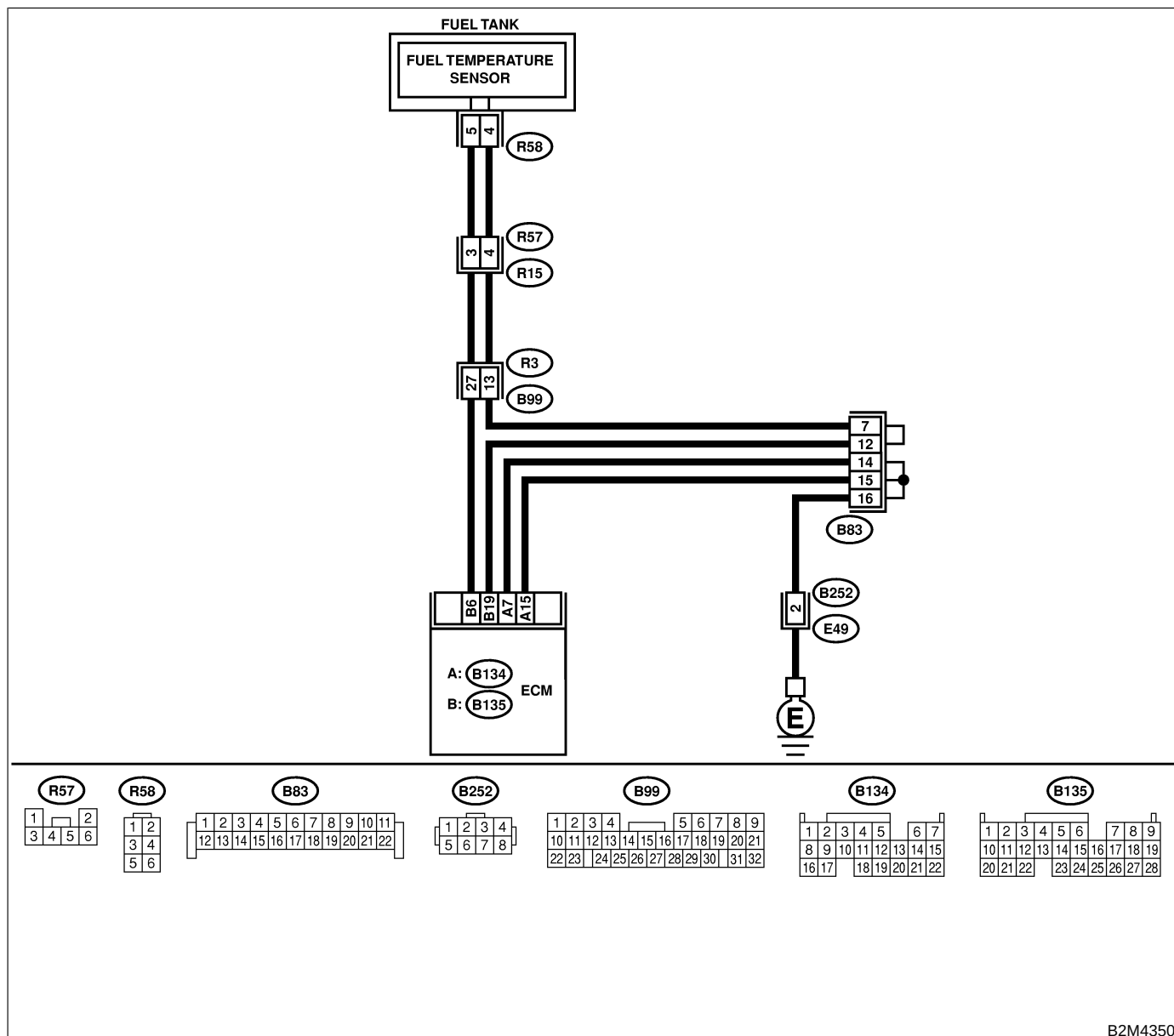
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4350

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0182 or P0183?	Inspect DTC P0182 or P0183 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0181.	Replace fuel temperature sensor. <Ref. to EC(H6)-10 Fuel Temperature Sensor.>

AG: DTC P0182 — FUEL TEMPERATURE SENSOR A CIRCUIT LOW INPUT —

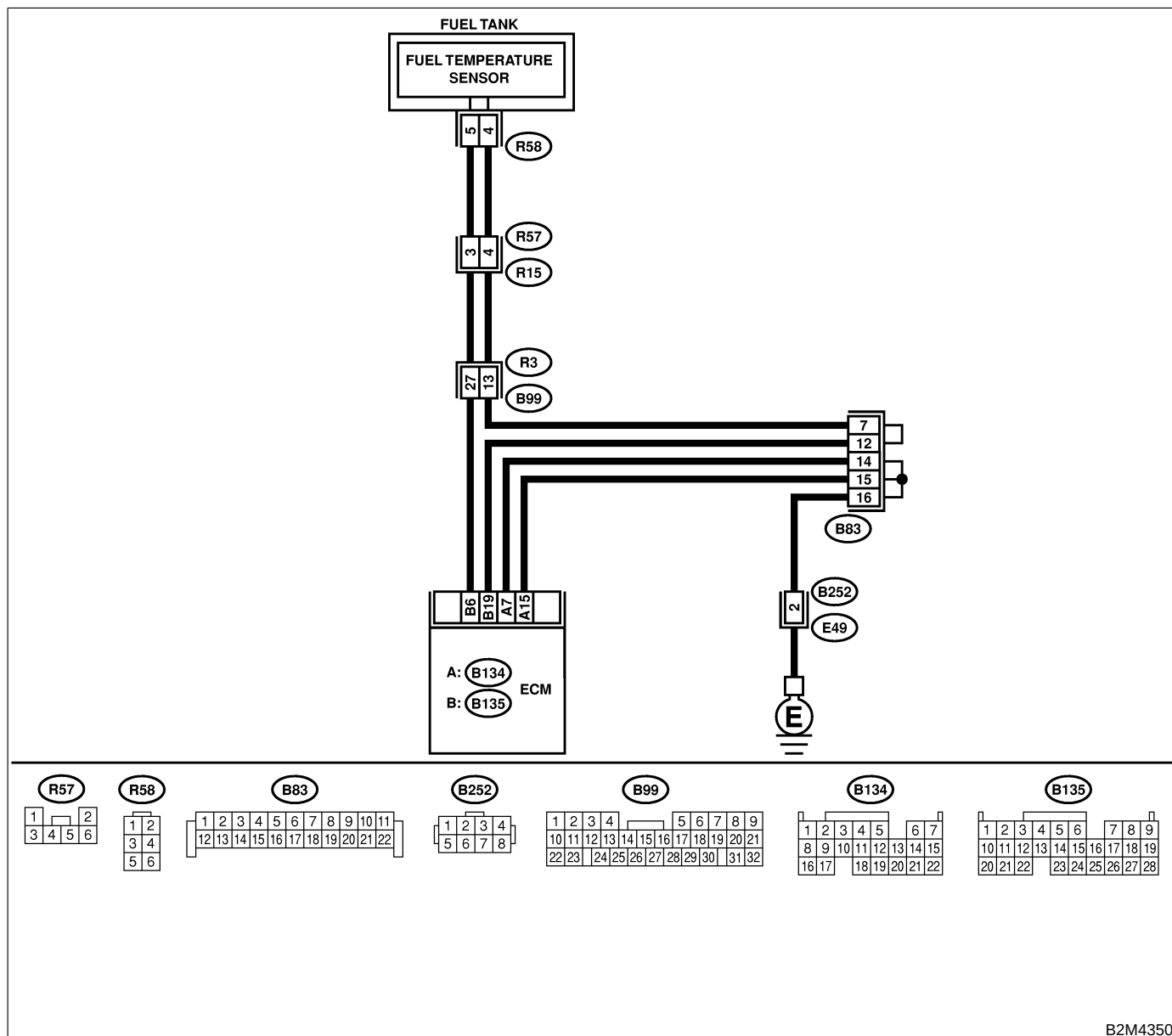
S048521B35

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



B2M4350

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Start engine. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value greater than 120°C (248°F)?	Go to step 2.	Even if MIL lights up, the circuit has returned to a normal condition at this time.
2	CHECK CURRENT DATA. 1) Turn ignition switch to OFF. 2) Remove access hole lid. 3) Disconnect connector from fuel pump. 4) Turn ignition switch to ON. 5) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than -40°C (-40°F)?	Replace fuel temperature sensor. <Ref. to EC(H6)-10 Fuel Temperature Sensor.>	Repair ground short circuit in harness between fuel pump and ECM connector.

AH: DTC P0183 — FUEL TEMPERATURE SENSOR A CIRCUIT HIGH INPUT

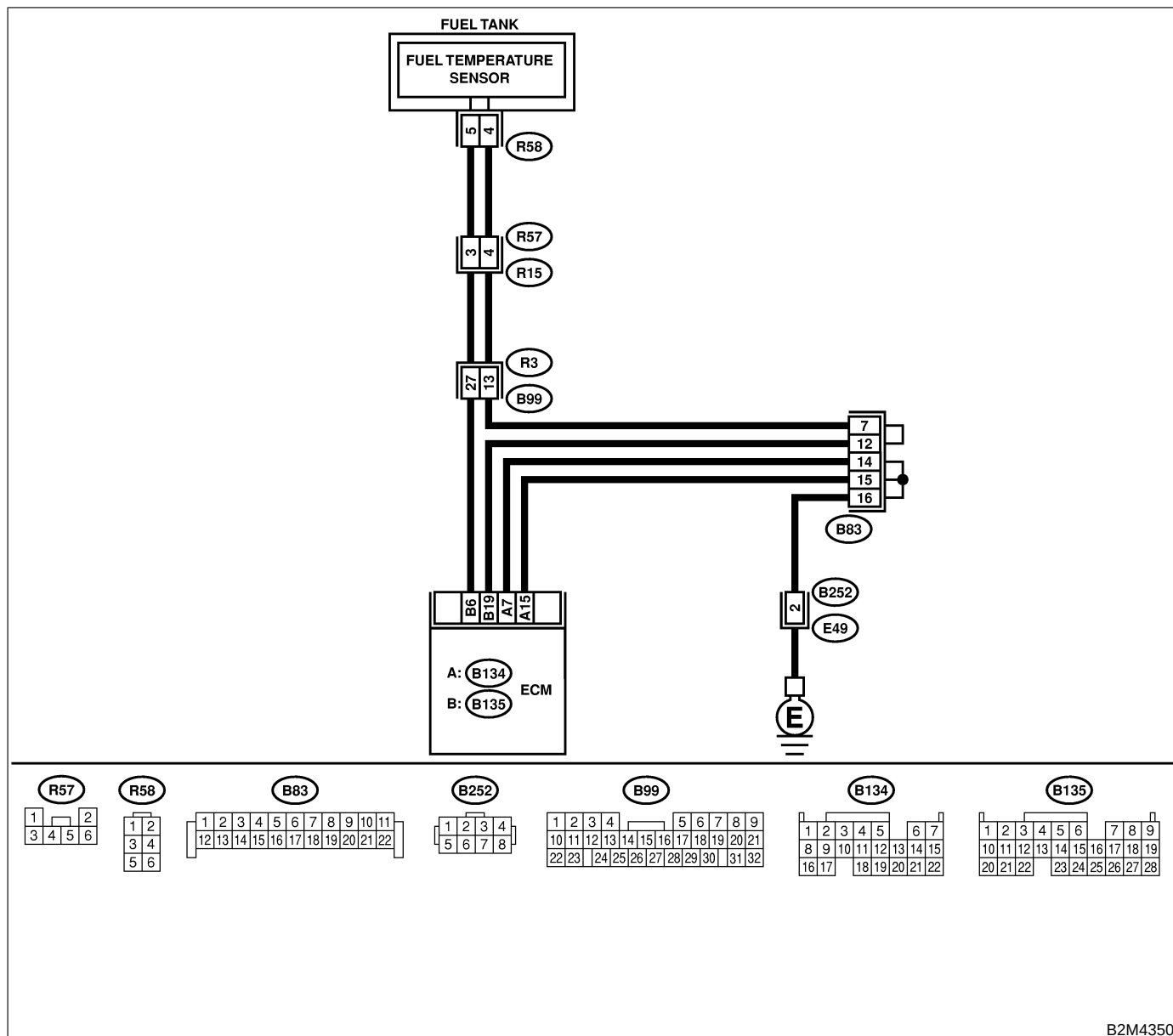
S048521B36

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4350

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Start engine. 2) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> - OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than -40°C (-40°F)?	Go to step 2.	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 - Poor contact in joint connector
2	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. 5 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and fuel pump connector.	Go to step 3.
3	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. 5 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and fuel pump connector.	Go to step 4.
4	CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR. Measure voltage between fuel pump connector and chassis ground. Connector & terminal (R58) No. 5 (+) — Chassis ground (-):	Is the voltage more than 4 V?	Go to step 5.	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

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
5	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. 4 — Chassis ground:	Is the resistance less than 5 Ω ?	Replace fuel temperature sensor. <Ref. to EC(H6)-13, Fuel Temperature Sensor.>	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 ● Poor contact in joint connector

AI: DTC P0301 — CYLINDER 1 MISFIRE DETECTED — S048521B37**NOTE:**

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6)-186 DTC P0306 — CYLINDER 6 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AJ: DTC P0302 — CYLINDER 2 MISFIRE DETECTED — S048521B38**NOTE:**

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6)-186 DTC P0306 — CYLINDER 6 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AK: DTC P0303 — CYLINDER 3 MISFIRE DETECTED — S048521B39**NOTE:**

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6)-186 DTC P0306 — CYLINDER 6 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AL: DTC P0304 — CYLINDER 4 MISFIRE DETECTED — S048521B40

NOTE:

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6)-186 DTC P0306 — CYLINDER 6 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AM: DTC P0305 — CYLINDER 5 MISFIRE DETECTED — S048521H02

NOTE:

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6)-186 DTC P0306 — CYLINDER 6 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AN: DTC P0306 — CYLINDER 6 MISFIRE DETECTED — S048521H03

● **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

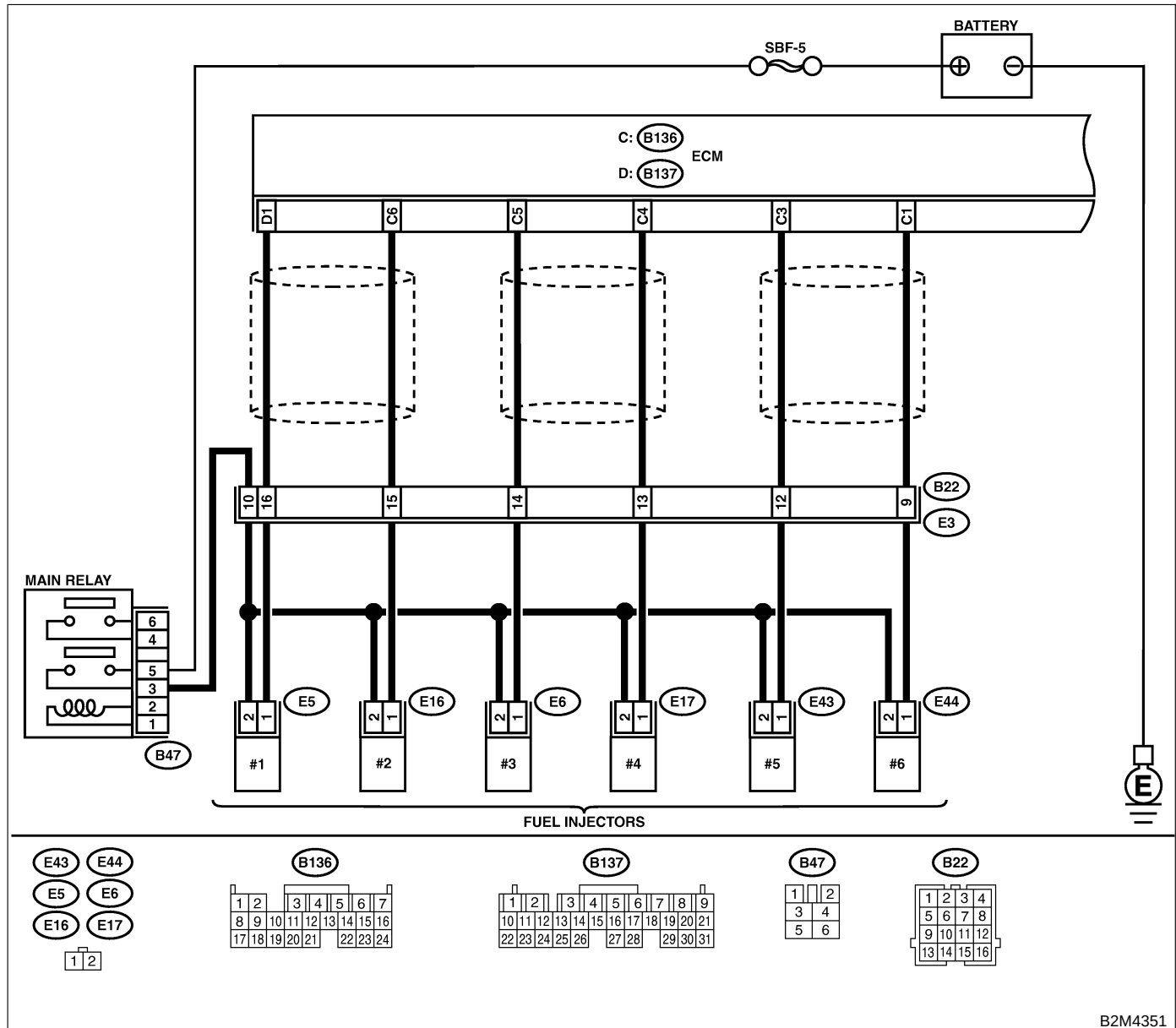
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

● WIRING DIAGRAM:



B2M4351

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P0117, P0118, P0125 or P0400?	Inspect DTC P0106, P0107, P0108, P0117, P0118, P0125 or P0400 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0301, P0302, P0303, P0304, P0305 and P0306.	Go to step 2.
2	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 (B137) No. 1 (+) — Chassis ground (-): #2 (B136) No. 6 (+) — Chassis ground (-): #3 (B136) No. 5 (+) — Chassis ground (-): #4 (B136) No. 4 (+) — Chassis ground (-): #5 (B136) No. 3 (+) — Chassis ground (-): #6 (B136) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 7.	Go to step 3.
3	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: #5 (E43) No. 1 — Engine ground: #6 (E44) No. 1 — Engine ground:	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between fuel injector and ECM connector.	Go to step 4.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
4	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 (B137) No. 1 — (E5) No. 1: #2 (B136) No. 6 — (E16) No. 1: #3 (B136) No. 5 — (E6) No. 1: #4 (B136) No. 4 — (E17) No. 1: #5 (B136) No. 3 — (E43) No. 1: #6 (B136) No. 1 — (E44) No. 1:	Is the resistance less than 1 Ω?	Go to step 5.	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
5	CHECK FUEL INJECTOR. Measure resistance between fuel injector terminals on faulty cylinder. Terminals No. 1 — No. 2:	Is the resistance between 5 and 20 Ω?	Go to step 6.	Replace faulty fuel injector. <Ref. to FU(H6)-39, Fuel Injector.>
6	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 (-): #5 (E43) No. 2 (+) — Engine ground (-): #6 (E44) No. 2 (+) — Engine ground (-):	Is the voltage more than 10 V?	Repair poor contact in all connectors in fuel injector circuit.	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 ● Poor contact in main relay connector ● Poor contact in fuel injector connector on faulty cylinders

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	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 (B137) No. 1 (+) — Chassis ground (-): #2 (B136) No. 6 (+) — Chassis ground (-): #3 (B136) No. 5 (+) — Chassis ground (-): #4 (B136) No. 4 (+) — Chassis ground (-): #5 (B136) No. 3 (+) — Chassis ground (-): #6 (B136) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and fuel injector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 8.
8	CHECK FUEL INJECTOR. 1) Turn ignition switch to OFF. 2) Measure resistance between fuel injector terminals on faulty cylinder. Terminals No. 1 — No. 2:	Is the resistance less than 1 Ω?	Replace faulty fuel injector <Ref. to FU(H6)-39, Fuel Injector.> and ECM <Ref. to FU(H6)-46, Engine Control Module.>.	Go to step 9.
9	CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.	Is camshaft position sensor or crankshaft position sensor loosely installed?	Tighten camshaft position sensor or crankshaft position sensor.	Go to step 10.
10	CHECK CRANKSHAFT PLATE.	Is crankshaft plate rusted or does it have broken teeth?	Replace crankshaft plate.	Go to step 11.
11	CHECK INSTALLATION CONDITION OF TIMING CHAIN. Turn crankshaft using ST, and align alignment mark on crankshaft sprocket with alignment mark. ST 499987500 CRANKSHAFT SOCKET	Is timing chain dislocated from its proper position?	Repair installation condition of timing chain. <Ref. to ME(H6)-45, Timing Chain Assembly.>	Go to step 12.
12	CHECK FUEL LEVEL.	Is the fuel meter indication higher than the "Lower" level?	Go to step 13.	Replenish fuel so fuel meter indication is higher than the "Lower" level. After replenishing fuel, Go to step 13.
13	CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL). 1) Clear memory using Subaru Select Monitor. <Ref. to EN(H6)-48 Clear Memory Mode.> 2) Start engine, and drive the vehicle more than 10 minutes.	Is the MIL coming on or blinking?	Go to step 15.	Go to step 14.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
14	CHECK CAUSE OF MISFIRE DIAGNOSED.	Was the cause of misfire diagnosed when the engine is running?	Finish diagnostics operation, if the engine has no abnormality. NOTE: Ex. Remove spark plug cord, etc.	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
15	CHECK AIR INTAKE SYSTEM.	Is there a fault in air intake system?	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?	Go to step 16.
16	CHECK MISFIRE SYMPTOM. 1) Turn ignition switch to ON. 2) Read diagnostic trouble code (DTC). ● Subaru Select Monitor <Ref. to EN(H6)-37 Subaru Select Monitor.> ● 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.	Does the Subaru Select Monitor or OBD-II general scan tool indicate only one DTC?	Go to step 22.	Go to step 17.
17	CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0301 and P0302?	Go to step 23.	Go to step 18.
18	CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0303 and P0304?	Go to step 24.	Go to step 19.
19	CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0305 and P0306?	Go to step 25.	Go to step 20.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
20	CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0301, P0303 and P0305?	Go to step 26.	Go to step 21.
21	CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0302, P0304 and P0306?	Go to step 27.	Go to step 28.
22	ONLY ONE CYLINDER	Is there a fault in that cylinder?	Repair or replace faulty parts. NOTE: Check the following items. ● Spark plug ● Spark plug cord ● Fuel injector ● Compression ratio	Inspect DTC P0171, P0172, P0173 or P0174 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0171, P0172, P0174 or P0175.
23	GROUP OF #1 AND #2 CYLINDERS	Are there faults in #1 and #2 cylinders?	Repair or replace faulty parts. NOTE: ● Check the following items. Spark plugs Fuel injectors Ignition coil Compression ratio ● If no abnormality is discovered, check for "IGNITION CONTROL SYSTEM" of #1 and #2 cylinders side. <Ref. to EN(H6)-74 IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Inspect DTC P0171, P0172, P0173 or P0174 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0171, P0172, P0174 or P0175.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
24	GROUP OF #3 AND #4 CYLINDERS	Are there faults in #3 and #4 cylinders?	Repair or replace faulty parts. NOTE: ● Check the following items. Spark plugs Fuel injectors Ignition coil ● If no abnormality is discovered, check for "16. D: IGNITION CONTROL SYSTEM" of #3 and #4 cylinders side. <Ref. to EN(H6)-74 IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Inspect DTC P0171, P0172, P0173 or P0174 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0171, P0172, P0173 or P0174.
25	GROUP OF #5 AND #6 CYLINDERS	Are there faults in #5 and #6 cylinders?	Repair or replace faulty parts. NOTE: ● Check the following items: Spark plugs, fuel injector, ignition coil and compression ratio ● If no abnormality is discovered, check for "16. IGNITION CONTROL SYSTEM" of #5 and #6 cylinders side. <Ref. to EN(H6)-74 IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Inspect DTC P0171, P0172, P0173 or P0174 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0171, P0172, P0173 or P0174.
26	GROUP OF #1, #3 AND #5 CYLINDERS	Are there faults in #1, #3 and #5 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. ● Spark plugs ● Fuel injectors ● Skipping timing belt teeth	Inspect DTC P0171, P0172, P0173 or P0174 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0171, P0172, P0173 or P0174.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
27	GROUP OF #2, #4 AND #6 CYLINDERS	Are there faults in #2, #4 and #6 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. ● Spark plugs ● Fuel injectors ● Compression ratio ● Skipping timing belt teeth	Inspect DTC P0171, P0172, P0174 or P0175 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0171, P0172, P0174 or P0175.
28	CYLINDER AT RANDOM	Is the engine idle rough?	Go to DTC P0171. <Ref. to EN(H6)-170, DTC P0171 — FUEL TRIM #1 (RH) MALFUNCTION (A/F TOO LEAN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Repair or replace faulty parts. NOTE: Check the following items. ● Spark plugs ● Fuel injectors ● Compression ratio

MEMO:

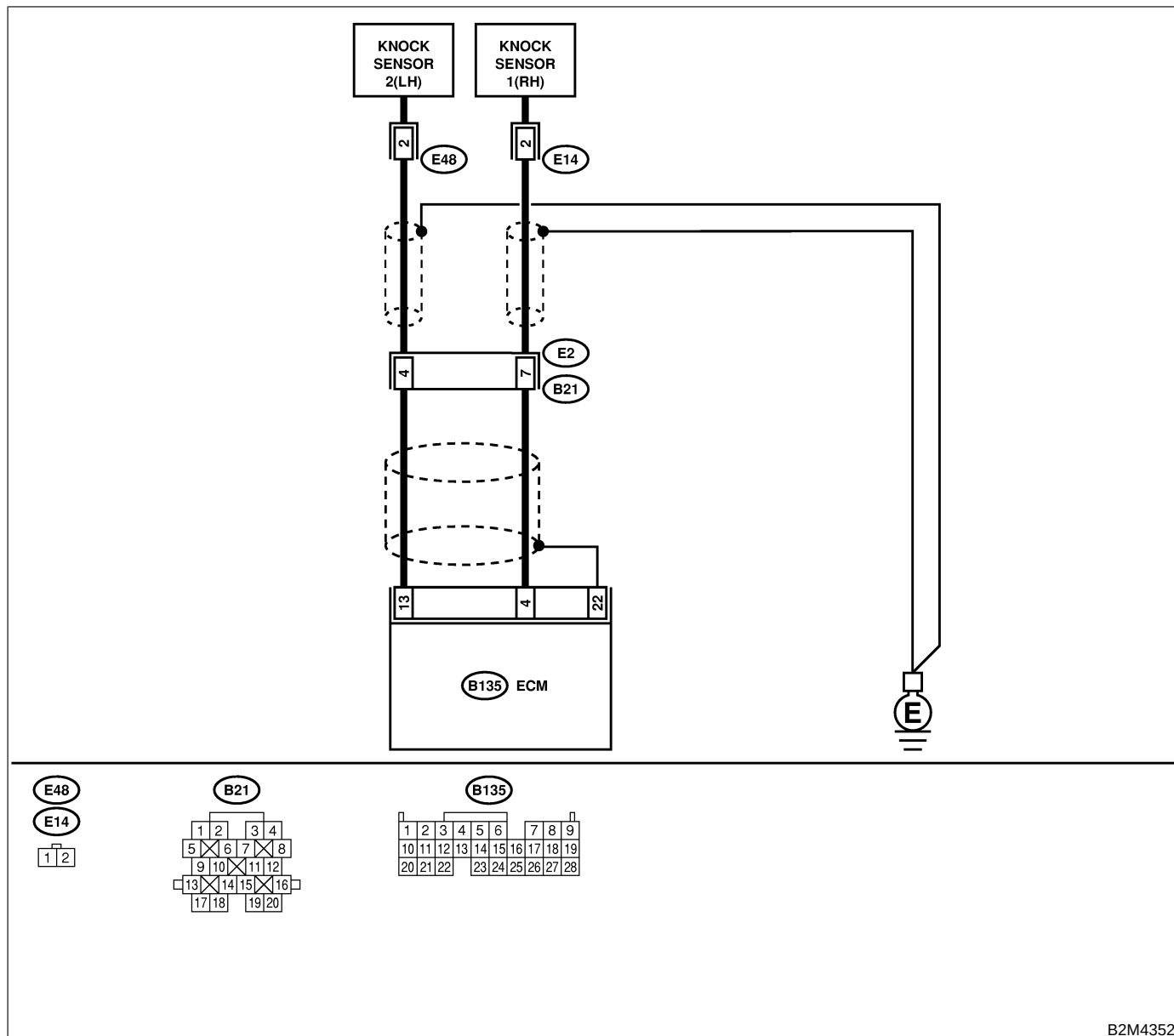
AO: DTC P0327 — KNOCK SENSOR 1 CIRCUIT LOW INPUT — S048521H04

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN KNOCK SENSOR 1 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 (B135) No. 4 — Chassis ground:	Is the resistance more than 700 k Ω ?	Go to step 2.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between knock sensor 1 (RH) and ECM connector ● Poor contact in knock sensor 1 (RH) connector ● Poor contact in coupling connector
2	CHECK KNOCK SENSOR 1 (RH). 1) Disconnect connector from knock sensor 1 (RH). 2) Measure resistance between knock sensor connector terminal and engine ground. Terminal No. 2 — Engine ground:	Is the resistance more than 700 k Ω ?	Go to step 3.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between knock sensor 1 (RH) and ECM connector ● Poor contact in knock sensor 1 (RH) connector ● Poor contact in coupling connector
3	CHECK CONDITION OF KNOCK SENSOR 1 (RH) INSTALLATION.	Is the knock sensor 1 (RH) installation bolt tightened securely?	Replace knock sensor 1 (RH). <Ref. to FU(H6)-32, Knock Sensor.>	Tighten knock sensor 1 (RH) installation bolt securely.

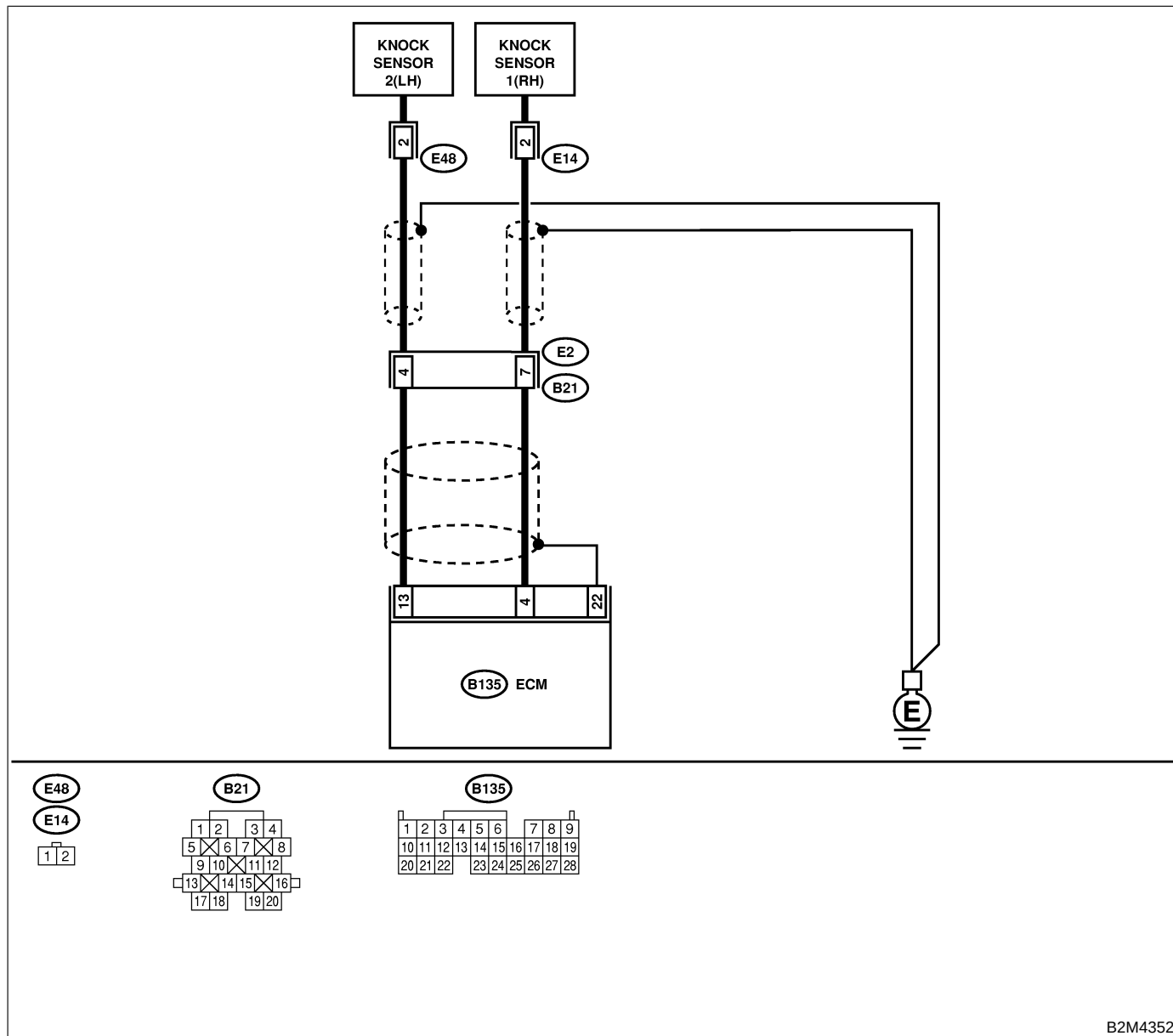
AP: DTC P0328 — KNOCK SENSOR 1 CIRCUIT HIGH INPUT — S048521H05

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN KNOCK SENSOR 1 (RH) AND ECM CONNECTOR. Measure resistance of harness between ECM connector and chassis ground. Connector & terminal (B135) No. 4 — Chassis ground:	Is the resistance less than 400 k Ω ?	Go to step 2.	Go to step 3.
2	CHECK KNOCK SENSOR 1 (RH). 1) Disconnect connector from knock sensor 1 (RH). 2) Measure resistance between knock sensor connector terminal and engine ground. Terminal No. 2 — Engine ground:	Is the resistance less than 400 k Ω ?	Replace knock sensor 1 (RH). <Ref. to FU(H6)-32, Knock Sensor.>	Repair ground short circuit in harness between knock sensor 1 (RH) connector and ECM connector. NOTE: The harness between both connectors is shielded. Repair short circuit of harness together with shield.
3	CHECK INPUT SIGNAL FOR ECM. 1) Connect connectors to ECM and knock sensor 1 (RH). 2) Turn ignition switch to ON. 3) Measure voltage between ECM and chassis ground. Connector & terminal (B135) No. 4 (+) — Chassis ground (-):	Is the voltage more than 2 V?	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 1 (RH) connector ● Poor contact in ECM connector ● Poor contact in coupling connector	Repair poor contact in ECM connector.

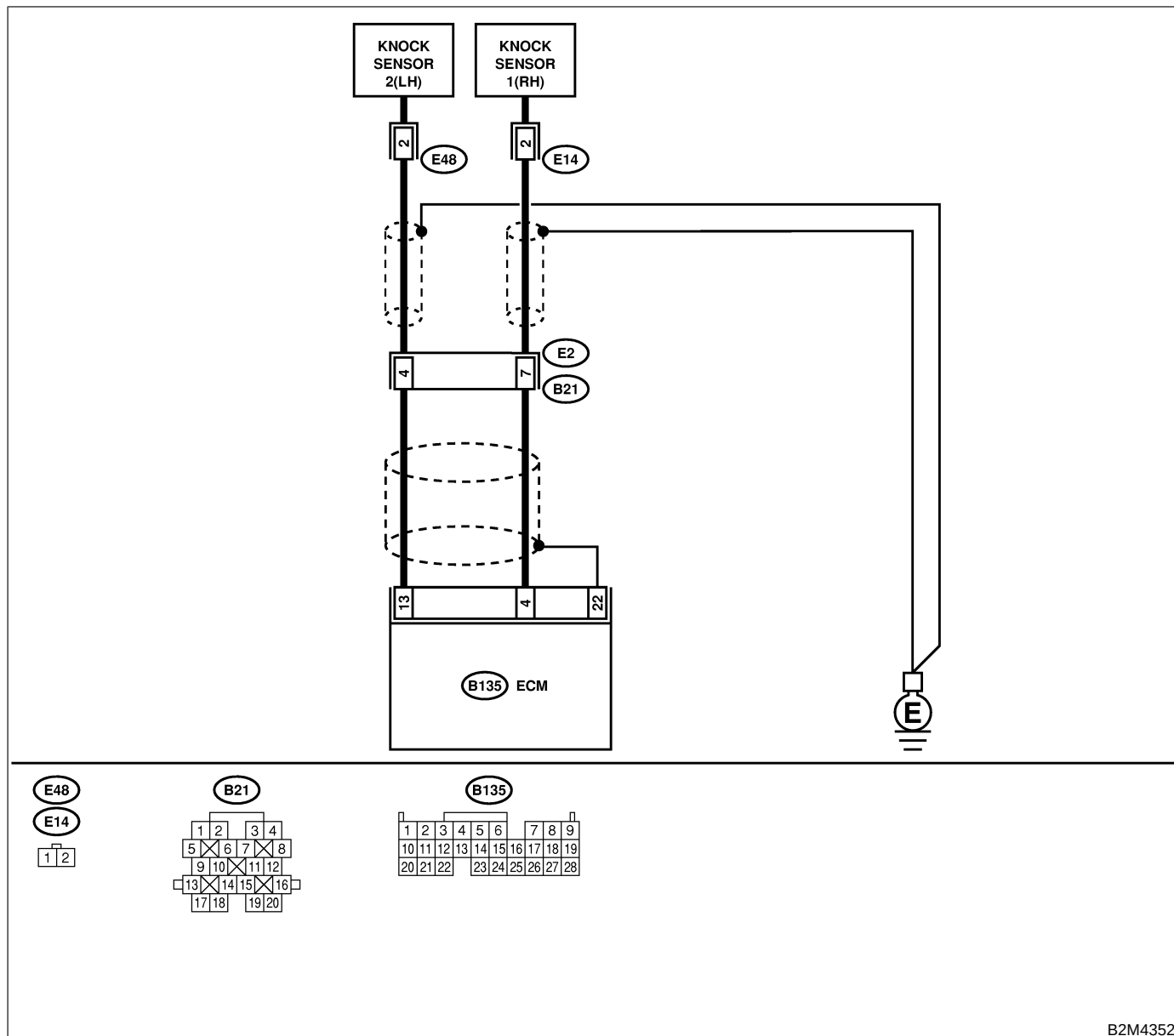
AQ: DTC P0332 — KNOCK SENSOR 2 CIRCUIT LOW INPUT — S048521H06

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN KNOCK SENSOR 2 (LH) 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 (B135) No. 13 — Chassis ground:	Is the resistance more than 700 k Ω ?	Go to step 2.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between knock sensor 2 (LH) and ECM connector ● Poor contact in knock sensor 2 (LH) connector ● Poor contact in coupling connector
2	CHECK KNOCK SENSOR 2 (LH). 1) Disconnect connector from knock sensor 2 (LH). 2) Measure resistance between knock sensor 2 (LH) connector terminal and engine ground. Terminal No. 2 — Engine ground:	Is the resistance more than 700 k Ω ?	Go to step 3.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between knock sensor 2 (LH) and ECM connector ● Poor contact in knock sensor 2 (LH) connector ● Poor contact in coupling connector
3	CHECK CONDITION OF KNOCK SENSOR 2 (LH) INSTALLATION.	Is the knock sensor 2 (LH) installation bolt tightened securely?	Replace knock sensor 2 (LH). <Ref. to FU(H6)-32, Knock Sensor.>	Tighten knock sensor 2 (LH) installation bolt securely.

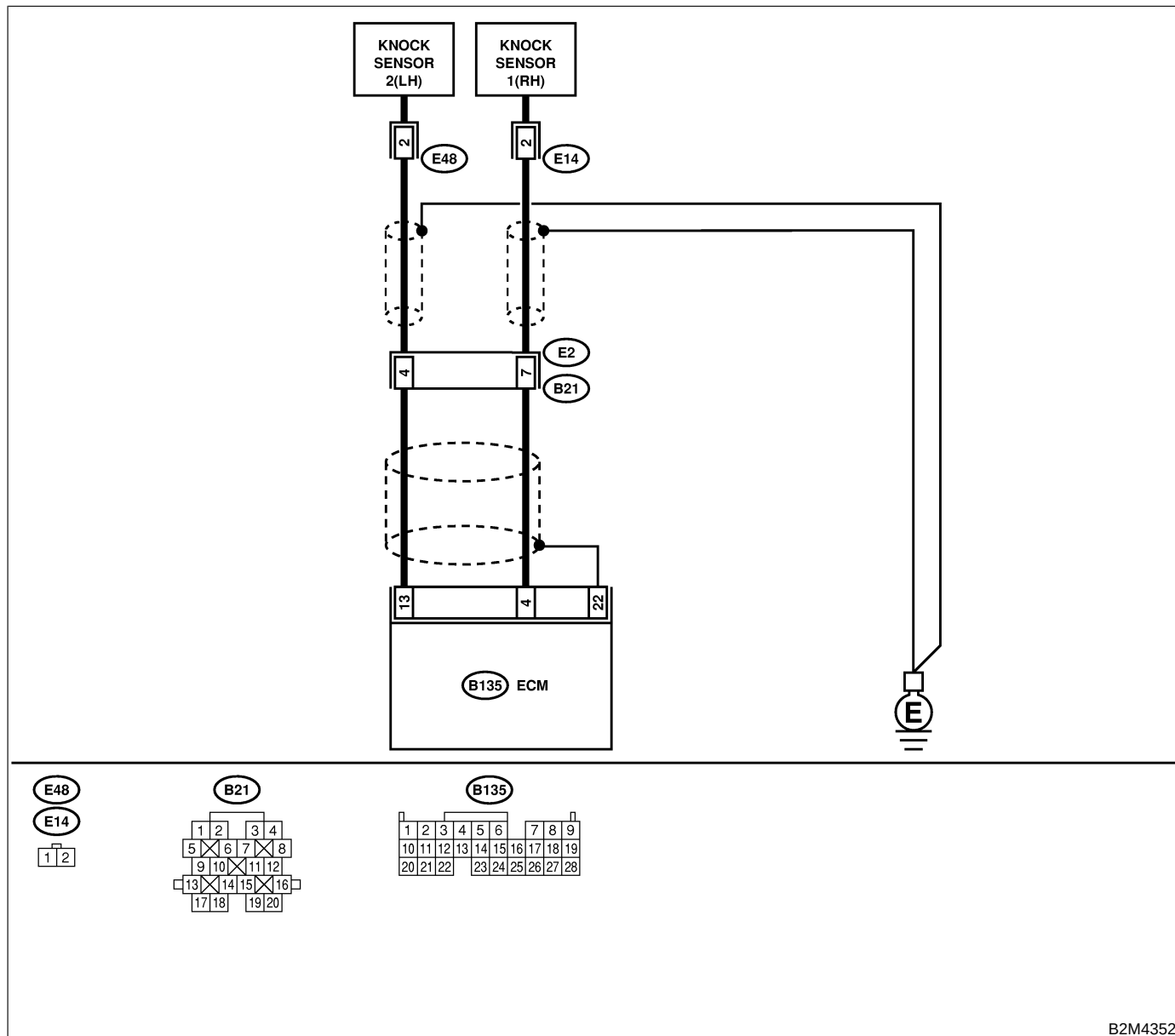
AR: DTC P0333 — KNOCK SENSOR 2 CIRCUIT HIGH INPUT — S048521H07

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN KNOCK SENSOR 2 (LH) AND ECM CONNECTOR. Measure resistance of harness between ECM connector and chassis ground. Connector & terminal (B135) No. 13 — Chassis ground:	Is the resistance less than 400 kΩ?	Go to step 2.	Go to step 3.
2	CHECK KNOCK SENSOR 2 (LH). 1) Disconnect connector from knock sensor 2 (LH). 2) Measure resistance between knock sensor 2 (LH) connector terminal and engine ground. Terminal No. 2 — Engine ground:	Is the resistance less than 400 kΩ?	Replace knock sensor 2 (LH). <Ref. to FU(H6)-32, Knock Sensor.>	Repair ground short circuit in harness between knock sensor 2 (LH) connector and ECM connector. NOTE: The harness between both connectors is shielded. Repair short circuit of harness together with shield.
3	CHECK INPUT SIGNAL FOR ECM. 1) Connect connectors to ECM and knock sensor 2 (LH). 2) Turn ignition switch to ON. 3) Measure voltage between ECM and chassis ground. Connector & terminal (B135) No. 13 (+) — Chassis ground (-):	Is the voltage more than 2 V?	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 2 (LH) ● Poor contact in ECM connector ● Poor contact in coupling connector	Repair poor contact in ECM connector.

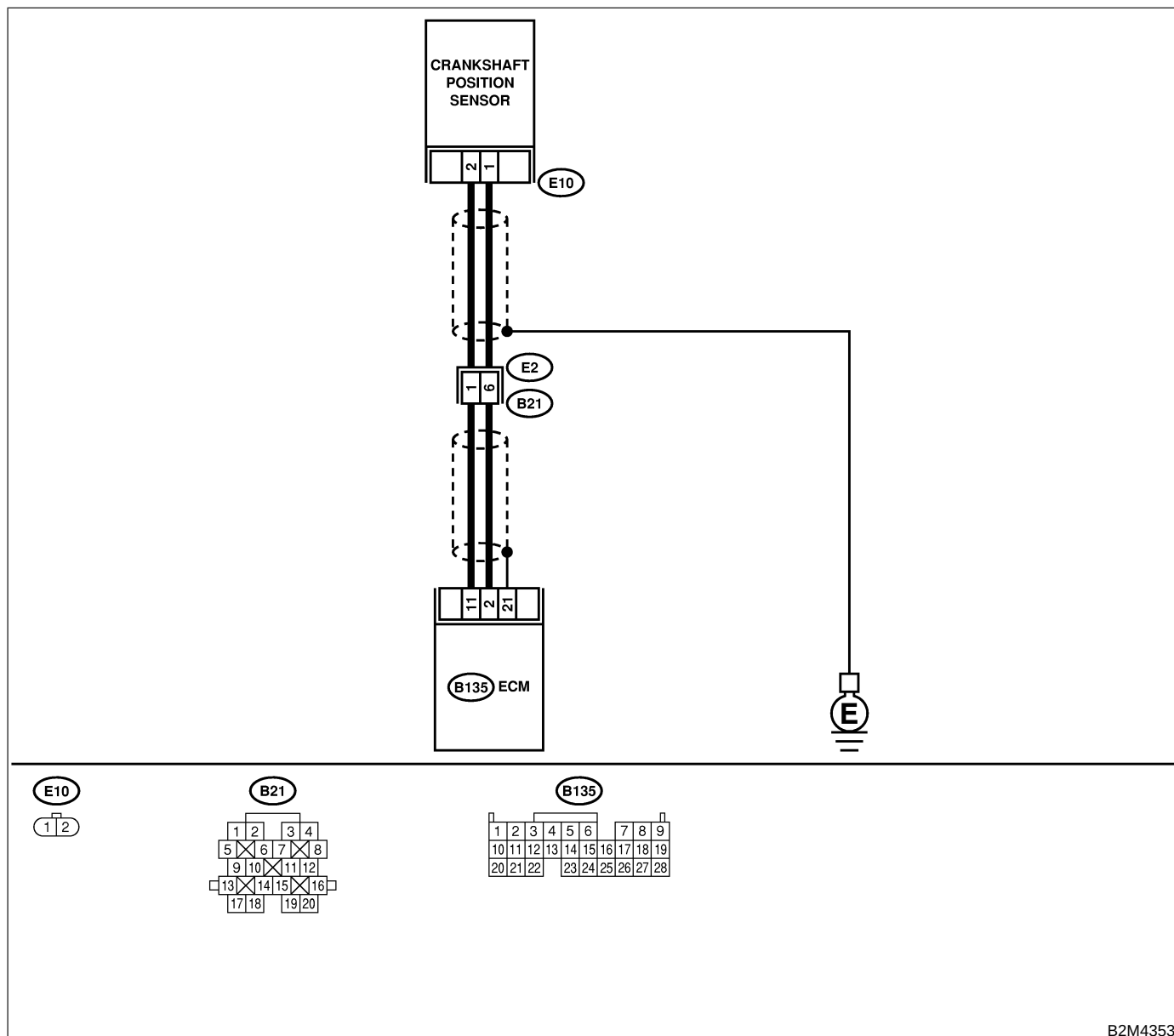
**AS: DTC P0335 — CRANKSHAFT POSITION SENSOR CIRCUIT
MALFUNCTION —** S048521B42

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance between crankshaft position sensor and ECM. Connector & terminal (E10) No. 1 — (B135) No. 2: (E10) No. 2 — (B135) No. 11:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit between crankshaft position sensor and ECM.
2	CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM. Measure resistance between crankshaft position sensor and engine ground. Connector & terminal (E10) No. 1 — Engine ground: (E10) No. 2 — Engine ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair ground short circuit between crankshaft position sensor and ECM.
3	CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.	Is the crankshaft position sensor installation bolt tightened securely?	Go to step 4.	Tighten crankshaft position sensor installation bolt.
4	CHECK CRANKSHAFT POSITION SENSOR. 1) Turn ignition switch to OFF. 2) Remove crankshaft position sensor. 3) Measure resistance between connector terminals of crankshaft position sensor. Terminals No. 1 — No. 2:	Is the resistance between 800 and 1300 k Ω ?	Go to step 5.	Replace crankshaft position sensor. <Ref. to FU(H6)-31, Camshaft Position Sensor.>
5	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>

**AT: DTC P0336 — CRANKSHAFT POSITION SENSOR CIRCUIT
RANGE/PERFORMANCE PROBLEM —** S048521B43

● **DTC DETECTING CONDITION:**

- Tow consecutive driving cycles with fault

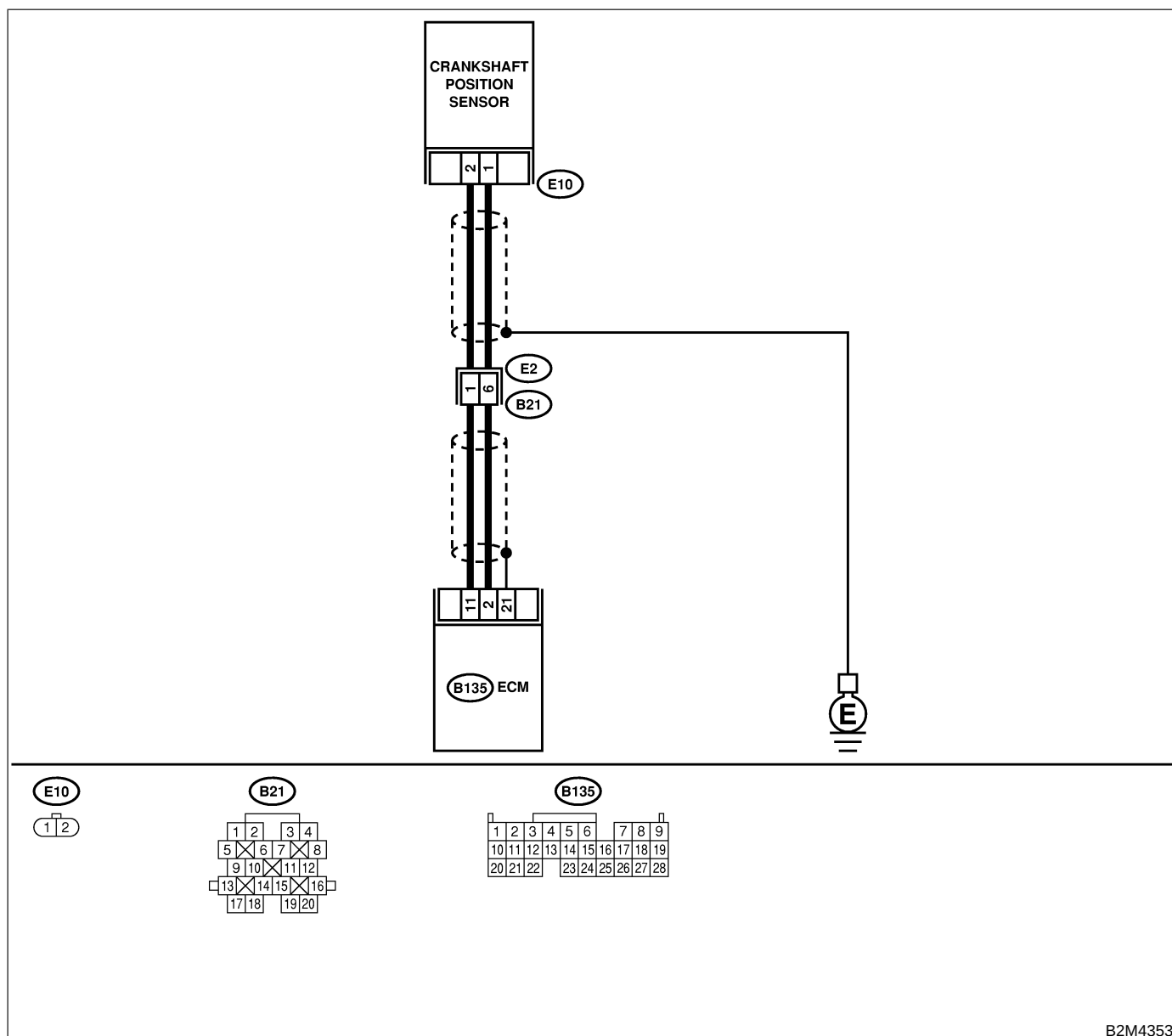
● **TROUBLE SYMPTOM:**

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0335?	Inspect DTC P0335 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK CONDITION OF CRANKSHAFT POSITION SENSOR. Turn ignition switch to OFF.	Is the crankshaft position sensor installation bolt tightened securely?	Go to step 3.	Tighten crankshaft position sensor installation bolt securely.
3	CHECK CRANKSHAFT PLATE.	Are crankshaft plate teeth cracked or damaged?	Replace crankshaft plate.	Go to step 4.
4	CHECK INSTALLATION CONDITION OF TIMING CHAIN. Turn crankshaft using ST, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is timing chain dislocated from its proper position?	Repair installation condition of timing chain. <Ref. to ME(H6)-45, Timing Chain Assembly.>	Replace crankshaft position sensor. <Ref. to FU(H6)-30, Crankshaft Position Sensor.>

AU: DTC P0340 — CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

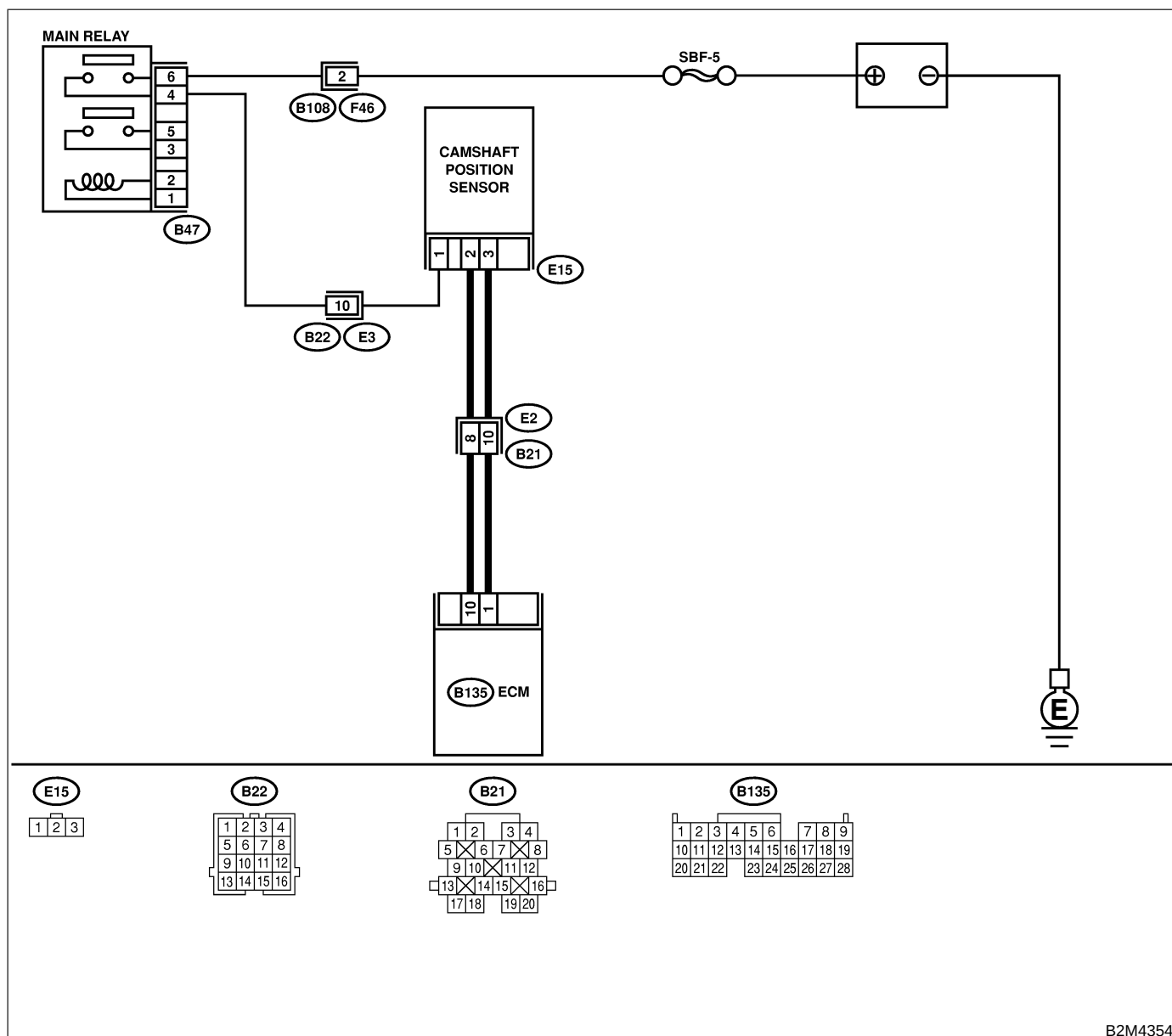
S048521B44

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● WIRING DIAGRAM:



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK POWER SUPPLY TO CAMSHAFT POSITION SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from camshaft position sensor. 3) Measure voltage between camshaft position sensor and engine ground. Connector & terminal (E15) No. 1 (+) — Engine ground (-):	Is the voltage more than 10V ?	Repair ground short circuit between main relay connector and camshaft position sensor connector.	Go to step 2.
2	CHECK POWER SUPPLY TO CAMSHAFT POSITION SENSOR. 1) Turn ignition switch to ON. 2) Measure voltage between camshaft position sensor and engine ground. Connector & terminal (E15) No. 1 (+) — Engine ground (-):	Is the voltage more than 10V ?	Go to step 3.	Repair open or ground short circuit between main relay connector and camshaft position sensor connector.
3	CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance between camshaft position sensor and ECM. Connector & terminal (E15) No. 2 — (B135) No. 10: (E15) No. 3 — (B135) No. 1:	Is the resistance less than 1 Ω?	Go to step 4.	Repair open circuit between camshaft position sensor and ECM.
4	CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM. Measure resistance between camshaft position sensor and engine ground. Connector & terminal (E15) No. 2 — Engine ground: (E15) No. 3 — Engine ground:	Is the resistance more than 1 MΩ?	Go to step 5.	Repair ground short circuit between camshaft position sensor and ECM.
5	CHECK CONDITION OF CAMSHAFT POSITION SENSOR.	Is the camshaft position sensor installation bolt tightened securely?	Go to step 6.	Tighten camshaft position sensor installation bolt.
6	CHECK CAMSHAFT POSITION SENSOR. Check camshaft position sensor wave form. <Ref. to EN(H6)-29, WAVEFORM, MEASUREMENT, Engine Control Module (ECM) I/O Signal.>	Is any abnormality found in waveform?	Go to step 7.	Replace camshaft position sensor. <Ref. to FU(H6)-31, Camshaft Position Sensor.>
7	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>

**AV: DTC P0341 — CAMSHAFT POSITION SENSOR CIRCUIT
RANGE/PERFORMANCE PROBLEM —**

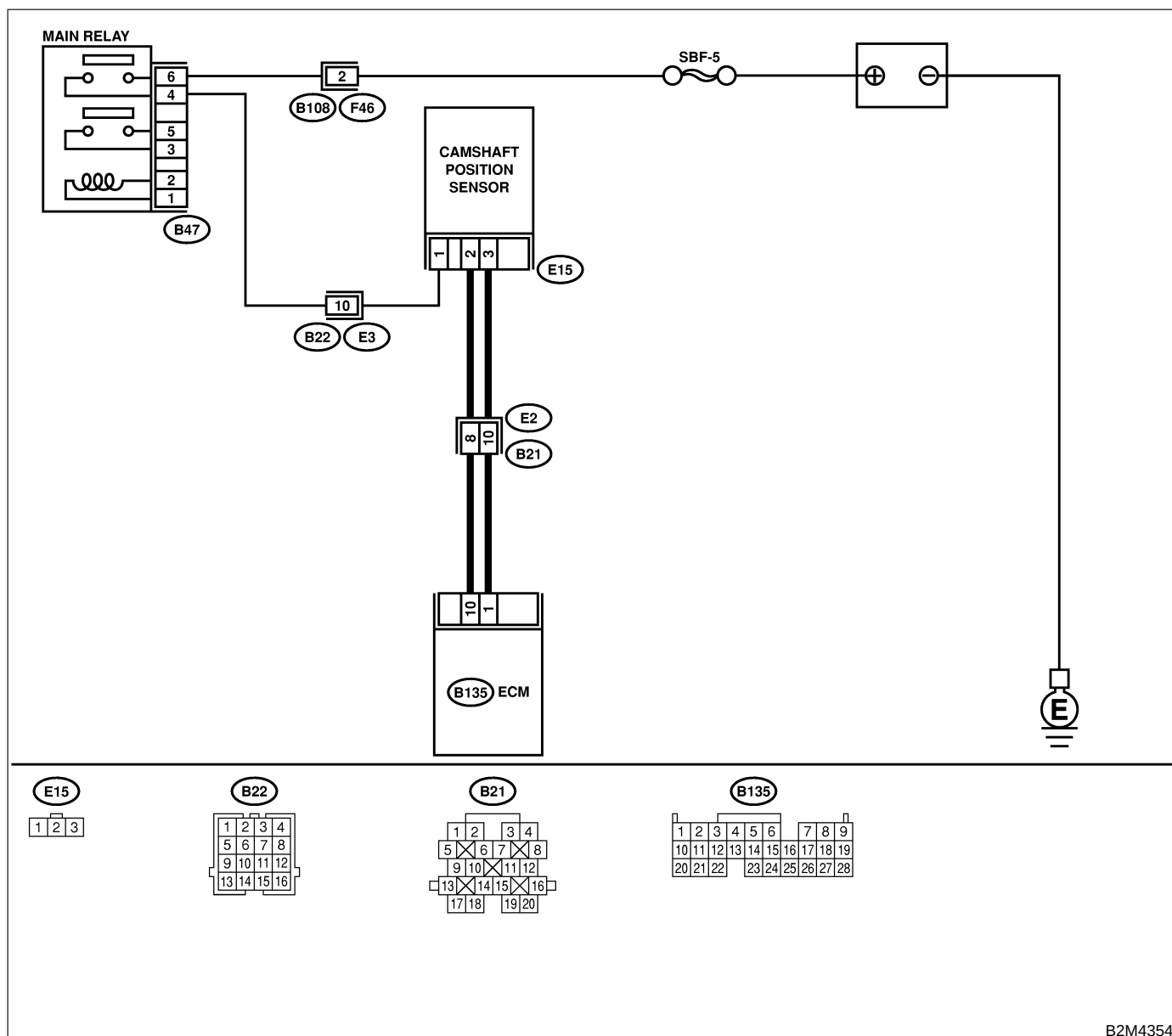
S048521B45

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4354

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0340?	Inspect DTC P0340 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK CONDITION OF CAMSHAFT POSITION SENSOR.	Is the camshaft position sensor installation bolt tightened securely?	Go to step 3.	Tighten camshaft position sensor installation bolt securely.
3	CHECK CAMSHAFT SPROCKET. Remove front chain cover. <Ref. to ME(H6)-43, Front Chain Cover.>	Are camshaft sprocket teeth cracked or damaged?	Replace camshaft sprocket. <Ref. to ME(H6)-50, Camshaft Sprocket.>	Go to step 4.
4	CHECK INSTALLATION CONDITION OF TIMING CHAIN. Turn camshaft using ST, and align alignment mark on camshaft sprocket with alignment mark. ST 18231AA000 CAMSHAFT SPROCKET WRENCH	Is timing belt dislocated from its proper position?	Repair installation condition of timing chain. <Ref. to ME(H6)-45, Timing Chain Assembly.>	Replace camshaft position sensor. <Ref. to FU(H6)-31, Camshaft Position Sensor.>

AW: DTC P0400 — EGR SYSTEM MALFUNCTION — S048521H08

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

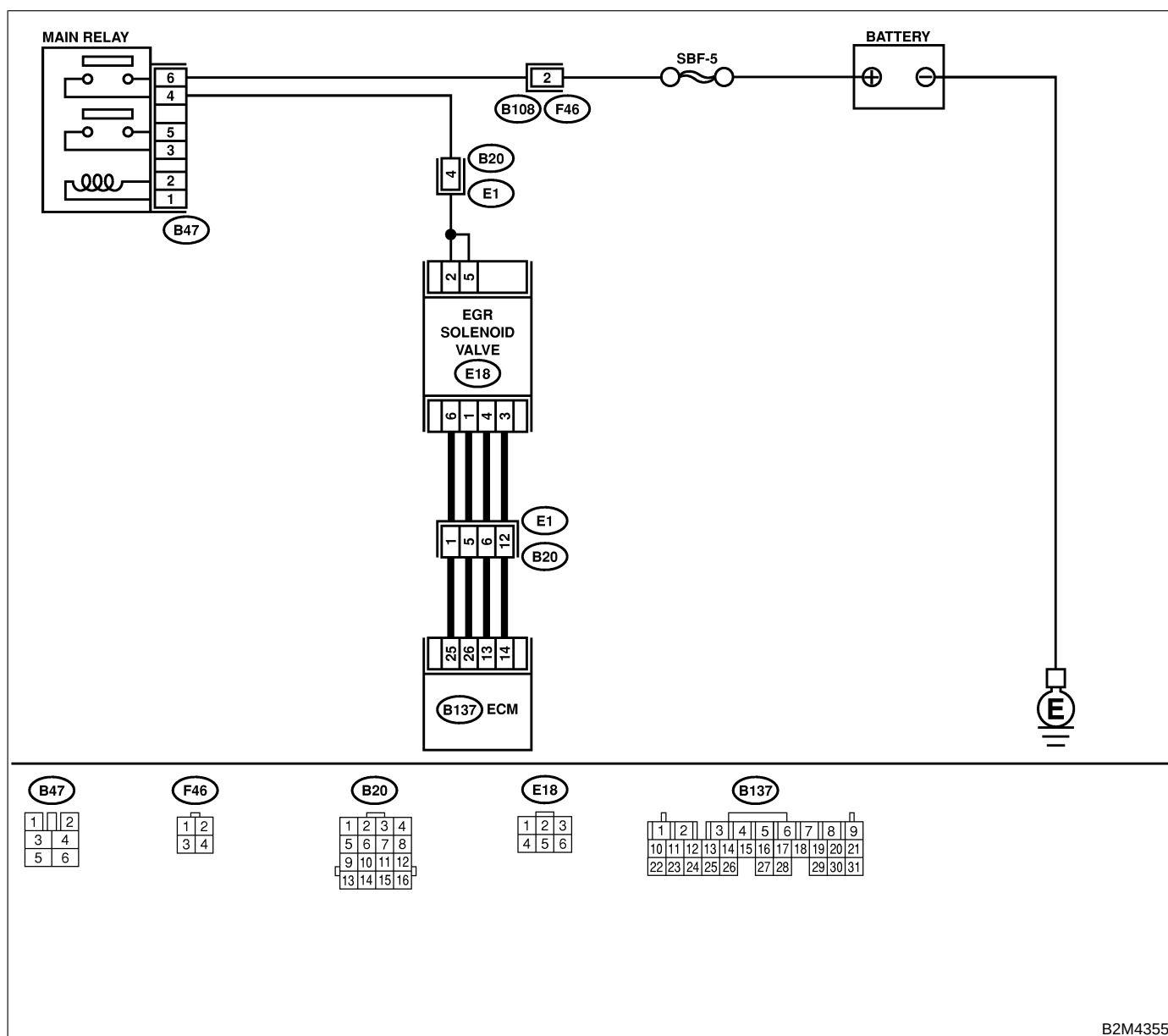
● **TROUBLE SYMPTOM:**

- Poor driving performance on low engine speed
- Erroneous idling
- Poor driving performance.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4355

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0106?	Inspect DTC P0106 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK CURRENT DATA. 1) Start engine. 2) Rear 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 FOR ENGINE". <Ref. EN(H6)-52, Subaru Select Monitor. ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 53.3 kPa (400 mmHg, 15.75 inHg)?	Check if EGR valve, intake manifold pressure sensor and throttle body are securely installed.	Go to step 3.
3	CHECK POWER SUPPLY TO EGR SOLENOID VALVE. 1) Disconnect connector from EGR solenoid valve. 2) Turn ignition switch to ON. 3) Measure voltage between EGR solenoid valve and engine ground. Connector & terminal (E18) No. 2 — Engine ground: (E18) No. 5 — Engine ground:	Is the voltage more than 10 V?	Go to step 4.	Repair open circuit in harness between main relay and EGR solenoid valve connector.
4	CHECK EGR SOLENOID VALVE. Measure resistance between EGR solenoid valve terminals. NOTE: Make sure there are no foreign objects caught between EGR solenoid valve and valve seat. Terminals No. 1 — No. 2: No. 3 — No. 2: No. 4 — No. 5: No. 6 — No. 5:	Is the resistance between 20 and 30 Ω?	Go to step 5.	Replace EGR solenoid valve. <Ref. to EC(H6)-10, EGR Valve.>
5	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to OFF. 2) Connect connectors to ECM and EGR solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 25 — Chassis ground: (B137) No. 26 — Chassis ground: (B137) No. 13 — Chassis ground: (B137) No. 14 — Chassis ground:	Does voltage change between 0 and 10 V?	Repair poor contact in ECM connector.	Go to step 6.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	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 and ECM connector. Connector & terminal (B137) No. 25 — (E18) No. 6: (B137) No. 26 — (E18) No. 1: (B137) No. 13 — (E18) No. 4: (B137) No. 14 — (E18) No. 3:	Is the resistance less than 1 Ω?	Go to step 7.	Repair open circuit in harness between ECM and EGR solenoid valve connector.
7	CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR. Measure resistance of harness between EGR solenoid valve and chassis ground. Connector & terminal (B137) No. 25 — Chassis ground: (B137) No. 26 — Chassis ground: (B137) No. 13 — Chassis ground: (B137) No. 14 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 8.	Repair short circuit in harness between main relay and EGR solenoid valve connector.
8	CHECK POOR CONTACT. Check poor contact in ECM and EGR solenoid valve connector.	Is there poor contact in ECM and EGR solenoid valve connector?	Repair poor contact in ECM and EGR solenoid valve connector.	Even if MIL lights up, the circuit has returned to a normal condition at this time.

MEMO:

AX: DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD

S048521B46

• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

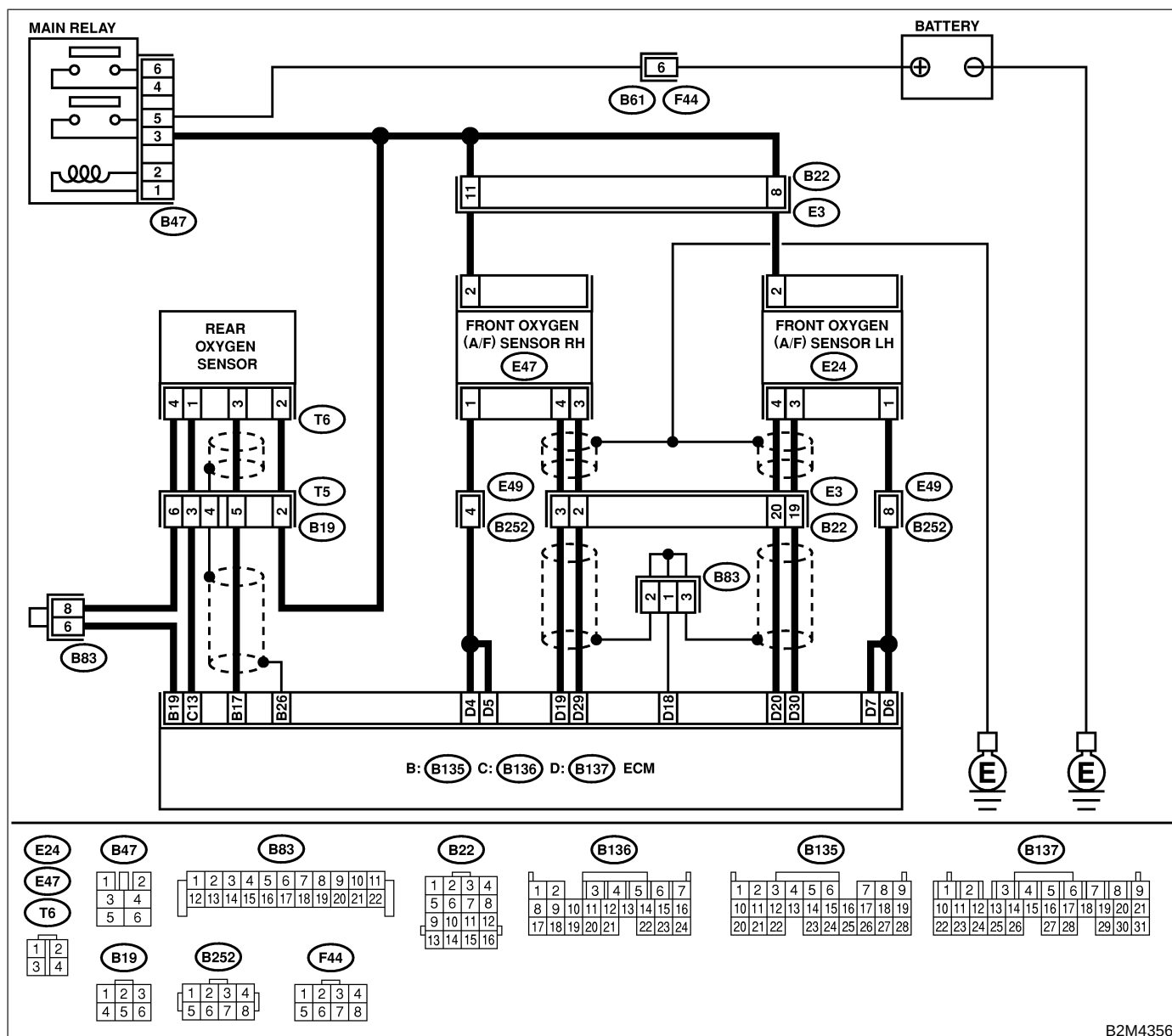
• TROUBLE SYMPTOM:

- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

• WIRING DIAGRAM:



B2M4356

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0133, P0136, P0139, P0037, P0301, P0302, P0303, P0304, P0305, P0306, P0051, P0052, P0131, P0132, P0151, P0152, P0153, P0031, P0032, P0038, P1139, P1140 and P1134?	Inspect the relevant DTC using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step 2.
2	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	Is there a fault in exhaust system?	Repair or replace exhaust system.	Go to step 3.
3	CHECK REAR CATALYTIC CONVERTER. Separate rear catalytic converter from rear exhaust pipe.	Is there damage at rear face of rear catalyst?	Replace front catalytic converter <Ref. to EC(H6)-3, Front Catalytic Converter.> and rear catalytic converter <Ref. to EC(H6)-6, Rear Catalytic Converter.>.	Go to step 4.
4	CHECK FRONT CATALYTIC CONVERTER. Remove front catalytic converter.	Is there damage at rear face or front face of front catalyst?	Replace front catalytic converter. <Ref. to EC(H6)-3, Front Catalytic Converter.>	Contact with SOA service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

**AY: DTC P0442 — EVAPORATIVE EMISSION CONTROL SYSTEM
MALFUNCTION —** S048521B48

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

● **TROUBLE SYMPTOM:**

- Gasoline smell
- There is a hole of more than 1.0 mm (0.04 in) dia. in evaporation system or fuel tank.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

Engine (DIAGNOSTICS)

EN(H6)-219

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is there any other DTC on display?	Inspect the relevant DTC using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK FUEL FILLER CAP. 1) Turn ignition switch to OFF. 2) Check the fuel filler cap. NOTE: The DTC code is stored in memory if fuel filler cap is or was loose or if the cap chain was caught while tightening.	Is the fuel filler cap tightened securely?	Go to step 3.	Tighten fuel filler cap securely.
3	CHECK FUEL FILLER PIPE PACKING.	Is there any damage to the seal between fuel filler cap and fuel filler pipe?	Repair or replace fuel filler cap and fuel filler pipe. <Ref. to FU(H6)-61, Fuel Filler Pipe.>	Go to step 4.
4	CHECK DRAIN VALVE. 1) Connect test mode connector. 2) Turn ignition switch to ON. 3) Operate drain valve. NOTE: Drain valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-49 Compulsory Valve Operation Check Mode.>	Does drain valve produce operating sound?	Go to step 5.	Replace drain valve. <Ref. to EC(H6)-20, Drain Valve.>
5	CHECK PURGE CONTROL SOLENOID VALVE. Operate purge control solenoid valve. NOTE: Purge control solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-49 Compulsory Valve Operation Check Mode.>	Does purge control solenoid valve produce operating sound?	Go to step 6.	Replace purge control solenoid valve. <Ref. to EC(H6)-8, Purge Control Solenoid Valve.>
6	CHECK PRESSURE CONTROL SOLENOID VALVE. Operate pressure control solenoid valve. NOTE: Pressure control solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-49 Compulsory Valve Operation Check Mode.>	Does pressure control solenoid valve produce operating sound?	Go to step 7.	Replace pressure control solenoid valve. <Ref. to EC(H6)-16, Pressure Control Solenoid Valve.>
7	CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE. Turn ignition switch to OFF.	Is there a hole of more than 1.0 mm (0.04 in) dia. on fuel line?	Repair or replace fuel line. <Ref. to FU(H6)-77, Fuel Delivery, Return and Evaporation Lines.>	Go to step 8.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

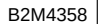
No.	Step	Check	Yes	No
8	CHECK CANISTER.	Is canister damaged or is there a hole of more than 1.0 mm (0.04 in) dia. in it?	Repair or replace canister. <Ref. to EC(H6)-7, Canister.>	Go to step 9.
9	CHECK FUEL TANK. Remove fuel tank. <Ref. to FU(H6)-52, Fuel Tank.>	Is fuel tank damaged or is there a hole of more than 1.0 mm (0.04 in) dia. in it?	Repair or replace fuel tank. <Ref. to FU(H6)-52, Fuel Tank.>	Go to step 10.
10	CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.	Are there holes of more than 1.0 mm (0.04 in) dia., cracks, clogging or disconnections of hoses or pipes in evaporative emission control system?	Repair or replace hoses or pipes.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

Engine (DIAGNOSTICS)

S048521G47

- CAUTION:**

- **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 16 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Go to step 2.
2	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:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and purge control solenoid valve connector.	Go to step 3.
3	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 (B137) No. 16 — (E4) No. 2:	Is the resistance less than 1 Ω ?	Go to step 4.	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
4	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:	Is the resistance between 10 and 100 Ω ?	Go to step 5.	Replace purge control solenoid valve. <Ref. to EC(H6)-8 Purge Control Solenoid Valve.>
5	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 (-):	Is the voltage more than 10 V?	Go to step 6.	Repair open circuit in harness between main relay and purge control solenoid valve connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	CHECK POOR CONTACT. Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair poor contact in purge control solenoid valve connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

BA: DTC P0445 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH INPUT — S048521G48

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

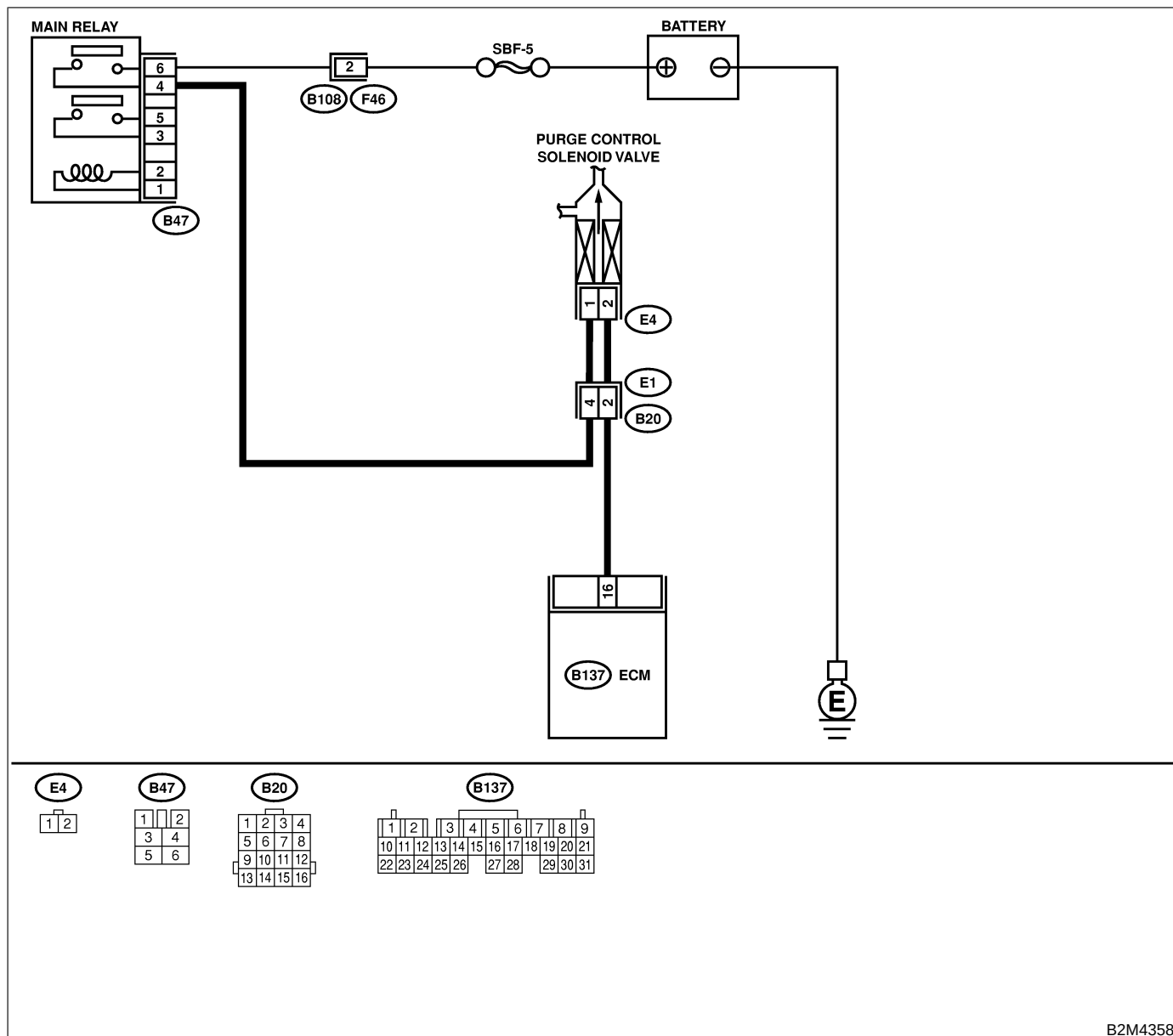
● **TROUBLE SYMPTOM:**

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	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) While operating purge control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-49 Compulsory Valve Operation Check Mode.> Connector & terminal (B137) No. 16 (+) — Chassis ground (-):	Does voltage change between 0 and 10 V?	Go to step 2.	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.
2	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 16 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 4.	Go to step 3.
3	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>
4	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 (B137) No. 16 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 5.
5	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:	Is the resistance less than 1 Ω ?	Replace purge control solenoid valve <Ref. to EC(H6)-8, Purge Control Solenoid Valve.> and ECM <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 6.
6	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-67 Engine Control Module.>

BB: DTC P0447 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL LOW INPUT —

S048521F98

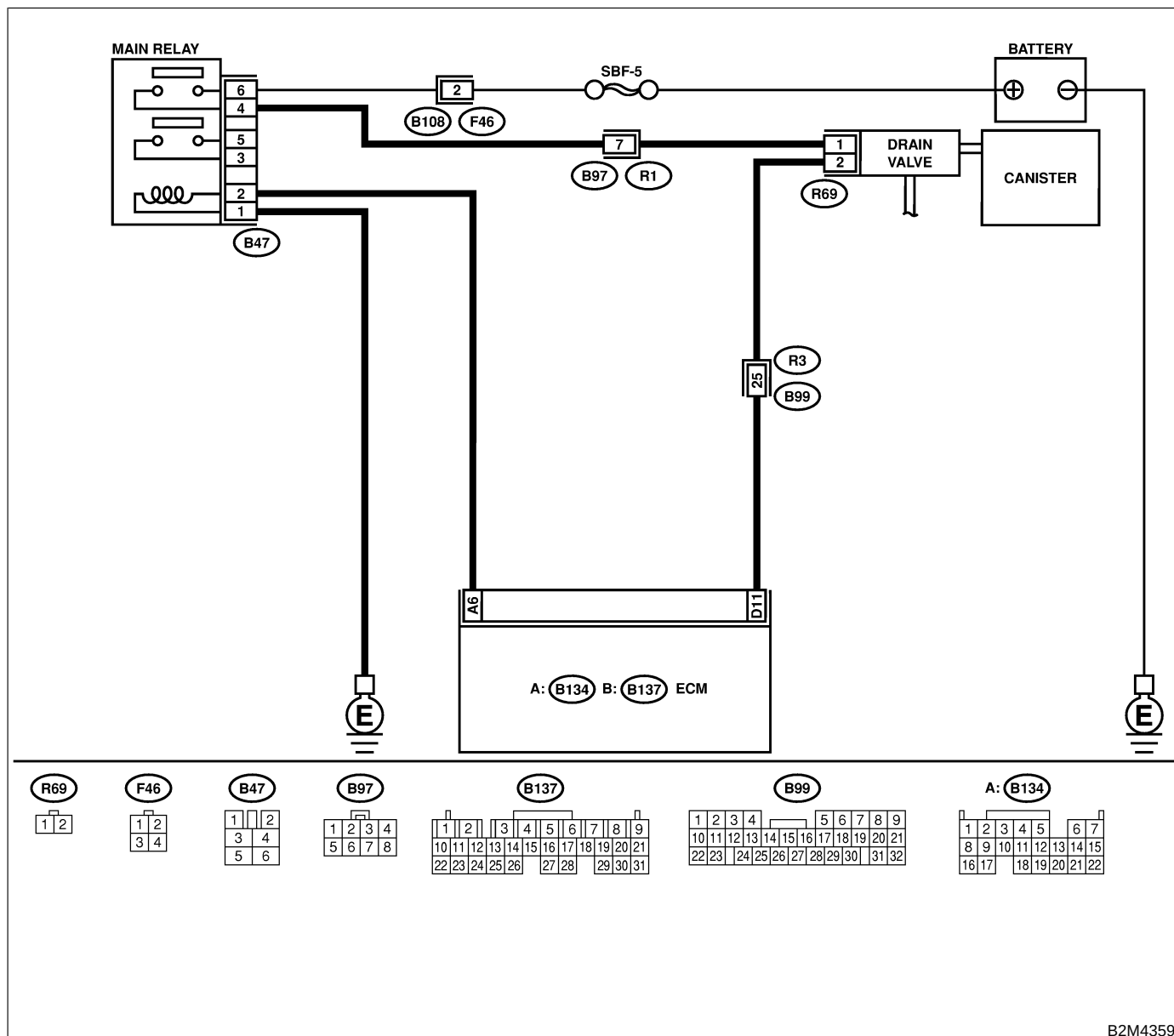
● **DTC DETECTING CONDITION:**

- Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 11 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 2.	Go to step 3.
2	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	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
3	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:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and drain valve connector.	Go to step 4.
4	CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR. Measure resistance of harness between ECM and drain valve connector. Connector & terminal (B137) No. 11 — (R69) No. 2:	Is the voltage less than 1 Ω ?	Go to step 5.	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
5	CHECK DRAIN VALVE. Measure resistance between drain valve terminals. Terminals No. 1 — No. 2:	Is the resistance between 10 and 100 Ω ?	Go to step 6.	Replace drain valve. <Ref. to EC(H6)-20, Drain Valve.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	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 (-):	Is the voltage more than 10 V?	Go to step 7.	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 ● Poor contact in main relay connector
7	CHECK POOR CONTACT. Check poor contact in drain valve connector.	Is there poor contact in drain valve connector?	Repair poor contact in drain valve connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

BC: DTC P0448 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL HIGH INPUT —

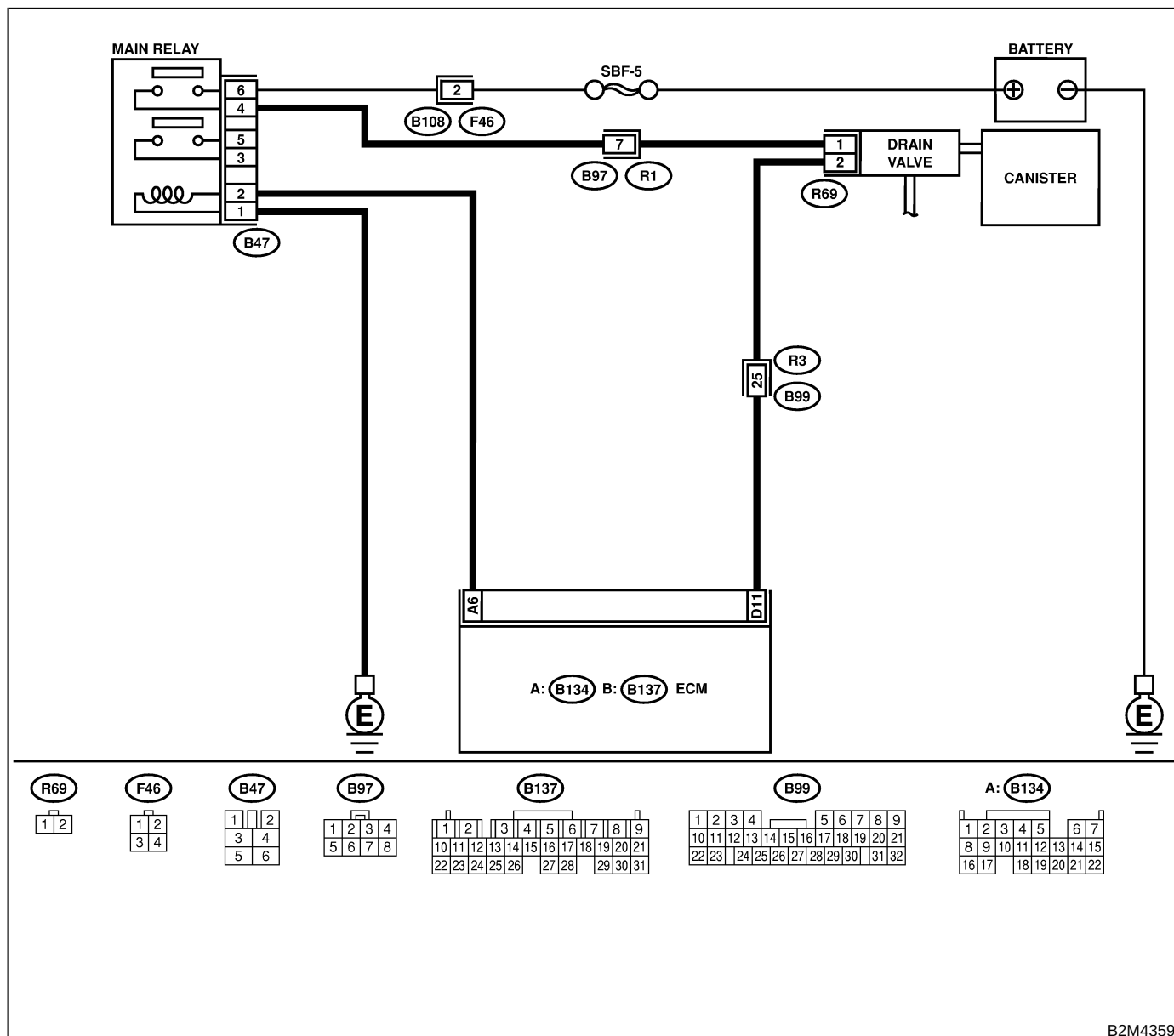
S048521F99

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4359

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	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) While operating drain valve, measure voltage between ECM and chassis ground. NOTE: Drain valve operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-49 Compulsory Valve Operation Check Mode.> Connector & terminal (B137) No. 11 (+) — Chassis ground (-):	Does voltage change between 0 and 10 V?	Go to step 2.	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.
2	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 11 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 4.	Go to step 3.
3	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>
4	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 (B137) No. 11 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and drain valve connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 5.
5	CHECK DRAIN VALVE. 1) Turn ignition switch to OFF. 2) Measure resistance between drain valve terminals. Terminals No. 1 — No. 2:	Is the resistance less than 1 Ω ?	Replace drain valve <Ref. to EC(H6)-20, Drain Valve.> and ECM <Ref. to FU(H6)-46 Engine Control Module.>	Go to step 6.
6	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>

**BD: DTC P0451 — EVAPORATIVE EMISSION CONTROL SYSTEM
PRESSURE SENSOR RANGE/PERFORMANCE PROBLEM —**

S048521B51

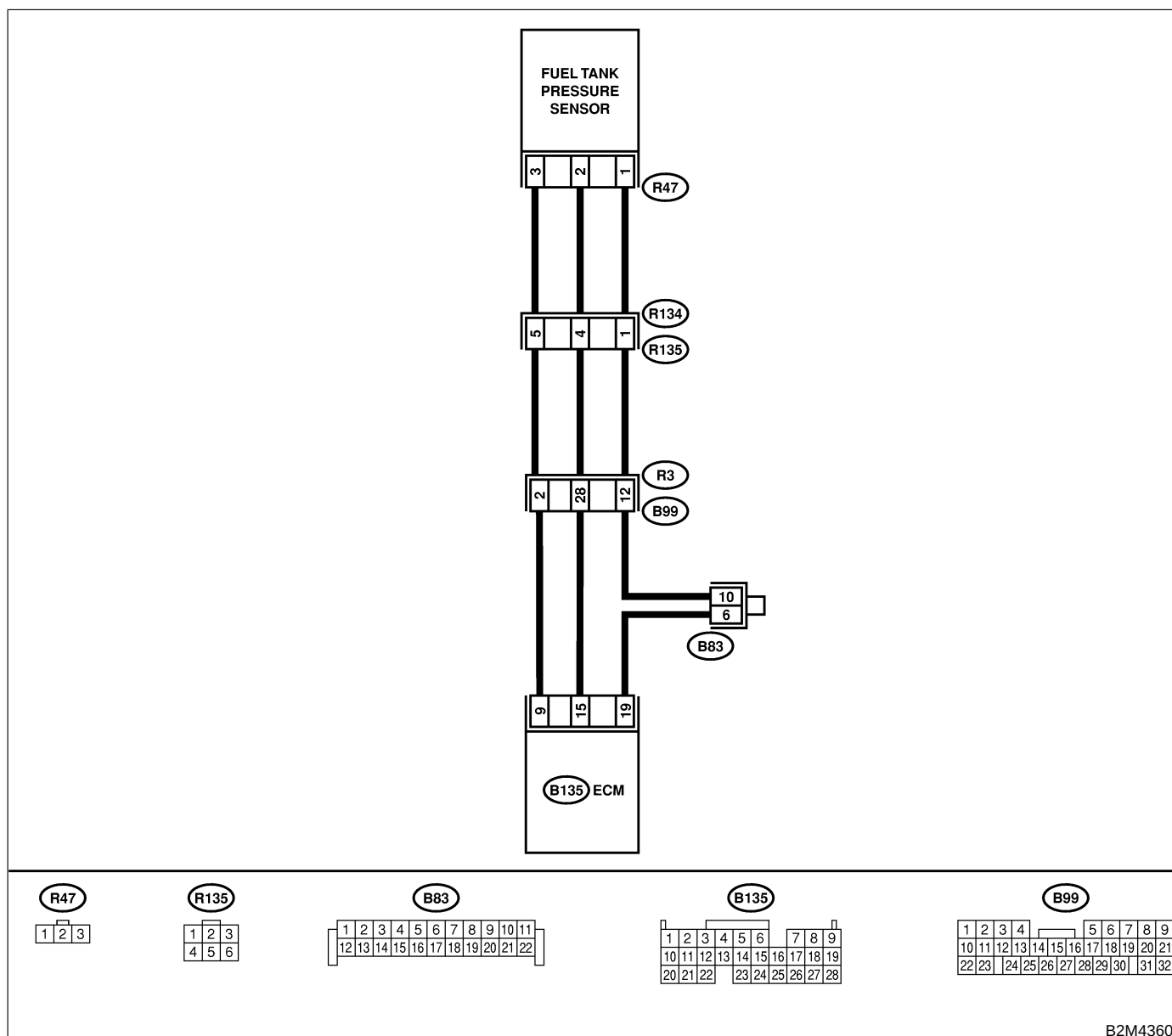
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is there any DTC on display?	Inspect the relevant DTC using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK FUEL FILLER CAP. 1) Turn ignition switch to OFF. 2) Open the fuel flap.	Is the fuel filler cap tightened securely?	Go to step 3.	Tighten fuel filler cap securely.
3	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	Is there a fault in pressure/vacuum line?	Repair or replace hoses and pipes.	Replace fuel tank pressure sensor. <Ref. to EC(H6)-15, Fuel Tank Pressure Sensor.>

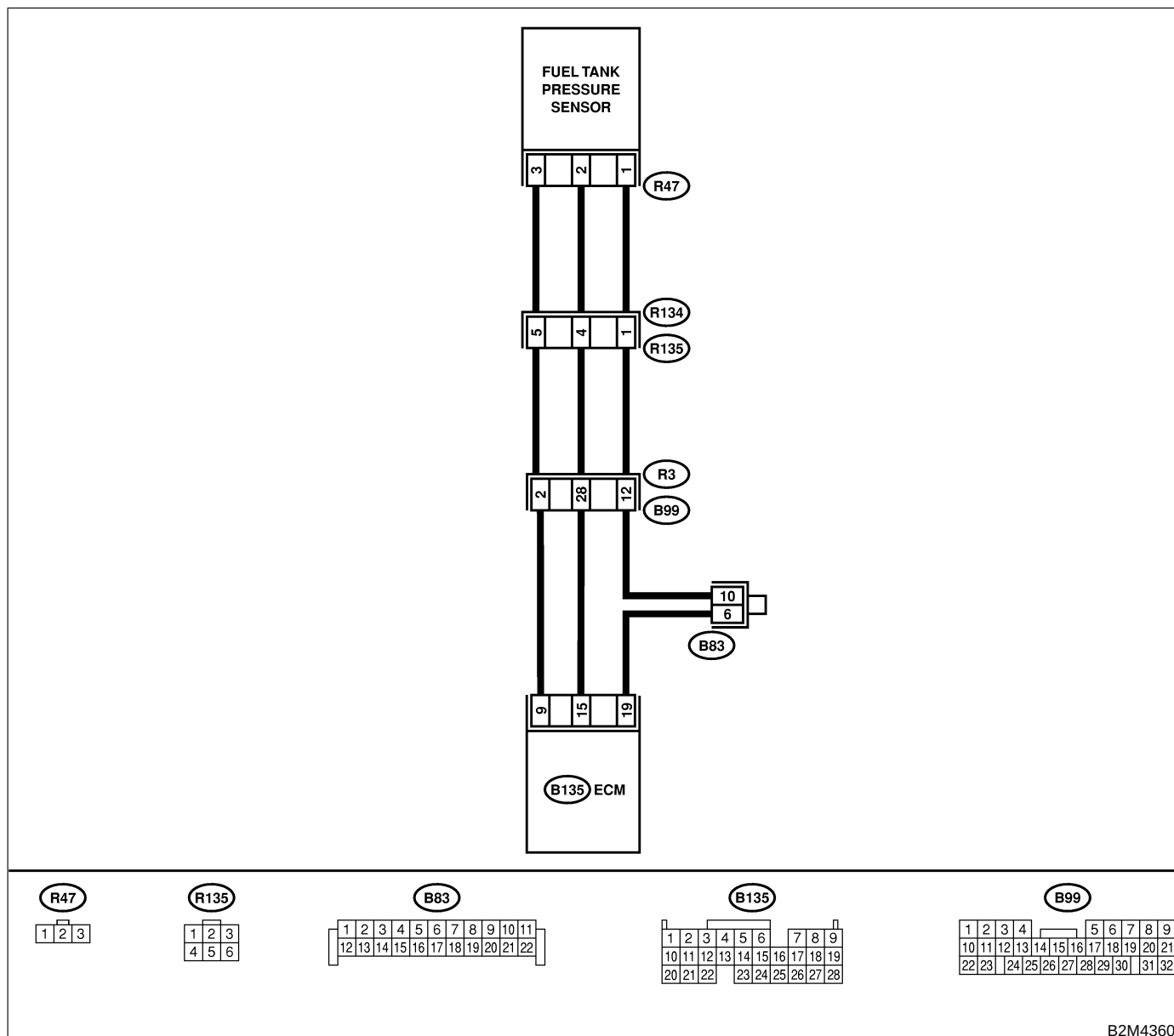
**BE: DTC P0452 — EVAPORATIVE EMISSION CONTROL SYSTEM
PRESSURE SENSOR LOW INPUT —** S048521B52

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Turn ignition switch to OFF. 2) Remove fuel filler cap. 3) Install fuel filler cap. 4) Turn ignition switch to ON. 5) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value less than -2.8 kPa (-21.0 mmHg, -0.827 inHg)?	Go to step 2.	Even if MIL lights up, the circuit has returned to a normal condition at this time.
2	CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 9 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 4.	Go to step 3.
3	CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 9 (+) — Chassis ground (-):	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 15 (+) — Chassis ground (-):	Is the voltage less than 0.2 V?	Go to step 6.	Go to step 5.
5	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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.>	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?	Repair poor contact in ECM connector.	Go to step 6.
6	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 (R135) No. 5 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 7.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and rear wiring harness connector ● Poor contact in coupling connector

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	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 (B135) No. 19 — (R135) No. 1:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and rear wiring harness connector ● Poor contact in coupling connector ● Poor contact in joint connector
8	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 (R135) No. 1 — Chassis ground:	Is the resistance more than 500 k Ω ?	Go to step 9.	Repair ground short circuit in harness between ECM and rear wiring harness connector.
9	CHECK FUEL TANK CORD. 1) Disconnect connector from fuel tank pressure sensor. 2) Measure resistance of fuel tank cord. Connector & terminal (R134) No. 5 — (R47) No. 3:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair open circuit in fuel tank cord.
10	CHECK FUEL TANK CORD. Measure resistance of fuel tank cord. Connector & terminal (R134) No. 1 — (R47) No. 1:	Is the resistance less than 1 Ω ?	Go to step 11.	Repair open circuit in fuel tank cord.
11	CHECK FUEL TANK CORD. Measure resistance of harness between fuel tank pressure sensor connector and chassis ground. Connector & terminal (R47) No. 2 — Chassis ground:	Is the resistance more than 500 k Ω ?	Go to step 12.	Repair ground short circuit in fuel tank cord.
12	CHECK POOR CONTACT. Check poor contact in fuel tank pressure sensor connector.	Is there poor contact in fuel tank pressure sensor connector?	Repair poor contact in fuel tank pressure sensor connector.	Replace fuel tank pressure sensor. <Ref. to EC(H6)-15, Fuel Tank Pressure Sensor.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

MEMO:

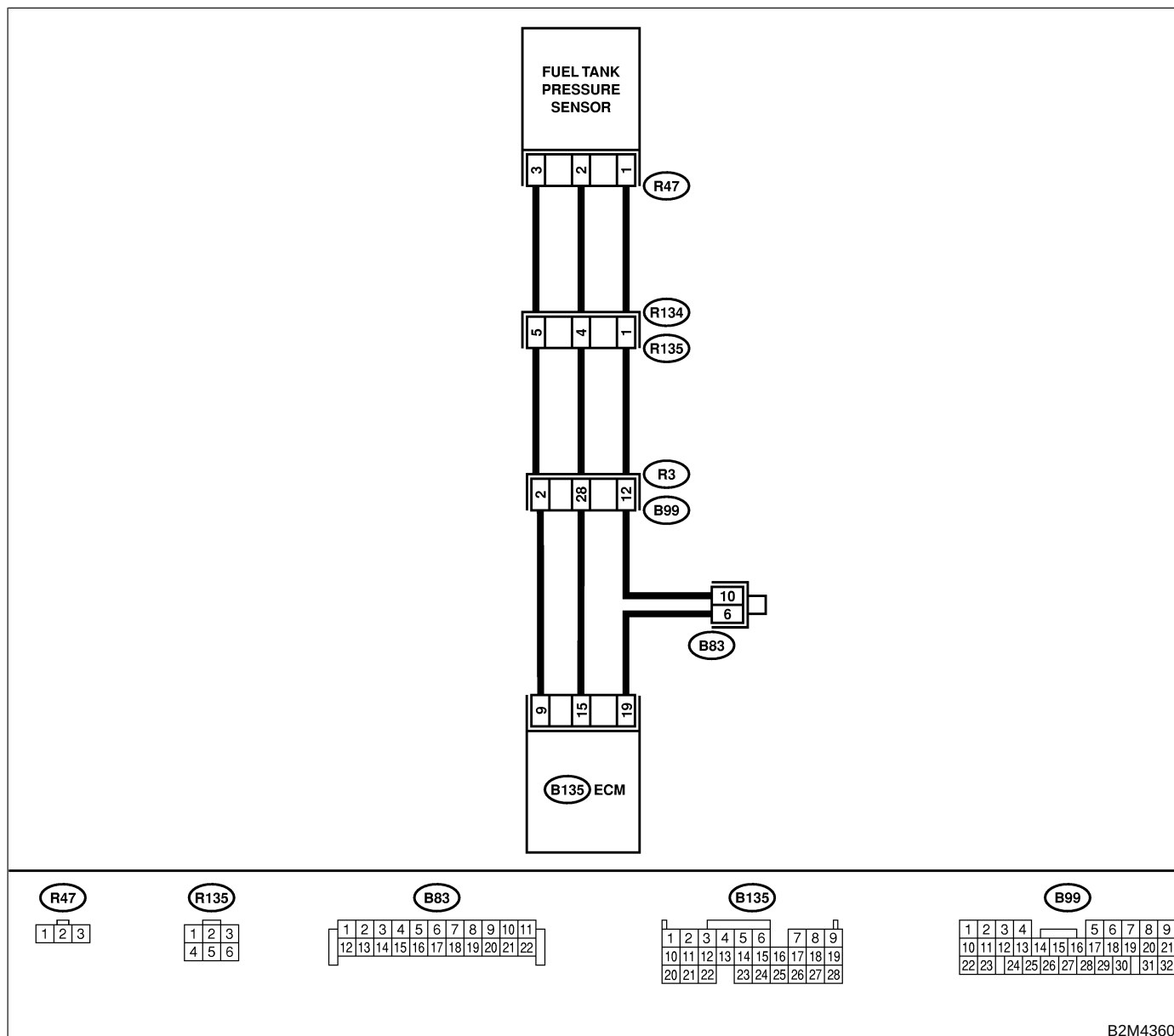
BF: DTC P0453 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT — S048521B53

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



B2M4360

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK CURRENT DATA. 1) Turn ignition switch to OFF. 2) Remove fuel filler cap. 3) Install fuel filler cap. 4) Turn ignition switch to ON. 5) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?	Go to step 12.	Go to step 2.
2	CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 9 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 4.	Go to step 3.
3	CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 9 (+) — Chassis ground (-):	Does the voltage change more than 4.5 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>
4	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 15 (+) — Chassis ground (-):	Is the voltage less than 0.2 V?	Go to step 6.	Go to step 5.
5	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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.>	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?	Repair poor contact in ECM connector.	Go to step 6.
6	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 (R135) No. 5 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 7.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and rear wiring harness connector ● Poor contact in coupling connector

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	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 (B135) No. 15 — (R135) No. 4:	Is the resistance less than 1 Ω?	Go to step 8.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and rear wiring harness connector ● Poor contact in coupling connector
8	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 (B135) No. 9 — (R135) No. 5:	Is the resistance less than 1 Ω?	Go to step 9.	Repair ground short circuit in harness between ECM and rear wiring harness connector.
9	CHECK FUEL TANK CORD. 1) Disconnect connector from fuel tank pressure sensor. 2) Measure resistance of fuel tank cord. Connector & terminal (R134) No. 4 — (R47) No. 2:	Is the resistance less than 1 Ω?	Go to step 10.	Repair open circuit in fuel tank cord.
10	CHECK FUEL TANK CORD. Measure resistance of fuel tank cord. Connector & terminal (R134) No. 1 — (R47) No. 1:	Is the resistance less than 1 Ω?	Go to step 11.	Repair open circuit in fuel tank cord.
11	CHECK POOR CONTACT. Check poor contact in fuel tank pressure sensor connector.	Is there poor contact in fuel tank pressure sensor connector?	Repair poor contact in fuel tank pressure sensor connector.	Replace fuel tank pressure sensor. <Ref. to FU(H6)-15, Fuel Tank Pressure Sensor.>
12	CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from fuel tank pressure sensor. 3) Turn ignition switch to ON. 4) 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 2.8 kPa (21.0 mmHg, 0.827 inHg)?	Repair battery short circuit in harness between ECM and fuel tank pressure sensor connector.	Replace fuel tank pressure sensor. <Ref. to FU(H6)-15, Fuel Tank Pressure Sensor.>

MEMO:

BG: DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM —

S048521B54

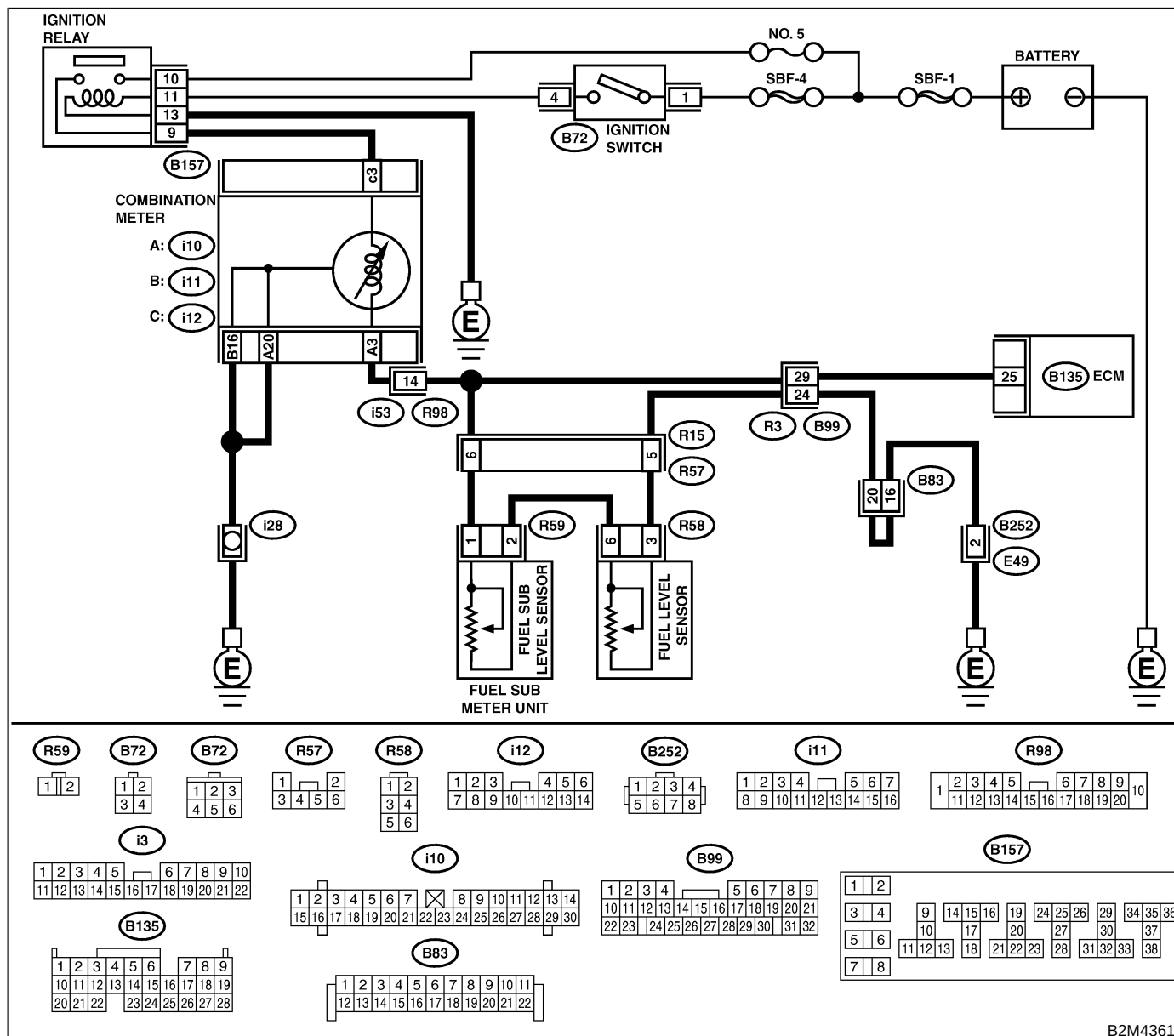
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4361

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0462 or P0463?	Inspect DTC P0462 or P0463 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect this trouble.	Replace fuel level sensor <Ref. to EC(H6)-12, Main Fuel Level Sensor.> and fuel sub level sensor <Ref. to FU(H6)-14, Fuel Sub Level Sensor.>.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

BH: DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT — S048521B55

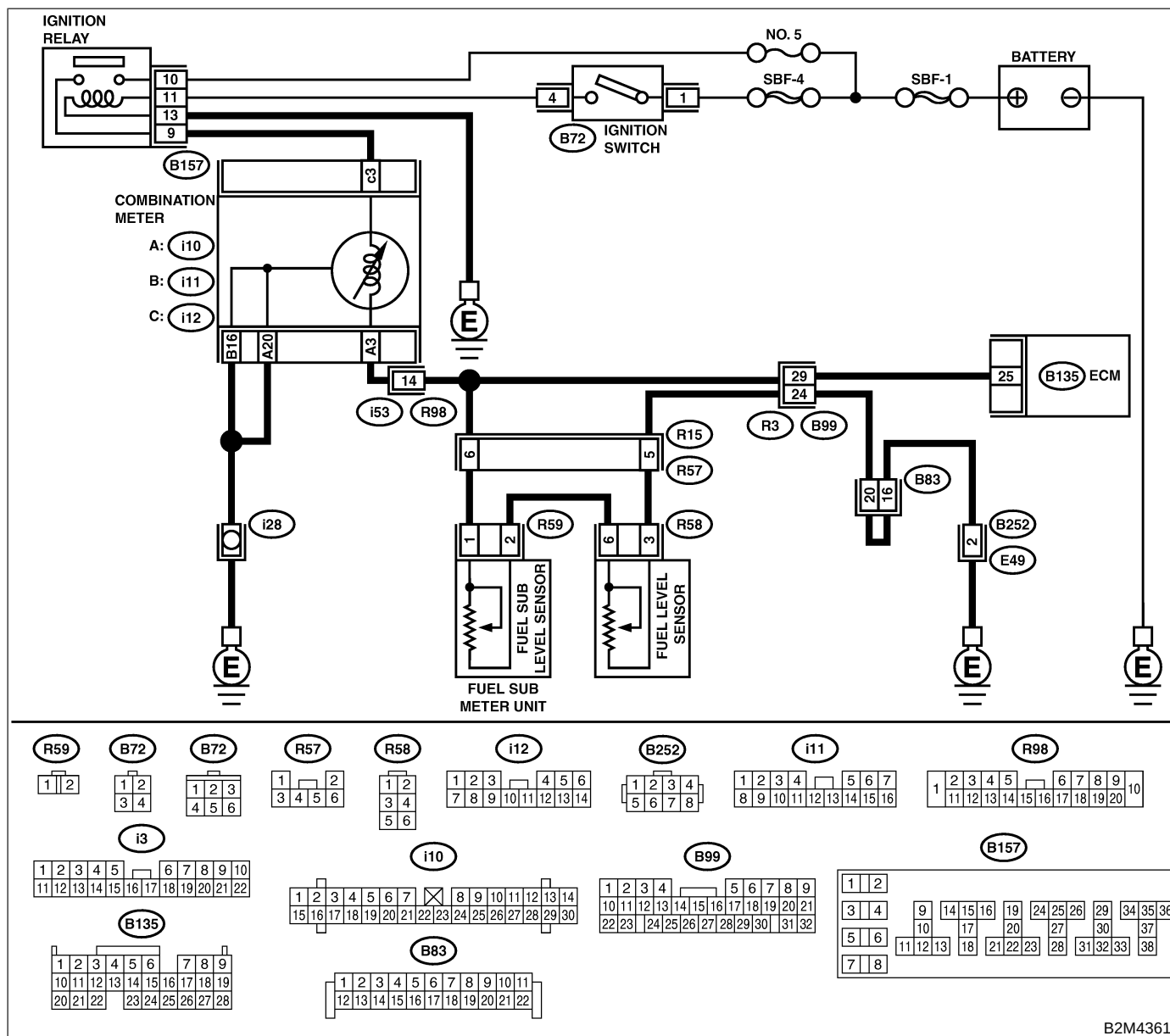
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

• WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.	Does speedometer and tachometer operate normally?	Go to step 2.	Repair or replace combination meter. <Ref. to IDI-4 Combination Meter System.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	CHECK INPUT SIGNAL FOR ECM. 1) Turn ignition switch to ON. (Engine OFF) 2) Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 25 (+) — Chassis ground (-):	Is the voltage less than 0.12 V?	Go to step 6.	Go to step 3.
3	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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.>	Does the value change less than 0.12 V by shaking harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair poor contact in ECM connector.	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 combination meter connector ● Poor contact in ECM connector ● Poor contact in coupling connectors
4	CHECK INPUT VOLTAGE OF ECM. 1) Turn ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Turn ignition switch to ON. 4) Measure voltage of harness between ECM connector and chassis ground. Connector & terminal (B135) No. 25 (+) — Chassis ground (-):	Is the voltage more than 0.12 V?	Go to step 4.	Go to step 7.
5	CHECK HARNESS BETWEEN ECM AND COMBINATION METER. 1) Turn ignition switch to OFF. 2) Disconnect connector from connector (i10) and ECM connector. 3) Measure resistance between ECM and chassis ground. Connector & terminal (B135) No. 25 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 6.	Repair ground short circuit in harness between ECM and combination meter connector.
6	CHECK HARNESS BETWEEN ECM AND COMBINATION METER. Measure resistance between ECM and combination meter connector. Connector & terminal (B135) No. 25 — (i10) No. 3:	Is the resistance less than 10 Ω?	Repair or replace combination meter. <Ref. to IDI-4 Combination Meter System.>	Repair open circuit between ECM and combination meter connector. NOTE: In this case, repair the following: Poor contact in coupling connector

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	CHECK FUEL TANK CORD. 1) Turn ignition switch to OFF. 2) Disconnect connector from fuel sub level sensor. 3) Measure resistance between fuel sub level sensor and chassis ground. Connector & terminal (R59) No. 1 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 8.	Repair ground short circuit in fuel tank cord.
8	CHECK FUEL TANK CORD. 1) Disconnect connector from fuel pump assembly. 2) Measure resistance between fuel pump assembly and chassis ground. Connector & terminal (R59) No. 2 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 9.	Repair ground short circuit in fuel tank cord.
9	CHECK FUEL LEVEL SENSOR. WARNING: During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill. 1) Remove fuel pump assembly. <Ref. to FU(H6)-90 Fuel Pump.> 2) Measure resistance between fuel level sensor and terminals with its float set to the full position. Terminals No. 3 — No. 6:	Is the resistance between 0.5 and 2.5 Ω?	Go to step 10.	Replace fuel level sensor.
10	CHECK FUEL SUB LEVEL SENSOR. WARNING: During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill. 1) Remove fuel sub level sensor. <Ref. to FU(H6)-94 Fuel Sub Level Sensor.> 2) Measure resistance between fuel sub level sensor and terminals with its float set to the full position. Terminals No. 1 — No. 2:	Is the resistance between 0.5 and 2.5 Ω?	Repair poor contact in harness between ECM and combination meter connector.	Replace fuel sub level sensor.

MEMO:

BI: DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT — S048521B56

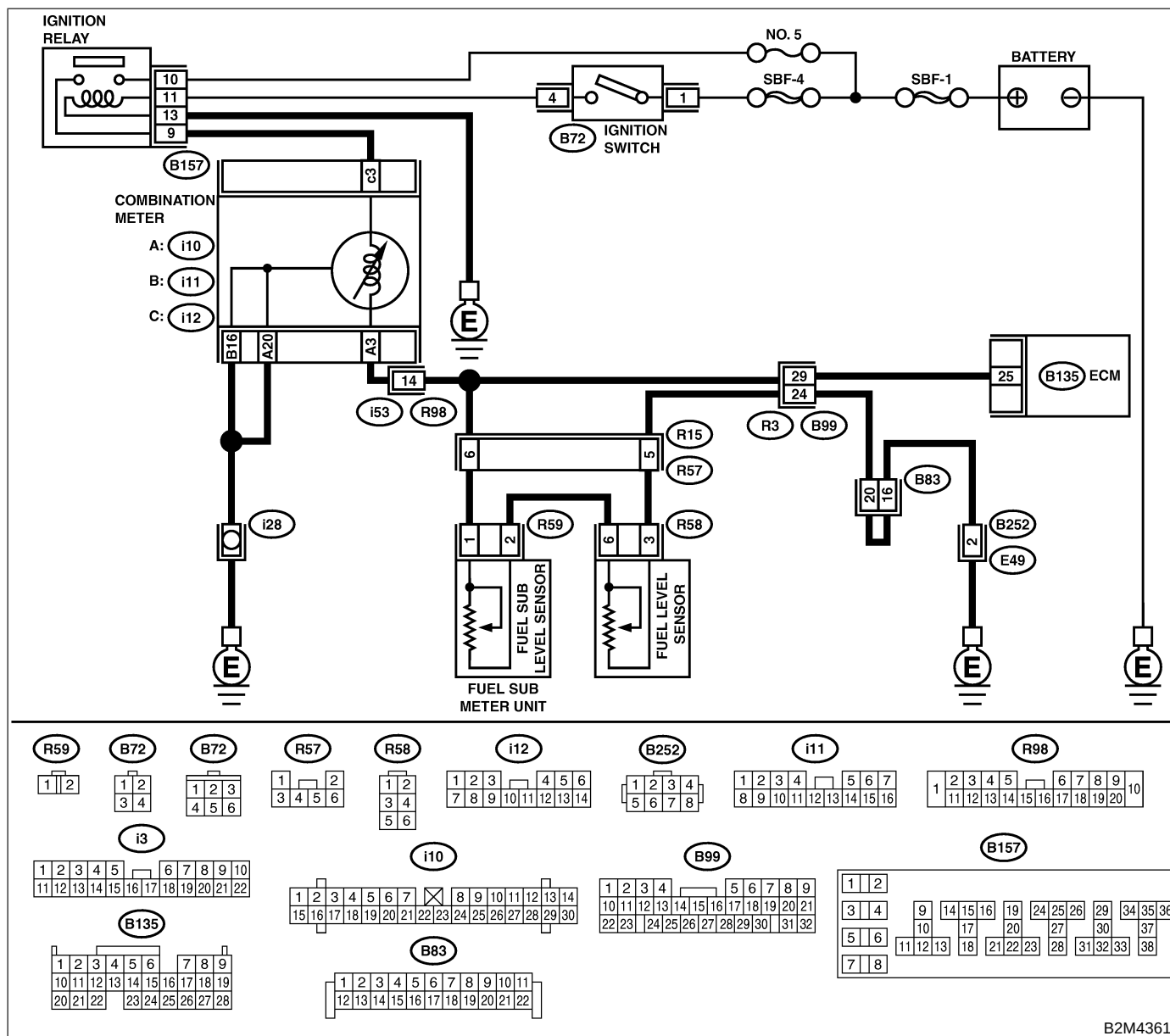
• DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

• WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.	Does speedometer and tachometer operate normally?	Go to step 2.	Repair or replace combination meter. <Ref. to IDI-4 Combination Meter System.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	CHECK INPUT SIGNAL FOR ECM. 1) Turn ignition switch to ON. (Engine OFF) 2) Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 25 (+) — Chassis ground (-):	Is the voltage more than 4.75 V?	Go to step 3.	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 coupling connector
3	CHECK INPUT VOLTAGE OF ECM. 1) Turn ignition switch to OFF. 2) Disconnect combination meter connector (i10) and ECM connector. 3) Turn ignition switch to ON. 4) Measure voltage of harness between ECM and chassis ground. Connector & terminal (B135) No. 25 (+) — Chassis ground (-):	Is the voltage more than 4.75 V?	Go to step 4.	Repair battery short circuit between ECM and combination meter connector.
4	CHECK HARNESS BETWEEN ECM AND FUEL TANK CORD. 1) Turn ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Measure resistance between ECM and fuel tank cord. Connector & terminal (B135) No. 25 — (R15) No. 6:	Is the resistance less than 5 Ω ?	Go to step 5.	Repair open circuit between ECM and fuel tank cord.
5	CHECK HARNESS BETWEEN FUEL TANK CORD AND CHASSIS GROUND. Measure resistance between fuel tank cord and chassis ground. Connector & terminal (R15) No. 5 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 6.	Repair open circuit between fuel tank cord and chassis ground. NOTE: In this case, repair the following: Poor contact in coupling connectors
6	CHECK FUEL TANK CORD. 1) Disconnect connector from fuel level sensor. 2) Measure resistance between fuel level sensor and coupling connector. Connector & terminal (R57) No. 5 — (R58) No. 3:	Is the resistance less than 10 Ω ?	Go to step 7.	Repair open circuit between coupling connector and fuel level sensor.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	CHECK FUEL TANK CORD. 1) Disconnect connector from fuel sub level sensor. 2) Measure resistance between fuel level sensor and fuel sub level sensor. Connector & terminal (R58) No. 6 — (R59) No. 2:	Is the resistance less than 10 Ω ?	Go to step 8.	Repair open circuit between fuel level sensor and fuel sub level sensor.
8	CHECK FUEL TANK CORD. Measure resistance between fuel sub level sensor and coupling connector. Connector & terminal (R57) No. 6 — (R59) No. 1:	Is the resistance less than 10 Ω ?	Go to step 9.	Repair open circuit between coupling connector and fuel sub level sensor.
9	CHECK FUEL LEVEL SENSOR. WARNING: During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill. 1) Remove fuel pump assembly. <Ref. to FU(H6)-69, Fuel Pump.> 2) While moving fuel level sensor float up and down, measure resistance between fuel level sensor terminals. Terminals No. 3 — No. 6:	Is the resistance more than 54.5 Ω ?	Replace fuel level sensor. <Ref. to FU(H6)-72, Fuel Level Sensor.>	Go to step 10.
10	CHECK FUEL SUB LEVEL SENSOR. WARNING: During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill. 1) Remove fuel sub level sensor. <Ref. to FU(H6)-73 Fuel Sub Level Sensor.> 2) While moving fuel sub level sensor float up and down, measure resistance between fuel sub level sensor terminals. Terminals No. 1 — No. 2:	Is the resistance more than 41.5 Ω ?	Replace fuel sub level sensor. <Ref. to FU(H6)-73 Fuel Sub Level Sensor.>	Replace combination meter. <Ref. to IDI-17 Combination Meter Assembly.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

MEMO:

BJ: DTC P0464 — FUEL LEVEL SENSOR INTERMITTENT INPUT— S048521G01

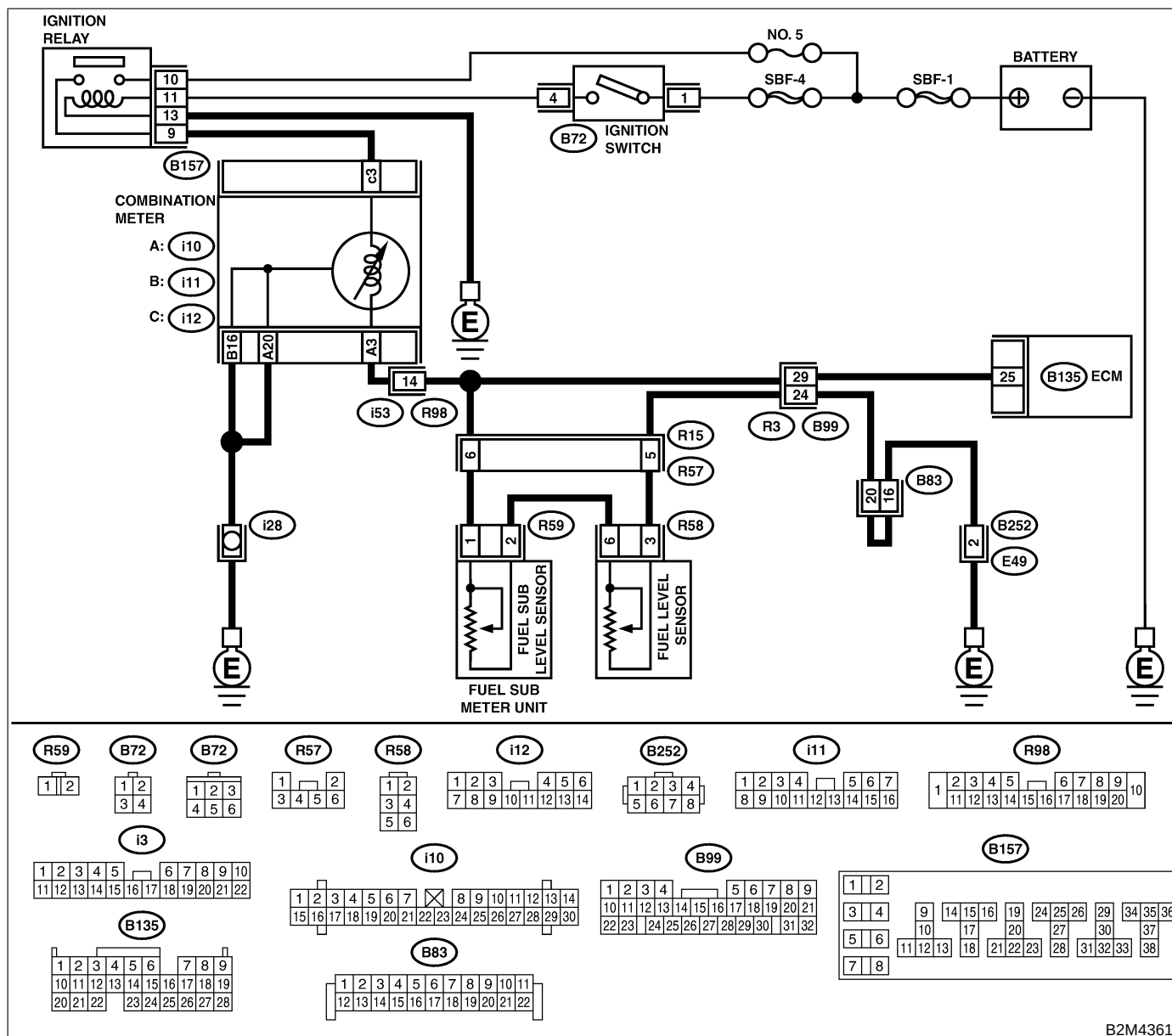
• **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

• **WIRING DIAGRAM:**



B2M4361

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0462 or P0463?	Inspect DTC P0462 or P0463 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK FUEL LEVEL SENSOR. 1) Remove fuel pump assembly. <Ref. to FU(H6)-69, Fuel Pump.> 2) While moving fuel level sensor float up and down, make sure that the resistance between fuel level sensor terminals changes smoothly. Terminals No. 3 — No. 6:	Does the resistance change smoothly?	Go to step 3.	Replace fuel level sensor. <Ref. to FU(H6)-72, Fuel Level Sensor.>
3	CHECK FUEL SUB LEVEL SENSOR. WARNING: During work procedures, if fuel tank is more than 3/4 full, be careful because fuel may spill. 1) Remove fuel sub level sensor. <Ref. to FU(H6)-94 Fuel Sub Level Sensor.> 2) While moving fuel sub level sensor float up and down, make sure that the resistance between fuel level sensor terminals changes smoothly. Terminals No. 1 — No. 2:	Does the resistance change smoothly?	Repair poor contact in ECM, combination meter and coupling connectors.	Replace fuel sub level sensor. <Ref. to FU(H6)-73, Fuel Sub Level Sensor.>

BK: DTC P0480 — COOLING FAN RELAY 1 CIRCUIT LOW INPUT — S048521B57

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Radiator fan does not operate properly.
 - Overheating

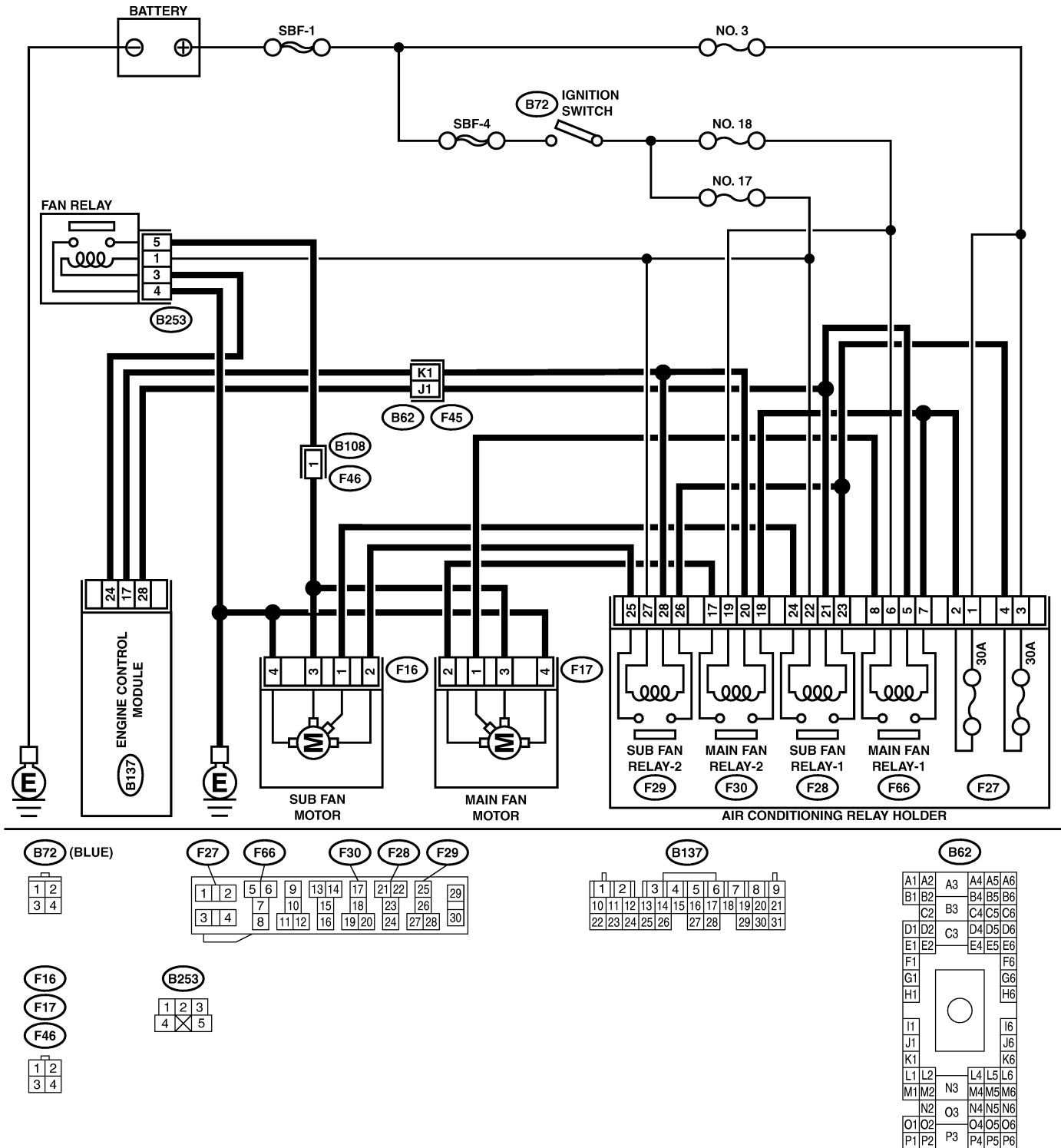
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

● WIRING DIAGRAM:



B2M4362

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	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) While operating radiator fan relay, measure voltage between ECM terminal and ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-37 Subaru Select Monitor.> Connector & terminal (B137) No. 28 (+) — Chassis ground (-): (B137) No. 17 (+) — Chassis ground (-):	Does voltage change between 0 and 10 V?	Repair poor contact in ECM connector.	Go to step 2.
2	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 (B137) No. 28 — Chassis ground: (B137) No. 17 — Chassis ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in radiator fan relay 1 control circuit.	Go to step 3.
3	CHECK POWER SUPPLY FOR RELAY. 1) Remove main fan relays from A/C relay holder. 2) Turn ignition switch to ON. 3) Measure voltage between fuse and relay box (F/B) connector and chassis ground. Connector & terminal (F66) No. 5 (+) — Chassis ground (-): (F30) No. 19 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 4.	Repair open circuit in harness between ignition switch and fuse and relay box (F/B) connector.
4	CHECK MAIN FAN RELAYS. 1) Turn ignition switch to OFF. 2) Measure resistance between main fan relay terminals. Terminal (F66) No. 5 — No. 6: (F30) No. 19 — No. 20:	Is the resistance between 87 and 107 Ω ?	Go to step 5.	Replace main fan relay.
5	CHECK OPEN CIRCUIT IN MAIN FAN RELAY CONTROL CIRCUIT. Measure resistance of harness between ECM and main fan relay connector. Connector & terminal (B137) No. 28 — (F66) No. 6: (B137) No. 17 — (F30) No. 20:	Is the resistance less than 1 Ω ?	Go to step 6.	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

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	CHECK POOR CONTACT. Check poor contact in ECM or main fan relay connector.	Is there poor contact in ECM or main fan relay connector?	Repair poor contact in ECM or main fan relay connector.	Contact your Subaru distributor.

BL: DTC P0483 — COOLING FAN FUNCTION PROBLEM — S048521B58

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

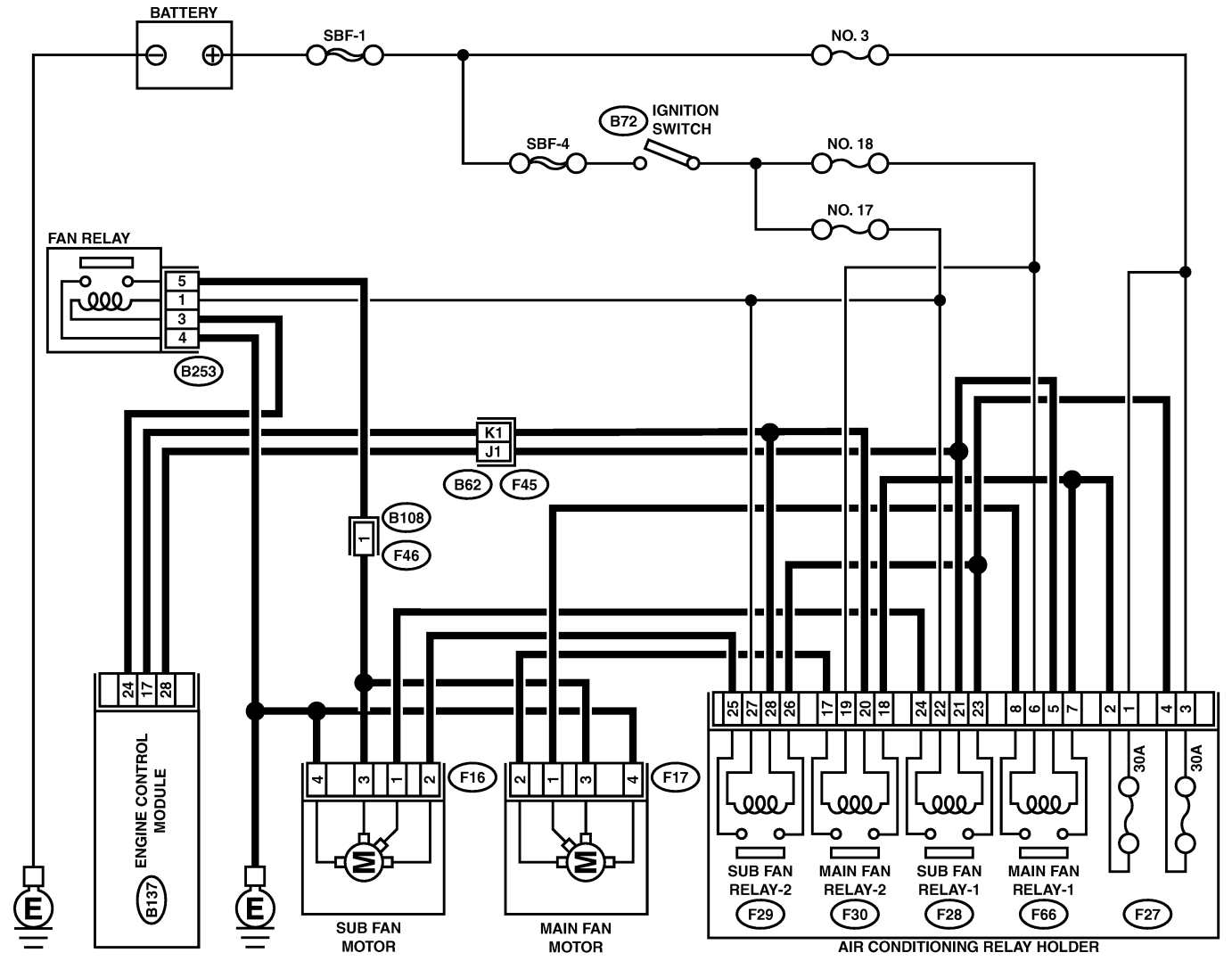
NOTE:

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.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

● WIRING DIAGRAM:



(B72) (BLUE)

1	2
3	4

F27	F66	F30	F28	F29
1	2	5	6	9
7	10	13	14	17
21	22	25	26	29
3	4	8	11	12
16	19	20	24	27
28	30			

(B137)

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31					

(B62)

A1	A2	A3	A4	A5	A6
B1	B2	B3	B4	B5	B6
C1	C2	C3	C4	C5	C6
D1	D2	D3	D4	D5	D6
E1	E2	E3	E4	E5	E6
F1	F2	F3	F4	F5	F6
G1	G2	G3	G4	G5	G6
H1	H2	H3	H4	H5	H6
I1	I2	I3	I4	I5	I6
J1	J2	J3	J4	J5	J6
K1	K2	K3	K4	K5	K6
L1	L2	L3	L4	L5	L6
M1	M2	M3	M4	M5	M6
N1	N2	N3	N4	N5	N6
O1	O2	O3	O4	O5	O6
P1	P2	P3	P4	P5	P6

(F16)

1	2
3	4

(B253)

1	2	3
4	5	

1	2
3	4

B2M4362

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is there any other DTC on display?	Inspect the relevant DTC using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Check radiator fan and fan motor. <Ref. to CO(H6)-22 INSPECTION, Radiator Main Fan and Fan Motor.> and <Ref. to CO(H6)-24 INSPECTION, Radiator Sub Fan and Fan Motor.>

MEMO:

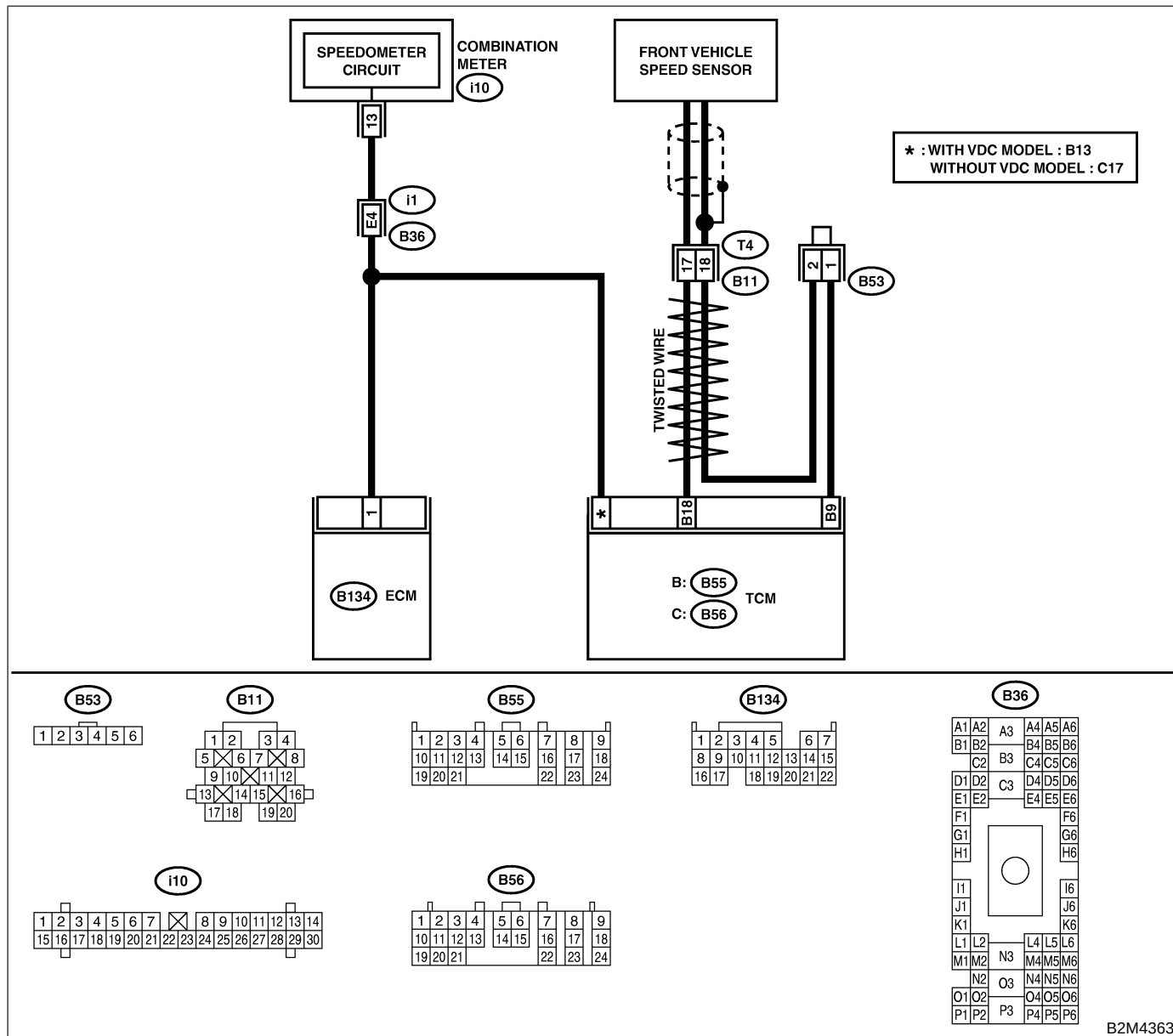
BM: DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION — S048521B59

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4363

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK DTC P0720 ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0720?	Check front vehicle speed sensor signal circuit. <Ref. to AT-56 TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Go to step 2.
2	CHECK SPEEDOMETER OPERATION IN COMBINATION METER.	Does speedometer operate normally?	Go to step 3.	Check speedometer and vehicle speed sensor. <Ref. to IDI-19 Speedometer.> and <Ref. to AT-31 Front and Rear Vehicle Speed Sensor, Torque Converter Turbine Speed Sensor and Harness Assembly.>
3	CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from combination meter. 3) Measure resistance between ECM and combination meter. Connector & terminal (B134) No. 1 — (i10) No. 13:	Is the resistance less than 10 Ω ?	Repair poor contact in ECM connector.	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

BN: DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED

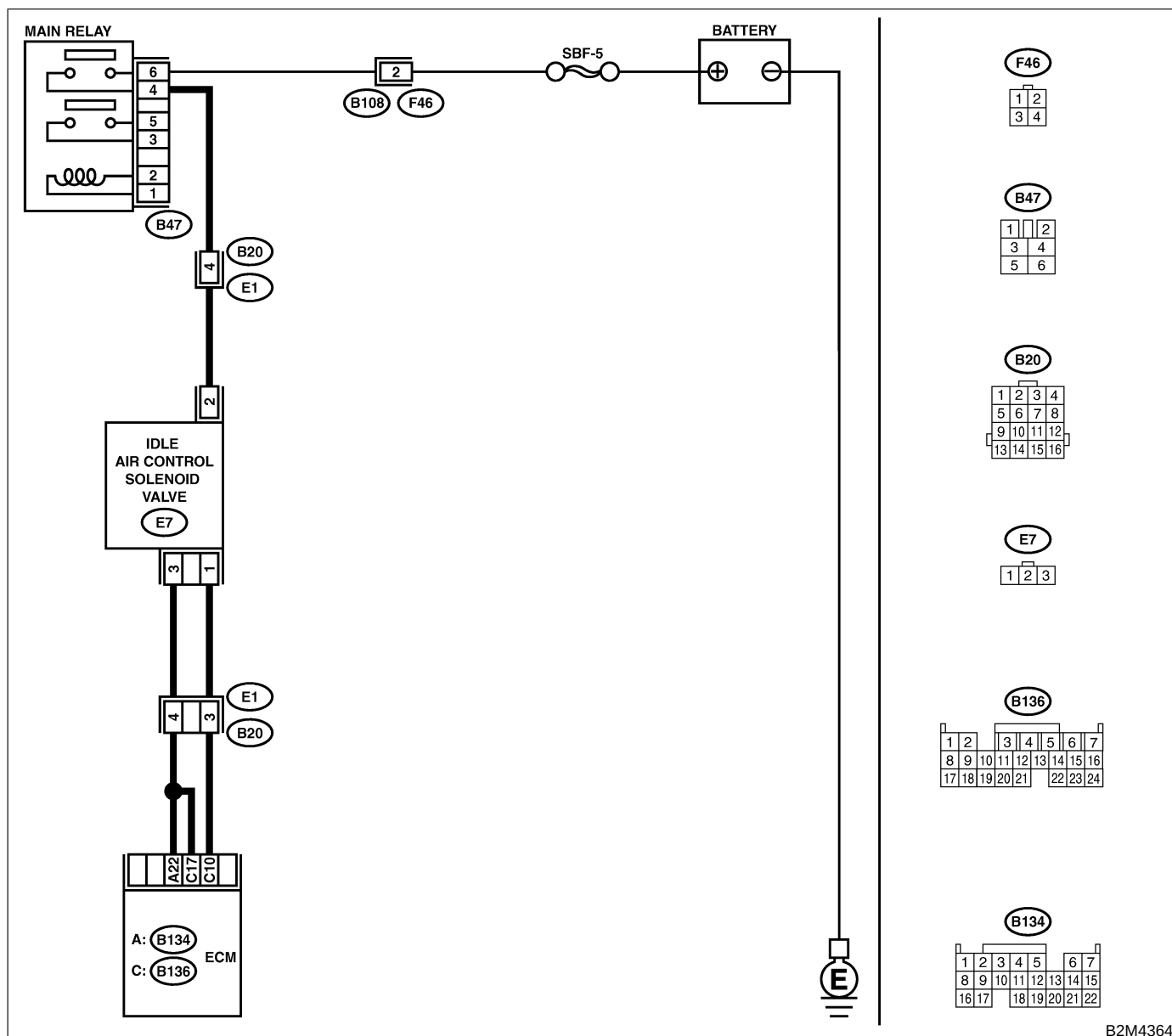
S048521B61

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4364

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B136) No. 10 (+) — Chassis ground (-):	Is the voltage more than 3 V?	Repair poor contact in ECM connector.	Go to step 2.
2	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 (-):	Is the voltage more than 10 V?	Go to step 3.	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
3	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 (B136) No. 10 — (E7) No. 1:	Is the resistance less than 1 Ω ?	Go to step 4.	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
4	CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B136) No. 10 — Chassis ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.	Go to step 5.
5	CHECK GROUND CIRCUIT OF IDLE AIR CONTROL SOLENOID VALVE. Measure resistance of harness between idle air control solenoid valve connector and engine ground. Connector & terminal (E7) No. 3 — Engine ground:	Is the resistance less than 5 Ω ?	Go to step 6.	Repair open circuit in harness between idle air control solenoid valve connector and engine ground terminal.
6	CHECK POOR CONTACT. Check poor contact in ECM and idle air control solenoid valve connectors.	Is there poor contact in ECM and idle air control solenoid valve connectors?	Repair poor contact in ECM and idle air control solenoid valve connectors.	Replace idle air control solenoid valve. <Ref. to FU(H6)-36, Idle Air Control Solenoid Valve.>

BO: DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED

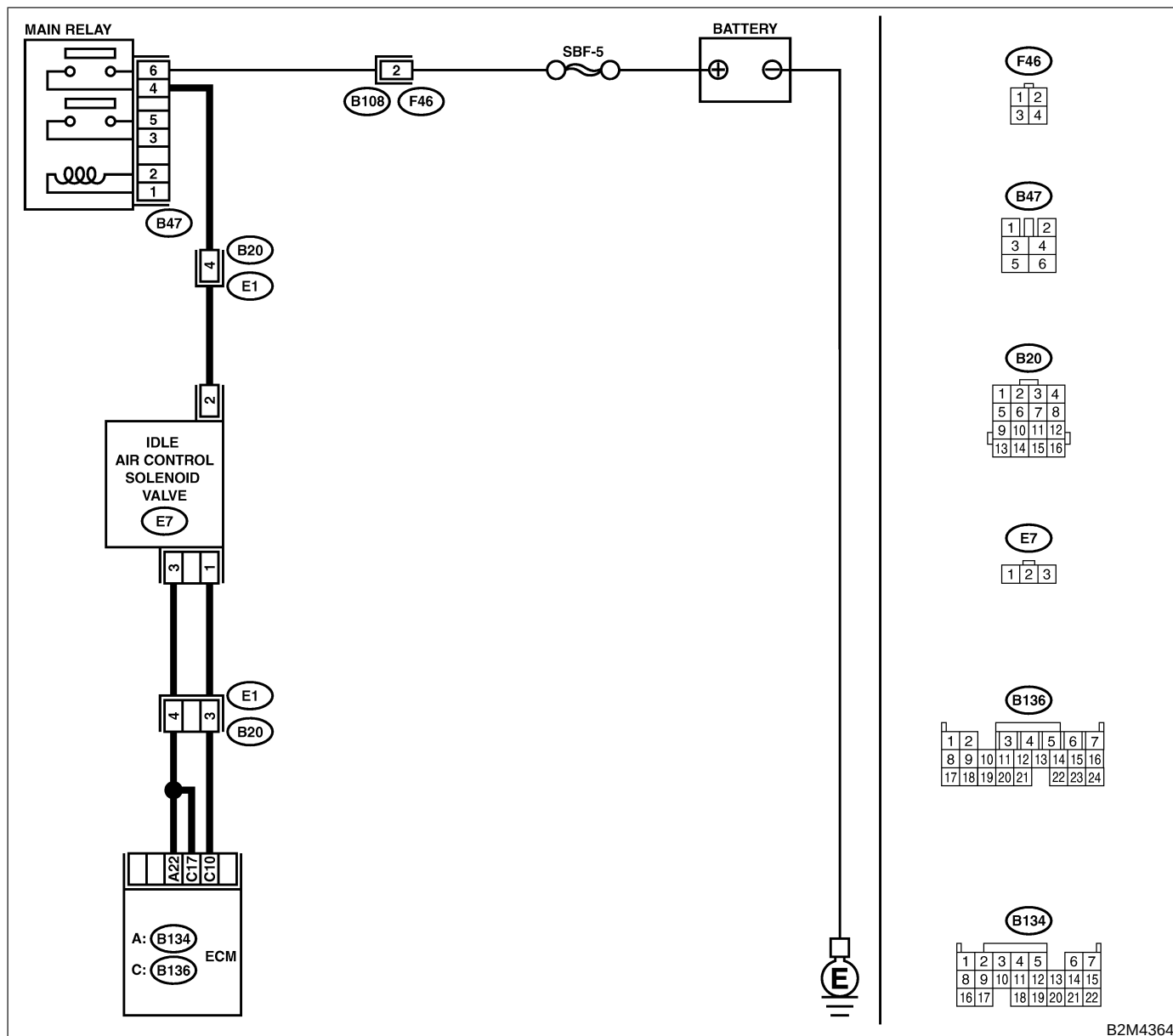
S048521B62

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Engine does not return to normal idle speed.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4364

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0508 or P0509?	Inspect DTC P0508 or P0509 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0506.	Go to step 2.
2	CHECK IDLE AIR CONTROL SOLENOID VALVE. 1) Turn ignition switch to OFF. 2) Remove idle air control solenoid valve from throttle body. <Ref. to FU(H6)-36, Idle Air Control Solenoid Valve.> 3) Using an air gun, force air into idle air control solenoid valve by-pass air inlet. Confirm that forced air subsequently escapes from both main air passage and assist air passage.	Does air flow out?	Go to step 4.	Replace idle air control solenoid valve. <Ref. to FU(H6)-36, Idle Air Control Solenoid Valve.> After replace, Go to step 3.
3	CHECK IDLE AIR CONTROL SOLENOID VALVE DUTY RATIO. 1) Turn ignition switch to ON. 2) Start engine, and warm-up the engine. 3) Turn all accessory switches to OFF. 4) Read data of idle air control solenoid valve duty ratio using Subaru Select Monitor or OBD-II general scan tool. NOTE: ● Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Is the value more than 60%?	Go to step 4.	END.
4	CHECK BY-PASS AIR LINE. 1) Turn ignition switch to OFF. 2) Remove idle air control solenoid valve from throttle body. <Ref. to FU(H6)-36, Idle Air Control Solenoid Valve.> 3) Remove throttle body to intake manifold. <Ref. to FU(H6)-16, Throttle Body.> 4) Using an air gun, force air into solenoid valve installation area and throttle valve interior. Confirm that forced air subsequently escapes from both these areas.	Does air flow out?	Replace idle air control solenoid valve. <Ref. to FU(H6)-36, Idle Air Control Solenoid Valve.>	Replace throttle body. <Ref. to FU(H6)-16, Throttle Body.>

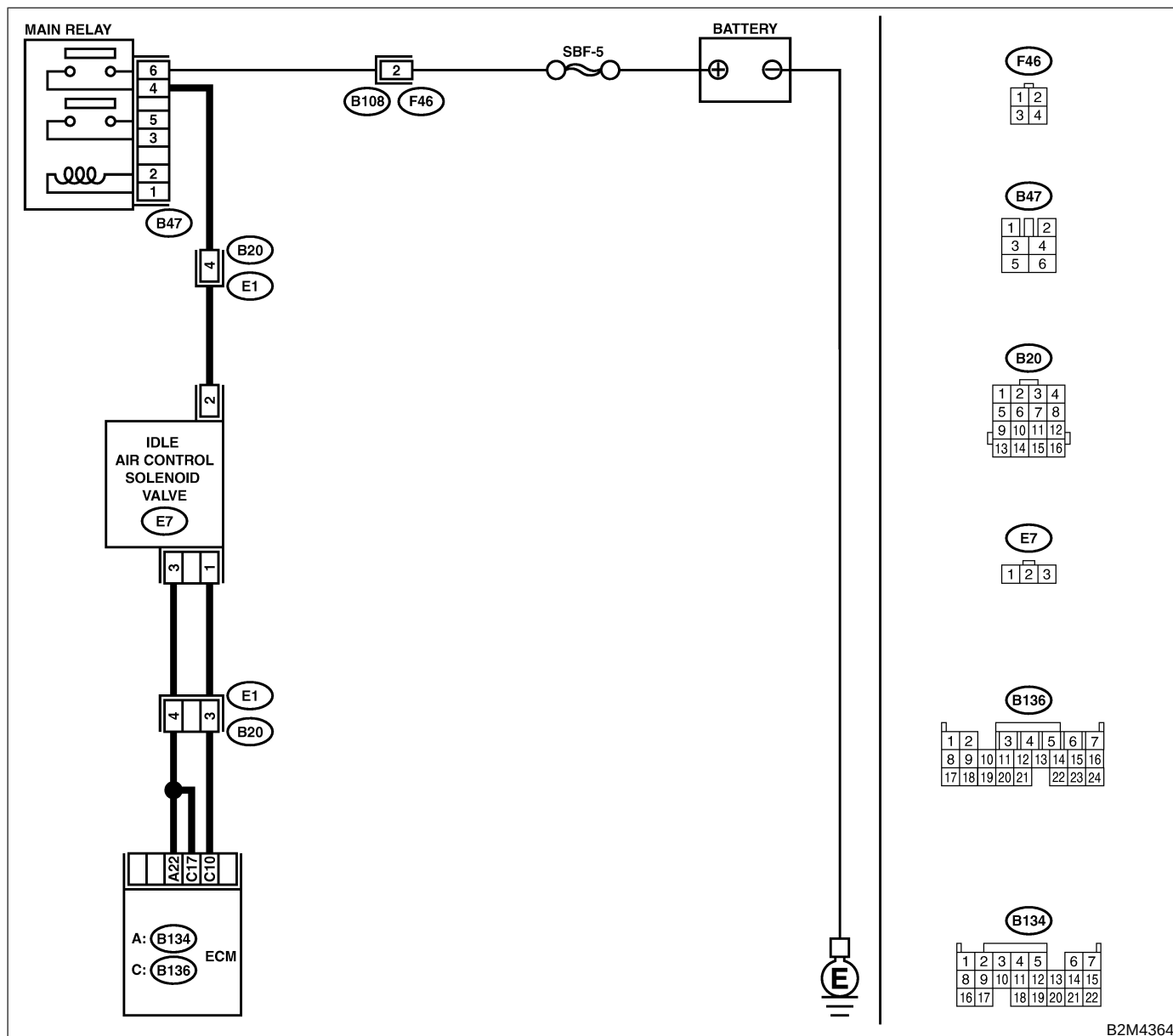
BP: DTC P0508 — IDLE CONTROL SYSTEM CIRCUIT LOW INPUT — S048521H09

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4364

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B136) No. 10 (+) — Chassis ground (-):	Is the voltage more than 3 V?	Repair poor contact in ECM connector.	Go to step 2.
2	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 (-):	Is the voltage more than 10 V?	Go to step 3.	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
3	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 (B136) No. 10 — (E7) No. 1:	Is the resistance less than 1 Ω ?	Go to step 4.	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
4	CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B136) No. 10 — Chassis ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.	Go to step 5.
5	CHECK GROUND CIRCUIT OF IDLE AIR CONTROL SOLENOID VALVE. Measure resistance of harness between idle air control solenoid valve connector and engine ground. Connector & terminal (E7) No. 3 — Engine ground:	Is the resistance less than 5 Ω ?	Go to step 6.	Repair open circuit in harness between idle air control solenoid valve connector and engine ground terminal.
6	CHECK POOR CONTACT. Check poor contact in ECM and idle air control solenoid valve connectors.	Is there poor contact in ECM and idle air control solenoid valve connectors?	Repair poor contact in ECM and idle air control solenoid valve connectors.	Replace idle air control solenoid valve. <Ref. to FU(H6)-36, Idle Air Control Solenoid Valve.>

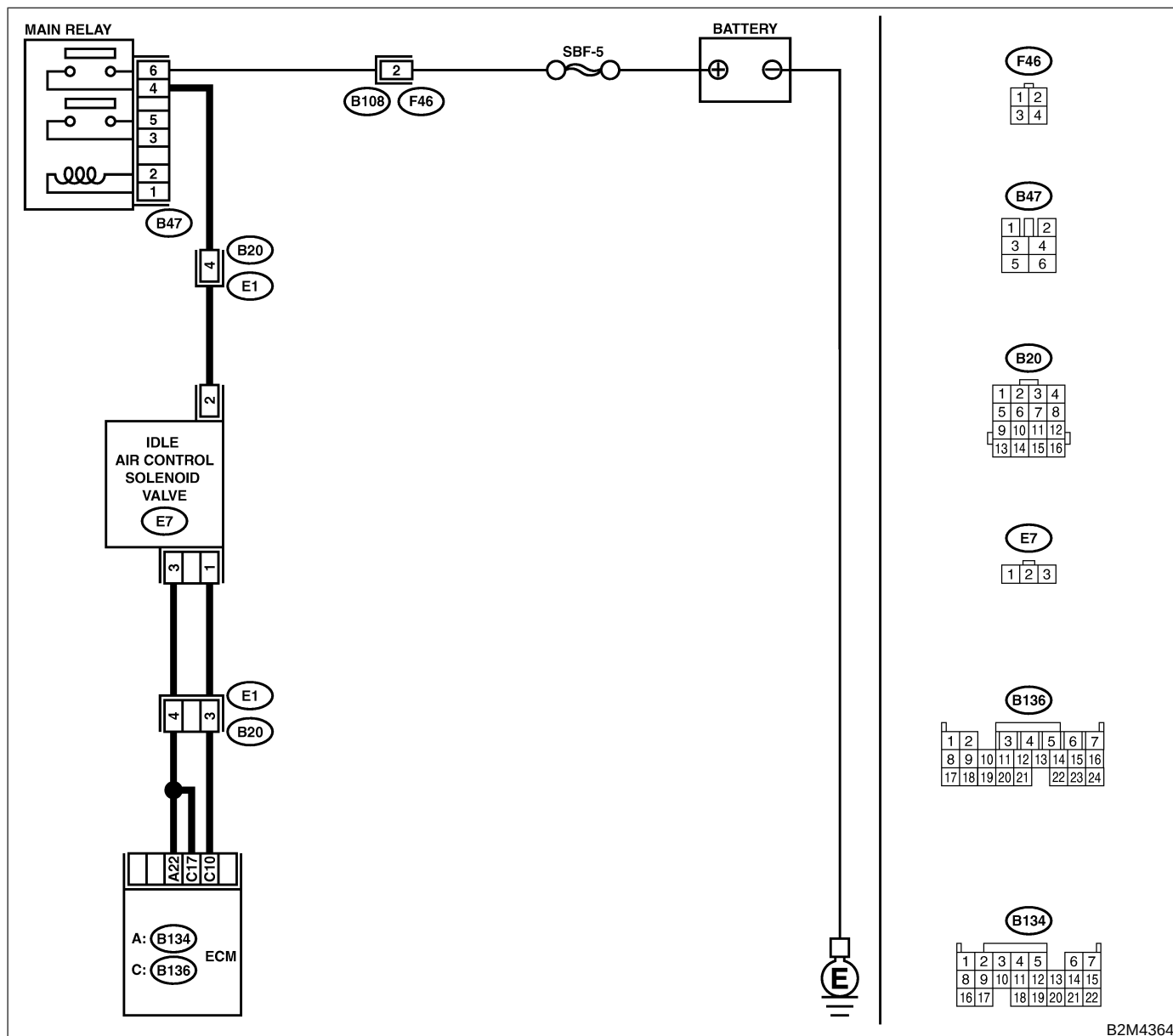
BQ: DTC P0509 — IDLE CONTROL SYSTEM CIRCUIT HIGH INPUT — S048521H10

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4364

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK THROTTLE CABLE.	Does throttle cable have play for adjustment?	Go to step 2.	Adjust throttle cable. <Ref. to SP(H6)-6, Accelerator Control Cable.>
2	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B136) No. 10 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 3.	Go to step 4.
3	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 (B136) No. 10 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Replace idle air control solenoid valve <Ref. to FU(H6)-36, Idle Air Control Solenoid Valve.> and ECM <Ref. to FU(H6)-46, Engine Control Module.>.
4	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM and chassis ground. Connector & terminal (B136) No. 10 (+) — Chassis ground (-):	Does the voltage change more than 10 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

BR: DTC P0512 — STARTER SWITCH CIRCUIT HIGH INPUT — S048521G02

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Failure of engine to start

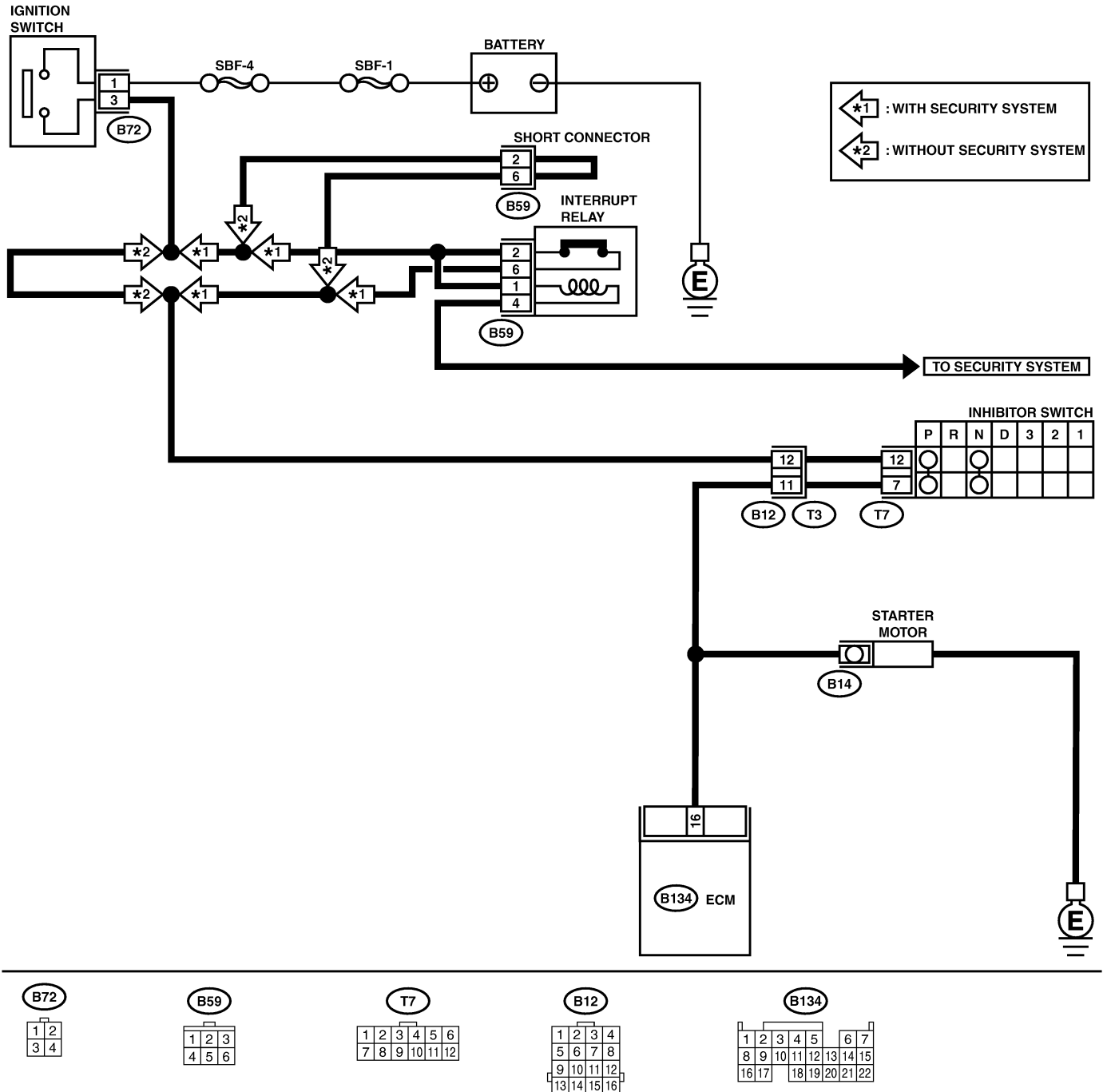
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

● WIRING DIAGRAM:



B2M4339

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OPERATION OF STARTER MOTOR. NOTE: Place the inhibitor switch in each position.	Does starter motor operate when ignition switch to "ON"?	Repair battery short circuit in starter motor circuit. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Check starter motor circuit. <Ref. to EC(H6)-67 Diagnostics for Engine Starting Failure.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

MEMO:

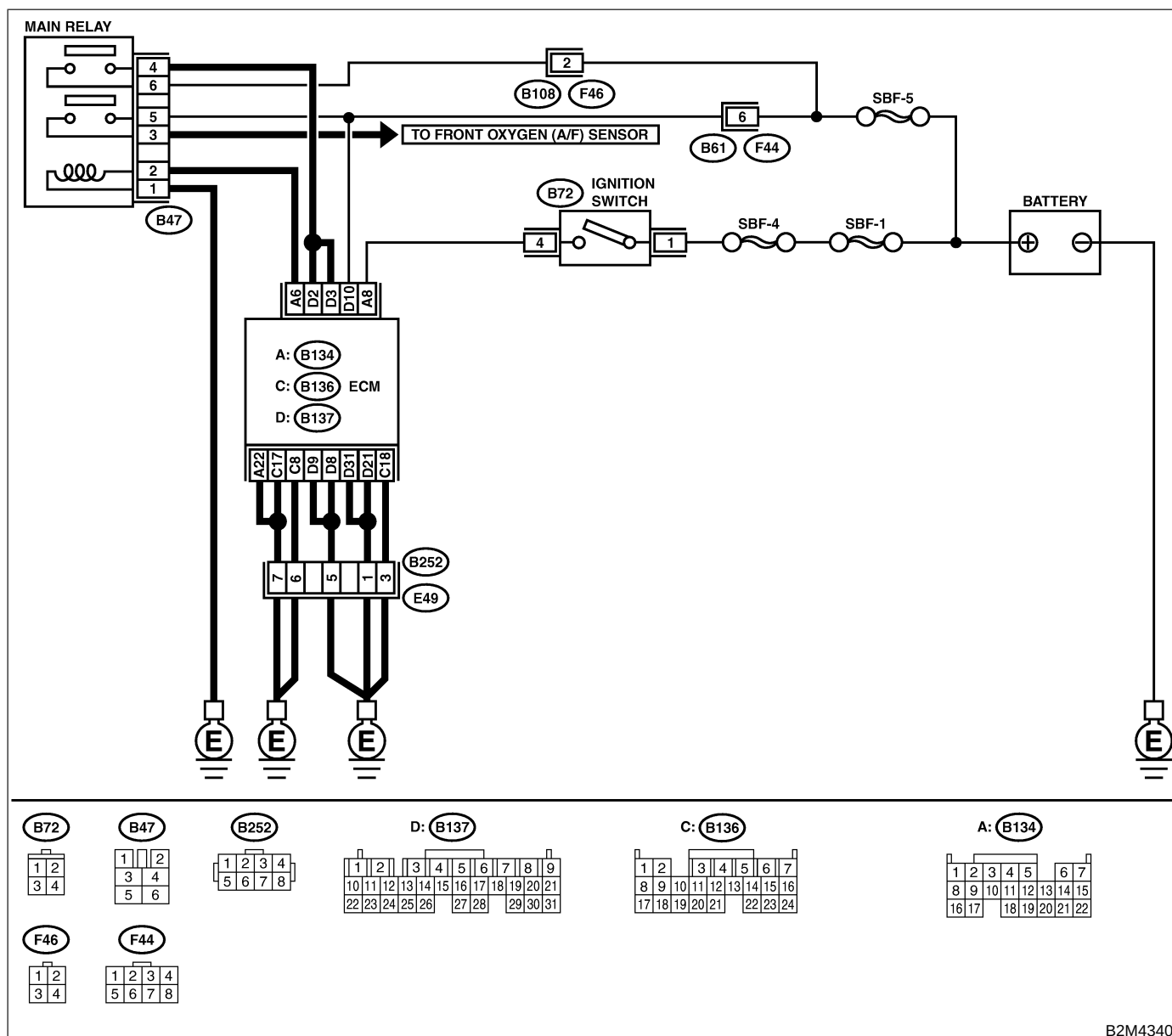
BS: DTC P0604 — INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR — S048521G03

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Engine does not start.
 - Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4340

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0604?	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	It is not necessary to inspect DTC P0604.

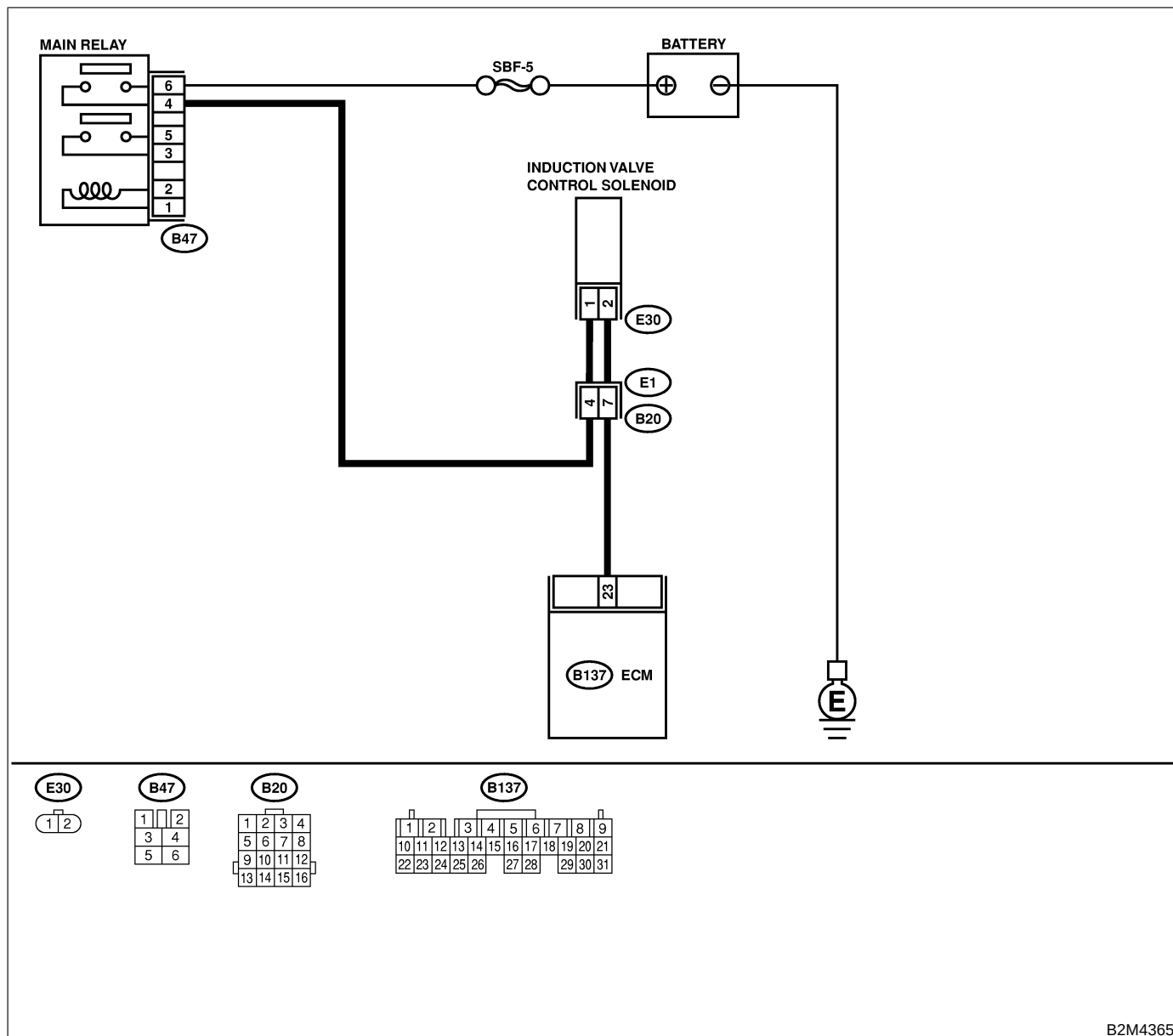
BT: DTC P0661 — INDUCTION VALVE CONTROL SOLENOID CIRCUIT LOW INPUT — S048521H11

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 23 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Even if MIL lights up, the circuit has returned to a normal condition at this time. Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Go to step 2.
2	CHECK HARNESS BETWEEN INDUCTION CONTROL SOLENOID VALVE AND ECM CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connectors from induction control solenoid valve and ECM. 3) Measure resistance of harness between induction control solenoid valve connector and engine ground. Connector & terminal (E30) No. 2 — Engine ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and induction control solenoid valve connector.	Go to step 3.
3	CHECK HARNESS BETWEEN INDUCTION CONTROL SOLENOID VALVE AND ECM CONNECTOR. Measure resistance of harness between ECM and induction control solenoid valve of harness connector. Connector & terminal (B137) No. 23 — (E30) No. 2:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair open circuit in harness between ECM and induction control solenoid valve connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and induction control solenoid valve connector ● Poor contact in coupling connector
4	CHECK INDUCTION CONTROL SOLENOID VALVE. 1) Remove induction control solenoid valve. 2) Measure resistance between induction control solenoid valve terminals. Terminals No. 1 — No. 2:	Is the resistance between 37 and 44 Ω ?	Go to step 5.	Replace induction control solenoid valve. <Ref. to FU(H6)-38, Induction Valve Control Solenoid.>
5	CHECK POWER SUPPLY TO INDUCTION CONTROL SOLENOID VALVE. 1) Turn ignition switch to ON. 2) Measure voltage between induction control solenoid valve and engine ground. Connector & terminal (E30) No. 1 (+) — Engine ground (-):	Is the voltage more than 10 V?	Go to step 6.	Repair open circuit in harness between main relay and induction control solenoid valve connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	CHECK POOR CONTACT. Check poor contact in induction control solenoid valve connector.	Is there poor contact in induction control solenoid valve connector?	Repair poor contact in induction control solenoid valve connector.	Contact your Subaru distributor NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

MEMO:

BU: DTC P0662 — INDUCTION VALVE CONTROL SOLENOID CIRCUIT HIGH INPUT — S048521H12

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

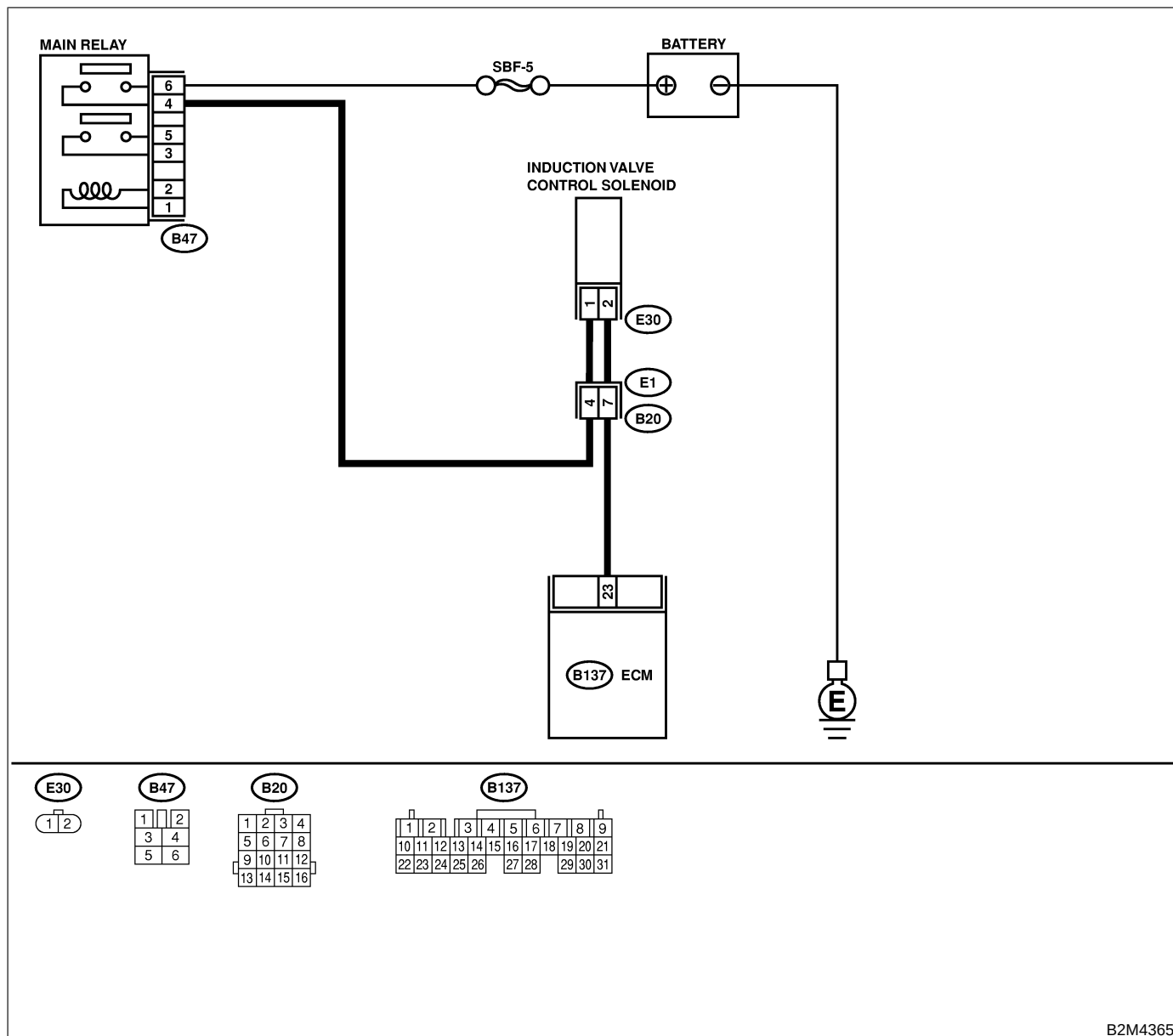
● **TROUBLE SYMPTOM:**

- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4365

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

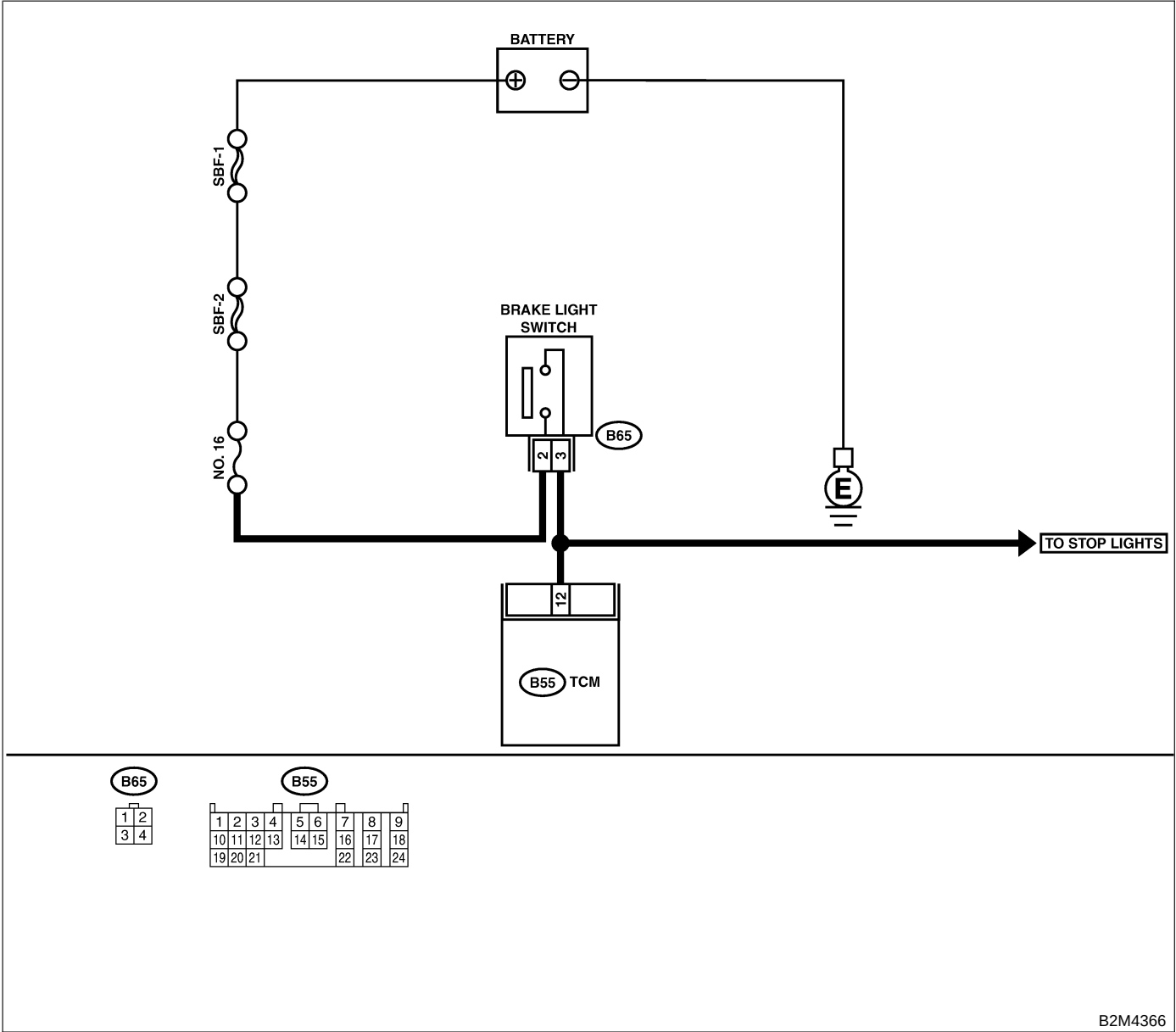
No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 23 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 3.	Go to step 2.
2	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>
3	CHECK HARNESS BETWEEN INDUCTION CONTROL SOLENOID VALVE AND ECM CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from induction control solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between ECM and chassis ground. Connector & terminal (B134) No. 2 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and induction control solenoid valve connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 4.
4	CHECK INDUCTION CONTROL SOLENOID VALVE. 1) Turn ignition switch to OFF. 2) Measure resistance between induction control solenoid valve terminals. Terminals No. 1 — No. 2:	Is the resistance less than 1 Ω ?	Replace induction control solenoid valve <Ref. to FU(H6)-38, Induction Valve Control Solenoid.> and ECM <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 5.
5	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-67 Engine Control Module.>

BV: DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION — S048521B64

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	CHECK OPERATION OF BRAKE LIGHT.	Does brake light come on when depressing the brake pedal?	Go to step 2.	Repair or replace brake light circuit.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	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 (B55) No. 12 — (B65) No. 3:	Is the resistance less than 1 Ω ?	Go to step 3.	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
3	CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 12 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 4.	Repair ground short circuit in harness between TCM and brake light switch connector.
4	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and brake light switch. 2) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 12 (+) — Chassis ground (-):	Is the voltage less than 1 V when releasing the brake pedal?	Go to step 5.	Adjust or replace brake light switch. <Ref. to LI-19 STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
5	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 12 (+) — Chassis ground (-):	Is the voltage more than 10 V when depressing the brake pedal?	Go to step 6.	Adjust or replace brake light switch. <Ref. to LI-19 STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
6	CHECK POOR CONTACT. Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-42 Transmission Control Module.>

BW: DTC P0705 — TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION — S048521F05

● **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 effective when selector lever is in “3” range.
- Shift characteristics are erroneous.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check inhibitor switch circuit. <Ref. to AT-126 CHECK INHIBITOR SWITCH, Diagnostic Procedure for No-Trouble Code.>

BX: DTC P0710 — TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT MALFUNCTION — S048521B66

● **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check ATF temperature sensor circuit. <Ref. to AT-44 TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —, Diagnostic Procedure with Trouble Code.>

BY: DTC P0715 — TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT MALFUNCTION — S048521B67

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check torque converter turbine speed sensor circuit. <Ref. to AT-62 TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>

BZ: DTC P0720 — OUTPUT SPEED SENSOR (VEHICLE SPEED SENSOR 2) CIRCUIT MALFUNCTION — S048521B68

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check front vehicle speed sensor circuit. <Ref. to AT-56 TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>

CA: DTC P0725 — ENGINE SPEED INPUT CIRCUIT MALFUNCTION — S048521B69

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check engine speed input signal circuit. <Ref. to AT-40 TROUBLE CODE 11 — ENGINE SPEED SIGNAL —, Diagnostic Procedure with Trouble Code.>

CB: DTC P0731 — GEAR 1 INCORRECT RATIO — S048521B70**NOTE:**

For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H6)-290 DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CC: DTC P0732 — GEAR 2 INCORRECT RATIO — S048521B71**NOTE:**

For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H6)-290 DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CD: DTC P0733 — GEAR 3 INCORRECT RATIO — S048521B72**NOTE:**

For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H6)-290 DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CE: DTC P0734 — GEAR 4 INCORRECT RATIO — S048521B73

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

● **TROUBLE SYMPTOM:**

- Shift point too high or too low; engine brake not effective in “3” range; excessive shift shock; excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is there any other DTC on display?	Inspect relevant DTC using “17. List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK THROTTLE POSITION SENSOR CIRCUIT. Check throttle position sensor circuit. <Ref. to AT-48 TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in throttle position sensor circuit?	Repair or replace throttle position sensor circuit.	Go to step 3.
3	CHECK FRONT VEHICLE SPEED SENSOR CIRCUIT. Check front vehicle speed sensor circuit. <Ref. to AT-56 TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in vehicle speed sensor 2 circuit?	Repair or replace vehicle speed sensor 2 circuit.	Go to step 4.
4	CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT. Check torque converter turbine speed sensor circuit. <Ref. to AT-62 TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace torque converter turbine speed sensor circuit.	Go to step 5.
5	CHECK POOR CONTACT. Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Go to step 6.
6	CHECK MECHANICAL TROUBLE. Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace automatic transmission. <Ref. to AT-11 INSPECTION, Road Test.>	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

MEMO:

CF: DTC P0741 — TORQUE CONVERTER CLUTCH SYSTEM MALFUNCTION

— S048521G04

● **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is there any other DTC on display?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC) for AT Vehicles.>	Go to step 2.
2	CHECK LOCK-UP DUTY SOLENOID CIRCUIT. Check lock-up duty solenoid circuit. <Ref. to AT-102 TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in lock-up duty solenoid circuit?	Repair or replace lock-up duty solenoid circuit.	Go to step 3.
3	CHECK THROTTLE POSITION SENSOR CIRCUIT. Check throttle position sensor circuit. <Ref. to AT-48 TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in throttle position sensor circuit?	Repair or replace throttle position sensor circuit.	Go to step 4.
4	CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT. Check torque converter turbine speed sensor circuit. <Ref. to AT-62 TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace torque converter turbine speed sensor circuit.	Go to step 5.
5	CHECK ENGINE SPEED INPUT CIRCUIT. Check engine speed input circuit. <Ref. to AT-40 TROUBLE CODE 11 — ENGINE SPEED SIGNAL —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in engine speed input circuit?	Repair or replace engine speed input circuit.	Go to step 6.
6	CHECK INHIBITOR SWITCH CIRCUIT. Check inhibitor switch circuit. <Ref. to AT-126 CHECK INHIBITOR SWITCH, Diagnostic Procedure for No-trouble Code.>	Is there any trouble in inhibitor switch circuit?	Repair or replace inhibitor switch circuit.	Go to step 7.
7	CHECK BRAKE LIGHT SWITCH CIRCUIT. Check brake light switch circuit. <Ref. to AT-124 CHECK BRAKE SWITCH, Diagnostic Procedure for No-trouble Code.>	Is there any trouble in brake light switch circuit?	Repair or replace brake light switch circuit.	Go to step 8.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	CHECK ATF TEMPERATURE SENSOR CIRCUIT. Check ATF temperature sensor circuit. <Ref. to AT-44 TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble in ATF temperature sensor circuit?	Repair or replace ATF temperature sensor circuit.	Go to step 9.
9	CHECK POOR CONTACT. Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Go to step 10.
10	CHECK MECHANICAL TROUBLE. Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace automatic transmission. <Ref. to AT-11 INSPECTION, Road Test.>	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

CG: DTC P0743 — TORQUE CONVERTER CLUTCH SYSTEM (LOCK-UP DUTY SOLENOID) ELECTRICAL — S048521B75

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check lock-up duty solenoid circuit. <Ref. to AT-102 TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>

CH: DTC P0748 — PRESSURE CONTROL SOLENOID (LINE PRESSURE DUTY SOLENOID) ELECTRICAL — S048521B76

- **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 Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check line pressure duty solenoid circuit. <Ref. to AT-90 TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>

CI: DTC P0753 — SHIFT SOLENOID A (SHIFT SOLENOID 1) ELECTRICAL —

S048521B77

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - No shift

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check shift solenoid 1 circuit. <Ref. to AT-74 TROUBLE CODE 71 — SHIFT SOLENOID 1 —, Diagnostic Procedure with Trouble Code.>

CJ: DTC P0758 — SHIFT SOLENOID B (SHIFT SOLENOID 2) ELECTRICAL —

S048521B78

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - No shift

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check shift solenoid 2 circuit. <Ref. to AT-78 TROUBLE CODE 72 — SHIFT SOLENOID 2 —, Diagnostic Procedure with Trouble Code.>

CK: DTC P0778 — 2-4 BRAKE PRESSURE CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION —

S048521G05

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check 2-4 brake pressure control solenoid valve circuit. <Ref. to AT-96 TROUBLE CODE 76 — 2-4 BRAKE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>

CL: DTC P0785 — 2-4 BRAKE TIMING CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION —

S048521G06

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check 2-4 brake timing control solenoid valve circuit. <Ref. to AT-86 TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>

CM: DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT LOW INPUT — S048521B84

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1110?	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.> NOTE: Atmospheric pressure sensor is built into ECM.	It is not necessary to inspect DTC P1110.

CN: DTC P1111 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT HIGH INPUT — S048521B85

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1111?	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.> NOTE: Atmospheric pressure sensor is built into ECM.	It is not necessary to inspect DTC P1111.

**CO: DTC P1112 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/
 PERFORMANCE PROBLEM —** S048521B86

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0106, P0107, P0108, P1110, P1111 or P1146?	Inspect DTC P0106, P0107, P0108, P1110, P1111 or P1146 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.> NOTE: Atmospheric pressure sensor is built into ECM.

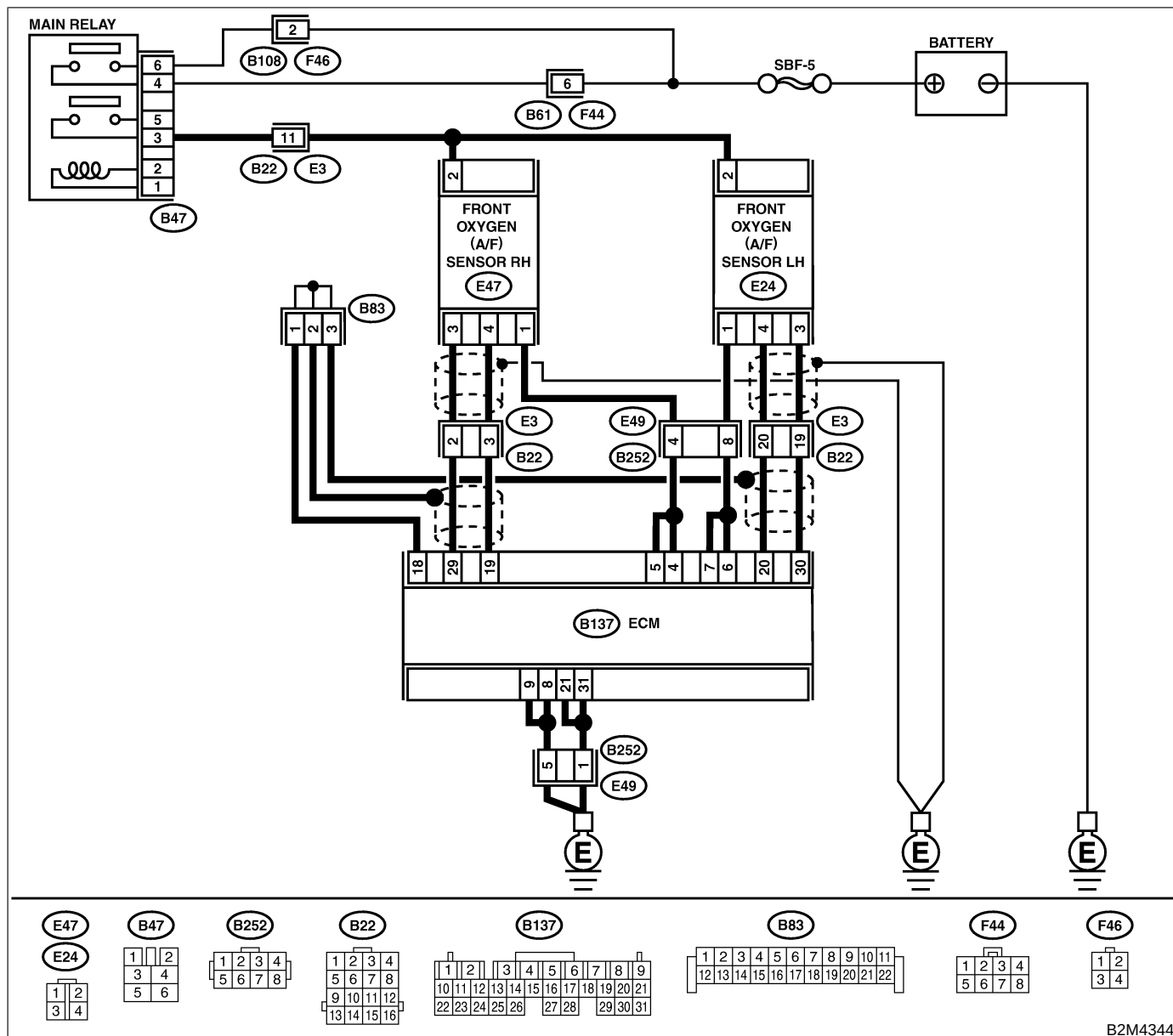
CP: DTC P1130 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT MALFUNCTION (OPEN CIRCUIT) — S048521H39

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 19 — (E47) No. 4:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and front oxygen (A/F) sensor connector ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in ECM connector
2	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 29 — (E47) No. 3:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and front oxygen (A/F) sensor connector ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in ECM connector
3	CHECK POOR CONTACT. Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair poor contact in front oxygen (A/F) sensor connector.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

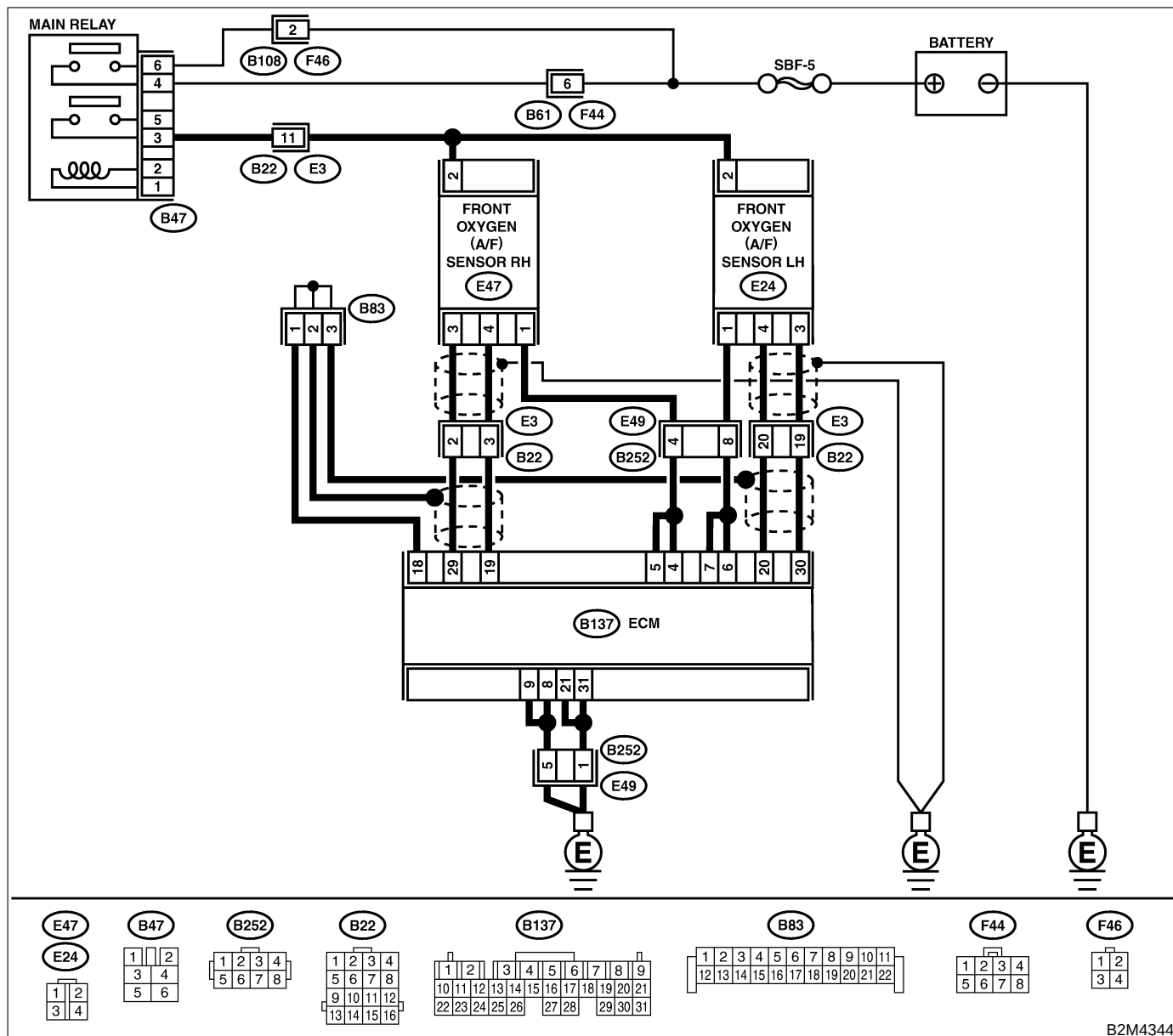
CQ: DTC P1131 — BANK #1 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT RH) CIRCUIT MALFUNCTION (SHORT CIRCUIT) — S048521H40

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR 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 (B137) No. 19 — Chassis ground:	Is the resistance more than 10 Ω?	Go to step 2.	Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. Measure resistance of harness between ECM connector and chassis ground. Connector & terminal (B137) No. 29 — Chassis ground:	Is the resistance more than 10 Ω?	Go to step 3.	Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	CHECK OUTPUT SIGNAL FOR ECM. 1) Connect connector to ECM. 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 19 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 4.	Go to step 5.
4	CHECK OUTPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 19 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Repair poor contact in ECM connector.
5	CHECK OUTPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 29 (+) — Chassis ground (-):	Is the voltage more than 4.95 V?	Go to step 6.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>
6	CHECK OUTPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 29 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace ECM. <Ref. to FU(H6)-46 Engine Control Module.>	Repair poor contact in ECM connector.

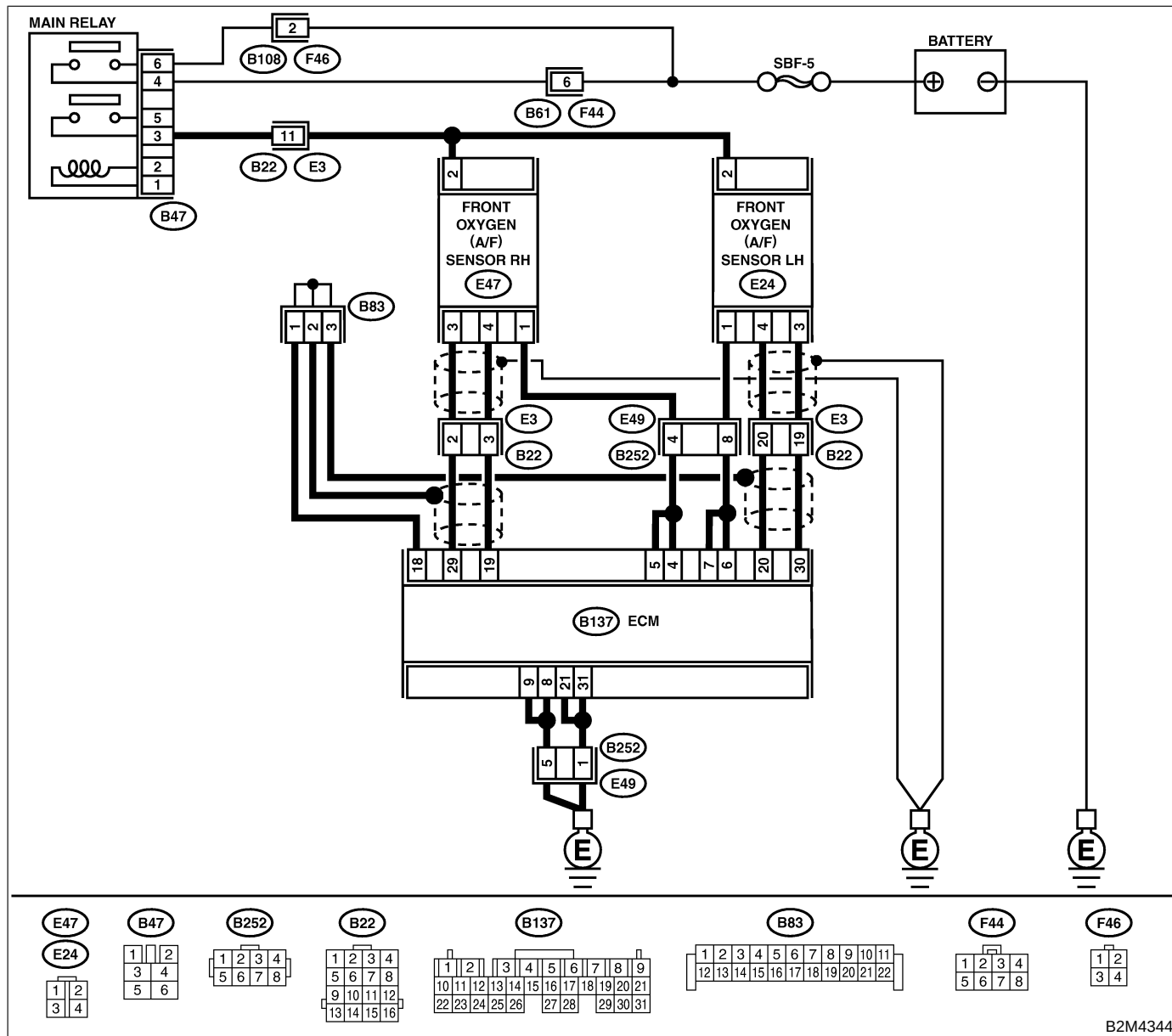
CR: DTC P1134 — FRONT OXYGEN (A/F) SENSOR MICRO-COMPUTER PROBLEM — S048521B96

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1134?	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	It is not necessary to inspect DTC P1134.

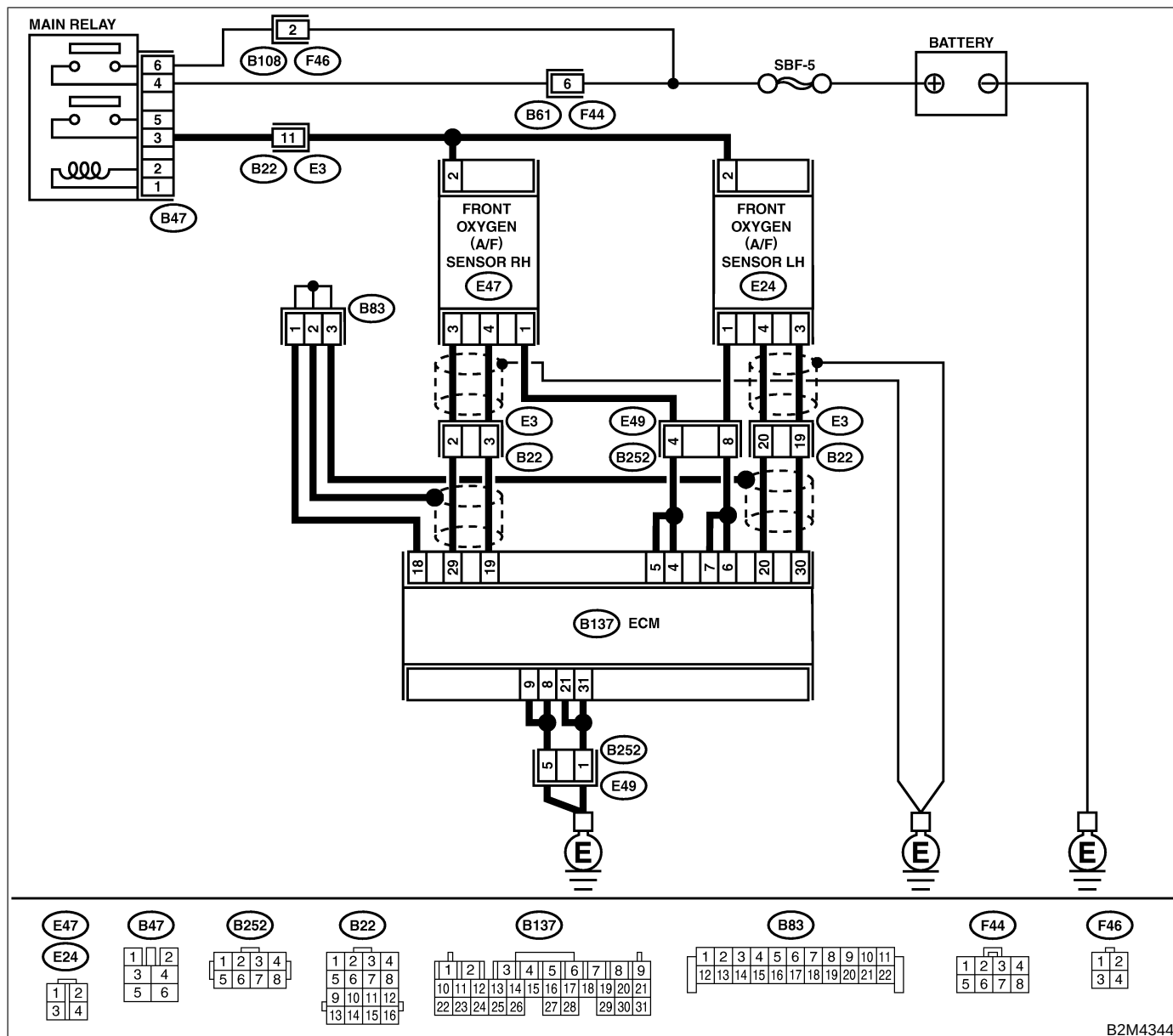
CS: DTC P1135 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) CIRCUIT MALFUNCTION (OPEN CIRCUIT) — S048521H41

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 20 — (E24) No. 4:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and front oxygen (A/F) sensor connector ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in ECM connector
2	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 30 — (E24) No. 3:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and front oxygen (A/F) sensor connector ● Poor contact in front oxygen (A/F) sensor connector ● Poor contact in ECM connector
3	CHECK POOR CONTACT. Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair poor contact in front oxygen (A/F) sensor connector.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

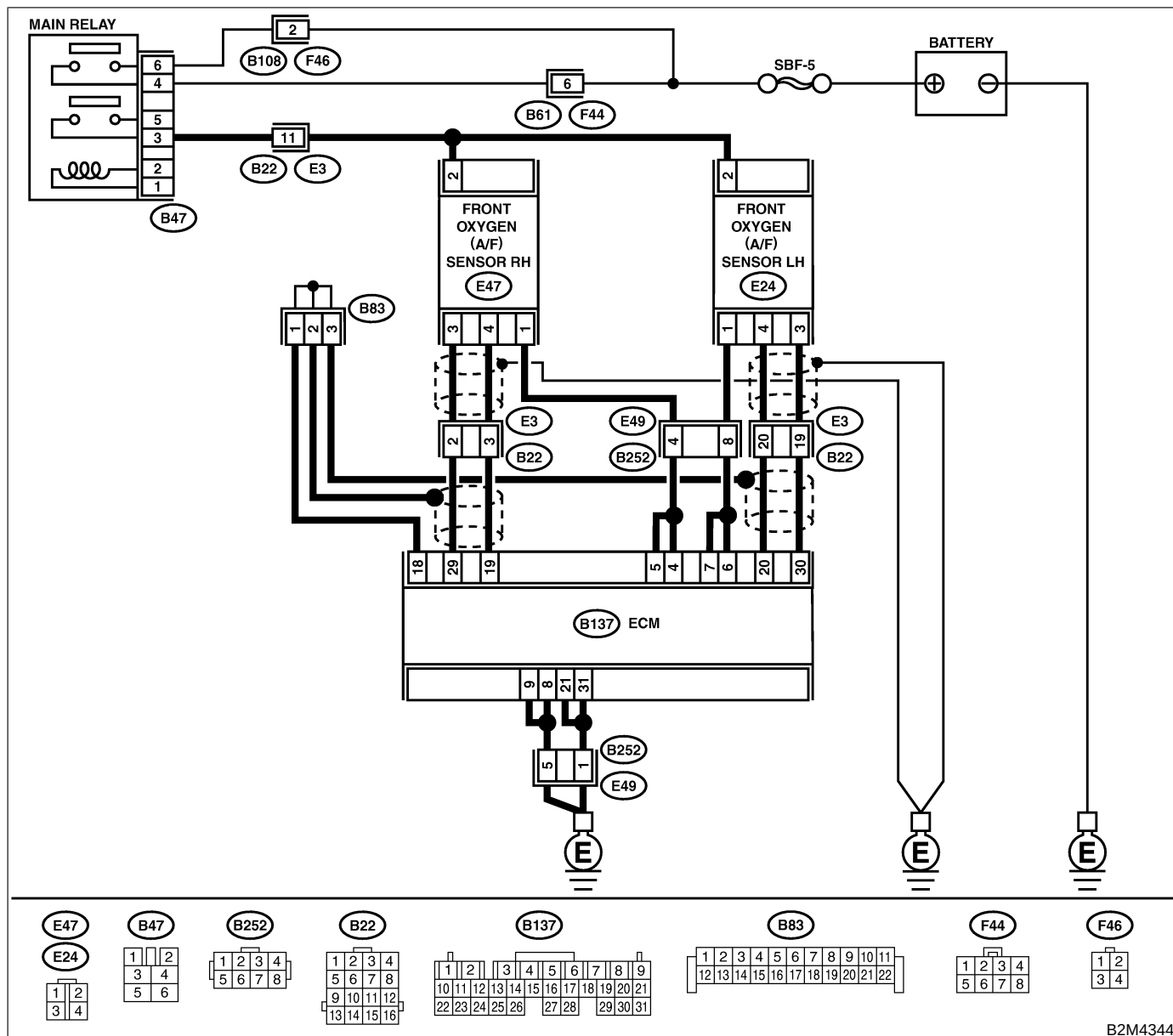
CT: DTC P1136 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) CIRCUIT MALFUNCTION (SHORT CIRCUIT) — S048521H42

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR 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 (B137) No. 20 — Chassis ground:	Is the resistance more than 10 Ω ?	Go to step 2.	Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. Measure resistance of harness between ECM connector and chassis ground. Connector & terminal (B137) No. 30 — Chassis ground:	Is the resistance more than 10 Ω ?	Go to step 3.	Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	CHECK OUTPUT SIGNAL FOR ECM. 1) Connect connector to ECM. 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 20 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 4.	Go to step 5.
4	CHECK OUTPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 20 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Repair poor contact in ECM connector.
5	CHECK OUTPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 30 (+) — Chassis ground (-):	Is the voltage more than 4.95 V?	Go to step 6.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>
6	CHECK OUTPUT SIGNAL FOR ECM. Measure voltage between ECM connector and chassis ground. Connector & terminal (B137) No. 30 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Repair poor contact in ECM connector.

Engine (DIAGNOSTICS)

S048521H43

- Two consecutive driving cycles with fault

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. 1) Start engine, and warm-up the engine. 2) Turn ignition switch to OFF. 3) Disconnect connectors from ECM and front oxygen (A/F) sensor. 4) Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 4 — (E47) No. 1: (B137) No. 5 — (E47) No. 1:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 19 — (E47) No. 4:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 29 — (E47) No. 3:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.
4	CHECK FRONT OXYGEN (A/F) SENSOR. Measure resistance between front oxygen (A/F) sensor connector terminals. Terminals No. 2 — No. 1:	Is the resistance less than 5 Ω ?	Go to step 5.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>
5	CHECK POOR CONTACT. Check poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair poor contact in ECM or front oxygen (A/F) sensor connector.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

CV: DTC P1140 — BANK #2 AND SENSOR #1 OXYGEN (A/F) SENSOR (FRONT LH) HEATER CIRCUIT RANGE/PERFORMANCE PROBLEM —

S048521H44

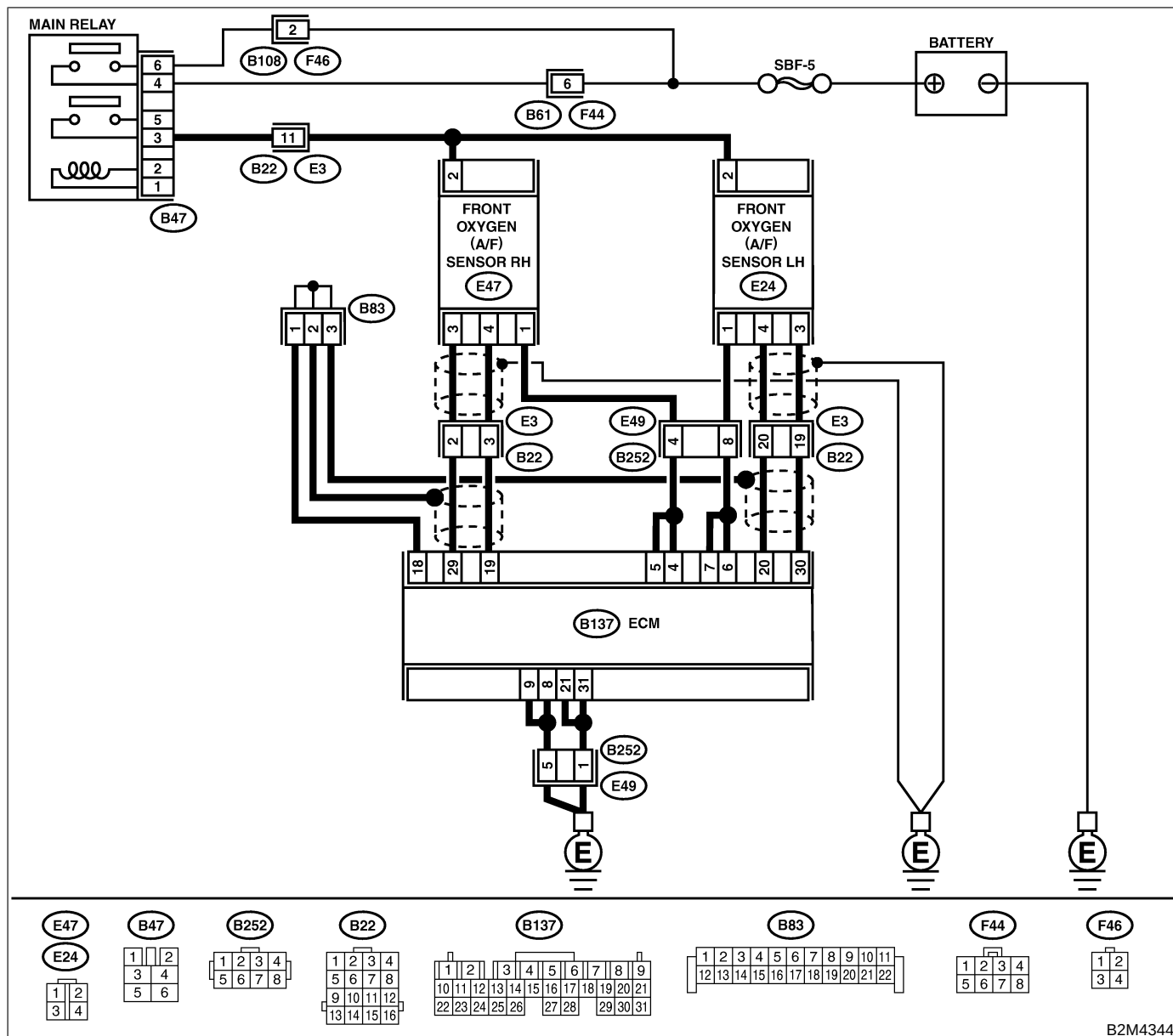
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4344

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. 1) Start engine, and warm-up the engine. 2) Turn ignition switch to OFF. 3) Disconnect connectors from ECM and front oxygen (A/F) sensor. 4) Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 4 — (E24) No. 6: (B137) No. 5 — (E24) No. 7:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 20 — (E24) No. 4:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR. Measure resistance of harness between ECM and front oxygen (A/F) sensor connector. Connector & terminal (B137) No. 30 — (E24) No. 3:	Is the resistance less than 1 Ω?	Go to step 4.	Repair open circuit in harness between ECM and front oxygen (A/F) sensor connector.
4	CHECK FRONT OXYGEN (A/F) SENSOR. Measure resistance between front oxygen (A/F) sensor connector terminals. Terminals No. 2 — No. 1:	Is the resistance less than 5 Ω?	Go to step 5.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>
5	CHECK POOR CONTACT. Check poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair poor contact in ECM or front oxygen (A/F) sensor connector.	Replace front oxygen (A/F) sensor. <Ref. to FU(H6)-43, Front Oxygen (A/F) Sensor.>

**CW: DTC P1142 — THROTTLE POSITION SENSOR CIRCUIT
RANGE/PERFORMANCE PROBLEM (LOW INPUT) —** S048521B99

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

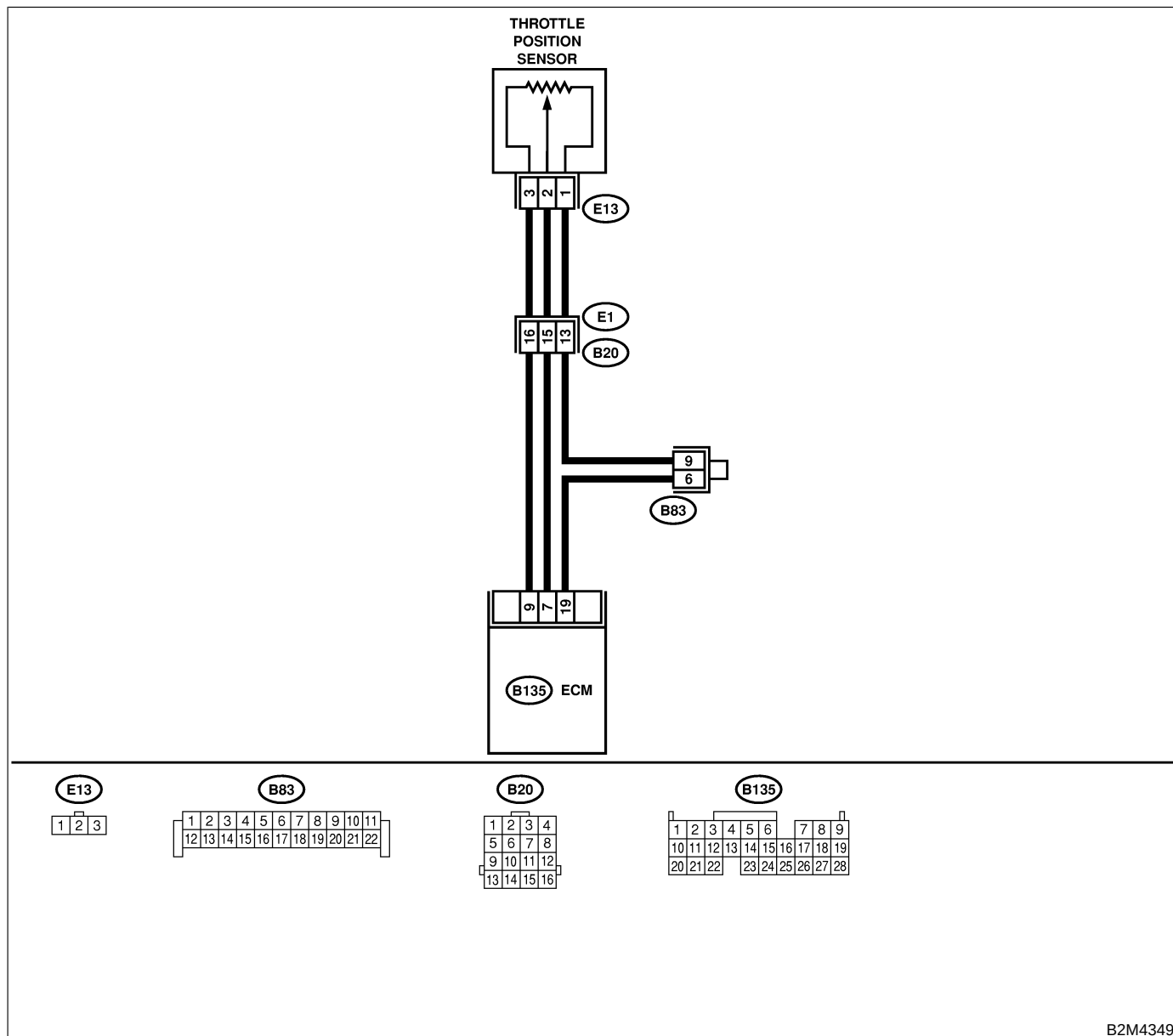
● **TROUBLE SYMPTOM:**

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4349

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0122 or P0123?	Inspect DTC P0122 or P0123 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1142.	Replace throttle position sensor. <Ref. to FU(H6)-33, Throttle Position Sensor.>

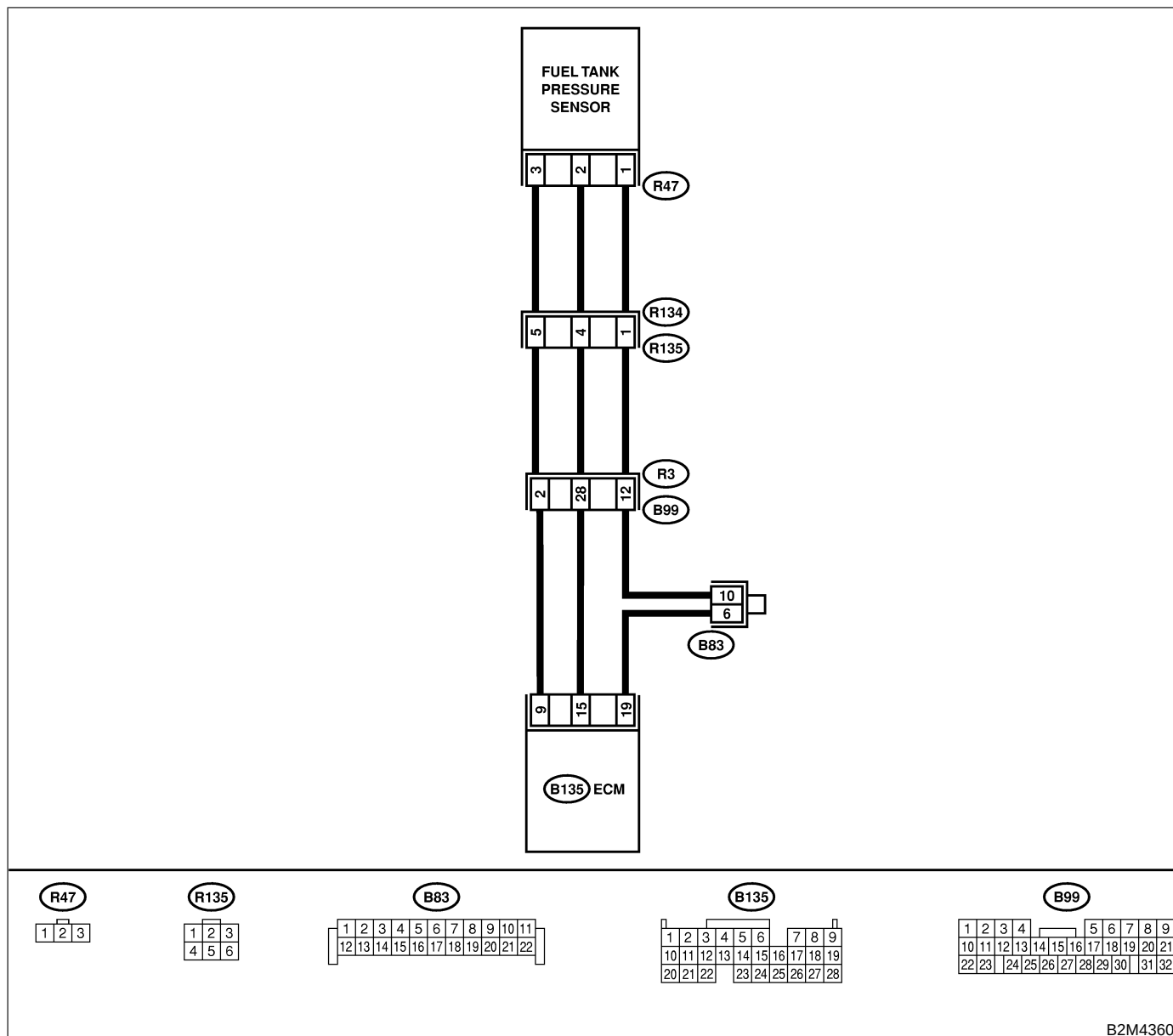
CX: DTC P1146 — PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT) — S048521G07

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY. NOTE: In this case, it is not necessary to inspect DTC P0106.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0107, P0108 or P1112?	Inspect DTC P0107, P0108 or P1112 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK AIR INTAKE SYSTEM.	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step 3.
3	CHECK PRESSURE SENSOR. 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in 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 intake manifold 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual. Specification: ● Intake manifold absolute pressure Ignition ON 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) Idling 20.0 — 46.7 kPa (150 — 350 mmHg, 5.91 — 13.78 inHg)	Is the value within the specifications?	Go to step 4.	Replace intake air temperature sensor and pressure sensor. <Ref. to FU(H6)-35, Intake Air Temperature Sensor.>
4	CHECK THROTTLE POSITION. Read data of throttle position 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 FOR ENGINE". <Ref. to EN(H6)-37 Subaru Select Monitor.> ● OBD-II general scan tool For detailed operation procedure, refer to the OBD-II General Scan Tool Instruction Manual.	Is throttle positioning ratio equal to or less than 5% when throttle is fully closed?	Go to step 5.	Adjust or replace throttle position sensor. <Ref. to FU(H6)-33, Throttle Position Sensor.>
5	CHECK THROTTLE POSITION.	Is throttle positioning ratio equal to or more than 85% when throttle is fully open?	Replace intake air temperature and pressure sensor. <Ref. to FU(H6)-35, Intake Air Temperature Sensor.>	Replace throttle position sensor. <Ref. to FU(H6)-33, Throttle Position Sensor.>

**CY: DTC P1400 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE
CIRCUIT LOW INPUT —** S048521C07

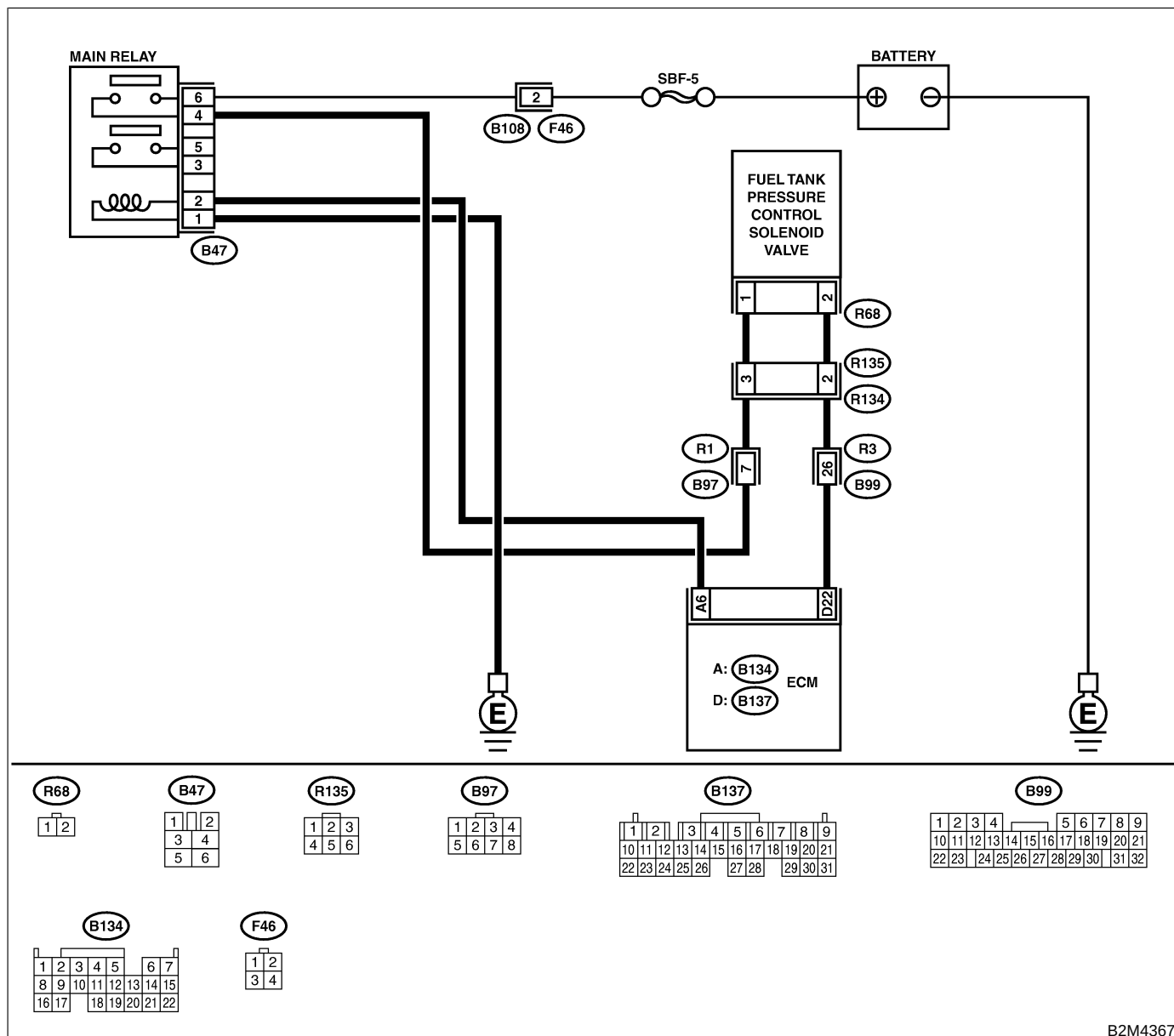
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4367

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 22 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 2.	Go to step 3.
2	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
3	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:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and fuel tank pressure control solenoid valve connector.	Go to step 4.
4	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 (B137) No. 22 — (R68) No. 2:	Is the voltage less than 1 Ω ?	Go to step 5.	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
5	CHECK FUEL TANK PRESSURE CONTROL SOLENOID VALVE. Measure resistance between fuel tank pressure control solenoid valve terminals. Terminals No. 1 — No. 2:	Is the resistance between 10 and 100 Ω ?	Go to step 6.	Replace fuel tank pressure control solenoid valve. <Ref. to EC(H6)-16, Pressure Control Solenoid Valve.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	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 (-):	Is the voltage more than 10 V?	Go to step 7.	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 ● Poor contact in main relay connector
7	CHECK POOR CONTACT. Check poor contact in fuel tank pressure control solenoid valve connector.	Is there poor contact in fuel tank pressure control solenoid valve connector?	Repair poor contact in fuel tank pressure control solenoid valve connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO:

**CZ: DTC P1420 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE
CIRCUIT HIGH INPUT —** S048521C08

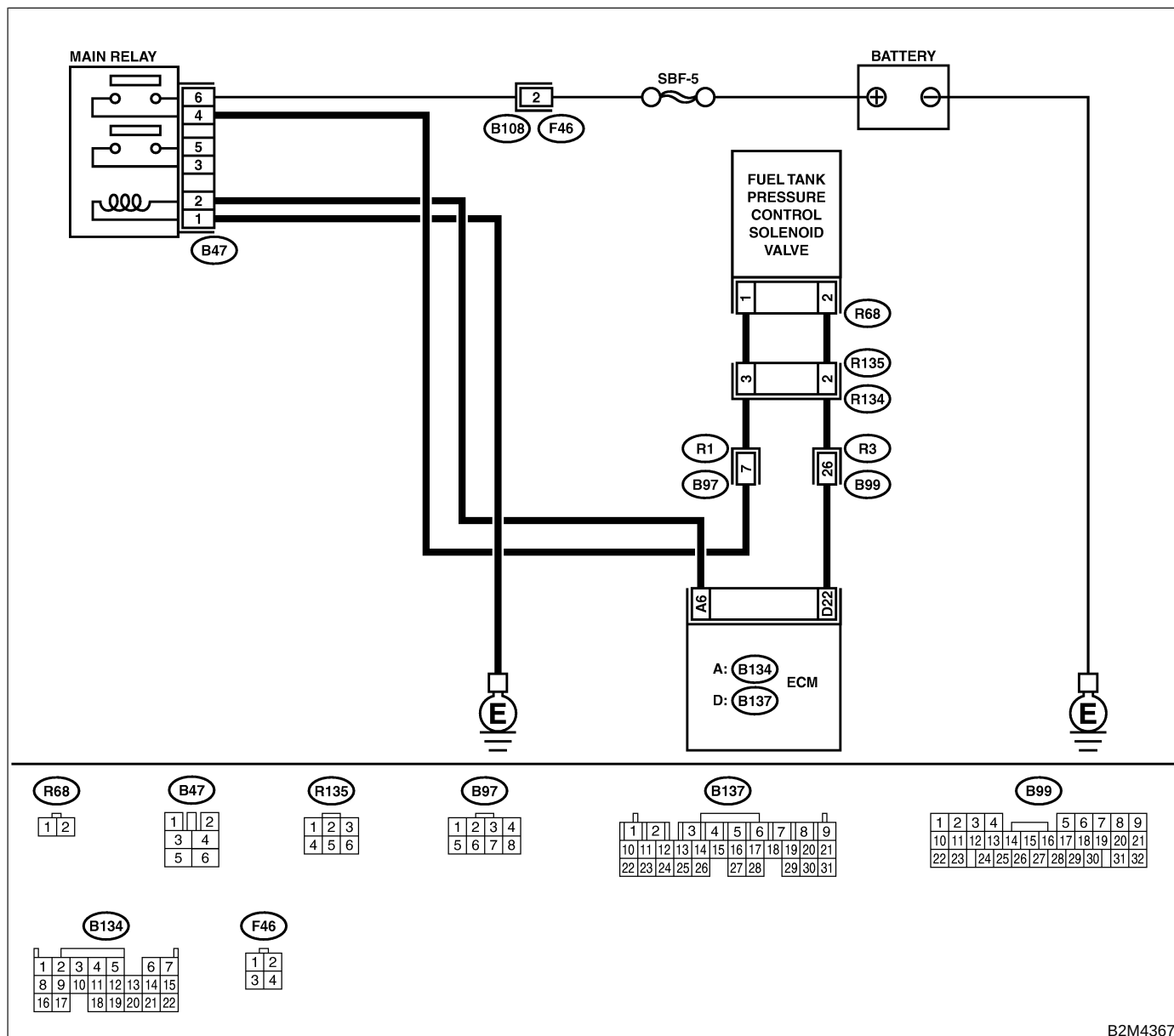
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4367

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	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) While operating fuel tank pressure control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Fuel tank pressure control solenoid valve operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-49 Compulsory Valve Operation Check Mode.> Connector & terminal (B137) No. 22 (+) — Chassis ground (-):	Does voltage change between 0 and 10 V?	Go to step 2.	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.
2	CHECK OUTPUT SIGNAL FROM ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 22 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 4.	Go to step 3.
3	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>
4	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 (B137) No. 22 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and fuel tank pressure control solenoid valve connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 5.
5	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:	Is the resistance less than 1 Ω ?	Replace fuel tank pressure control solenoid valve <Ref. to EC(H6)-16, Pressure Control Solenoid Valve.> and ECM <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 6.
6	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>

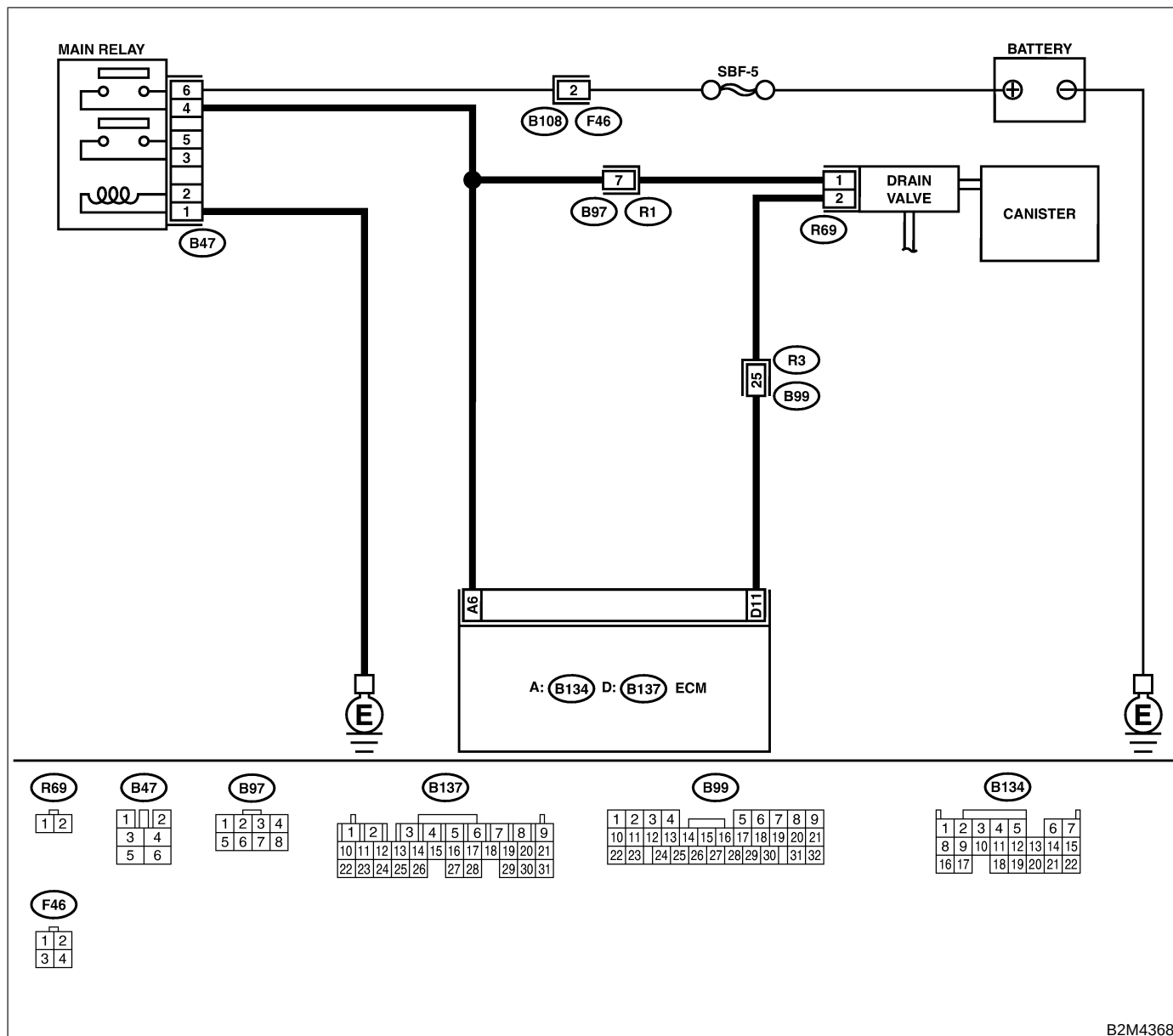
DA: DTC P1443 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL FUNCTION PROBLEM — S048521C12

- **DTC DETECTING CONDITION:**
 - Immediately after fault occurrence
- **TROUBLE SYMPTOM:**
 - Improper fuel supply

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4368

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is there any other DTC on display?	Inspect the relevant DTC using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	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 drain filter	Is there a fault in vent line?	Repair or replace the faulty part.	Go to step 3.
3	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. 4) Operate drain valve. NOTE: Drain valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to the "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-49 Compulsory Valve Operation Check Mode.>	Does drain valve produce operating sound?	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Replace drain valve. <Ref. to EC(H6)-20 Drain Valve.>

DB: DTC P1480 — COOLING FAN RELAY 1 CIRCUIT HIGH INPUT — S048521G08

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Radiator fan does not operate properly.
 - Overheating

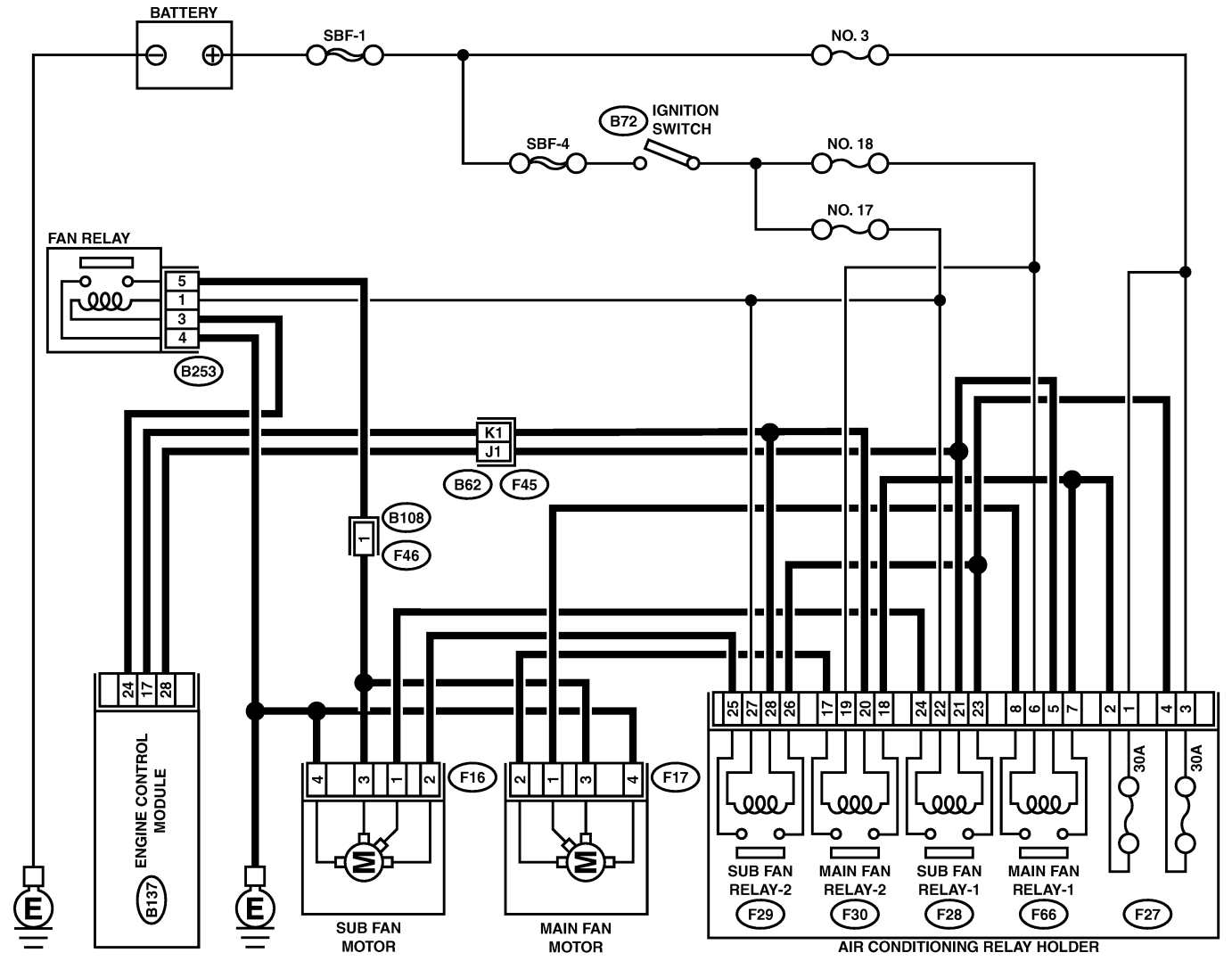
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

● WIRING DIAGRAM:



(B72) (BLUE)

1	2
3	4

F27		F66		F30		F28		F29			
1	2	5	6	9	13	14	17	21	22	25	29
3	4	7	10	15	18	23	26	27	28	30	
		8	11	12	16	19	20	24			

(B137)

1	2		3	4	5	6	7	8	9		
10	11	12	13	14	15	16	17	18	19	20	21
22	23	24	25	26		27	28		29	30	31

(B62)

A1	A2	A3	A4	A5	A6
B1	B2	B3	B4	B5	B6
C1	C2	C3	C4	C5	C6
D1	D2	D3	D4	D5	D6
E1	E2	E3	E4	E5	E6
F1	F2	F3	F4	F5	F6
G1	G2	G3	G4	G5	G6
H1	H2	H3	H4	H5	H6
I1	I2	I3	I4	I5	I6
J1	J2	J3	J4	J5	J6
K1	K2	K3	K4	K5	K6
L1	L2	L3	L4	L5	L6
M1	M2	M3	M4	M5	M6
N1	N2	N3	N4	N5	N6
O1	O2	O3	O4	O5	O6
P1	P2	P3	P4	P5	P6

(F16)

1	2
3	4

(B253)

1	2	3
4	5	

1	2
3	4

B2M4362

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	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) While operating radiator fan relay, measure voltage between ECM and chassis ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6)-49 Compulsory Valve Operation Check Mode.> Connector & terminal (B137) No. 28 (+) — Chassis ground (-): (B137) No. 17 (+) — Chassis ground (-):	Does voltage change between 0 and 10 V?	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.	Go to step 2.
2	CHECK SHORT CIRCUIT IN RADIATOR FAN RELAY CONTROL CIRCUIT. 1) Turn ignition switch to OFF. 2) Remove main fan relay and sub fan relay. (with A/C models) 3) Disconnect test mode connector. 4) Turn ignition switch to ON. 5) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 28 (+) — Chassis ground (-): (B137) No. 17 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in radiator fan relay control circuit. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 3.
3	CHECK MAIN FAN RELAY. 1) Turn ignition switch to OFF. 2) Remove main fan relay. 3) Measure resistance between main fan relay terminals. Terminal (F66) No. 5 — No. 6: (F30) No. 19 — No. 20:	Is the resistance less than 1 Ω ?	Replace main fan relay and ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 4.
4	CHECK SUB FAN RELAY. 1) Remove sub fan relay. 2) Measure resistance between sub fan relay terminals. Terminal (F28) No. 21 — No. 22: (F29) No. 27 — No. 28:	Is the resistance less than 1 Ω ?	Replace sub fan relay and ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 5.
5	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46 Engine Control Module.>

MEMO:

DC: DTC P1507 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —

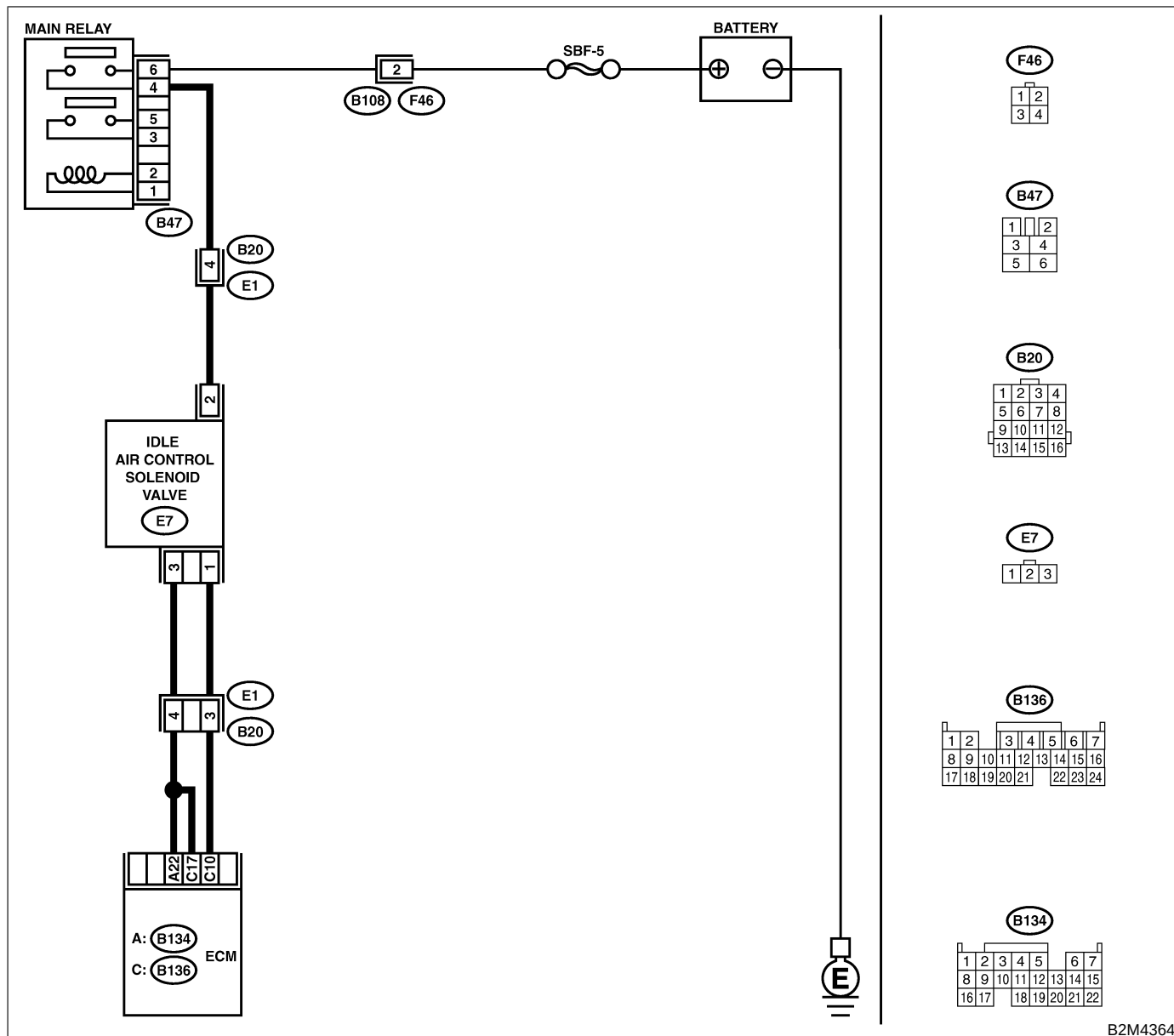
S048521C16

- **DTC DETECTING CONDITION:**
 - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
 - Engine does not return to normal idle speed.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4364

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0500, P0508 or P0509?	Inspect DTC P0500, P0508 or P0509 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1507.	Go to step 2.
2	CHECK THROTTLE CABLE.	Does throttle cable have play for adjustment?	Go to step 2.	Adjust throttle cable. <Ref. to SP(H6)-6, Accelerator Control Cable.>
3	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 ● Disconnections of vacuum hoses	Is there a fault in air intake system?	Repair air suction and leaks.	Replace idle air control solenoid valve. <Ref. to FU(H6)-36, Idle Air Control Solenoid Valve.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

DD: DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT — S048521G09

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Failure of engine to start

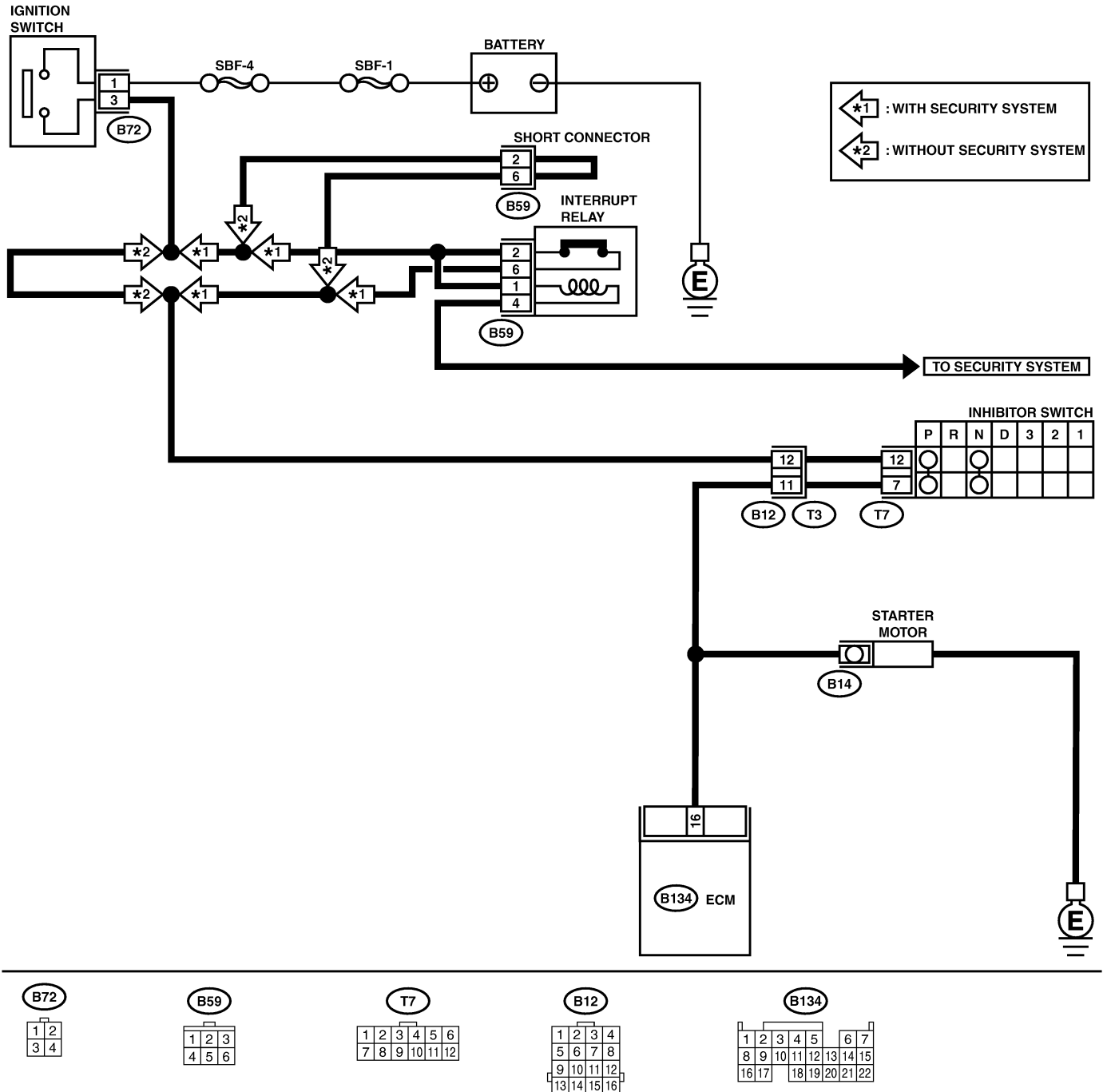
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

● WIRING DIAGRAM:



B2M4339

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OPERATION OF STARTER MOTOR. NOTE: Place the inhibitor switch in the "P" or "N" position.	Does starter motor operate when ignition switch to "ST"?	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.	Check starter motor circuit. <Ref. to EN(H6)-68 STARTER MOTOR CIRCUIT, Diagnostic for Engine Starting Failure.>

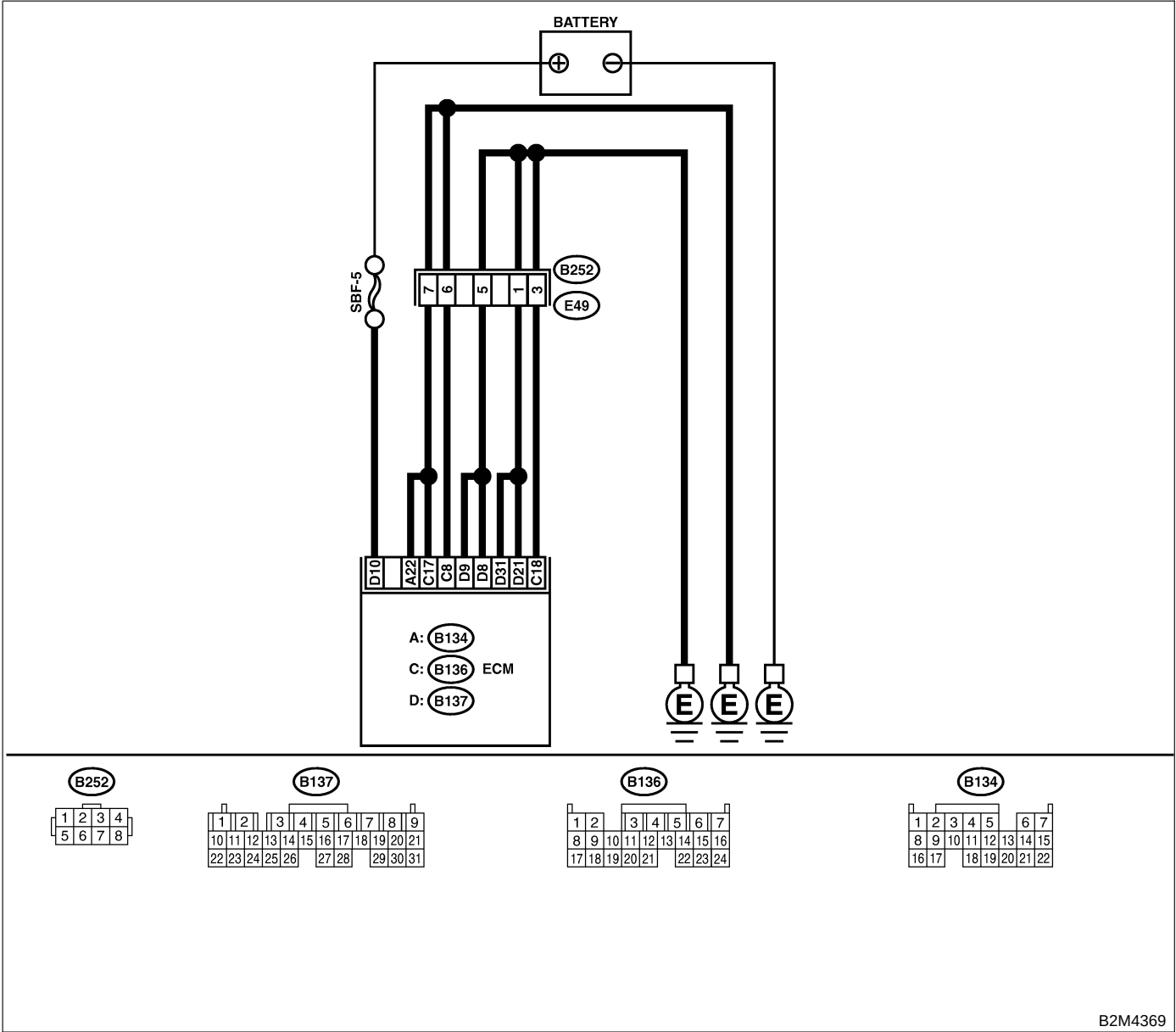
MEMO:

DE: DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION — S048521C27

- DTC DETECTING CONDITION:
 - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK INPUT SIGNAL FOR ECM. 1) Turn ignition switch to OFF. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B137) No. 10 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair poor contact in ECM connector.	Go to step 2.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR. 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and chassis ground. <i>Connector & terminal (B137) No. 10 — Chassis ground:</i>	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM connector and battery terminal.	Go to step 3.
3	CHECK FUSE SBF-5.	Is fuse blown?	Replace fuse.	Repair harness and connector. NOTE: In this case, repair the following: ● Open circuit in harness between ECM and battery ● Poor contact in ECM connector ● Poor contact in battery terminal

DF: DTC P1590 — NEUTRAL POSITION SWITCH CIRCUIT HIGH INPUT —

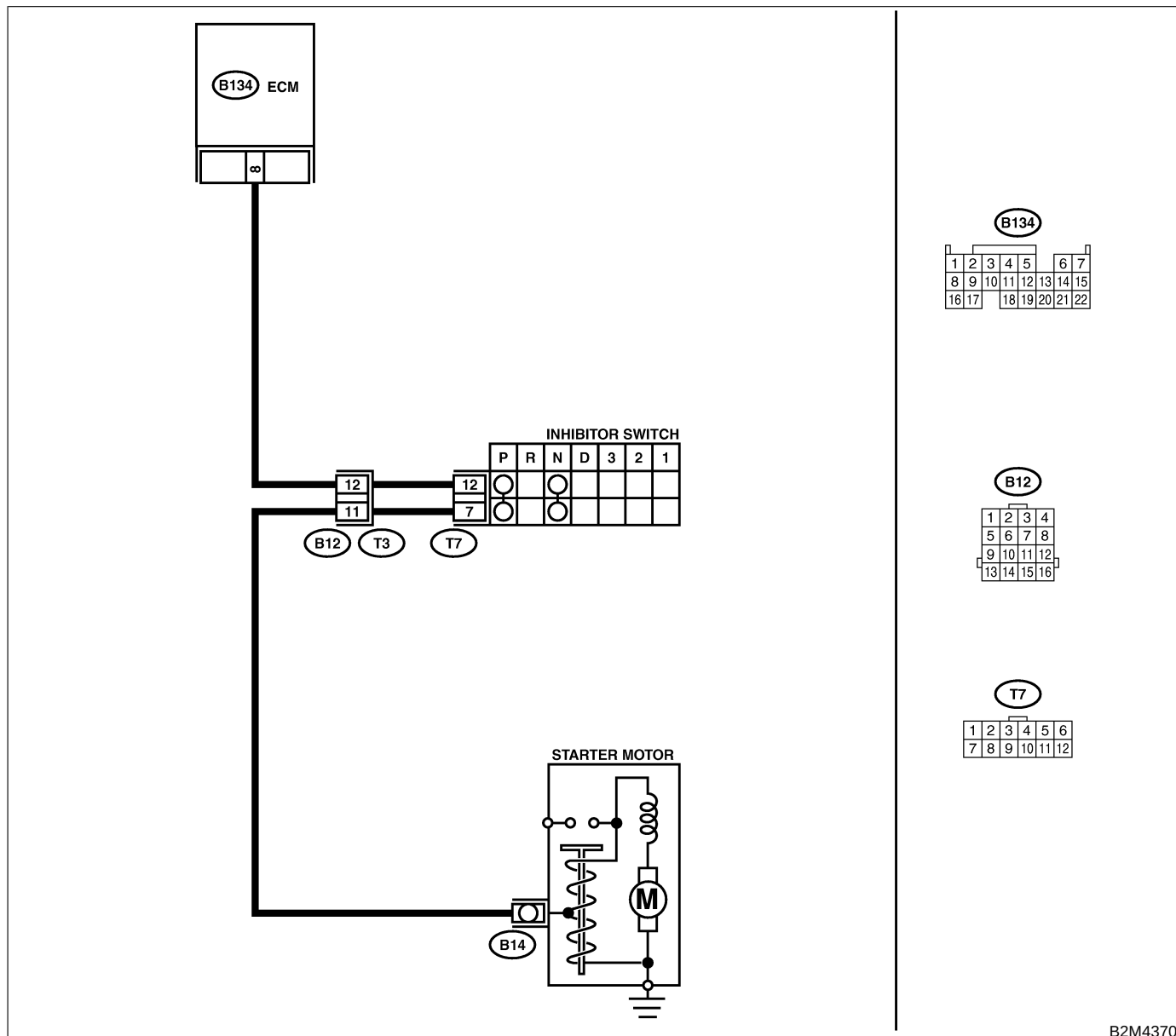
S048521G10

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4370

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK DTC P0705 ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0705?	Inspect DTC P0705 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	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 (B134) No. 8 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 3.	Go to step 5.
3	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM and chassis ground in selector lever except for "N" and "P" positions. Connector & terminal (B134) No. 8 (+) — Chassis ground (-):	Is the voltage between 4.5 and 5.5 V?	Go to step 4.	Go to step 5.
4	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM and chassis ground. Connector & terminal (B134) No. 8 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and inhibitor switch connector.	Go to step 6.
6	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 (B134) No. 8 — (T7) No. 12:	Is the resistance less than 1 Ω?	Go to step 7.	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 ● Poor contact in inhibitor switch connector ● Poor contact in ECM connector

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	CHECK INHIBITOR SWITCH GROUND LINE. Measure resistance of harness between inhibitor switch connector and engine ground. Connector & terminal (T7) No. 7 — Engine ground:	Is the resistance less than 5 Ω ?	Go to step 8.	Repair open circuit in harness between inhibitor switch connector and starter motor ground line. NOTE: In this case, repair the following: ● Open circuit in harness between inhibitor switch connector and starter motor ground line ● Poor contact in starter motor connector ● Poor contact in starter motor ground ● Starter motor
8	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals in selector lever "N" and "P" positions. Terminals No. 7 — No. 12:	Is the resistance less than 1 Ω ?	Go to step 9.	Replace inhibitor switch. <Ref. to AT-28 Inhibitor Switch.>
9	CHECK SELECTOR CABLE CONNECTION.	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-25 INSPECTION, Select Cable.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

MEMO:

DG: DTC P1591 — NEUTRAL POSITION SWITCH CIRCUIT LOW INPUT —

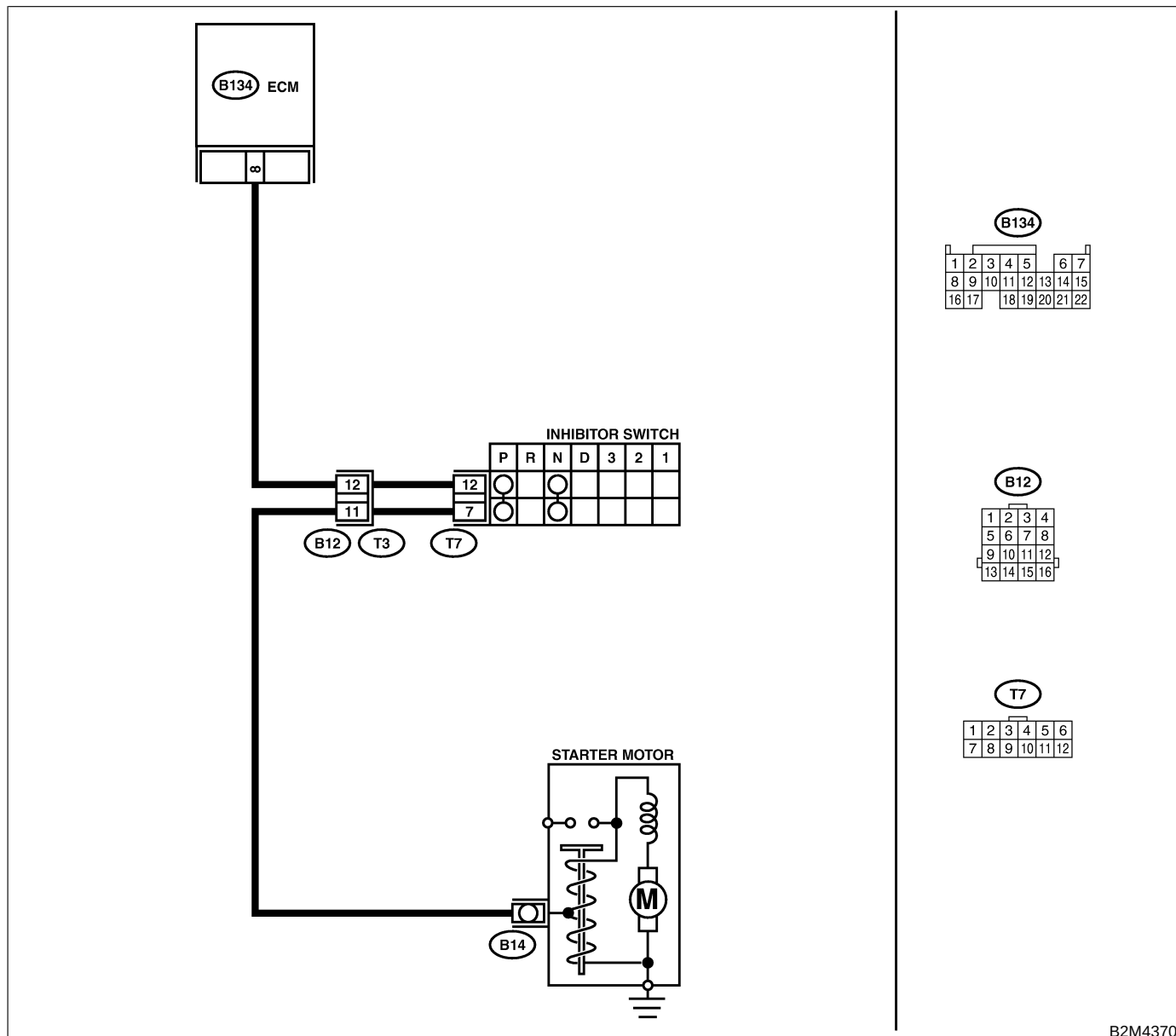
S048521G11

- **DTC DETECTING CONDITION:**
 - Two consecutive driving cycles with fault
- **TROUBLE SYMPTOM:**
 - Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK DTC P0705 ON DISPLAY.	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0705?	Inspect DTC P0705 using "17. List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6)-87 List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	CHECK INPUT SIGNAL FOR ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B134) No. 8 (+) — Chassis ground (-):	Is the voltage between 4.5 and 5.5 V at except "N" and "P" positions?	Even if MIL lights up, the circuit has returned to a normal condition at this time.	Go to step 3.
3	CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect connectors from ECM and transmission harness connector (T3). 3) Measure resistance of harness between ECM connector and chassis ground. Connector & terminal (B134) No. 8 — Chassis ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and transmission harness connector.	Go to step 4.
4	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:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between transmission harness and inhibitor switch connector.	Go to step 5.
5	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals in selector lever except for "N" position. Terminals No. 7 — No. 12:	Is the resistance more than 1 M Ω at except "N" and "P" positions?	Go to step 6.	Replace inhibitor switch. <Ref. to AT-28 Inhibitor Switch.>
6	CHECK SELECTOR CABLE CONNECTION.	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-25 INSPECTION, Select Cable.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DH: DTC P1594 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT MALFUNCTION — S048521G12

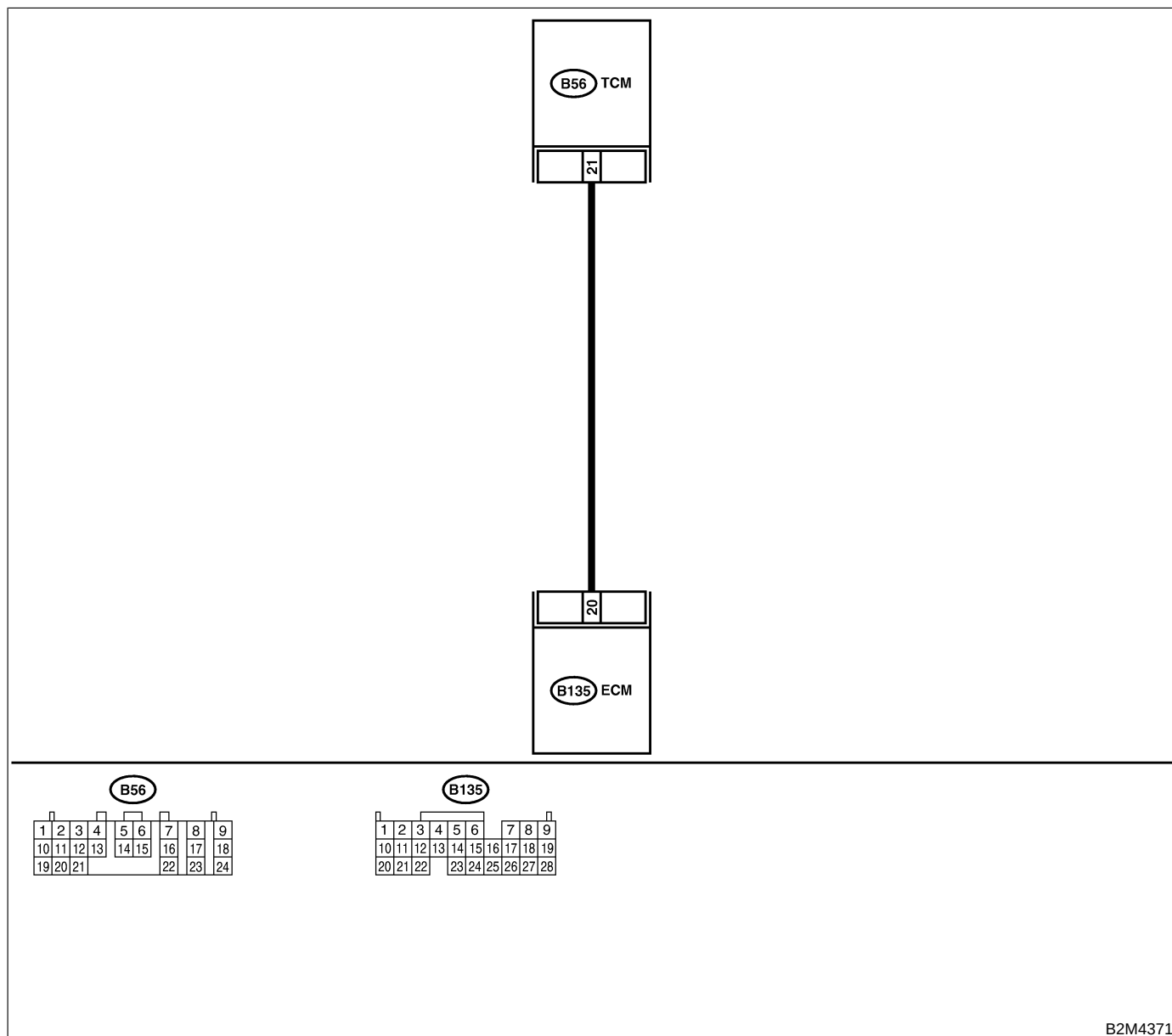
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4371

No.	Step	Check	Yes	No
1	CHECK DRIVING CONDITION. 1) Start and warm-up the engine until the radiator fan makes one complete rotation. 2) Drive the vehicle.	Is AT shift control functioning properly?	Go to step 2.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	CHECK ACCESSORY.	Are car phone and/or CB installed on vehicle?	Repair grounding line of car phone or CB system.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

DI: DTC P1595 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT — S048521G13

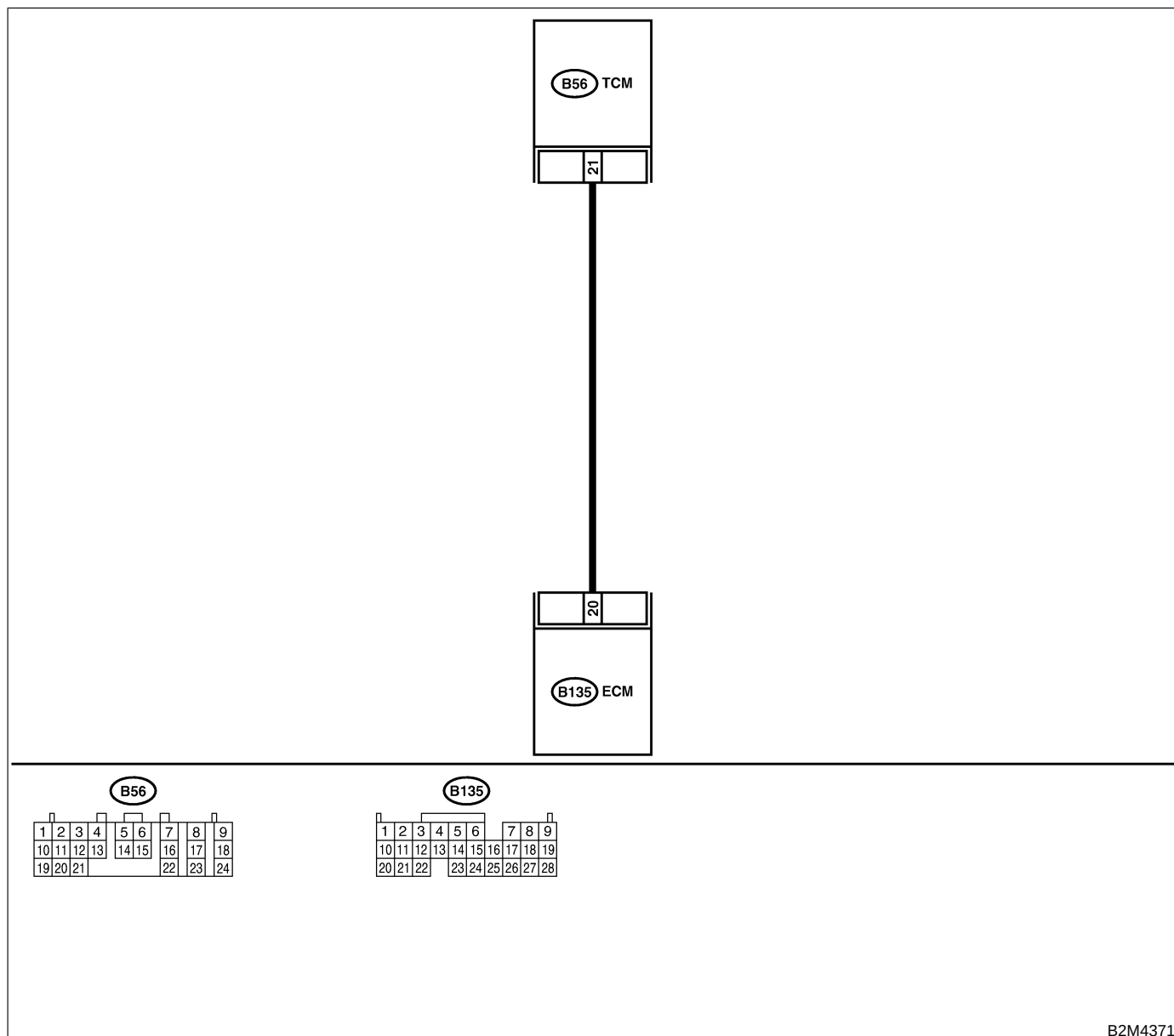
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B135) No. 20 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 2.	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
2	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 (B135) No. 20 — Chassis ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and TCM connector.	Go to step 3.
3	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 (B135) No. 20 (+) — Chassis ground (-):	Is the voltage more than 5 V?	Go to step 4.	Repair poor contact in ECM connector.
4	CHECK TROUBLE CODE FOR AUTOMATIC TRANSMISSION. Read trouble code for automatic transmission. <Ref. to AT-26 Read Diagnostic Trouble Code.>	Does trouble code appear for automatic transmission?	Inspect trouble code for automatic transmission. <Ref. to AT-36 Diagnostic Procedure with Trouble Code.>	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

DJ: DTC P1596 — AUTOMATIC TRANSMISSION DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT — S048521G14

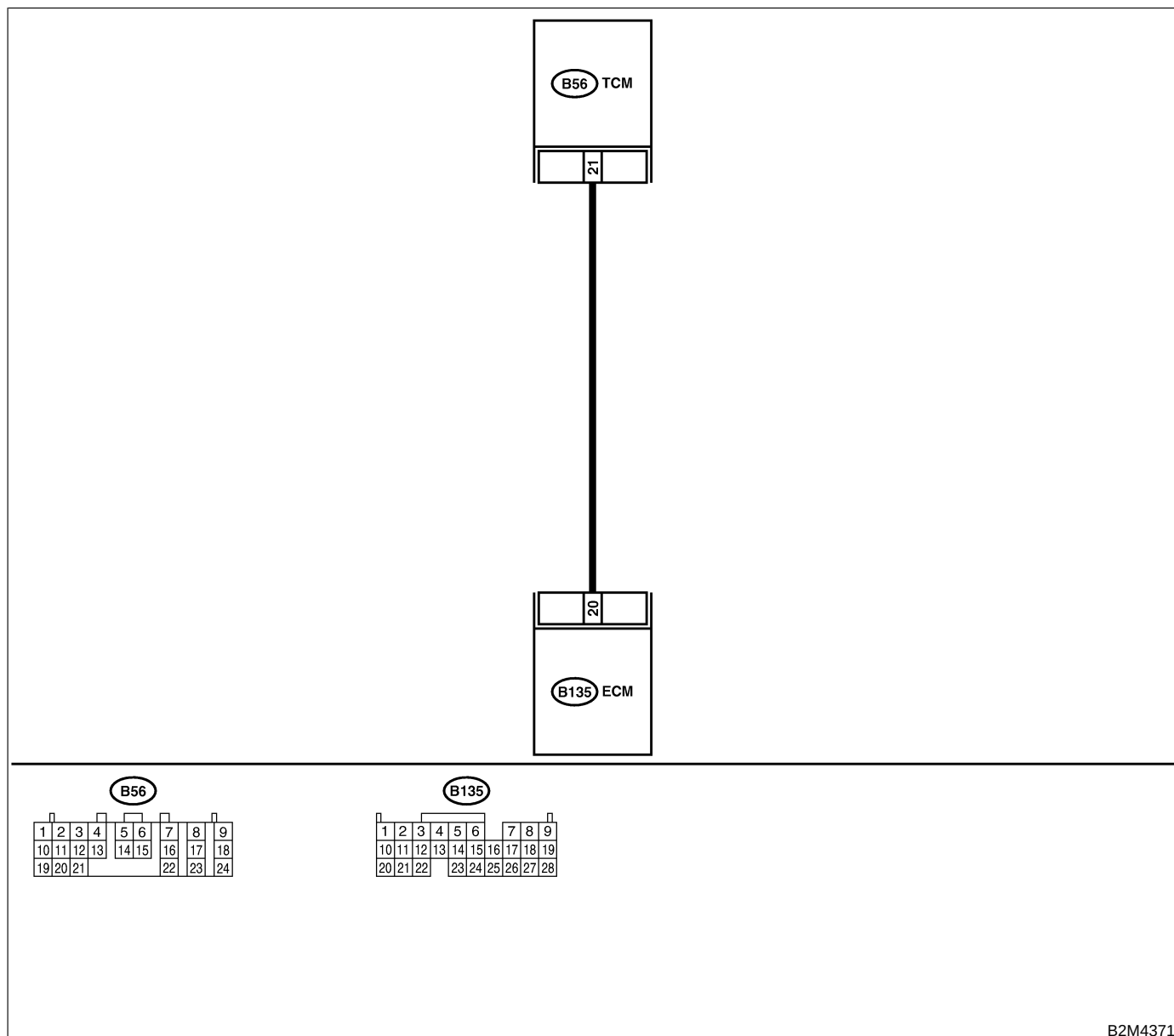
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B135) No. 20 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Go to step 2.
2	CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR. Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 20 (+) — Chassis ground (-):	Is the voltage more than 4 V?	Go to step 5.	Go to step 3.
3	CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR. Measure voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 20 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Repair poor contact in ECM connector.	Go to step 4.
4	CHECK OUTPUT SIGNAL FROM ECM. Measure voltage between ECM and chassis ground. Connector & terminal (B135) No. 20 (+) — Chassis ground (-):	Does the voltage change from 1 V to 4 V while monitoring the value with voltage meter?	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	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR. Measure voltage between TCM and chassis ground. Connector & terminal (B54) No. 20 (+) — Chassis ground (-):	Is the voltage more than 4 V?	Go to step 6.	Repair open circuit in harness between ECM and TCM connector.
6	CHECK POOR CONTACT. Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Check TCM power supply line and grounding line.

DK: DTC P1698 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT LOW INPUT — S048521G15

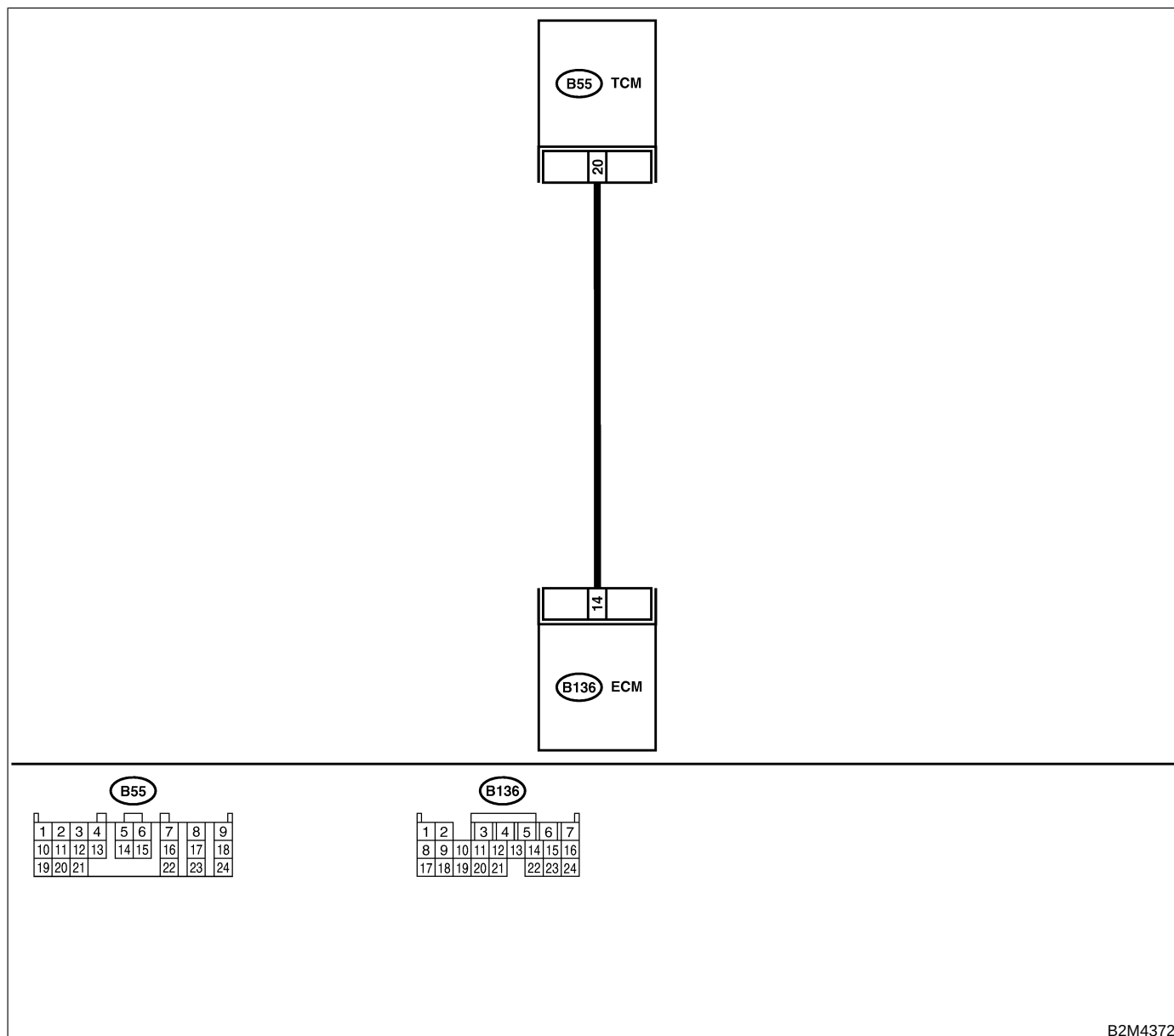
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Start engine, and warm-up the engine. 2) Turn ignition switch to OFF. 3) Turn ignition switch to ON. 4) Measure voltage between ECM and chassis ground. Connector & terminal (B136) No. 14 (+) — Chassis ground (-):	Is the voltage more than 3 V?	Repair poor contact in ECM connector.	Go to step 2.
2	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 chassis ground. Connector & terminal (B136) No. 14 — Chassis ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and TCM connector.	Go to step 3.
3	CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR. Measure resistance of harness between ECM and TCM connector. Connector & terminal (B136) No. 14 — (B55) No. 20:	Is the resistance less than 1 Ω ?	Repair poor contact in ECM or TCM connector.	Repair open circuit in harness between ECM and TCM connector.

DL: DTC P1699 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT HIGH INPUT — S048521G16

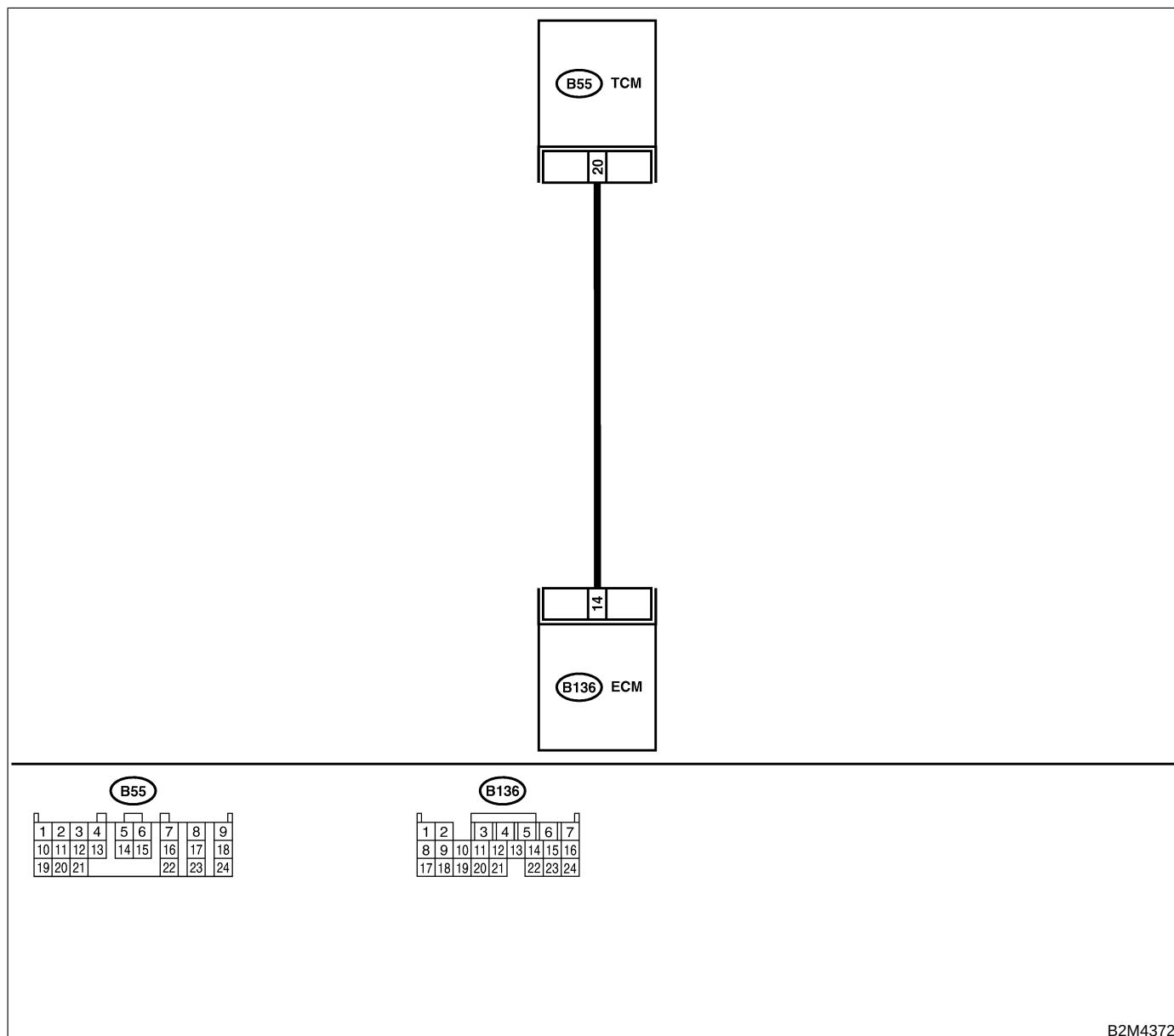
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK OUTPUT SIGNAL FROM ECM. 1) Start engine, and warm-up the engine. 2) Turn ignition switch to OFF. 3) Disconnect connector from TCM. 4) Turn ignition switch to ON. 5) Measure voltage between ECM and chassis ground. Connector & terminal (B136) No. 14 (+) — Chassis ground (-):	Is the voltage less than 3 V?	Go to step 2.	Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>
2	CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR. 1) Turn ignition switch to OFF. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B136) No. 14 (+) — Chassis ground (-):	Does the voltage change more than 10 V by shaking harness and connector of ECM while monitoring the value with voltage meter?	Repair battery short circuit in harness between ECM and TCM connector. After repair, replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>	Contact your Subaru distributor. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

**DM: DTC P1700 — THROTTLE POSITION SENSOR CIRCUIT MALFUNCTION
FOR AUTOMATIC TRANSMISSION —** S048521C28

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

● **TROUBLE SYMPTOM:**

- Shift point too high or too low; engine brake not effective in “3” range; excessive shift shock; excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check throttle position sensor circuit. <Ref. to AT-48 TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

MEMO:

**DN: DTC P1701 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION
FOR AUTOMATIC TRANSMISSION —** S048521C29

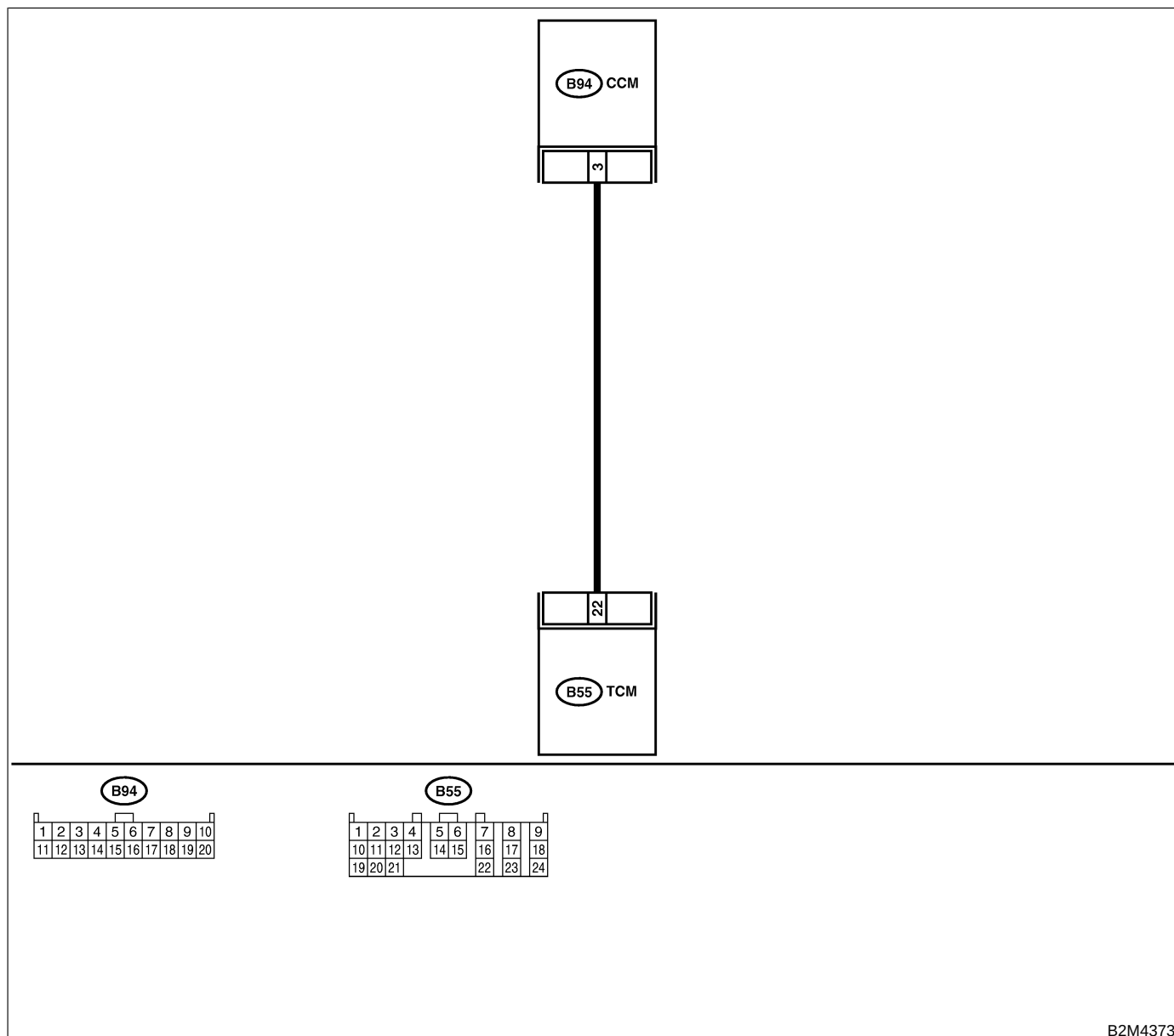
● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



B2M4373

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	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 (B55) No. 22 — (B94) No. 3:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between TCM and CCM connector.
2	CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 22 — Chassis ground:	Is the resistance less than 10 Ω ?	Repair short circuit in harness between TCM and CCM connector.	Go to step 3.
3	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) Move selector lever to "D" and slowly increase vehicle speed to 50 km/h (31 MPH). 6) Cruise control command switch to ON. 7) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 11 (+) — Chassis ground (-):	Is the resistance less than 1 V?	Go to step 4.	Check cruise control command switch circuit. <Ref. to CC-6 INSPECTION, Cruise Control Command Switch.>
4	CHECK POOR CONTACT. Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

**DO: DTC P1703 — LOW CLUTCH TIMING CONTROL SOLENOID VALVE
CIRCUIT MALFUNCTION —** S048521C31

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

NOTE:

Check low clutch timing control solenoid valve circuit. <Ref. to AT-82 TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>

MEMO:

**DP: DTC P1711 — ENGINE TORQUE CONTROL SIGNAL 1 CIRCUIT
MALFUNCTION** — S048521G17

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

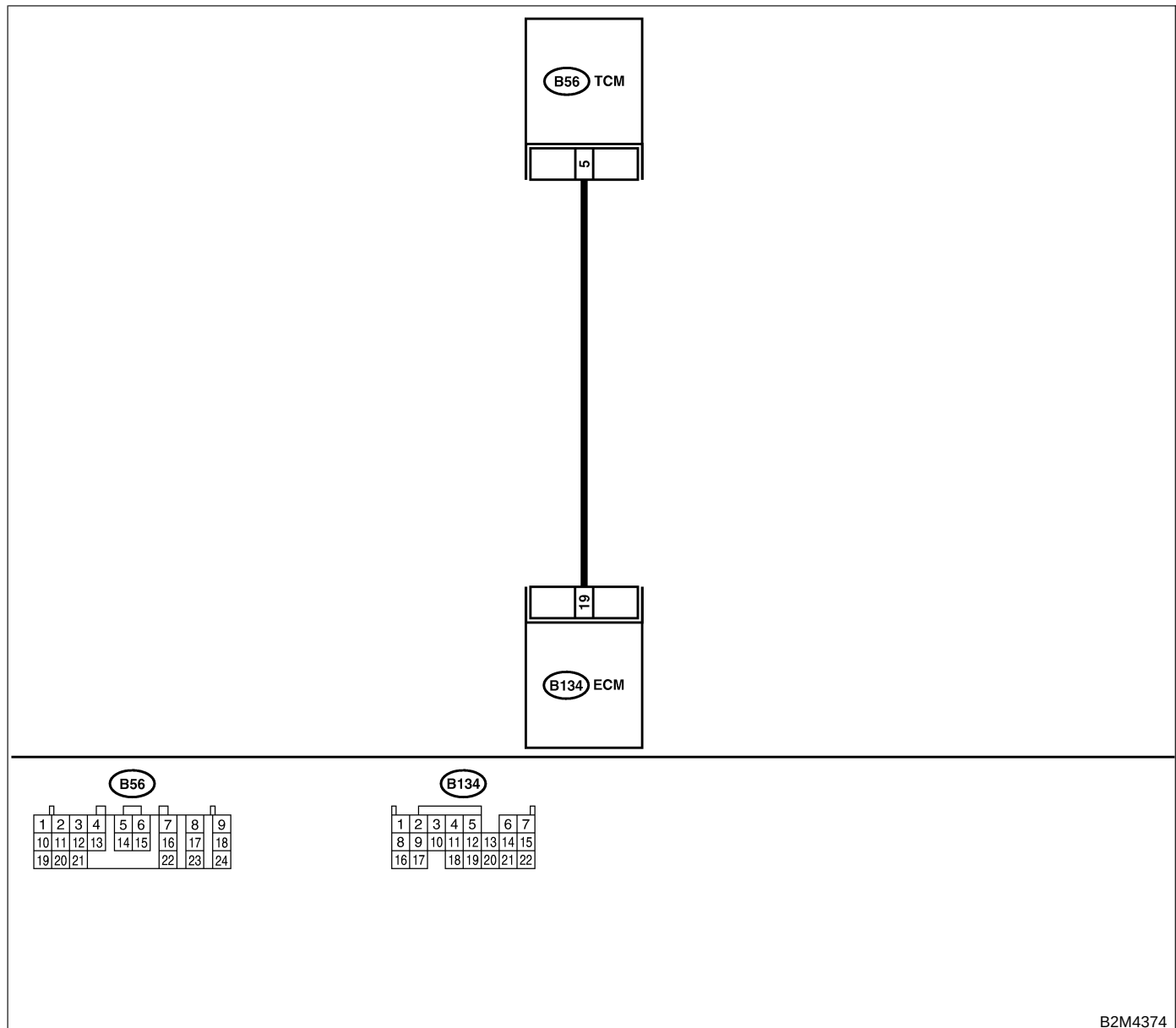
● **TROUBLE SYMPTOM:**

- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK INPUT SIGNAL FOR ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B135) No. 19 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 2.	Go to step 4.
2	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM and chassis ground. Connector & terminal (B135) No. 19 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector.	Go to step 3.
3	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>
4	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 (B135) No. 19 — (B54) No. 13:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair open circuit in harness between ECM and TCM connector.
5	CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B135) No. 19 — Chassis ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and TCM connector.	Go to step 6.
6	CHECK POOR CONTACT. Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

DQ: DTC P1712 — ENGINE TORQUE CONTROL SIGNAL 2 CIRCUIT MALFUNCTION — S048521G18

● **DTC DETECTING CONDITION:**

- Two consecutive driving cycles with fault

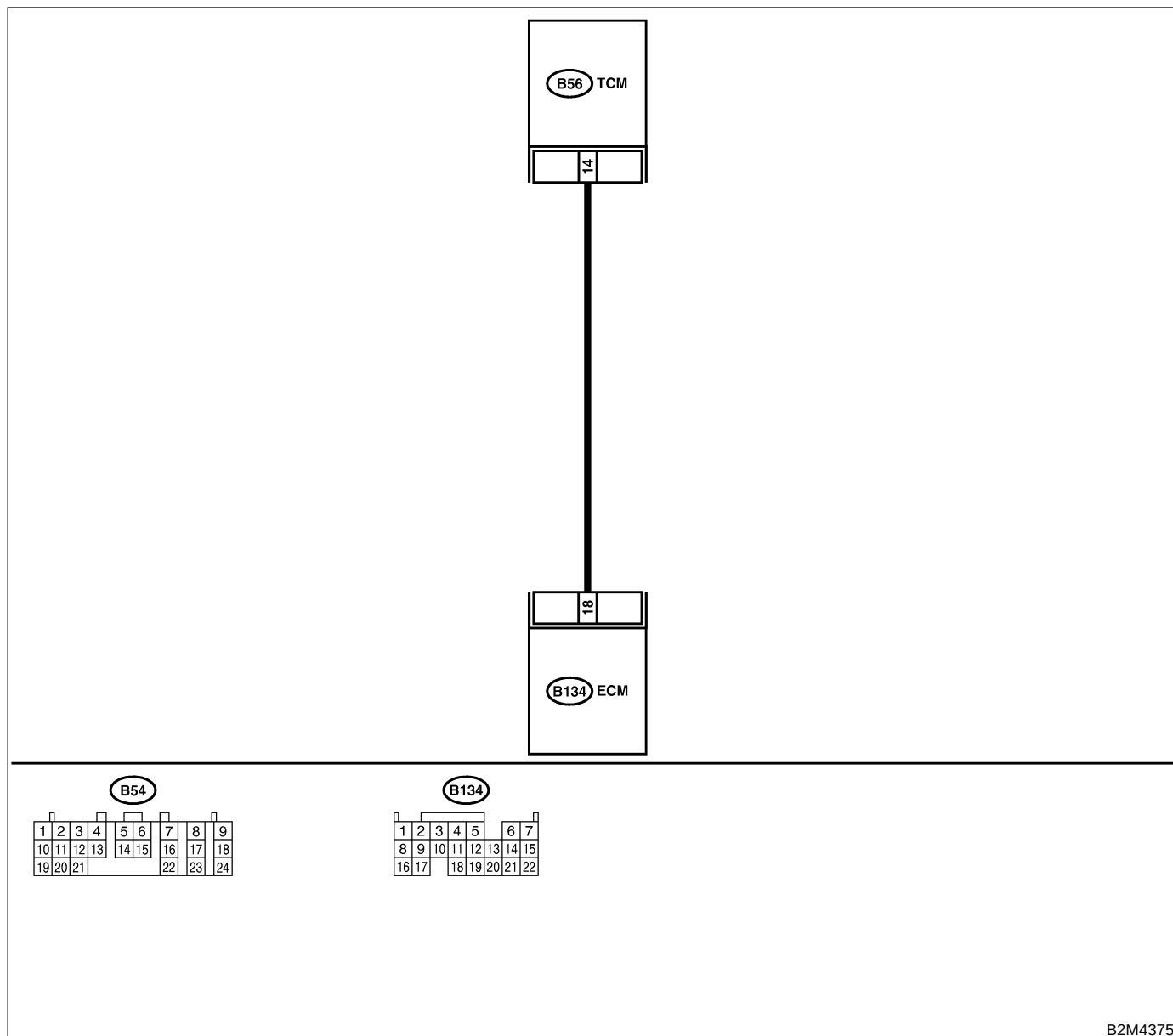
● **TROUBLE SYMPTOM:**

- Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6)-48 OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6)-45 OPERATION, Inspection Mode.>.

● **WIRING DIAGRAM:**



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Engine (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK INPUT SIGNAL FOR ECM. 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. Connector & terminal (B134) No. 18 (+) — Chassis ground (-):	Is the voltage more than 4.5 V?	Go to step 2.	Go to step 4.
2	CHECK INPUT SIGNAL FOR ECM. Measure voltage between ECM and chassis ground. Connector & terminal (B134) No. 18 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector.	Go to step 3.
3	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace ECM. <Ref. to FU(H6)-46, Engine Control Module.>
4	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 (B134) No. 18 — (B56) No. 4:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair open circuit in harness between ECM and TCM connector.
5	CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR. Measure resistance of harness between ECM and chassis ground. Connector & terminal (B134) No. 18 — Chassis ground:	Is the resistance less than 10 Ω ?	Repair ground short circuit in harness between ECM and TCM connector.	Go to step 6.
6	CHECK POOR CONTACT. Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

GENERAL DIAGNOSTIC TABLE

Engine (DIAGNOSTICS)

19. General Diagnostic Table

S048257

A: INSPECTION

S048257A10

1. ENGINE

S048257A1001

NOTE:

Malfunction of parts other than those listed is also possible. <Ref. to ME(H6)-80, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Idle air control solenoid valve 2) Intake manifold pressure sensor 3) Intake air temperature sensor 4) Intake air temperature and pressure sensor 5) Ignition parts (*1) 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) Fuel injection parts (*4) 10) EGR valve
2. Rough idling	1) Idle air control solenoid valve 2) Intake manifold pressure sensor 3) Intake air temperature sensor 4) Intake air temperature and pressure sensor 5) Engine coolant temperature sensor (*2) 6) Ignition parts (*1) 7) Air intake system (*5) 8) Fuel injection parts (*4) 9) Throttle position sensor 10) Crankshaft position sensor (*3) 11) Camshaft position sensor (*3) 12) Oxygen sensor 13) Fuel pump and fuel pump relay 14) EGR valve
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) Intake manifold pressure sensor 6) Intake air temperature sensor 7) Intake air temperature and pressure sensor 8) EGR valve
4. Poor acceleration	1) Intake manifold pressure sensor 2) Intake air temperature sensor 3) Intake air temperature and pressure sensor 4) Throttle position sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay 7) Engine coolant temperature sensor (*2) 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) A/C switch and A/C cut relay 11) Engine torque control signal circuit 12) Ignition parts (*1) 13) EGR valve

GENERAL DIAGNOSTIC TABLE

Engine (DIAGNOSTICS)

Symptom	Problem parts
5. Engine stalls or engine sags or hesitates at acceleration.	1) Intake manifold pressure sensor 2) Intake air temperature sensor 3) Intake air temperature and pressure sensor 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Purge control solenoid valve 8) Fuel injection parts (*4) 9) Throttle position sensor 10) Fuel pump and fuel pump relay 11) EGR valve
6. Surge	1) Intake manifold pressure sensor 2) Intake air temperature sensor 3) Intake air temperature and pressure sensor 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Fuel pump and fuel pump relay 10) EGR valve
7. Spark knock	1) Intake manifold pressure sensor 2) Intake air temperature sensor 3) Intake air temperature and pressure sensor 4) Engine coolant temperature sensor 5) Knock sensor 6) Fuel injection parts (*4) 7) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Intake manifold pressure sensor 2) Intake air temperature sensor 3) Intake air temperature and pressure sensor 4) Engine coolant temperature sensor (*2) 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor assembly 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.

2. AUTOMATIC TRANSMISSION S048257A1002

NOTE:

Check general diagnostics table with non-conformity symptom for automatic transmission. <Ref. to AT-2 Basic Diagnostic Procedure.>

GENERAL DIAGNOSTIC TABLE

Engine (DIAGNOSTICS)

MEMO: